

Mikron

# HSM 200 LP

# HSM 200U LP



### **GF Machining Solutions: all about you**

When all you need is everything, it's good to know that there is one company that you can count on to deliver complete solutions and services. From world-class Milling, electrical discharge machines (EDM) and Laser texturing machine tools through to first-class Automation, Tooling and software systems—all backed by unrivaled Customer service and support—we, through our Mikron, Liechti, AgieCharmilles and System 3R technologies help you raise your game and increase your competitive edge.

# Swiss design and quality

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## GF Machining Solutions

### The high-speed reference in the 3-axis and 5-axis range.

The Mikron HSM 200(U) LP series has been designed for the highest precision and surface quality.

These vertical high-speed machining centers are therefore offered for both tool and mold-making and the production of high-quality parts.

They incorporate the full technical competence of the Swiss machine manufacturer.

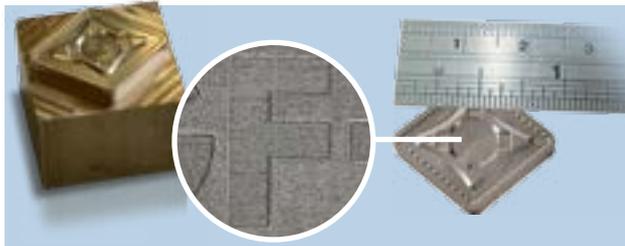
GF AgieCharmilles

# Applications



## Complex parts

- Various materials
- Watch-making industry / micro mechanics
- + Form and position accuracy
- + Extremely small geometries
- + Part-specific handling systems



## Electrodes

- Tungsten-copper / graphite
- Tool and mold-making
- + Surface quality
- + Dimensional accuracy
- + Very small geometric features



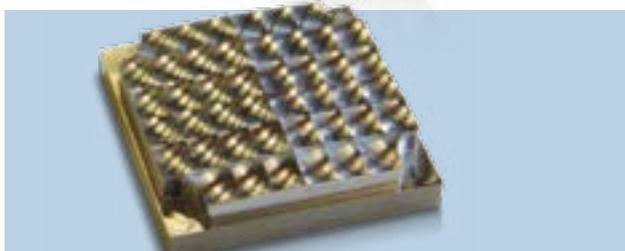
## Prostheses and implants

- Titanium / CoCr
- Medical technology
- + Powerful torque
- + 5-axis simultaneous machining
- + Perfect surfaces and working accuracy



## Fluidics

- Aluminum
- Automobile industry
- + 5-axis simultaneous machining
- + Shortest machining time
- + Excellent surface quality

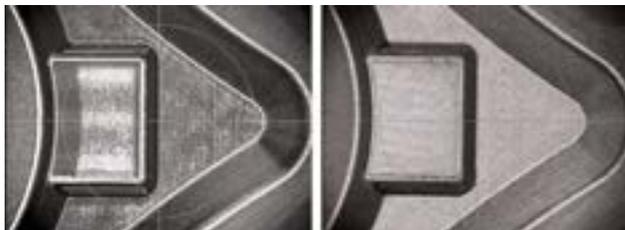


## Reflectors

- Powder-metallurgical tool steel
- Tool and mold-making
- + 5-axis machining
- + Specular surface quality

Drive with ball screw

Drive with linear direct motor





Perfect 5-axis machining without restriction.



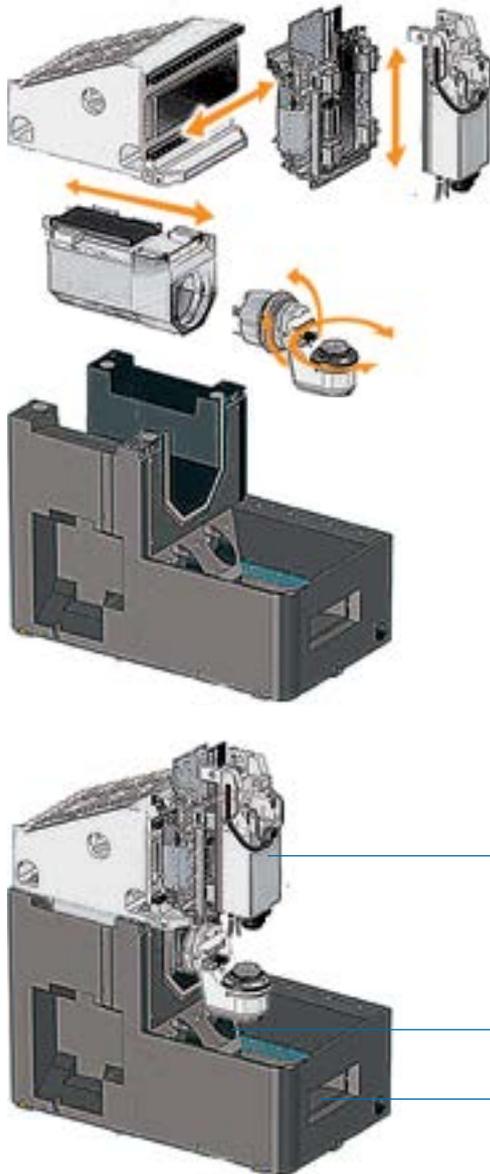
## Highlights

# Precision and quality for tool- and mold-making, as well as exact parts production

## Mikron HSM 200 LP / HSM 200U LP



# For uncompromising demands. Dynamics and precision brought together in one unit.



## Short power flow, short tolerance chain

With high-speed milling machines, most important prerequisites for very high precision and surface quality are damping and the stability of the machine structure. The revolutionary axis concept of the Mikron HSM 200(U) LP therefore consists of the following:

- + Polymer concrete machine base with strong damping properties and heavy static weight
- + Optimized force application and transmission within a slide construction
- + Linear axes with recirculating roller guides 35 mm wide (X, Y, and Z axes)
- + High dynamic rigidity of the linear direct drives
- + Water-cooled direct drives in all axes: X, Y, Z, B, C
- + Highly compact and extremely rigid axis assembly made of steel with thermal conductivity and expansion behavior
- + All guides above the machining area
- + Suction openings for graphite
- + Chip drawer

## Ergonomics

The spacious work area door enables the quick changing of externally equipped workpieces.

