GF Machining Solutions

Mikron

MILL S 400
MILL S 400 U
MILL S 500

Swiss design and quality

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For more than 15 years, GF Machining Solutions has been pioneering the High Speed Milling technology with its Mikron machines. The MILL S series is the result of this continuous development and brings together the utmost features that make it the reference solution within the industry.

The MILL S 400 and MILL S 500 as well as MILL S 400 U are, respectively, 3-axis and 5-axis sensational High Speed Milling solutions for mold and die manufacturers. From automotive to ICT, through packaging and electrical components, these solutions serve manufacturers looking for high accuracy tools, highly repeatable multi-cavity molds, perfect surface quality expected as finished. Its "Plus" delivering all this at unbeaten productivity thanks to its machining speed and integrated Automation.

Applications

Pins

Steel NimaxUddeholm / 40-45 HRc

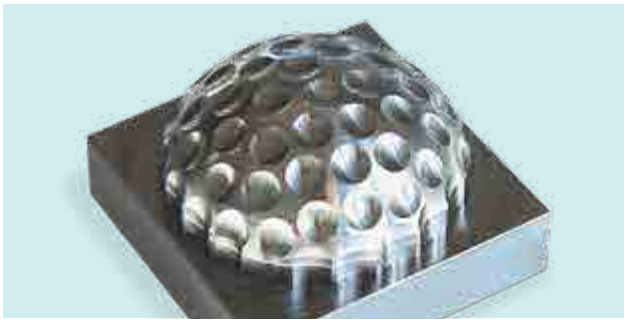
+ Delicate geometries D0.1x16mm
+ High surface quality Ra 0.1 µm
+ Smallest workpieces

Mold insert

Tempered steel 61 HRC 1.2379

Construction of molds and workpieces

+ Highest surface quality Ra 0.05 µm
+ High metal removal rate Q=1.215 cm^3/min
+ Highest accuracy when measuring the workpieces thanks to ITM

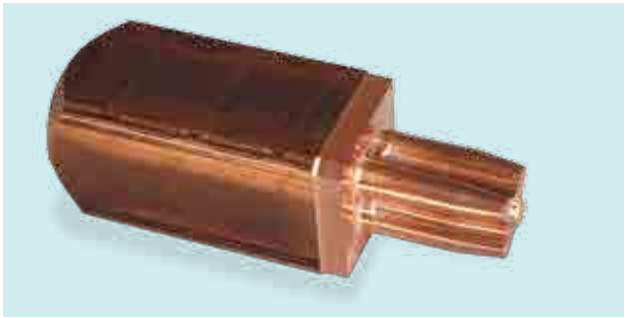


Reflector

Böhler M333 50 HRC

Automotive

+ Highest dimensional accuracy
+ High surface quality Ra 0.1 µm
+ Most precise track control using OSS extreme

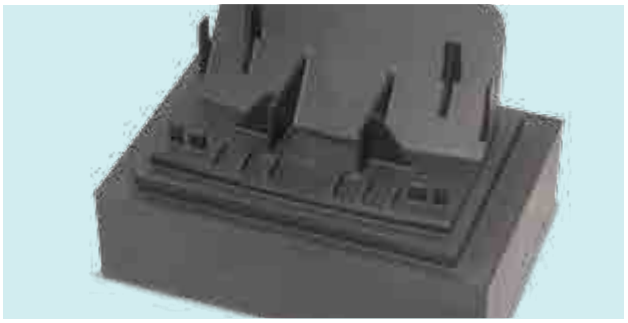


Electrode

Copper E-Cu 58

Watches and jewelery

+ Highest dimensional accuracy +/-0.004mm
+ Five-axis simultaneous processing



Graphite electrode

Graphite

Mold making

+ High contour accuracy
+ Efficient graphite processing

Five-axis simultaneous processing of mold inserts

Highlights

Precision and quality for workpiece and mold making as well as production of precise parts

Mikron MILL S 400 U

Stability and dampening
The most important conditions for the highest dynamics, the best workpiece surface quality and precision include the dampening and stability of the machine foundation.

