ALZMETALL

we drive productivity

MACHINING CENTER **GS 1000**

www.alzmetall.com

CONTENT

Explanations/Abbreviations

AF	Air Foil
ASGK	ALZMETALL-Specific-Gantry-Concept
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.

ALZMETALL Machine Tools (Taicang) Co., Ltd.,
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AT A GLANCE

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

5-Axes Machining Center GS 1000/5-FDT

Highlights

- ALZMETALL-Specific-Gantry-Concept (ASGK)
- Grey Cast Iron and Spheroidal Graphite Cast Iron Machine Body and Frame components
- Travel-System-Carriage with incorporated Box-in-Box-System - patented -
- 4-fold Linear Guidance for X-YTravel-System-Carriage and Z-Axis with integrated Motor-Spindle
- 3-fold Torque-Drives for Swivel-Axis (A-Axis) and Rotary-Axis (C-Axis) at GS 1000/5-T and GS 1000/5-FDT
- Hybrid-Machining-Applications such as: Drilling/Milling/Turning and Grinding at one Clamping-Set-Up
- Up to 1800 kg workpiece weight including Clamping-Set-Up-Device at GS 1000/3
- Up to 1000 kg [1500 kg] Option, workpiece weight including Clamping-Set-Up-Device at GS 1000/5-T and GS 1000/5-FDT

Focus on operators needs

- Access to Machine-Table on Operator level
- Working-Space access from top, loading by crane possible
- Mist extraction directly at Machine-Table
- 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

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 without additional Axes compensation
- Significant reduction of Cutting-Tool costs

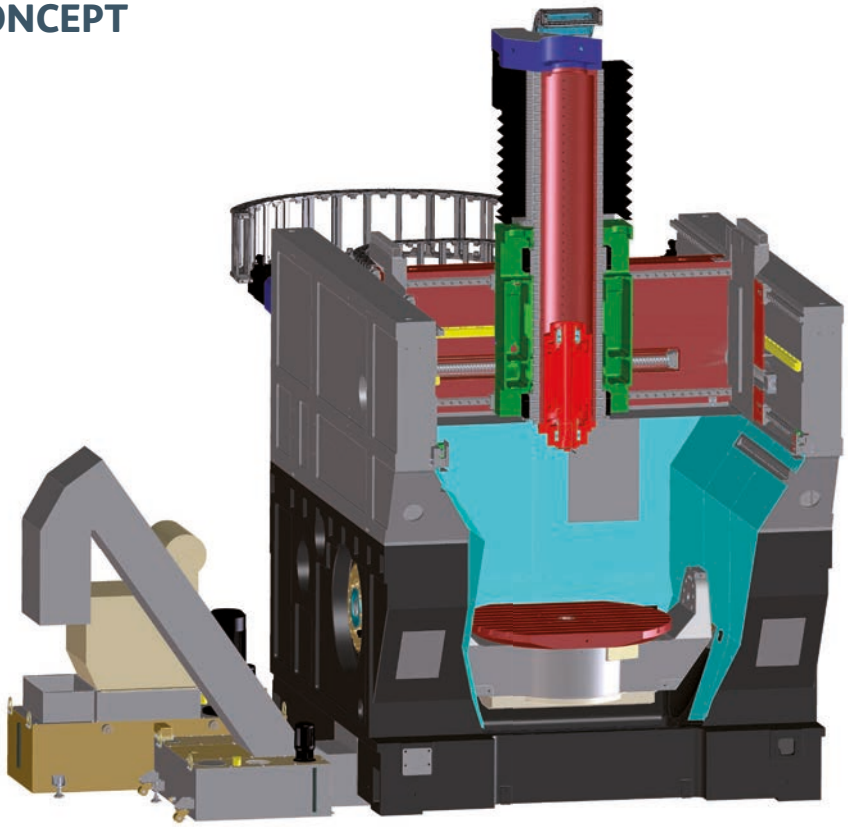
➲ **Optimized**

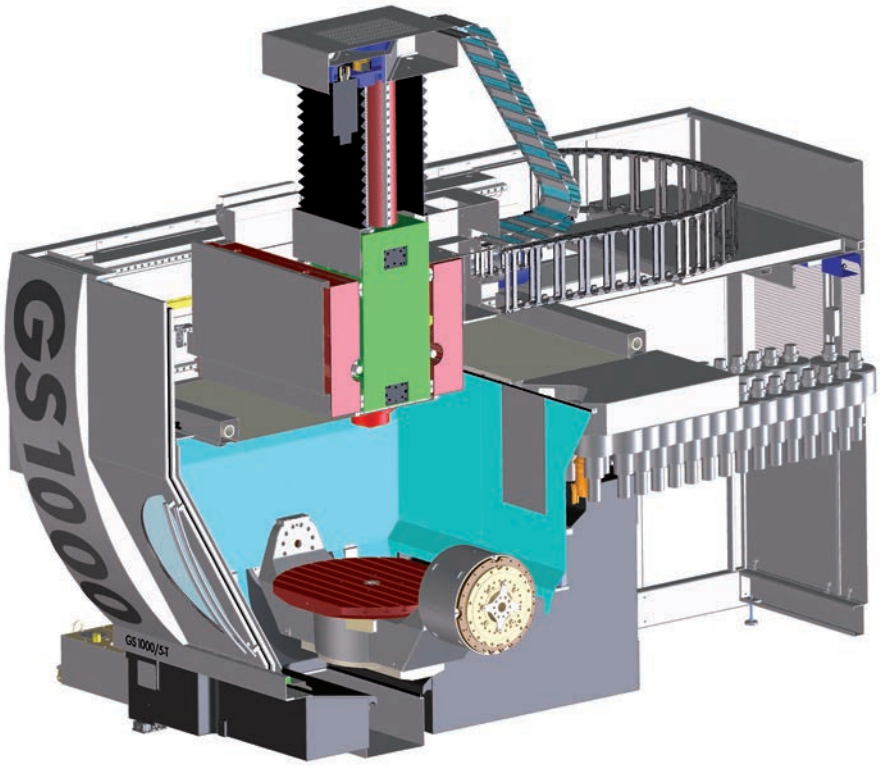
- Contour consistency at highest path velocity
- Lifetime of Motor-Spindle

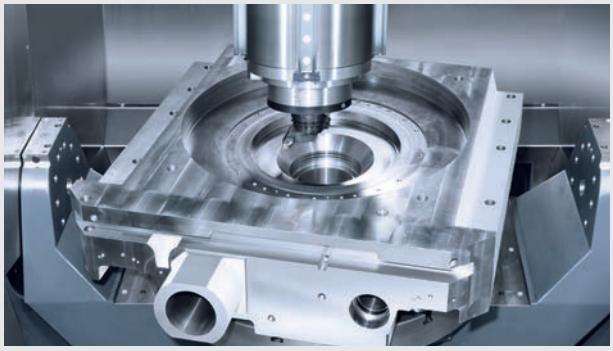
➲ **Guaranteed Benefits**

- Extremely high Parallel-Path-Precision through two Servo-Drives at each X-, Y-Axis
- Considerably reduced Total Cost of Ownership (TCO) over lifetime period of Machining Center

