**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 electrical discharge machines (EDM), Laser texturing and Additive Manufacturing through to first-class Milling and Spindles, Tooling, Automation and software systems — all backed by unrivalled customer service and support — we, through our AgieCharmilles, Microlution, Mikron Mill, Liechti, Step-Tec and System 3R technologies, help you raise your game and increase your competitive edge.

**Passion for Precision**
The Mikron MILL E 500 U / 700 U machine range comprises efficient, 5-Axis machines in a stiff, stable, cast iron C-frame construction. With its large-sized guideways and double-supported rotary table, this range delivers parts quality on parts and the optimum chip removal rate for users’ best efficiency. The Mikron MILL E 500 U and 700 U are the right solutions for job shops and parts producers in the automotive, energy and power generation, and general machinery markets.

This high-efficiency machine targets customers producing parts in small to medium patches, including those looking for best price performance value with high reliability to lower their cost per part.

The machine provides ideal ergonomics for manual loading of workpieces, up to 450 kg, from the front or the side. Additionally, the machine can be equipped from the side with a pallet changer with a capacity of up to 200 kg to fully cover fully second or third shifts.
Market segments and applications

Typical applications

Automotive

Home appliances

Packaging
Technology

High-efficiency Milling

+ Flexible for all kinds of material
+ Efficient processing
+ Economical
+ Simple to operate

Efficiency and productivity for 5-Axis machining
Solutions

The right solution—
for you

+ Stiff machine construction
+ Double-supported rotary table
+ Pre-clamped, large-sized ball screw
+ Large-sized roller guides
+ High-quality components
+ Step-Tec Spindle
+ Heidenhain and Fanuc control
+ Integrated Automation or third-party automation
+ Wide range of pallets
+ Rotary joint trough table

• Benefit from the dynamic behavior essential to perfect part production.
• Machine under maximum load with minimal Milling noise and still achieve top quality result on your parts.
• Get the performance and Spindle power to execute all kinds of applications.
• Enjoy unmanned production—nights or weekends—with your favorite Automation system.
Ramp up your productivity and flexibility

Start your automated process

Execute small, express jobs with the same efficiency and profitability as mid-size series or repeat orders.

Move from 3-Axis, multi-clamping Milling, to 5-Axis, one-clamping Milling

Upgrade the machine: clamping with System 3R

+46% productivity

Productive machining

+20% productivity

Productive machining
+ Fast setup time
+ Lowest machine downtime
+ High profitability
+ Broad flexibility
+ Efficient productivity

Extend your system: pallet magazine and clamping with System 3R

+ Mikron MILL E 500 U
+ 20,000 min⁻¹ Spindle
+ Symmetrical table
+ Delphin chuck
+ Seven-pallet magazine

You’ll run additional shifts 24/7 at lowest cost

+16 h additional capacity daily

Productive machining
Robust and precise

Mikron MILL E 500 U / 700 U

Core components

+ **Up to 60 tools**
  Easy tool loading during machine operation

+ **High stiffness**
  Increased stability thanks to the counter bearing

+ **Compact footprint**
  Highest efficiency in smallest space
More than 50 years legacy of machine design expertise

+ Thermal symmetrical construction
  Designed according to newest element calculation

+ High stability
  Large-dimension ball screw and linear guides

+ Ergonomic access
  Well integrated rotary table
smart machine

Enhance your process beyond program and machine setup

This includes a range of modules collectively referred to under the generic term “smart machine” and that fulfill various functions. In order to make the Milling process “intelligent,” various requirements have to be implemented.

Saving energy
smart machine like Econowatt, saving up to 50 % energy, are ecological necessities with attractive economic advantages.

Precision
smart machine like ITC, OSS and Kinematic opt support the precise base of your machining center to achieve an even more precise final part.

Protection
smart machine like PFP protect and extend the lifetime of your machine and tools.

