GS 1400
Machining Center
ALZMETALL COMPANY INTRODUCTION

is a company with an international reputation and global activities. For more than six 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 aircraft industry, as well as in many mid-size mechanical engineering enterprises. Our experience is based on over 198,000 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“.

How to find us
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 Travel-System-Carriage and Z-Axis with integrated Motor-Spindle
• 3-fold Torque-Drives for Swivel-Axis (A-Axis) and Rotary-Axis (C-Axis)
• Hybrid-Machining-Applications such as: Drilling/Milling/ Turning and Grinding at one Clamping-Set-Up
• Up to 3000 kg workpiece weight including Clamping-Set-Up-Device

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

Optimum

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

Guaranteed

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

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
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.
Think Big when Milling and Turning

Extreme rigid, Integral-Basic-Body prepared to be fitted with:

- Frame Side Walls as carrier for both Y-Axes (Y- and V-Axis)
- NC – Swivel- and Rotary-Table (A- and C- Axis)
- Tool-Magazines (ATC)

All statically stressed Basic-Machine-Parts made from EN-GJL 300 (GG 30) and all dynamically stressed Basic-Machine-Parts and components made from EN-GJS 500 (GGG 50).
ALZMETALL-Specific-Gantry-Concept (ASGK)

In comparison to conventional and modified Gantry-Designs:

- 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
Design Characteristics

Box-in-Box-System:

- Y- and V-Axis 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 each 8-fold and in 2 levels linear guided

- All 3 Linear-Axes (X/Y/Z) are each driven by 2 Ballscrews and 2 Servo-Drives
  ➤ Excellent Axes dynamics
  ➤ Cutting edge Parallel-Path-Precision
  ➤ Thermal stability due to geometrical symmetry with Thermo-Symmetric Motor-Spindle
**NC - SWIVEL - AND - ROTARY - TABLE (SDK)**

Swivel- (A-Axis) and Rotary- (C-Axis) Unit

- Direct Rotary Drives (Torque-Motors) for high dynamic and oscillating Machining – maintenance free –
- 2 internal Torque-Motors 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
- 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

*Standard Rotary-Table DIA. 800 mm*

*Torque-Motor sectional view*
Machining Space

- Maximum utilization of Machining Space
- C-Axis DIA. 1420 mm
- A-Axis DIA. 1380 mm
- Spherical sector DIA. 1380 mm up to 700 mm height
- Swivel range +/- 140 degrees
- Up to 3000 kg workpiece weight including Clamping-Set-Up-Device
- Stainless steel Machining Space cover (option)
### Options

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

<table>
<thead>
<tr>
<th>Clamping surface mm</th>
<th>ø 900 Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-slots acc. DIN 650</td>
<td>4 x 18 H7 and 4 x 18 H12</td>
</tr>
<tr>
<td>Configuration</td>
<td>8 x 45°</td>
</tr>
<tr>
<td>RPM max.</td>
<td>100 ¹) 560 ²)</td>
</tr>
<tr>
<td>Table Load max. kg</td>
<td>3000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Clamping surface mm</th>
<th>ø 1000 Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-slots acc. DIN 650</td>
<td>4 x 18 H7 and 4 x 18 H12</td>
</tr>
<tr>
<td>Configuration</td>
<td>8 x 45°</td>
</tr>
<tr>
<td>RPM max.</td>
<td>100 ¹) 560 ²)</td>
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<tr>
<td>Table Load max. kg</td>
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<table>
<thead>
<tr>
<th>Clamping surface mm</th>
<th>ø 1200 x 1000 Option</th>
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<tbody>
<tr>
<td>T-slots acc. DIN 650</td>
<td>8 x 18 H12 and 1 x 18 H7</td>
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<tr>
<td>Configuration</td>
<td>parallel</td>
</tr>
<tr>
<td>RPM max.</td>
<td>100 ¹) 560 ²)</td>
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<tr>
<td>Table Load max. kg</td>
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</table>

<table>
<thead>
<tr>
<th>Clamping surface mm</th>
<th>780 x 780 mm at NPS ³) Option</th>
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<td>T-slots acc. DIN 650</td>
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<tr>
<td>Configuration</td>
<td>4 x 90°</td>
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<td>RPM max.</td>
<td>100 ¹) 560 ²)</td>
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<td>Table Load max. kg</td>
<td>3000</td>
</tr>
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</table>

Further executions on demand

¹) GS 1400/5-T
²) GS 1400/5-FDT
³) NPS = Zero Point Tooling System
CNC-Controls
Heidenhain iTNC 530 HSCI (standard)
Heidenhain TNC 640
(in prep.)