ALZMETALL - THE CONCEPT

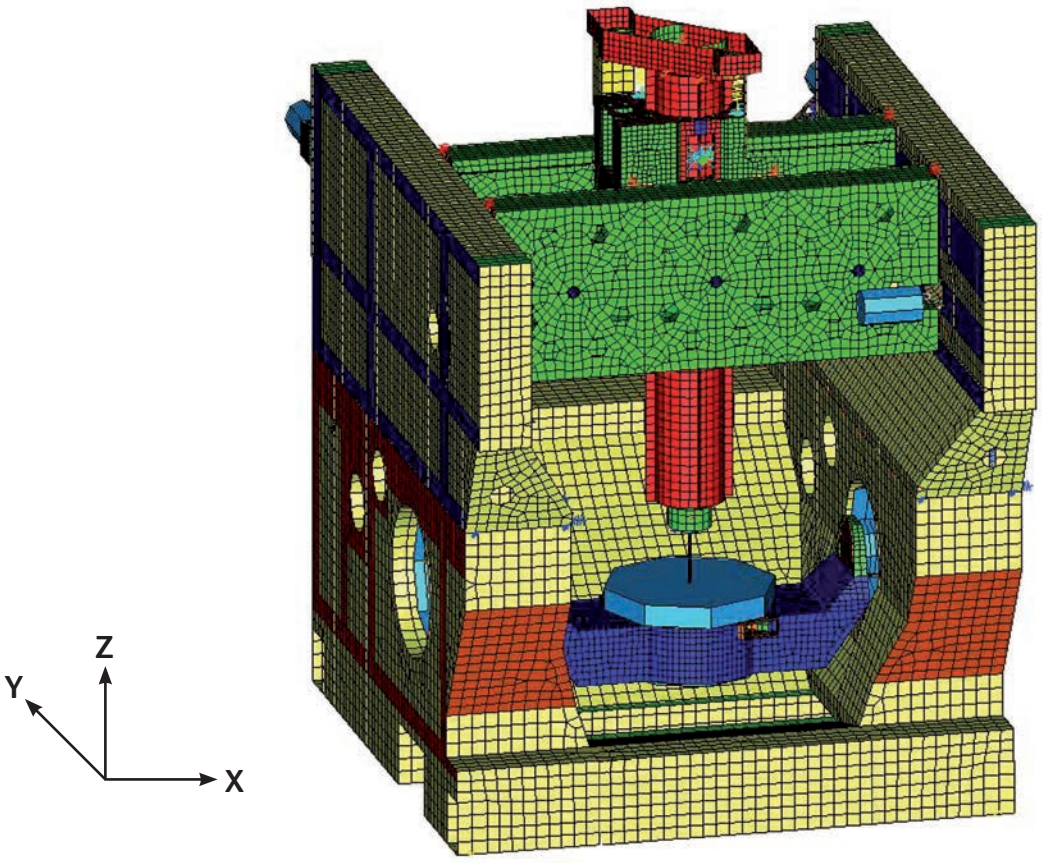






RESEARCH AND DEVELOPMENT

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.

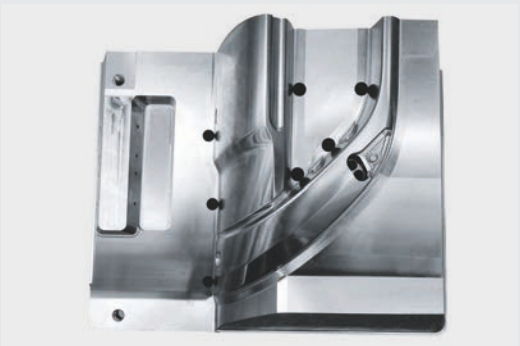
Multi-Elements-Simulation

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.

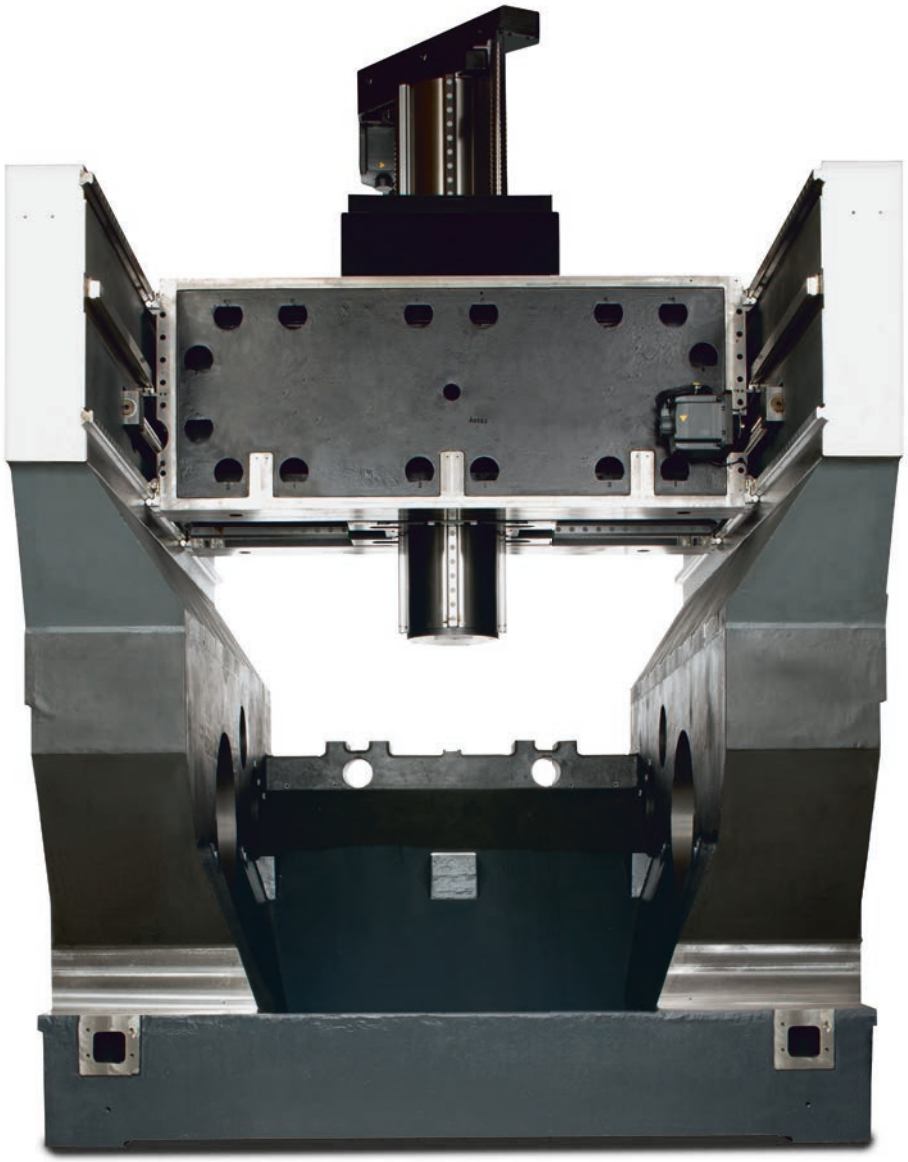
Modal-Analysis

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:

- Frame Side Walls as carrier for X-Y- and Z-Axis
- NC – Swivel- and Rotary-Table (A- and C- Axis) or Static-Table
- Chain-Tool-Magazine with 33, [63], [66], [75], [126] or [150] Tool-Positions [Option]
- Rack-Type Tool-Magazine for [224] Tool Positions [Option]

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

ALZMETAL - SPECIFIC -GANTRY - CONCEPT (ASGK)

– patented –

ALZMETALL-Specific-Gantry-Concept (ASGK)