Time
smart machine like OSS and software tools such as rConnect boost your productivity. OSS extreme yields up to 24 % more speed with improved surface finish and accuracy.

Saving energy

Precision

Protection

Time

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
+ Improved process safety
+ Higher availability
+ Better operating comfort
+ Considerable increase in reliability in unmanned operation

1st is establishing comprehensive communication between man and machine, which makes available precise information that the operator requires to assess the Milling process.

2nd is supporting the operator in the optimization of the process, which considerably improves the performance.

3rd is the machine optimizing the Milling process, which improves process safety and workpiece quality—especially important in unmanned operation.

smart machine construction kit system
Each of the modules fulfills a specific task. Just like in a construction kit, the user can selects the modules that seem to him to be the best option for improving his process.

- Produce your workpieces in a process-secure and precise manner
- Increase reliability in unmanned operation
- Boost the service life of the machine
- Significantly reduce production costs
High-performance Spindles

High-efficiency Milling and effective processing

The high-performance Spindles on the Mikron MILL E 500 U / 700 U series are designed to do heavy roughing and Milling to best surface finish all at once. With a bearing design with three preloaded hybrid ball bearings in the front and a thermally robust hybrid cylindrical roller bearing on the back, you are guaranteed a super-rigid rotating system that enables Milling with extra-long tools reaching into deep cavities. Ramp up your chip removal, thanks the feed rates made possible by this solution’s absorption of high Milling forces at the tool tip.

The 20,000 min⁻¹ Spindle is the well-proven OptiCool principle that keeps the front bearing area cool while the extra heat barrier cooling loop keeps the motor heat away from the Spindle nose. That results in a thermally balanced Spindle thus assuring a high level of precision, repeatability and surface finish.

<table>
<thead>
<tr>
<th>Spindle 20,000 min⁻¹</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (S6)</td>
<td>36 kW</td>
</tr>
<tr>
<td>Torque (S6)</td>
<td>120 Nm</td>
</tr>
<tr>
<td>Speed max.</td>
<td>20,000 min⁻¹</td>
</tr>
<tr>
<td>Acceleration</td>
<td>2.5 s</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Oil - air</td>
</tr>
<tr>
<td>Tool interface</td>
<td>HSK-A63 DIN69063-1</td>
</tr>
</tbody>
</table>

- Direct Lubricating System (DLS) oil-air bearing lubrication through outer race
- Fully digital Spindle equipped with every conceivable sensor to support smart machine integration
- Through-Spindle cooling featuring rotary unions fed by all known liquid and gaseous media

The 12,000 min⁻¹ Spindle delivers sufficient performance and power for all kinds of applications. The ball bearings, which are lubricated for life, are effectively protected against incoming dirt with an air purge system. The tool is held by a spring and is released through hydraulic cylinder.

<table>
<thead>
<tr>
<th>Spindle 12,000 min⁻¹</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (S6)</td>
<td>20 kW</td>
</tr>
<tr>
<td>Torque (S6)</td>
<td>88 Nm</td>
</tr>
<tr>
<td>Speed max.</td>
<td>12,000 min⁻¹</td>
</tr>
<tr>
<td>Acceleration</td>
<td>2.5 s</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Oil - air</td>
</tr>
<tr>
<td>Tool interface</td>
<td>ISO 40 / BT 40 / CAT 40</td>
</tr>
</tbody>
</table>

- Good thermal stability through OCS
- Excellent weight / performance ratio
- Integrated inteliSTEP functionality
- Spindle cone ISO 40 / BT 40 / CAT 40
- Infinitely variable rotation speed range — no loss of performance
- Prepared with internal cooling agent feed for production use (optional)
Efficient processing with fast return on investment
Tool magazines

We have the solution for your needs

**Tool magazine for big capacities**
- Disc-type or chain magazine
- Up to 60 tools can be stored in the chain-type tool magazine of the machine with no influence on the footprint.

