

Mikron

High-speed Milling graphite solutions



Passion for Precision

GF Machining Solutions

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 unmatched Electrical Discharge Machining (EDM), Laser texturing, Laser micromachining, Additive Manufacturing and first-class Milling and Spindles to Tooling and Automation, all of our solutions are backed by unrivaled Customer Services and expert GF Machining Solutions training. Our AgieCharmilles, Microlution, Mikron Mill, Liechti, Step-Tec and System 3R technologies help you raise your game—and our digital business solutions for intelligent manufacturing, offering embedded expertise and optimized production processes across all industries, increase your competitive edge.



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

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Based on Mikron MILL S and HSM machines, the GRAPHITE series is dedicated to the machining of glass molds and electrodes.

From information and communications technology (ICT) and automotive to electronic components, manufacturers must cope with a variety of graphite machining challenges. These range from material specifications to requirements for highest precision and surface quality.

Whatever your application, GF Machining Solutions has the right solution.

Market segments and applications

Glass molds

High quality graphite molds to shape the glass for ICT and automotive markets

The emergence of new end products, like high-end curved touch screens, requiring molded glass drives an increasing need for machining of graphite molds—an application that presents specific manufacturing challenges in terms of precision, surface finish, and long machining times.

Challenges

Molds for glass manufacturing are made of graphite and present their own distinct manufacturing challenges. They require up to $\pm 5 \mu\text{m}$ precision, Ra 0.4 μm surface finish and as many as five hours of machining (depending on the application) in wet or dry conditions. These molds must have absolutely no milling marks.

Solution

GF Machining Solutions' Milling machines ensure the process stability, parts quality and shop floor productivity to support machining of graphite molds for glass end products.

As ambient workshop temperatures fluctuate and machining speed changes, process stability is maintained, due to Mikron Mill machines' intelligent thermal management system and thermostabilized machine body.

Step-Tec's completely tight Spindle brings the precision and stability to the tool tip.



ICT
Automotive



Electrodes

Fast production of electrodes for subsequent EDM process

Graphite machining has never been so attractive—and challenging. Precise graphite electrodes boost die-sinking electrical discharge machining's productivity and reduce costs.

Challenges

Manufacturers require speed in their mold manufacturing as lead times are becoming shorter; automated and reliable processes are requested to maintain precision, flexibility, higher productivity and reduce the cost per electrode.

