

Mikron

MILL E

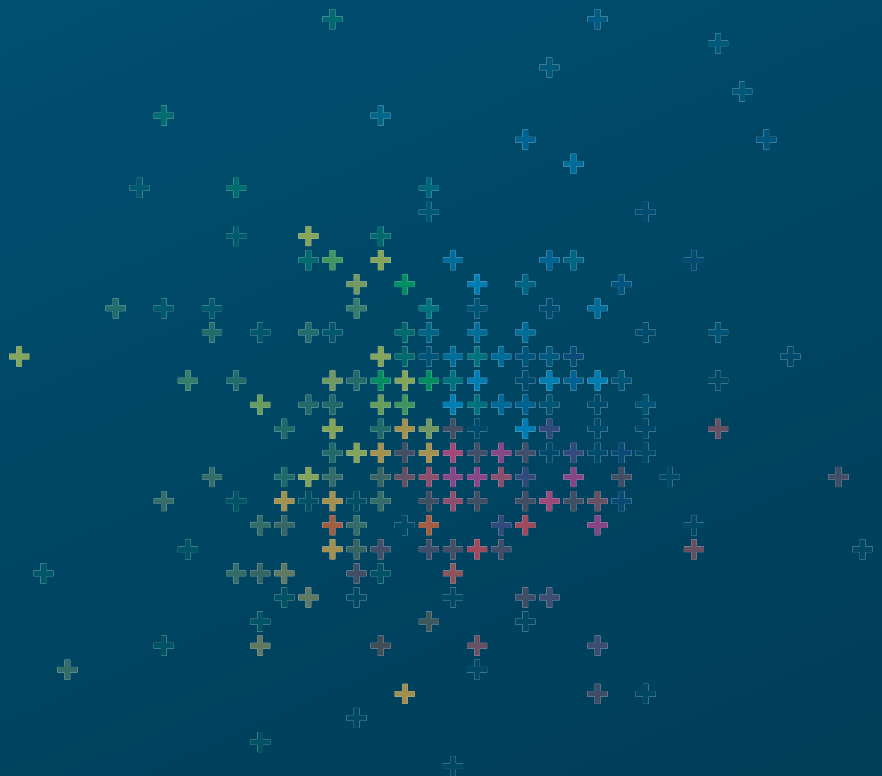
500 U
700 U



Passion for Precision

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.



+ We are Mikron Mill.
We are GF Machining Solutions.

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The Mikron MILL E 500/700 U high-efficiency series comprises five-axis machines in a stiff, stable, cast iron C-frame construction. With large-sized guideways and double supported rotary table, this range delivers parts quality and optimum chip removal rate—ideal for job shops and parts producers in automotive, energy and power generation, and general machinery.

Market segments and applications

Typical applications



Aerospace

PART EXAMPLE

Secure process stability – Milling with no chatter marks

Achieve high accuracy and surface quality

Get ready for production ramp-up with no worries

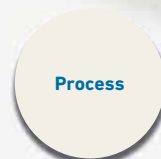
Plate cover
Material: AL 7575

Wall thickness
0.5mm

Surface finish
Ra 0.5µm

Accuracy
± 0.05mm

Repeat-ability
24 / 7 parts production



Medical

PART EXAMPLE

Get a turnkey solution

Reduce cost of operations

Achieve high surface quality

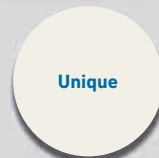
Surgical support device
Material: AL 6061

Surface finish
0.3µm



Process time
6.5h

Production cost reduced by
30%



Medical

PART EXAMPLE

Speed-up operations and reduce cost: one clamping

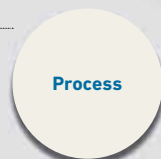
Efficient process – from roughing to finishing

Productive and flexible serial production

Swivel range of
+120° to -65°

Surface finish
Ra 0.5µm

Processing time
80min



Hook bone plate
Material: SS 17-4





Automotive

PART EXAMPLE

Lever flexibility:
many different milling
processes

Reduce cost:
Mill efficiently with
5-Axis

Secure process
stability over long
milling periods

Tools from
 $\varnothing 4\text{mm}$ to
 $\varnothing 40\text{mm}$

Process
time
23h

Accuracy
 \pm
0.03mm

Removed
material
 0.021m^3
/min

Process

Airbag shooting device
Material: AL 6082



Mold and die

PART EXAMPLE

Deep cavity Milling

High surface finish

Continuous cutting
speed thanks 5-Ax
simultaneous Milling

Cookie blister
Material: AL 6082

Accuracy
 \pm
0.05mm

Removed
rate
 $+210\text{cm}^3$
/min

Process

Tool
diameter
1.5mm

Surface
finish
Ra
 $0.5\mu\text{m}$



Machinery and general mechanics

PART EXAMPLE

Achieve high positioning
accuracy in 5-Axes

High material removal
rate

Variable operations
on all five sides

Multiple machining
operation

Deformation-free
machining

Cover plate
Material: AL 6082

Wall
thickness
 $< 1\text{mm}$

Removed
rate
 $+210\text{cm}^3$
/min

Accuracy
 \pm
0.05mm

Process



Technology

High-efficiency Milling

The Mikron MILL E U series is a dynamic, high-efficiency machine center for entry-level five-axis machining.

It provides highly efficient and productive processing for all kinds of materials, including aluminum alloys and stainless steel. This solution's economical design saves spaces and its ergonomics make it easy for your operator to use.

- + 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.

**Efficiency
and productivity
for 5-Axis
machining**



Solutions

The right solution— for you



Stiff machine construction



Double-supported
rotary torque table



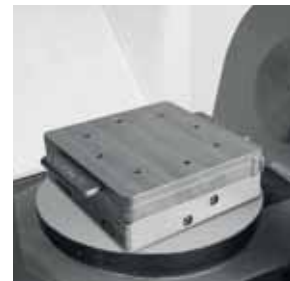
Step-Tec Spindle:
120 Nm, 20,000 rpm



Choice of HEIDENHAIN
or FANUC control



Integrated Automation or
third-party automation



Integrated palletization

Customer benefits

- + Benefit from the dynamic behavior essential to perfect part production.
- + Machine under maximum load generates minimal noise and achieves top quality 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.