In comparison to conventional and modified Gantry-Designs:

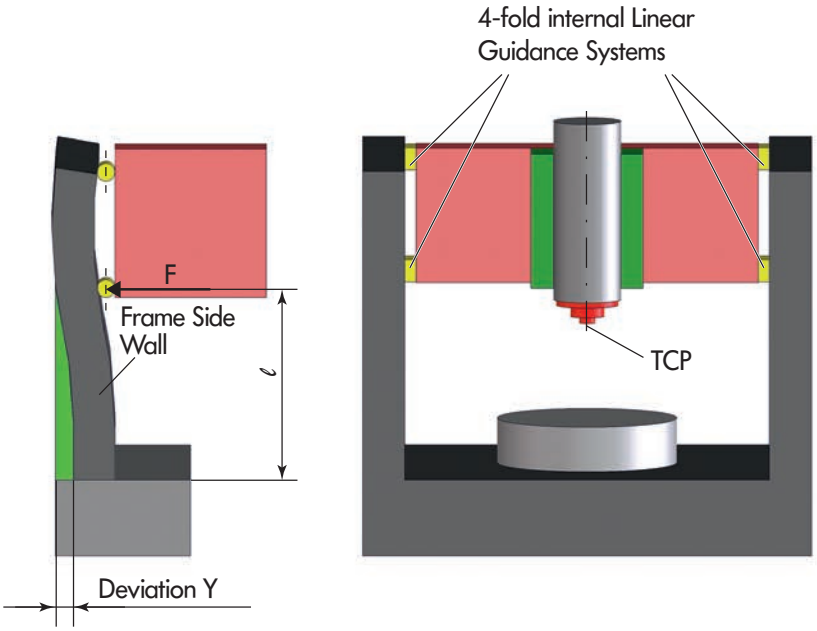
- 4-fold internal Linear Guidance Systems

➲ Deviation (Deflection) reduced by factor 2.3 delivers

➲ Rigidity increased by factor 2.3 versus "On-Top-mounted" Linear Guidance Systems

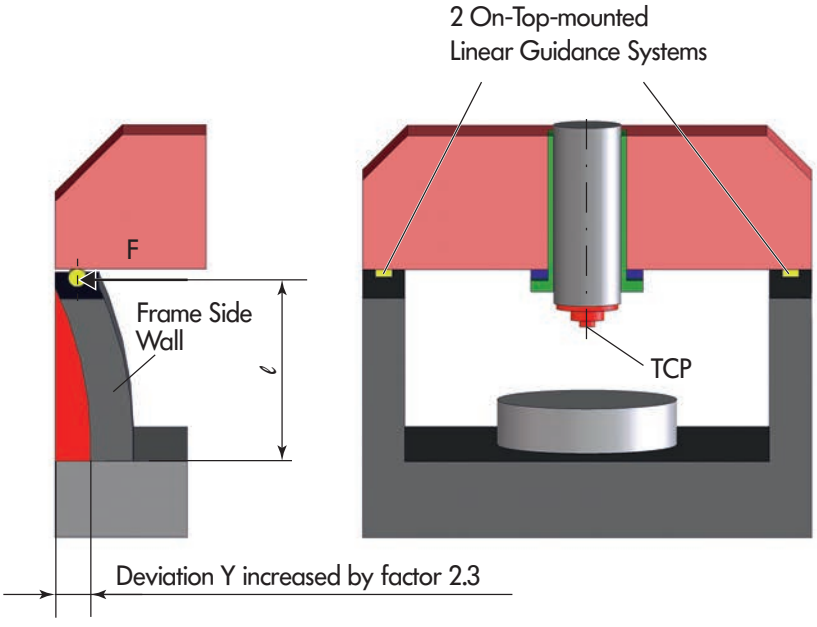
➲ Less Position Deviation at TCP at the same level of Acceleration

➲ Significant increase of Cutting-Tool lifetime



Conventional and modified Gantry-Designs

- 2 On-Top-mounted Linear Guidance Systems
- Deviation (Deflection) of Frame Side Walls increased by factor 2.3



TRAVEL - SYSTEM - CARRIAGE

Design Characteristics

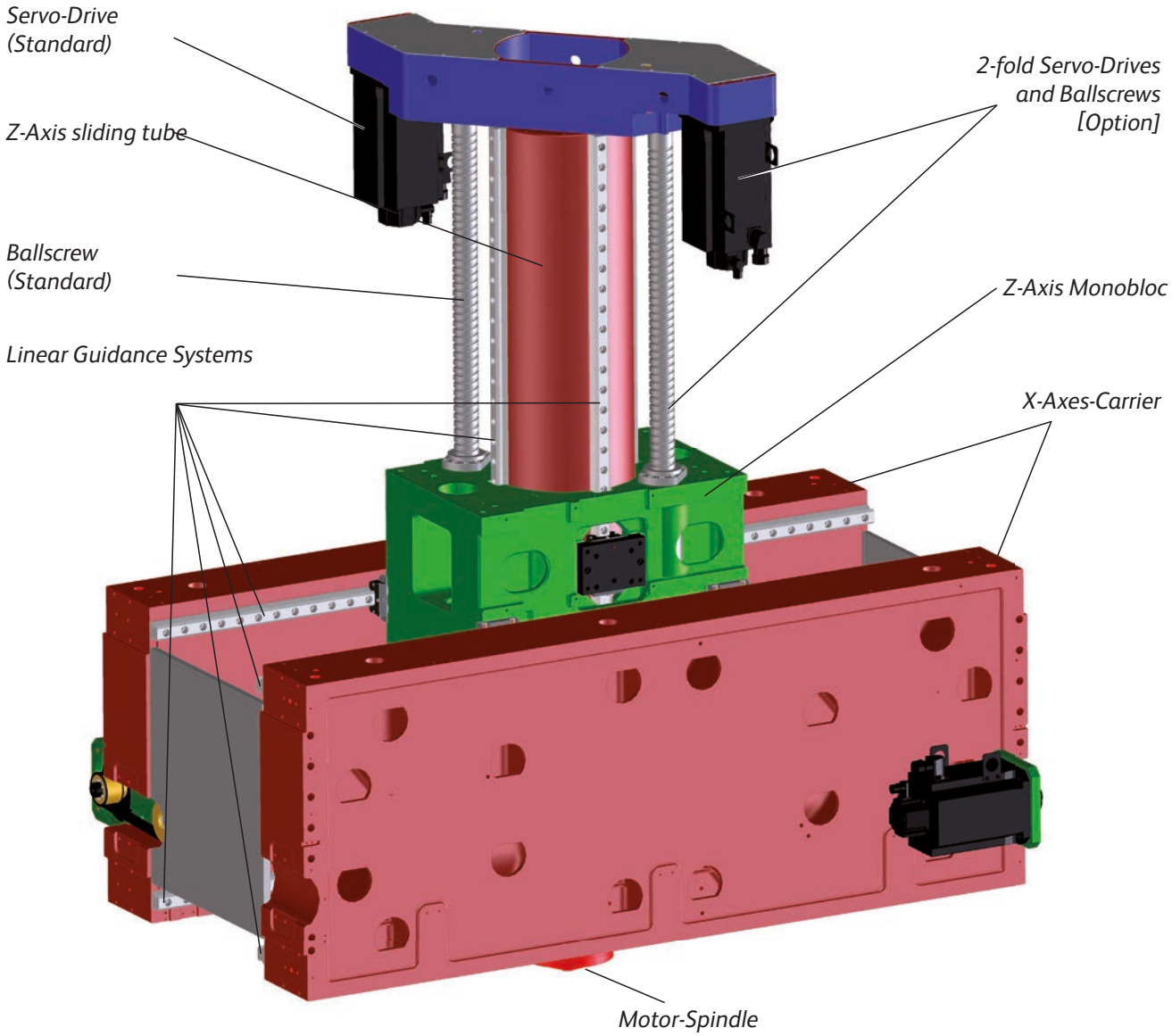
Box-in-Box-System:

