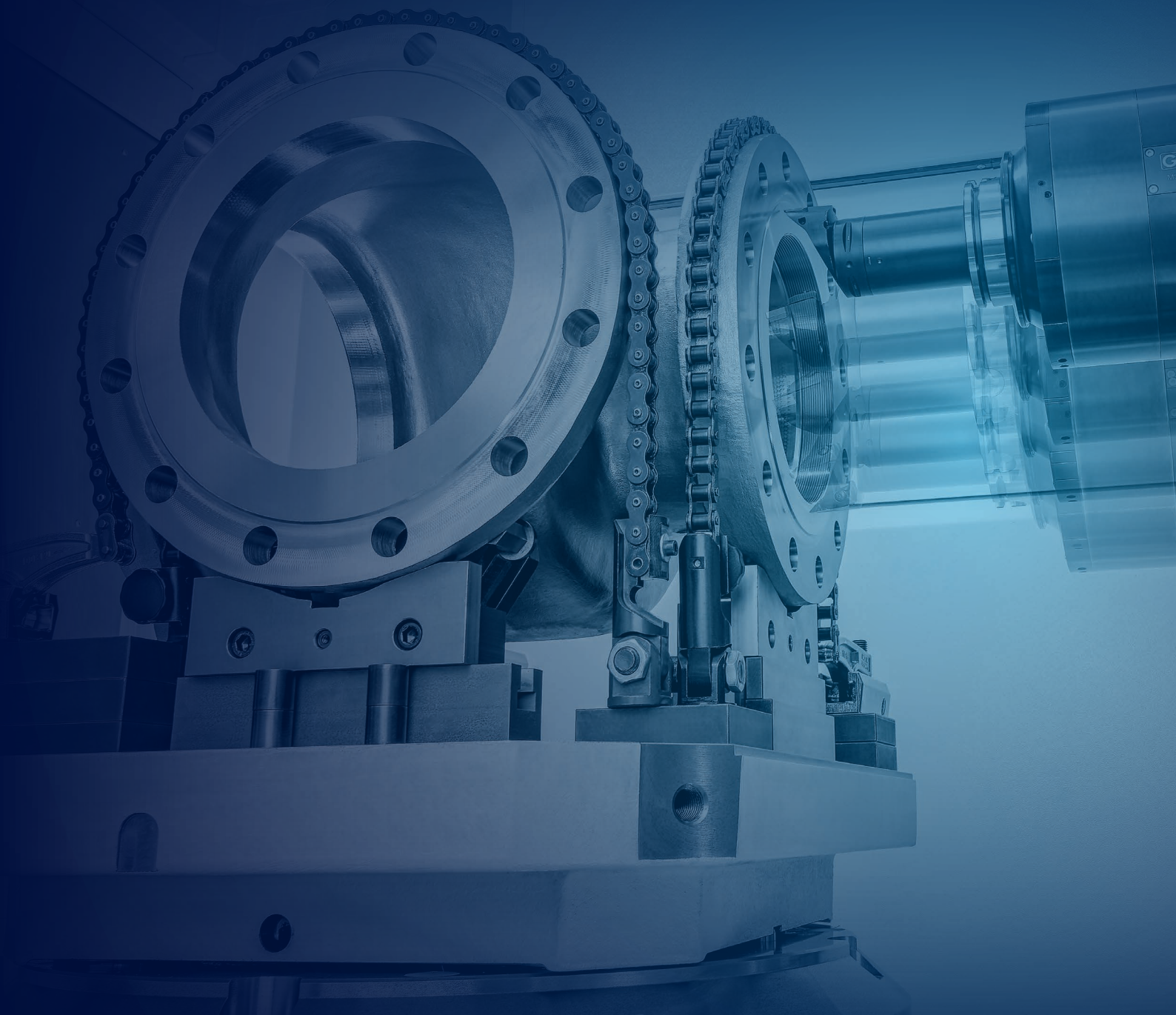
#AdvancedMachiningTechnology

TECHNOLOGY OPTIONS FOR UNIVERSAL MACHINING CENTERS



This is who we are

GROB-WERKE

Technology at its best

STEP INTO A GREEN FUTURE WITH US

At GROB, we strive for continuous progress and improvement. Not only do we strive to develop outstanding solutions and products for our customers, but we also seek to make a contribution to our environment and future generations. This is firmly anchored in our corporate philosophy and lived every day.

We therefore utilize photovoltaics and geothermal energy in our locations and support a wide variety of social projects. But we also place great emphasis on SUSTAINABILITY in our internal departments. Our products are based on the highest energy efficiency and regenerative drive systems. We integrate our supplier network in reducing the carbon footprint.

Excellence in sustainable technology

OUR PRODUCT RANGE

#MachiningTechnology #UniversalMachiningCenters #AssemblyPlants #Electromobility #Automation #AdditiveManufacturing #Digitalization #NewAndQualityCheckedUsedMachines #Service

Concentrated competence worldwide

INTELLIGENT TECHNOLOGY IS HUMAN

For generations, we at GROB have lived and experienced this principle by making customer requirements the focus of our work. The result is sophisticated technology creating more efficient production processes worldwide and delivering highest quality.

RESEARCH & DEVELOPMENT

With a high degree of creativity and technical intuition, as well as the best engineering expertise, our developers have worked hard to earn the reputation of being a technology leader.

ASSEMBLY

From pre-assembly to machine assembly to process commissioning – our employees demonstrate their expertise with optimally coordinated workflows.

ENGINEERING

With method development and structured problem solving, our employees in Engineering develop innovative concepts representing milestones for precision, dynamics, and reliability.

COMMISSIONING

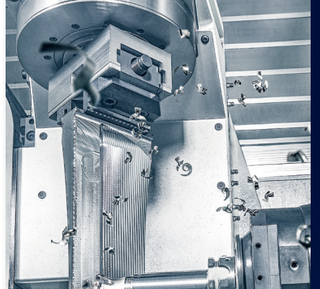
With simulation techniques and virtual commissioning, we achieve the highest adherence to delivery dates and product quality.

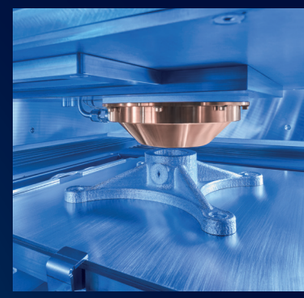
PRODUCTION

The high degree of vertical integration along the entire value creation chain, numerous machining technologies and our employees' distinctive specialist knowledge create the best conditions for state-of-the-art production.

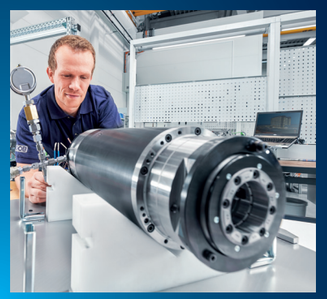
TECHNICAL APPLICATION CENTERS

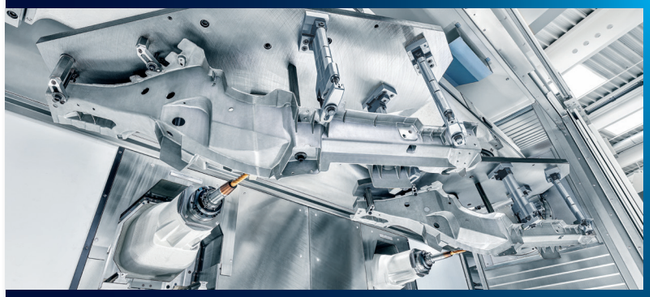
Our production plants in Germany, Brazil, the USA, China, Italy and India have technical application centers for the machining and electromobility sectors, where our customers can experience GROB technologies up close.

