

**GROB**



# G-SERIES

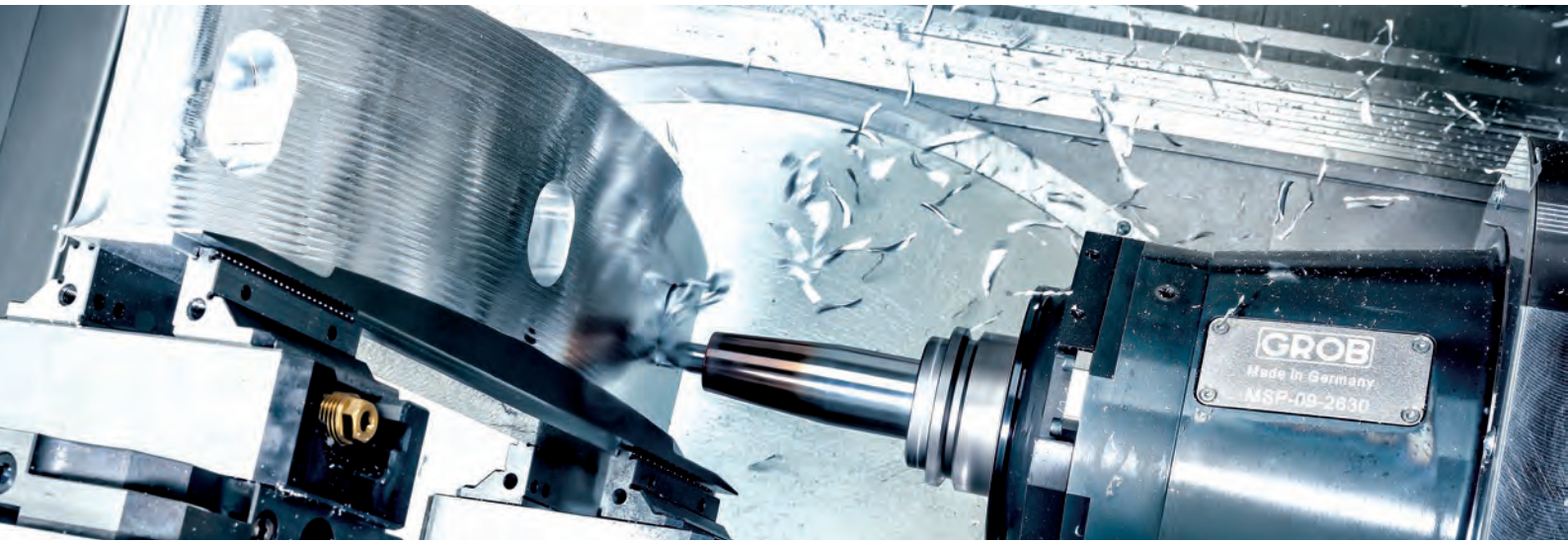
5-AXIS UNIVERSAL MACHINING CENTERS

**G350**  
Generation 2

**G550**  
Generation 2

**G750**  
Generation 1

# PURE TECHNOLOGY IN THE SMALLEST SPACE



## Our 5-axis universal machining centers

The G350, G550 and G750 5-axis universal machining centers offer all customers in the machining sector practically limitless possibilities for milling parts made of the most diverse materials. This universal machine series is set apart by **HIGH PRODUCTIVITY, OPTIMUM AVAILABILITY** and **EXCELLENT MAINTENANCE ACCESS**.

A compact design, maximum milling performance, high visibility and optimized work area access are just some of the outstanding machine features that make GROB a dependable partner for your production facility. Thanks to extensive configuration options, our machining centers can be perfectly matched to your requirements.

## Unique machine concept

### **HORIZONTAL SPINDLE POSITION**

The horizontal spindle position permits the longest possible Z-travel path and optimum chip fall.

### **MAXIMUM STABILITY**

The unique arrangement of the three linear axes minimizes the distance between the guides and the machining point (TCP), lending the machine considerable stability.

### **"TUNNEL" CONCEPT**

The "tunnel" concept provides the basis – even with extremely long tools – for being able to swivel and machine the largest possible component within the work area without collision.

### **LARGE SWIVEL RANGE**

Three linear and two rotary axes permit 5-sided machining, as well as 5-axis simultaneous interpolation. With a swivel range of 230° in the A'-axis and 360° in the B'-axis, the GROB machines offer the greatest possible positioning flexibility.

# One concept for a broad range of industries

No matter whether aerospace, mechanical engineering, die and mold industries, automotive, medical or energy technology – our 5-axis universal machining centers cover a convincingly broad range of possible applications and provide the optimum solution for just about any material. Moreover, the universal machining centers are designed for automation solutions and, depending on the customer's requirement, are also available as mill-turn machines in sizes G350T, G550T and G750T.

**Benefit from the process reliability, efficiency and durability of our machine concept.**



## AEROSPACE

Ideal for complex components where high cutting volumes have to be achieved



## MECHANICAL ENGINEERING

Individual machine configuration for optimized flexibility



## DIE AND MOLD INDUSTRIES

Optimal machining options of complex milling contours



## AUTOMOTIVE

Benefit from 90 years' experience in the automotive business



## MEDICAL TECHNOLOGY

Best guarantee for high surface qualities



## ENERGY TECHNOLOGY

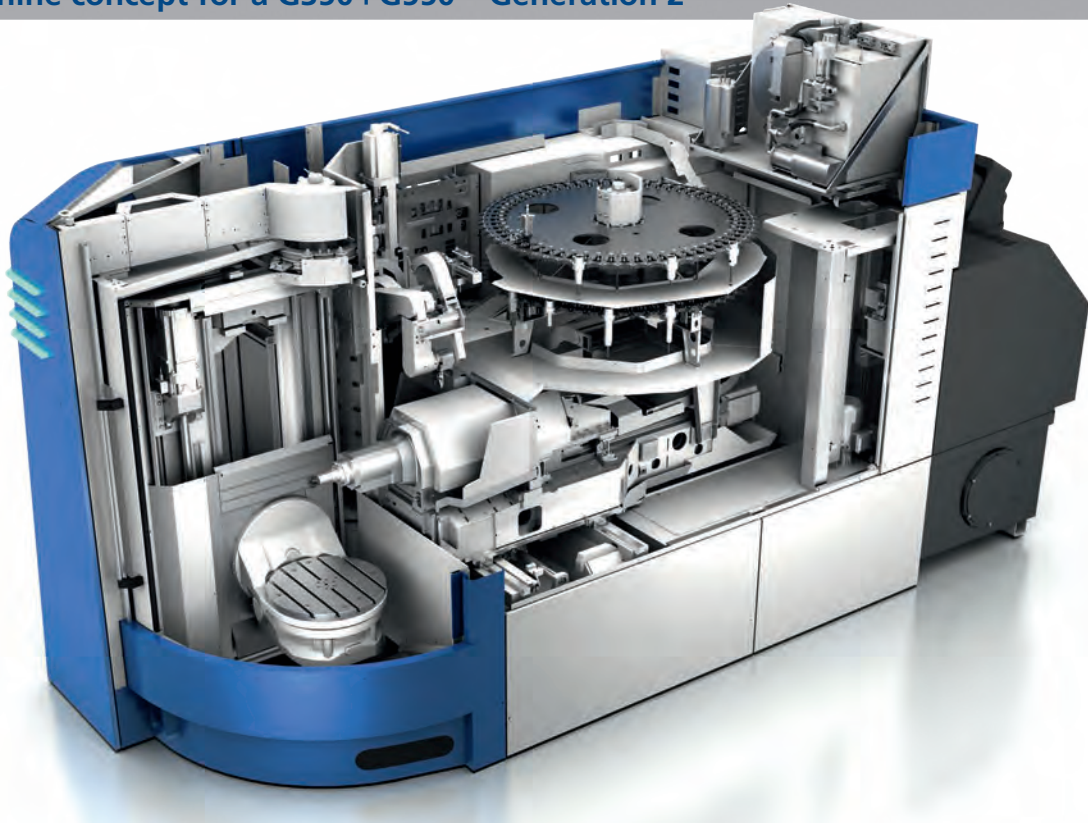
Precise machining results with outstanding machine stability

# MACHINE CONCEPT

## THE BENEFITS TO YOU at a glance

- ⊕ High productivity
- ⊕ Maintenance access
- ⊕ Optimized availability
- ⊕ Compact design

Machine concept for a G350 | G550 – Generation 2



### **HORIZONTAL 5-AXIS CONCEPT**

Three linear and two rotary axes permit 5-axis simultaneous machining

### **TILTING ROTARY TABLE**

Almost limitless machining options due to a largest possible swivel range

### **HORIZONTAL MOTORIZED SPINDLE**

For meeting the toughest cutting requirements

### **MACHINE BED**

Intrinsically stiff welded design for optimum machine rigidity

### **ABSOLUTE POSITION ENCODERS**

Including air purge seal in all linear and rotary axes

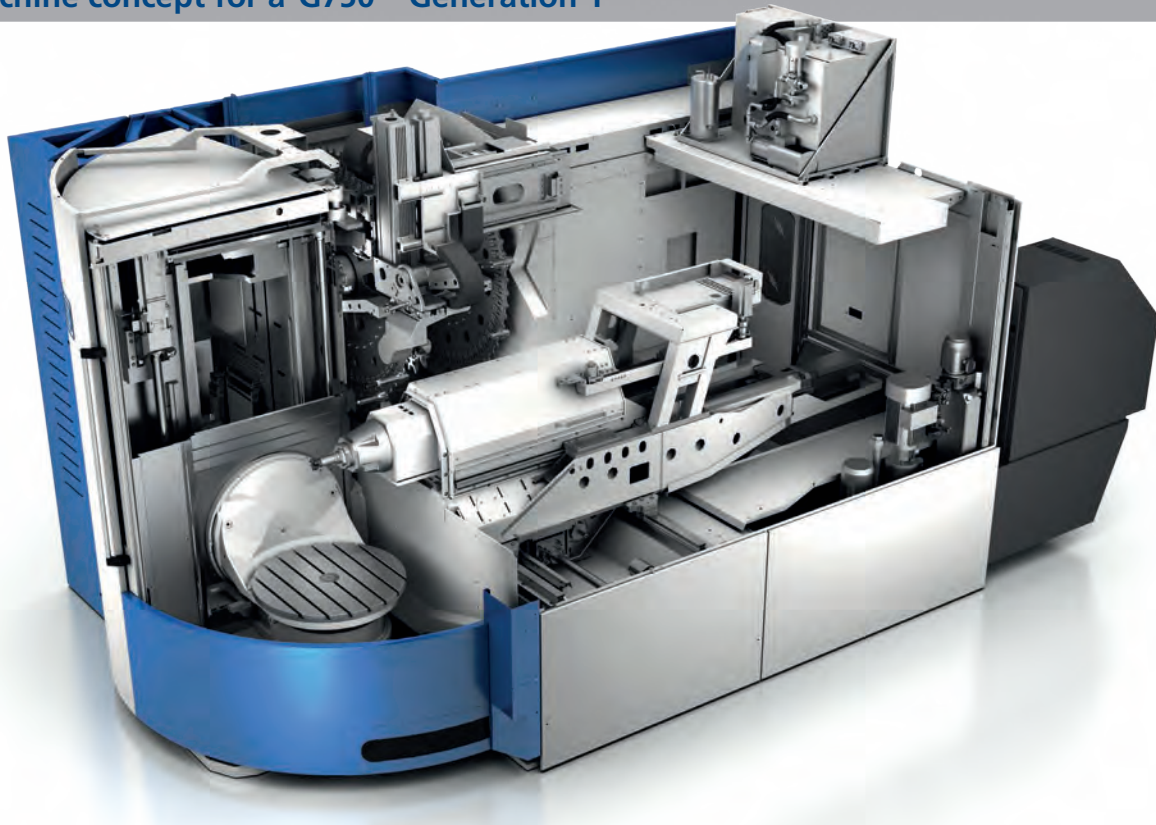
### **DISK-TYPE TOOL MAGAZINE**

Fast tool change through the intelligent arrangement of magazine to motorized spindle

Illustrations may contain options

- ⊕ High visibility
- ⊕ Optimum accessibility
- ⊕ Flexible applications
- ⊕ Round-the-clock service

### Machine concept for a G750 – Generation 1



#### CHIP DISPOSAL

Uninterrupted part machining with chip disposal by a scraper-type conveyor

#### FLUID CABINET

Optimized accessibility and maintenance access without machine stillstand

#### MAINTENANCE ACCESS

Large maintenance door for optimum access to the machine components

#### INTEGRATED CUTTING FLUID SYSTEM

Including internal cutting fluid supply (23 bar) and paper band filter

#### OVERHEAD MACHINING

Unique tilting rotary table concept allows free fall of chips

#### CONTROL SYSTEMS

Machine control systems from SIEMENS, (840D sl) HEIDENHAIN, TNC 640 or FANUC (30i-B) available

# MACHINE CONCEPT

## Maximum flexibility thanks to machining in every angular position

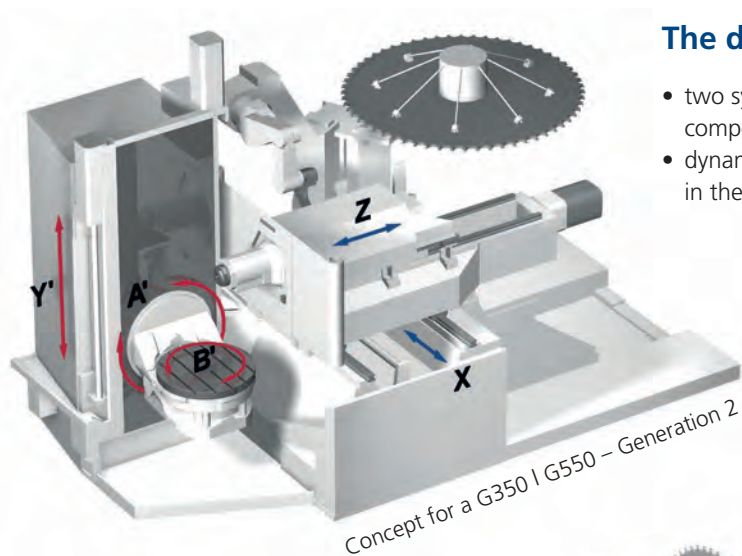
The machine's unique axis arrangement permits overhead machining, offering you almost limitless possibilities for part machining.