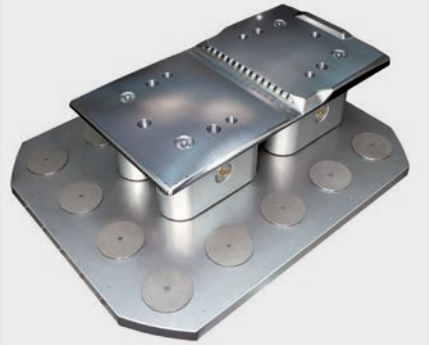
- Frame Side Walls as static basic structure. Therein embedded two X-Axes-Carrier with integrated Z-Axis Monobloc
- Dynamically stressed Basic-Machine-Parts and components made from EN-GJS 500 (GGG 50)
- All 3 Linear-Axes (X/Y/Z) are 4-fold guided with 8 guiding elements each.
- The Linear-Axes X and Y are each driven by two Servo-Drives and two Ballscrews. The Linear-Axis Z is driven by one Servo-Drive and one Ballscrew and optional by two Servo-Drives and two Ballscrews.

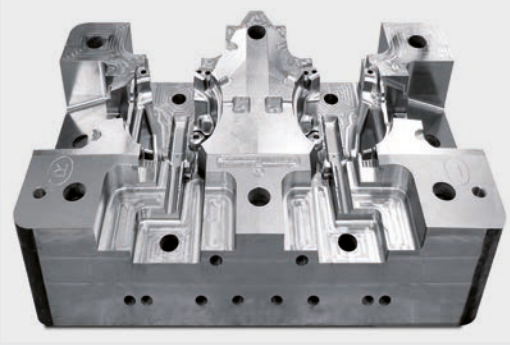
➲ Excellent Axes dynamics

➲ Cutting edge Parallel-Path-Precision

➲ Thermal stability due to geometrical symmetry with Thermo-Symmetric Machine construction





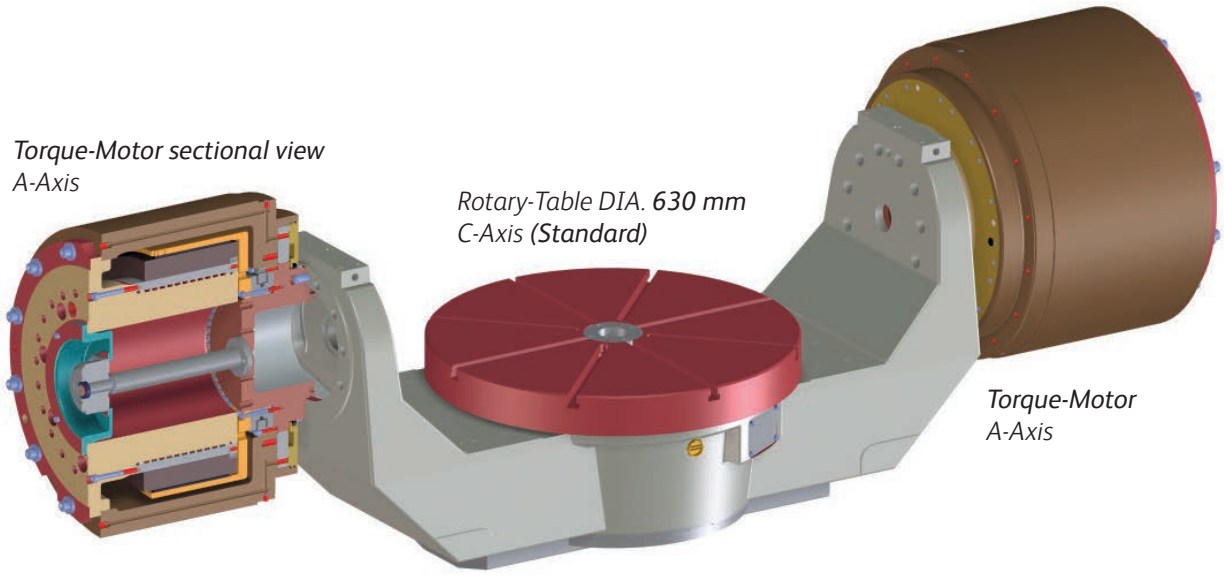


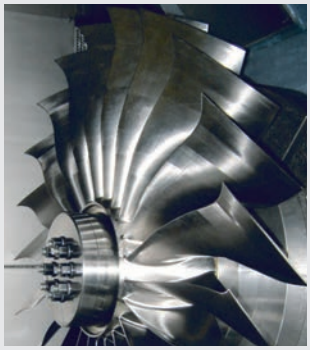
NC - SWIVEL - AND - ROTARY - TABLE (SDK)