## Chip management

Machining chips fall into the central chip shaft below the machining table. With low chip volumes, chips are caught in a chip drawer. With high chip volumes, the chips are discharged via an external system together with the cooling lubricant.

## Dust management

Machining dust is sucked away centrally below the machining point. Two suction shafts integrated into the machine bed enable a generously proportioned suction cross section.

## Table variants

# As flexible as required

### Fully automatic production of small batches

Avoid unproductive periods during the production of small batches through

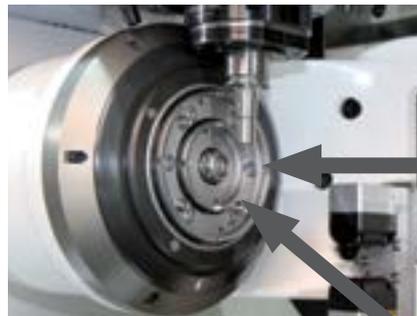
- + Automated changing of pallets or pallet-bound, part-specific zeropoint clamping systems
- + Automated changing of customer-specific individual parts through the employment of part-specific, zeropoint clamping systems

### A solution for all automation projects

Wide selection of simple or complex pallet designs

- + System 3R GPS 70
- + System 3R GPS 70 with 3 additional media
- + System 3R GPS 70 COCN (central lifting rod for automated collet changes)
- + System 3R GPS 120
- + System 3R GPS 120 with up to 4 additional media on the pallet surface (can be activated via the M function and the pressure adjusted variably via the cycle, e.g. for System 3R TwistLock)

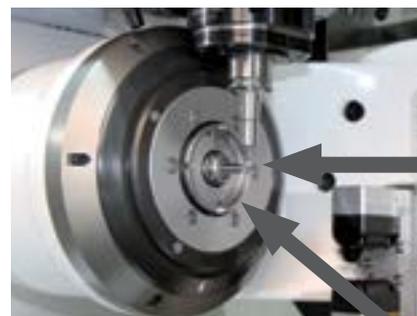
### Automatic zero-point clamping system for pallets



GPS 120 with 4× media



GPS 120



GPS 70 with COCN

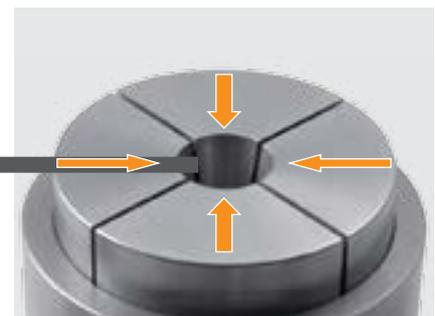
### Options for automatic zero-point clamping systems for customized parts