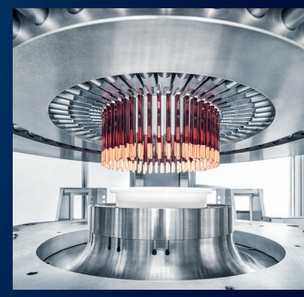


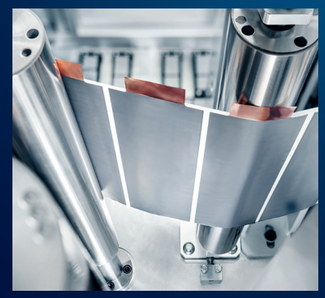













Perfect accuracy – automatic – any time

TECHNOLOGY OPTIONS FROM GROB

PROCESS MONITORING

GROB process monitoring

GROB chip-in-spindle detection system

GROB Spike® process force monitoring system

CERATIZIT ToolScope assistance system: CERAsmart

Dynamic collision monitoring DCM Collision *HEIDENHAIN TNC – Option 40*

Machine protection system GEMCMS and collision detection from *MARPOSS*

ACCURACY

GROB GSC CLASSIC (swivel axis calibration)

GROB GSC ADVANCED

GROB KINEMATICS SET

GROB GSC Tabletop Height

LOAD-SENSITIVE DRIVE TUNING

Load Sensitive Tuning *SIEMENS Sinumerik*

Load Adaptive Control *HEIDENHAIN TNC*

GROB WAY coordinate measuring software

PRODUCTIVITY

GROB FILE INPUT OUTPUT

Technology package *SIEMENS Sinumerik M-Dynamics*

GROB Energy Efficiency Package

GROB OPC UA interface

EES function for NC program execution on an external *SIEMENS* data carrier

LC50 Orientate Tool *BLUM*

DXF Converter *SIEMENS Sinumerik*

CAD Import *HEIDENHAIN TNC – Option 42*

OCM Optimized Contour Milling *HEIDENHAIN TNC – Option 167*

AFC *HEIDENHAIN TNC – Option 45*

GROB Extended Toolchange

GROB close-to-spindle tool sorting

GROB One Click Tool Calibration

GROB matrix code writing/reading

AC kinematics change *HEIDENHAIN TNC*

MACHINING/TECHNOLOGY

GROB INTERPOLATION TURNING PLUS

Advanced Spindle Interpolation *HEIDENHAIN TNC – Option 96*

GROB TRAORI TURNING

General GROB gearing cycles

GROB Speed Feed Tools

UNIVERSAL MACHINING CENTERS

SERVICE

Process monitoring

OPTIMIZE YOUR PRODUCTION PERFORMANCE!

Our innovative technologies enable you to monitor the process in real-time and react immediately to changes. By accurately recording process forces, deviations and potential risks are identified early on before they lead to costly failures.

- INCREASED PRODUCTIVITY
  With optimized process control, you can achieve increased production output and impressive output volumes
- REDUCED DOWNTIMES
  Avoid costly downtimes through proactive fault detection and preventive maintenance measures
- IMPROVED QUALITY
  Minimize rejects and rejects costs by ensuring precise process parameters
- COST SAVINGS
  With our process force monitoring, you not only reduce maintenance costs, but also increase the service life of your machine tools

OUR PORTFOLIO

#G350a #G550a
#G440 #G640 #G840
#G150 #G350 #G550 #G750
#G350T #G550T #G750T

GROB-WERKE

PROCESS MONITORING

The "Process Monitoring Tools" and "Process Monitoring Feed" functions offer you innovative functions for monitoring tools and feed during machining.

- Protection of tools, motorized spindle, and machine kinematics
- More efficient machining processes
- Improved machine performance

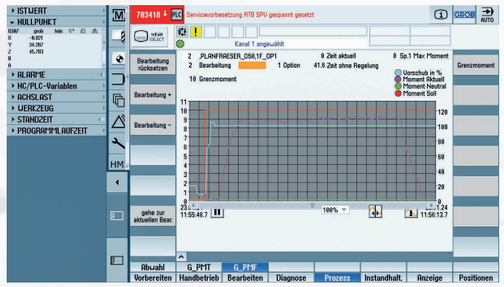
PROCESS MONITORING TOOLS

By presetting minimum and maximum torques that can act on the motorized spindle, the system can detect the breakage of a tool. As soon as the trigger torque is reached, the lower torque limit is activated. The torque of the motorized spindle must then be within the specified tolerance limits. If these limits are undercut or exceeded, the machine stops.

PROCESS MONITORING FEED

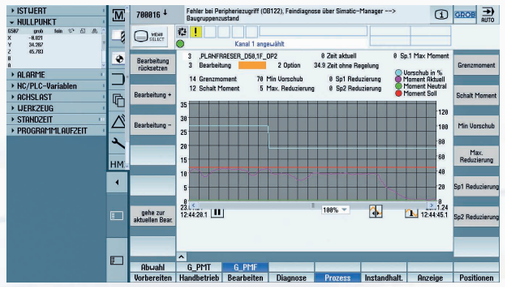
Monitor and control the feed rate and the maximum torque during machining. The adjustable range is between 50 % and 200 % of the programmed feed rate.

FUNCTION 1



- The machine stops when the preset limit torque is exceeded without controlling the feed rate

FUNCTION 2



- If the specified torque is exceeded, the feed rate is reduced to the minimum feed rate on a percentage basis

FUNCTION 3

- The control system tries to reach the target torque. This calculates the resulting feed rate override, which is limited by specified maximum and minimum feed rate values

Example illustration

GROB-WERKE

CHIP-IN-SPINDLE DETECTION SYSTEM

With the GROB chip-in-spindle detection system (SiS), you have control over tool clamping and ensure part and process quality in automated manufacturing systems. The SiS system enables reliable monitoring by means of the following factors:

DETECTION OF DEFORMATIONS WITHIN A FEW MILLISECONDS

- Inspection and detection of chip and foreign body errors between flat and tapered surfaces
- Automatic interruption if a clamping error is detected
- System independently takes fault clearance measures

AUTOMATIC TOOL CLEANING WITH BRUSHES OR COMPRESSED AIR

- The cleaning cycles can be programmed
- If the fault cannot be corrected, the machine stops automatically and the operator can manually remove the tool from the motorized spindle for inspection

Example illustration

SPIKE® PROCESS FORCE MONITORING SYSTEM

With the Spike® process force monitoring system, you have full control over the process force and ensure outstanding part and process quality in your machining processes.