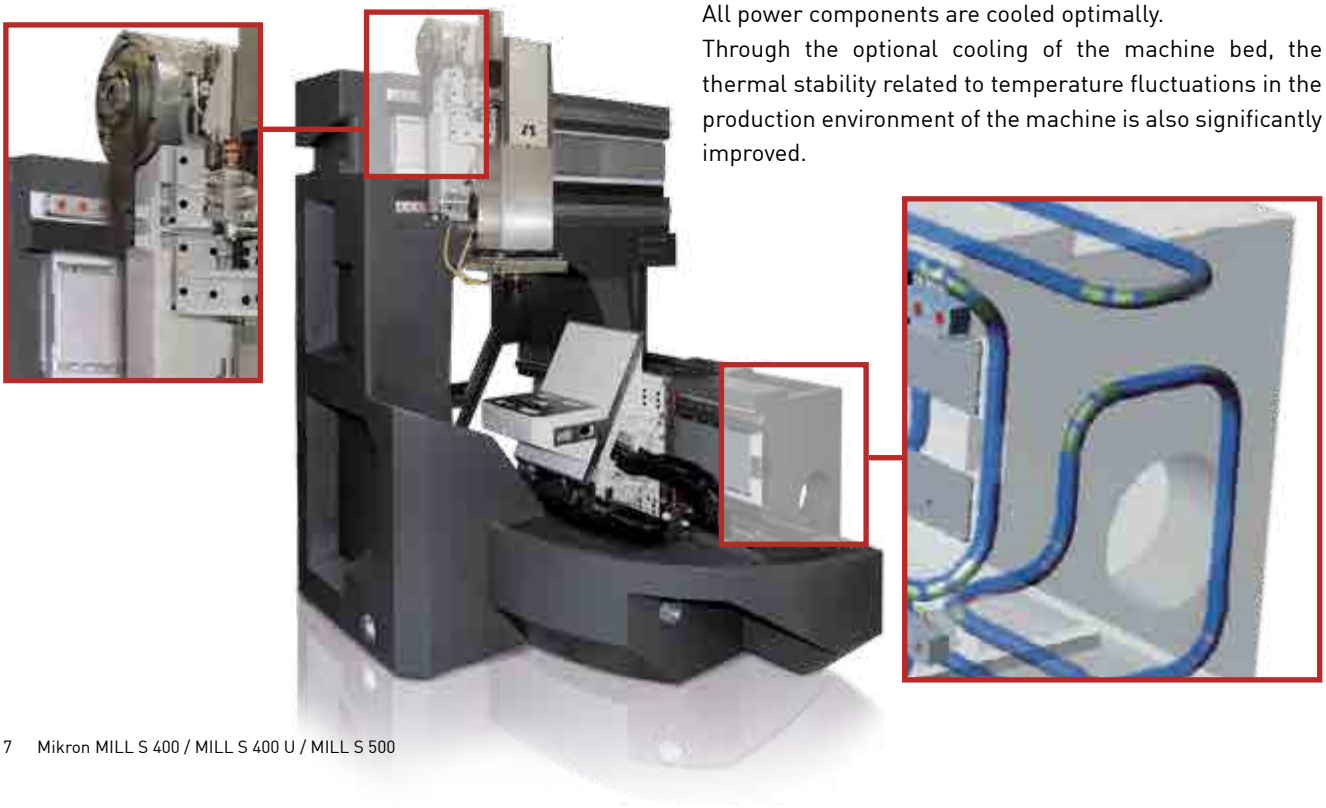
Accessible

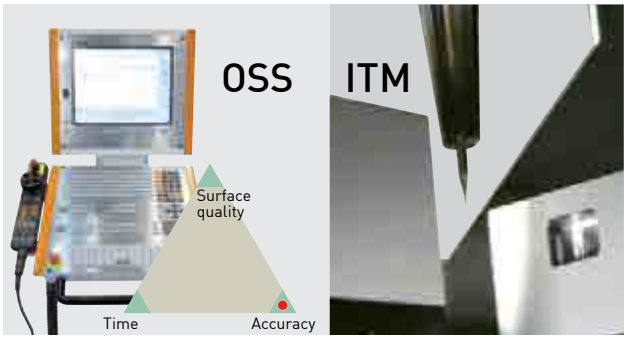
The compact construction provides extraordinary accessibility to all relevant areas of the machining center.

+ Small installation footprint
+ Fast part setup
+ Best accessibility, also for maintenance

HSM inside

The axes are powered with linear drives for the highest speed and acceleration. The pyramid-shaped structure made of polymer concrete and the weight-optimized construction and rigidity are essential for the high-speed cutting (HSM) process.





User friendly

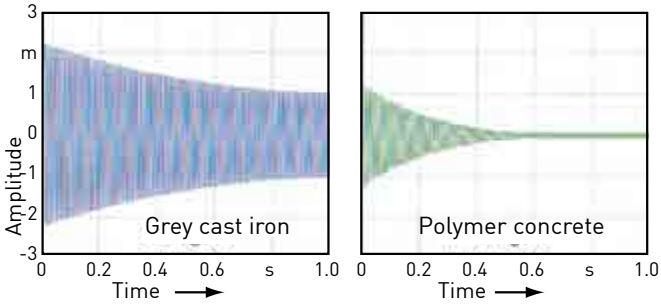
The user friendliness of a machining center starts with the control.

GF Machining Solutions supplements the Heidenhain control with high-performance smart machine modules such as:

+ OSS extreme: Process optimization the easy way
+ ITM: Precision and reliability in the measuring process

Stable

The machine bed made of polymer concrete results in high thermal inertia as well as excellent dampening properties.



Optimal cooling

All power components are cooled optimally.

Through the optional cooling of the machine bed, the thermal stability related to temperature fluctuations in the production environment of the machine is also significantly improved.

Accuracy

HSM core components: Static and dynamic accuracy

Static accuracy

Swiss precision

Before delivery, every Mikron MILL S machine is subjected to an extensive quality control process according to GF Machining Solutions approval guidelines in our air-conditioned production facility.

