

ALZMETALL
we drive productivity



MACHINING CENTER **GS 600**

www.alzmetall.com

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EXPLANATIONS/ABBREVIATIONS

AF	Air Foil
AGK	ALZMETALL-Gantry-Concept
E	Efficiency
CDF	Cycle duration factor
FEM	Finite-Elements-Method
FDT	Milling - Turning – Torque-Drive
GS	Gantry Standard
GX	Gantry Special execution
KGT	Ballscrew-Drive
LOB	Laser Surface Machining/Treatment
NPS	Zero Point Clamping System
SDK	NC-Swivel-and-Rotary-Table
T	Torque-Drive
TCO	Total Cost of Ownership
TCP	Tool Center Point
WN	ALZMETALL – Standard Specification

COMPANY INTRODUCTION



ALZMETALL is a company with an international reputation and global activities. For more than seven decades we have been the leader in technology for drilling, milling and casting. Alzmetall products have proven themselves in general machining applications, in the automotive industry, in mould and die business, at the aerospace sector, as well as in many mid-size mechanical engineering enterprises. Our experience is based on over 220.000 machines supplied.

We focus on precision, performance and Quality for all our products. With our own foundry we do not only produce grey cast iron and spheroidal grey cast iron for our own machines, but also are supplier to the machine tool manufacturers and customers worldwide.

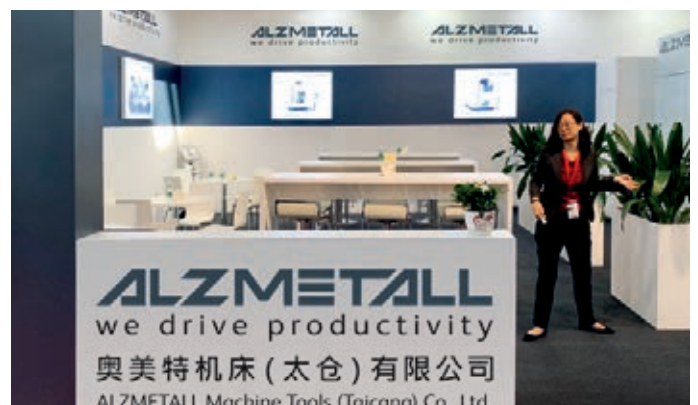
Our open company culture encourages innovation and performance by a continuous innovation towards High Tech and customer benefit for added value.

Developing the GS-series, we offer highly dynamic and extremely rigid machining centers according to our pretensions: „we drive productivity“.

ALZMETALL is holding its own Sales and Service associated Company in China.

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sales-support@alzmetall.cn



AT A GLANCE

Machining Center with options: chip conveyor, cooling unit and coolant filter. These options are either to be installed along the right - or left side of the Machining Center.



5-Axis Machining Center GS 600/5-FDT

HIGHLIGHTS

- ALZMETALL-Gantry-Concept (AGK)
- Grey Cast Iron and Spheroidal Graphite Cast Iron
- Monobloc Travel-System-Carriage with incorporated Box-in-Box-System
- 2-fold Linear Guidance for X-Y-Travel System-Carriage and 4-fold Linear Guidance for Z-Axis with Travel-System-Carriage with integrated Motor-Spindle
- 3-fold Torque-Drives for Swivel-Axis (A-Axis) and Rotary-Axis (C-Axis) at GS 600/5-T und GS 600/5-FDT
- Hybrid-Machining-Applications such as: Drilling/Milling/Turning and Grinding at one Clamping-Set-Up
- Up to 750 kg workpiece weight including Clamping-Set-Up-Device at GS 600E/3 (Static Table)
- Up to 500 kg workpiece weight including Clamping-Set-Up-Device at 5-Axis Machines

FOCUS ON OPERATORS NEEDS

- Access to Machine-Table ergonomically configured at working height
- Workpiece loading by front side, top side and sideways access.
- Mist extraction directly at Machine-Table
- Steeply sloping chip tunnel straight below Machine-Table
- Working-Space flushing with coolant (option)

- Automatic Access-Door feature open/close (option)
- Access to all maintenance units at working height
- Machine control panel, for setting up the tool magazine, can be swivelled to the side. (For optional attachments such as chip conveyors, the coolant system is on the left-hand side).

USER BENEFITS

Streamlined Force-Circuit between workpiece and Cutting-Tool in addition to geometrical and symmetrical configuration of the Carriage-Travel-System.

➤ Performing

- Thermal consistency at Tool Center Point (TCP) at X-Y- level
- Significant reduction of Cutting-Tool costs