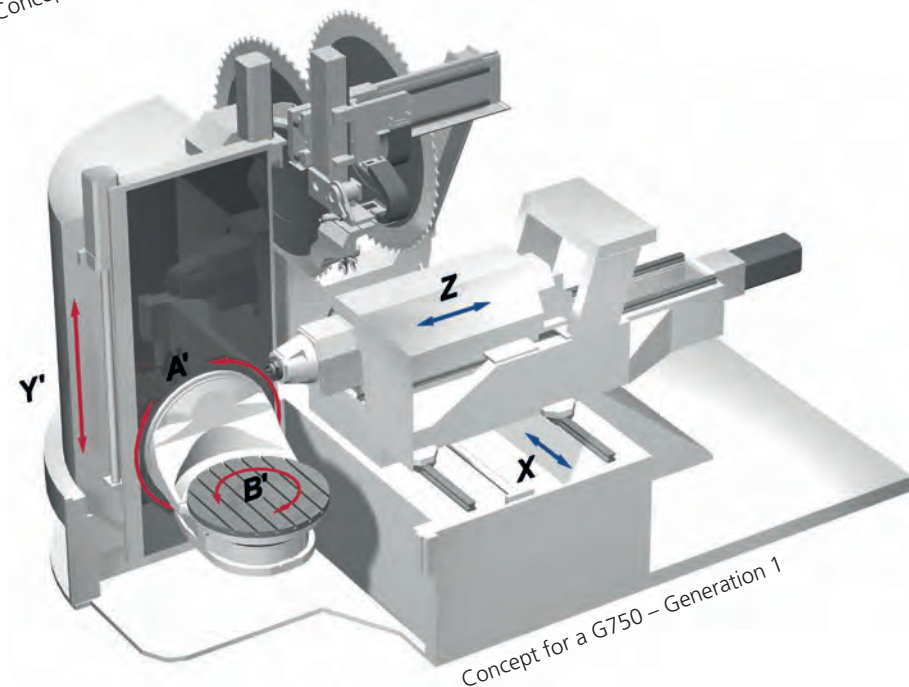
## Axis arrangement and drive concept

Three linear and two rotary axes permit 5-sided machining, as well as 5-axis simultaneous interpolation.



### The drive concept is based on

- two symmetrically arranged ball screws and a weight compensation function on G550 | G750 in the Y'-axis.
- dynamic, wear-free torque motors in the A'- and B'-axis.



## THE BENEFITS TO YOU

- ⊕ Optimally designed machining point (TCP) for extreme rigidity
- ⊕ Longest Z-travel path in this machine class
- ⊕ Extremely large swivel range of 230° in the A'-axis
- ⊕ Largest possible part in the work area can be machined with maximum tool length

# MACHINE CONCEPT

## Machining overhead and in other angular positions

Due to the slim spindle design and the extremely large swivel range of the A'-axis of  $-185^{\circ}$  to  $+45^{\circ}$ , the table can be positioned in various angular positions, including overhead, for optimum accessibility of the tool to the part.



## Optimal chip fall

Thanks to the unique axis arrangement with horizontal spindle bearing and a  $230^{\circ}$  A'-axis swivel range, chips fall directly into the chip shaft and the part remains largely free of interfering chip accumulations.



## THE BENEFITS TO YOU

- ⊕ No malfunctions due to chip remnants
- ⊕ No heat influx into the machine from chips left on part and clamping equipment
- ⊕ Simple cleaning of components ahead of the part change
- ⊕ No cutting fluid residues in the part

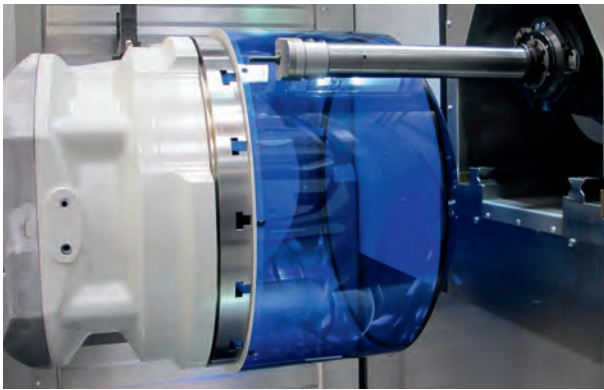




## Part machining with maximum tool length

Thanks to the special axis concept, the full tool length can be employed in any axis position, even with maximum part size. The "tunnel" concept allows the entire work area to be used, since the motorized spindle and tool can fully retract into the spindle shaft.

In special cases where the part is larger than the maximum part contours shown here, a machining operation is often made possible through re-clamping and a special axis arrangement.



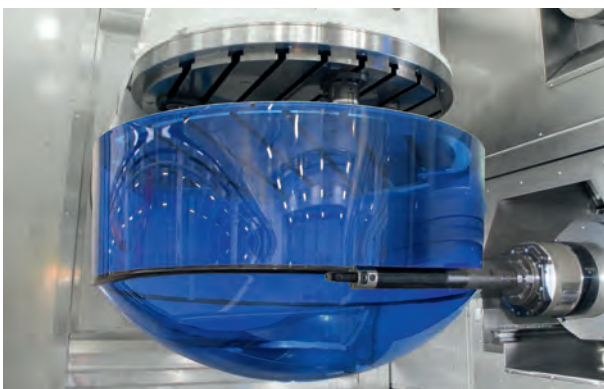
### G350 ▶ Max. tool length

Single disk-type tool magazine [mm]	HSK-A63 365
Double disk-type tool magazine (bottom/top/above both) [mm]	HSK-A63 365/180/550*



### G550 ▶ Max. tool length

Single disk-type tool magazine [mm]	HSK-A63 465
	HSK-A100 500
Double disk-type tool magazine (bottom/top/above both) [mm]	HSK-A63 465/280/700*
	HSK-A100 500/260/750*



### G750 ▶ Max. tool length

Single disk-type tool magazine [mm]	HSK-A63 650* (525)
Double disk-type tool magazine (front/rear) [mm]	HSK-A63 650* (525)/500
	HSK-A100 650* (590)/500

\*With restrictions in the work area

# MACHINE COMPONENTS

## Quality components and extensive functions included in the basic equipment

Motorized spindle and tool magazine form the heart of all universal machining centers. Designs optimally matched to the machine sizes can be individually combined to suit customer requirements.

**Motorized spindle**



**Disk-type tool magazine**



**Work area flushing and lighting**



**Internal cutting fluid supply (23 bar)**





## Centralization of all maintenance-relevant machine components

The central, ergonomic arrangement of the machine components guarantees optimal accessibility to fluid cabinet and electrical cabinet as well as easy access for preventive maintenance and inspection.

Electrical cabinet



Fluid cabinet



Chip disposal and integrated cutting fluid system



Machine cooling unit



Illustrations may contain options

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# MACHINE COMPONENTS

## Diverse machining options with powerful tilting rotary tables

Various tilting rotary table versions to choose from, depending on requirements. The powerful rotary tables are based on the latest torque motor technology and offer optimized dynamics.

### Tilting rotary table A'-/B'-axis



#### Axis arrangement

In addition to the standard versions with A'- and B'-axis, the "A'-axis" (without B'-axis) and "B'-axis" (without A'-axis) options are offered for all three machine sizes G350, G550 and G750.

#### General technical data on the tilting rotary table A'-/B'-axis

	G350	G550	G750
Swiveling angle A'-axis [°]	-185/+45	-185/+45	-180/+45
Max. speed A'-axis [rpm]	35	25	20
Type of drive A'-/B'-axis	Torque motor	Torque motor	Torque motor
Angle of rotation B'-axis [°]	n x 360	n x 360	n x 360
Max. speed B'-axis [rpm]	50	50	50

#### 1 Tilting rotary table with T-slots arranged in parallel (standard)





	G350	G550	G750
Aligning slot (number/width/quality)	1 x 14 H7	1 x 14 H7	1 x 18 H7
Clamping slot (number/width/quality)	4 x 14 H12	6 x 14 H12	8 x 18 H12
Table diameter [mm]	570	770	950
Interference diameter [mm]*	720	900	1,280
Max. permissible loading weight incl. clamping fixture [kg]	400	800	1,500

#### 2 Tilting rotary table with pallet clamping system (option)

	G350	G550	G750
Pallet size [mm]	400x400	630x630	800x800
Max. pallet load [kg]	338	700	1,000

\*Maximum part size with restrictions on machines with pallet changer



Other tilting rotary table versions for machine size G350 (options)				
Table versions	Highly dynamic rotary table	Vario rotary table versions		
Figures				
Table designations	<b>Rotary table with pallet clamping system</b>	<b>Basic module</b>	<b>Steady rest with tailstock center</b>	<b>Steady rest with tandem drive</b>
General application cases	For high-efficiency machining of large parts using short tools	For machining long, thin components such as turbine blades or tools, for example		
Table diameter [mm]	—	200	200	200
Interference diameter [mm]	600	300	300	280
Swiveling angle A'-axis [°]	-225/+135	-185/+45	-185/+45	-45/+45
Angle of rotation B'-axis [°]	n x 360	n x 360	n x 360	n x 360
Max. speed B'-axis [rpm]	200	200	200	200
Pallet size [mm]	Ø 320/350 x 350	—	—	—
Distance between centers* [mm]	—	—	485	—
Maximum loading weight [kg]	250 on pallet	230	230	230
Special features	Pallet clamping system for round or square pallets; ideal for automating the part flow	Designed for the modular construction of various steady rests and drives	For stable parts, e.g. rotor blades, or tools of up to 300 mm in length; max. steady rest stroke 195 mm	Max. distance between the top edges of the rotary table 470 mm, max. steady rest stroke 195 mm



#### Motorized spindle has optimized access to part

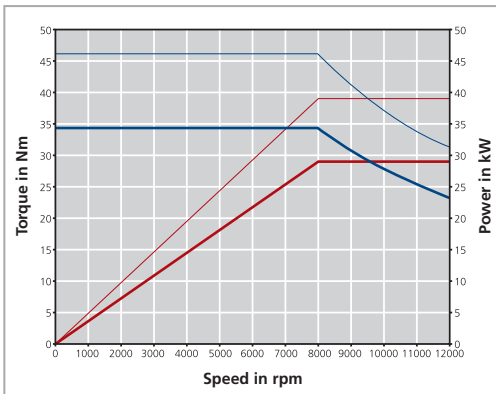
An optimum swivel range is achieved thanks to the compact designs of the highly dynamic rotary table and the Vario rotary table versions being matched to the motorized spindle contour. Consequently, it is possible to use significantly shorter tools with smaller Z-travel paths for greater stability, accuracy and more efficient part machining.

\* Measured from the top edge of the table to the tip of the steady rest

## GROB motorized spindles

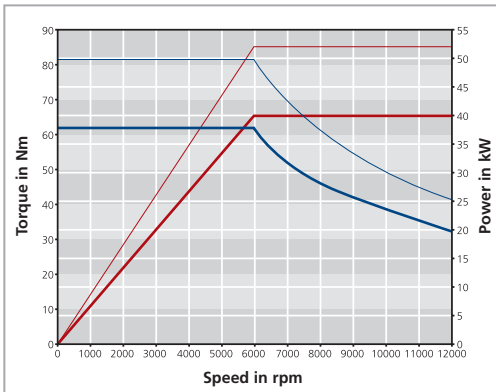
Besides the broad range of spindles, the motorized spindles designed and produced by GROB itself are the preferred choice for optimized process design. These are optimally matched to the G-modules and have optimized quality features:

- Shortest ramp-up times
- Good accessibility & maintenance
- Suitable for all standard cutting fluids
- Universal applicability
- Best mechanical characteristics
- Durability



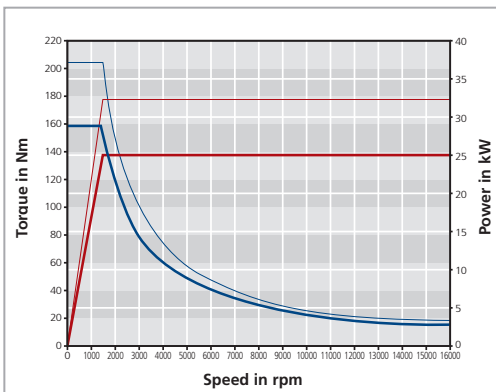
### Motorized spindle 47 Nm, 12,000 rpm (standard)

Tool interface	HSK-A63
Spindle bearing Diameter at front bearing [mm]	70
Speed $n_{max}$ [rpm]	12,000
Max. drive power at 100%/40% duty cycle [kW]	29/39
Max. spindle torque at 100%/40% duty cycle [Nm]	34.6/46.6



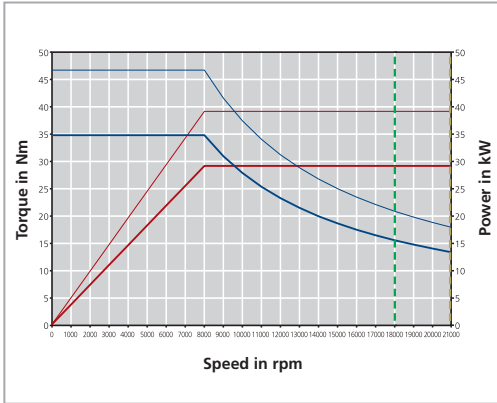
### Motorized spindle 83 Nm, 12,000 rpm

Tool interface	HSK-A63
Spindle bearing Diameter at front bearing [mm]	70
Speed $n_{max}$ [rpm]	12,000
Max. drive power at 100%/40% duty cycle [kW]	40/52
Max. spindle torque at 100%/40% duty cycle [Nm]	63.7/82.8



### Motorized spindle 206 Nm, 16,000 rpm

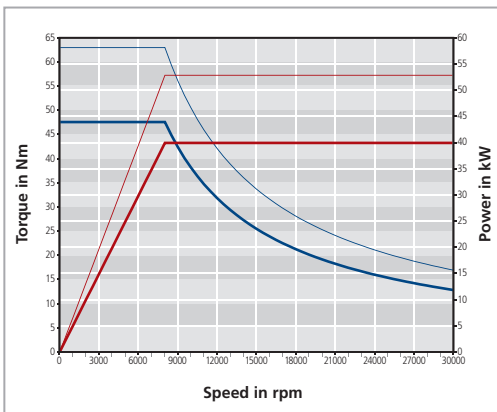
Tool interface	HSK-A63
Spindle bearing Diameter at front bearing [mm]	80
Speed $n_{max}$ [rpm]	16,000
Max. drive power at 100%/40% duty cycle [kW]	25/32
Max. spindle torque at 100%/40% duty cycle [Nm]	159/206



--- n<sub>max</sub> = 18,000 --- n<sub>max</sub> = 21,000

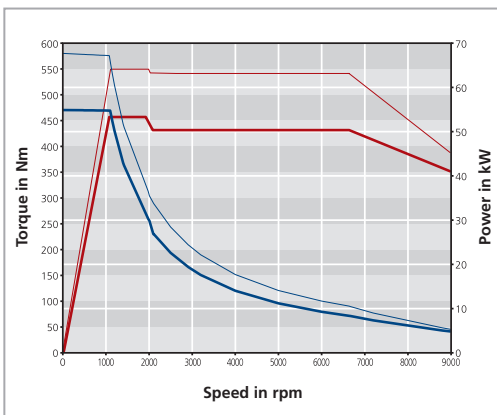
### Motorized spindle 47 Nm, 18,000 / 21,000 rpm

Tool interface	HSK-A63
Spindle bearing Diameter at front bearing [mm]	70
Speed n <sub>max</sub> [rpm]	18,000 21,000
Max. drive power at 100% / 40% duty cycle [kW]	29/39
Max. spindle torque at 100% / 40% duty cycle [Nm]	34.6/46.6