MONITORING OF BENDING MOMENTS AND PULL-IN FORCES

- Based on these values, the system detects and monitors: Tool wear, incipient tool breakage, vibrations, and rattling
- Tool change planning based on system data
- Reduction of tool damage and optimal utilization of the tool life
- Continuous monitoring during the machining process

THE GROB CHIP-IN-SPINDLE DETECTION SYSTEM (SIS) IS ALWAYS INCLUDED IN THIS OPTION

Example illustration

CERATIZIT

TOOLSCOPE – ASSISTANCE SYSTEM

The comprehensive hardware and software system offers you a wide range of applications that give you access to and allow usage of the recorded machine, operating and process data. The ToolScope assistance system is implemented by an industrial PC (IPC) installed ready for operation in the electrical cabinet on a DIN rail.

- Fully automated process control in real time
- Machine protection through permanent monitoring of the machine status
- Documentation and digitalization of the entire machining process

PROCESS MONITORING TS-PM

ToolScope automatically learns the optimum sequence for your process and then responds to deviations in the machining.

- Maximum adaptability of the monitoring strategy for every process
- Detects tool breakages and deviations in the process
- Reduces subsequent damage to the tool, part, and machine
- Quick and easy adaptation to the manufacturing processes
- Enables unmanned manufacturing with 100 % parts monitoring

WEAR DETECTION TS-WEAR

ToolScope detects worn tools based on the average process force.
This ensures that the tool's reserves are fully utilized without risking a tool breakage.

- Reduces tool costs/tool breakages
- Increases machine availability
- Optimizes tool use

COLLISION MONITORING CD-XDIM

The CD-xDim collision monitoring detects impact collisions using acceleration sensors and responds within <1ms. The fastest possible response reduces damage to the machine and part.

- Reduces damage to the tool and part
- Reduces repair costs
- Reduces machine downtimes
- Documents collisions

PACKAGE 3

- TS-PM:
  For monitoring all processes and tools in real time
- TS-WEAR:
  For determining wear limits for a tool
- CD303:
  For monitoring impact collisions in rapid travel and vibrations in the process

PACKAGE 1

- TS-PM:
  For monitoring all processes and tools in real time
- TS-WEAR:
  For determining wear limits for a tool

ADAPTIVE EXPANSION OPTIONS TS-AFC

The feed control speeds up the process, saving up to 25% of the cycle time while also protecting the tool from overload.

- Standard parameters individually adjustable for every process
- Increases tool life and machine availability
- Optimizes the processes and protects the machine

Example illustration

HEIDENHAIN TNC – Option 40

DYNAMIC COLLISION MONITORING

This dynamic collision monitoring watches for potential collisions of machine components such as the motorized spindle and tilting rotary table.

- DCM Collision is effective for CNC programs and manual movement of the machine axes
- Immediate error message on the screen if a collision is imminent
- The operator can view all defined collision objects on the screen of the machine control system
- Collision objects are displayed in color

Example illustration

GEMCMS by MARPOSS

MACHINE PROTECTION SYSTEM AND COLLISION DETECTION

The system operates independently of the NC control system and triggers various stop reactions as required to prevent machine, tool and clamping fixture damage.

It is activated when the machining center is switched on and is effective both during the execution of NC programs and during manual movements of the machine axes. It offers three different operating modes, standard, heavy, and light machining, for which up to three limit values can be defined each.

- Permanent monitoring – always active
- Event memory with date and time if set limits are exceeded
- Tracking and analysis of saved entries
- Fast alarm output to stop the drives

USER-FRIENDLY SCREEN

- On the machine control panel

VISUALIZATION

- Of all sensor limit and measured values

LIMIT VALUES

- Easily defined

Example illustration

Technology options

AVAILABILITY AT A GLANCE!

AVAILABLE MACHINES	G350a / G550a		G150 / G350 / G550 / G750		G350T / G550T / G750T		G440 / G640 / G840
CONTROL SYSTEM	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**
PROCESS MONITORING							
GROB process monitoring	○	—	○	—	○	—	○
GROB chip-in-spindle detection system	—	—	○	—	—	—	○
GROB Spike® process force monitoring system	—	—	○	—	—	—	○
CERATIZIT ToolScope assistance system: CERAsmart	○	○	○	○	○	○	○
Dynamic collision monitoring DCM Collision HEIDENHAIN TNC – Option 40	—	○	—	○	—	○	—
Machine protection system GEMCMS and collision detection from MARPOSS	○	○	○	○	○	○	○

○ Option — Not available
Subject to technical changes without prior notice

Accuracy

OUR TECHNOLOGIES SET NEW STANDARDS!

Achieve the highest levels of accuracy and quality in your manufacturing with our advanced technology options. We understand that precision is the key to success in any industry – that's why we provide the solution you need!

Our state-of-the-art, innovative technologies deliver unbeatable accuracy. Every cut, every machining and every shaping is done with absolute precision and repeatability.

- UNSURPASSED QUALITY
  Achieve flawless end product quality that will impress your customers
- EFFICIENT MANUFACTURING
  Reduce rejects and improve productivity by requiring less rework
- COST OPTIMIZATION
  Minimize material waste and keep operating costs to a minimum
- RELIABILITY
  Rely on our technology options to deliver outstanding performance even in demanding environments

OUR PORTFOLIO

#G350a #G550a
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#G350T #G550T #G750T

GROB-WERKE

GSC CLASSIC

GSC Classic enables precise calibration of the swivel axes and the perpendicularity of the main axes* to ensure optimum machining accuracy. Our innovative indicator measurement provides feedback within seconds on whether the machine needs to be warmed up or recalibrated. The 5X-Check also provides a detailed measurement of the spatial accuracy of your machine. If probing errors occur during calibration, the machine automatically stops** and thus avoids rejects. User-guided dialogs ensure that the operator always knows exactly what the next step to perfect accuracy is.

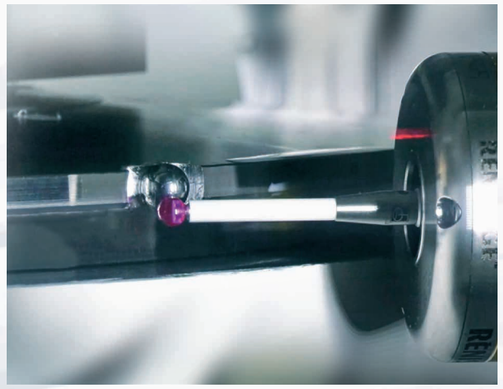
- Calibrates both swivel axis errors and the perpendicularity of the main axes
- Fully automatic calibration with non-removable calibration sphere (without operator interaction, e.g., for pallet change)
- Measurement of spatial accuracy using 5X check
- Fast determination of machine accuracy by means of indicator measurement
- Application via user-guided dialogs
- Detection of sensing errors prevents miscalibration
  (only with SIEMENS control system and high-precision touch probe, e.g., RMP600)

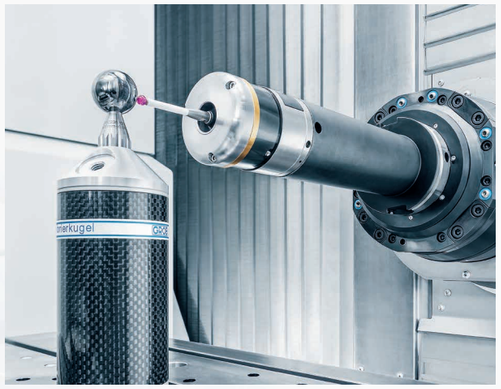
*Only for 5X machines **Only in combination with Renishaw strain gauge probes such as RMP400

GSC ADVANCED

GSC Advanced makes the calibration of your machine even more intuitive and efficient. This option enables your machine to detect the need for calibration fully automatically and to perform a precise adjustment by using the permanently installed calibration sphere – completely without user intervention, even during a pallet change.

