

Mikron

# VCE Pro



### **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

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## GF Machining Solutions

**Machining centers belonging to the Mikron VCE Pro series:  
More robust, more reliable, better performance, better ergonomics.**

## Applications

# A wide range of parts...

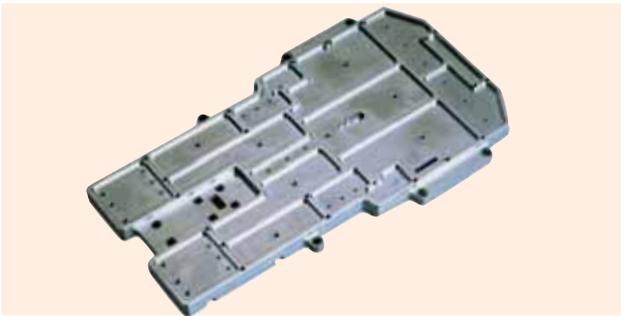


### Fixture

Ck45

Mechanical engineering

- + High cutting performance
- + Precision round-pocket milling
- + Preset pocket milling cycles make programming on the machine quick and easy



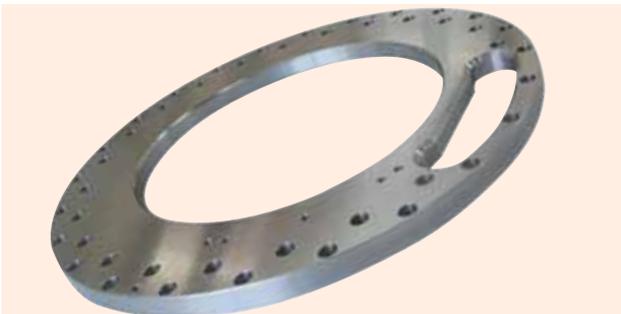
### Baseplate

AlCu4Mg1.5

High-strength aluminum alloy

Electronics/mechatronics

- + High cutting speeds and small tool diameters require high spindle speeds
- + High-quality surface
- + Longer tool service life because tool is cooled



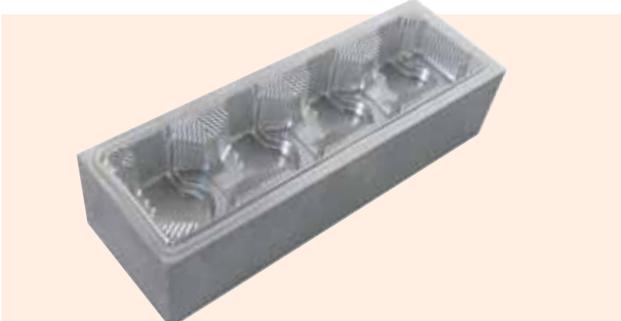
### Motor flange

X38CrMoV 5 1

High-alloy hot-working steel

Mechanical engineering

- + Thread cutting without compensating chuck
- + The touch probe was used to automatically align machining on the back
- + Tools measured using the tool touch measuring system



### Mold for biscuit packaging

Al 99.5 aluminum

Mold construction

- + Machined using HSC technology
- + Minimum quantity lubrication
- + The machine is highly dynamic, which reduces machining time considerably
- + Machining time including rough machining approx. 7 h
- + The tools are measured by laser



### Four-axis cutting drum

34CrAlMo5 nitrided steel

Paper industry

- + Cutting drum contours absolutely precise
- + Programmed using the cylinder mantel milling function
- + With a 0.5 ms block processing time, even complex contours can be executed quickly



**There are no limits to how the Mikron VCE Pro machines can be used. This one is being used in die and mold construction for smoothing using a round-head cutter. Because the Mikron VCE Pro spindle can rotate at 16,000 rpm, the necessary cutting speeds can even be achieved using small tools.**

## Highlights

# The Mikron VCE Pro can be used for any commissioned work



### Other features

- + Compact construction
- + Optional linear scales
- + Almost any optional extra can be retrofitted
- + Ethernet and USB ports included
- + Mobile handwheel

Mikron machining centers are distinguished by their exceptional ergonomics. The Mikron VCE Pro boasts unrivaled accessibility, regardless of how the machine is configured.



**Belt-driven spindle 6,000 rpm, 10,000 rpm,  
Inline spindle 16,000 rpm**

Strong spindles always offer sufficient performance for any conventional machining processes, even up to 350 Nm in the ISO 50 version of the Mikron VCE 1600 Pro. When drilling, which requires the highest performance, the capabilities of modern tools can be utilized to the fullest.