Robust and precise

Mikron MILL E 500 U / 700 U core components

+ Up to 60 tools integrated. 215 tools on a tool tower

Easy loading during operation

+ Torque or gear drives for rotary table

High positioning accuracy and repeatability thanks to direct drive technology

+ Large swivel range from -65° to $+120^{\circ}$

Allows perfect access with the optimal tool length to the part

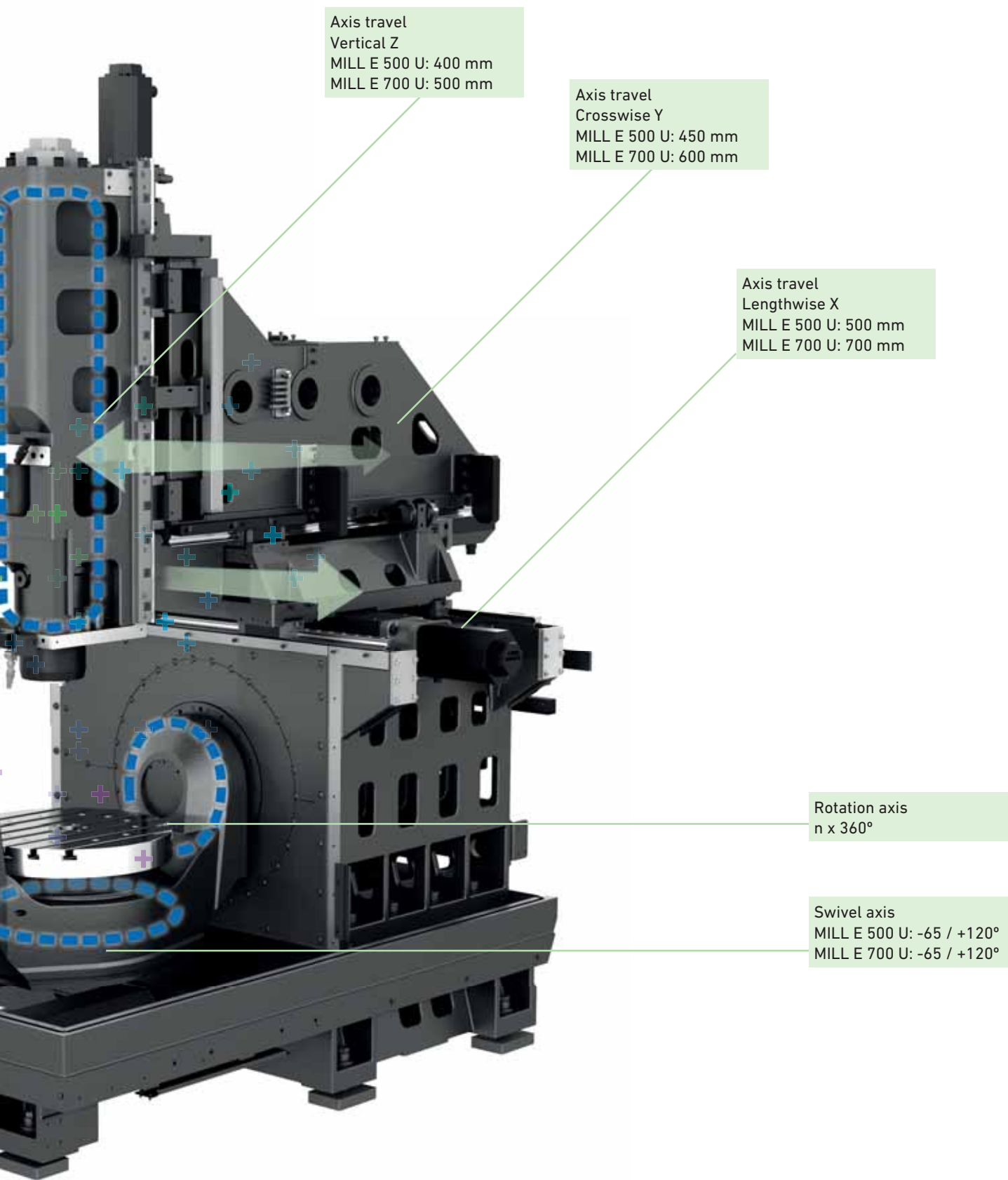
+ 20,000 rpm motor spindle with 120 Nm

Best surface finish for both roughing and finishing

+ Compact footprint and ergonomic access

Highest efficiency and ergonomics on smallest space

**More than 50 years legacy of
machine design expertise**



Axis travel
Vertical Z
MILL E 500 U: 400 mm
MILL E 700 U: 500 mm

Axis travel
Crosswise Y
MILL E 500 U: 450 mm
MILL E 700 U: 600 mm

Axis travel
Lengthwise X
MILL E 500 U: 500 mm
MILL E 700 U: 700 mm

Rotation axis
n x 360°

Swivel axis
MILL E 500 U: -65 / +120°
MILL E 700 U: -65 / +120°

Benefit from an automated process

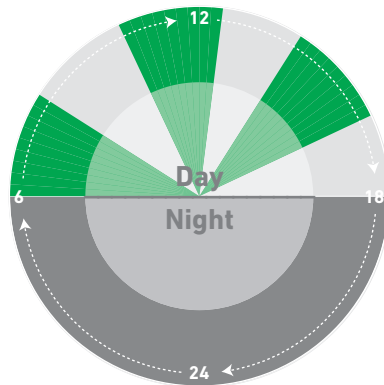
Ramp up your productivity and flexibility

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

Your progress to higher productivity:

Step 1

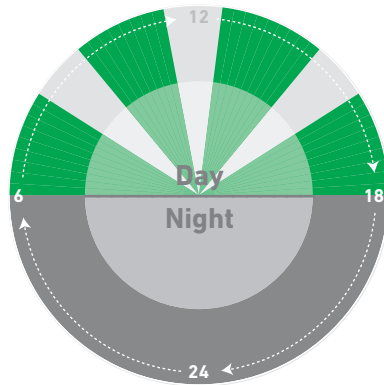
Move from three-axis, multi-clamping Milling to five-axis, one-clamping Milling.



+46%
productivity

Step 2

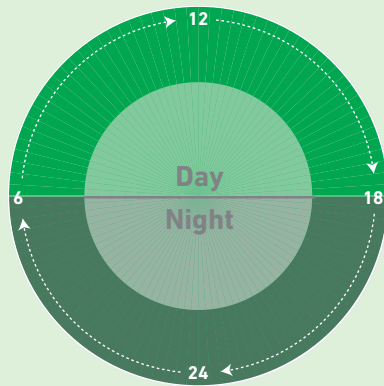
Upgrade the machine: clamping with System 3R



+20%
productivity

Step 3

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



+16h
additional capacity
daily

You'll run additional
shifts 24/7 at lowest
cost.

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



Generate a fast return on invest with a Mikron MILL E 500 U with 20,000 rpm Spindle, simultaneous torque table and our own pallet Mikron Mill pallet Automation with up to seven pallets.





Automation with pallet magazine

Integrated palletization

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.



Ergonomic door design for easy loading of parts up to 200 kg



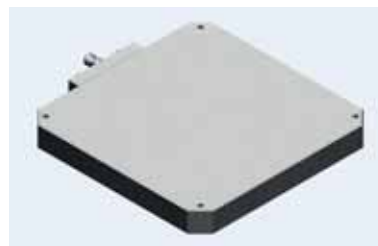
Five-sided processing in one clamping

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 axes results in easily understood tool/workpiece movements during the Milling process
- + Direct measurement on the B and C axes
- + Machine available as 5-Ax or 5-Axis simultaneous versions



Dynafix pallet Automation



Delphin pallet Automation



Rotary swiveling table with parallel grooves

We have the solution for your needs

- + 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





120, 170 or 215 tools

Circular magazine design with handling system



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 features 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.

Spindle 20,000 min⁻¹

Power (S6)	36 kW
Torque (S6)	120 Nm
Speed max.	20,000 min ⁻¹
Acceleration	2.5 s
Lubrication	Oil-air
Tool interface	HSK-A63 DIN69063-1

- 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.

Spindle 12,000 min⁻¹

Power (S6)	20 kW
Torque (S6)	88 Nm
Speed max.	12,000 min ⁻¹
Acceleration	2.5 s
Lubrication	Oil-air
Tool interface	ISO 40 / BT 40 / CAT 40

- Good thermal stability through OCS
- Excellent weight/performance ratio
- Integrated intelliSTEP 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)



Spindle challenge

Slotting operation

Description

- Slotting with a depth of 1.5xD is a challenging task for the machine.
- The feed rate was set to a spindle load of 85%.
- Tests with more speed brought the machine to soar up.