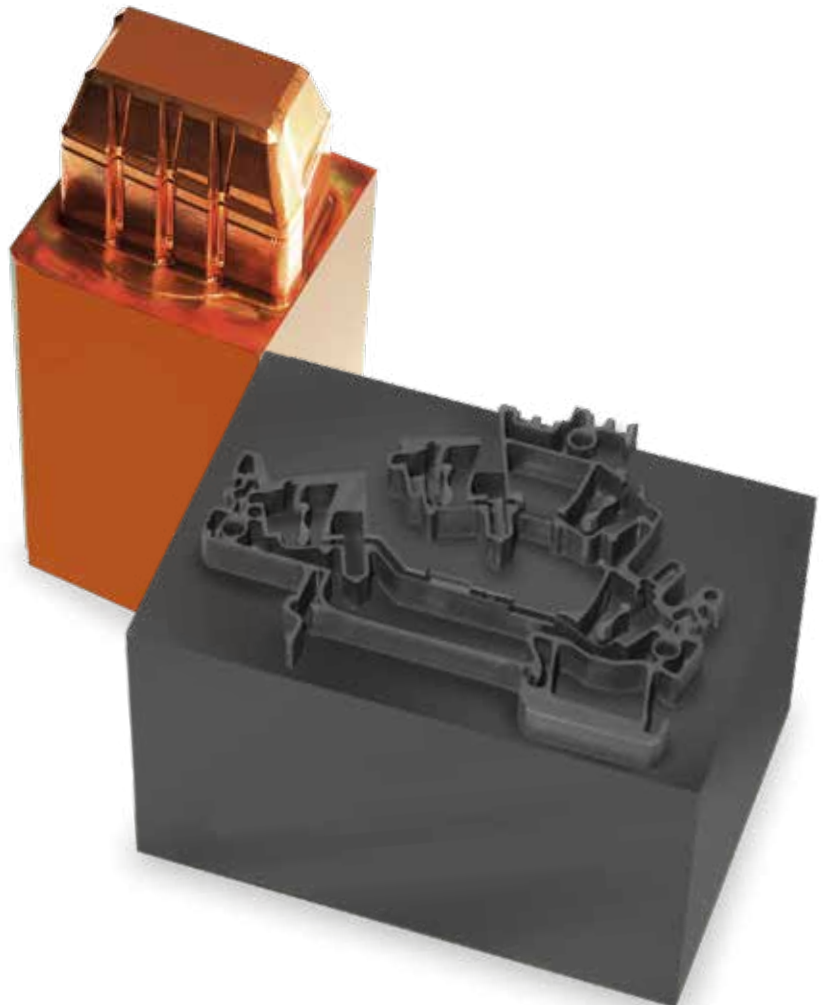
Solution

GF Machining Solutions' Milling machines are genuine high-speed Milling solutions due to both their high-speed Spindle and their unparalleled process dynamics. This is enhanced by integrated Automation from GF Machining Solutions, positioning mold makers for above-average agility, productivity and return on investment.

Furthermore, these solutions deliver more process capabilities, allowing mold makers to machine graphite and a wide variety of other materials.



ICT
EC
Automotive
Packaging



Mikron MILL S 400 / 500 GRAPHITE

Fast track – no trace

Master precision over time and perfect surface finish on 3D graphite mold

Drive your graphite business to meet the challenging and booming demand of graphite molds for glass end products. Demand for high-end, glass touch screens is soaring due to the emergence of new information and communications technology (ICT) products such as smart phones featuring near field communication (NFC) and wireless battery loading.



$R_a 0.4 \mu m$ surface finish, no milling marks

$\pm 5 \mu m$ accuracy

25% higher productivity vs. well-known competitors

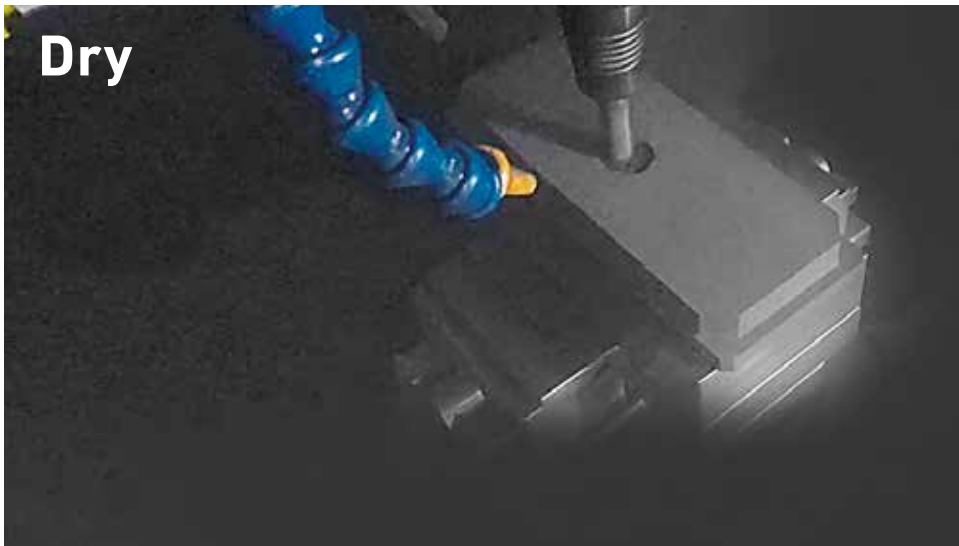
24/7 reliable process with $\pm 1 \mu m$ repeatability thanks to S3R reference systems

Dry and wet machining

Beyond the market requirements, operating a graphite machining shop presents specific challenges.

Establishing a process, ensuring its stability, and sustaining productivity while reducing running cost are paramount. Furthermore, maintaining a clean environment is necessary for both process quality and employees' health.

GF Machining Solutions offers two different solutions to best suit your specific environment and process requirement.