The spindles for universal machining are designed for 10,000 rpm (standard). These also offer high torque levels of 94 to more than 209 Nm.

Only hybrid ball bearings are used for the sake of longevity. No compensating chuck is needed for thread cutting.



**Tool changer with double-arm gripper for even shorter downtimes**

A side-mounted tool changer with integrated double-arm gripper makes it even easier to change tools. Because the tool changer faces away from the working space, the tools are all well protected. This design, which is free of interfering edges, enables high parts and applications to be machined on an indexer.

**Feed rate up to 40 m/min (X + Y)**

The Mikron VCE Pro achieves the level of dynamism required to machine free-form services on account of feed motors that allow it to work at a feed rate of up to 40 m/min. This pays off when moving to new milling positions and changing tools.

**Optional linear scales**

Linear scales ensure a constant level of precision for machining, even when temperatures fluctuate. Compressed air is connected up to protect them as effectively as possible against dirt.



**Clean enclosure thanks to perfect chip management**

A spiral conveyor removes chips automatically. Its load level is monitored and, in the case of overload, an unblocking cycle is automatically initiated. Solid telescopic covers made of sheet steel protect the three linear axes all around against chips and dirt. The design of the enclosure prevents chips from mounting up.

Table

# There is still enough room for the clamping elements, even when travel ranges are used to the fullest.



## **Chips effectively flushed away**

A side-mounted flushing system rinses the chips lying on the enclosure wall outlet directly into the chip conveyor. Spray and compressed-air pistols provide a flexible means of cleaning.

## **Compressed-air connection on every table**

Each table is fitted with an air connector for pneumatically activated zero-point clamping systems.