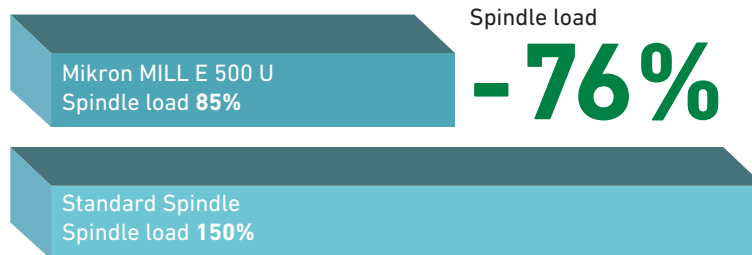


Tool

- Type: Ø16 end mill
- Manufacturer: FRANKEN (2615AZ.016)

Processing parameters

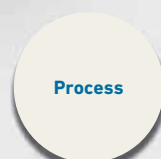
- Spindle speed: 2,586 min⁻¹
- Feed rate: 1,034 mm/min
- Cutting depth: 24 mm
- Step over: 16 mm
- Material removal rate: 397 cm³/min



Machinery and general mechanics

PART EXAMPLE

- Faster processing**
- Higher chip removal rate**
- Less vibration and longer machine live time**



Challenge part
Böhler K110 1.2379
(X153CrMoV12)

- + No wear
- + High dynamics
- + High accuracy
- + No backlash

The standard version of the swivelling table is ideally suited to the machining of workpieces in multiple clamping devices.



Direct torque drive

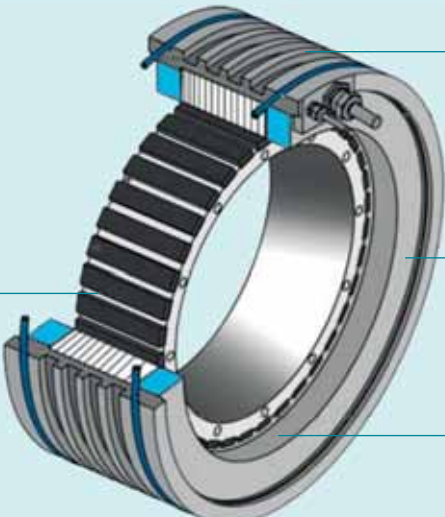
Direct drive rotary tilting table

Direct torque drive technology allows excellent precision and surface finish on the workpiece.

The fact that there are no mechanical transmission elements involved in the force transmission means that friction and wear as well as reduction in dynamic and rigidity are things of the past.

All rotary tables are designed and manufactured in-house by GF Machining Solutions.

Torque drive



Experience high dynamics due to no mechanical transmission elements.

Water cooling ensures optimum heat transfer.

Fixation damping absorbs stress and vibration.

Contactless motor system eliminates wear and ensures a long lifetime.



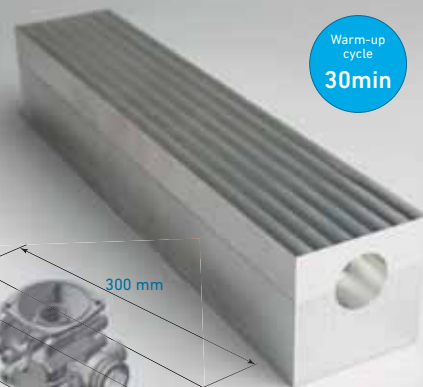
Automotive

PART EXAMPLE

Ensure positioning accuracy on five-sided parts.

Secure repeatability over series production.

Get ready to rapidly achieve stable quality.



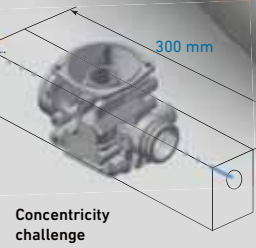
Warm-up cycle
30min

Thermal stability
24/7

Repeatability within
10µm

Concentricity of two holes
< 10µm

Bore length
2x 150mm



Chip management

Clean machining, wet or dry

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

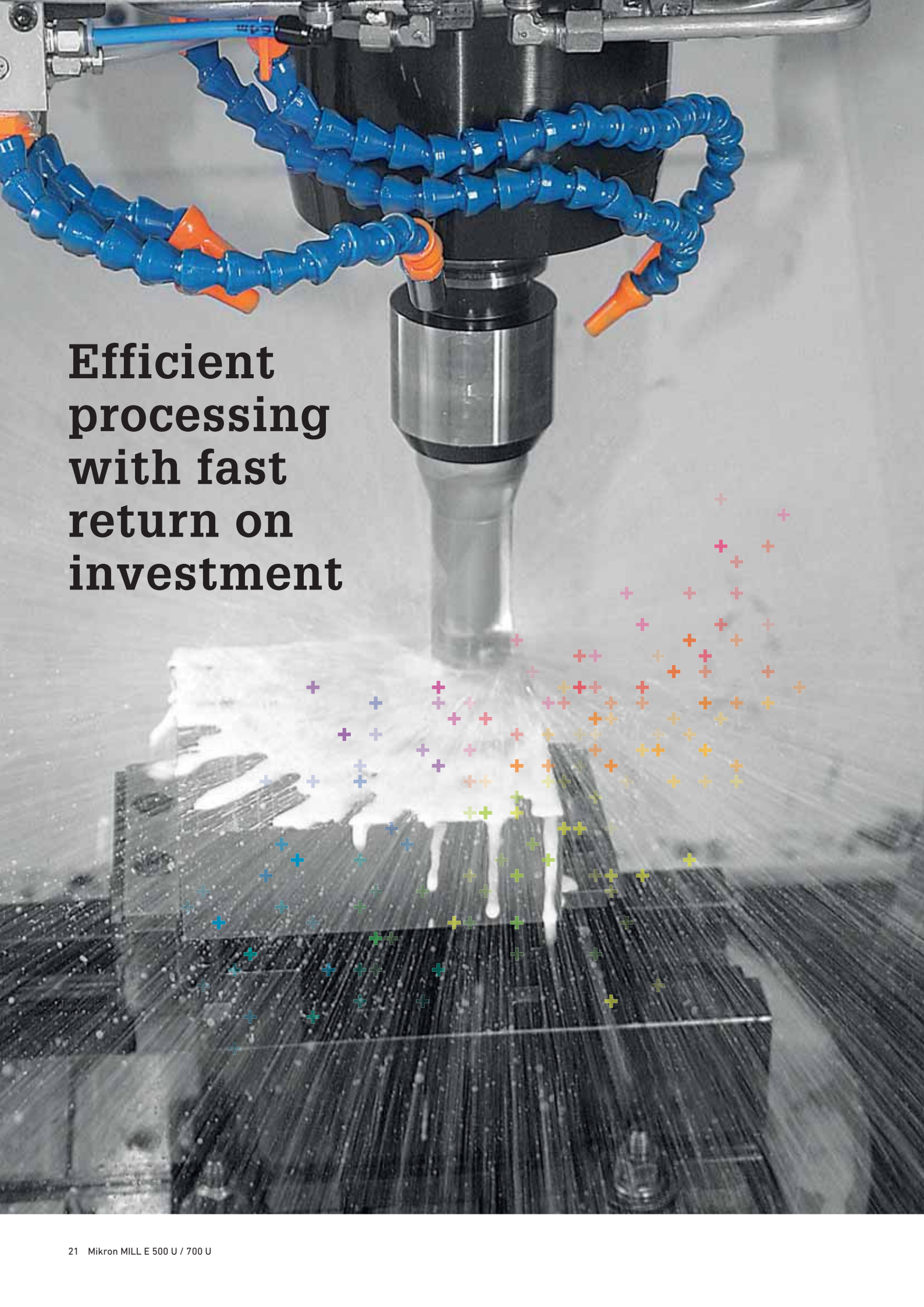


Options

- Through-Spindle coolant
- Wash-down system
- Coolant thermal control
- Oil skimmer