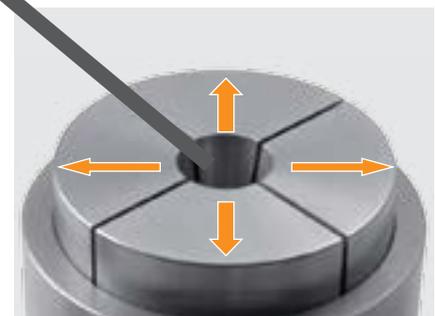
System 3R TwistLock



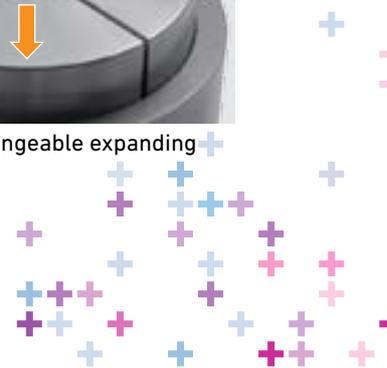
Watch plates

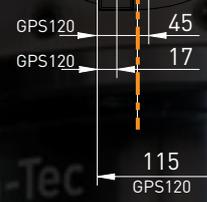
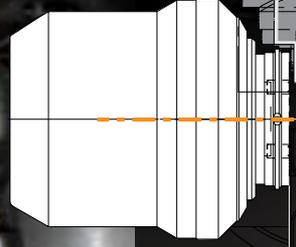
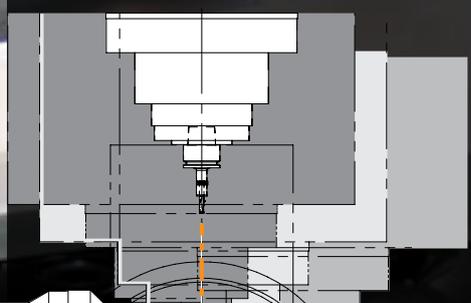
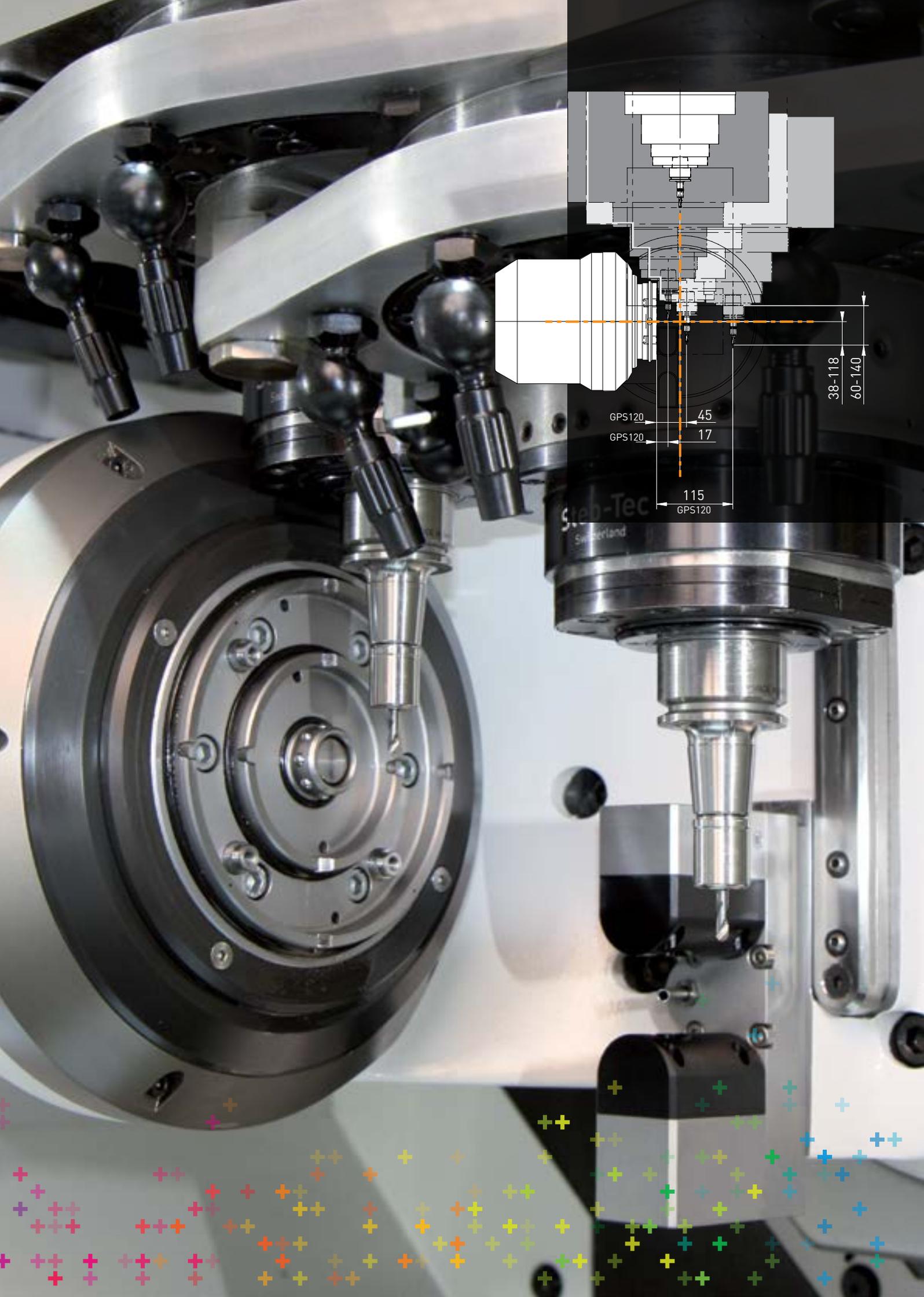


Automatically changeable collets



Automatically changeable expanding mandrel





38-118  
60-140

GPS120 45  
GPS120 17  
115  
GPS120



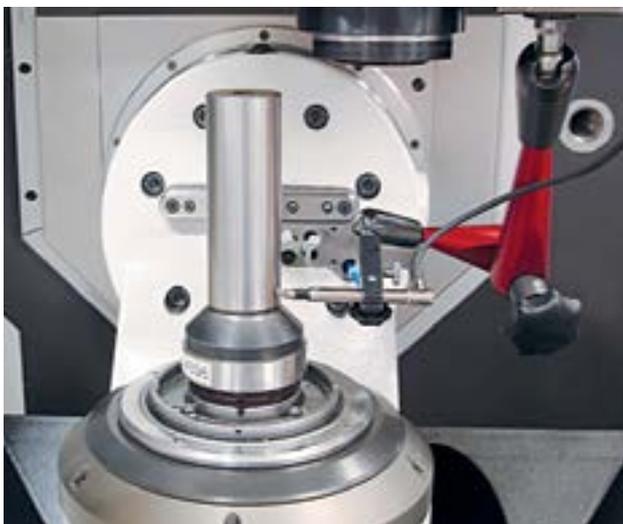
## Precision

# Core components: Static and dynamic precision

### Static precision

#### Swiss thoroughness

Prior to delivery, each Mikron HSM LP machine undergoes a comprehensive quality inspection in our air-conditioned assembly hall according to GF Machining Solutions acceptance guidelines.

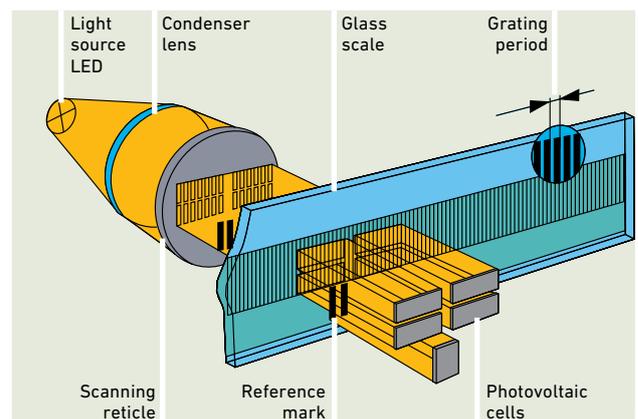


### Dynamic precision

#### Position sensor systems

All Mikron HSM 200(U) LP machines are equipped with direct position sensor systems in the linear and rotary axes as standard.