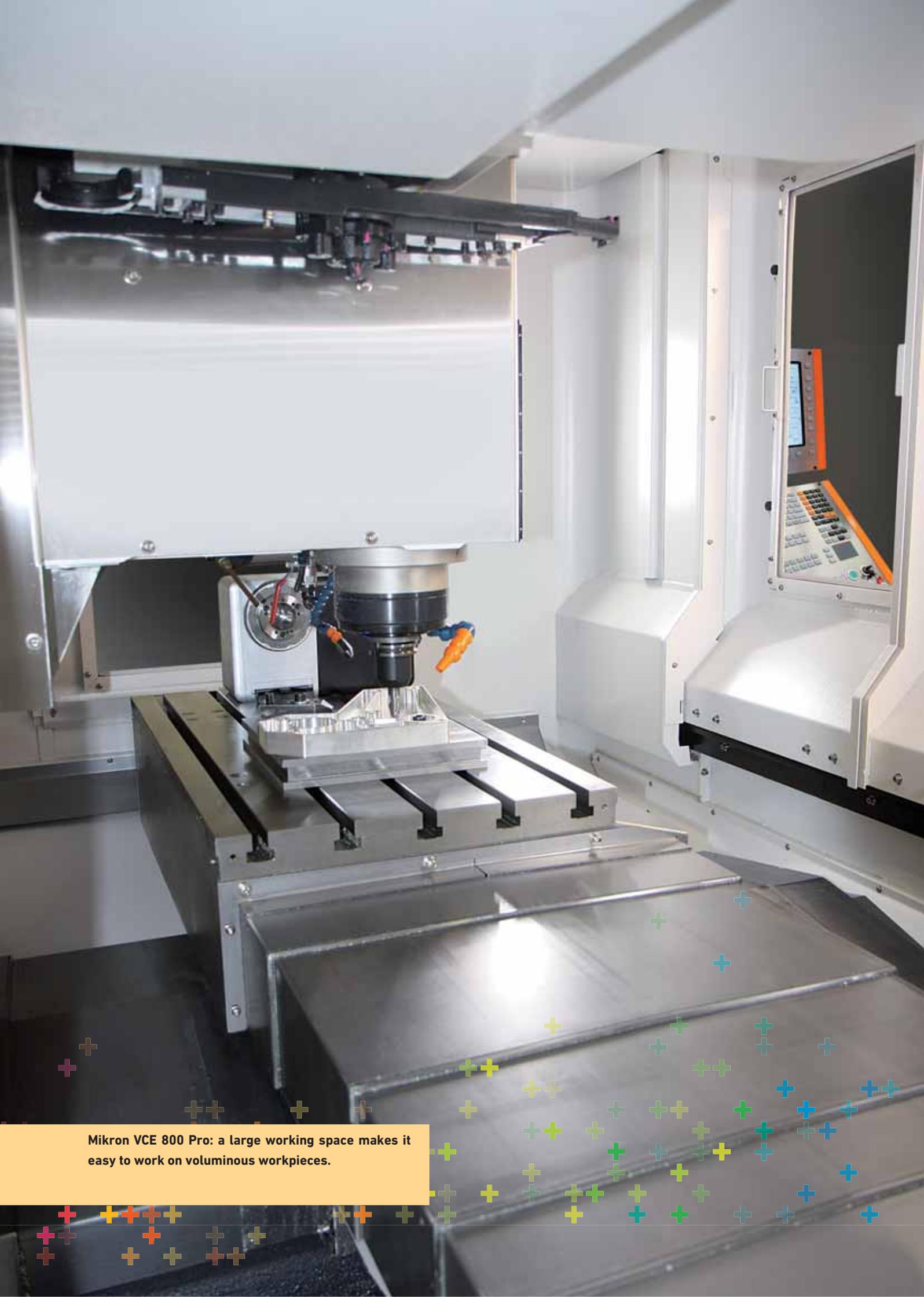


## **Extended usage possibilities thanks to fourth axis**

A fourth axis connection is included in the Mikron VCE Pro's electrical cabinet as standard. This means it is easy to fit an indexer at any later stage. Activation is done using parameters at the controller. Many accessories are available. The precision indexers belonging to the Mikron VCE Pro series are the right solution for machining medium to large workpieces. A small range of dependable products supplements the vertical machining center with a crucial fourth axis.

- + Pneumohydraulic axis clamp with integrated pressure intensifier
- + Center heights of 150 mm, 180 mm, 250 mm
- + Workpiece weights up to 1,000 kg