Benefits

- + Well-established process
- + Simple and compact solution
- + Free of graphite slurry accumulation



Benefits

- + Increased tool lifetime, reduced cost
- + Clean process
- + Dust-free air
- + Also capable of copper and hard milling



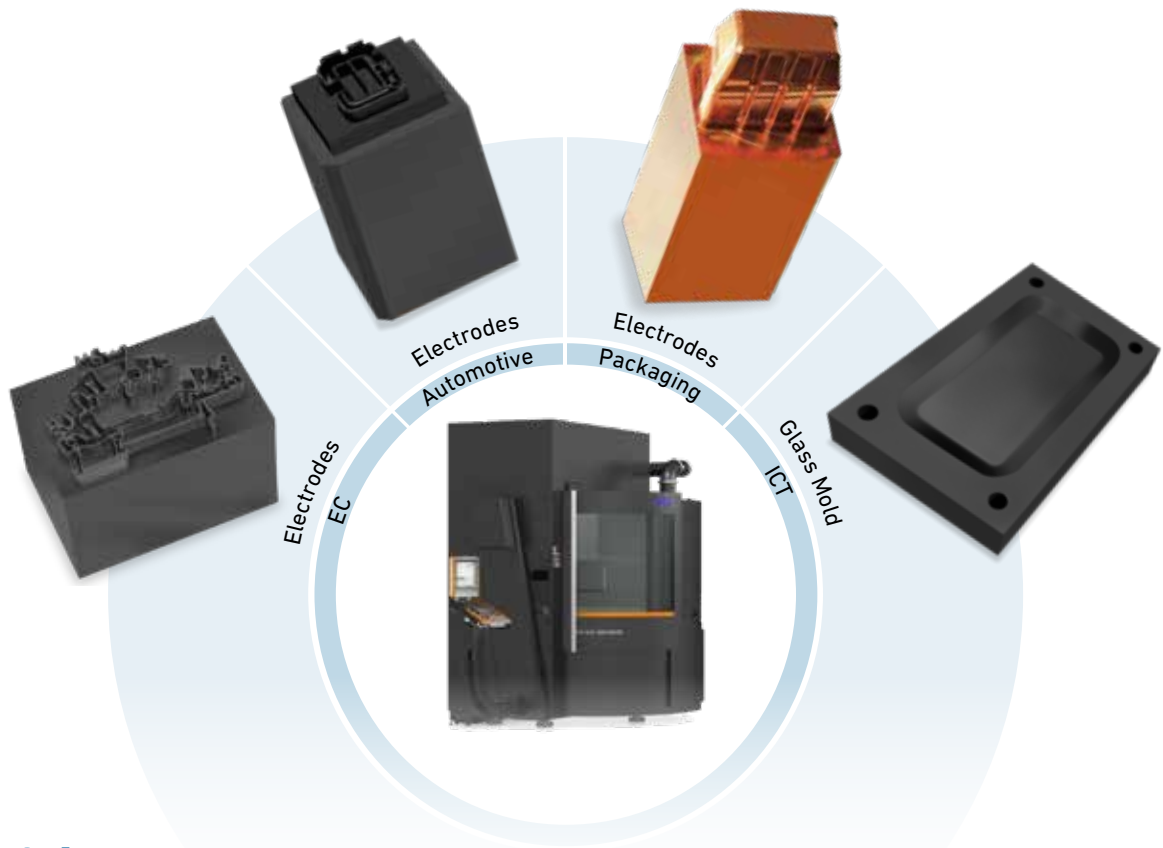
450-liter filter system

Fast track – no trace

Graphite machining has never been so attractive—and challenging. While graphite electrodes boost die-sinking electrical discharge machining's (EDM's) productivity and reduces costs, the graphite-based glass mold market is quickly growing, with new requirements in terms of surface finish, precision and machining speed.

The HSM 500 Graphite provides the ideal answer to these challenges. It combines the well-established HSM 500 that set a benchmark in terms of speed and surface finish with a dedicated high-precision Step-Tec Spindle. Additional benefits are its improved dust exhaust unit in a black enclosure and integration of the System 3R WPT1+.