GS 1000/5-T AND GS 1000/5-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

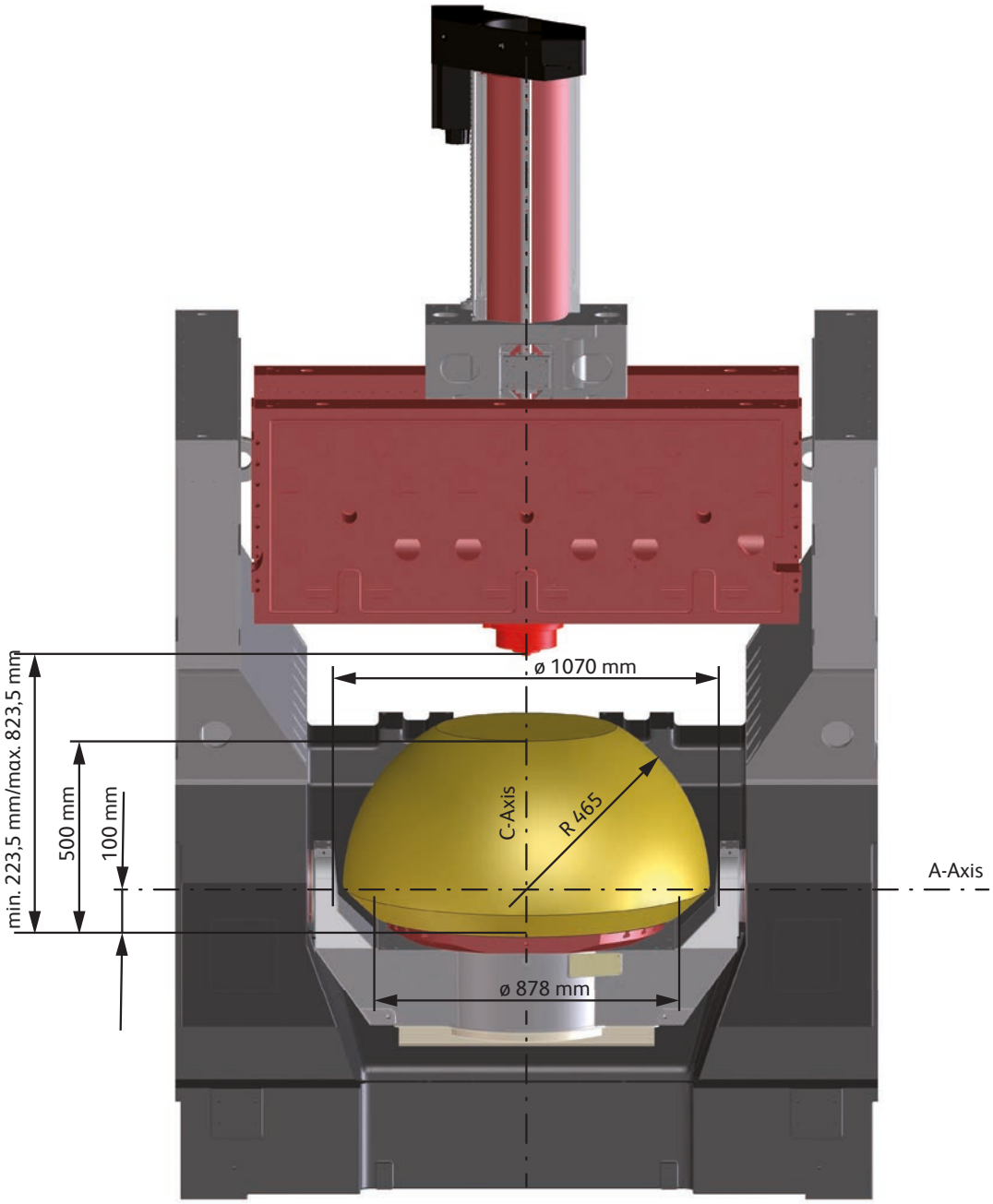




WORKPIECE DIMENSIONS - MACHINING SPACE

Machining Space

- Maximum utilization of Machining Space
- C-Axis DIA. 1070 mm
- A-Axis DIA. 930 mm
- Maximum workpiece dimension: Spherical sector Radius 465 mm up to 500 mm height
- Swivel range ± 140°
- Table load up to 1000 kg [1500 kg] [Option]
- Stainless steel inside covering [Option]

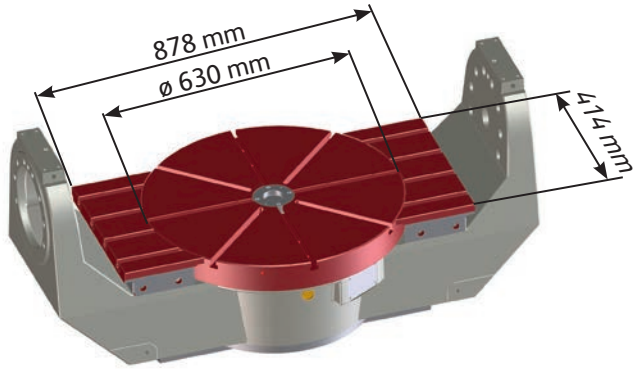


OPTIONS

NC - Swivel - (A-Axis) and Rotary-Tables (C-Axis)

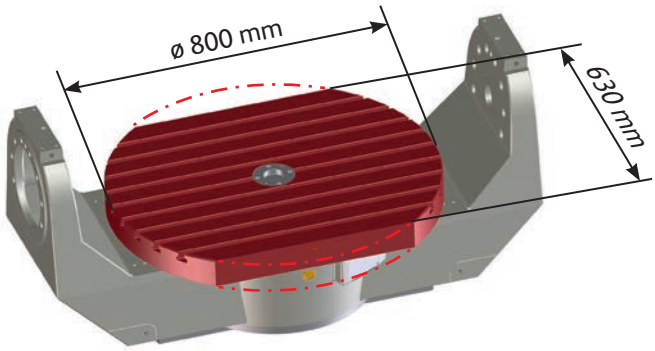
Table-Set [1) 2)]

Clamping surface mm	878 x 414
T-slots acc. DIN 650	4 x 14 H12
Configuration	parallel in X-direction
Distance mm	63
Table Load max. kg	1000 /1500
Notice	Rotary-Table ø 630 mm



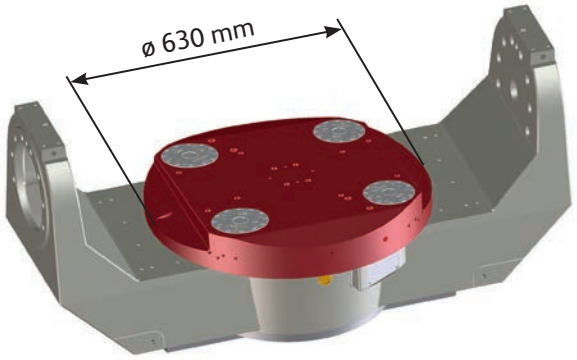
Rotary-Table C-Axis [1) 2)]

Clamping surface mm	ø 800 / ø 800 x 630	
T-slots acc. DIN 650	8x45° , 4x14 H7 and 4x14 H12 / 1x14H7 and 8x14H12	
Configuration	radial / parallel	
C-Axis RPM max. min^{-1}	100 [1)]	350/900 [2)]
Table Load max. kg	1000 /1500	
Distance T-slots mm	63	



Rotary-Table C-Axis with NPS [1) 2) 3)]

Clamping surface mm	ø 630	
T-slots	without	
Configuration NPS	4 x 90 °	
C-Axis RPM max. min^{-1}	100 [1)]	350/900 [2)]
Table Load max. kg	1000 /1500	



[1)] GS 1000/5-T
[2)] GS 1000/5-FDT
[3)] NPS = Zero point clamping System

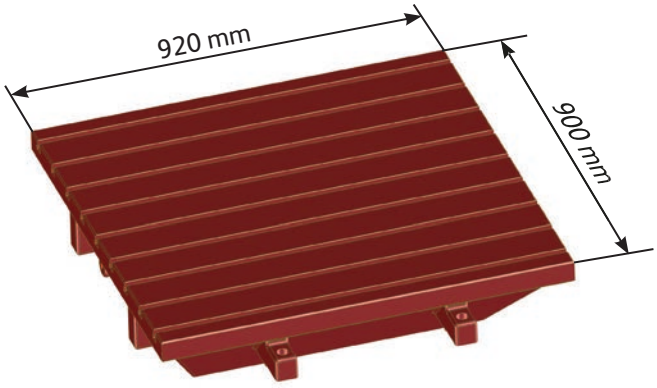
Further designs on demand

GS 1000/3

3-Axis-Machine with rigid fixed base table

Rigid fixed base table

Clamping surface mm	920 x 900
T-slots acc. DIN 650	1 x 14 H7 and 8 x 14 H12
Configuration	parallel in X-direction
Distance T-slots mm	100
Table Load max. kg	1800



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

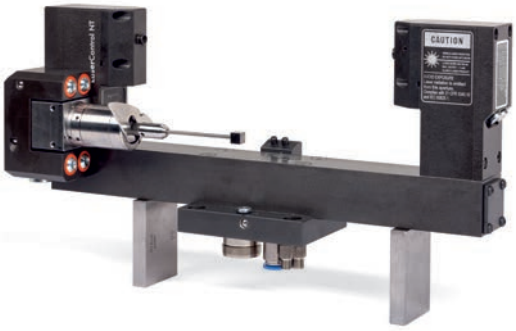
Multiple-Media-Coupling

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)