### Motorized spindle 63 Nm, 30,000 rpm

Tool interface	HSK-A63
Spindle bearing Diameter at front bearing [mm]	65
Speed n <sub>max</sub> [rpm]	30,000
Max. drive power at 100% / 40% duty cycle [kW]	40/53
Max. spindle torque at 100% / 40% duty cycle [Nm]	48/63

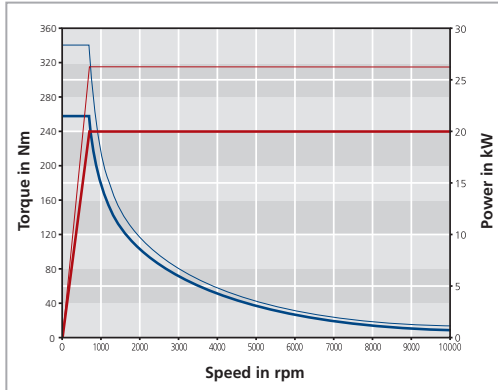


### Motorized spindle 575 Nm, 9,000 rpm

Tool interface	HSK-A100
Spindle bearing Diameter at front bearing [mm]	110
Speed n <sub>max</sub> [rpm]	9,000
Max. drive power at 100% / 40% duty cycle [kW]	54/65
Max. spindle torque at 100% / 40% duty cycle [Nm]	470/575

— power S1: 100% duty cycle — power S6: 40% duty cycle — torque S1: 100% duty cycle — torque S6: 40% duty cycle

# MACHINE COMPONENTS



Motorized spindle 340 Nm, 10,000 rpm	
Tool interface	HSK-A100
Spindle bearing Diameter at front bearing [mm]	100
Speed $n_{max}$ [rpm]	10,000
Max. drive power at 100%/40% duty cycle [kW]	20/26
Max. spindle torque at 100%/40% duty cycle [Nm]	262/340

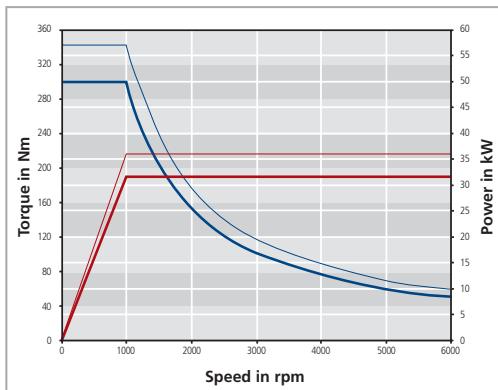
## Motorized spindle with cross-feed

GROB motorized spindles with cross-feed allow complex internal and external contours to be manufactured with feed-out tools.



### THE BENEFITS TO YOU

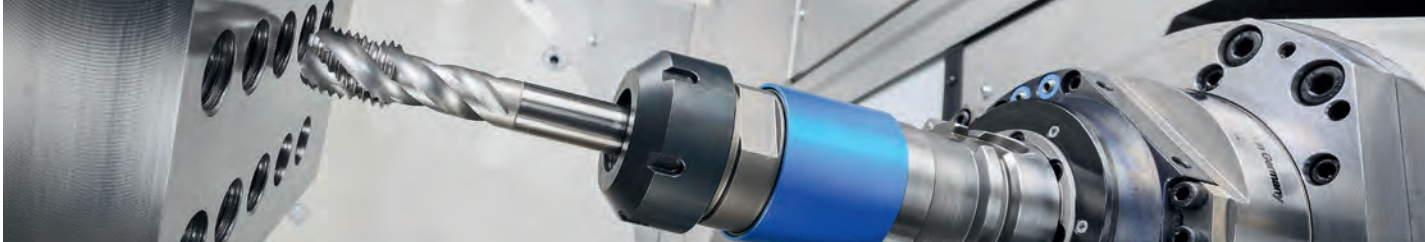
- ⊕ High system rigidity
- ⊕ No additional interference contour on the motorized spindle
- ⊕ No referencing required
- ⊕ Higher cutting speeds during contour machining
- ⊕ Low tool costs



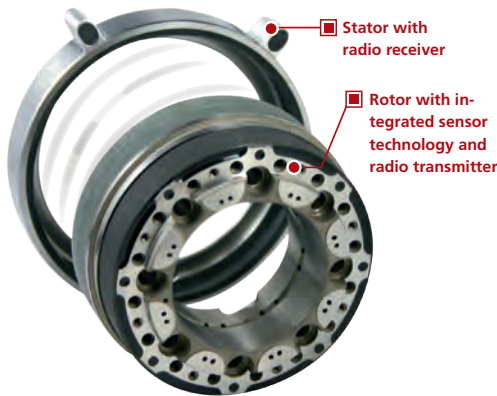
Motorized spindle 344 Nm, 6,000 rpm	
Tool interface	HSK-A100
Spindle bearing Diameter at front bearing [mm]	100
Speed $n_{max}$ [rpm]	6,000
Max. drive power at 100%/40% duty cycle [kW]	31.5/36
Max. spindle torque at 100%/40% duty cycle [Nm]	301/344
Spindle drive	synchronous motor
Control bar stroke (axial) [mm]	40
Control bar lock	bayonet
Tool release unit	hydraulic-free



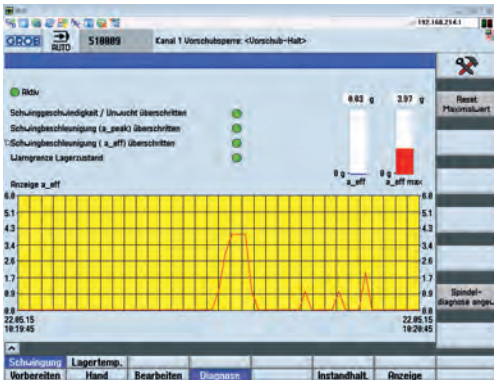




## Spindle options



Detailed information on request



### GROB Chip-in-Spindle Detection System (SiS)

This system is able to detect at an early stage tool clamping faults caused by chips between the HSK plain surface and the spindle nose from 10 µm.

#### THE BENEFITS TO YOU

- ⊕ Reject components and radial runout avoided
- ⊕ Damage caused by machining faults prevented
- ⊕ Optimized machining process
- ⊕ Protection of tool and motorized spindle
- ⊕ Higher degree of process stability

### GROB Spindle Diagnostics (GSD)

GROB spindle diagnostics is a system that automatically monitors the condition of the motorized spindle (Condition Monitoring).

#### THE BENEFITS TO YOU

- ⊕ Service life of the motorized spindle extended through identification of critical operating states
- ⊕ Process optimization / reduction of tool wear
- ⊕ Machine downtimes avoided through scheduled maintenance

### SPINDLE TYPE ◀ ▶ MACHINE • AVAILABILITY AT A GLANCE !

Tool interface* for short hollow taper tools acc. to ISO 12164-1	HSK- A63	HSK- A63	HSK- A63	HSK- A63	HSK- A63	HSK- A63	HSK- A100	HSK- A100	HSK- A100**
<b>Spindle bearing</b> Diameter at front bearing [mm]	70	70	80	70	70	65	110	100	100
Speed n <sub>max</sub> [rpm]	12,000	12,000	16,000	18,000	21,000	30,000	9,000	10,000	6,000
Max. drive power at 100%/40% duty cycle [kW]	29/39	40/52	25/32	29/39	29/39	40/53	54/65	20/26	31.5/36
Max. spindle torque at 100%/40% duty cycle [Nm]	34.6/46.6	63.7/82.8	159/206	34.6/46.6	34.6/46.6	48/63	470/575	262/340	301/344
Spindle bearing lubrication									
▶ Lifetime grease lubrication	●	●	●	●	—	—	●	●	●
▶ Oil/air lubrication	—	—	●	—	●	●	—	—	—
<b>G350</b>	●	●	●	●	●	●	—	—	—
<b>G550</b>	●	●	●	●	●	●	●	●	● ***
<b>G750</b>	●	●	●	●	●	●	●	●	● ***

\* Optional tool interfaces on request

\*\* Motorized spindle with cross-feed

\*\*\*In combination with a SIEMENS machine control system

## Tool magazine – diverse combinations

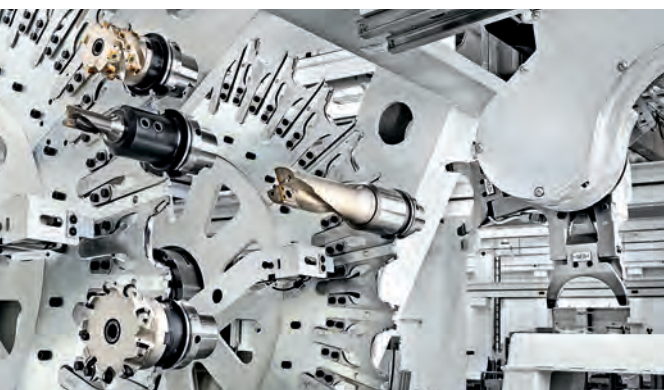
GROB tool magazine technology is set apart by fast chip-to-chip times, a small space requirement and optimized accessibility.



Example of G350 – Generation 2

### Single disk-type tool magazine

- Tool change via highly dynamic tool changer arm with swiveling double gripper
- Loading/unloading during the machining operation
- Magazine tool disk can be accessed at any time
- An imminent tool change starts as soon as the tool magazine door is closed
- Horizontal magazine disk arrangement on G350 and G550
- Vertical magazine disk arrangement on G750



Example of G750 – Generation 1

### Double disk-type tool magazine

- Tool change via highly dynamic tool changer arm with swiveling double gripper
- Loading/unloading during the machining operation
- Tool magazine disks can be accessed at any time
- An imminent tool change starts as soon as the tool magazine door is closed
- Horizontally stacked magazine disks on G350 and G550 (disks coupled)
- Vertically adjacent magazine disks on G750 (disks can be rotated individually)

### DISK-TYPE TOOL MAGAZINE ◀ ▶ MACHINE • AVAILABILITY AT A GLANCE !

	Single disk-type tool magazine				Double disk-type tool magazine								
Tool interface*	HSK-A63	HSK-A63	HSK-A63	HSK-A100	HSK-A63	HSK-A63	HSK-A63	HSK-A63	HSK-A63	HSK-A100	HSK-A100	HSK-A100	
Disk arrangement	horiz.	horiz.	vert.	horiz.	horiz.	horiz.	horiz.	horiz.	horiz.	vert.	horiz.	horiz.	vert.
Number of tool pockets	60	70	60	40	117	105**	137	126 **	120	77	69 **	60	
G350	●	—	—	—	●	●	—	—	—	—	—	—	
G550	—	●	—	●	—	—	●	●	—	●	●	—	
G750	—	—	●	—	—	—	—	—	●	—	—	●	

\*Optional tool interfaces on request

\*\*With tool pockets for oversize tools



### Additional tool magazine TM (option)

The additional tool magazine increases the tool capacity of the basic machine.

- Block-wise setup of up to six HSK-A63 tools on TM200, TM309 and TM374 and up to five HSK-A100 tools on TM180 and TM251
- Additional tool magazine equipped with tools during the machining operation
- If the tool intended for the next machining operation is already in the disk-type tool magazine of the basic machine, the machining time is not impaired
- Tool and magazine management via an industrial control system (Beckhoff-TwinCAT) with screen and keyboard

NUMBER OF TOOL POCKETS ▶ G350								
Basic machine			Additional tool magazine TM					
Motorized spindle	Tool interface	Number of tool pockets	Total number of tools of the basic machine and the TM					
<b>Single disk-type tool magazine</b>			<b>TM200</b>	<b>TM309</b>	<b>TM374</b>			
For all spindle types	HSK-A63	60	251	360	425			
<b>Double disk-type tool magazine</b>			<b>TM200</b>	<b>TM309</b>	<b>TM374</b>			
For all spindle types	HSK-A63	117	311	420	485			
	HSK-A63	105*	293	402	467			
NUMBER OF TOOL POCKETS ▶ G550								
<b>Single disk-type tool magazine</b>			<b>TM200</b>	<b>TM309</b>	<b>TM374</b>	<b>TM180</b>	<b>TM251</b>	
For all spindle types	HSK-A63	70	261	370	435	—	—	
	HSK-A100	40	—	—	—	211	282	
<b>Double disk-type tool magazine</b>			<b>TM200</b>	<b>TM309</b>	<b>TM374</b>	<b>TM180</b>	<b>TM251</b>	
For all spindle types	HSK-A63	137	331	440	505	—	—	
	HSK-A63	126*	317	426	491	—	—	
	HSK-A100	77	—	—	—	251	322	
	HSK-A100	69*	—	—	—	243	314	
NUMBER OF TOOL POCKETS ▶ G750								
			With SIEMENS control system			With HEIDENHAIN or FANUC control system		
<b>Single disk-type tool magazine</b>			<b>TM167</b>	<b>TM218</b>	<b>TM145</b>	<b>TM167</b>	<b>TM218</b>	<b>TM145</b>
12,000/16,000/18,000/30,000 rpm	HSK-A63	60	221	272	—	218	269	—
<b>Double disk-type tool magazine</b>			<b>TM167</b>	<b>TM218</b>	<b>TM145</b>	<b>TM167</b>	<b>TM218</b>	<b>TM145</b>
12,000/16,000/18,000/30,000 rpm	HSK-A63	120	281	332	—	278	329	—
9,000/10,000 rpm	HSK-A100	60	—	—	200	—	—	196

\* Facility to store extra-long tools over both magazine disks due to double assignment

# MACHINE COMPONENTS

## GROB<sup>4</sup>Pilot – Your powerful machine control panel

The innovative GROB<sup>4</sup>Pilot machine control panel offers the machine operator a convenient working environment on the machine through a multi-functional user interface. The entire production process – from the CAD model through to the NC simulation – is now digitally mapped on the GROB<sup>4</sup>Pilot control system itself.



### FEATURES

- 3D display of parts and their clampings
- Reading out of dimensions or product characteristics (PMI) directly from the 3D model
- Touch keyboard within the display
- HTML5-compliant web browser
- Custom user interface
- Activation of remote maintenance via switch

### THE BENEFITS TO YOU

- + Enhanced user comfort with simplified and intuitive machine operation
- + CAD/CAM programming directly on the machine itself
- + Access to the GROB-NET<sup>4</sup>Industry platform
- + Expanded applications for increased efficiency
- + Permits paperless production
- + Time saving by use of applications parallel to machine operation

HARDWARE	SOFTWARE
<ul style="list-style-type: none"> <li>• 24" multi-touch display</li> <li>• Illuminated keys with innovative color feedback system</li> <li>• Trackball with three keys for controlling the mouse</li> <li>• 3D SpaceMouse®</li> <li>• Two USB interfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated CAD/CAM system</li> <li>• Simulation viewer</li> <li>• High connectivity of web browser and PDF viewer</li> <li>• Digital operating/programming instructions</li> </ul>

Example illustration



## Your GROB<sup>4</sup>Pilot Advanced Package (option)

### Multi-functional override rotary switch



#### Integrated start/stop function

NC start by pulling and NC stop by pushing the feed override rotary switch.