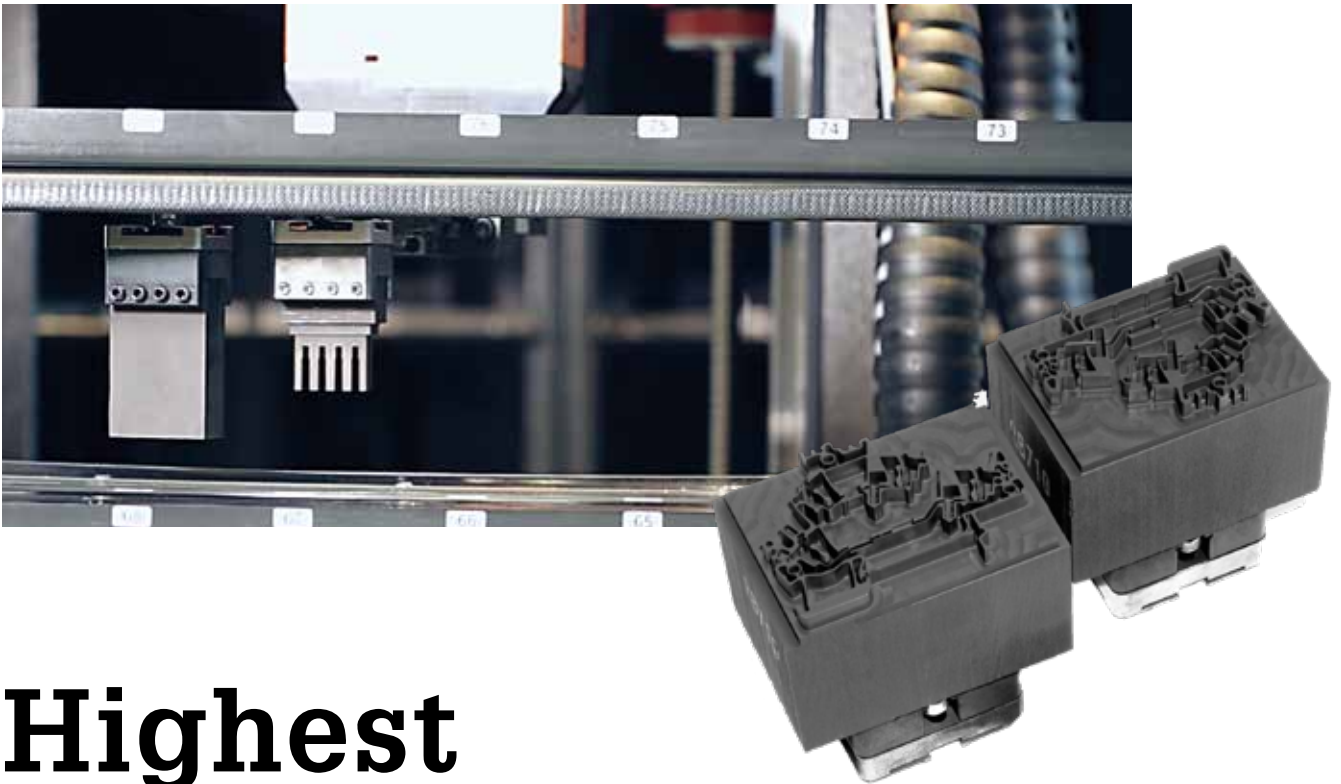
The fast-track machine has been transformed into the perfect graphite solution that leaves no trace on your parts or in your workshop.