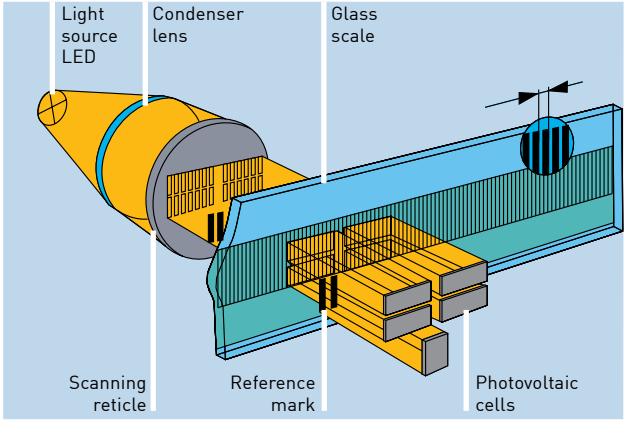
Quality awareness means added value.

Dynamic accuracy

Position sensor systems

All Mikron MILL S machines are equipped with direct sensor systems in the linear and rotary axes.

+ Proven Heidenhain accuracy
+ Resolution in nanometer range
+ Protected with air purge system



HSM core components: Thermal accuracy

Thermal accuracy

Cooling concept

The Mikron MILL S series leads precision machining into a new era. Since high axis feed rates over long periods always generate heat in the drive components, the Mikron MILL S series has a sophisticated cooling management system.
Each of the linear axes as well as the rotary unit has a separate cooling circuit. The heat is consistently transferred out of the machine and not distributed further inside the machine. This results in geometric stability which, in turn, ensures extremely high repeat accuracy of the motion control.
In Mikron MILL S machines, all electric heat sources are water cooled.

+ X, Y, Z, B, C drives
+ Spindle with Opticool technology
+ Electric cabinet

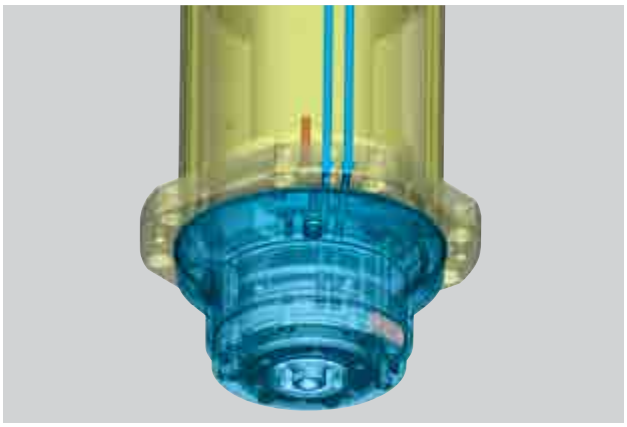
Five separate cooling circuits

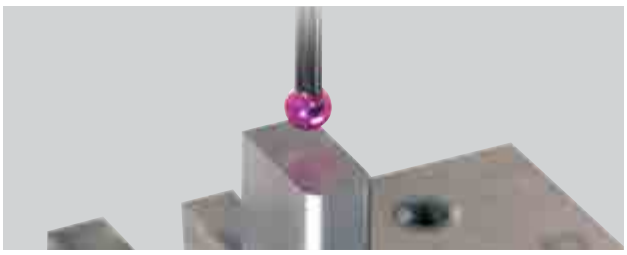
Liquid-cooled primary and secondary part

Spindle

Even higher accuracy with Step-Tec Opticool technology.

+ Cooling of the front roller bearings
+ Low transfer of heat in the workpiece interface
+ Increases accuracy when working with measuring probe on the machine





Measuring probes

Even higher accuracy with new Thermo-Lock measuring probe technology.

+ Easy to install
+ Slows down the transfer of heat between measuring probe and tool Spindle
+ Increases accuracy when working with measuring probe on the machine
+ A strong duo: Thermo-Lock and Opticool

Spindle

Hightech Motor Spindle from Step-Tec

	30'000 min^{-1} HSK-E40 Opticool	42'000 min^{-1} HSK-E40 Opticool	42'000 min^{-1} HSK-E40 Cool Core	60'000 min^{-1} HSK-E32 Opticool
Mikron MILL S 400	+	+	+	+
Mikron MILL S 400 U	+	+	+	+
Mikron MILL S 500	+	+	+	+

Spindles for demanding processing tasks

Whichever machine configuration you choose, with a Mikron MILL S machine you will also receive state-of-the-art Spindle technology.

The facts

+ Vector control for full torque in the lowest range
+ Highly stable ceramic hybrid Spindle bearing
+ Spindle jacket cooling using controlled cooling agent circuit for constant temperatures during the entire processing time
+ Oil/air lubrication system with extraction of used oil
+ Integrated "smart machine" sensors
+ Cooling between tool interface and front Spindle bearing with the Opticool Spindles

Your benefits

+ Precise high performance
+ Shorter acceleration phases
+ High torque
+ Thread cutting without compensation chuck up to M14 (CK45 to M8)
+ Drilling up to Ø 12 mm

Included in delivery is the smart machine module Advanced Processing System (APS) for the reliable recording and display of vibrations during the Milling process.

+ Higher accuracy with Step-Tec Opticool technology
+ Cooling of the front roller bearings
+ Low transfer of heat in the workpiece interface
+ Also increases accuracy when working with measuring probe
+ Additional cooling of the rotor with separate cooling unit

Step-Tec Spindles

Since 1995, Step-Tec has been developing, producing, selling and repairing precise high-performance Spindles for leading manufacturers of machining centers for milling and drilling applications.