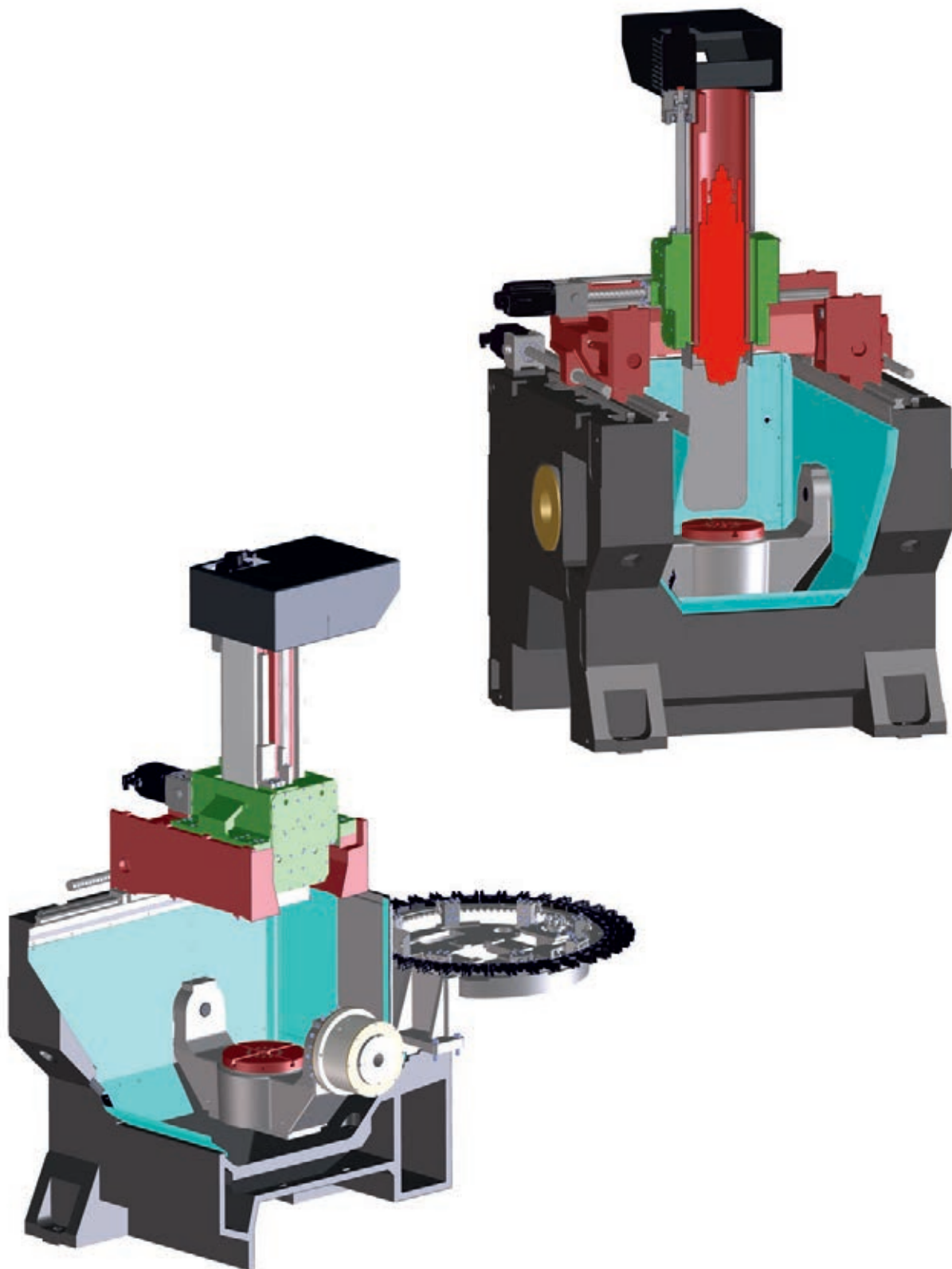
➤ Optimized

- Contour consistency at highest path velocity
- Lifetime of Motor-Spindle

➤ Guaranteed Benefits

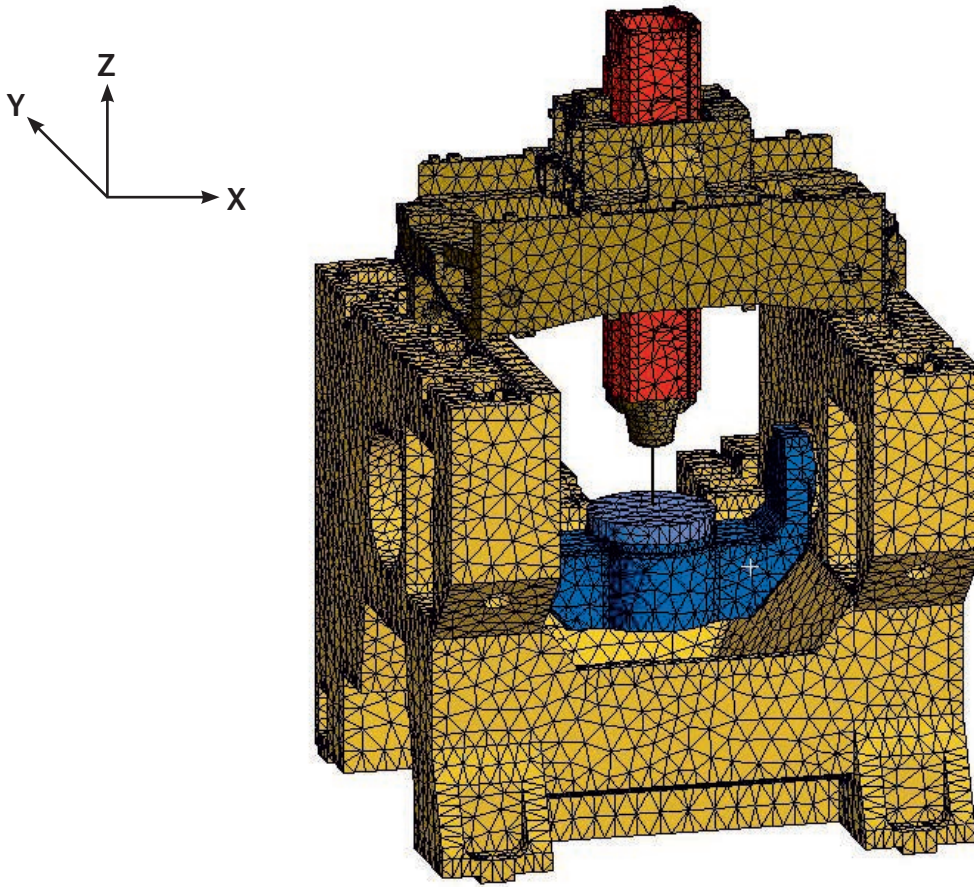
- High-grade Parallel-Path-Precision through two Servo-Drives at Y-Axis
- Considerably reduced Total Cost of Ownership (TCO) over lifetime period of Machining Center

ALZMETALL - THE CONCEPT



RESEARCH AND DEVELOPMENT

DEVELOPMENT BY USING FINITE-ELEMENTS-METHOD (FEM)



FEM generated Structural Model - Point of force-input at TCP and simultaneously at Machine-Table

DEVELOPMENT

The „Finite-Elements-Method“ was applied to obtain the desired static and dynamic characteristics of each individual part of the machine and to investigate the collective rigidity of the Machining Center.

MULTI-ELEMENTS-SIMULATION

During the development process the Finite-Elements-Method was already applied by building the structure of the machine, patterned from the 3D-Volume-Model born from CAD to simulate vibration characteristics. Thus enabling engineers to determine the optimal dynamic rigidity of the machine under terms and conditions of the daily use at the shop floor.

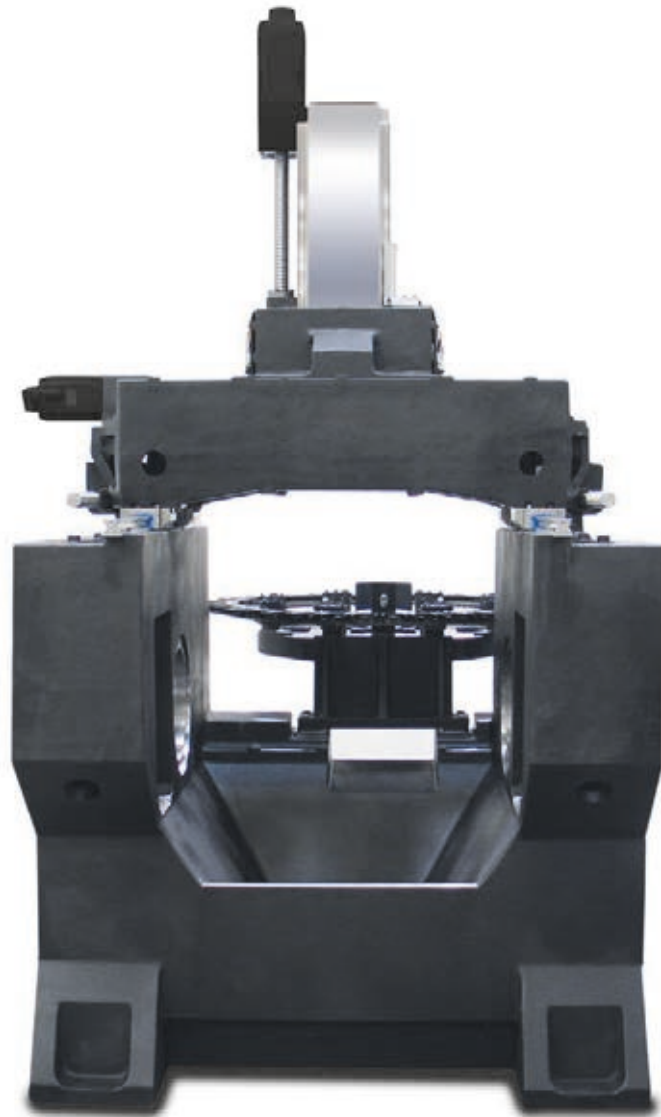
MODAL-ANALYSIS

Results gained by the Multi-Elements-Simulation of entire machine structure and design had to be confirmed at the prototype of the GS-Machining Center by using the Modal-Analysis. The experimental Modal-Analysis procedure is being used to realize and demonstrate the quality of the dynamic machine characteristics under production conditions.

The final test of the Modal-Analysis accomplished at ALZMETALL verified the high degree of performance of the dynamic requirements in reality. Thus the ALZMETALL GS-Series offers comparable Best-in-Class conditions for high dynamic machining applications.



BASIC DESIGN



RIGIDITY, DYNAMIC AND THERMAL SYMMETRY „THAT’S IT WHAT COUNTS“

Extreme rigid, Integral-Basic-Body prepared for:

- Monobloc Travel-System-Carriage for X-Y-Z Axes
- NC – Swivel- and Rotary-Table (A- and C- Axis) or Static-Table
- Disc-Tool-Magazine with 40 Tool Positions, alternative twin Disc-Tool-Magazine with [76] Tool-Positions. [Option]
- Rack-Type Tool-Magazine for [224] Tool Positions [Option].