- ⊕ Allows the operator to concentrate fully on the process



#### Vibration feedback

Short vibration of the feed override rotary switch at 100 %.

- ⊕ Information communicated without the operator having to change the point of focus



#### Rapid travel single block

Single block stop only if a rapid travel movement follows a feed motion.

Critical movement enabled only from the 0 % position of the feed override rotary switch.

- ⊕ Time-saving running-in of non-critical program passages; maximum protection in critical situations via stop



#### Rapid travel reduction

Activation of rapid travel speed reduction to a preset % value at the touch of a button without program reset.

- ⊕ Intuitive application and increased safety during run-in



Feed override rotary switch

Joystick for axis movement

### Joystick for axis movement

Axis direction and axis speed can be intuitively controlled with just one input device.

- ⊕ Axis direction keys can not be confused



### AVAILABLE CNC CONTROL PROVIDERS FOR GROB<sup>4</sup>Pilot

	SIEMENS 840D sl	HEIDENHAIN TNC 640	FANUC 30i-B
G350	•	•	—
G550	•	•	—
G750	—	—	—

# ACCESSORIES



## High-pressure cutting fluid system

### High-pressure cutting fluid pump

A **23 bar high-pressure cutting fluid pump** with on/off functionality is integrated in the standard version for generating the cutting fluid high pressure. To meet higher pressure requirements, high-pressure cutting fluid pumps with the following infinitely variable pressure ranges can be selected:

**5–40 bar | 10–80 bar** (Mounted on the cutting fluid tank)

### Cooling unit for cutting fluid

External continuous cooler for cooling the cutting fluid

- ▶ Available for all three high-pressure cutting fluid systems
- ▶ The cooling unit is recommended for the 10–80 bar variant



## Decentralized work area extraction system

An emulsion mist separator with the following components is available for keeping the work area clean:

- Integrated pre-separator stage (G350 and G550 only)
- Regenerative filtration stage
- Integrated post-filter stage

The adjustable suction power is optimally modified to the particular machine status (cutting, tool/part change).

### Adjustable suction power

**G350** ▶ 800 m<sup>3</sup>/h

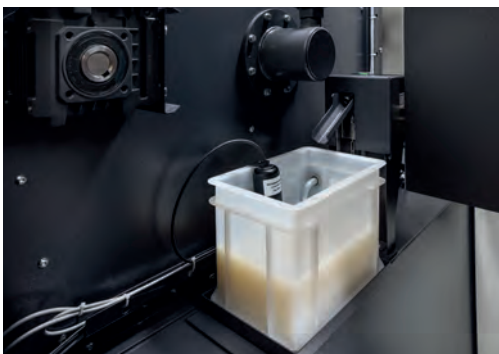
Mounted in an easily accessible place in the machine maintenance area

**G550** ▶ 800 m<sup>3</sup>/h

Mounted in an easily accessible place at the rear of the machine roof

**G750** ▶ 2,000 m<sup>3</sup>/h

Mounted in an easily accessible place at the rear of the machine roof



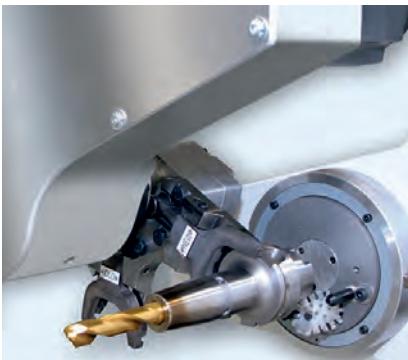
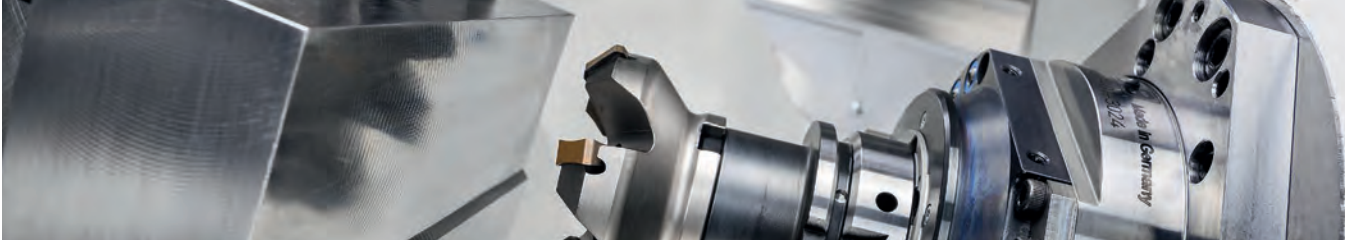
## Oil skimmer

The oil skimmer is used to remove hydraulic and/or lubricating oil from the cutting fluid surface. This keeps the cutting fluid as clean as possible.

Included components:

- Belt drive
- Wiper
- Collecting vessel with level switch

Mounted to the cutting fluid tank



### Tool cleaning device

- Brushing and air cleaning of the conical and flat surfaces of the tool interface during the machining operation
- Combined, GROB-patented brushing/blow-off device

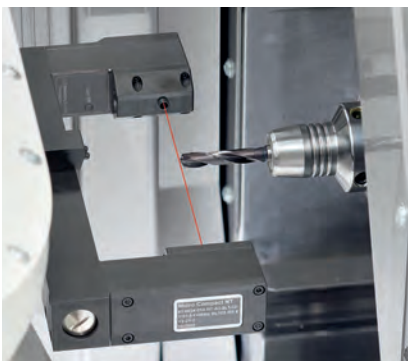
Mounted to tool magazine



### Tool coding

- Allows data to flow between tool and machine control system
- Shorter tooling times
- Write-read unit for tools with tool coding
- Errors when entering the tool data are avoided

Mounted to the tool insert location



### Laser measurement system for milling tools

- Contactless, optical tool monitoring/measurement of rotating tools (e.g. milling cutters, drills)
- Measurement and monitoring of the following tool parameters:
  - ▶ Tool length, tool diameter, tool breakage, tool wear, tool cutting edge status

Mounted to tilting rotary table



### Electromechanical tool breakage detection device

- Tool breakage detection via a tactile tool breakage detection device
- Monitoring during machining
- Tool breakage detection possible from a length of 100 mm

Mounted in the tool magazine at the tool transfer point, between motorized spindle and tool magazine disk

# ACCESSORIES

## Available hand-held controllers

### General equipment:

Keys for selecting the axis directions, feed, rapid travel, emergency stop and for acknowledging axis movements

#### SIEMENS Hand-held controller



Additional option for tool data input by connecting the controller to the tool loading station

#### HEIDENHAIN electronic handwheel



Compact controller for a high degree of flexibility during setting up and tooling work (incl. electronic handwheel)

#### FANUC hand-held controller HMO Panel



Compact controller for a high degree of flexibility during setting up and tooling work (incl. electronic handwheel)



## Machine status light

A three-color light is used to visually indicate the machine status. A distinction is drawn between automatic mode (green), warning (yellow) and malfunction (red).

Available either as a stacked light pole or integrated into the machine enclosure.



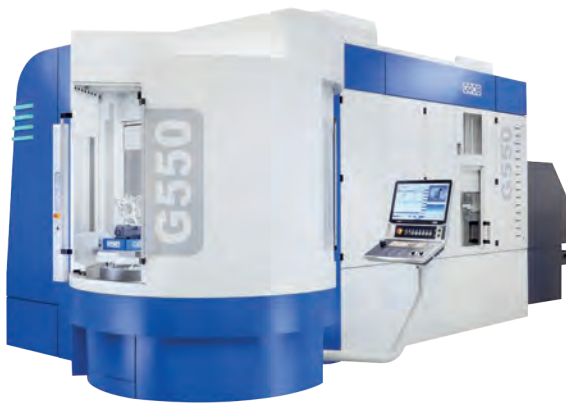
## Touch probe

- Broad range of applications:
  - Aligning and measuring parts or clamping fixtures; setting zero and reference points for downstream machining;
  - machine kinematics measurement (optional)
- Touch probe including data transmission with infrared or radio
- Non-machining time for tooling and measuring reduced
- Higher achievable part accuracy



## Pallet changer system

Improved productivity through retooling during part machining by means of a double pallet changer system.



### Functional principle of the double pallet changer system

- Pallets are interchanged between setup station and work area of the machine by means of a rotating pallet changer.
- The pallets are clamped on the rotary table and setup station of the machine by a pallet clamping system built into the machine table.
- A high degree of process reliability is guaranteed by an integrated seating check system and by flushing the zero point clamping system during the pallet change sequence.

### Pallet design

The standard pallet has a grid hole pattern on the top. A pallet surface with T-slots is also available as an option.



### THE BENEFITS TO YOU

- ⊕ Retooling or loading and unloading of the parts to the machine setup station during the machining operation
- ⊕ Double pallet changer system compactly integrated into the machine
- ⊕ Optimized access to the rotatable and lockable setup station
- ⊕ Fast exchange of pallets between work area and setup station
- ⊕ Seating check system for the pallets already included in the pallet changer system
- ⊕ Wide-opening setup station doors with crane loading capability

### PALLET CHANGER SYSTEM ◀ ▶ MACHINE • AVAILABILITY AT A GLANCE !

	Pallet size [mm]	Pallet surface with grid hole pattern [mm]	Pallet surface with T-slots [mm]	Maximum pallet load [kg]	Pallet change time [s]*
<b>G350</b>	400 x 400	Thread M12; grid 50	Width 14; spacing 50	338	12.0
<b>G550</b>	630 x 630	Thread M16; grid 100	Width 18; spacing 100	700	13.0
<b>G750</b>	800 x 800	Thread M16; grid 100	Width 18; spacing 100	1,000	16.0

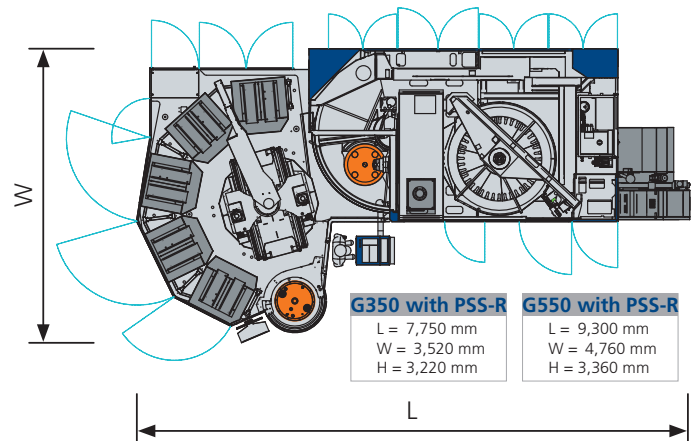
\*Time value without seating check system

## Customized automation solutions

For decades now, our customers in large-scale production have been relying on GROB automation solutions. The experience garnered is fed straight into our automation solutions, making GROB a strong partner – for solutions with part storage systems through to highly flexible manufacturing systems.

### GROB rotary pallet storage system (PSS-R)

The GROB rotary pallet storage system expands the G-module to a flexible production cell to offer optimum entry to automated, highly efficient production.



### FEATURES

- Three design versions per machine size
  - **G350** (PSS-R5, PSS-R10, PSS-R15)
  - **G550** (PSS-R5, PSS-R10, PSS-R13)
- Design versions with up to 15 pallet storage positions at one to three levels
- Fast double change when using two pallets thanks to an innovative pallet changing device
- Visualization and organization of production orders with a flexible production control software
- Latest production control software with 19-inch touch screen panel
- Easily accessible setup station arranged next to the machine control panel (can be rotated and locked)
- High-precision setup station for G350 and G550 for positioning your parts (optional)

### THE BENEFITS TO YOU

- ⊕ Complete solution from a single source in a standardized design
- ⊕ Cost-effective production through increased machine utilization
- ⊕ Permits a longer and unmanned production period
- ⊕ Optimized view into the work area and towards the pallet storage positions
- ⊕ Parallel loading and unloading of the pallets from the PSS-R during the machining operation
- ⊕ High storage capacity with small footprint
- ⊕ Pallet storage solution with small initial investment
- ⊕ Simple retrofit on existing machines (if machine is prepared for palletizing)

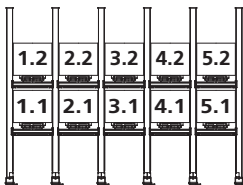


## Pallet storage racking

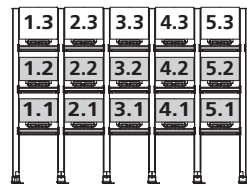
For storing pallets containing rough and finished parts, as well as fixtures

### G350

#### PSS-R5 / PSS-R10



#### PSS-R15



### G550

#### PSS-R5\* / PSS-R10\*



#### PSS-R13\*



\* Ø 850 mm from a part height of 430 mm

## PALLET CHANGING DEVICE

- Pallet changing device with two pallet forks arranged opposite
- For the storage and retrieval of pallets from the setup station to and from the pallet storage racking and for loading and unloading the machining center
- Determination of the part weight by the pallet changing device



## GROB<sup>4</sup>Automation – Production control software

The production control software controls and visualizes the flexible production cell. It therefore facilitates automatic, low-staff production and is set apart by the following functionalities:

- Overview of the state of the flexible production cell
- Autonomous part management
- Changing the priority of individual orders
- Changing the machining sequence of parts
- Assignment of the process sheet to one or multiple pallets
- Automatic, repeat machining of a part on a specified pallet through to a defined final condition
- Organization of the pallets and parts, the pallet change and of the requisite process steps

## Setup station

- Setting up the clamping fixture / pallets with parts
- Storage and retrieval of pallets
- Ergonomic working height and optimum accessibility
- Manual rotation and locking of the setup station table
- Control panel for setup station right next to the setup station door

TECHNICAL DATA	G350 – Generation 2			G550 – Generation 2		
	PSS-R5	PSS-R10	PSS-R15	PSS-R5	PSS-R10	PSS-R13
<b>DESIGN VERSIONS PSS-R</b>						
<b>Part data</b>						
Max. part dimensions [mm]	☐ Type 1 ▶ Ø 600x500 ☐ Type 2 ▶ Ø 600x400			☐ Type 1 ▶ Ø 900x725 ☐ Type 2 ▶ Ø 900x350		
Max. part weight [kg]						
▶ when one pallet is changed individually	380	380	380	700	700	700
▶ when two pallets are changed at the same time	230	230	230	250	250	250
<b>Pallet data</b>						
Maximum pallet size [mm]	400x400	400x400	400x400	630x630	630x630	630x630
Maximum number of pallets in the system	6	11	16	6	11	14
Total number of pallet storage positions	5	10	15	5	10	13
Number of storage positions at a part height of 500/400 mm	5/-	10/-	5/10	—	—	—
Number of storage positions at a part height of 725/350 mm	—	—	—	5/-	10/-	7/6
Maximum interference diameter [mm]	600	600	600	900	900	900
Pallet change time [s] for 1 or 2 pallets at the same time	38/25	38/25	38/25	34/23	34/23	34/23

\* Ø 850 mm from a part height of 430 mm

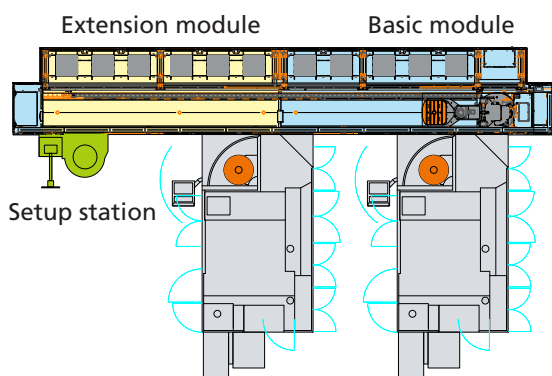
# AUTOMATION TECHNOLOGY

## GROB linear pallet storage system (PSS-L)

The linear pallet storage system is a new development from GROB that complements the product range with a highly automated, flexible manufacturing line for a wide variety of part machining.