Table variations

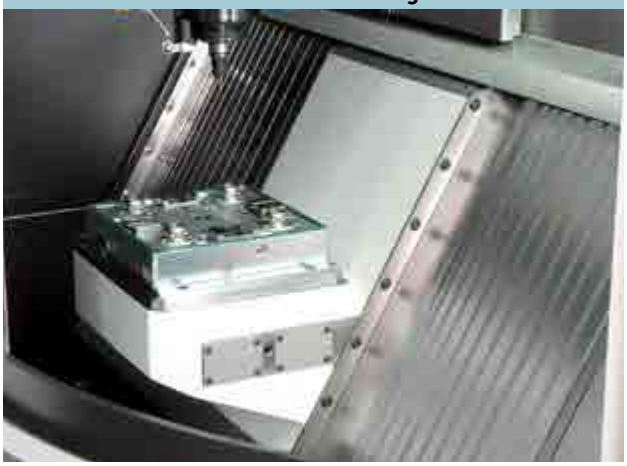
As flexible as needed

Three-axis models

Mikron MILL S 500 **200 kg**

Avoid unproductive times
Completely integrated zero-point clamping systems from the manufacturers System 3R and Erowa.

Mikron MILL S 400 **120 kg**



Mikron MILL S 400 with clamping chuck
+ System 3R Dynafix
+ System 3R GPS
+ Erowa UPC

5-axis models

Mikron MILL S 400 U **25 kg**

+ Extremely dynamic and fast:
  Rotating and swiveling with direct drives in B and C axes up to 250 min^{-1}
+ Extremely accurate and precise:
  Liquid-cooled motors and absolute measuring systems
+ Extremely stable and flexible:
  Hydraulic clamping in the rotatary and swiveling axis plus integrated zero-point clamping system with a B axis swivel range of 220°

Rotary swivel table with clamping chuck
+ System 3R Macro Magnum
+ Erowa ITS


Step-Tec

Machining of molds and workpieces

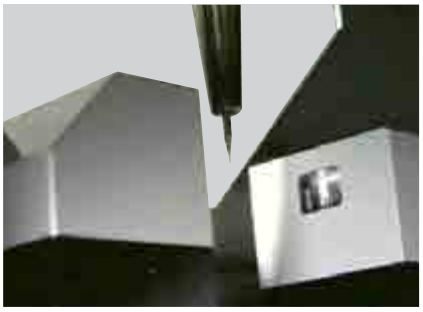
ITM (Intelligent Tool Measurement)

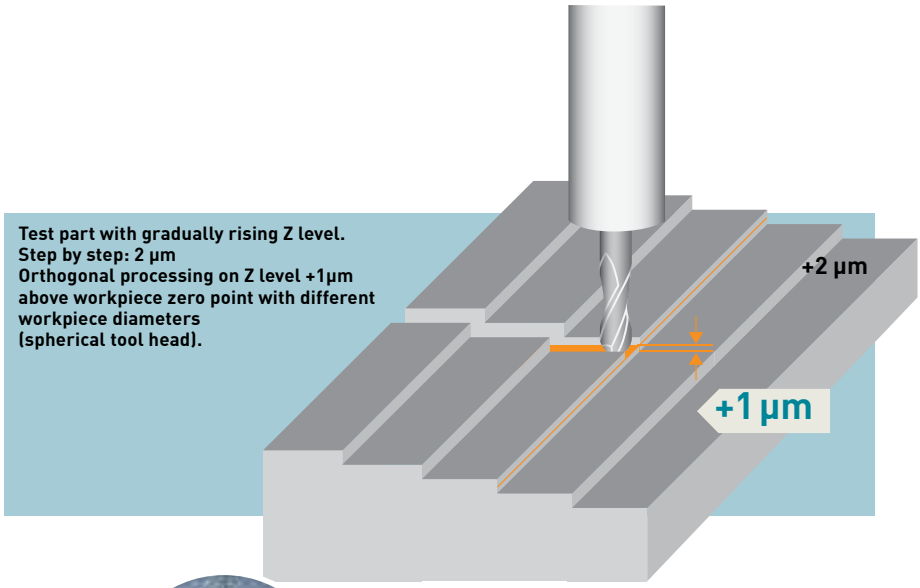
ITM: the breakthrough in cutting tool measuring

Intelligent Tool Measurement (ITM)

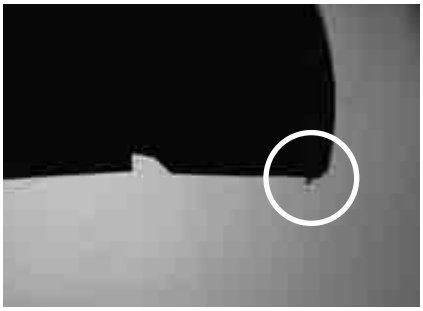
The ITM cutting tool measuring system records the complete tool tip up to Ø 12 mm on modern image sensors.