**Mikron VCE 800 Pro: a large working space makes it easy to work on voluminous workpieces.**

# No restrictions on working space accessibility

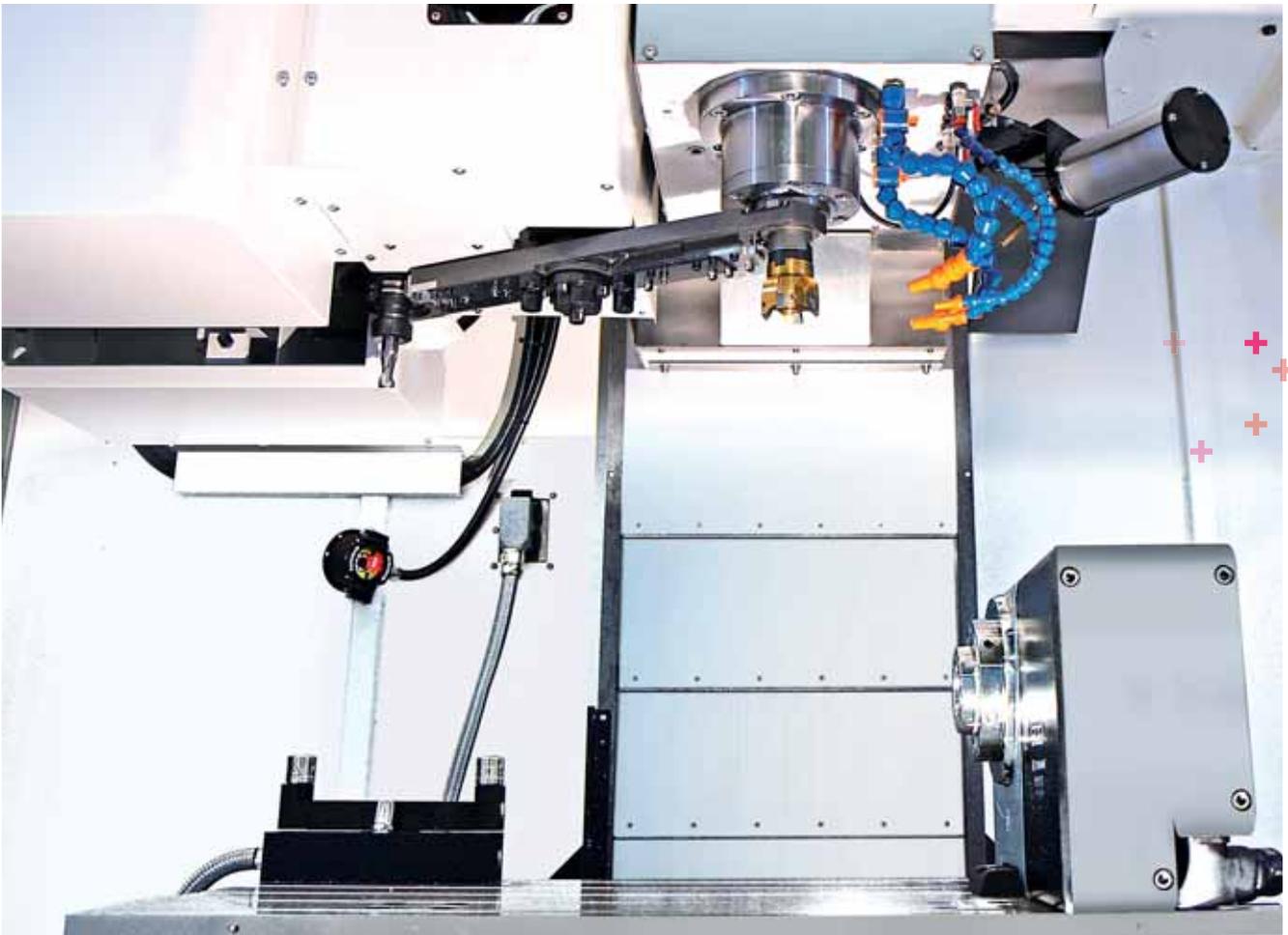


## More productivity with larger tool magazines

The machining autonomy of the popular VCE Pro line has been greatly increased.

Along with the 24-compartment and 30-compartment changers, chain changers with 40 and 60 compartments are now also available.

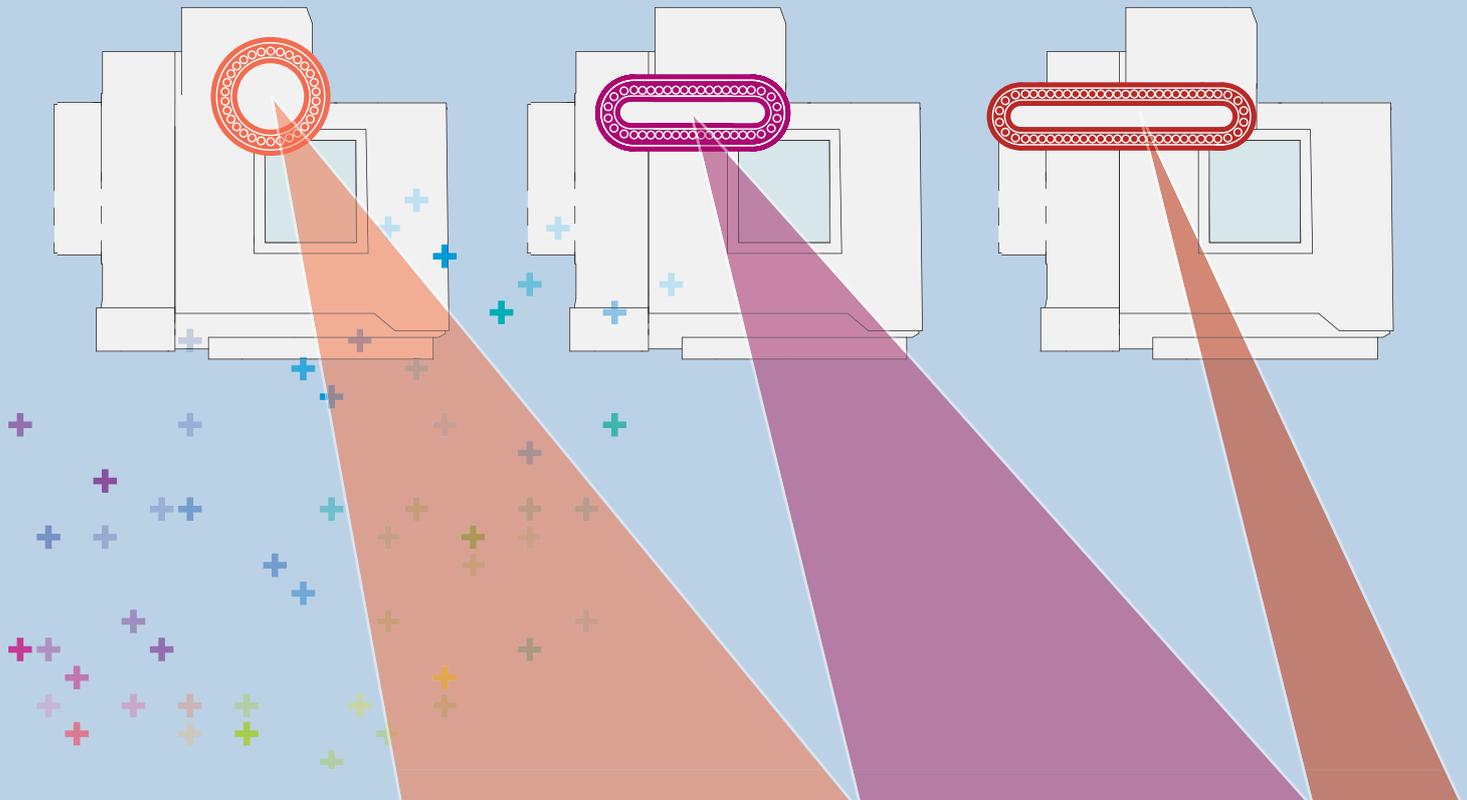
The 40- and 60-compartment chain changers are equipped with a simultaneous tool-fitting feature.