- Expansion of GSC Classic to make machine calibration even more intuitive and take it to the next level
- The machine detects the need for calibration fully automatically and uses the non-removable calibration sphere for it
  (without operator interaction, e.g., during pallet change)





GROB KINEMATICS SET

All the necessary measuring equipment for the precise calibration of your machine or touch probe is combined in this case. One set is sufficient for all your machines, as the parts are only used during calibration.

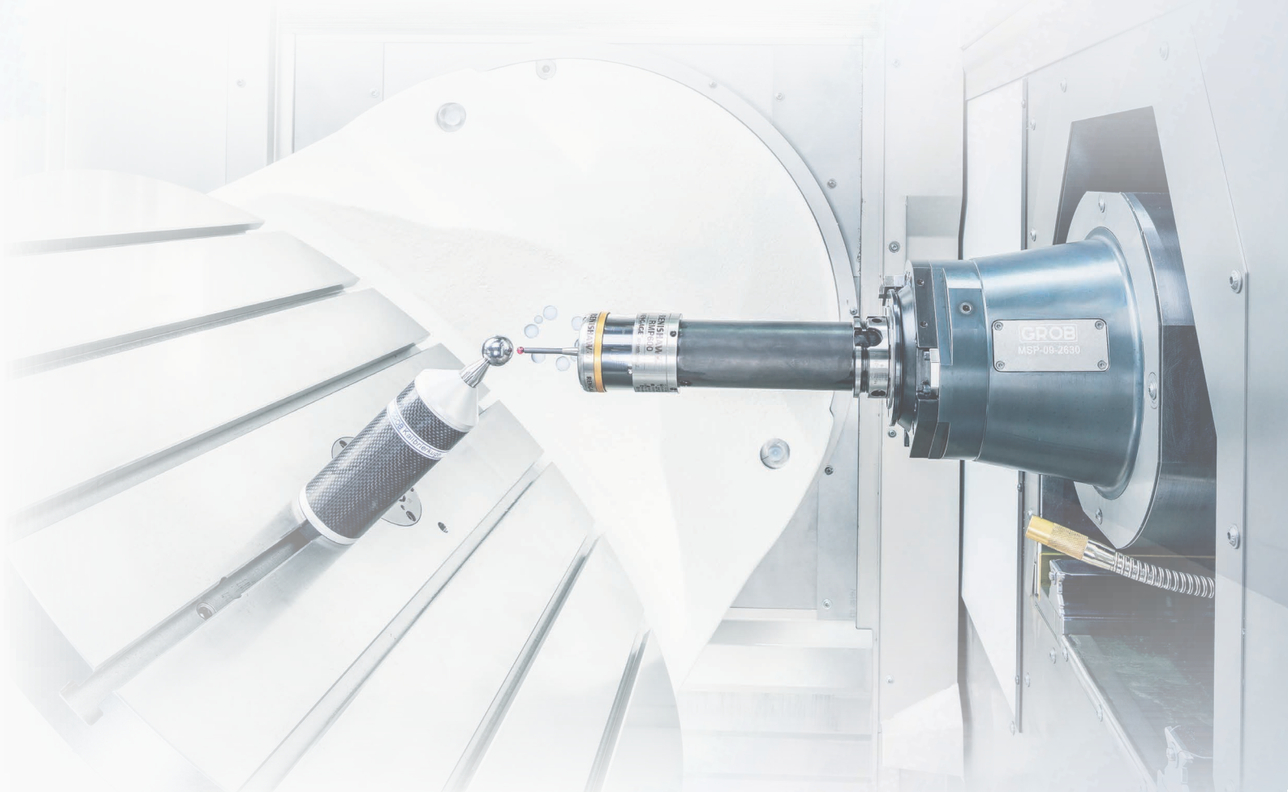
- One or two carbon magnetic bases*
- One or two high-precision gauge balls for screwing into the magnetic base*
- One lever type dial indicator for adjusting the concentricity of the probe tip
- Holder for mounting the lever type dial indicator on the magnetic base
- Device for calibrating the touch probe

*4-axis machines: 1; 5-axis machines: 2

GSC TABLETOP HEIGHT

As part of the GSC package, this suboption allows you to adjust the distance between the table surface and the center of rotation of the A-axis. Especially in machines that are connected via a linear pallet storage system (PSS-L), it is often necessary that each pallet can be used in each machine. Since the distance can vary minimally on each machine, individual zero points are required.

With GSC Tabletop Height, you can compensate for these mechanical differences and ensure that the same zero points can be used in all machines. The same compensation technology is used as in the GSC. The compensation can balance out deviations of up to approx. 50 µm.



SIEMENS and HEIDENHAIN

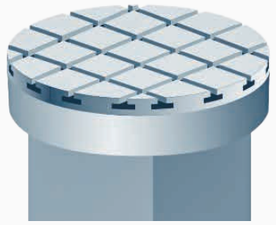
LOAD-SENSITIVE DRIVE TUNING

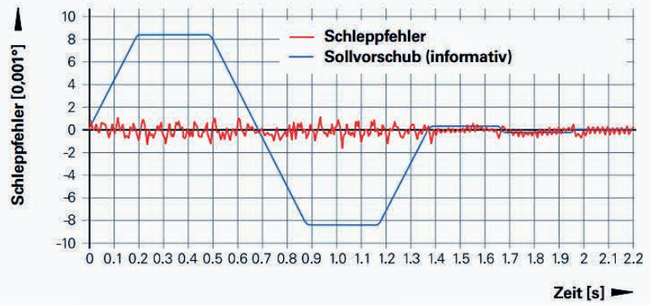
Our software determines the optimum drive and pilot control parameters for the A-, B- and Y-axis for each part based on the weight. These part-specific settings are stored and recalled during the machining process.

BENEFIT FROM THE FUNCTIONS OF LOAD-SENSITIVE DRIVE TUNING LST (LOAD SENSITIVE CONTROL, SIEMENS) AND LAC (LOAD ADAPTIVE CONTROL, HEIDENHAIN):

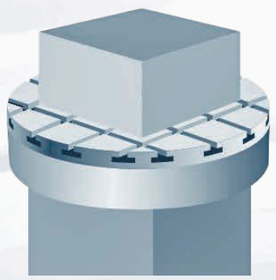
- Determination and storage of optimum controller settings based on the inertia of the part
- Especially suitable for customers with a variety of parts of different dimensions and weights
- Load-dependent switching of the parameter sets for the swivel axes (A- and B-axis) and the Y-axis
- Each parameter set can be assigned to a specific part
- Optimal drive parameters ensure the highest machining quality
- The machine movements are adapted to the part weight
- No rocking of the axes

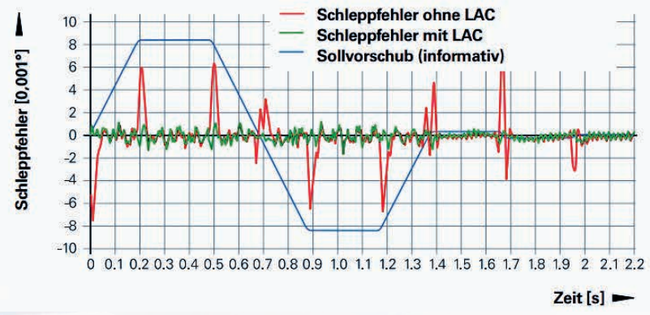
LAC – LOAD ADAPTIVE TUNING OF CONTROL PARAMETERS





Optimum pilot control for rotary table without load with tracking error within the tolerance range (± 0.001°)





Load changed: without LAC: with unchanged pilot control, the tracking error is outside the tolerance range (± 0.008°);
with LAC: with pilot control with active LAC, the tracking error is within the tolerance range (± 0.001°)

GROB-WERKE

WAY COORDINATE MEASURING SOFTWARE

With WAY, you can position your rough parts just as you would on dedicated measuring machines – without the need for rough part alignment via a clamping fixture. Freely select the clamping points and optimize your manufacturing process.