### System plan view



#### Example of use

Flexible manufacturing system consisting of two G550 – Generation 2, a basic module PSS-L15, an expansion module PSS-L18, and a setup station

### Setup station

- Setting up the clamping fixture/ pallets with parts
- Storage and retrieval of pallets
- Ergonomic working height and optimum accessibility
- Manually rotatable and lockable setup station table
- Main control panel on swivel arm for optimized ergonomics (freely selectable placement at customer's request)
- Optionally available with part clamping system (clamping hydraulics)

## FEATURES

- **Up to five machines** can be connected to one system (G550a | G550(T) – Generation 2)
- **Expandable modular system** consisting of at least one basic module
- System flexibly expandable by up to 4 expansion modules and additional setup stations
- Easily accessible setup station with **crane loading capability**
- Visualization and organization of production orders with a flexible production control software
- For machines with and without pallet changer
- Highly dynamic loading unit with optimized control system for reduced pallet change time

## THE BENEFITS TO YOU

- ⊕ **Flexibly configurable** according to your requirements
- ⊕ **Complete solution** from a single source in a standardized design and an interface which is optimally matched to the machine
- ⊕ Cost-effective production through **increased machine utilization**
- ⊕ Permits a longer and **unmanned production period**
- ⊕ Allows optimum access to work area of the machine during automation  
e.g. for manual loading or setup work.
- ⊕ **High storage capacity** with small footprint
- ⊕ Pallet storage solution with **low investment**

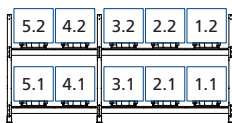


## Pallet storage racking

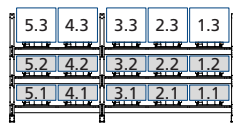
- Storing of pallets containing rough and finished parts, as well as fixtures
- With pallet storage positions on one, two or three levels, depending on the development stage

### Basic modules

#### PSS-L5/PSS-L10

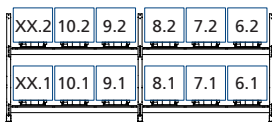


#### PSS-L15\*

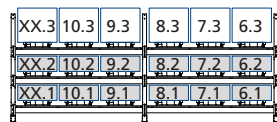


### Expansion modules

#### PSS-L6/PSS-L12



#### PSS-L18\*



□ Type 1   □ Type 2

\* optionally also available for type 2 parts on all 3 levels



## Pallet changing device

- Pallet changing device with one pallet fork
- Storage and retrieval of pallets via the setup station to and from the pallet storage racking and for loading and unloading the machining centers
- Determination of the part weight by the pallet changing device



## GROB<sup>4</sup>Automation – Production control software

The production control software visualizes, controls, and monitors the manufacturing processes as well as the corresponding manufacturing cells. It enables uninterrupted and automatic loading of the manufacturing cells for planned production orders. In order to guarantee order-optimized production, we are constantly improving and extending the following range of functions of our production control software:

- System overview and range information
- Simple, intuitive organization of pallets and parts with associated process steps
- Autonomous part and pallet control with consideration of resources (machining sequence, prioritization, pallet utilization, tool resources, etc.)
- Automatic, repeated machining of the parts through to a defined final condition
- Monitoring and verification of tool resources for all scheduled orders

TECHNICAL DATA	Basic module			Extension module		
	PSS-L5	PSS-L10	PSS-L15	PSS-L6	PSS-L12	PSS-L18
<b>DESIGN VERSIONS PSS-L</b>						
<b>Part data</b>						
Maximum part dimensions [mm]	□ Type 1 ▶ Ø 900x785 □ Type 2 ▶ Ø 900x350			□ Type 1 ▶ Ø 900x785 □ Type 2 ▶ Ø 900x350		
Maximum part weight [kg]	700			700		
<b>System data</b>						
Maximum pallet size [mm]	630x630			630x630		
Minimum number of pallets per module	5			6		
Maximum number of pallets per module	15			18		
Maximum total number of pallet storage positions in the system	87 (1 basic module + 4 extension modules)					
Maximum interference diameter [mm]	900					
Footprint [mm x mm]	7,180 x 2,290			6,985 x 2,290		

# AUTOMATION TECHNOLOGY

## Customer-specific automation solution

The tougher requirements in the automation sector require an individual solution for optimized flexibility and efficiency that is tailored to the customer's specific needs.

GROB offers solutions from compact pallet storage systems to individual part handling through to flexible manufacturing systems with multiple machines and centralized tool supply.

### ► Compact pallet storage system

The compact pallet storage system offers even greater flexibility in the configuration of pallet storage positions, permits a mixed operation of differently sized pallets and considers the length of the parts.



#### Equipment features of the illustrated design:

- Universal machining center G550
- 40 pallet storage positions for compact pallets/parts with HSK interface at 4 levels
- 1 gripper arm for pallet/part handling
- 1 setup station

## Example of a customized solution for part handling

We work with our customers to develop a concept for fully automated part handling to suit their particular requirements. All components, such as robot arm, robot cell, buffer storage system and measuring machine are matched to the universal machining center required and to the specified output.



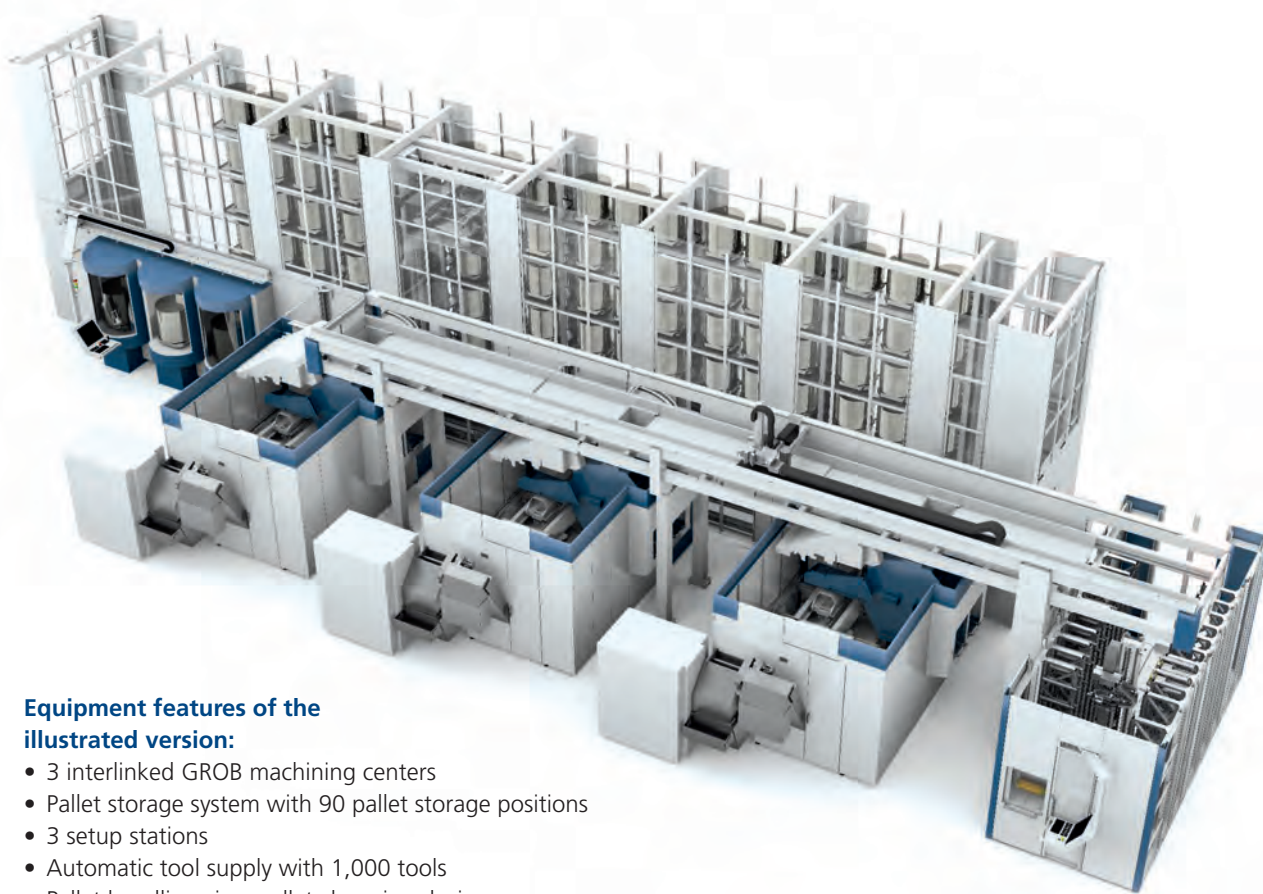
#### Equipment features of universal machining center G350 of the illustrated design:

- Robot arm for part handling in a robot cell
- GROB<sup>4</sup>Pilot control panel
- Cooling unit for cutting fluid
- Rotary table with driven steady rest



## ► Flexible manufacturing system

In the full version, both the tool flow and the part flow can be automated. The illustration shows a version of a flexible manufacturing system with a tool buffer storage rack. The robot can interchange tools in the disk-type tool magazines of individual machines. The part flow is managed by a pallet changing device for pallet handling, to which three setup stations, one high-rack storage system with 90 pallet storage positions and the machining units are connected.



### Equipment features of the illustrated version:

- 3 interlinked GROB machining centers
- Pallet storage system with 90 pallet storage positions
- 3 setup stations
- Automatic tool supply with 1,000 tools
- Pallet handling via a pallet changing device
- Space requirement approx. 240 m<sup>2</sup>

AUTOMATION ◀▶ MACHINE • AVAILABILITY AT A GLANCE !			
	GROB rotary pallet storage system (PSS-R)	GROB linear pallet storage system (PSS-L)	Part handling
<b>G350</b>	5 / 10 / 15 storage locations + 1 setup station	individually	individual
<b>G550</b>	5 / 10 / 13 storage locations + 1 setup station	individually	individual
<b>G750</b>	individual	individually	individual

## Optimizing machine kinematics

Every machine tool has slight system-related geometric deviations in the rotary axes. These individual, minimal deviations add up to a volumetric geometric deviation within the work area. The following solutions for optimizing machine kinematics are able to analyze and hence minimize these deviations.



### GROB swivel axis calibration (GSC)

The GROB swivel axis calibration (GSC) function achieves highly precise machine calibration and replaces control-specific kinematic cycles, such as CYCLE996 or KinematicsOpt.

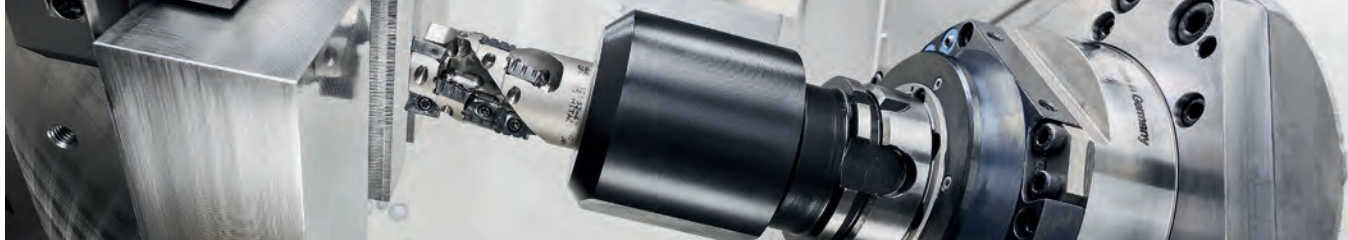
#### Mode of operation

- Determination of the current kinematics via a 3D touch probe and a high-precision gauge ball
- Display of measured values for analyzing the geometric deviation
- Optimization of swivel accuracy based on the measurement results

#### Special features

- GSC delivers a much higher level of accuracy than a standard calibration cycle (e.g. CYCLE996, KinematicsOpt)
- Improved accuracy even without using swivel cycles





## GROB kinematic measurement inspection equipment set

In addition to the kinematic measuring cycles, all measuring instruments are supplied in an inspection equipment set.

### Included components

- Two carbon magnetic bases with high-precision gauge ball for screwing in
- Parallel gauge block
- Magnetic foot with switchable permanent magnet
- Precision lever-type dial indicator, scale division value: 0.002 mm
- High-precision measuring ring and other accessories



## Interpolation turning PLUS

Interpolation turning PLUS in the form of a pure software solution enables any turning operations on a GROB universal machining center, including turning operations that are not coaxial to the B'-axis. Interpolation turning PLUS simulates a diameter axis (transverse slide) through the simultaneous interpolation of X- and Y'-axis and motorized spindle. The programming and handling correspond to that of a CNC turning machine. Interpolation turning PLUS can also be combined with a spindle operation. For example, a chamfer at a reamed hole can be machined by interpolation turning and line-bored using the same tool in the same operation of the cylindrical part. As a result, the speed limitation via interpolation turning applies only for machining the chamfer – when machining the cylinder, the usual speeds are possible.

### THE BENEFITS TO YOU

- ⊕ Fast delivery of prototypes and small series, since standard turning tools can be used and long waiting times for special tooling can often be avoided
- ⊕ Shortest tool setup times, since almost all special tooling can be replaced by standard turning tools
- ⊕ Significant cycle time reduction in certain cases, where several step drills can be replaced by one turning tool, thereby reducing tool changes
- ⊕ Optimized machine availability and productivity, since interpolation turning PLUS as a backup can compensate for missing special tools



## Energy efficiency package

For efficient use of energy by reducing the power consumption of the universal machining centers with SIEMENS control system.