## 24 / 30 tool ports

## 40 tool ports

## 60 tool ports



Tool Magazines	DT 24 (ISO 40)	DT 30 (ISO 40)	DT 24 (ISO 50)	CT 40 (HSK-A63)	CT 40 (ISO 40)	CT 40 (ISO 50)	CT 60 (ISO 40)
Machine types	VCE 600 Pro, VCE 800 Pro	VCE 1600 Pro VCE 2000 Pro	VCE 1600 Pro VCE 2000 Pro	VCE 600 Pro, VCE 800 Pro	VCE 600 Pro, VCE 800 Pro	VCE 1600 Pro VCE 2000 Pro	VCE 800W Pro, VCE 1000 Pro
	VCE 800W Pro, VCE 1000 Pro			VCE 800W Pro, VCE 1000 Pro	VCE 1200 Pro, VCE 1400 Pro		
	VCE 1200 Pro, VCE 1400 Pro			VCE 1200 Pro, VCE 1400 Pro	VCE 1600 Pro VCE 2000 Pro		
				VCE 1600 Pro VCE 2000 Pro			
Tool magazine (type)	Double-arm, side-mounted	Double-arm, side-mounted	Double-arm, side-mounted	Double-arm, side-mounted	Double-arm, side-mounted	Double-arm, side-mounted	Double-arm, side-mounted
Number of tool ports	24	30	24	40	40	40	60
Tool selection	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Bidirectional
Maximum tool diameter (mm)	77	85	125	75	75	125	75
With permanent space coding and with free neighboring spaces (mm)	115	150	240	125	125	240	125
Maximum tool length (mm)	305	305	350	305	305	350	305
Maximum tool weight (kg)	6	6	15	7	7	15	7
Tool-changing time "Chip to chip" (sec.)*	8	8	11	8	8	11	8

\*) As per VDI Guideline 2852, Sheet 1

# Outstanding workpiece quality thanks to exceptional machine concept



### **Lasting quality**

This machine concept produces a strength and rigidity that permeates the machining center. A generously proportioned cast structure exhibits outstanding damping properties, combined with high stability and rigidity even under full load and in continuous operation. This enables a stable milling process, guaranteeing sustained quality and narrow tolerances on the workpiece.

### **Strong spindle head**

A broadly supported and strongly designed spindle head facilitates a milling/drilling process involving strong forces along the Z-axis. A closed coolant circuit stabilizes and regulates the temperature of the spindle head. Active spindle cooling also has positive effect on the ball bearings, the life span, and the elongation of the spindle (optional 6,000/10,000 rpm, standard 16,000 rpm).

### **Robust belt-driven spindle**

A generously proportioned spindle motor enables uninterrupted production, whether at low speeds with high torque or at high speeds with a high output. The machining center is equipped with a 10,000 rpm spindle for the processing of aluminum nonferrous metal and for finely detailed work.

### **Precise, dynamic, safe: ball screw, linear guide, automatic central lubrication**

A pre-tensioned and doubly anchored ball screw guarantee high levels of running precision which is an important precondition for high-level workpiece precision. Linear guides made from hardened steel, with ball rollers, offer the best dynamic properties while requiring minimal force. During operation, the linear guides and ball screws belonging to the machining center are automatically supplied with the right amount of lubricant by the central lubrication system.