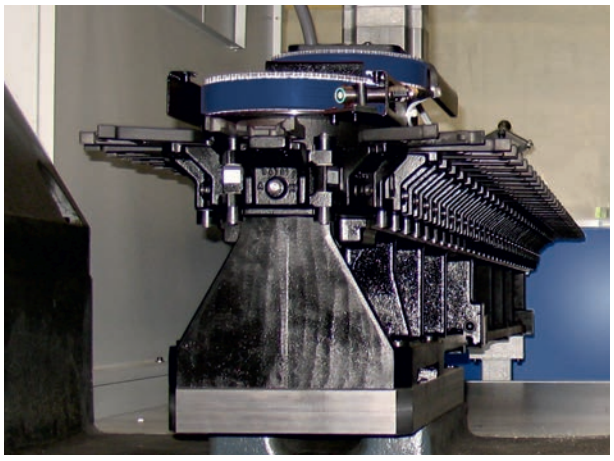


Camera and Screen

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

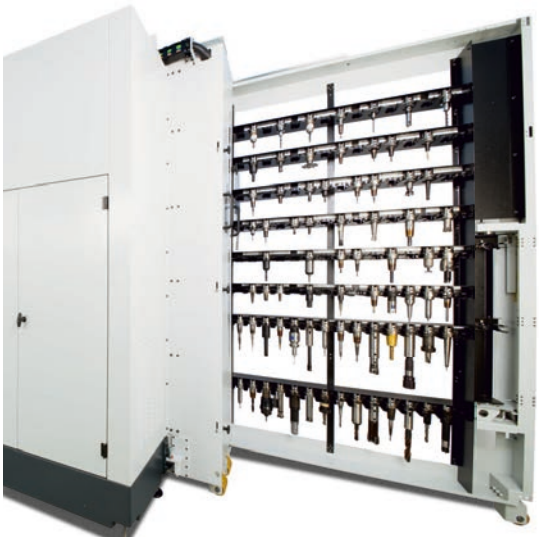
Tool-Magazines

Twin magazine, 66 Tool positions, (Chain Magazine)
Single magazine, 75 Tool positions, (Chain Magazine)
Twin magazine, 150 Tool positions, (Chain Magazine)



Tool-Magazines

Rack-Type Magazines designed for 250 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

OPTIONEN

Mist Extraction Unit

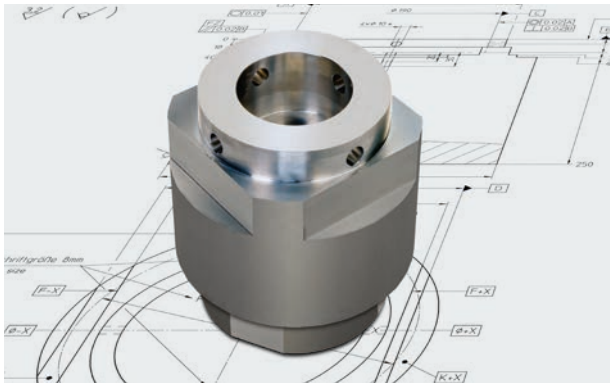
Attached to Machine-Basic-Body

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

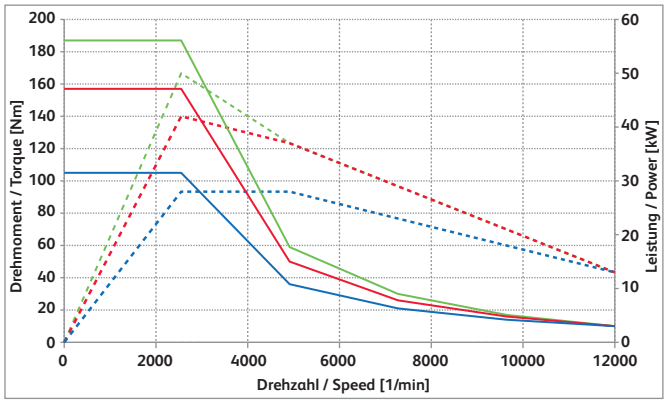
Typ	GS 1000/3	GS 1000/5	GS 1000/5-T	GS 1000/5-FDT
Working Range				
Traverse Path	800 / 800 / 600 mm			
Rigid fixed base table				
Distance Spindle - Table min./max.	223,5/823,5 mm			
Clamping Surface (w x d)	920 x 900 mm			
9 T-Slots acc. DIN 650 at X-Direction	9H12 x 100 mm			
Alignment-Slot at Table Center Line	14H7			
Machine-Table Load	1800 kg			
NC-Swivel-and Rotary-Table				
Distance Spindle - Table min/max.	223,5/823,5 mm			
Drives at Swivel- and Rotary-Axis	conventional indirect	Torque direct		
Swivel Range of A-Axis	± 140 °			
Swivel Speed at A-Axis max.	20 min^{-1}	50 min^{-1}		
C-Axis Rotation	360 ° unlimited			
C-Axis RPM max.	30 min^{-1}	100 min^{-1}	350, [900] min^{-1}	
Diameter Machine-Table C-Axis	Ø 630, [800], [Ø 800 x 630] mm			
8 T-Slots acc. DIN 650	4 x 14 H 7 und 4 x 14 H12 [8 x 14 H12 / 1 x 14H7]			
Star-Shaped Configuration	8 x 45 ° [9 x parallel]			
Machine-Table Center Bore	Ø 50 H7 mm			
Table Load max.	1000 kg	1000 kg, [1500 kg]		
C-Axis Rotary-Diameter at A-Axis Center	Ø 1070 mm			
A-Axis Swivel Diameter (Swing) at X-Axis Center	Ø 930 mm			
Distance A-Axis-Center to Rotary-Table	100 mm			
Feed-Drive-System X-, Y-, Z-Axis				
Digital AC-Servo-Motors, maintenance free				
Max. Rapid Travel X-, Y-, Z-Axis at TCP	75 m/min [100 m/min]			
Feeding Force X-, Y-, Z-Axis at CDF 40 %	10 kN			
Motor-Spindle-Drive				
High Frequency Motor-Spindle				
Cutting-Tool Interface	HSK-A63 [SK40]			HSK-T63
Motor-Spindle-Power at CDF 25 % max.	50 kW [40/48], [44] [30] kW			50 [48] kW
Variable Speed Range max.	12.000 min^{-1} [18.000] [24.000] [30.000] min^{-1}			12.000 [18.000] min^{-1}
Motor-Spindle Torque at CDF 25 % max.	187 Nm [136/170] [96] [40] Nm			187 [170] Nm
Tool-Magazines				
Tool positions 1 Chain [2 Chains] [Rack-Type-Magazins]	33 [63] [66] [75] [126] [150] [224 Rack-Type-Magazine]			
Max. Tool Diameter, Chain fully loaded	95 mm [80 Rack-Type-Magazine] mm			
Max. Tool Diameter, Chain neighbour positions unloaded	110/150 [150 Rack-Type-Magazine] mm			
Max. Tool Length	350/225 mm [400 Rack-Type-Magazine] mm			
Max. Tool Weight	10 kg			
Tool-Change-Cycle (approx.)	6 s			
Chip-to-Chip Cycle (approx.)	7 s			
Linear Encoders X-, Y-, Z-Axis	absolut, direct			
Positional Tolerance TP acc. VDI/DGQ 3441 (DIN/ISO 230-2)	≤ 0,007 mm [≤ 0,005 mm]			
Angle Encoder System A-, and C-Axis	direct			
Machine Weight excl. Options	14.000 kg	15.500 kg		
CNC-Controls	TNC 640 Heidenhain, [840 D sl Siemens]			