### Package content

- Shut-down strategies for machine cooling unit, chip conveyor and various fans
- Optimized control strategy for motorized spindle and axis drives
- Timed machine shut-down

# SOFTWARE OPTIONS



Gear hobbing machining situation

## Gearing cycles in general

- Axes coupled as on a gear wheel milling machine
- Programming and handling as per a gear hobbing machine
- Individual correction option (e.g. crowned, tapered, etc.)
- Block entry option at an arbitrary cut (e.g. finish cut)

## Gear hobbing

- For external gearing with gear hobbing tools
- Ideal for gearing on shafts
- Frontal part access not required

## Power skiving

Available especially for mill-turn versions

- For external and internal gearing with power skiving tools
- Frontal part access required

### OPTION PACKAGE ◀ ▶ CNC CONTROL • AVAILABILITY AT A GLANCE !

	GROB swivel axis calibration (GSC)	GROB inspection equipment set	Interpolation turning PLUS	Energy efficiency package	Gear hobbing	Power skiving
SIEMENS 840D sl	•	•	•	•	•	•
HEIDENHAIN TNC 640	•	•	—	•	—	—
FANUC 30i-B	•	•	—	•	—	—

# GROB-NET<sup>4</sup>Industry

Your applications for global transparency throughout the entire production process

## GROB<sup>4</sup>Line



### The machine in sight via smartphone

- Proactive messages from the machine and notification in case of machine shutdown
- Mobile access to the machines

## GROB<sup>4</sup>Analyze



### Feedback from the machine for the CIP process

- Visualization of stored machine states
- User-friendly data preparation for the improvement process

## GROB<sup>4</sup>Coach



### Programming, simulation, training

- Programming of part programs
- Effective, PC-supported training software for CNC novices and experts

## GROB<sup>4</sup>Simulate



### Complex processes and parts simply simulated

- Avoidance of collisions
- Simulation of the actual NC code and the mean values

## GROB<sup>4</sup>Interface



### Easy route to machine communication

- Data transfer straight from the machine control system
- Information retrieval without additional hardware having to be installed

## GROB<sup>4</sup>Connect



### Connection from the real world to the ERP system

- Coupling the machine to the ERP system
- Transmission of all production-relevant data to machine operators via web technology

## GROB<sup>4</sup>Pilot



### Multi-functional, interactive machine operation

- All production processes amalgamated in one place
- Powerful hardware that is easy to handle

## GROB<sup>4</sup>Automation



### Intuitive production control software for unmanned operation

- Support of unmanned shifts by simple operation
- Autonomous part management

## GROB<sup>4</sup>Track



### Machine axes in view at all times

- Machine state monitoring
- Reduction of unscheduled machine downtimes

## GROB<sup>4</sup>Care



### Service and maintenance portal

- Convenient procurement of spare parts via an online portal without great effort
- Clarification of part availability and display of customer-specific prices

Machine concept  
P. 4 – 9

Machine components  
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Accessories  
P. 22 – 24

Automation technology  
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Software options  
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Typical machining operations  
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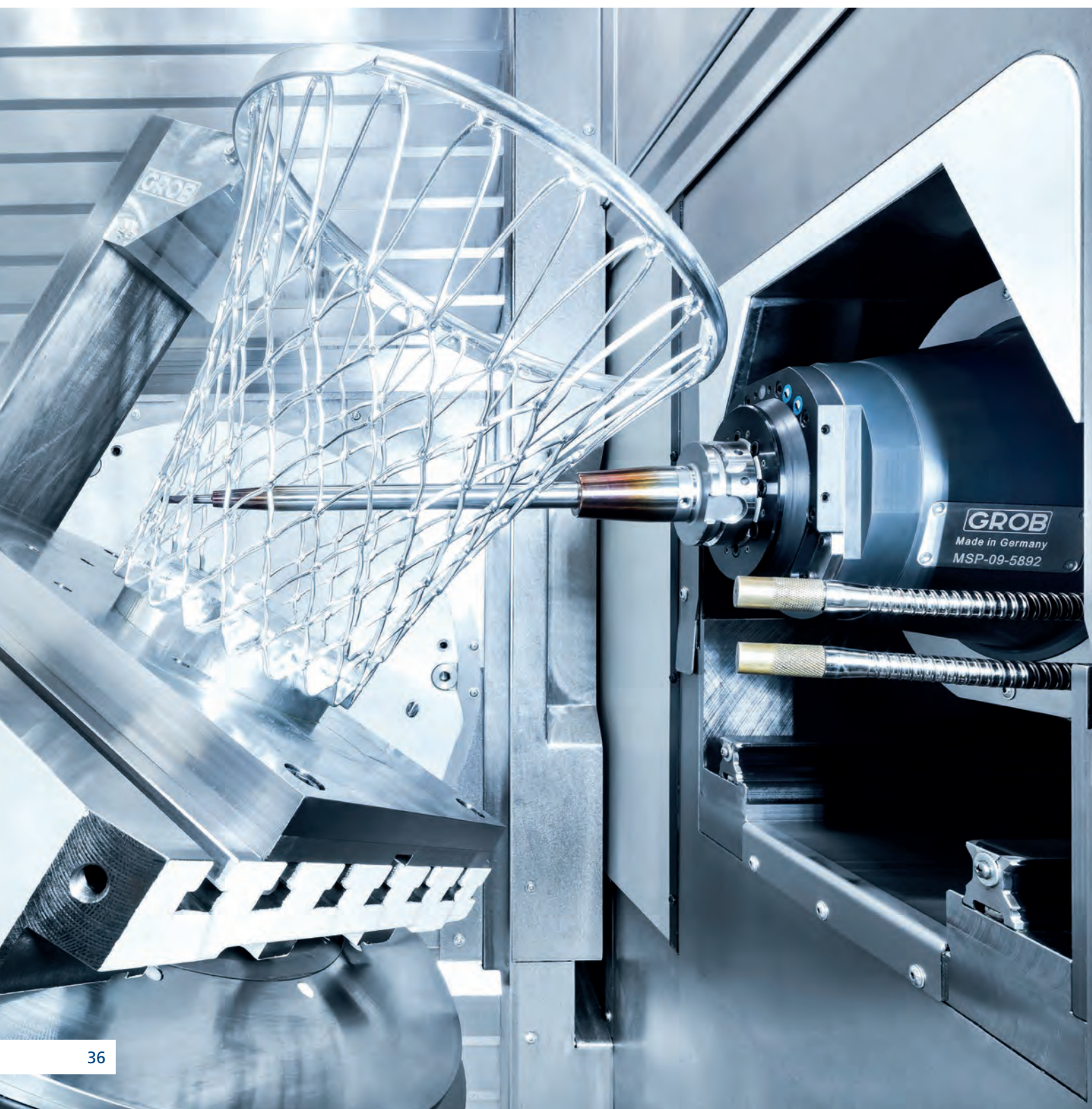
Machine characteristics  
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Technical data  
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# TYPICAL MACHINING OPERATIONS

## Use the advantages of our 5-axis universal machining centers

Fewer clamping operations and hence shorter throughput times with higher accuracies. See for yourself!



## FRAME



**Machining unit: G550** | Dimensions of raw material [mm]: 307x221x90

Industry	<b>Aerospace</b>	Motorized spindle	30,000 rpm
Material	F7050	Power/torque	53 kW/63 Nm
Machining time	39 minutes	Cutting volume	87 %

**Challenges:**

Wall thicknesses of 1.5 mm • Complete machining in one setup • High cutting volume with optimized machine dynamics

## SUSPENSION



**Machining unit: G550** | Dimensions of raw material [mm]: 340x250x85

Industry	<b>Prototype construction</b>	Motorized spindle	21,000 rpm
Material	F7050	Power/torque	39 kW/46.6 Nm
Machining time	68 minutes	Cutting volume	86.5 %

**Challenges:**

Machining of deep envelopes • High accuracy enquiries for center bore • Machining by interpolation turning PLUS

## CHISEL HOLDER



**Machining unit: G350** | Dimensions of raw material [mm]: Ø 80x250

Industry	<b>Medical technology</b>	Motorized spindle	16,000 rpm
Material	X5CrNiCuNb16-4	Power/torque	32 kW/206 Nm
Machining time	90 minutes	Cutting volume	—

**Challenges:**

The outstanding machine stability significantly reduces machining time through faster feed rates

## SEGMENT OF A TIRE MOLD



**Machining unit: G350** | Dimensions of raw material [mm]: 300x300x100

Industry	<b>Mold industry</b>	Motorized spindle	30,000 rpm
Material	F7050	Power/torque	53 kW/63 Nm
Machining time	6 hours	Cutting volume	—

**Challenges:**

Small compensation motions due to horizontal A'-/B'-kinematics • Fastest machining times with high machine dynamics • High surface quality

# TYPICAL MACHINING OPERATIONS

## Performance milling – Performance drilling – Tapping

A selection of performance examples illustrates the diverse range of possible applications of GROB universal machining centers.



### Motorized spindle 12,000 rpm (83 Nm)/HSK-A63 Machining on a G350

Machining type / tool	Steel – 16MnCrS5	
Drilling Ø 50 mm	$v_c = 160$	$n = 1,019$
	$f_u = 0.13$	$v_f = 132$
	$a_p/a_e = 50/50$	$Q = 330$
Tapping M24	$v_c = 15$	$n = 199$
	$f_u = 3$	$v_f = 597$
Milling with cutting head Ø 63 mm $z = 5$	$v_c = 300$	$n = 1,516$
	$f_z = 0.24$	$v_f = 1,743$
	$a_p/a_e = 3/55$	$Q = 288$



### Motorized spindle 16,000 rpm (206 Nm)/HSK-A63 Machining on a G350

Machining type / tool	Steel – 16MnCrS5	
Drilling Ø 60 mm	$v_c = 160$	$n = 849$
	$f_u = 0.18$	$v_f = 153$
	$a_p/a_e = 50/60$	$Q = 459$
Tapping M36	$v_c = 13$	$n = 115$
	$f_u = 4$	$v_f = 460$
Milling with cutting head Ø 100 mm $z = 12$	$v_c = 330$	$n = 1,050$
	$f_z = 0.18$	$v_f = 2,268$
	$a_p/a_e = 3/95$	$Q = 646$

Example illustrations

Cutting speed:  $v_c$  [m/min]      Spindle speed:  $n$  [rpm]      Feed rate per revolution:  $f_u$  [mm/rev]      Feed rate per tooth:  $f_z$  [mm/tooth]  
Feed rate:  $v_f$  [mm/min]      Cutting depth:  $a_p$  [mm]      Cutting width:  $a_e$  [mm]      Metal removal rate:  $Q$  [cm<sup>3</sup>/min]      Number of tool edges:  $z$



### Motorized spindle 18,000 rpm (47 Nm) / HSK-A63 Machining on a G550

Machining type / tool	Aluminum – F7050	
Milling with end mill Ø 20 mm z = 3	$v_c = 1,131$	$n = 18,000$
	$f_z = 0.25$	$v_f = 13,500$
	$a_p = 13$	$a_e = 20$
	$Q = 3,510$	
Milling with cutting head Ø 32 mm z = 3	$v_c = 1,809$	$n = 17,994$
	$f_z = 0.18$	$v_f = 9,717$
	$a_p = 10$	$a_e = 32$
	$Q = 3,109$	



### Motorized spindle 30,000 rpm (63 Nm) / HSK-A63 Machining on a G550

Machining type / tool	Aluminum – F7050	
Milling with end mill Ø 25 mm z = 3	$v_c = 2,120$	$n = 26,993$
	$f_z = 0.09$	$v_f = 7,288$
	$a_p = 19$	$a_e = 25$
	$Q = 3,462$	
Milling with cutting head Ø 50 mm z = 4	$v_c = 2,042$	$n = 13,000$
	$f_z = 0.24$	$v_f = 12,480$
	$a_p = 6$	$a_e = 50$
	$Q = 3,744$	



### Motorized spindle 9,000 rpm (575 Nm) / HSK-A100 Machining on a G550

Machining type / tool	Steel – 16MnCrS5	
Drilling Ø 70 mm	$v_c = 150$	$n = 682$
	$f_u = 0.40$	$v_f = 273$
	$a_p = 50$	$Q = 955$
Milling with milling cutter Ø 50 z = 4	$v_c = 80$	$n = 509$
	$f_z = 0.12$	$v_f = 244$
	$a_p/a_e = 40/50$	$Q = 488$
Milling with cutting head Ø 125 mm z = 14	$v_c = 250$	$n = 637$
	$f_z = 0.3$	$v_f = 2,675$
	$a_p/a_e = 5/90$	$Q = 1,204$

Example illustrations

# TYPICAL MACHINING OPERATIONS



## AEROSPACE INDUSTRY



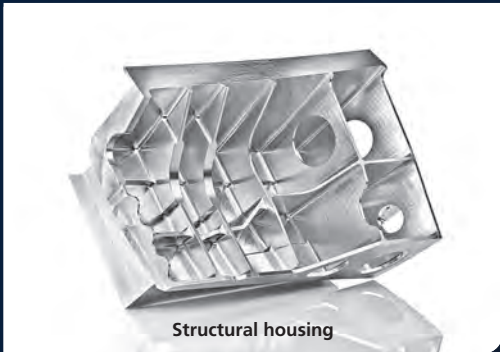
Turbine blade



Valve block



Titanium bearing block



Structural housing



## AUTOMOTIVE INDUSTRY



Knuckle



Steering box



Turbine housing



Crankcase





## MECHANICAL ENGINEERING



Drill bit



Segment of a vise



Tool magazine drum



Bearing housing



## DIE AND MOLD INDUSTRIES



Segment of a tire mold



Mold of a PET bottle



## MEDICAL INDUSTRY



Endoscope holder



Scalpel holder

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# MACHINE CHARACTERISTICS



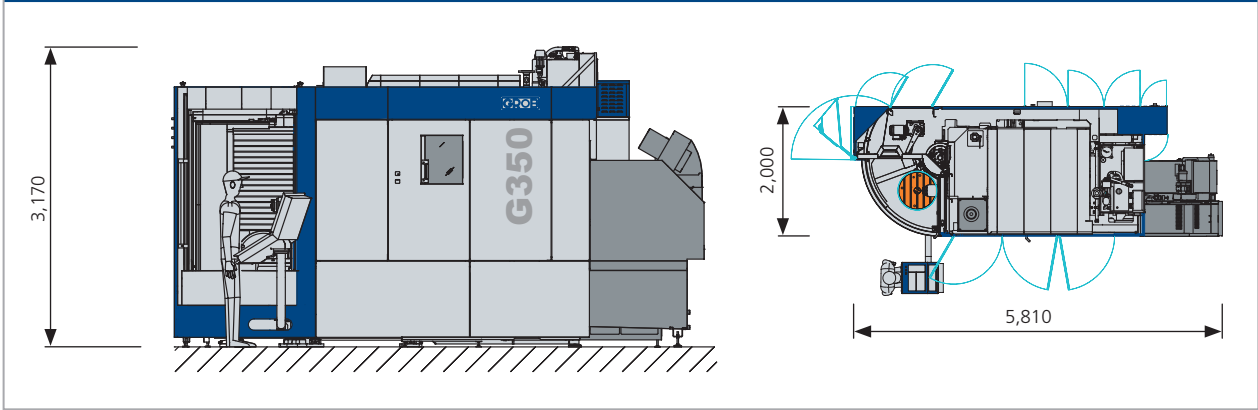
G350 – Generation 2 ▶ Maximum part size		
A'-/B'-axis (max.) [mm]	B'-axis (max.) [mm] (for A'-axis 0°)	Plan view (max.) [mm]
<b>Basic machine</b>		
<b>Basic machine with pallet clamping system (without pallet changer; incl. dimensioning for PSS-R)</b>		
<b>Pallet changer with pallet clamping system*</b>		