Thanks to WAY, geometric elements with any number of points can be precisely probed and optimally fitted via Best Fit. The additional sensing points also enable you to determine the shape accuracy, for example for roundness. The software detects any inaccuracies in the rough parts directly on your machine and automatically compensates for them during machining. You get precise and error-free production, without additional effort due to complex clamping fixtures.

UNCOMPROMISING PROCESSES

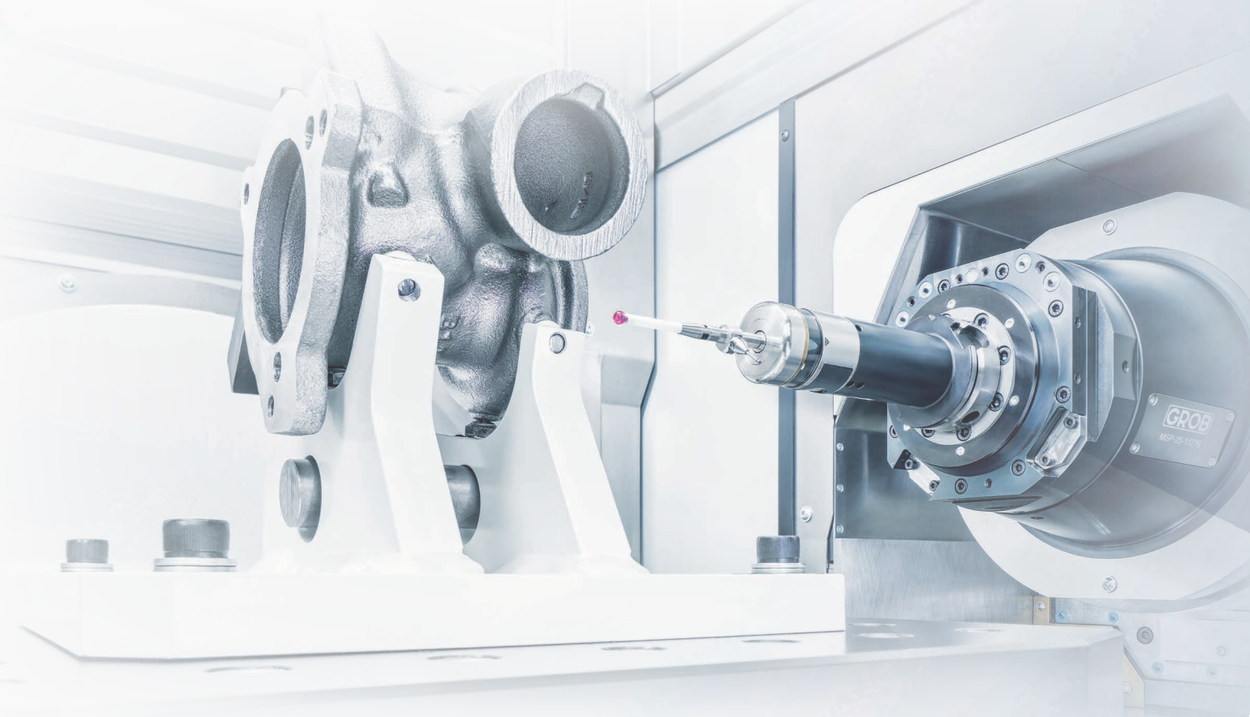
You receive unimaginable process design possibilities. The rough parts are positioned as on measuring machines, select the clamping points freely without rough part alignment.

MAXIMUM SAFETY

WAY allows for probing geometric elements with any number of points and fitting them in with Best Fit. The additional sensing points also allow you to determine dimensional accuracy (e.g., roundness). Avoid rejects by stopping the machine early if dimensional accuracy exceeds the tolerance.

BEST COMPONENT PERFORMANCE

Identify rough part inaccuracies directly in the machine to compensate for them during machining.



Technology options

AVAILABILITY AT A GLANCE!

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CONTROL SYSTEM	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**
ACCURACY							
GROB GSC CLASSIC (swivel axis calibration)	○	○	○	○	○	○	○
GROB GSC ADVANCED	○	○	○	○	○	○	○
GROB KINEMATICS SET	○	○	○	○	○	○	○
GROB GSC Tabletop Height	○	—	○	—	○	—	○
Load Sensitive Tuning SIEMENS Sinumerik	○	—	•	—	•	—	○
Load Adaptive Control HEIDENHAIN TNC	○	○	—	•	—	•	—
GROB WAY coordinate measuring software	○	—	○	—	○	—	○

• Standard ○ Option — Not available
Subject to technical changes without prior notice

Productivity

INCREASE YOUR PRODUCTIVITY WITH OUR HIGH-PERFORMANCE TECHNOLOGY OPTIONS!

Are you striving for efficiency and want to optimize your manufacturing processes? Our advanced technology options are the solution you are looking for!

Thanks to our innovative technologies, we take your productivity to a new level. Every operation is performed with incredible speed and precision, so you can achieve your production goals with ease.

- HIGHER OUTPUT
  Increase your production capacity and handle larger order volumes without compromising on best quality
- EFFICIENT PROCESSES
  Reduce downtime and optimize material consumption to cut costs and save time.
- RELIABILITY
  Rely on robust and durable machine tools that work reliably even in demanding environments.

OUR PORTFOLIO

#G350a #G550a
#G440 #G640 #G840
#G150 #G350 #G550 #G750
#G350T #G550T #G750T

GROB-WERKE

FILE INPUT OUTPUT

With FIO you can perform a wide variety of actions directly from the NC program.

Read and write lini files with extensive file operations. Create custom user queries with pop-up dialogs to get specific information. Design elaborate text formatting and output results to text windows or text files.

- Read and write access to lini files enables extensive file operations
- Option to create individual user queries
- Use of pop-up dialogs for the targeted collection of specific information
- Ability to structure complex text formatting
- Presentation of results in text windows without saving in text files possible

User name query

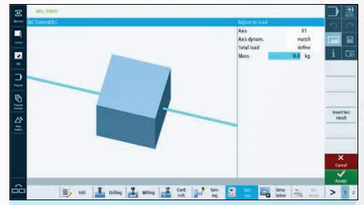
ACTUAL diameter query

SIEMENS

SINUMERIK M-DYNAMICS

Take advantage of innovative setup and tool management features, advanced multi-axis functionality, and graphical programming interfaces for simplified operation. Achieve precise results with high-speed cutting functions, advanced surface, spline interpolation, and the ability to perform shell surface interpolation.