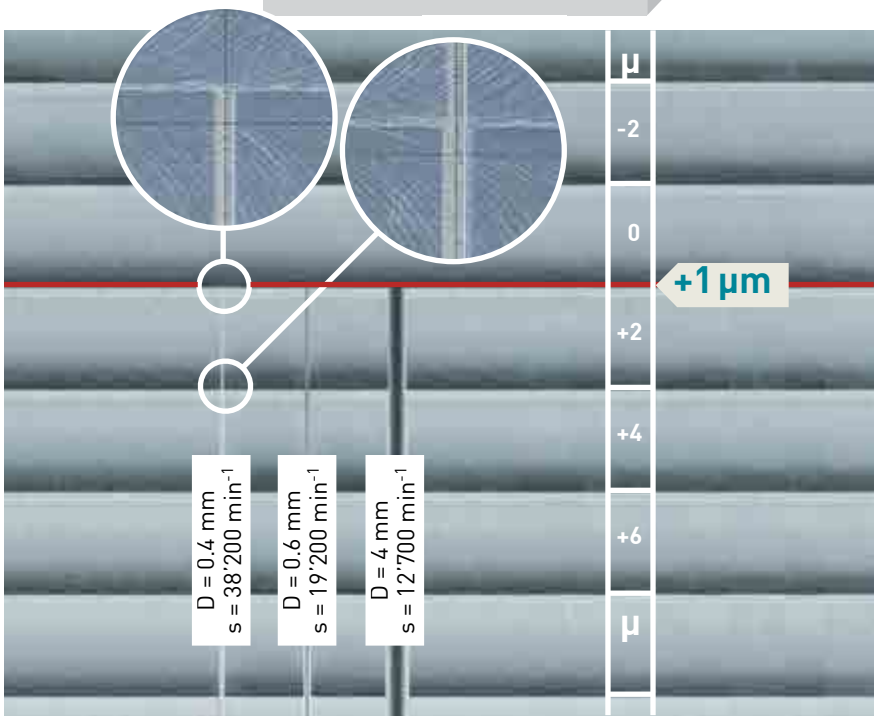
The digitally recorded cutting tool geometry is digitally cleaned and measured using special software. The idea becomes a reality: For the first time, ITM makes possible cutting tool measuring on a Mikron machine with a repeat accuracy in the micrometer range - even after the machining process.



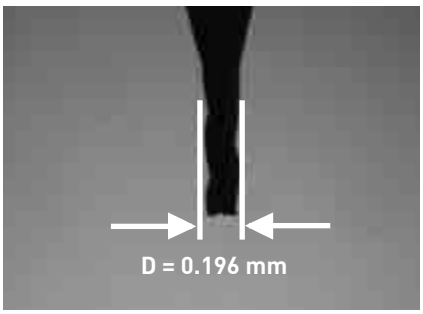


Detection of adhesive foreign particles





Measurement of smallest diameters



Produce more parts in less time at lower costs

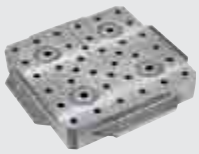
Axis travel X, Y, Z: 500 x 450 x 360 mm	Three-axis models Mikron MILL S 400	90 kg	Five-axis models Mikron MILL S 400 U	25 kg

The pallet magazine is an important plus

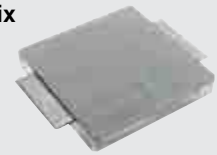
Taking customer requirements into account, GF Machining Solutions has developed its own compact pallet magazines.

The round storage and linear storage pallet magazines can be loaded during operation, and the CNC control is easy to operate.

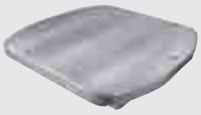
System 3R GPS
240 x 240 mm
10x



System 3R Dynafix
280 x 280 mm
7x



System 3R Dynafix
350 x 350 mm
7x

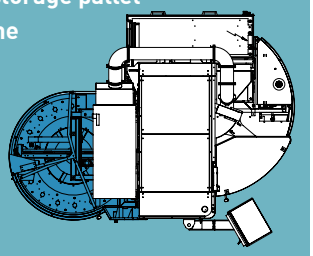


Erowa UCP
320 x 320 mm
7x

System 3R Macro Magnum
Ø 156 mm
18x

Erowa ITS
Ø 148 mm
20x

Round storage pallet magazine



Automation interface

Thanks to a standardized robot interface, the Mikron MILL S series can be operated with robot systems from well known suppliers.

Regardless of the handling system is used, the machine offers comfortable accessibility when machines are linked to each other.

Tool magazine

Individual solutions, tailored for your production needs

Tool Automation in every expansion stage

+ Single- or double-row disk magazine
+ Reliable “pick-up” changing system
+ Feed monitoring using light beam
+ Capacity of up to 68 tools with magazines integrated in the basic machine
+ Alignment of the measuring probe

User-friendly loading of workpieces

Productivity and process reliability are guaranteed thanks to the workpiece loading on the side

+ Simultaneous processing and loading
+ Easy feed monitoring due to large glass window
+ Ergonomic access

Optionally available with a variety of capacities:

Mikron MILL S 400
Mikron MILL S 400 U
Mikron MILL S 500
HSK-E40: 18; 36; 68, 168, 308 tools
HSK-E32: 20; 40 tools

HSK E40 magazine with two rows, integrated in the basic machine, with a capacity of 68 workpieces.

Chip and dust management

Clean workspace

System models

The form and volume of the chips are determined by the machined material as well as the processing strategy. The options offered range from an colant tank with chip flushing to models with cooling oil and colant temperature stabilization...

...to an lift up chip conveyor with a spiral conveyor.

To increase the tank capacity, an external filter system with a capacity of 650l is available.