- + 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





**Efficient
processing
with fast
return on
investment**



Optimal machining to enhance your process beyond program and machine setup

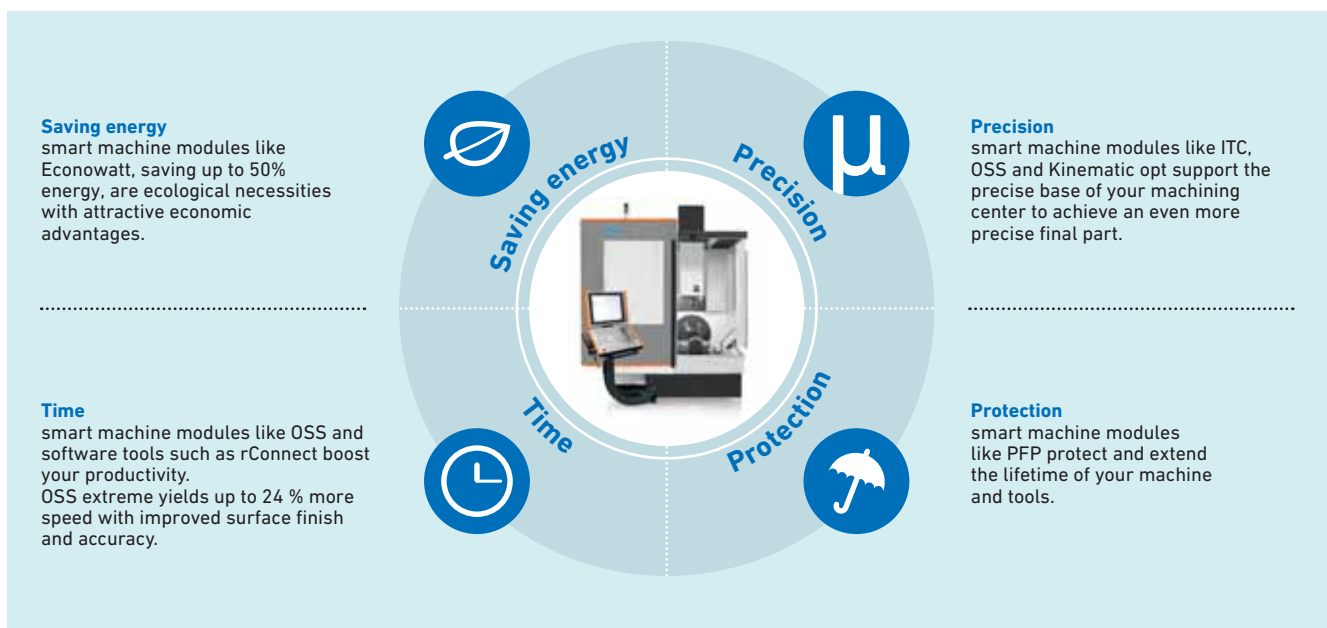
This includes a range of modules collectively referred to under the generic term “smart machine” and that fulfill various functions. In order to make the Milling process “intelligent,” various requirements have to be implemented.

- 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.



- + 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.

The Heidenhain TNC 640 control provides flexibility and efficiency from job preparation until part is milled. Mounted on a pivot arm to give more operator’s accessibility, the touchable screen allows the operator to quickly navigate through the control. Thanks to an user-friendly and practical interface in combination with several functionalities, the TNC 640 support operators in their daily job giving to them more availability for other tasks.



Customer Services

New digital service possibilities

GF Machining Solutions Customer Services continues to push technological boundaries to deliver the future of services to you—today.



rConnect is the digital services platform available for all GF Machining Solutions technologies. Following a modular approach, rConnect comprises a range of services that empower you to increase your manufacturing productivity. Certified with the TÜViT Trusted Product Certificate.

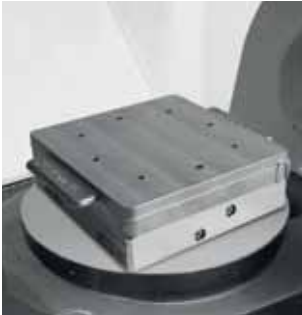
rConnect Messenger, we deliver machine data to your mobile device to keep you constantly informed about your production. You can supervise your workshop from your smartphone.

rConnect Live Remote Assistance (LRA), our expert engineers rapidly respond to your service requests. LRA allows effective face-to-face assistance using audio, video, chat and many more functionalities.



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)



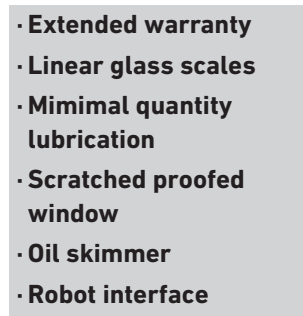
Rotating inspection window



Operation mode 3



Signal light



- Extended warranty
- Linear glass scales
- Minimal quantity lubrication
- Scratched proofed window
- Oil skimmer
- Robot interface

Additional options



- APS
- APS extended
- ITC
- ITC 5X
- RNS
- PFP
- DNC
- KinematicsOpt

smart machine



Fanuc control system

Reliable and cost-performance CNC with high-end features like NANO interpolation and AI contour control

Performance and reliability

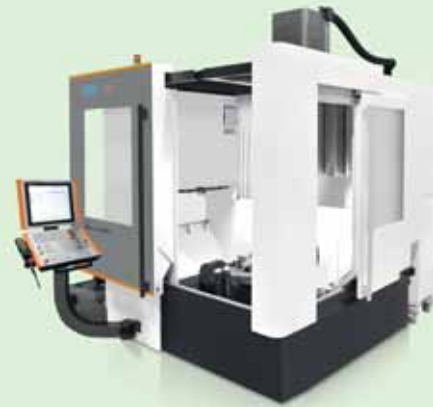
The Fanuc 0i-MD features an ultra-compact design using limited cabling to ensure highest reliability and provide easy maintenance.

Coupled with the latest Fanuc drive technology, the Fanuc 0i-MD ensures smooth machined surfaces by using a much finer resolution for position commands.