- DIN/ISO programming offline via CAD/CAM system or at the machine
- Measuring functions for parts and tools during the machining process
- New, optimized motion control including tool and program management
- Advanced multi-axis functionalities, e.g., the integrated TRAORI programming (Kinematics Transformation Tool Center Point)
- Simplified programming of parts through a graphical programming interface
- Innovative technology/automatic measuring cycles and efficient high-speed cutting functions are integrated
- Advanced Surface
- Spline, transmit, and shell surface interpolation
- Measuring cycles for the touch probe enable measurement of edges, corners, holes, pockets, studs and planes in JOG and automatic mode
- Residual material detection
- 3D simulation to support programming and quotation costing
- Tool radius compensation



GROB-WERKE

ENERGY EFFICIENCY PACKAGE

Our 5-axis universal machining centers with SIEMENS control system offer you numerous functions to reduce power consumption. We minimize energy requirements through intelligent shutdown strategies for machine cooling, chip conveyors and fans.

- Optimized control strategy for motorized spindle and axis drives
- Less power consumption with the same performance
- Targeted use of energy with time-controlled shut-off
- Users retain control of the energy consumption
- Cost saving through optimized energy efficiency and targeted machine use

OPC UA INTERFACE

Optimize your production processes with the precise machine data provided by our interface. Effortlessly transmit the machine status with the three reliable GROB standard signals, keep track of the last selected program, and control the potentiometer setting for feed rate and spindle speed – all in real-time and as a percentage!

- Fast detection and response to important alarm classifications
- Seamless communication between the control system and external system
- Offers unmatched efficiency in the workflows
- Data exchange between the control system and external system
- Prevent overloading of the interface
- Individual adjustment to customer needs

SIEMENS

EES FUNCTION

Discover the advantages of SIEMENS' EES (Execution from External Storage) function, which allows you to call up and execute large NC programs directly from an external data carrier.

- The size of your part programs is limited only by the capacity of the external storage medium.
- You benefit from uniform syntax for the subroutine call, regardless of the subroutine location. An EXTCALL call is no longer required.
- Restrictions that exist when using "Process from External" and "Process from External Subroutines (EXTCALL)" are removed. This now allows backward jumps, wide jumps and long program loops (goto/gotof/gotob).
- 10 GB memory

BLUM

LASER ORIENTATE TOOL

Discover the advanced technology cycle Laser LC50 OrientateTool from BLUM – the perfect complement to the standard measuring cycles of the BLUM Laser LC50 software, which is available for most control systems. This cycle provides a special measurement cycle for tool alignment based on spindle orientation (also for tools with one cutting edge).

- Precise tool alignment based on spindle orientation
- Compatibility with selected machine control and measuring systems

SIEMENS

SINUMERIK: DXF CONVERTER

With this software you can extract part contours or machining positions and use them for your NC program. The use of the DXF converter depends on your machine control system. Currently, data from the following machine control systems is supported: SIEMENS 840D sl as of software version 4.7.

- Import DXF drawings directly to your machine control system
- Extract precise part contours or machining positions
- Simplify the workflow and streamline your programming processes
- Experience seamless integration of DXF files into your machine control system and increase the efficiency of your manufacturing operations

HEIDENHAIN TNC – Option 42

CAD IMPORT

With the CAD Viewer you can display 2D and 3D models directly on your TNC, regardless of the format (e.g., DXF, Step, or IGES). With the CAD import option, you can easily transfer contours and machining positions from these CAD files directly into your plain text program.

AVOIDANCE OF INPUT ERRORS

- And minimization of potential risks

REDUCTION IN PROGRAMMING EFFORT

- And valuable time savings

VISUALIZATION OF OWN MODELS

- On the existing TNC with CAD Viewer and seamless integration of contours as well as machining positions in the plain text program

Example illustration

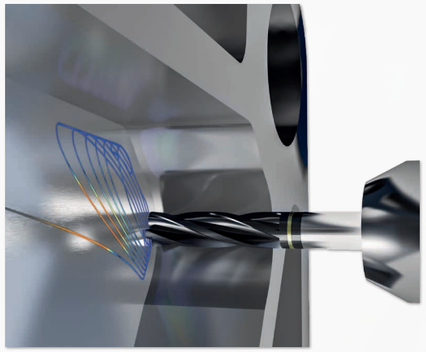
HEIDENHAIN TNC – Option 167

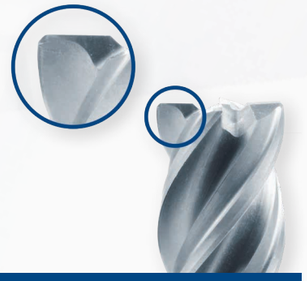
OPTIMIZATION OF CLEARING PROCESSES

With OCM (Optimized Contour Milling), you can achieve process-reliable milling with maximum cutting performance by optimally adapting the cutting data to the properties of the tool and part material.

Thanks to the integrated cutting data calculator and an extensive material database, you can specifically adapt the automatically calculated cutting values to the mechanical and thermal load of your tool.

- Reduce the thermal load on your tool and improve chip removal
- Achieve higher machining speed and significantly reduced tool wear
- Produce more chips in less time and thus increase the efficiency of your machining processes





CONVENTIONAL MACHINING	
S5000, F1200 [mm]	a_p = 5.5
Path overlap [mm]	5
Machining time [min / s]	21 / 35
Tool: Solid carbide end mill Ø [mm]	10
Part material	1.4104

MACHINING WITH OCM	
S8000, F4800 [mm]	a_p = 22
Path overlap [mm]	1.4
Machining time [min / s]	6 / 59
Tool: Solid carbide end mill Ø [mm]	10
Part material	1.4104

HEIDENHAIN TNC – Option 45

ADAPTIVE FEED CONTROL

Adaptive Feed Control (AFC) adjusts the conveyor feed in real-time based on the spindle power and other process data.

OPTIMIZE MACHINING TIME

- By adapting the conveyor feed to the current process conditions

TOOL MONITORING

- Minimize the risk of tool breakage and wear

EXTEND THE SERVICE LIFE OF THE MACHINE

- Protection of the machine's mechanical systems

Example illustration

GROB-WERKE

EXTENDED TOOLCHANGE

With Extended Toolchange, you can now perform all secondary operations in parallel with the tool change in order to continue machining at lightning speed after the change. Transfer the NC code describing the state after the tool change to the cycle and our software will ensure that this state is set as quickly as possible.

- Shortest chip-to-chip times
- Efficient preparation of axes that are not directly involved in the current process
- No more tedious manual intervention
- Option to preselect the gear stage of the spindle for optimized performance
- Improved cooling with early cutting fluid activation
- Extended Toolchange in mill-turn machines:
  Accelerates the turning spindle to the desired speed during the tool change

CLOSE-TO-SPINDLE TOOL SORTING

With close-to-spindle tool sorting, you can optimally place your tools for the next machining step. This means that the tools are sorted into the tool magazine as close as possible to the main spindle.