- Ergonomic and user friendly
- Ensures productivity and process reliability
- Parallel machining and tool loading
- Easy tool loading possibilities thanks to an ergonomic tool loading door
Chip management

Clean machining, wet or dry

Customer benefits
- Optimum chip flow to steep and smooth cabin walls
- Wash-down nozzles for all corners to prevent chip accumulation
- Professional lift-up scraper to transport 43 l/h chips out of the working area

Adapted chip management

- Solution for high-volume small and light chips with lift-up scraper chip conveyor and coolant unit with fine filtration
- Solution for high-volume steel Milling chips with lift-up scraper chip conveyor and coolant filtration unit

Options
- Through-Spindle coolant
- Wash down system
- Coolant thermal control
- Oil skimmer
Automation with pallet magazine

Lower your costs, increase productivity with Automation

Take your productivity to new levels while reducing your costs with our superior Automation solution. The pallet magazine’s generously dimensioned door allows optimum pallet access for loading light parts by hand and heavy parts by crane. Larger windows allow a good view into the pallet area, and pallets are managed by using the machine control.

**Five-sided processing in one clamping**

5-Axis processing offers significant advantages for large and small components. Using 5-Axis technology, it is possible to process different shapes and surfaces with one clamping device.

- Rotary swiveling table available as a pallet version: System 3R (Dynafix/Delphin)
- Rotary swiveling table available as a generously dimensioned tabletop version (Ø 500 / 630 mm with parallel T-grooves)
- Cartesian (right-angled) arrangement of the Axis results in easily understood tool/workpiece movements during the Milling process
- Direct measurement on the B- and C-Axis
- Machine available as 5-Ax or 5-Axis simultaneous versions

![Dynafix pallet Automation](image1)

![Delphin pallet Automation](image2)

![Rotary swiveling table with parallel grooves](image3)
Enjoy unmanned production—nights and weekends
Options

Multiple options to drive your success

Pallets
Laser tool measuring system
Infrared measuring probe
Mist extraction
Air through Spindle/coolant through Spindle
Wash down system
TSC belt filter system (20 bar)
Rotating inspection window
Operation mode 3
Signal light
TSC belt filter system (20 bar)
Additional options
Extended warranty
Linear glass scales
Minimal quantity lubrication
Scratched proofed window
Oil skimmer
Roboter Interface
Fanuc control system
Reliable and cost-performance CNC with high-end features like NANO interpolation and AI contour control
Performance and reliability
The Fanuc 0i-MD features an ultra-compact design using limited cabling to ensure highest reliability and provide easy maintenance.
Coupled with the latest Fanuc drive technology, the Fanuc 0i-MD ensures smooth machined surfaces by using a much finer resolution for position commands.

APS
APS extended
ITC
ITC 5X
RNS
PFP
DNC
Kinematic opt
smart machine
Customer Services

rConnect: Live Remote Assistance

rConnect comprises GF Machining Solution’s modular digital services. You stay connected with your machine park, at any time and wherever you are. Select the digital service that best fits your individual needs. Our Live Remote Assistance (LRA) supports you in keeping your commitments.

Maximize your uptime
Live Remote Assistance provides you direct access to our expert service engineers with the latest technology. The LRA features audio, video, chat, whiteboard, file transfer, system access and screen sharing by using a Windows tablet or your standard PC.

Increase your flexibility
Know the status of your machines in real time at any location. The rConnect Cockpit is the user interface for your machine operator, maintenance technician or operations manager. It provides the operator with support for daily machine-related activities.