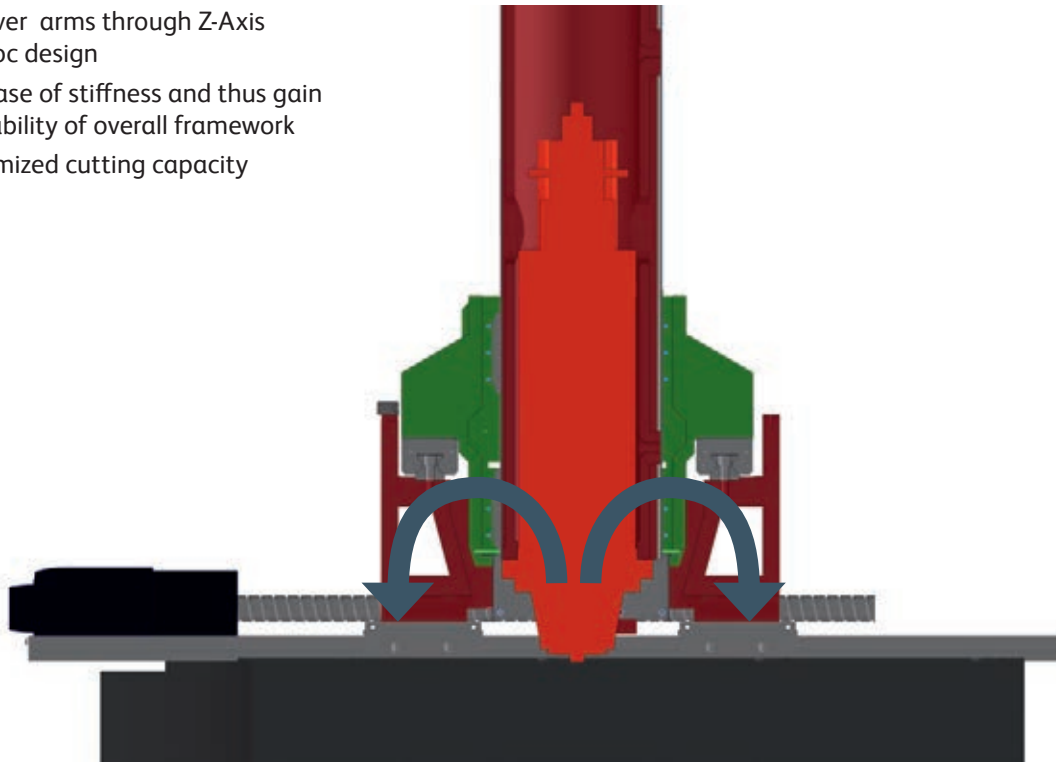
All statically stressed Basic-Machine-Parts made from gray cast iron and all dynamically stressed Basic-Machine-Parts and components made from spheroidal cast iron.



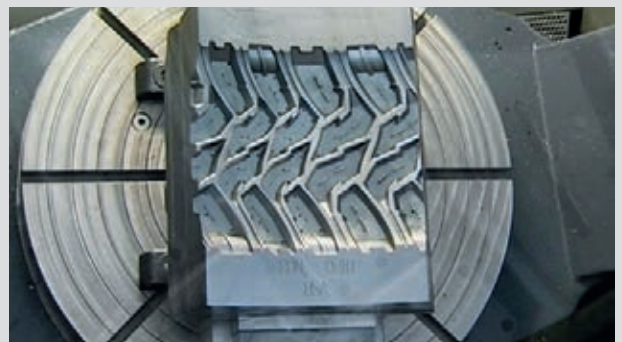
TRAVEL - SYSTEM - CARRIAGE

FORCE TRANSMISSION - SYMMETRY

- Small lever arms through Z-Axis Monobloc design
 - ➔ Increase of stiffness and thus gain of Stability of overall framework
 - ➔ Maximized cutting capacity



- Thermo-Symmetric
- Narrow and direct Force-Circuit
- ➔ Thermal stability
- ➔ High grade stability and stiffness with coexistent weight-optimized Axes-Elements

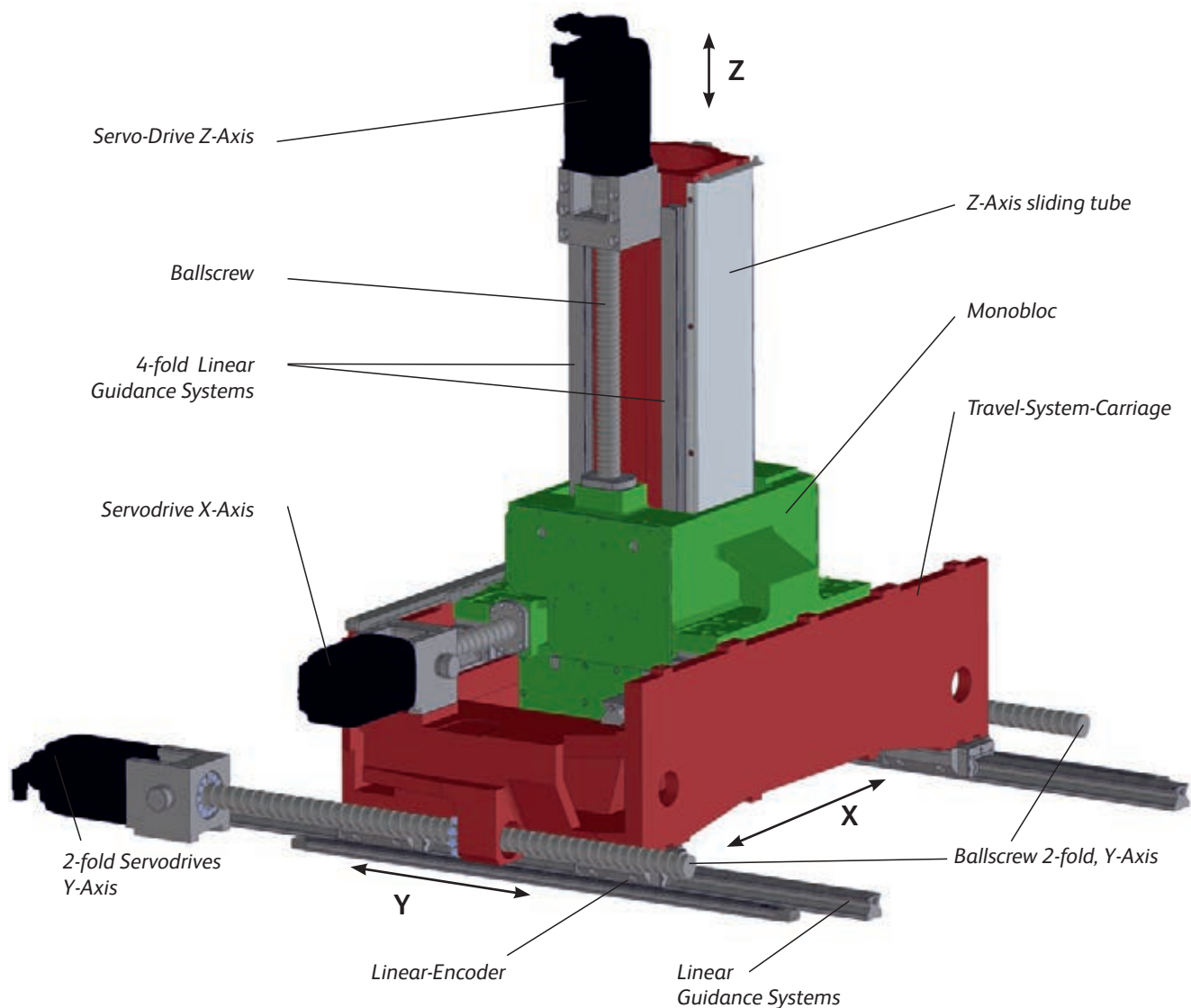


TRAVEL - SYSTEM - CARRIAGE

DESIGN CHARACTERISTICS

Box-in-Box-System:

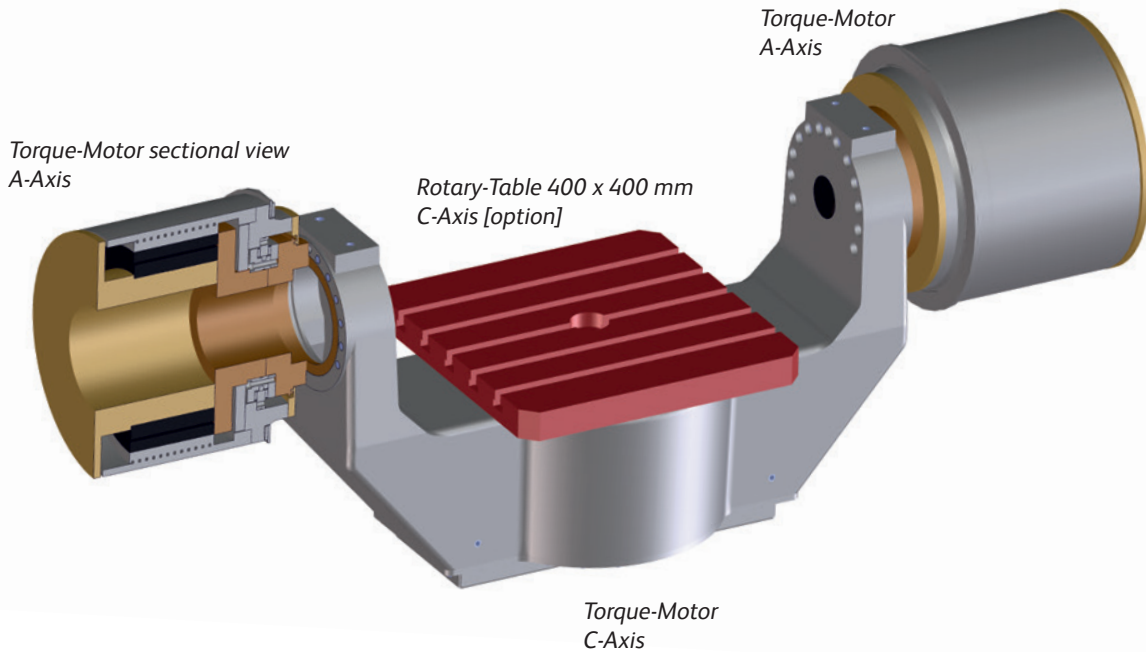
- Frame Side Walls as static basic structure Y-axis. On top mounted Travel-System-Carriage with integrated Z-Axis Monobloc.
 - Dynamically stressed Basic-Machine-Parts and components made from EN-GJS 600 (GGG60).
 - Both Linear-Axis X and Y 2-fold guided, with 4 guiding elements each, Z-Axis 4-fold guided with 8 guiding elements.
- Linear-Axis Y driven by two Ballscrews and two Servo-Drives. X- and Z-Axis each driven by one Ballscrew and one Servo-Drive.
 - ➔ Excellent Axis dynamics
 - ➔ Cutting edge Parallel-Path-Precision
 - ➔ Thermal stability due to geometrical symmetry with Thermo-Symmetric Machine construction



NC - SWIVEL - AND - ROTARY - TABLE (SDK)

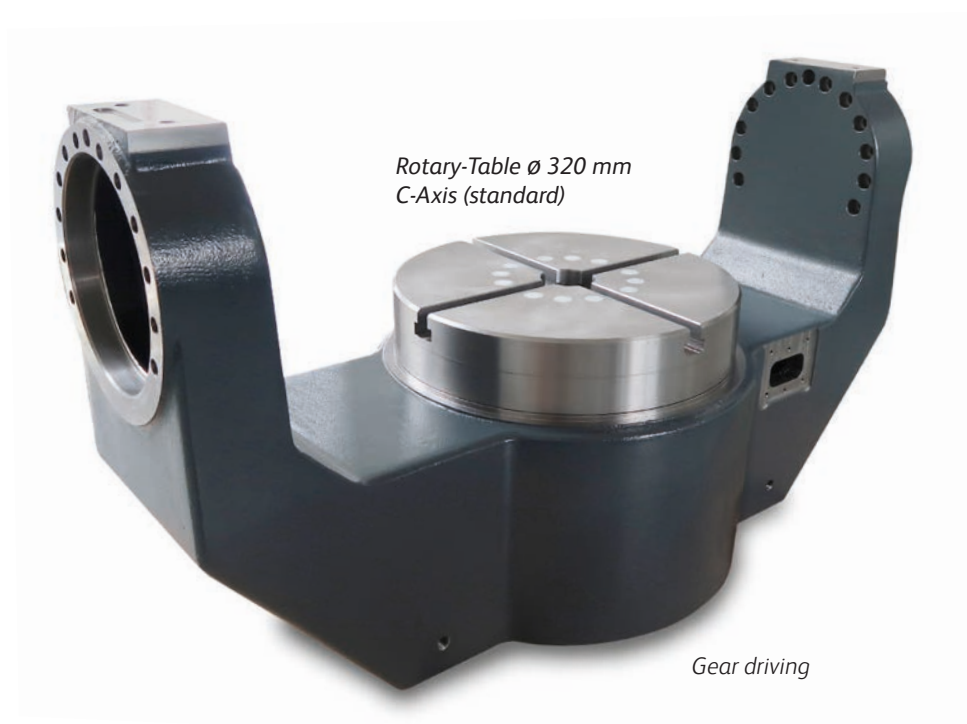
GS 600/5 -T AND GS 600/5 - FDT

- Direct Rotary Drives (Torque-Motors) for high dynamic and oscillating machining – maintenance free –
- Internal Torque-Motor at each frame side wall as NC-Swivel-Axis (A-Axis) – patented –
- NC-Rotary-Table (C-Axis) equipped with Torque-Motor
- Highest swivel and rotational speed with outstanding control quality
- Higher accuracies – no mechanical backlash
- Elimination of friction at Drive-Components
- Wear – and maintenance free delivers reduced Total Cost of Ownership (TCO) over lifetime period of Machining Center