- + Resolution in the nanometer range
- + Protected by sealing air



## Precision

# Core components: Thermal precision and component precision

### Thermal precision

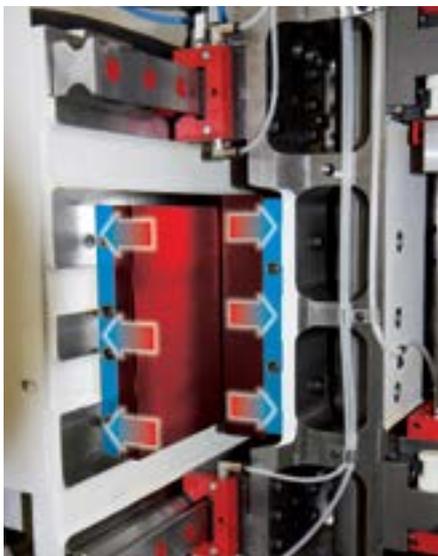
#### Cooling concept and reserve capacity

The Mikron HSM 200(U) LP range leads precision machining into a new era. Sophisticated cooling management for heat discharge of the electrical drive groups.

All linear axes and the circular-swivel unit feature a separate cooling circuit.



Five separate cooling circuits for the motors of the drives in the X, Y, Z, B/C axes, and the spindle motor.



Primary and secondary part mounted on a large cooling plate.

### Component precision

#### Micro machining made easy

The workpiece and tool measuring systems are especially suited for micro machining.

- + Low tactile forces allow for damagefree and highly precise measurement of geometric features
- + Precision laser optics for highly precise measurement of very small tool diameters



Low tactile forces and high temperature stability – 0.8 N of tactile force in the Z direction on thermo lock interface (hexagon / m&h)



Precise measurement of very small tool diameters from 25 µm to 20 mm

## Automation

# More parts in less time at lower costs



With the Mikron HSM 200 and HSM 200U, automatic production is ensured by the low-cost integration of the pallet magazine.

- + Repetitive machining is executed without interruption in multi-shift operation
- + The machine's efficiency is increased with an accordingly higher profit
- + System 3R GPS 120            14 pallets
- + System 3R GPS 70            20 pallets
- + System 3R MacroMagnum    12 pallets
- + System 3R Macro 116        14 pallets
- + System 3R Macro 70         20 pallets
- + System 3R Macro 54         20 pallets
- + Erowa ITS 148                12 pallets
- + Erowa ITS 115                14 pallets
- + Erowa ITS 72                 20 pallets



Increased  
profitability is  
indispensable  
today

## High-tech HSC spindle

# Core components of Step-Tec



### Tool spindles for demanding machining

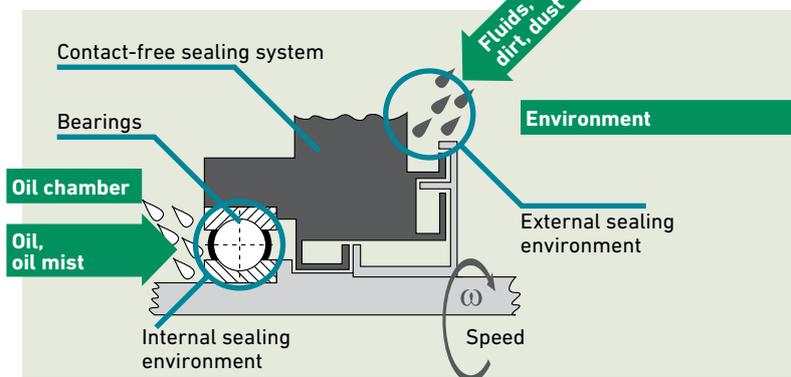
With a Mikron HSM 200(U) LP machine you get the latest tool spindle technology.

- + 50,000 rpm HSK E-32
- + High torque up to 20,000 rpm
- + Low spindle heating increases working accuracy
- + Highly stable double-ceramic hybrid bearings in an "O" configuration for very high radial capacity and rigidity during machining
- + Contact-free 3-chamber labyrinth seal for optimum sealing of the spindle nose
- + Vector control for full torque in the lower speed range
- + Oil/air lubrication system with extraction of the consumed oil
- + Very short acceleration time – 2 seconds from 0 to 50,000 rpm
- + Thread cutting without compensating chuck in steel up to M6 (CK45)