40% cost reduction per part vs. well-known competitors

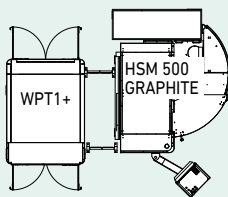
± 7 μm accuracy

24/7 reliable process with ± 1 μm repeatability thanks to S3R reference systems



Highest productivity and flexibility per m²

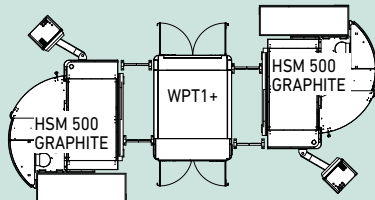
24/7
reliable
automated process



WPT1+ with up to 70 pallets
1x HSM 500 GRAPHITE
= 10.4 m²



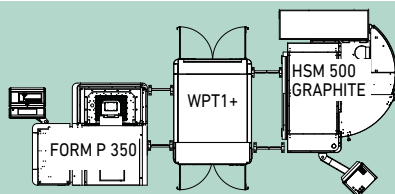
2x
more
production capacity



WPT1+ with up to 70 pallets
2x HSM 500 GRAPHITE
= 18.5 m²



+100%
more
flexibility



WPT1+ with up to 70 pallets
1x HSM 500 GRAPHITE
1x FORM P 350
= 19.5 m²

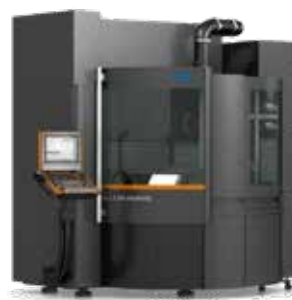


Dust extraction

Up to 2940 Pa suction 3600m³/h



- + Clean processing
- + Clean environment
- + Reliable Machining



Mikron
MILL S 400 GRAPHITE
MILL S 500 GRAPHITE



Mikron
HSM 500 GRAPHITE

High-speed Step-Tec Spindle

42,000 / 30,000 min⁻¹ High speed, precision

Benefits

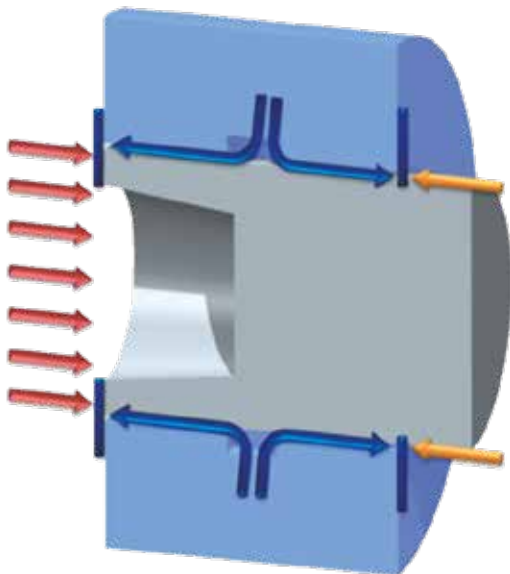
- + Best thermal stability and polar temperature behavior with less than 1.7 K around the Spindle mantle thanks to sophisticated design and OptiCool principle (OCS)
- + Dust dry Spindle nose
- + Consistently high surface quality thanks to Intelligent Spindle Monitoring (ISM). It constantly monitors vibrations along each axis as well as temperatures of hot spots (bearings, motor) and ambient air.



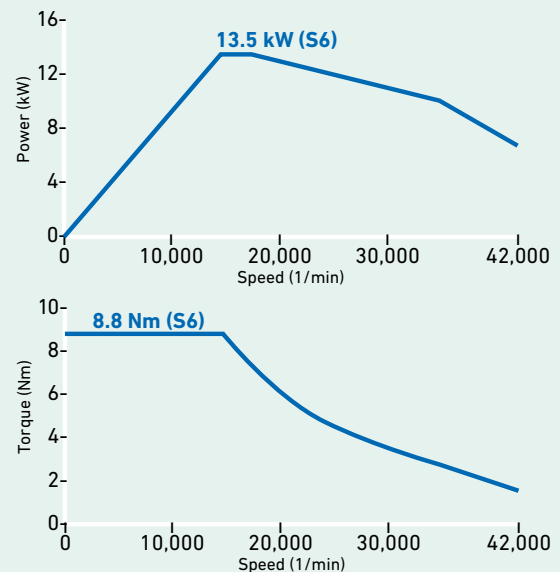
Spindle nose

Twin-air sealing system

- Protecting air
- Dirt
- Oil



Dimensions	Ø 140 mm x 492 mm
Tool Interface	HSK-E40 DIN69063-1
Power (S6)	13.5 kW
Torque (S6)	8.8 Nm
Speed max.	42,000 min ⁻¹ / 30,000 min ⁻¹



— S6 40% ED ts=2min

Our Solutions - for you



AgieCharmilles
FORM P 350

Achieve high performance, extend the scope of your parts production operations, take on new applications, and enjoy vast Automation capability with the AgieCharmilles FORM P 350.

GF Machining Solutions' die-sinking EDM know-how is fully embedded in the FORM P series through its EDM process management.

The die-sinking iGAP feature varies spark power between the fronts and sides of electrodes to enable outstanding material removal and push your productivity ahead.