[Option]

MOTOR - SPINDLES

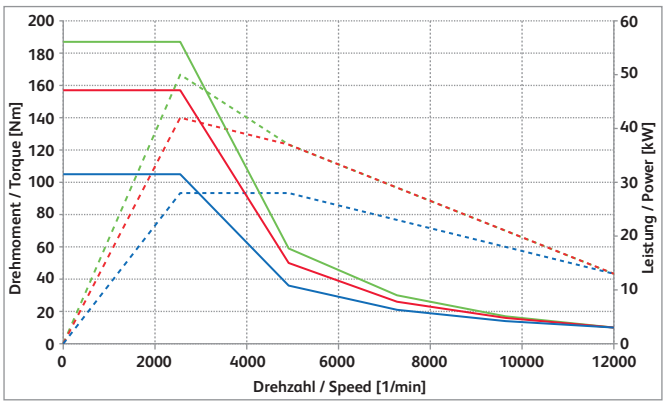
RPM / Power / Torque Track Record

RPM $_{max.}$ = 12.000



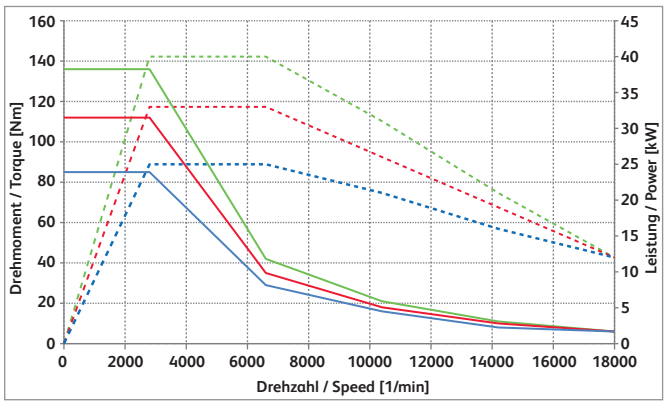
GS 1000/3, GS 1000/5, GS 1000/5-T

RPM $_{max.}$ = 12.000 with Hirth Gear Indexing



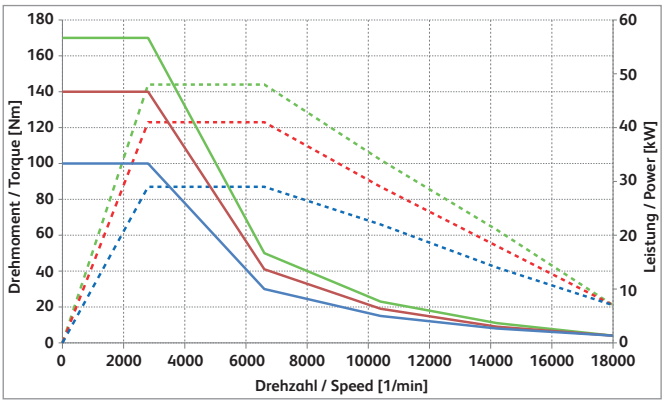
GS 1000/5-FDT

[RPM $_{max.}$ = 18.000] Option



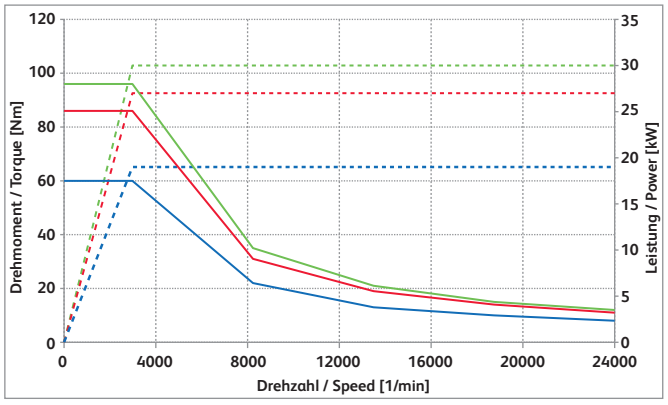
GS 1000/3, GS 1000/5, GS 1000/5-T

[RPM $_{max.}$ = 18.000] Option



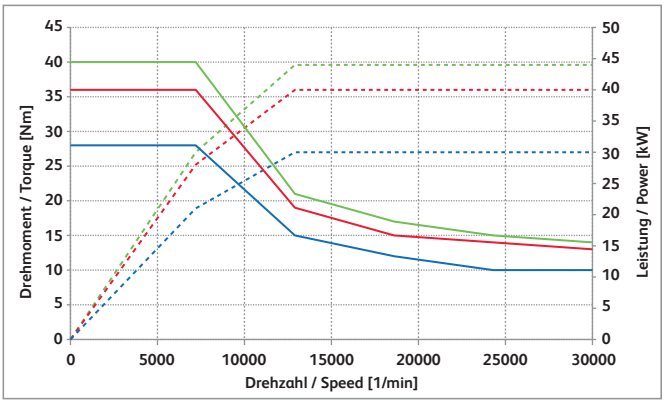
GS 1000/3, GS 1000/5, GS 1000/5-T, GS 1000/5-FDT