GS 600E/5

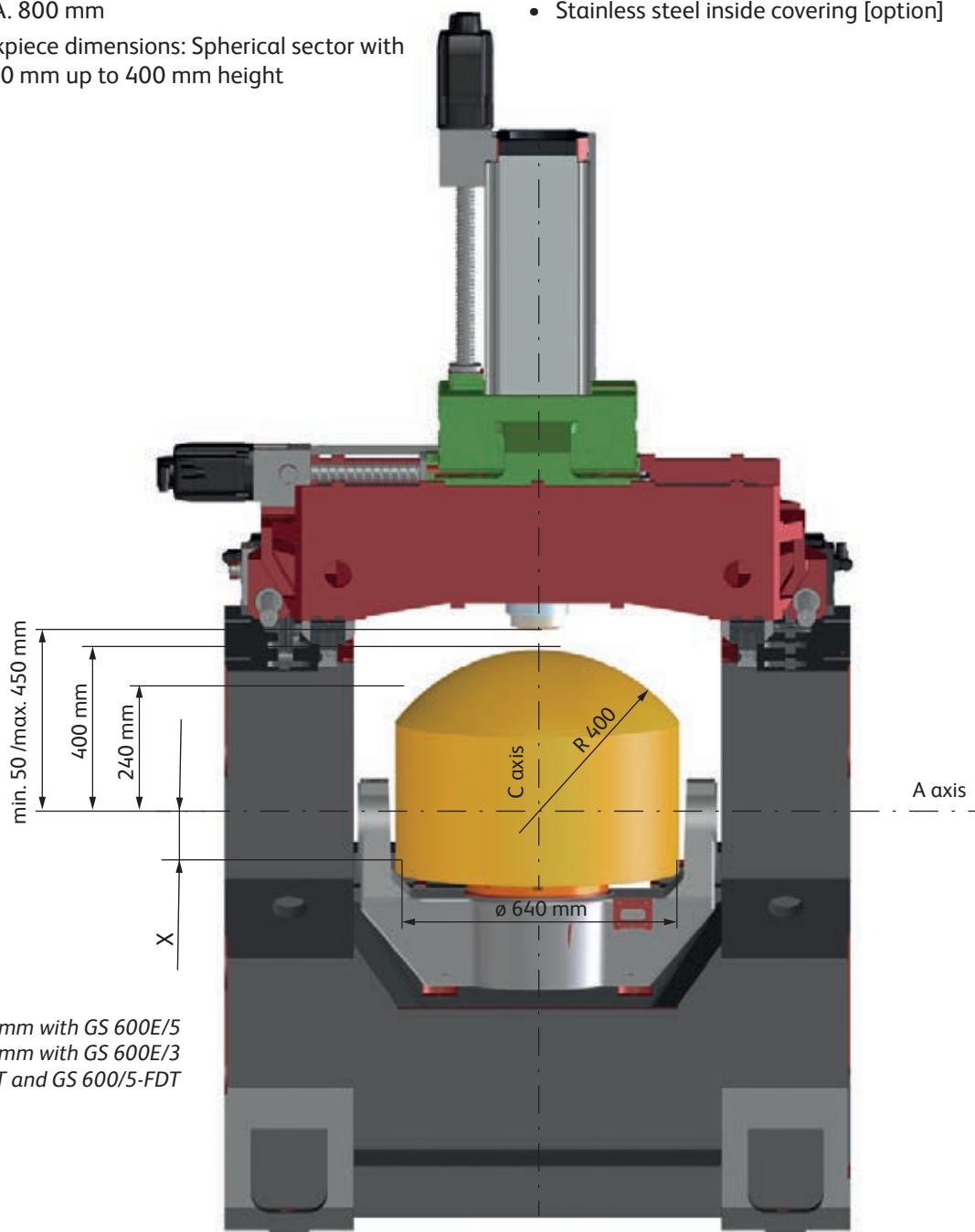
- A-Axes Servo-Drive with DC coupled preloaded gear (cycloidal gear transmission). Counter-Bearing with pneumatic clamping.
- C-Axes Compact-Unit with Servo-Drive, integrated gear (flex spline transmission) and clamping.
- High grade torsion stiffness
- Fast rotary motion of gear through capacious gear transmission at short positional movements of the Axes
- No single-edged wear



WORKPIECE DIMENSIONS - MACHINING SPACE

MACHINING SPACE

- Maximum utilization of Machining Space
- C axis DIA. 640 mm
- A axis DIA. 800 mm
- Max. workpiece dimensions: Spherical sector with Radius 400 mm up to 400 mm height
- Swivel range $\pm 140^\circ$
- Table load max. 500 kg
- Stainless steel inside covering [option]

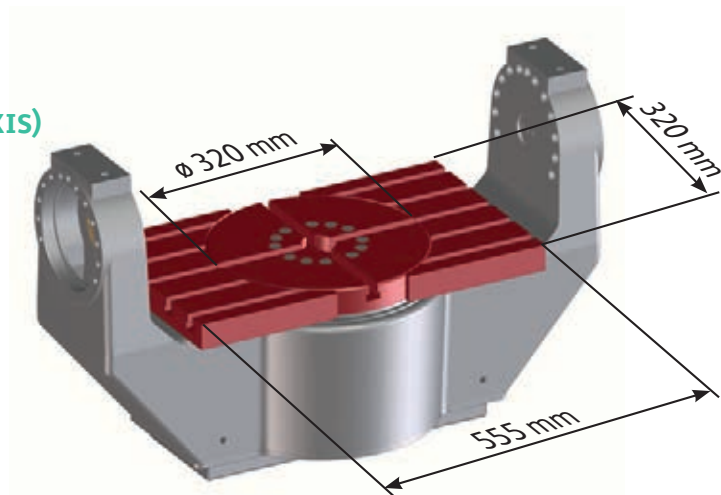


OPTIONS

NC - SWIVEL - (A-AXIS) AND ROTARY-TABLES (C-AXIS)

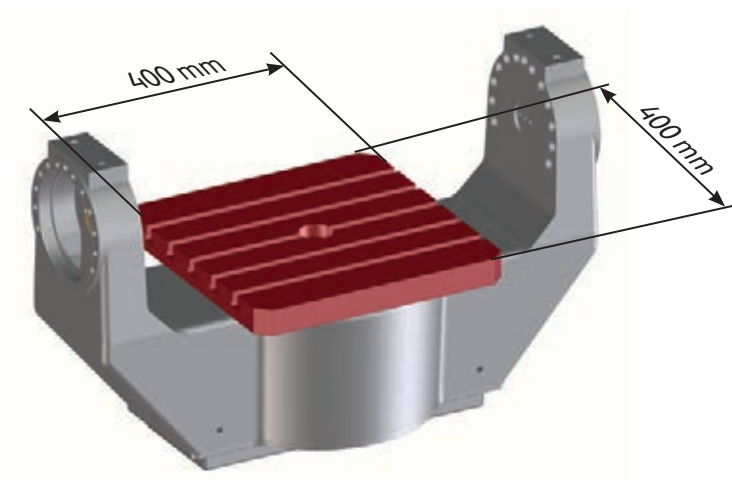
Table-Set ^{1) 2)}

Clamping surface mm	555 x 320
T-slots acc. DIN 650	5 x 14 H12
Configuration	parallel in X-direction
Distance mm	63
Table Load max.	500 kg
Notice	Rotary-Table ø 320 mm



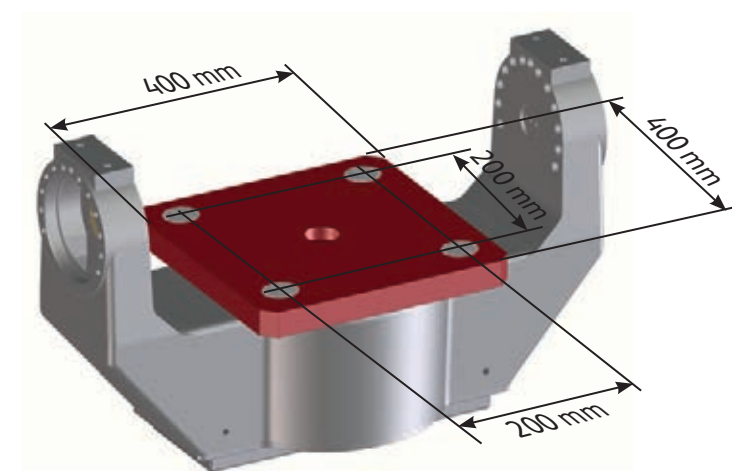
Rotary-Table C-Axis ^{1) 2)}

Clamping surface mm	400 x 400	
T-slots acc. DIN 650	4 x 14 H12 / 1 x 14H7	
Configuration	parallel	
RPM max.	100 ¹⁾	1200 ²⁾
Table Load max.	500 kg	
Distance T-slots mm	63 mm	



Rotary-Table C-Axis with NPS ^{1) 2) 3)}

Clamping surface mm	400 x 400	
T-slots	without	
Configuration NPS	4 x 90 °	
RPM max.	100 ¹⁾	1200 ²⁾
Table Load max.	500 kg	