Graphite extraction using a powerful suction system

Options

Custom-tailored systems


Chip rinsing


Coolant tank


Spiral conveyor


Chip conveyor to remove large volumes of chips


Cooling lubricant filtration


Cooling oil packing with temperature stabilization


Oil mist lubrication


Mist extraction


Mist extraction


Automation interface (closed)


Automation interface (open)


Measuring probes TI

APS
CAMplete
Econowatt
SIGMA FMC
ITC
ITC 5X
ITM
OSS
OSS extended
OSS extreme
PFP
RNS

smart machine (www.gfac.com)

Additional options:

+ Rotating window
+ Dust extraction
+ Beacon
+ Laser measuring system
+ ITM (Intelligent Tool Measurement)
+

smart machine

The new dimension in modern production

Saving energy

Protection

Precision

Productivity

The smart machine is constantly being further developed. The currently available modules can be found at www.gfms.com

Bringing intelligence into the milling process is the intended aim of "smart machine".

This includes a range of modules that are collectively referred to under the generic term "smart machine" and that fulfil various functions. In order to make the milling process "intelligent", various requirements have to be implemented.

First of all, establishing comprehensive communication between man and machine, which makes precise information that the operator requires to assess the milling process available to him. Secondly, supporting the operator in the optimisation of the process, which considerably improves the performance. Thirdly, the machine optimises the milling process, which improves the process safety and the quality of the workpiece - above all in unmanned operation.

The facts

+ Greater accuracy in shorter machining times
+ Increase in the workpiece surface quality as well as the surface and shape accuracy
+ Recognition of critical machining strategies
+ Improvement in the process safety
+ Reduction of the machine set due to longer service life
+ Higher availability
+ Better operating comfort
+ Considerable increase in reliability in unmanned operation

smart machine construction kit system

Each of the modules fulfils a specific task. Just like in a construction kit, the user can select the modules that seem to him to be the best option for improving his process.

Your benefit

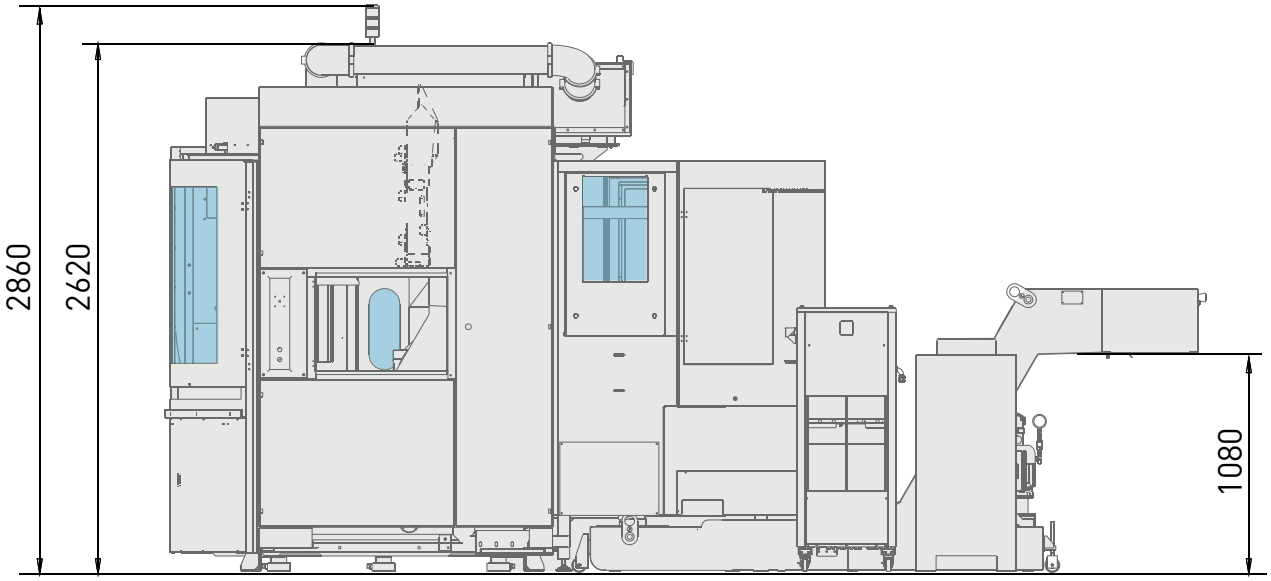
Producing the workpieces in a process-secure and precise manner, increasing the reliability in unmanned operation, increasing the service life of the machine and significantly reducing production costs.