## Cooling

# Spectacular performance in conventional and high-speed milling

### Programmed precision

Gone are the days of time-consuming and imprecise manual adjustments on the coolant inlet. A programmable coolant nozzle directs the jet automatically to precisely where the action is after each tool change (optional).



### All-around cooling with spray ring

Cooling is always guaranteed with the optional spray ring (optional).



### Cooling through the spindle, 18 or 42 bar

Coolant is fed directly to the cutting edges under high pressure and through the working spindle. The benefits of this are high cutting speeds, easy deep drilling, blind hole milling, and longer tool service life (optional). The supply unit consists of a large, mobile coolant tank and can be added to with an optionally available belt filter. This system has two switchable filter cartridges to enable uninterrupted use in production.

- + Cooled spindle head
- + Large coolant tank that can be pulled out on wheels, making cleaning easier
- + Spray gun and air gun
- + Coolant nozzles and blow-off nozzles on the spindle head

## Control

# Ideal for any production job in the workshop

### This control console does everything

Its clearly structured monitoring desk is genuinely user friendly. Fourteen function keys give you direct access to menu functions on, beneath and next to the 15-inch color TFT display. The console pivots and can be adjusted in height, and its screen tilts so you can avoid reflections.



### Digital drive technology

A digital control circuit for the drive motors offers exceptionally dynamic control. This enables precision contour reproduction and excellent service quality.

### Automatic calculation of cutting data

The control software offers a facility for automatically calculating cutting data. To do this, you enter tool-specific data into a table, from which the controller calculates suggested spindle speeds and feed rates, which technicians can of course then change and adjust to the levels they have found most effective.

- + Programming using Heidenhain plain text dialogue or DIN/ISO
- + Keyboard with alpha keys, track function keys, operating mode keys, and separate spindle and feed override potentiometers
- + Graphical support for the programming of cycles and contours, graphics for testing programs and for checking on current workpiece machining
- + Cutting data automatically calculated
- + Heat exchanger on electrical cabinet cools power components and keeps outside dust away from the cabinet by means of two separate circuits
- + Touch measuring system cycles
- + Short block processing time (1.5 ms)

All about the Workpiece

# Efficient working preparation for shorter downtimes

The unusual design of this protective enclosure helps operators to make the important preparations for their work. They can also rely on our popular workpiece and tool measurement options. The Mikron VCE Pro helps you perform basic handling with ease so that you can focus on what is most important.

## Outstanding view of the workpiece from three sides

An excellent window construction on both sliding doors at the front, along with big windows on either side, provides you with an unrestricted view of the setup and machining processes in a completely closed protective enclosure. Another benefit is that the working space is accessible from the side, with operating buttons for the tool magazine (optional).

## Setting up is easy with the OMP 40-2 workpiece probe

An infrared probe inserted into the spindle enables the workpiece to be set up, detected, and measured rationally (optional).

This reduces setup times considerably.



## Produce safely with the TS 27 tool probe

Precision tool setup, reliable tool breakage monitoring: the length and diameter of tools can be measured precisely using a probe mounted on the worktable (optional).

## Tool measurement using laser

Tools with small diameters are measured by laser. Contours, such as those of round-head cutters, can also be monitored. The unit has a built-in blow-off nozzle in order to blow dirt off the tool before measuring (optional).