- Sorting of tools from the additional tool magazine in parallel with the machining time on the basis of a usage file
- Automatic creation of the usage file during program runtime
- Replacement of sister tools in case of breakage or expired service life
- Re-sorting of tools if the required number exceeds the capacity of the magazine close to the spindle
- Usage test for efficient setup verification

ONE CLICK TOOL CALIBRATION

With our innovative software, setting up and calibrating touch probes or tools becomes as easy as pressing a button. Setting up touch probes is handled fully automatically by the machine through the standard procedure. All settings such as the activation method and the trigger filter are set automatically. In addition, wireless touch probes are automatically coupled with the machine.

- Automatic calibration of touch probes without operator interaction
- The use of gauge blocks for blocking out is no longer necessary
- Calibration for SIEMENS and WAY measuring cycles
- The Ø10 calibration sphere included in the kinematics set is used as a calibration standard
- Complex processes for tool calibration can be saved in the special folder as NC programs
- The calibration process is easy to start with OCTC softkey

MATRIX CODE WRITING/READING

With our software you can create and read data matrix codes in accordance with ECC200. During milling, a special ball nose cutter is used, which cuts small "indentations" into the surface of the part. With our software package and a standard touch probe, these "indentations" can be read out. Alternatively, the pixels can also be created by drilling or needle embossing, although here, too, high demands are placed on the position and flatness of the surface.

- Generation and reading of data matrix codes in accordance with ECC200
- Various technologies for writing matrix codes
- Multiple possibilities for revolutionizing the marking process

HEIDENHAIN TNC

AC KINEMATICS CHANGE

With this innovative tool, seamlessly switching between conventional AB machine kinematics (SIEMENS, FANUC) and the precise AC machine kinematics of the HEIDENHAIN machine control system is possible.

- Significantly reduced time required for the adaptation of part programs
- Seamless switching between different machine kinematics without time-consuming reprogramming
- Maximum flexibility and efficiency in your CNC production
- Optimization of production times and increase in productivity

Technology options

AVAILABILITY AT A GLANCE

AVAILABLE MACHINES	G350a / G550a		G150 / G350 / G550 / G750		G350T / G550T / G750T		G440 / G640 / G840
CONTROL SYSTEM	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**
PRODUCTIVITY							
GROB FILE INPUT OUTPUT	•	—	•	—	•	—	•
Technology package SIEMENS Sinumerik M-Dynamics	○	—	•	—	•	—	○
GROB Energy Efficiency Package	○	○	○	○	○	○	○
GROB OPC UA interface	○	○	○	○	○	○	○
EES function for NC program execution on an external SIEMENS data carrier	○	—	○	—	○	—	○
LC50 Orientate Tool BLUM	○	○	○	○	○	○	—
DXF Converter SIEMENS Sinumerik	○	—	○	—	○	—	○
CAD Import HEIDENHAIN TNC – Option 42	—	○	—	○	—	○	—
OCM Optimized Contour Milling HEIDENHAIN TNC – Option 167	—	○	—	○	—	○	—
AFC HEIDENHAIN TNC – Option 45	—	○	—	○	—	○	—
GROB Extended Toolchange	○	—	○	—	○	—	○
GROB close-to-spindle tool sorting	○*	—	○*	—	○*	—	—
GROB One Click Tool Calibration	○	—	○	—	○	—	○
GROB matrix code writing/reading	○	—	○	—	○	—	○**
AC kinematics change HEIDENHAIN TNC	—	○	—	○	—	○	—

* Only available for machines with additional magazine
** Milling and scanning may be limited due to missing A-axis

• Standard ○ Option — not available
Subject to technical changes without prior notice

Machining / Technology

DISCOVER THE NEXT LEVEL OF PRECISION MACHINING

You want first-class machining results and innovative solutions? Our advanced technology options set new standards in precision and performance!

With our technology, you can achieve exceptional results when machining your parts. Every cut, shape and contour is done with impressive accuracy and speed to take your manufacturing to a new level.

- PRECISION AT THE HIGHEST LEVEL
  Achieve flawless surfaces and dimensionally accurate results that will impress your customers
- EFFICIENT MACHINING
  Maximize production speed and minimize rejects for optimized manufacturing
- VERSATILITY
  Handle a wide range of machining tasks with flexible functions and tool options
- FUTURE-PROOF
  Rely on innovative technology that is continuously developed to keep your production always up to date

OUR PORTFOLIO

#G350a #G550a
#G440 #G640 #G840
#G150 #G350 #G550 #G750
#G350T #G550T #G750T

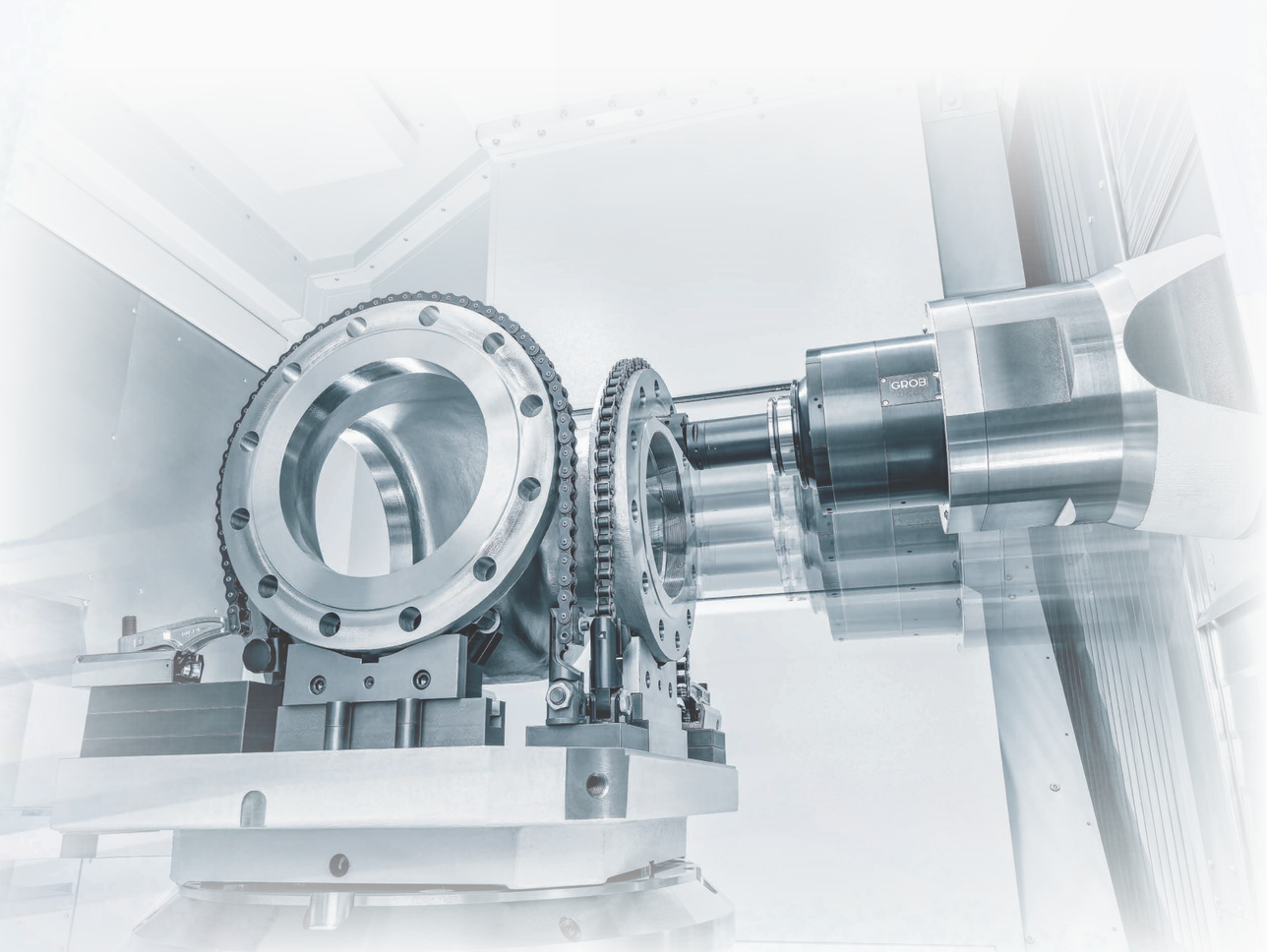
GROB-WERKE

INTERPOLATION TURNING PLUS

Our innovative software solution allows you to perform any turning operation on your GROB universal machining center – even for turning operations that are not coaxial to the B-axis.