Technical data



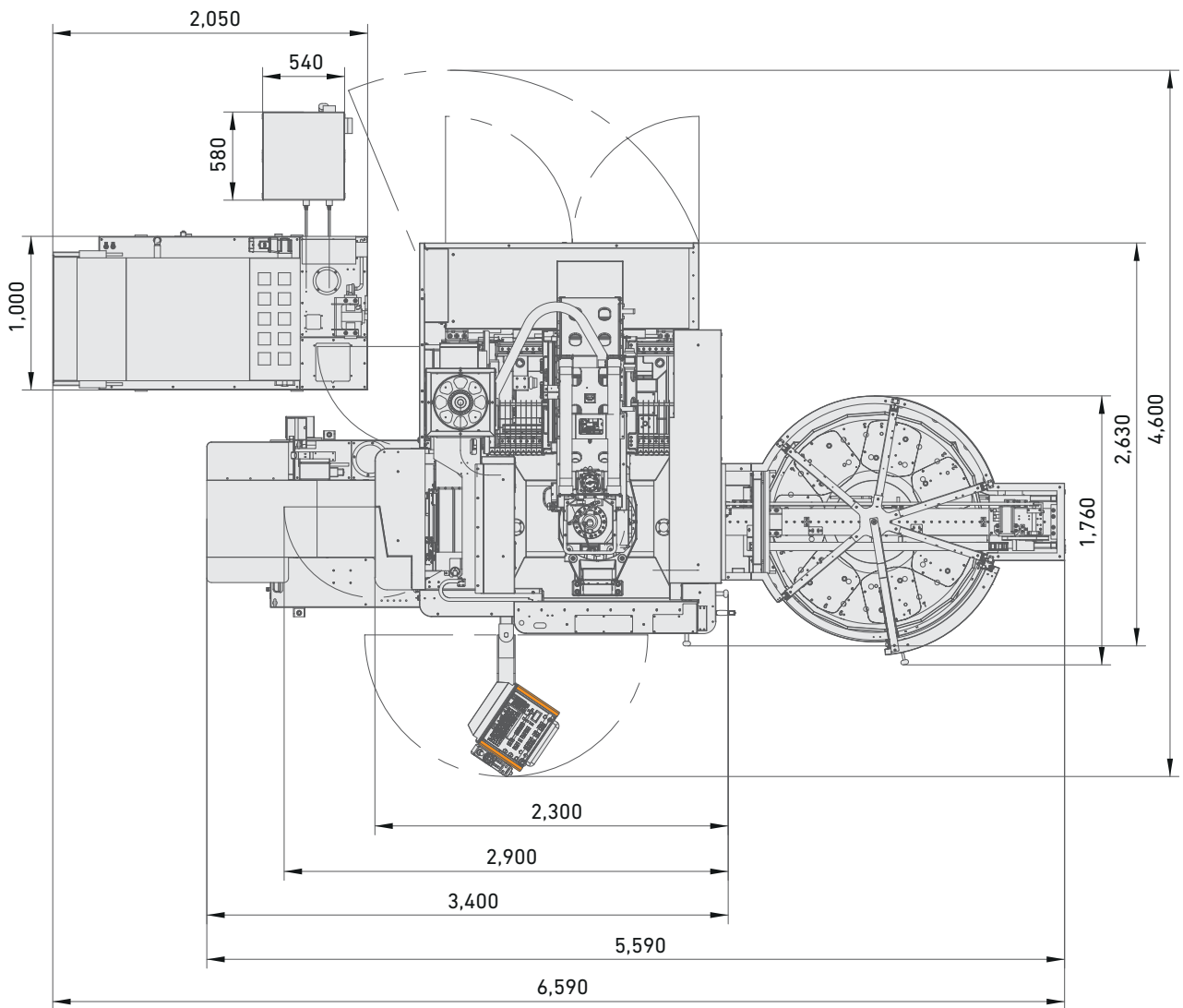
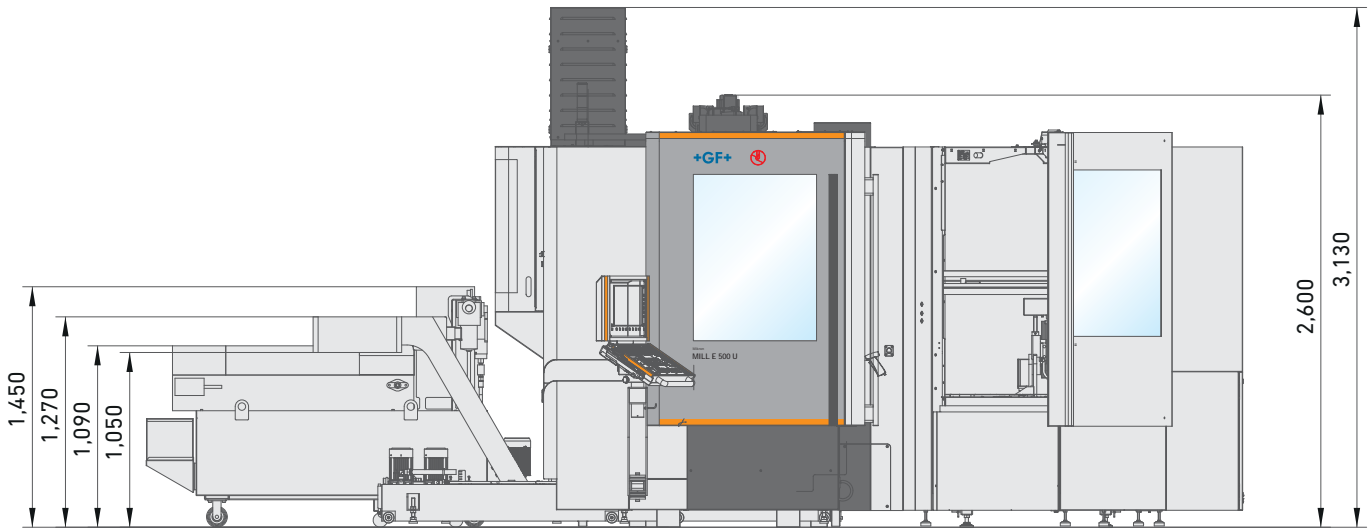
Mikron MILL E 500 U