G350, G550 and G750 also available as mill-turn machining centers

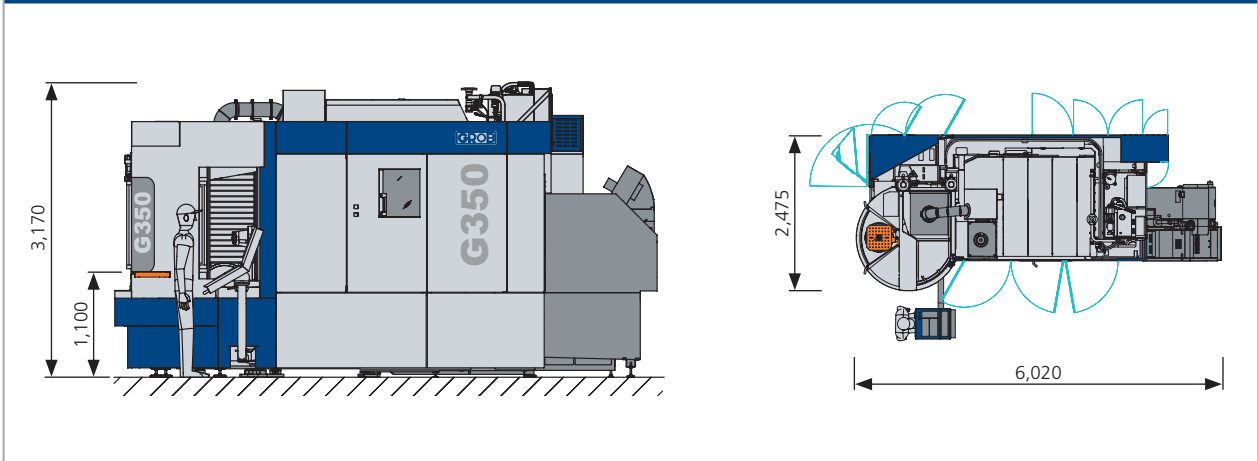
\*Maximum part size with restrictions



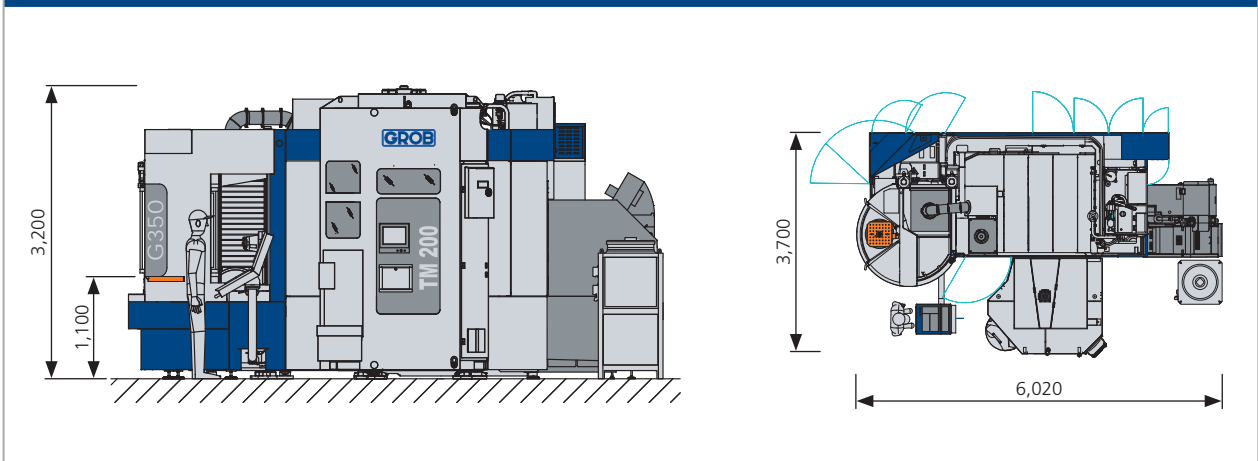
**G350 – Generation 2 ▶ Dimensioning ▶ Basic machine**



**G350 – Generation 2 ▶ Dimensioning ▶ With pallet changer**



**G350 – Generation 2 ▶ With additional tool magazine and cooling unit**



Dimension values [mm], not taking into account preventive maintenance and operating areas

Illustrations may contain options

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# MACHINE CHARACTERISTICS



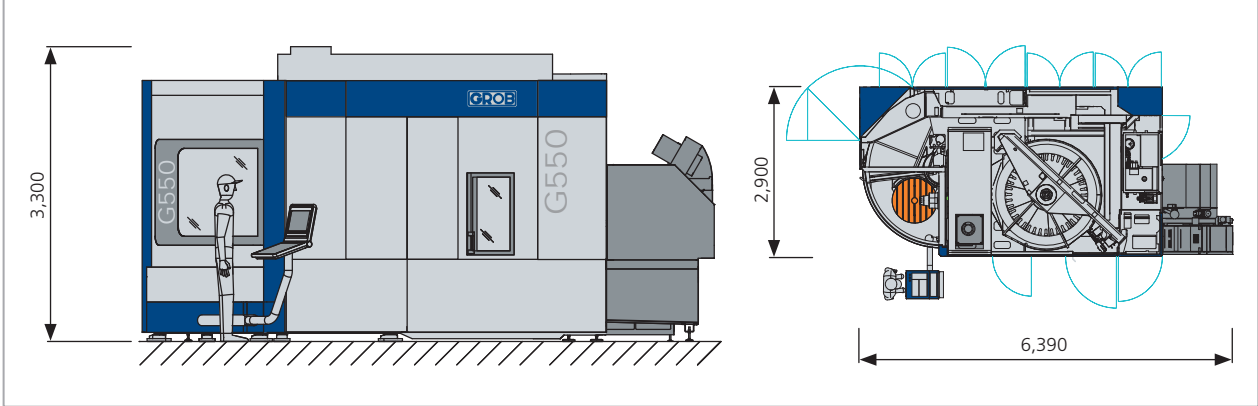
G550 – Generation 2 ▶ Maximum part size		
A'-/B'-axis (max.) [mm]	B'-axis (max.) [mm] (for A'-axis 0°)	Plan view (max.) [mm]
<b>Basic machine</b>		
<b>Basic machine with pallet clamping system (without pallet changer; incl. dimensioning for PSS-R and PSS-L)</b>		
<b>Pallet changer with pallet clamping system*</b>		

G350, G550 and G750 also available as mill-turn machining centers

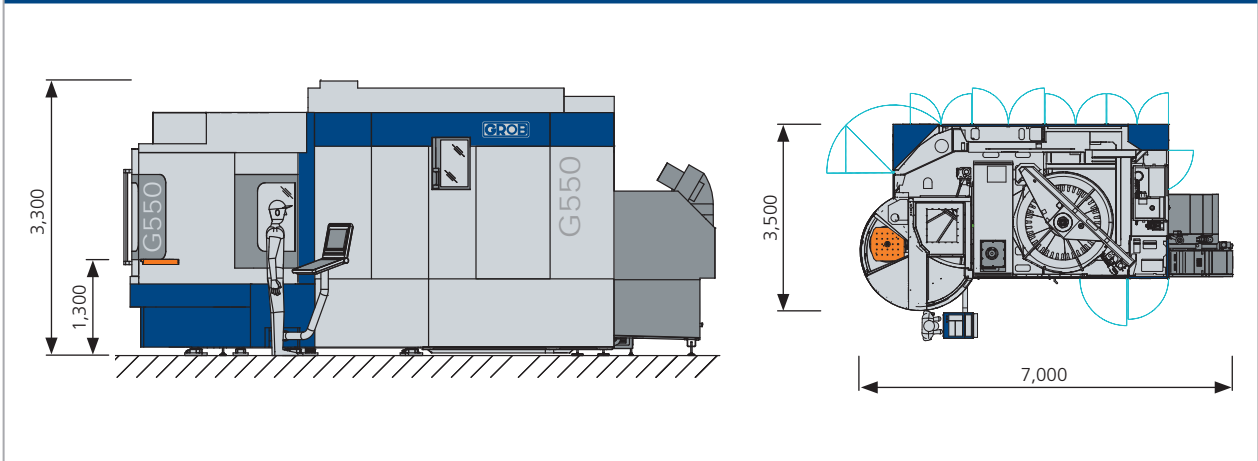
\*Maximum part size with restrictions



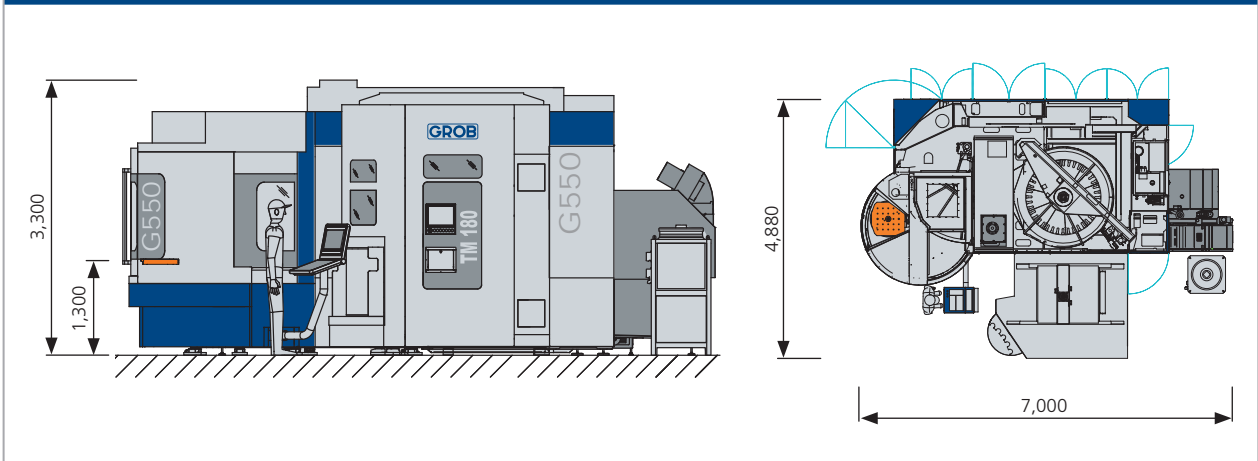
**G550 – Generation 2 ▶ Basic machine**



**G550 – Generation 2 ▶ With pallet changer**



**G550 – Generation 2 ▶ With additional tool magazine and cooling unit**



Dimension values [mm], not taking into account preventive maintenance and operating areas

Illustrations may contain options

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# MACHINE CHARACTERISTICS



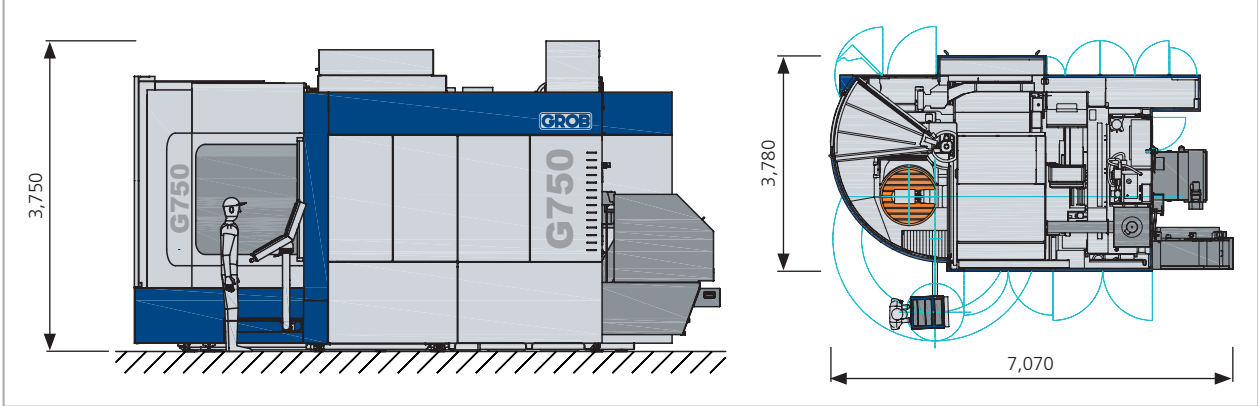
G750 – Generation 1 ▶ Maximum part size		
A'-/B'-axis (max.) [mm]	B'-axis (max.) [mm] (for A'-axis 0°)	Plan view (max.) [mm]
<b>Basic machine</b>		
<b>Basic machine with pallet clamping system (without pallet changer)</b>		
<b>Pallet changer with pallet clamping system*</b>		

G350, G550 and G750 also available as mill-turn machining centers

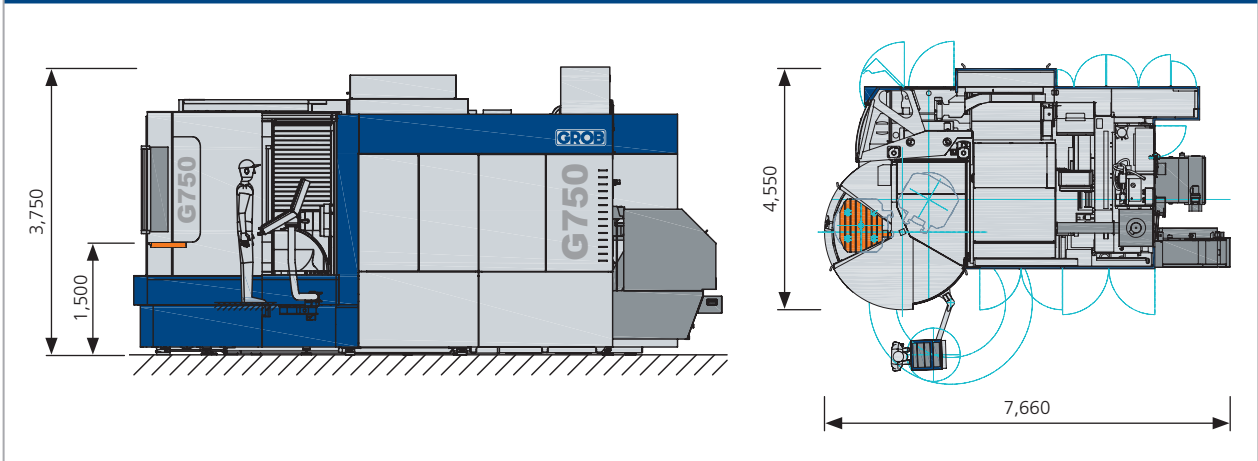
\*Maximum part size with restrictions



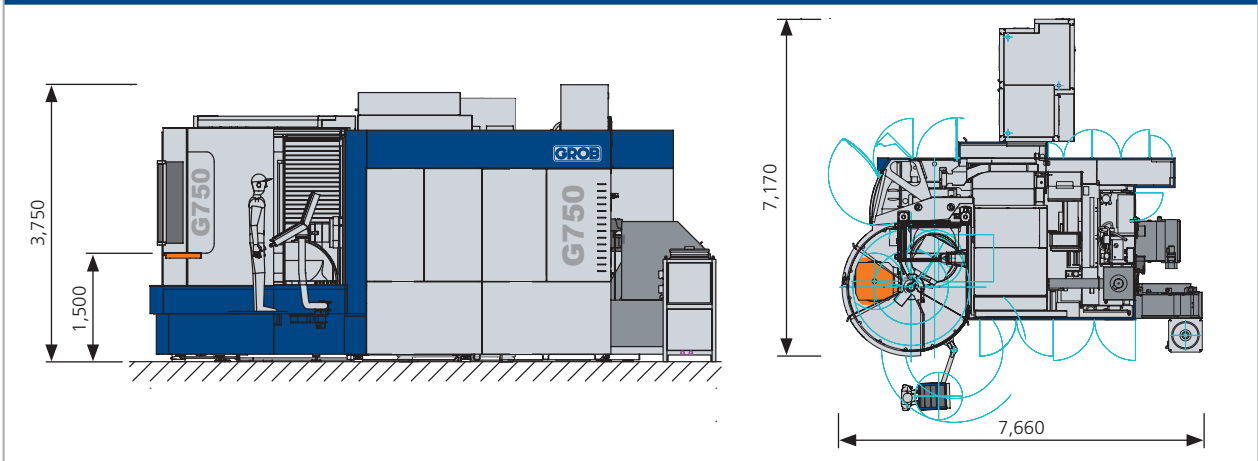
**G750 – Generation 1 ▶ Basic machine**



**G750 – Generation 1 ▶ With pallet changer**



**G750 – Generation 1 ▶ With additional tool magazine and cooling unit**



Dimension values [mm], not taking into account preventive maintenance and operating areas