Options

# Custom fittings



Tool touch measuring system  
TS 27



Laser tool measuring device



Preparing setup probe  
OMP 40-2



Setup probe OMP 40-2



Basic supply unit for IKZ (internal  
coolant supply), 18 bar



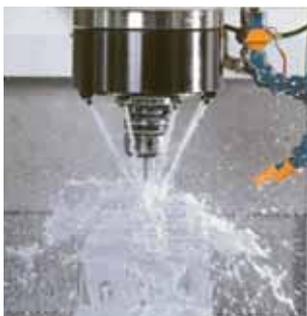
Supply unit for IKZ, 18 or  
42 bar



Belt filter unit on cooling water  
tank



Integrated belt filter for sizes  
600-1000



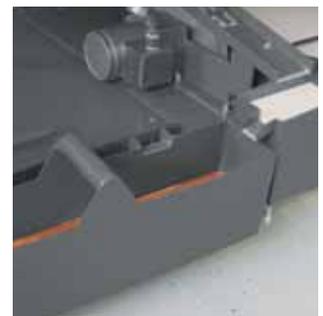
Spray ring



Programmable coolant nozzle



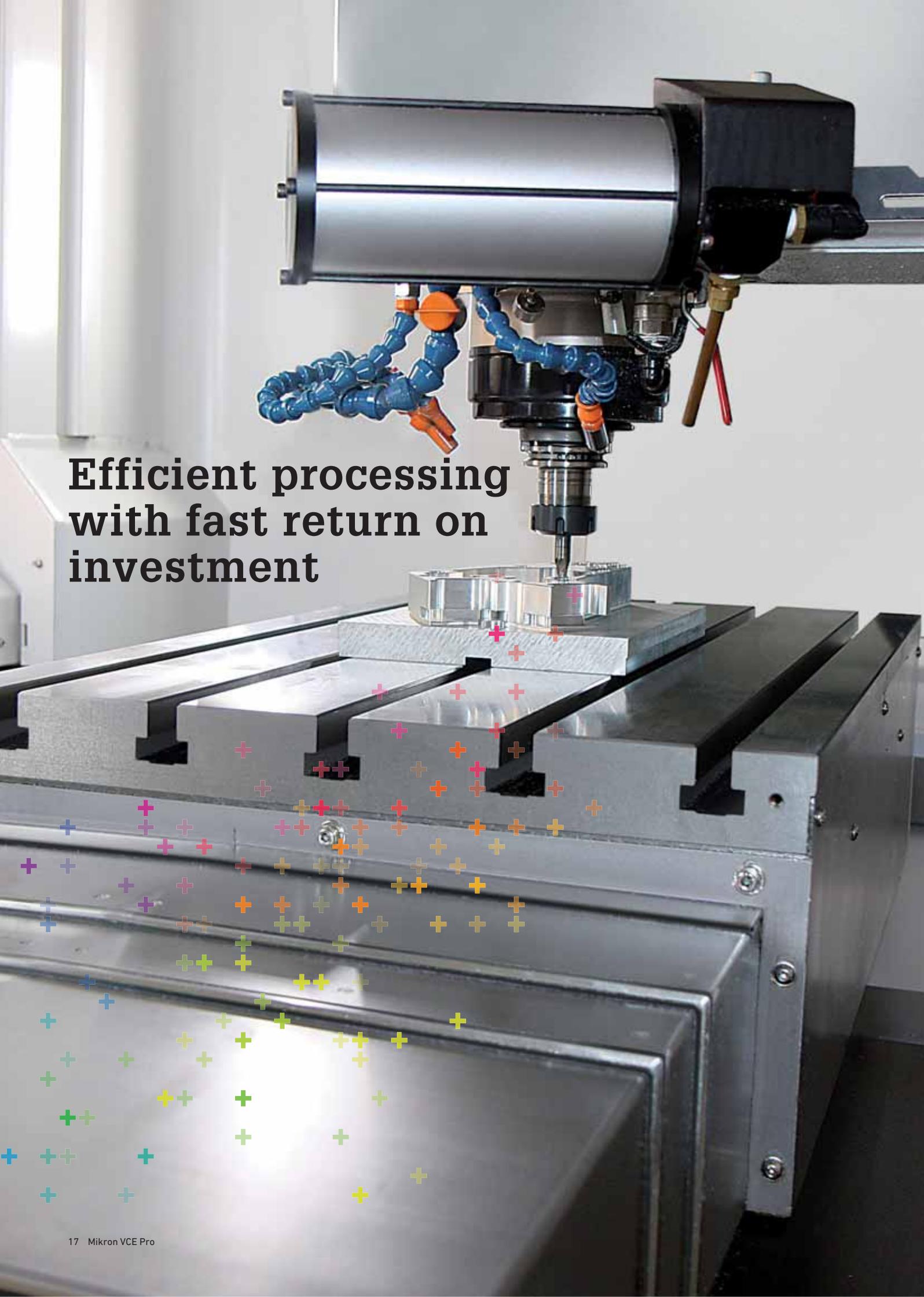
Minimum quantity lubrication



Mechanical oil/coolant  
separator



Indexer



**Efficient processing  
with fast return on  
investment**

## Technical data



Mikron VCE 600 Pro



Mikron VCE 800 Pro



Mikron VCE 800W Pro



Mikron VCE 1000 Pro

			Mikron VCE 600 Pro	Mikron VCE 800 Pro	Mikron VCE 800W Pro
<b>Travel ranges</b>					
Longitudinal	X	mm	600	800	860
Transverse	Y	mm	500	500	560
Vertical	Z	mm	540	540	600
Max. distance between spindle tip and worktable		mm	690	690	735
<b>Tool spindle</b>					
Drive type			Drive belt	Drive belt	Drive belt
Maximum speed up to			rpm	10'000	10'000
Tool 40% duty cycle/S6			kW @ rpm	18,5 @ 1188	18,5 @ 1188
Spindle torque 40% duty cycle/S6			Nm	149	149
Tool mount			ISO-B40	ISO-B40	ISO-B40
Optional working spindle			rpm	16'000 ISO-B40/HSK-A63	16'000 ISO-B40/HSK-A63
<b>Travel speed</b>					
Rapid traverse	X, Y	m/min.	40	40	40
Rapid traverse	Z	m/min	40	40	40
<b>Tool magazine</b>					
Magazine spaces		quantity	24/40 ISO-B40 40 HSK-A63	24/40 ISO-B40 40 HSK-A63	24/40/60 ISO-B40 40 HSK-A63