Mikron HSM 200 LP	+
Mikron HSM 200U LP	+



### Schematic diagram of three-chamber labyrinth



### smart machine

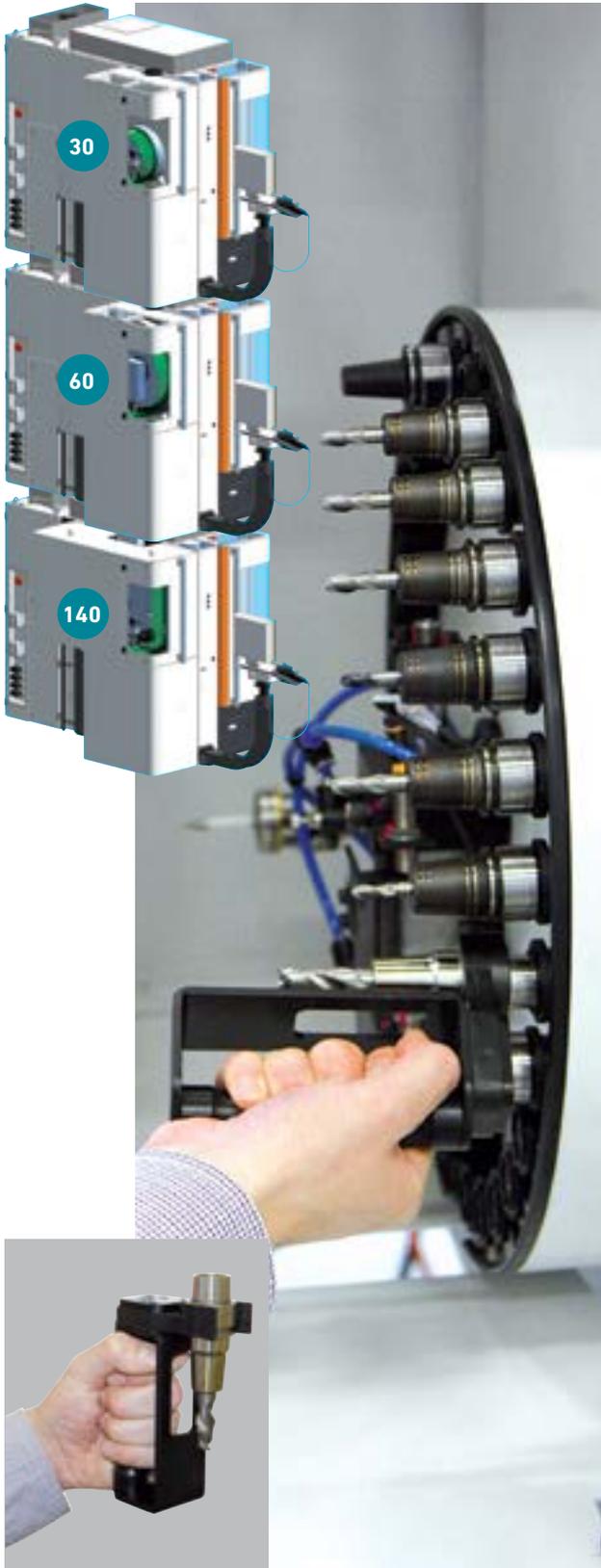
Supplied in the package is the APS (Advanced Processing System) smart machine module for the reliable recording and display of vibrations during the milling process.

### Step-Tec

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.

Tool magazine

# Tailored to your needs



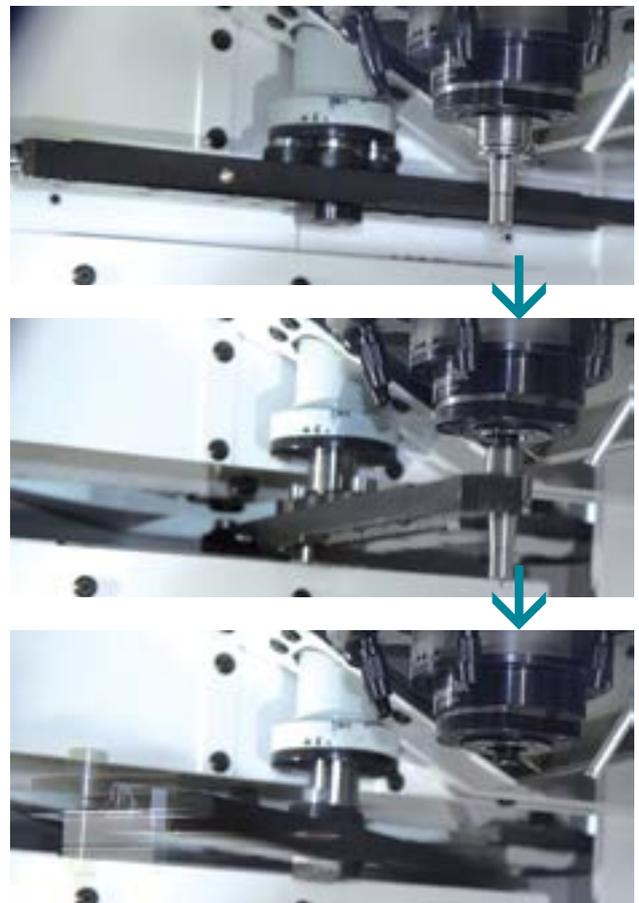
## Tool storage in many configurations

- + Disk magazine with 30, 60 or 140 tool positions
- + Reliable and extremely quick double-gripper change system
- + Chip-to-chip in 4.4 seconds
- + Secure orientation of the measuring sensor through a firmly assigned magazine space

## Productivity and process safety

- + User-friendly tool feeding
- + Simple feed monitoring through a large glass panel
- + Secure access even during full automation
- + Feeding during machining possible