Customer Services

Increase your productivity and optimize your costs and time.

Graphite's extraordinary characteristics make it the perfect material for electrodes and glass molds. Graphite is largely used for electrical discharge machining (EDM) in production and other applications fields like mold making, general engineering and micromachining. It offers many advantages, including low wear, easy machining and thermostability to provide very high cost-effectiveness.

GF Machining Solutions offers various grades of graphite with a wide range of performance characteristics. Each grade can be dedicated to a specific range of applications.



For a single machine with integrated Automation

Job Tool Manager (JTM) - bring agility back to the shop floor

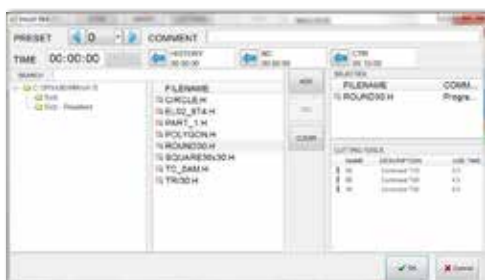
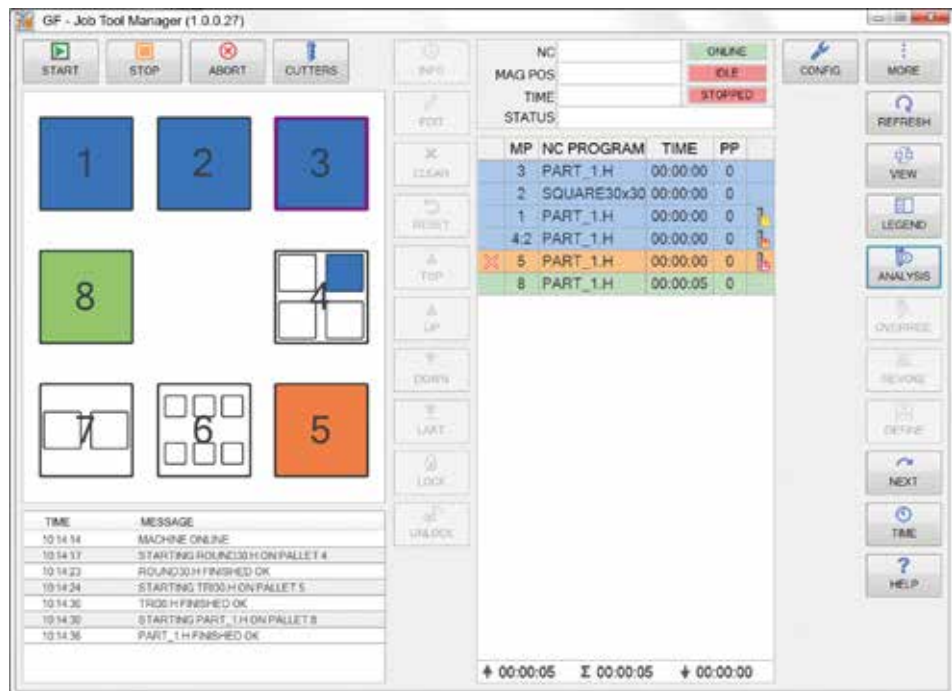


User friendly software for one machine with integrated pallet changer.

Assign NC programs to pallet position by drag and drop on a touch screen, close to the pallet changer.

Advantages

- + Easy to change priorities when the machine is working
- + Add or remove jobs while machining
- + Jobs where cutters are missing will not be started
- + Estimated and present machining time for the magazine content are calculated.



Assign NC file, check tool capacity, schedule

By selecting the NC program, JobToolManager register the tools used in the in the program. Time is stored if the NC program defines the time for the entire machining or if each tool has its use time.

If the program has been used earlier, it automatically displays the last recorded time.



Manage tools upon jobs to be done

Each time a new job is started, JobToolManager checks the machine tool table to see the availability of tools. If a tool is broken and no sister tool is available, will the job be blocked.