[RPM $_{max.}$ = 24.000] Option



GS 1000/3, GS 1000/5, GS 1000/5-T

[RPM $_{max.}$ = 30.000] Option

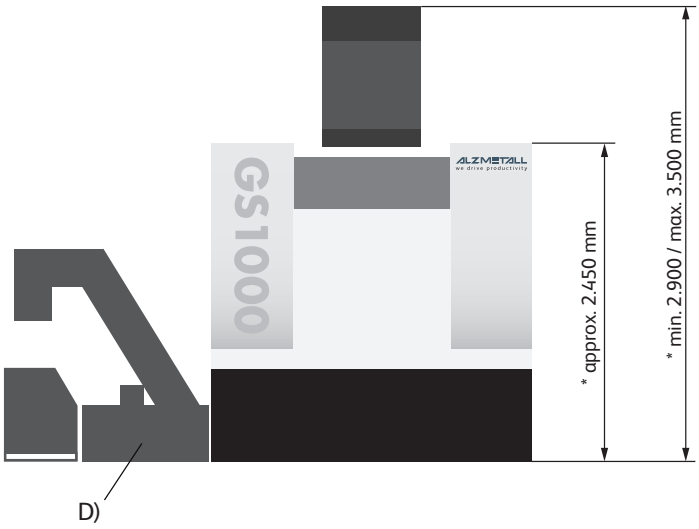


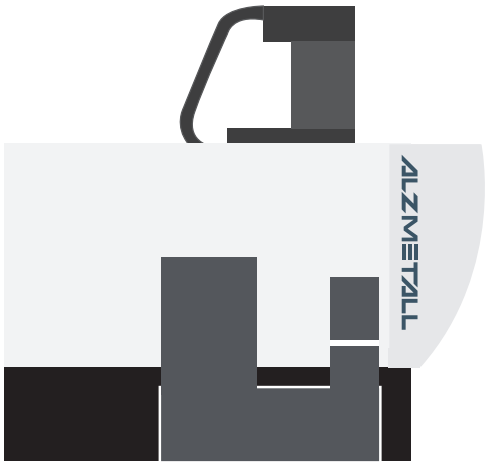
GS 1000/3, GS 1000/5, GS 1000/5-T

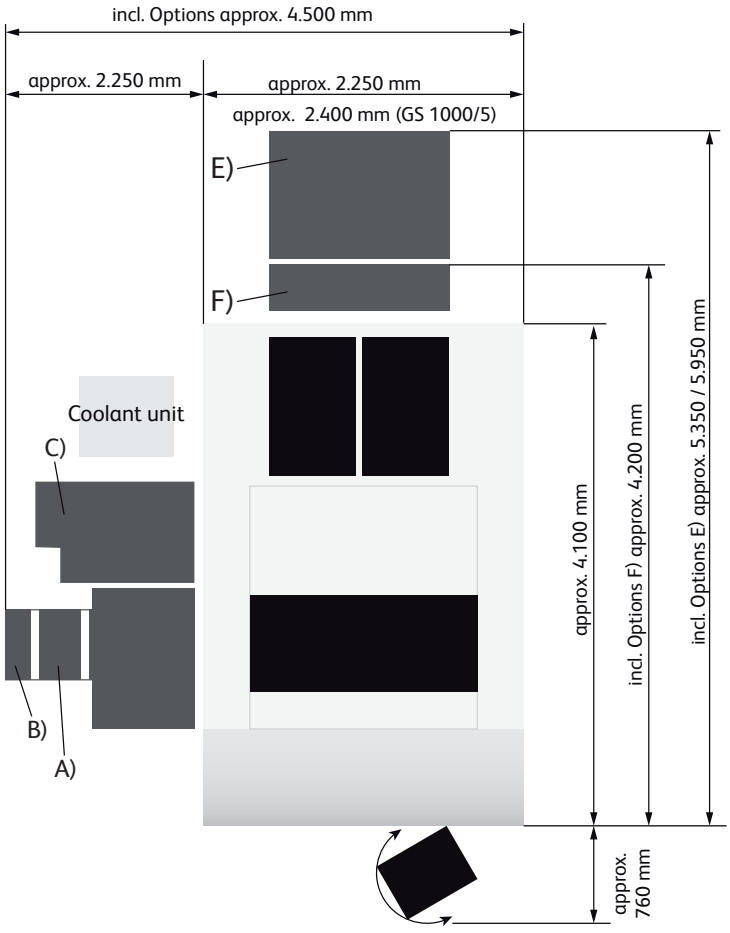
Legend

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

MACHINING CENTER DIMENSIONS







OPTIONS

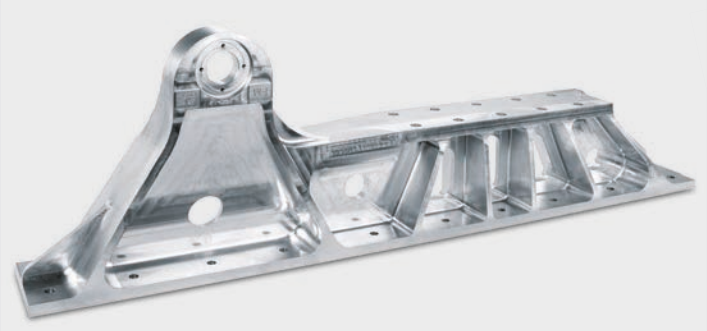
A) Chip Conveyor
B) Chip Trolley
C) Mist Extraction Unit
D) High pressure Coolant Unit
E) Tool-Magazine 126 /150 tool positions (chain magazine)
F) Tool-Magazine 224 tool positions (rack type magazine)

Please note: Options A, B, C and D are either to be installed along the right- or left side of the Machining Center.

The coolant unit can be placed variable.

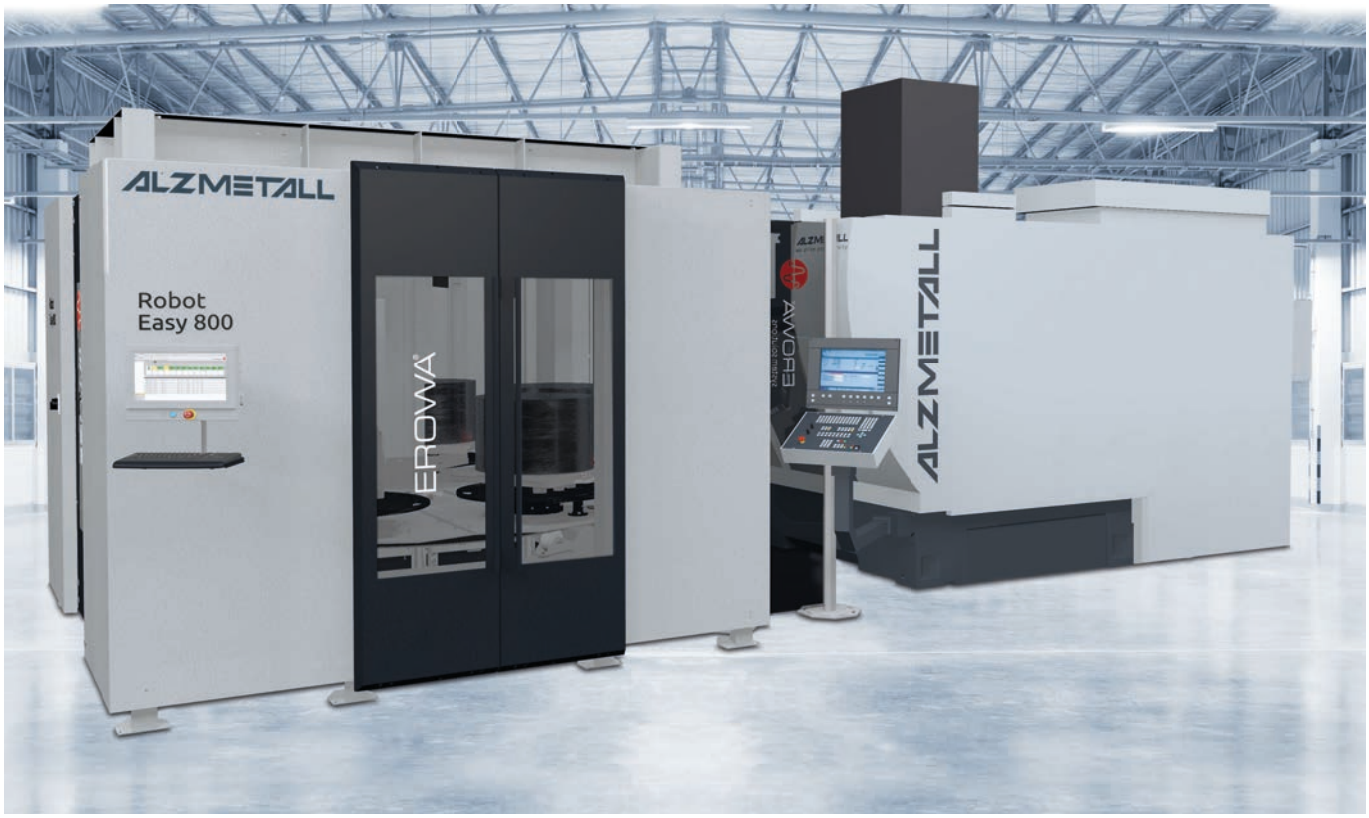
Please see machine layout for detailled information.

* incl. Precision levelling elements



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 ø 850 x 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 600E/3
- GS 600E/5
- GS 600/5-T
- GS 600/5-FDT

Machining centers

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

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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