## Double-gripper change system



## Chip and dust management

# Clean work area

Customer requirements		Configuration
<b>Cutting lubricant (Combination)</b>	<b>Autonomous chip volume</b>	<b>Chip management</b>
<ul style="list-style-type: none"> <li>+ Minimal quantity lubrication (MQL)</li> <li>+ Air blow off external / dry</li> </ul>	Small	<ul style="list-style-type: none"> <li>+ Chip drawer with closed bottom part</li> </ul>
<ul style="list-style-type: none"> <li>+ Emulsion</li> </ul>	Small	<ul style="list-style-type: none"> <li>+ Coolant tank 80 l</li> <li>+ Chip drawer with water-permeable bottom part and integrated fine filter</li> </ul>
<ul style="list-style-type: none"> <li>+ Dust extraction</li> </ul>	Large	<ul style="list-style-type: none"> <li>+ Dust extraction with a suction performance of 1,900 m<sup>3</sup> / h</li> <li>+ Chip drawer with closed top layer</li> </ul>
<ul style="list-style-type: none"> <li>+ Emulsion</li> </ul>	Large	<ul style="list-style-type: none"> <li>+ Band filter unit 400 l with chip container</li> <li>+ Chip drawer with opened bottom part</li> </ul>
<ul style="list-style-type: none"> <li>+ Minimal quantity lubrication (MQL)</li> <li>+ Air blow off external / dry</li> </ul>	Small	<ul style="list-style-type: none"> <li>+ Chip drawer with closed bottom part</li> </ul>



Supply air



Chips with emulsion



Chips



Air with dust



Emulsion

# Chips, graphite, emulsion. Always a solution!



Supply air for dust extraction

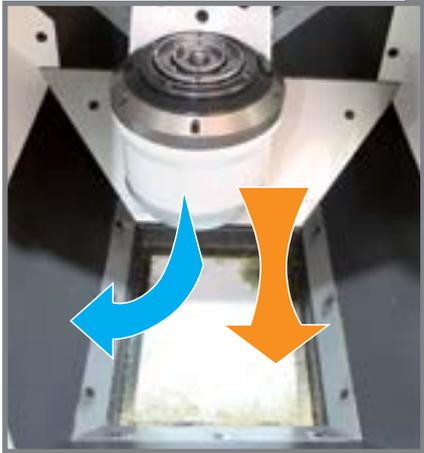
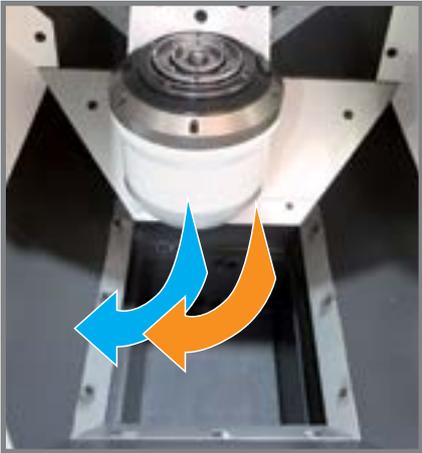
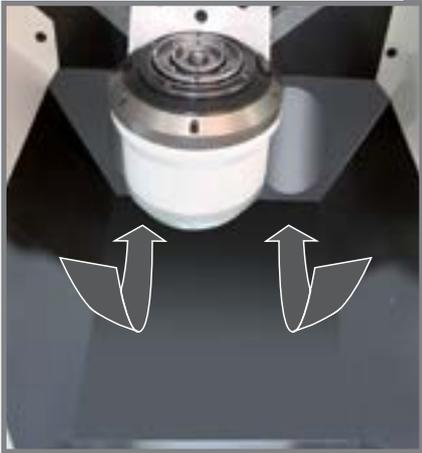


Chip drawer with water-permeable bottom part and integrated fine filter



Drawer with opened bottom part for emulsion operation with large chip volume

Suction openings for dust



## Options

# Tailor-made equipment



External coolant supply via two nozzles



Spray ring with up to nine individually adjustable nozzles



Coolant tank 80 l



Rotating window



Mist extraction



Dust extraction



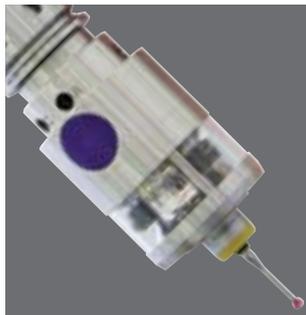
Air blow on C-axis positioned over laser system



Heidenhain iTNC530 HSCI FS



Automation interface



Touch probe m&h 40.40 LF/TI



Touch probe Renishaw OMP400

APS  
CAMplete  
Econowatt  
SIGMA FMC  
ITC  
ITC 5X  
ITM  
OSS  
OSS extended  
OSS extreme  
PFP  
RNS  
smart machine  
(www.gfac.com)