Intelligent Manufacturing Solutions from CAD to part

T.R.U.E. PRECISION

Just as GF Machining Solutions' rConnect platform leverages connectivity-enabled machine communication to deliver machine data to your mobile device to ensure access to our remote service centers, our innovative, intelligent T.R.U.E. (True Response to User Expectation) PRECISION fully digital manufacturing solution accelerates your Industry 4.0 readiness—today. With our proprietary Multi-Process Preparation (MPP) software component at its heart, T.R.U.E. PRECISION optimizes your die-sinking electrical discharge machining (EDM) process based on the real 3D shape of the electrode. Experience a highly accurate, fully predictable machining process that yields greater accuracy with T.R.U.E. PRECISION.



T.R.U.E. PRECISION

True Response to User Expectation

T.R.U.E. PRECISION is an innovative manufacturing solution for optimizing the die-sinking EDM process based on true geometry of the electrode. T.R.U.E. PRECISION ensures perfectly secure digital data utilization through an uninterrupted workflow for highest accuracy and consistency, from CAD and computer-aided manufacturing (CAM) to execution of the final part.

MPP

Multi-Process Preparation

MPP solves the significant manufacturing challenge of complete process chain optimization and gives you full control of your DSEDM process. In just six steps, MPP outlines the full DSEDM tool or part production process and, based on the 3D geometry of the truly active portion of the electrode, enhances your die-sinking EDM process to advance your efficiency, productivity and quality.

Your benefits

- High accuracy due to true digital geometry of electrode
- Predictable machining time
- Simulation and time/cost overview
- Optimized and increased the electrode usage
- Optimized machining sequence for each electrode
- Improve quality with the digital process with an accurate offset measurement within 2 μm
- Optimization of the die-sinking EDM process based on the true geometry of the electrode
- Best use of the Milling/die-sinking EDM ratio

Customer Services

rConnect: Live Remote Assistance

rConnect comprises GF Machining Solutions 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.

Certified by TÜViT Trusted Product

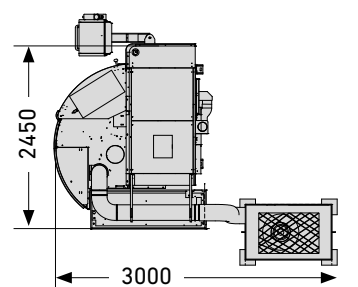


Technical data

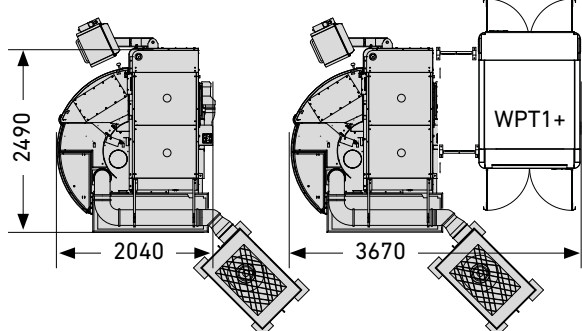


Machine		Mikron MILL S 400 GRAPHITE	Mikron MILL S 500 GRAPHITE	Mikron HSM 500 GRAPHITE
Basic machine		Linear drives, Ambient robust	Linear drives, Ambient robust	Ball screw
Work area				
Longitudinal	X mm	500	500	500
Lateral	Y mm	450	450	450
Vertical	Z mm	360	360	350
Feed rate				
Rapid traverse	X, Y, Z m / min	61	61	42
Working spindle (40% ED, S6)				
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	-
Work table				
Table	mm	-	590 x 450	550x450
Pallet/clamping surface	mm	Dynafix 280x280/350x350	-	-
Pallet/clamping surface	mm	GPS 240x240	-	-
Pallet/clamping surface	mm	UPC 320x320	-	-
Max table load	kg	120	200	200
Tool magazine				
HSK-E40	piece	18 / 36 / 68	18 / 36 / 68	18 / 36
Weight				
Machine	kg	6'800	6'800	5'500
Control unit				
Heidenhain		iTNC 530 HSCI	iTNC 530 HSCI	iTNC 530 HSCI
Dust extraction (Amano)				
Weight	kg	300	300	300
Power	kW	3.7	3.7	3.7
Suction	Pa	980 ~2940	980 ~2940	980 ~2940
Largest gas receive amount	m ³ /h	3600	3600	3600

Mikron MILL S 400/500 GRAPHITE



Mikron HSM 500 GRAPHITE



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.

www.gfms.com



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