KINEMATIK Gauging
Accuracy check and compensation
- KinematicsOpt., Heidenhain
- C 996, Siemens

3D-Touch Probes
Infrared transmission
- TS 640, Heidenhain
- TS 740, Heidenhain
- IRP 25.41, m&h Inprocess
- OMP 60, Renishaw
- TC 50, Blum

Electrical Handwheels
- HR 410, Heidenhain
- HR 520, Heidenhain
- Mini-Handwheel, Siemens

CNC-Controls
Siemens SINUMERIK 840 D sl

Multiple-Media-Coupling
for Rotary-Table
4-fold on selection air and/or fluids
Tool Setting System
Laser System for Tool Setting and Breakage Detection on selection including mechanical Touch Trigger Probes
LTS 35.65, m&h, (without mech. Touch Trigger Probes)
LC NT, Blum, (without mech. Touch Trigger Probes)
TC 76, Blum, (with mech. Touch Trigger Probes)

Tool-Magazines
Single Chain Magazine 75 Tool positions
Double Chain Magazine 150 Tool positions
Rack-Type Magazines over 150 Tool positions on request

Production Package
On selection A, B, C with Scratch-Type-Conveyor, Hinge-Type-Conveyor, Magnetic-Conveyor

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

Production Package
With Coolant Cleaning Unit with Metal-Edge-Filter or Compact-Paper-Filter
Options

Mist Extraction Unit
Attached to Machine-Basic-Body

Remote Diagnosis, Remote 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

Services
Machining Center Installation, Set-Up, Production Assistance and Maintenance

[ ] Options

- Rotary-Table (C-Axis) various configurations
- Multiple-Media-Coupling for Rotary-Table (C-Axis)
- Motor-Spindles RPM-Range 18,000 RPM/24,000 RPM
- Tool-Magazines up to 150 Tool positions
- Rack-Type Magazines over 150 Tool positions
- Cutting-Tool Interface HSK-A63/SK50
- Chip Conveyor: Scratch-Type-, Hinge-Type-, Magnetic-Conveyor
- High pressure Coolant Units up to 150 bar 1)
- Electrical Handwheels
- 3D-Touch Probes
- Automatic Workpiece-Changing-System
- Cutting-Tool Setting and Detection
- Mist Extraction Units 1)
- Workpiece-Pallet-Changing-System
- Robot-Systems, up to 1000 kg
- Equipment for Graphite Machining
- Custom-Made Solutions
- Services

1) Optional placement along the right- or left side of the Machining Center
<table>
<thead>
<tr>
<th><strong>Machine-Type</strong></th>
<th><strong>GS 1400/3</strong></th>
<th><strong>GS 1400/5-T</strong></th>
<th><strong>GS 1400/5-FDT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Working Range</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traverse Path</td>
<td>1200/1300/800 mm</td>
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<tr>
<td>Distance Spindle - Table min./max.</td>
<td>188/988 mm</td>
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<tr>
<td><strong>Static Table</strong></td>
<td></td>
<td></td>
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<tr>
<td>Clamping Surface (w x d)</td>
<td>1300 x 1400 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 T-Slots acc. DIN 650 at X-Direction</td>
<td>18H12 x 100 mm</td>
<td></td>
<td></td>
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<tr>
<td>Alignment-Slot at Table Center Line</td>
<td>18H7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine-Table Load</td>
<td>4000 kg</td>
<td></td>
<td></td>
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<tr>
<td><strong>NC-Swivel-and Rotary-Table</strong></td>
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<td></td>
</tr>
<tr>
<td>Torque-Drives at Swivel- and Rotary-Axis</td>
<td>Direct-Drives</td>
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<tr>
<td>Swivel Range of A-Axis</td>
<td>± 140 °</td>
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</tr>
<tr>
<td>Swivel Speed at A-Axis</td>
<td>30 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-Axis Rotation</td>
<td></td>
<td>360 ° unlimited</td>
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<tr>
<td>C-Axis RPM max.</td>
<td>100 rpm</td>
<td>560 rpm</td>
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<tr>
<td>Diameter Machine-Table C-Axis</td>
<td>Ø 800 mm, [Ø 900 mm], [Ø 1000 mm], [Ø 1200 x 1000 mm]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 T-Slots acc. DIN 650</td>
<td>18 H12</td>
<td></td>
<td></td>
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<tr>
<td>Star-Shaped Configuration</td>
<td>8 x 45 ° [9 T-Slots at X-Direction]</td>
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<tr>
<td>Machine-Table Center Bore</td>
<td>Ø 50 mm</td>
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<tr>
<td>Table Load max.</td>
<td>3000 kg</td>
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<tr>
<td>C-Axis Rotary-Diameter at A-Axis Center</td>
<td>Ø 1420 mm</td>
<td></td>
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<tr>
<td>A-Axis Swivel Diameter (Swing) at X-Axis Center</td>
<td>Ø 1380 mm</td>
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</tr>
<tr>
<td>Distance A-Axis-Center to Rotary-Table</td>
<td>100 mm</td>
<td></td>
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<tr>
<td><strong>Feed-Drive-System X-, Y-, Z-Axis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital AC-Servo-Motors, maintenance free</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Max. Rapid Travel X-, Y-, Z-Axis at TCP</td>
<td>82 m/min</td>
<td></td>
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<tr>
<td>Feeding Force X-, Y-, Z-Axis at CDF 40%</td>
<td>16 kN</td>
<td></td>
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</tr>
<tr>
<td><strong>Motor-Spindle Drive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Frequency Motor-Spindle</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cutting-Tool Interface</td>
<td>HSK-A100 [SK50] [HSK-A63]</td>
<td>HSK-T100</td>
<td></td>
</tr>
<tr>
<td>Motor-Spindle-Power at CDF 20%</td>
<td>82 kW [30] kW</td>
<td>82 kW</td>
<td></td>
</tr>
<tr>
<td>Variable Speed Range max.</td>
<td>14.000 [18.000][24.000] rpm</td>
<td>14.000 rpm</td>
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<tr>
<td>Motor-Spindle Torque at CDF 20%</td>
<td>500 Nm [140] [100] Nm</td>
<td>500 Nm</td>
<td></td>
</tr>
<tr>
<td><strong>Tool Magazines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool positions 1 Chain [2 Chains] [Rack-Type]</td>
<td>33 [66] [126] [150] [over 150]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Tool Diameter, Chain fully loaded</td>
<td>125 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Tool Diameter, Chain neighbour positions unloaded</td>
<td>250 mm</td>
<td></td>
<td></td>
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<tr>
<td>Max. Tool Length</td>
<td>420 mm [500 mm] (at DIA. 80 mm)</td>
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<td></td>
</tr>
<tr>
<td>Max. Tool Weight</td>
<td>32 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool-Change-Cycle (approx.)</td>
<td>4 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chip-to-Chip Cycle</td>
<td>7 s</td>
<td></td>
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<tr>
<td><strong>Linear Encoders X-, Y-, Z-Axis</strong></td>
<td>Absolute Measuring, Incremental Measuring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning Scatter acc. DIN/ISO 230-2 (VDI/DGQ 3441)</td>
<td>0,007 mm</td>
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</tr>
<tr>
<td>Angle Encoder System A-, and C-Axis</td>
<td>Incremental Measuring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine Weight excl. Options</td>
<td>31,000 kg</td>
<td>31,300 kg</td>
<td></td>
</tr>
<tr>
<td>CNC-Controls</td>
<td>iTNC 530 HSCI Heidenhain, [TNC 640 Heidenhain in prep.], [840 D sl Siemens]</td>
<td>840 D sl Siemens [TNC 640 Heidenhain in prep.]</td>
<td></td>
</tr>
</tbody>
</table>
MOTOR - SPINDLES