Air through spindle/spindle slots



Signal lamp

smart machine

# The new dimension in modern production

**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.



Saving energy



Protection



Precision



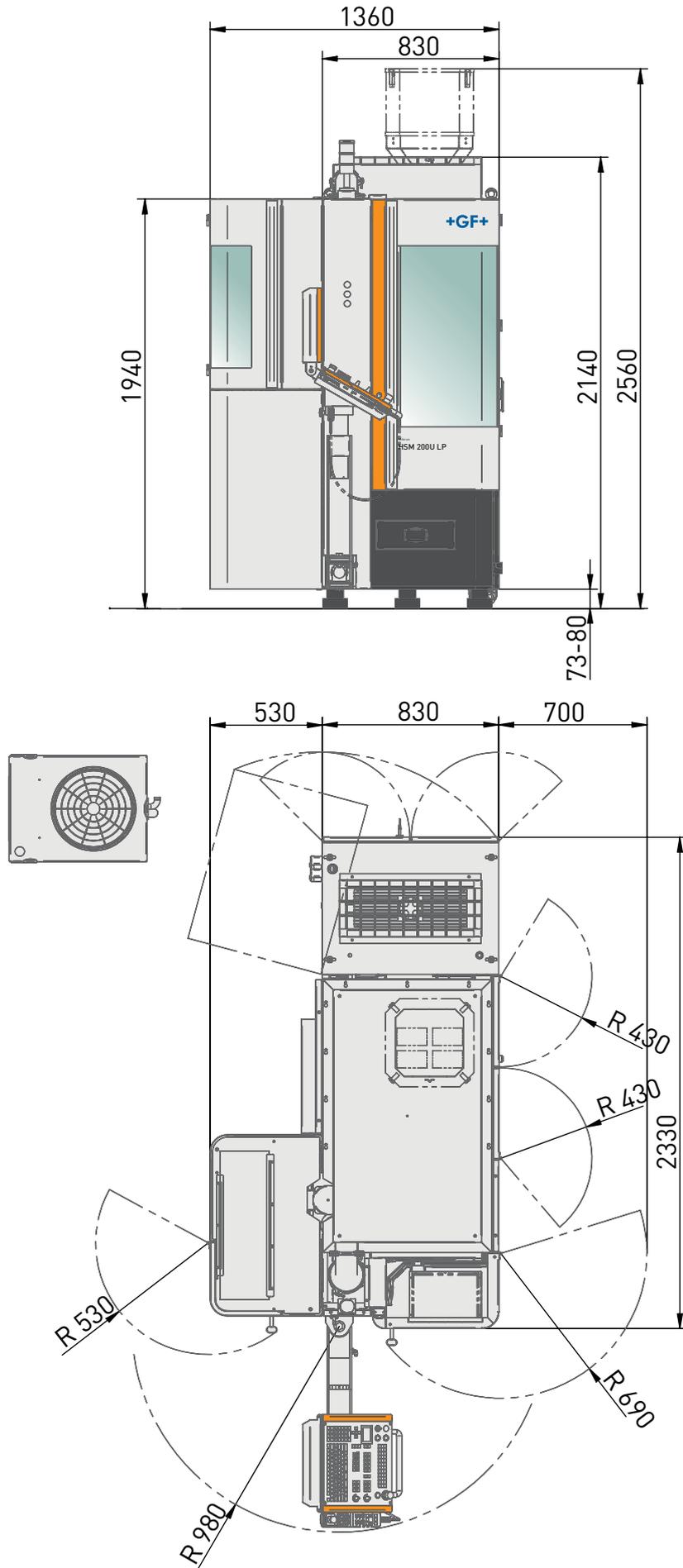
Productivity

The smart machine is constantly being further developed. The currently available modules can be found at [www.gfms.com](http://www.gfms.com)

## Technical data



			Mikron HSM 200 LP	Mikron HSM 200U LP
<b>Workarea</b>				
Longitudinal	X	mm	160	160
Cross	Y	mm	160	160
Vertical	Z	mm	200	200
B-axis		°	-	+30/-120
C-axis		°	-	n x 360
Number of simultaneous axis			3	5
<b>Feed drive</b>				
Feed rate	X, Y, Z	m / min	42	42
	B, C	min <sup>-1</sup>	-	150 / 250
Acceleration	X, Y, Z	m/sec <sup>2</sup>	up to 14	up to 14
	B, C	rad/sec <sup>2</sup>	-	up to 165 / 418
<b>Accuracy (Standart)</b>				
Accuracy	A	μ	4	4
Repeatability	B	μ	2	2
<b>Work table</b>				
Clamping surface		mm	according Pal.	according Pal.
Max. workpiece weight		kg	20	8
<b>Tool magazine</b>				
Configuration		Positions	30, 60, 140	30, 60, 140
<b>Weight</b>				
Including Pallet magazine		approx. kg	3600	3600
<b>Options</b>				
Laser Tool Measuring			+	+
Coolant tank 80l / 400l			+	+
Mist extraction			+	+
Dust extraction			+	+
<b>Spindle</b>				
50'000 rpm	Power 40% ED	kW	8.5	8.5
HSK E32	Torque 40% ED	Nm	3.4	3.4
<b>Pallet magazine</b>				
GPS 120, GPS 70		Pallet	14, 20	14, 20
MacroMagnum, Macro 116, 70, 54		Pallet	12, 14, 20, 20	12, 14, 20, 20
ITS 148, 115, 72		Pallet	12, 14, 20	12, 14, 20



# GF Machining Solutions



## EDM (electrical discharge machining)

**AgieCharmilles wire-cutting, die-sinking and hole-drilling machines.**

For over 60 years we have been at the forefront of every EDM development: designing and refining the EDM process and building machine tools that deliver peerless part accuracies, surface finishes, cutting speeds and process reliability. Today, our AgieCharmilles wire-cutting, die-sinking and hole-drilling machines are recognized throughout the world as the best in the business. Our continuous research and development in digital generator technology, control systems and integrated Automation systems are evidence of our commitment to keeping your EDM operations on the leading edge of technology.



## Laser

**AgieCharmilles Laser texturing machines.**

Laser texturing is a fully-digitized surface engineering process that has huge potential. The technology enables precise 2D and 3D textures or engravings to be machined accurately and directly onto complex parts or molds to improve and alter their aesthetic appeal, functionality and performance. The process is infinitely repeatable and offers many distinct environmental and economic advantages over conventional texturing processes.

**Laser Additive Manufacturing (AM).**

GF Machining Solutions has partnered with EOS, the global leader for high-end AM solutions, to integrate this innovative technology and further develop it into its current solutions to fully benefit the mold industry, by focusing on injection efficiency: optimized cooling design to reduce cycle time, lower energy consumption, higher quality of plastic parts.



## Automation

**System 3R Automation, Tooling and software.**

Productivity is the key to manufacturing success, and automating a manufacturing process is a proven method of increasing its efficiency, effectiveness, quality and reliability. System 3R's integrated Automation, Tooling and software solutions—simple workpiece pallet and electrode changers and flexible manufacturing and robot handling systems— increase your competitive advantage.