¹⁾ GS 600/5-T

³⁾ NPS = Zero point clamping system

²⁾ GS 600/5-FDT

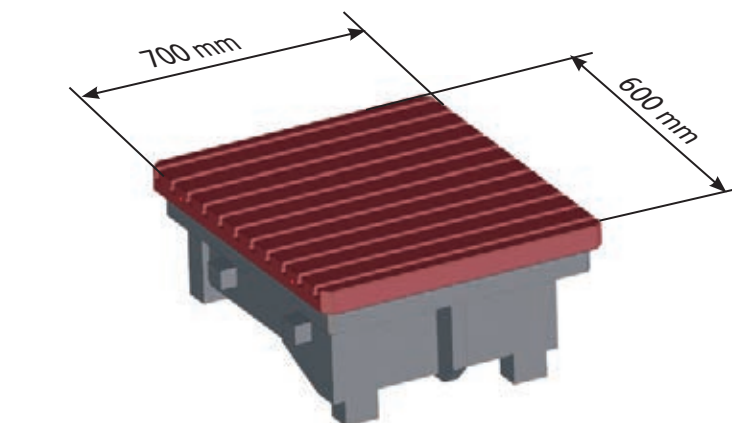
Further designs on demand

GS 600E/3

3-AXIS-MACHINE WITH RIGID FIXED BASE TABLE

Rigid fixed base table

Clamping surface mm	600 x 700
T-slots acc. DIN 650	9 x 14 H12 / 2 x 14H7
Configuration	parallel in X-direction
Distance T-slots	63 mm
Table Load max.	750 kg



OPTIONS

CNC-CONTROLS

Heidenhain TNC 640 (standard)



CNC-CONTROLS

Siemens SINUMERIK 840 D sl



KINEMATIK GAUGING

Accuracy check and compensation

- KinematicsOpt., Heidenhain
- C 996, Siemens



ELECTRICAL HANDWHEELS

- HR 510, Heidenhain
- HR 520, Heidenhain
- Mini-Handwheel, Siemens



3D - TOUCH PROBES

INFRARED TRANSMISSION

- Heidenhain
- m&h Inprocess
- Renishaw
- Blum



MULTIPLE-MEDIA-COUPLING

Rotary Joint at C-Axis-Table, 4 channels,
air and/or fluids on selection



OPTIONS

TOOL SETTING SYSTEM

Brand:
m&h (without mech. Touch Trigger Probes)
Blum (with or without mech. Touch Trigger Probes)



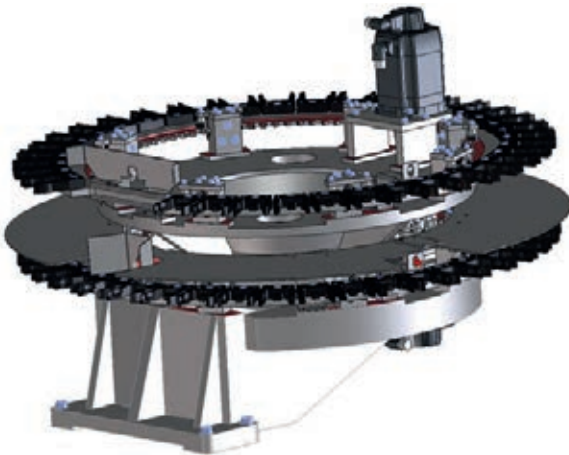
CAMERA AND SCREEN

Camera mounted at Machining Space with transmission to external flat screen or Video-Server for process-set-ups and process-controls



TOOL-MAGAZINES

Twin-Disc-Tool Magazine with 76 Tool Positions



TOOL-MAGAZINES

Rack-Type Magazines designed for 224 Tool Positions



OPERATING SUPPLY UNIT SET'S

Bundle set's A, B, C cooling and cleaning circuit system up to 80 bar high pressure, on selection Scratch-Type or Hinge-Type-Conveyor



OPERATING SUPPLY UNIT SET'S

Coolant Cleaning Unit with Compact-Paper-Filter



OPTIONS

MIST EXTRACTION UNIT

mounted to the left front side,
inside machine covering



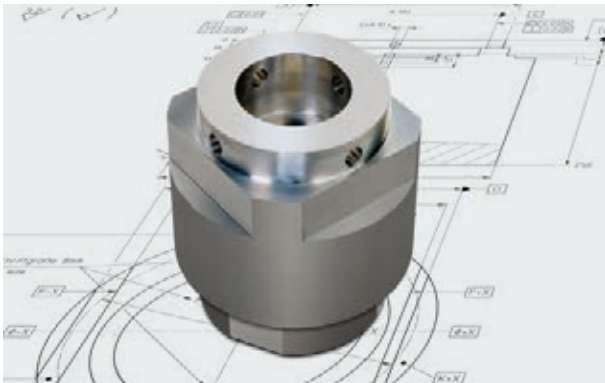
REMOTE DIAGNOSIS AND MAINTENANCE

and for NC-Programming-Support



MACHINING CENTER ACCEPTANCE

Workpiece according to ALZMETALL-Standard, on
selection Customer-Workpiece (option)



SERVICES

NC-Program-Training, Operator-Training for
Heidenhain and Siemens

- Machining Center Installation and Commissioning
- Process development
- Production Assistance
- Service and Maintenance

MORE SERVICES

- Cutting-Tool Setting and Detection
- Mist Extraction Units ¹⁾
- Equipment for Graphite Machining
- Custom-Made Solutions

¹⁾ Optional placement along the right- or left side of
the Machining Center



TECHNICAL DATA

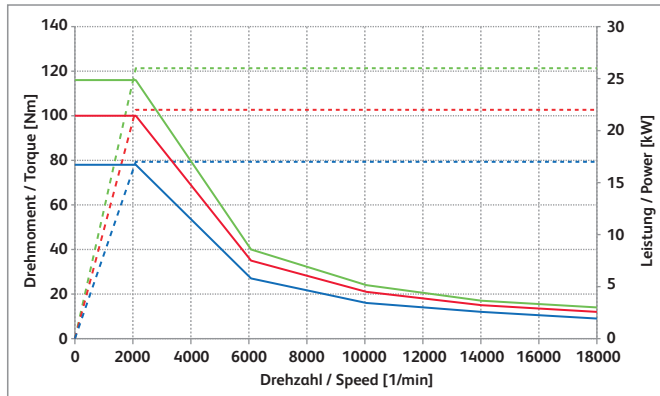
Type	GS 600E/3	GS 600E/5	GS 600/5-T	GS 600/5-FDT
Working Range				
Traverse Path	460 / 600 / 400 mm			
Rigid fixed base table				
Distance Spindle - Table min./max.	150/550 mm			
Clamping Surface (w x d)	600 x 700 mm			
11 T-Slots acc. DIN 650 at X-Direction	9 x 14H12, 2 x 14H7 63 mm distance			
Machine-Table Load	750 kg			
NC-Swivel-and Rotary-Table				
Distance Spindle - Table min/max.		125/525 mm	150/550 mm	
Drives at Swivel- and Rotary-Axis		conventional indirect	Torque direct	
Swivel Range of A-Axis			± 140 °	
Swivel Speed at A-Axis max.		30 min ⁻¹	90 min ⁻¹	
C-Axis Rotation			360 ° unlimited	
C-Axis RPM max.		30 min ⁻¹	100 min ⁻¹	1200 min ⁻¹
Diameter Machine-Table C-Axis		Ø 320, [400 x 400] mm		
T-Slots acc. DIN 650		4 x 14H7		
Star-Shaped Configuration		4 x 90 ° [5 x parallel, distance 63 mm]		
Machine-Table Center Bore		Ø 50 H7 mm		
Table Load max.		500 kg		
C-Axis Rotary-Diameter at A-Axis Center		Ø 640 mm		
A-Axis Swivel Diameter (Swing) at X-Axis Center		Ø 800 mm		
Distance A-Axis-Center to Rotary-Table		75 mm	100 mm	
Feed-Drive-System X-, Y-, Z-Axis				
Digital AC-Servo-Motors, maintenance free				
Max. Rapid Travel X-, Y-, Z-Axis at TCP	30 [75] m/min		75 m/min	
Feeding Force X-, Y-, Z-Axis at CDF 40%	4 - 4 - 5 kN			
Motor-Spindle-Drive				
High Frequency Motor-Spindle				
Cutting-Tool Interface	HSK-A63 [HSK-E50]			HSK-T63
Motor-Spindle-Power at CDF 25% max.	26 [16] [44] [17] kW			13 [24] kW
Variable Speed Range max.	18.000 [10.000] [30.000] [38.000] min ⁻¹			10.000 [18.000] min ⁻¹
Motor-Spindle Torque at CDF 25% max.	116 Nm [102] [40] [11] Nm			80 [92] Nm
Tool-Magazines				
Tool positions, Type	40 Disc, [76 Twin-Disc] [224 Rack-Type]			
Max. Tool Diameter, Chain fully loaded	80 mm			
Max. Tool Diameter, Chain neighbour positions unloaded	130 mm			
Max. Tool Length	300 mm [150 mm Twin-Disc / 350 mm and 175 mm Rack-Type]			
Max. Tool Weight	4 kg [10 kg at Rack-Type]			
Tool-Change-Cycle (approx.)	6 s			
Chip-to-Chip Cycle (approx.)	7 s			
Linear Encoders X-, Y-, Z-Axis	indirect		absolut, direct	
Positional Tolerance TP acc. DIN/ISO 230-2 (VDI/DGQ 3441)	≤ 0,007 mm			
Angle Encoder System A-, and C-Axis			direct	
Machine Weight excl. Options	6800 kg			
CNC-Controls	Heidenhain TNC 640, [Siemens 840 D sl]			