Illustrations may contain options

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# TECHNICAL DATA

MACHINE TYPE		G350 – Generation 2				
<b>SLIDE</b>						
Working travels in X-/Y’-/Z-axis [mm]		600/855/750				
Max. speeds in X-/Y’-/Z-axis [m/min]		70/45/90				
Max. acceleration in X-/Y’-/Z-axis [m/s <sup>2</sup> ] <sup>(1)</sup>		5/4/7				
Max. feed forces in X-/Y’-/Z-axis [kN] <sup>(1)</sup>		8/8/8				
Accuracies (ISO 230-2:2006)		0.006				
▶ Positioning accuracy in X-/Y’-/Z-axis [mm]						
▶ Repeat precision of positioning in X-/Y’-/Z-axis [mm]		<0.0025				
<b>MAIN SPINDLE</b>						
Drive unit: standard	Tool interface for short hollow taper tools acc. to ISO 12164-1 <sup>(3)</sup>	HSK-A63				
	Diameter at front bearing of spindle bearing [mm]	70				
	Speed n <sub>max</sub> [rpm]	12,000				
	Max. drive power at 100%/40% duty cycle [kW]	29/39				
	Max. spindle torque at 100%/40% duty cycle [Nm]	34.6/46.6				
	Chip-to-chip time t <sub>1</sub> according to VDI 2852 [s] relative to speed [rpm] SIEMENS control system and tool changer arm (dynamic package/standard)	2.7/4.0 to n = max				
Drive unit: options	Tool interface for short hollow taper tools acc. to ISO 12164-1	HSK-A63	HSK-A63	HSK-A63	HSK-A63	HSK-A63
	Diameter at front bearing of spindle bearing [mm]	70	70	70	80	65
	Speed n <sub>max</sub> [rpm]	12,000	18,000	21,000	16,000	30,000
	Max. drive power at 100%/40% duty cycle [kW]	40/52	29/39	29/39	25/32	40/53
	Max. spindle torque at 100%/40% duty cycle [Nm]	63.7/82.8	34.6/46.6	34.6/46.6	159/206	48/63
	Chip-to-chip time t <sub>1</sub> according to VDI 2852 [s] relative to speed [rpm] SIEMENS control system and tool changer arm (dynamic package/standard)	2.7 to n = max/ 4.0 to n = max	2.7 to n = max/ 4.0 to n = max	2.7 to n = 18,000/ 4.0 to n = max	2.7 to n = 7,000/ 4.0 to n = 10,000	2.7 to n = 8,000/ 4.0 to n = 15,500
<b>DISK-TYPE TOOL MAGAZINE</b>		Single disk-type tool magazine		Double disk-type tool magazine		
<b>TOOL INTERFACE</b>		HSK-A63		HSK-A63		HSK-A63
Number of tool pockets		60		117		105
Max. tool length [mm]						
▶ Horizontal disk arrangement (bottom/top/over both disks)		365		365/180		365/180/550 <sup>(6)</sup>
▶ Vertical disk arrangement (advanced/returned)		—		—		—
Max. tool diameter [mm]						
▶ No diameter restrictions for adjacent pockets		70		70		70
▶ Diameter restrictions for adjacent pockets		170		170		170
Max. tool weight [kg]		8		8		8
Max. tilt moment around gripper groove [Nm]		12		12		12
<b>PART</b>						
Table diameter [mm]		570				
Table load max. [kg] (with/without pallet)		400/338				
Interference diameter [mm]		720				
<b>CONNECTION RATINGS</b>						
Power requirements at 3 AC 400 V/50 Hz [kVA]		at least 42				
Compressed air [bar]		5				
<b>WEIGHT (approx.)</b>						
Total weight [kg] (without/with pallet changer)		15,300/17,500				
<b>EQUIPMENT LEVELS</b>						
Automatic pallet changer		2-fold				
Pallet size [mm]		400x400				
Pallet change time [s] <sup>(8)</sup>		12.0				
Tool magazine expansion		TM200; TM309; TM374 (HSK-A63)				

<sup>(1)</sup> Depending on motorized spindle type

<sup>(3)</sup> Optional tool interfaces on request

<sup>(5)</sup> During a facing slide tool change, the chip-to-chip time is extended by + 0.8 seconds

<sup>(6)</sup> With restrictions in the work area

<sup>(8)</sup> Time value without seating check system

<sup>(2)</sup> Can be achieved in combination with the dynamic package

<sup>(4)</sup> Available only in combination with a SIEMENS machine control system

<sup>(7)</sup> Higher values of up to 2,000 kg without pallet and up to 1,500 kg with pallet on request





G550 – Generation 2							G750 – Generation 1						
800/1,020/970							1,000/1,100/1,170						
65/50/80 (90/50/90) <sup>(2)</sup>							60/50/75						
6/4.5/8 (8.5/4.5/14) <sup>(2)</sup>							4.5/3.0/7.5						
8/8/12							10/10/12						
0.006							0.006						
<0.0025							<0.003						
HSK-A63							HSK-A63						
70							70						
12,000							12,000						
29/39							29/39						
34.6/46.6							34.6/46.6						
2.9/4.0 to n = max							-/3.6 to n = max						
HSK-A63	HSK-A63	HSK-A63	HSK-A63	HSK-A100	HSK-A100	HSK-A100 <sup>(4)</sup>	HSK-A63	HSK-A63	HSK-A63	HSK-A63	HSK-A100	HSK-A100	HSK-A100 <sup>(4)</sup>
70	70	80	65	100	110	100	70	70	80	65	100	110	100
12,000	18,000/21,000	16,000	30,000	10,000	9,000	6,000	12,000	18,000/21,000	16,000	30,000	10,000	9,000	6,000
40/52	29/39	25/32	40/53	20/26	54/65	31.5/36	40/52	29/39	25/32	40/53	20/26	54/65	31.5/36
63.7/82.8	34.6/46.6	159/206	48/63	262/340	470/575	301/344	63.7/82.8	34.6/46.6	159/206	48/63	262/340	470/575	301/344
2.9 to n = max/ 4.0 to n = max	2.9 to n = 16,000/ 4.0 to n = max	2.9 to n = 6,000/ 4.0 to n = 9,000	2.9 to n = 6,500/ 4.0 to n = 12,500	3.6 to n = 5,000/ 4.6 to n = 6,500	3.7 to n = 4,000/ 4.7 to n = 5,500	<sup>(5)</sup> 4.8 to n = 5,200/ 5.2 to n = 6,000	-/ 3.4 to n = max	-/ 3.4 to n = max	-/ 3.4 to n = 7,000	-/ 3.4 to n = 16,000	-/ 4.0 to n = 5,000	-/ 4.2 to n = 6,000	<sup>(5)</sup> -/ 4.0 to n = max
Single disk-type tool magazine			Double disk-type tool magazine				Single disk-type tool magazine			Double disk-type tool magazine			
HSK-A63		HSK-A100		HSK-A63		HSK-A100		HSK-A63		HSK-A63		HSK-A100	
70		40		137		123		77		69		60	
465		500		465/280		280/700 <sup>(6)</sup>		500/260		260/750 <sup>(6)</sup>		—	
—		—		—		—		—		650 <sup>(6)</sup> (500)		650 <sup>(6)</sup> /500	
70		118		70		70		118		118		68	
170		260		170		170		260		260		160	
8		22		8		8		22		22		12	
12		40		12		12		40		40		12	
770							950						
800/700							1,500 <sup>(7)</sup> /1,000						
900							1,280						
at least 42							at least 42						
5							5						
25,700/27,900							37,000/43,000						
2-fold							2-fold						
630x630							800x800						
13.0							16.0						
TM200; TM309; TM374 (HSK-A63)				TM180; TM251 (HSK-A100)			TM167/TM218 (HSK-A63)				TM145 (HSK-A100)		

G350, G550 and G750 also available as mill-turn machining centers

Subject to technical changes without notice

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# AFTER SALES SERVICE

CONSULTATION

ACCESSORIES

SPARE PARTS SUPPLY

WEBSHOP

EXPRESS TECHNICIAN

REPAIR

REMOTE DIAGNOSTICS

MOTORIZED SPINDLES

TRAINING

PREVENTIVE MAINTENANCE

OPTIMIZATION

OVERHAUL

## As versatile as our customers' demands

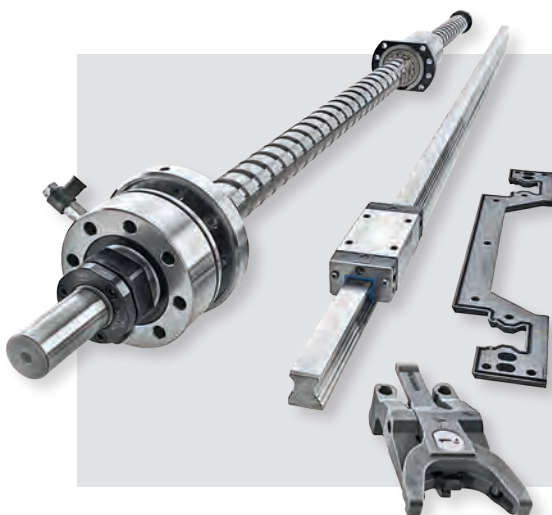


The decades of experience, excellent quality and reliability of GROB as one of the world's leading manufacturer of machining centers and complex production and assembly systems guarantee GROB customers optimal After Sales Service support.

At GROB, service starts with the planning and coordination of machine installation and therefore with support for start of production. It ranges from coordinated training services, advice on spare and wear parts, special equipment, optimized use and system overhaul, through to prompt assistance with machine malfunctions in the production process.

You can also conveniently view parts lists, drawings, spare part availabilities and prices for your customized systems and machines via your mobile end devices such as notebook, tablet or smartphone.

And so you can obtain the materials you may need for a malfunction, repair or preventive maintenance simply and quickly. Together with our service and sales branches, as well as the international GROB agents, we guarantee top quality and the best service throughout the global GROB service network.



### Service hotline:

**+49 8261 996-777**

**Our Hotline provides expert, qualified assistance in Mindelheim:**

- ⊕ 24 HOURS
- ⊕ 7 DAYS PER WEEK
- ⊕ 360 DAYS A YEAR
- ⊕ ALL AROUND THE GLOBE



# THE GROB GROUP

## Tradition – Know-how spanning generations

As a global, family-owned company, we have been developing manufacturing systems and machine tools for more than 90 years. Our customers include the world's leading automotive manufacturers, their component suppliers and other companies from a broad range of sectors.

We have an international reach through our production plants in Mindelheim (Germany), Bluffton, Ohio (USA), São Paulo (Brazil), Dalian (China) and Buttigliera Alta, TO (Italy), as well as through our worldwide service and sales branches. The GROB Group employs 6,900 people and generates 1.45 billion euro in revenue from all around the world (18/19 fiscal year).

## GROB product range

SYSTEM MACHINES	UNIVERSAL MACHINING CENTERS	ASSEMBLY SYSTEMS	E-MOBILITY	
<ul style="list-style-type: none"> <li>• G-modules</li> <li>• Large machining centers</li> <li>• Modular special-purpose machines</li> <li>• Thermal spraying systems</li> <li>• Machining centers for framework structure components</li> <li>• Machine configuration for turbine housing production</li> <li>• Motorized spindles</li> </ul>	<ul style="list-style-type: none"> <li>• 5-axis universal milling machining centers</li> <li>• 5-axis universal mill-turn machining centers</li> <li>• Large machining centers</li> <li>• Pallet storage systems</li> <li>• Additional tool magazines</li> <li>• Motorized spindles</li> </ul>	<ul style="list-style-type: none"> <li>• Individual assembly units (fully-automatic, semi-automatic, manual)</li> <li>• Customer-specific assembly systems</li> </ul>	<ul style="list-style-type: none"> <li>• Production systems for electric motors (stator, rotor and overall assembly)</li> <li>• Assembly systems for batteries (cell, module and pack) and fuel cells</li> </ul>	
<th>SOFTWARE AND AUTOMATION SOLUTIONS</th>				SOFTWARE AND AUTOMATION SOLUTIONS
<ul style="list-style-type: none"> <li>• GROB-NET<sup>4</sup>Industry (the Industry 4.0 solution)</li> <li>• Transport systems (e.g. automation and loading systems)</li> <li>• Highly complex manufacturing systems (turn-key projects)</li> </ul>				

## GROB core expertise

- ⊕ At GROB, all core expertise is concentrated under one roof:  
**Sales • Project Management • Engineering • Production • Assembly • Commissioning • Customer Service**
- ⊕ Clear sales structure: You have one dedicated contact person throughout the project cycle
- ⊕ Our production facility offers you optimized vertical integration, and enables us to dynamically control capacities and respond to bottle neck situations in a flexible manner
- ⊕ You can reach our Customer Service in Mindelheim 24 hours a day



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Bluffton, Ohio, USA  
Detroit, Michigan, USA  
Querétaro, Mexico

### **SOUTH AMERICA**

São Paulo, Brazil

### **EUROPE**

Mindelheim, Germany  
Buttigliera Alta, Italy  
Birmingham, Great Britain  
Hengelo, Netherlands  
Senlis, France  
Steinhausen, Switzerland  
Poznań, Poland  
Győr, Hungary  
Moscow, Russia

### **ASIA**

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