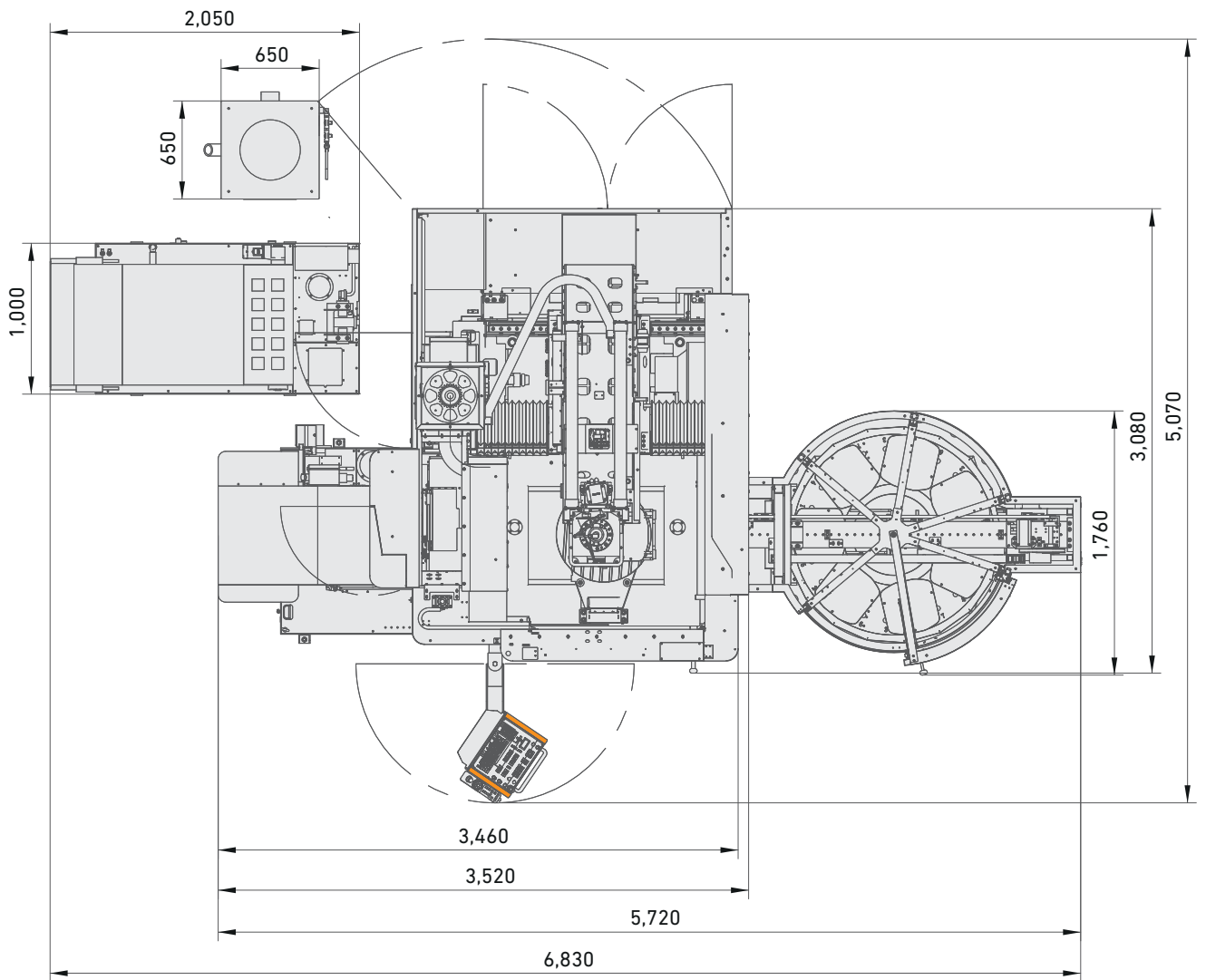
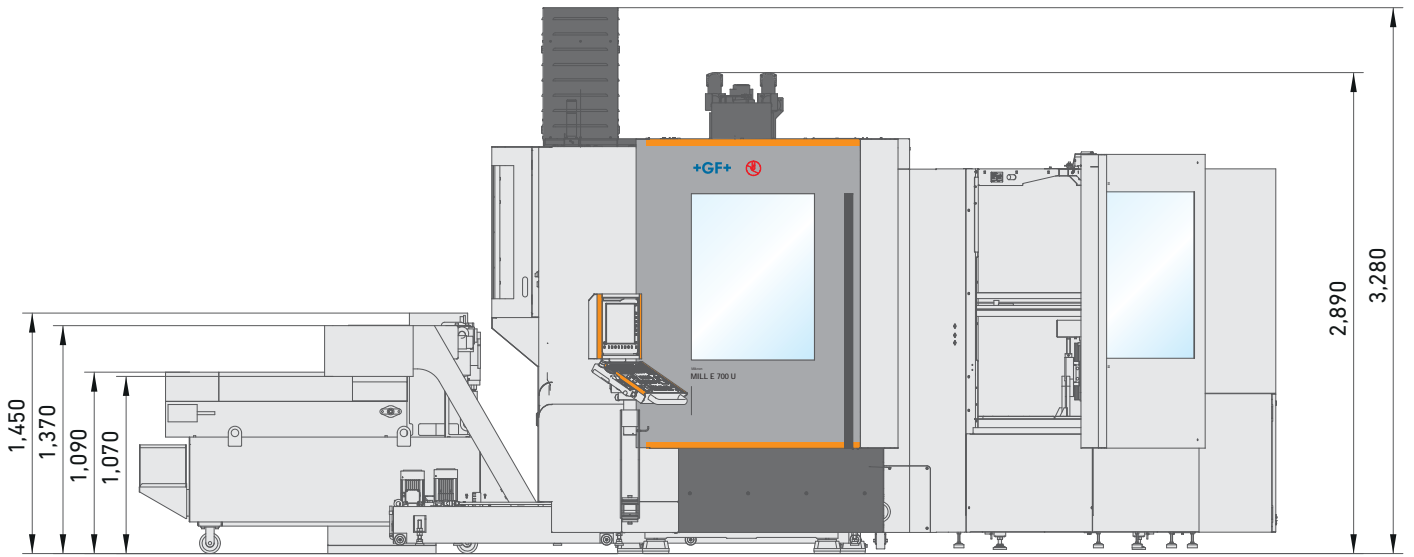
Mikron MILL E 700 U

Machine			Mikron MILL E 500 U		Mikron MILL E 500 U		Mikron MILL E 700 U		Mikron MILL E 700 U	
			RTT 5-Axis		RTT 5-Axis simultaneous		RTT 5-Axis		RTT 5-Axis simultaneous	
Axis travel										
Lengthwise	X	mm	500		500		700		700	
Crosswise	Y	mm	450		450		600		600	
Vertical	Z	mm	400		400		500		500	
Swivel axis		°	-65 / +120		-65 / +120		-65 / +120		-65 / +120	
Rotation axis		°	n x 360		n x 360		n x 360		n x 360	
Axes			3+2		5-Axis simultaneous		3+2		5-Axis simultaneous	
Spindle										
Spindle type			In-line	Motor	In-line	Motor	In-line	Motor	In-line	Motor
Max. rotations		min ⁻¹	12,000	20,000	12,000	20,000	12,000	20,000	12,000	20,000
Max. torque		kW/Nm	20/88	36/120	20/88	36/120	20/88	36/120	20/88	36/120
Tool interface			ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63
Travel speed										
Rapid traverse	X, Y, Z	m/min	30 / 30 / 30		30 / 30 / 30		30 / 30 / 30		30 / 30 / 30	
Rapid traverse	B, C	min ⁻¹	17 / 28		32 / 112		17 / 28		32 / 112	
Automation										
Integrated tool magazine	unit		DT 30 / CT 60		DT 30 / CT 60		DT 30 / CT 60		DT 30 / CT 60	
Tool tower	unit		120 / 170 / 215		120 / 170 / 215		120 / 170 / 215		120 / 170 / 215	
Pallet magazine	unit		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320	
Pallet changing time	sec.		30		30		30		30	
Robot interface			Available		Available		Available		Available	
Rotary swivel table										
T-groove table	mm		500		500		630		630	
Workpiece weight (3/5)	kg		300		300 / 200		450		450 / 450	
Weight										
Machine weight	kg		6,030		6,030		8,060		8,060	
Control										
Heidenhain			TNC 640		TNC 640		TNC 640		TNC 640	
Fanuc (12,000 min ⁻¹)			0i-MD		-		0i-MD		-	