[Option]

MOTOR - SPINDLES

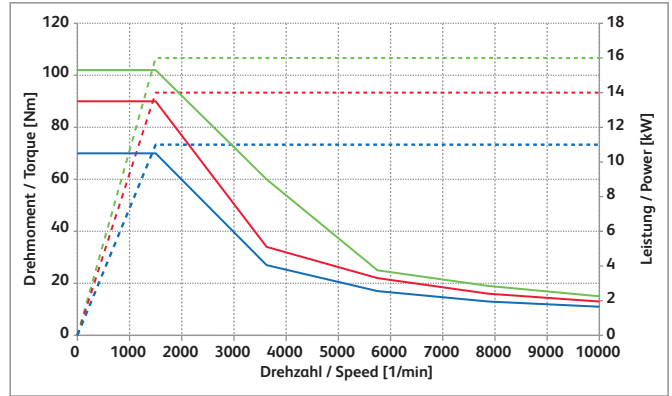
RPM / POWER / TORQUE TRACK RECORD

RPM_{max.} = 18.000 (standard)



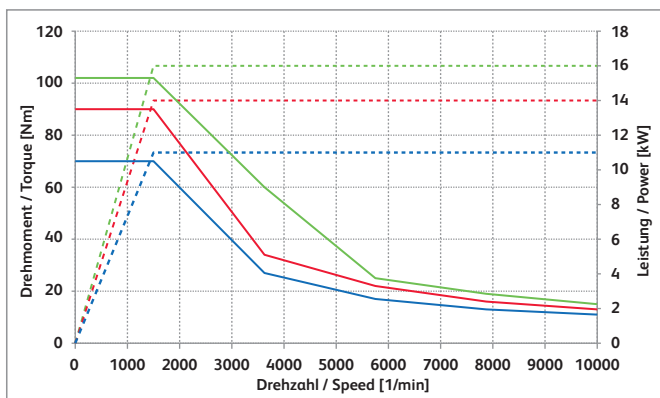
GS 600E/3, GS 600E/5, GS 600/5-T

RPM_{max.} = 10.000 with Hirth-Gear-Indexing (standard)