## Milling

**Mikron high-speed (HSM), high-performance (HPM) and high-efficiency (HEM) Milling centers.**

Customers operating in the mold, tool and die and precision component manufacturing sectors stake their reputations on being able to quickly and cost-competitively meet their customers' demands. That's why they invest in Mikron machines. Incorporating the latest and most advanced technologies and premium-performance components, Mikron HSM, HPM and HEM machines help you increase your production capabilities and improve your productivity. Designed and built for speed, accuracy and reliability, the machines, like you, are proven performers.

**Liechti Dedicated Aerospace and Energy machining Centers.**

Aerospace and power generation turbine manufacturers increasingly turn to Liechti dedicated five- and six-axis machining centers to machine complex, high-precision airfoils on blades, disks, blisks, blisks/IBRs and impellers. It's easy to see why because these machines, with their specific profile machining technology, specialized CAD/CAM software and engineering competence for ultra-dynamic machining in titanium, Inconel, nimonic, titanium-aluminide and high-alloy steels, yield productivity gains as much as 30 percent, thanks to reduced machining times. In the globally competitive aerospace and power generation manufacturing sector, that's definitely worth shouting about.

**Step-Tec Spindles.**

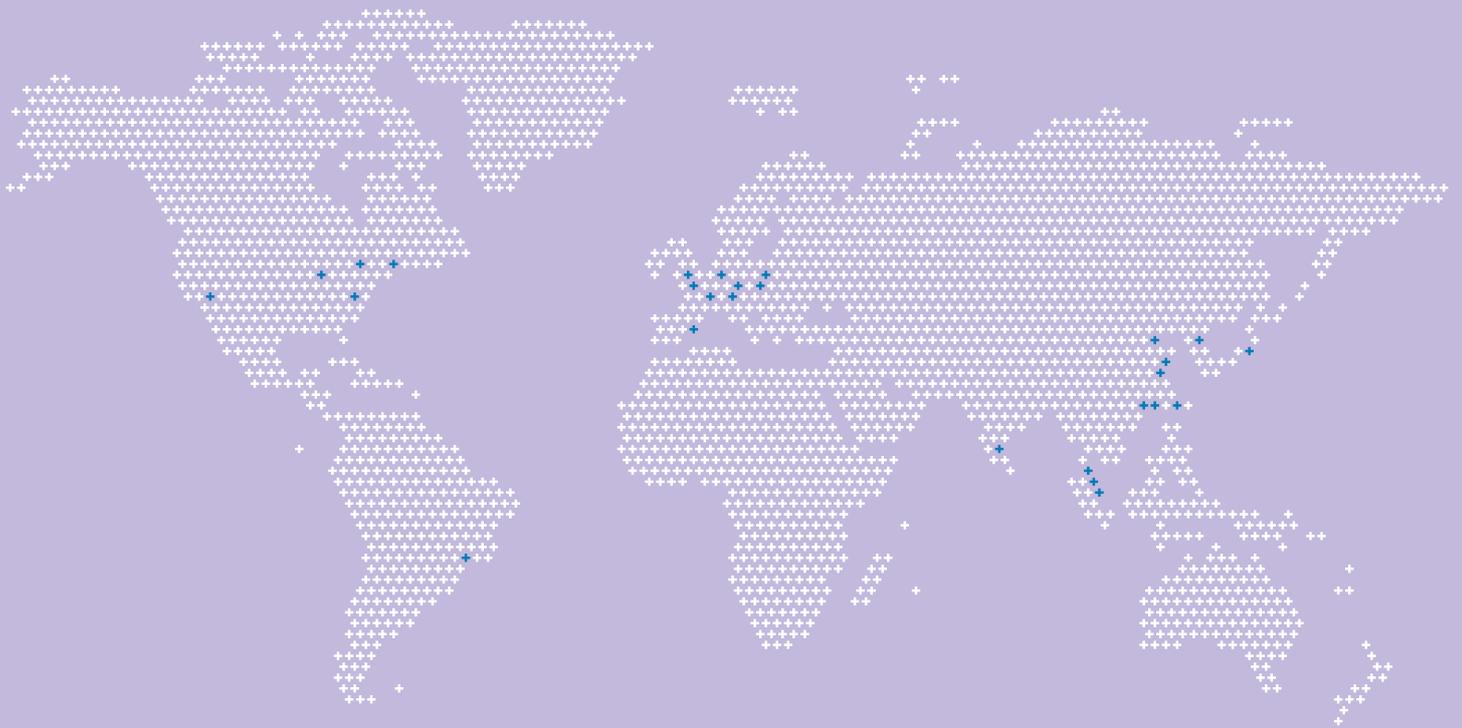
At the heart of every Mikron machining center is high-performance Step-Tec Spindle. Step-Tec Spindles are essential core components of our machining centers. Highly accurate and thermally stable Step-Tec Spindles ensure that our machines can handle everything from heavy-duty roughing to fine-finishing operations.



## Customer Services

**Operations Support, Machine Support and Business Support.**

To help you get the most and the best from your machine tools and equipment, we offer three levels of support. Operations Support covers our range of original wear parts and certified consumables (EDM wires, filters, resins, electrodes etc.) to ensure that your machines are performing at the highest levels. Machine Support maximizes, through our best-in-class technical support, preventive services and quality spare parts, your machine tool uptime. Business Support is designed to help you make a real step-change in your productivity and performance with solutions tailored to your specific needs.



## 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](http://www.gfms.com)