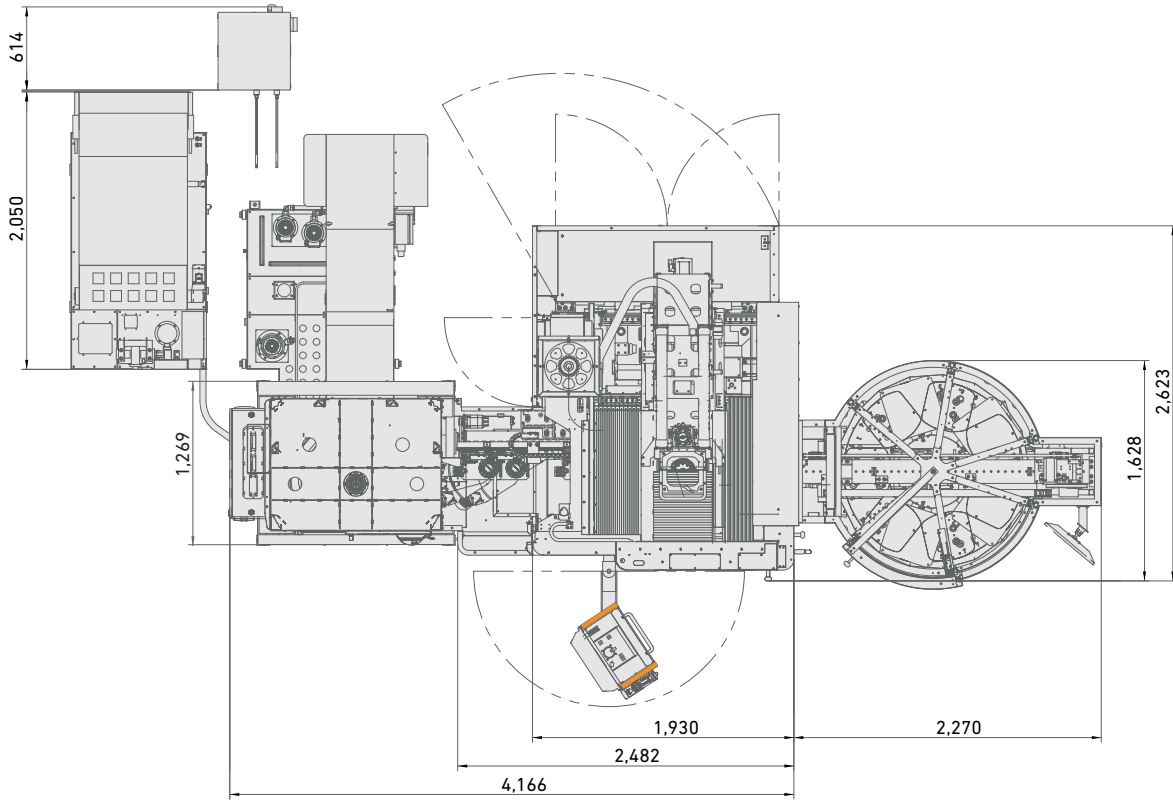
Mikron MILL E 500 U with pallet magazine



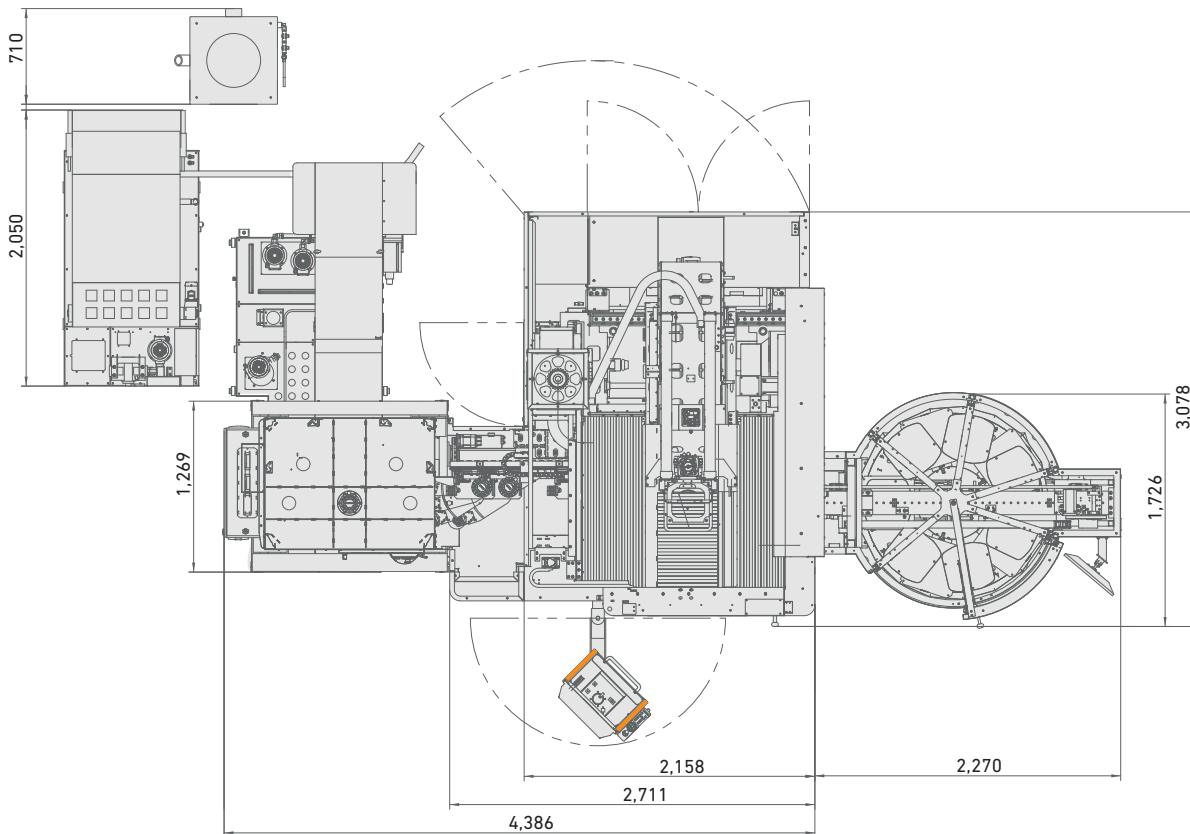
Mikron MILL E 700 U with pallet magazine



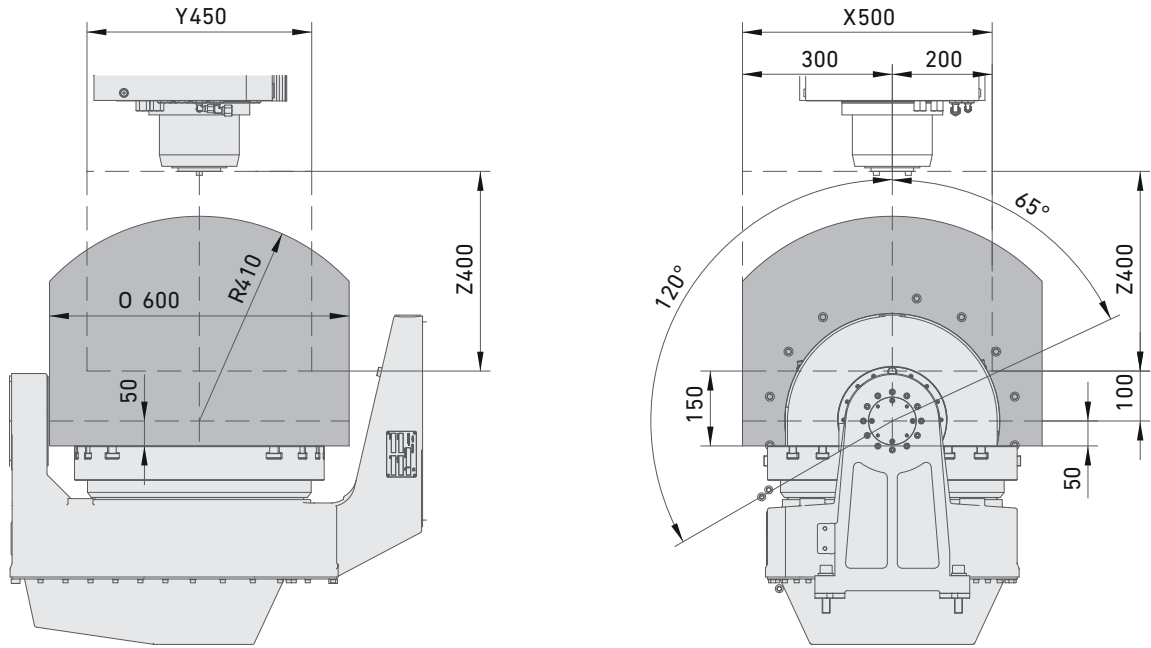
Mikron MILL E 500 U with pallet magazine and tool magazine 120, 170 or 215 tools