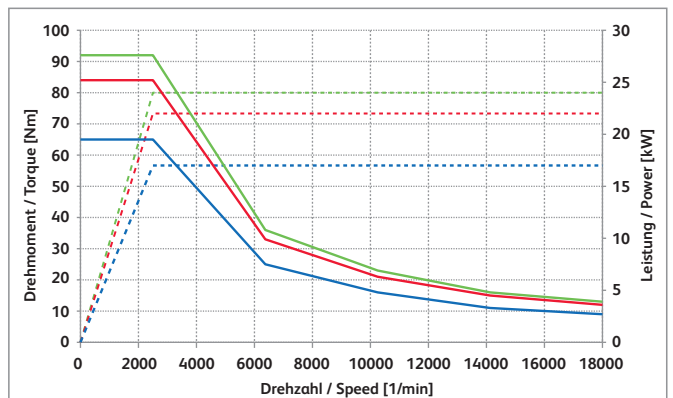
GS 600/5-FDT

[RPM_{max.} = 10.000] option



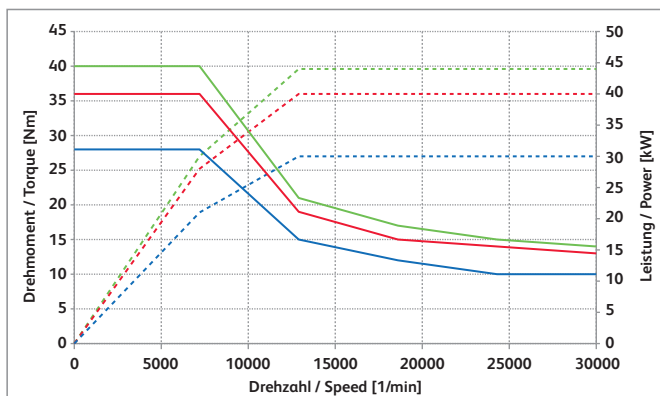
GS 600E/3, GS 600E/5, GS 600/5-T

[RPM_{max.} = 18.000 with Hirth-Gear-Indexing] option



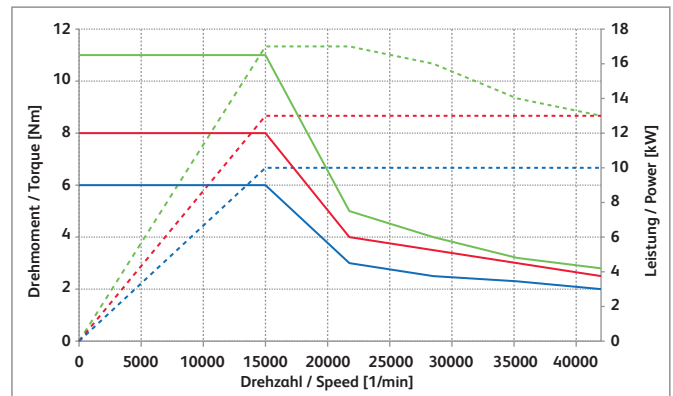
GS 600/5-FDT

[RPM_{max.} = 30.000] option



GS 600E/3, GS 600E/5, GS 600/5-T

[RPM_{max.} = 38.000] option



GS 600E/3, GS 600E/5, GS 600/5-T

Legend

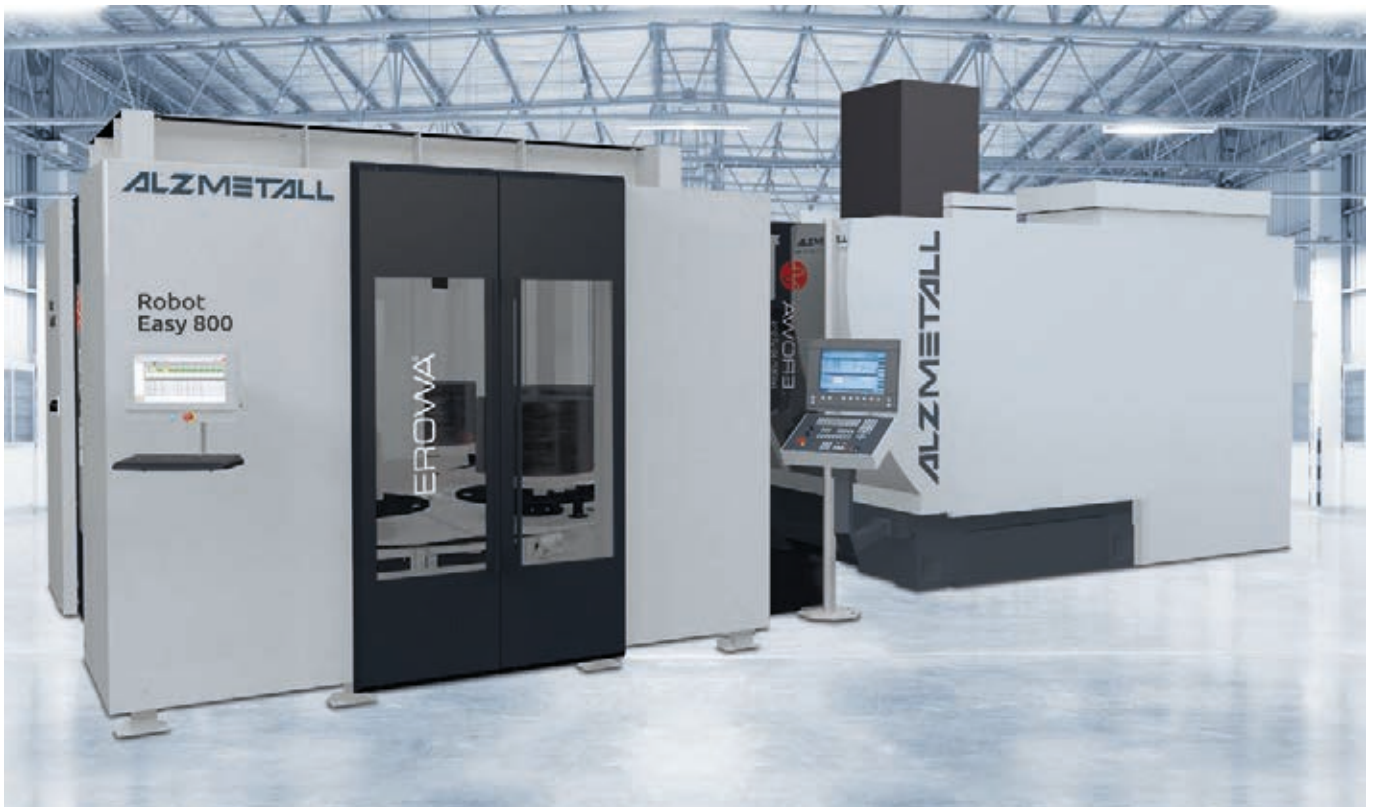
— Torque S1 [Nm]
— Torque S6 40% [Nm]
— Torque S6 25% [Nm]

- - - Power S1 [kW]
- - - Power S6 40% [kW]
- - - Power S6 25% [kW]

AUTOMATION SOLUTION



ALZMETALL GS 600/5-T and WU-robot cell RZ-3/20 implementation for specific part handling. Transfer weight of 20 kg dependent on inserted gripper.

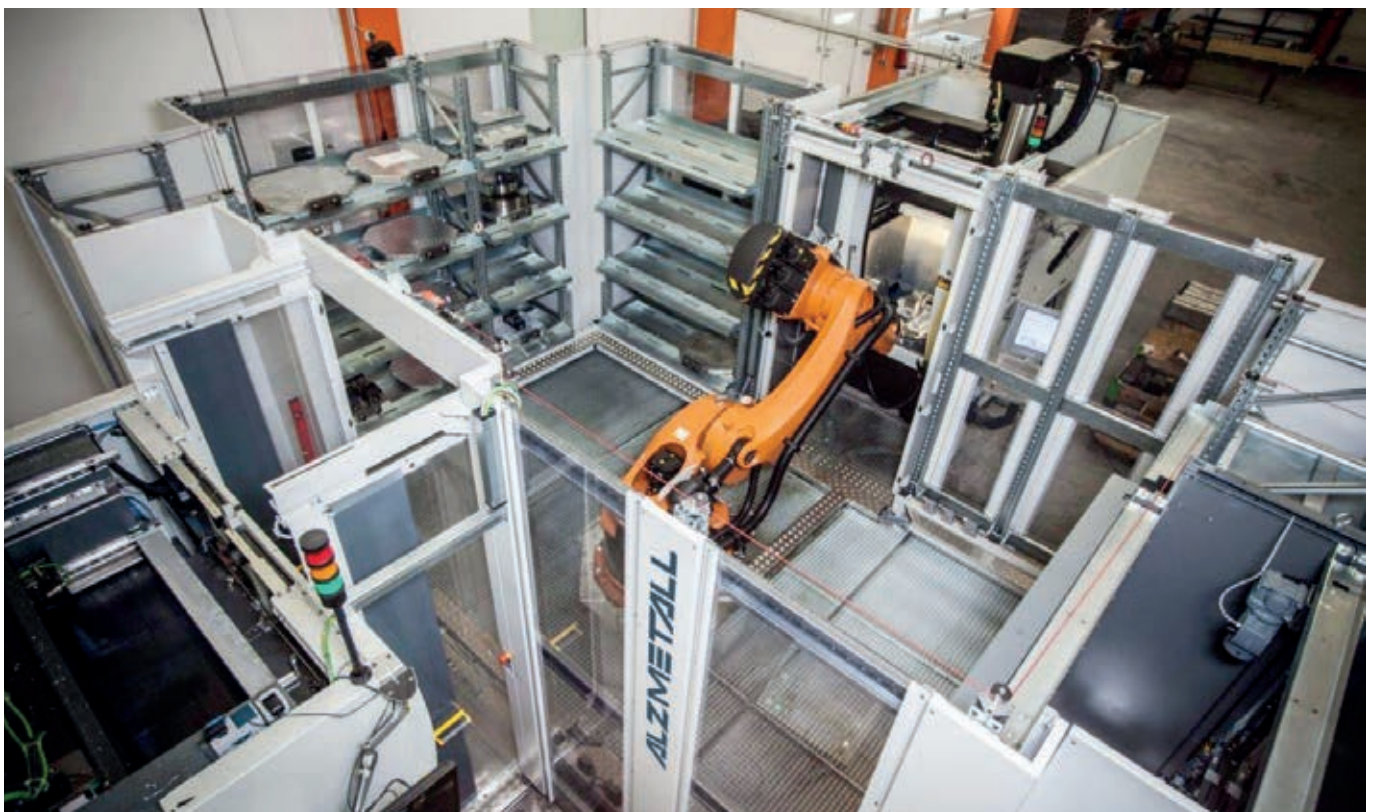


Automation solution ALZMETALL GS 1000 and EROWA ERE800 implemented for workpiece dimension $\varnothing 850 \times 1000$ mm. Transfer weight max. 800 kg, 6-12 Magazine-Positions, 6,4 metric tons Magazine capacity.

AUTOMATION SOLUTION



ALZMETALL GS 1000 and INDUMATIK Ultralight 300 implementation. Transfer weight of max. 300 kg, 3-12 pallet positions for pallets 320 x 320 mm up to 630 x 630 mm. Transfer carrier drive for operator access.



Flexible manufacturing cell with ALZMETALL GS 1000 and GS 800. Transfer weight of max. 400 kg, 28 work piece pallets for two pallet dimensions 470 x 470 mm and 700 x 700 mm.

PRODUCT RANGE - PLEASE CONTACT US



Machining Centers

- GS 800/3
- GS 800/5-T
- GS 800/5-FDT



Machining Centers

- GS 1000/3
- GS 1000/5
- GS 1000/5-T
- GS 1000/5-FDT
- GX 1000/5-AF
- GX 1000/5-LOB



Machining Centers

- GS 1200/3
- GS 1200/5-T
- GS 1200/5-FDT



Machining Centers

- GS 1400/3
- GS 1400/5-T
- GS 1400/5-FDT
- GX 1400/5-AF

We gladly inform you also about ALZMETALL Column Drilling machines and Foundry engineering.



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