Secure connection based on the latest technology
To ensure your security, an encrypted point-to-point connection is established between your machine and GF Machining Solutions only at your request. Our remote service product is certified with the TÜViT Trusted Product Certificate.
## Technical data

<table>
<thead>
<tr>
<th>Machine</th>
<th>Mikron MILL E 500 U</th>
<th>Mikron MILL E 500 U</th>
<th>Mikron MILL E 700 U</th>
<th>Mikron MILL E 700 U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Axis travel</strong></td>
<td>RTT 5-Axis</td>
<td>RTT 5-Axis simultaneous</td>
<td>RTT 5-Axis</td>
<td>RTT 5-Axis simultaneous</td>
</tr>
<tr>
<td>Lengthwise X mm</td>
<td>500</td>
<td>500</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Crosswise Y mm</td>
<td>450</td>
<td>450</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Vertical Z mm</td>
<td>400</td>
<td>400</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Swivel axis °</td>
<td>-65 / +120</td>
<td>-65 / +120</td>
<td>-65 / +120</td>
<td>-65 / +120</td>
</tr>
<tr>
<td>Rotation axis °</td>
<td>n x 360</td>
<td>n x 360</td>
<td>n x 360</td>
<td>n x 360</td>
</tr>
<tr>
<td>Axes</td>
<td>3+2</td>
<td>5-Axis simultaneous</td>
<td>3+2</td>
<td>5-Axis simultaneous</td>
</tr>
<tr>
<td><strong>Spindle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle type</td>
<td>In-line Motor</td>
<td>In-line Motor</td>
<td>In-line Motor</td>
<td>In-line Motor</td>
</tr>
<tr>
<td>Max. rotations min⁻¹</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Max. torque kW/Nm</td>
<td>20/88 36/120</td>
<td>20/88 36/120</td>
<td>20/88 36/120</td>
<td>20/88 36/120</td>
</tr>
<tr>
<td>Tool interface</td>
<td>ISO 40 BT 40 CAT 40</td>
<td>ISO 40 HSK-A63</td>
<td>ISO 40 BT 40 CAT 40</td>
<td>ISO 40 HSK-A63</td>
</tr>
<tr>
<td><strong>Travel speed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse X, Y, Z m/min</td>
<td>30 / 30 / 30</td>
<td>30 / 30 / 30</td>
<td>30 / 30 / 30</td>
<td>30 / 30 / 30</td>
</tr>
<tr>
<td>Rapid traverse B, C min⁻¹</td>
<td>17 / 28</td>
<td>32 / 112</td>
<td>17 / 28</td>
<td>32 / 112</td>
</tr>
<tr>
<td><strong>Automation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool magazine unit</td>
<td>DT 30 / CT 60</td>
<td>DT 30 / CT 60</td>
<td>DT 30 / CT 60</td>
<td>DT 30 / CT 60</td>
</tr>
<tr>
<td>Pallet magazine unit</td>
<td>5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320</td>
<td>5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320</td>
<td>5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320</td>
<td>5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320</td>
</tr>
<tr>
<td>Pallet changing time sec.</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Robot interface</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td><strong>Rotary swivel table</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-groove table mm</td>
<td>500</td>
<td>500</td>
<td>630</td>
<td>630</td>
</tr>
<tr>
<td>Workpiece weight (3/5) kg</td>
<td>300</td>
<td>300 / 200</td>
<td>450</td>
<td>450 / 450</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine weight kg</td>
<td>6030</td>
<td>6030</td>
<td>8060</td>
<td>8060</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heidenhain</td>
<td>iTNC 530 HSCI FS</td>
<td>iTNC 530 HSCI FS</td>
<td>iTNC 530 HSCI FS</td>
<td>iTNC 530 HSCI FS</td>
</tr>
<tr>
<td>Fanuc (12,000 min⁻¹)</td>
<td>0i-MD</td>
<td>-</td>
<td>0i-MD</td>
<td>-</td>
</tr>
</tbody>
</table>
Mikron MILL E 500 U

Mikron MILL E 700 U
Mikron MILL E 700 U
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.

**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 GF 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.

**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.

**Step-Tec Spindles**

At the heart of every GF Mikron machining center is high-performance Step-Tec Spindles. 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, preventative 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, Additive Manufacturing, Spindle, Tooling and Automation solutions. A comprehensive package of Customer Services completes our proposition.

www.gfms.com