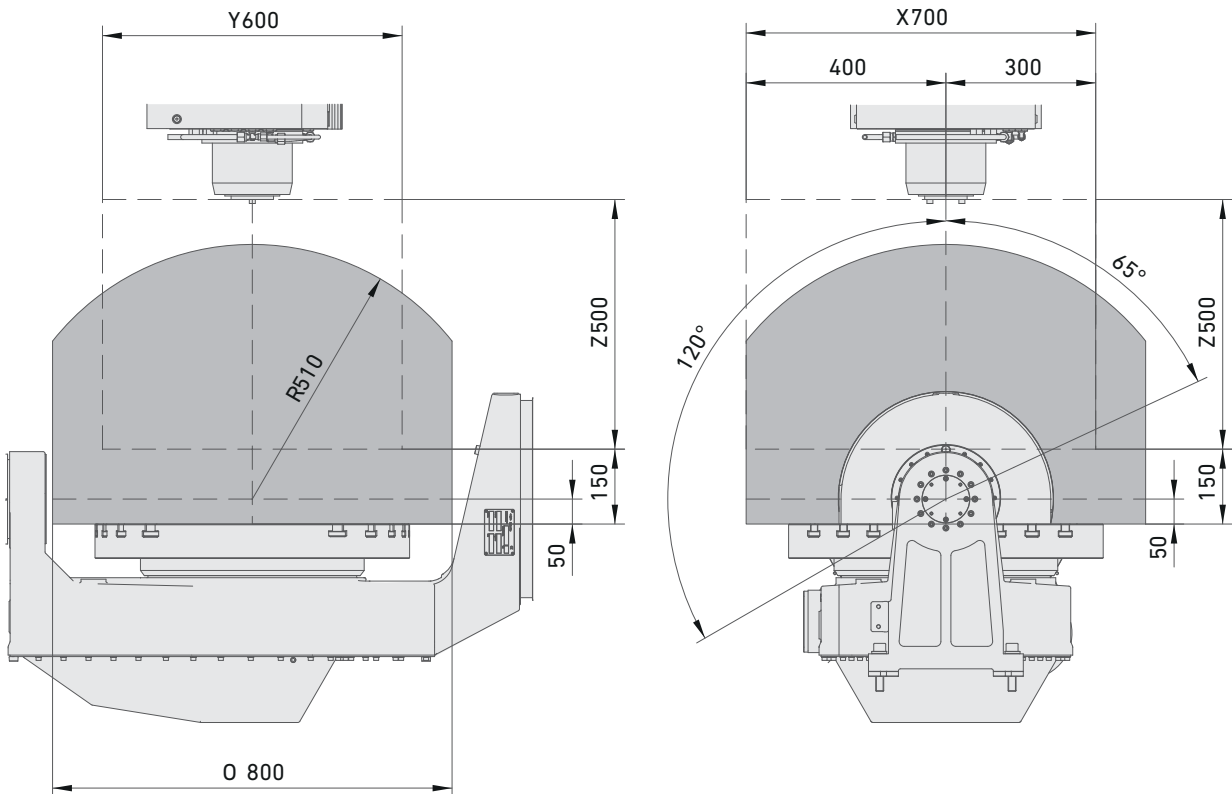
Mikron MILL E 700 U with pallet magazine and tool magazine 120, 170 or 215 tools



Mikron MILL E 500 U



Mikron MILL E 700 U



About GF Machining Solutions

Multi-technology solutions provider

Our commitment to you and your specific applications is proven by the value-adding intelligence, productivity and quality delivered by our multi-technology solutions. Your success is our chief motivator. That's why we are continuously advancing our legendary technical expertise. Wherever you are, whatever your market segment and whatever the size of your operation, we have the complete solutions and the customer-centric commitment to accelerate your success—today.

EDM (electrical discharge machining)



Wire-cutting EDM

GF Machining Solutions' wire-cutting EDM is fast, precise and increasingly energy efficient. From ultraprecise machining of miniaturized components down to 0.02 mm to powerful solutions for demanding high-speed machining with respect to surface accuracy, our wire EDM solutions position you for success.

Die-sinking EDM

GF Machining Solutions is revolutionizing die-sinking EDM with features like iGAP technology to dramatically boost machining speed and reduce electrode wear. All of our die-sinking systems offer fast removal and deliver mirror finishes of Ra 0.1 µm (4 µin).

Hole-drilling EDM

GF Machining Solutions' robust hole-drilling EDM solutions enable you to drill holes in electrically conductive materials at a very high speed—and, with a five-axis configuration, at any angle on a workpiece with an inclined surface.

Milling



Milling

Precision tool and mold manufacturers enjoy a competitive edge with our Mikron MILL S solutions' fast and precise machining. The Mikron MILL P machines achieve above-average productivity thanks to their high performance and Automation. Customers seeking fastest return on investment benefit from the affordable efficiency of our MILL E solutions.

High Performance Airfoil Machining

Our Liechti turnkey solutions enable the highly dynamic manufacturing of precision airfoils. Thanks to their unique performance and our expertise in airfoil machining, you increase productivity by producing at the lowest cost per part.

Spindles

As part of GF Machining Solutions, Step-Tec is engaged in the very first stage of each machining center development project. Compact design combined with excellent thermal and geometric repeatability ensure the perfect integration of this core component into the machine tool.

Advanced manufacturing



Laser texturing

Aesthetic and functional texturing is easy and infinitely repeatable with our digitized Laser technology. Even complex 3D geometries, including precision parts, are textured, engraved, microstructured, marked and labeled.

Laser micromachining

GF Machining Solutions offers the industry's most complete line of Laser micromachining platforms optimized for small, high-precision features to meet the increasing need for smaller, smarter parts to support today's leading-edge products.

Laser Additive Manufacturing (AM)

GF Machining Solutions and 3D Systems, a leading global provider of additive manufacturing solutions and the pioneer of 3D printing, have partnered to introduce new metal 3D printing solutions that enable manufacturers to produce complex metal parts more efficiently.

Tooling and Automation



Tooling

Our customers experience complete autonomy while maintaining extreme accuracy, thanks to our highly accurate System 3R reference systems for holding and positioning electrodes and work pieces. All types of machines can easily be linked, which reduces set-up times and enables a seamless transfer of workpieces between different operations.

Automation

Together with System 3R, we also provide scalable and cost-effective Automation solutions for simple, single machine cells or complex, multi-process cells, tailored to your needs.

Software



Digitalization solutions

To drive its digital transformation, GF Machining Solutions acquired symmedia GmbH, a company specialized in software for machine connectivity. Together, we offer a complete range of Industry 4.0 solutions across all industries. The future requires the ability to adapt quickly to continual digital processes. Our intelligent manufacturing offers embedded expertise, optimized production processes, and workshop Automation: solutions for smart and connected machines.

Customer Services



Worldwide for you

Ensuring the best performance throughout the lifetime of our customers' equipment is the goal of our three levels of support. Operations Support offers the complete range of original wear parts and certified consumables. Machine Support includes spare parts, technical support, and a range of preventive services to maximize machine uptime. Business Support offers customer-specific business 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, Additive Manufacturing, Spindle, Tooling and Automation solutions. A comprehensive package of Customer Services completes our proposition.

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