The simulation of a diameter axis (transverse slide) and the simultaneous interpolation of X-, Y-axis and motorized spindle open up completely new possibilities for you. Precise and flexible turning operations become a reality.

- Any turning operations
- Simulation of a diameter axis
- Simultaneous interpolation of axes
- Easy programming and handling
- Combination with other spindle operations
- Increased productivity



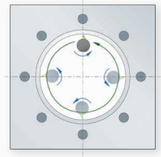
HEIDENHAIN TNC – Option 96

ADVANCED SPINDLE INTERPOLATION

With interpolation turning, your tool cutting edge makes a precise, circular movement. Whether you need outside machining or inside machining, the system ensures that the cutting edge is always aligned with the center of the circle. Flexible adjustment of the circle radius and axial position allows you to create rotationally symmetrical bodies in any desired machining plane.

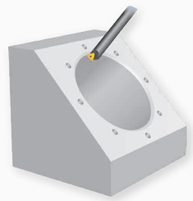
CYCLE 291

- Creation of any rotationally symmetrical bodies with the circular motion of the tool cutting edge



CYCLE 292

- Machine additional rotationally symmetrical contours (without undercuts)
- Enables external machining with orientation towards the center of the circle and internal machining with orientation away from the center



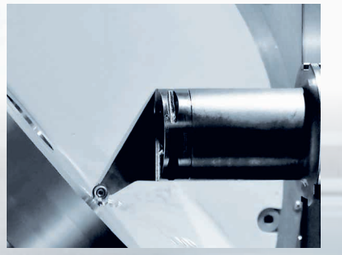
Example illustration

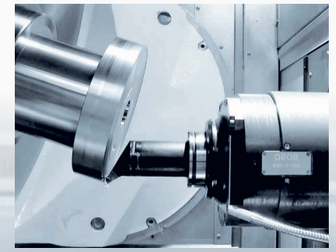
GROB-WERKE

TRAORI TURNING

With our technology, we enable simultaneous interpolation of the linear and rotary axes on our GROB universal machining centers. Experience dynamic alignment of the tool cutting edge to the turned part contour, taking into account tool length and radius.

- Simultaneous interpolation of linear and rotary axes
- Dynamic alignment of the tool cutting edge
- Optimization of the tool cutting edge
- Turning cycle is easy to understand
- Use of short tools for internal and undercut turning
- Longer tool life





GENERAL GEARING CYCLES

With our innovative software solution, you can couple the axes of your machining center like a gear-wheel milling machine. Programming is easily done via NC cycles, so you can create your gearing quickly and efficiently.

- Axes coupled as on a gear wheel milling machine
- Programming via NC cycles
- 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

GEAR SKIVING

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

SPEED FEED TOOLS

Speed Feed Tools – the programming tool for precise speed and feed adjustments. Thanks to the unique sinusoidal speed progression function, you can reduce vibrations and improve the quality of your machining operations.

With SFT's sinusoidal feed progression, you can program a controlled feed progression to break chips and increase machining quality. The cross-block cycle is applicable to all feed axes and allows you to individually adjust the amplitude.

- Standard installation and test on universal machining centers
- Reduction in unwanted vibrations
- Programmable speed variation
- Efficient chip breaking
- Can be adapted to all feed axes
- Seamless switching of rotational speed and feed

Technology options

AVAILABILITY AT A GLANCE

AVAILABLE MACHINES	G350a / G550a		G150 / G350 / G550 / G750		G350T / G550T / G750T		G440 / G640 / G840	
CONTROL SYSTEM	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**	**SIEMENS**	**HEIDENHAIN**
MACHINING / TECHNOLOGY								
GROB INTERPOLATION TURNING PLUS	○	—	○	—	○	—	○	—
Advanced Spindle Interpolation HEIDENHAIN TNC – Option 96	—	○	—	○	—	○	—	—
GROB TRAORI TURNING	—	—	—	—	○	—	—	—
General GROB gearing cycles (gear hobbing / gear skiving)	○/—	○/—	○/—	○/—	○/○	○/○	—/—	—/—
GROB Speed Feed Tools	○	—	○	—	○	—	○	—

○ Option — Not available
Subject to technical changes without prior notice

Pure technology in the smallest space

UNIVERSAL MACHINING CENTERS FOR OUTSTANDING MILLING PERFORMANCE

Our universal machining centers provide practically limitless possibilities for milling parts made of the most diverse materials to all customers in the machining sector.

Whether aerospace, mechanical engineering, die and mold industries, automotive, medical or energy technologies – our 5-axis universal machining centers cover an impressively broad range of possible applications.

- High productivity and process reliability
- Optimized availability and durability
- Excellent maintainability
- Extensive configuration possibilities
- Designed for automation solutions

OUR PORTFOLIO

#G350a #G550a
#G440 #G640 #G840
#G150 #G350 #G550 #G750
#G350T #G550T #G750T

Friendly,
committed, competent

GROB SERVICE

From 24-hour service and a comprehensive range of spare parts and training courses to professional machine maintenance and analysis: The GROB service spectrum offers you a comprehensive range of products and services and is available to you worldwide thanks to our global production plants and service branches.

- Worldwide service network
- Available 24/7/360
- One hotline for everything
- We are right where our customers are

OUR SERVICE PORTFOLIO

#Hotline #Webshop #ServiceAgreements
#SpareParts #RepairCenter #Overhaul&Optimization
#MotorizedSpindleService #GrobTechnicalAcademy

Worldwide throughout the machine service life

GROB – GLOBAL AND INTERNATIONAL

From Bavaria to the world: Since our founding in 1926 in Munich, we as a global, family-managed company have been on a constant growth trajectory developing and manufacturing systems and machine tools. Our customers include the world's leading automotive manufacturers, their suppliers, and renowned companies from the aerospace, mechanical engineering, and other industries. With our production facilities in Germany, Brazil, the USA, China, Italy and India, as well as 16 worldwide service centers and sales branches, we are represented around the globe, ensuring the highest quality.

FOUNDED IN 1926

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

6 PLANTS

16 SALES AND
SERVICE BRANCHES WORLDWIDE

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Bangkok, Thailand

Our global production sites

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São Paulo, Brazil

Bluffton, USA

Dalian, China

Pianezza, Italy

Bangalore, India

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