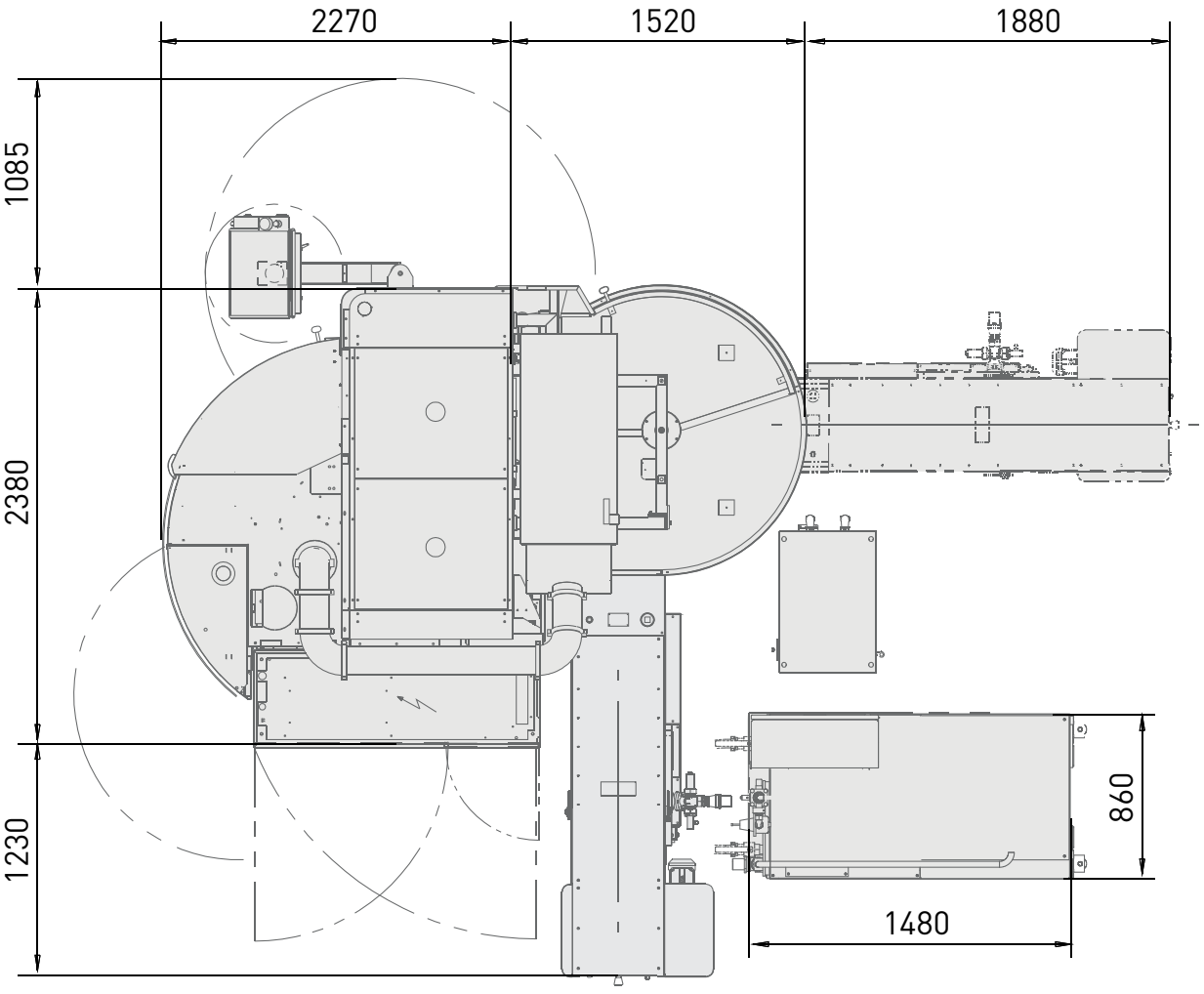
Technical data

Machine			Mikron MILL S 400	Mikron MILL S 400 U	Mikron MILL S 500
Axis travel					
Lengthwise	X	mm	500	500	500
Crosswise	Y	mm	450	240	450
Vertical	Z	mm	360	360	360
Swiveling axis		°	-	+110/-110	-
Rotary axis		°	-	n x 360	-
Travel speed					
Rapid traverse	X, Y	m/min	61	61	61
Rapid traverse	Z	m/min	61	61	61
Rapid traverse (swivel)		min^{-1}	-	165	-
Rapid traverse (rotary)		min^{-1}	-	250	-
Tool Spindle (40% ED, S6)					
60'000 min^{-1}, HSK-E32		kW / Nm	8.5/ 3.5	8.5 / 3.5	8.5 / 3.5
42'000 min^{-1}, HSK-E40		kW / Nm	13.5/ 8.8	13.5 / 8.8	13.5 / 8.8
30'000 min^{-1}, HSK-E40		kW / Nm	13.5/ 8.8	13.5 / 8.8	13.5 / 8.8
Work table					
Pallet/clamping surface		mm	Dynafix 280x280/350x350	MacroMagnum 156	550 x 450
Pallet/clamping surface		mm	GPS 240 x 240	ITS 148	-
Pallet/clamping surface		mm	UPC 320 x 320	-	-
Max. table load		kg	120	25	200
Tool magazine					
HSK-E32		tool holder	20/40	20/40	20/40
HSK-E40		tool holder	18 / 36 / 68 / 168 / 308	18 / 36 / 68 / 168 / 308	18 / 36 / 68 / 168 / 308
Automation					
Pallet size / Number		Piece	UPC/Dynafix / 7x	M.M. 156/18x	-
Pallet size / Number		Piece	GPS 240/10x	ITS 148/20x	-
Maximum additional load		kg	90	25	-
Weight					
Machine		kg	6'800	7'000	6'800
Pallet changer		kg	1'200	1'200	-
Control					
Heidenhain			iTNC 530 HSCI	iTNC 530 HSCI	iTNC 530 HSCI

Mikron MILL S 400 / MILL S 400 U / MILL 500

Standard chip conveyor and belt filter unit





GF Machining Solutions

Milling

High-Speed and High-Performance Milling Centers. In terms of cutting speed, HSM centers are 10 times faster than conventional milling machines. Greater accuracy and a better surface finish are also achieved. This means that even tempered materials can be machined to a condition where they are largely ready to use. One essential advantage of HSM is that with systematic integration, the process chain can be significantly shortened. HSM has developed alongside EDM into one of the key technologies in mold and tool making.