RPM - Power - Table

**GS 1400/5-T**

RPM – POWER – TABLE RPM max. 14,000

(Motor-Spindel Hirth-Gear-Indexing for turning operation)

**GS 1400/5-FDT**

RPM – POWER – TABLE RPM max. 14,000

**GS 1400/5-T**

RPM – POWER – TABLE RPM max. 18,000

**GS 1400/5-T**

RPM – POWER – TABLE RPM max. 24,000
MACHINING CENTER DIMENSIONS

Machining Center (Single Unit) - Transportation Dimensions

- Width approx. 3070 mm
- Depth approx. 6420 mm
- Height approx. 3607 mm

Options

A) Chip Conveyor
B) Chip Trolley
C) Mist Extraction Unit
D) High pressure Coolant Unit
E) Tool-Magazine 126/150 Tool positions

Please observe: Options A, B, C and D are either to be installed along the right- or left side of the Machining Center!
PowerCell Robot-Loading-System and Zero Point Tooling System with 24 workpiece-pallets

Robot-Loading-System for workpiece-pallets with external Rack-Type-System
PRODUCTIVITY DRIVEN BY GS - SERIES

The GS-Series – Focus on operators needs and user benefits

Productivity through Hybrid-Machining-Applications such as: Drilling/Milling/Turning and Grinding at one Clamping-Set-Up
PRODUCT RANGE - PLEASE CONTACT US

Machining Centers
- GS 650/3
- GS 650/5-T
- GS 650/5-FDT
- GS 800/3
- GX 800/5-AF

Machining Centers
- GS 1000/5
- GS 1000/5-T
- GS 1000/5-FDT
- GX 1000/5-LOB
- GS 1400/3
- GS 1400/5-T
- GS 1400/5-FDT
- GX 1400/5-AF

Loading a GS 1400 for Transportation

Also contact us for further Machining Centers of the CS-Series, Drilling Machines-Series and Custom made Cast-Iron-Products.

ALZMETALL Werkzeugmaschinenfabrik und Gießerei Friedrich GmbH & Co. KG
Postfach/P.O. Box 1169
D-83350 Altenmarkt/Alz · Germany
Harald-Friedrich-Straße 2-8
D-83352 Altenmarkt/Alz · Germany
Tel./Phone +49 (0) 86 21/88-0
Fax +49 (0) 86 21/88-213
E-Mail: info@alzmetall.com
Internet: www.alzmetall.com
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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 Tooling System
SDK  NC-Swivel-and-Rotary-Table
T  Torque-Drive
TCO  Total Cost of Ownership
TCP  Tool Center Point
WN  ALZMETALL – Standard Specification