EDM

Electric Discharge Machines. EDM can be used to machine conductive materials of any hardness (for example steel or titanium) to an accuracy of up to one-thousandth of a millimeter with no mechanical action. By virtue of these properties, EDM is one of the key technologies in mold and tool making. There are two distinct processes — wire-cutting EDM and die-sinking EDM.

Laser

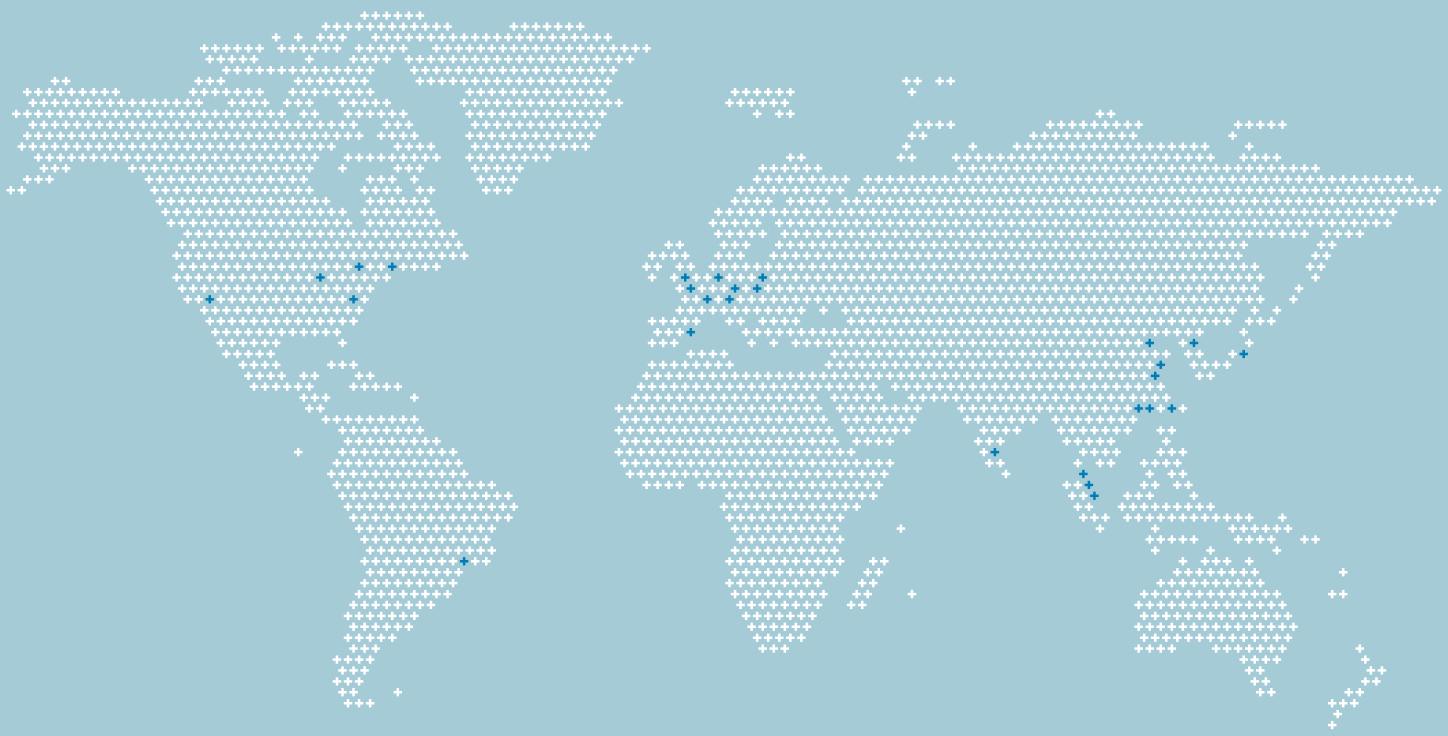
Laser texturing. Laser texturing supplements and extends the technologies offered by GF Machining Solutions. With our laser technology we enable you to produce texturizing, engraving, microstructuring, marking and labeling of 2D geometries right through to complex 3D geometries. Laser texturing, compared to conventional surface treatment using manual etching processes, offers economic, ecological and design advantages.

Automation

Tooling, Automation, Software. Tooling for fixing workpieces and tools; automation systems and system software for configuring machine tools and recording and exchanging data with the various system components and design advantages.

Customer Services

Operations, Machine and Business Support. Customer Services provides with three levels of support all kind of services for GF Machining Solutions machines. Operations Support offers the complete range of original wear parts and certified consumables including wires, filters, electrodes, resin and many other materials. Machine Support contains all services connected with spare parts, technical support and preventive services. Business Support offers business solutions tailored to the customer's specific needs.



GF Machining Solutions

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At a glance

We enable our customers to run their businesses efficiently and effectively by offering innovative Milling, EDM, Laser, Spindle, Automation and Tooling solutions.
A comprehensive package of Customer Services completes our proposition.

www.gfms.com