Tool magazine			Side-mounted	Side-mounted	Side-mounted
Max. tool length		mm	305	305	305
Max. tool diameter		mm	77/115	77/115	77/115
<b>Worktable</b>					
Table area		mm	700 x 500	910 x 500	1000 x 560
Maximum table load		kg	800	1100	1350
Number of T-grooves			5	5	5
T-groove spacing		mm	100	100	100
T-groove dimensions		mm	18 <sup>+0.006/ +0.024</sup>	18 <sup>+0.006/ +0.024</sup>	18 <sup>+0.006/ +0.024</sup>
<b>Cooling</b>					
Coolant tank capacity		l	300	300	300
<b>Controller</b>					
Type			Heidenhain TNC 620	Heidenhain TNC 620	Heidenhain TNC 620
<b>Machine weight</b>					
			kg	4'800	5'000
					6'500



Mikron VCE 1200 Pro



Mikron VCE 1400 Pro



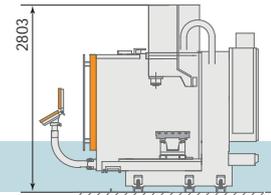
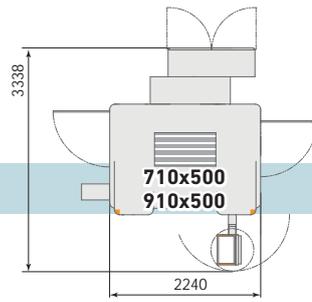
Mikron VCE 1600 Pro



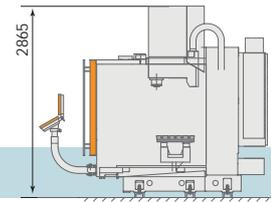
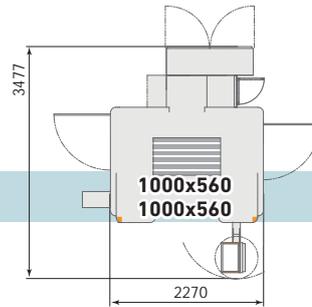
Mikron VCE 2000 Pro

Mikron VCE 1000 Pro	Mikron VCE 1200 Pro	Mikron VCE 1400 Pro	Mikron VCE 1600 Pro	Mikron VCE 2000 Pro
1020	1200	1400	1600	2000
560	600	650	900	900
600	675	675	800	800
735	775	775	900	900
Drive belt				
10'000	10'000	10'000	10'000	10'000
18,5 @ 1188	18 @ 823	18 @ 823	18 @ 823	18 @ 823
149	209	209	209	209
ISO-B40	ISO-B40	ISO-B40	ISO-B40 / ISO-B50	ISO-B40 / ISO-B50
16'000 ISO-B40/HSK-A63	-	-	6'000, ISO 50, 350 Nm	6'000, ISO 50, 350 Nm
40	32	32	24	20
40	24	24	20	15
24/40/60 ISO-B40	24/40/60 ISO-B40	24/40/60 ISO-B40	30/40/60 ISO-B40	30/40 ISO-B40
40 HSK-A63	-	-	24/40 ISO-B50	24/40 ISO-B50
Side-mounted	Side-mounted	Side-mounted	Side-mounted	Side-mounted
305	305	305	305 (350, ISO-B50)	305 (350, ISO-B50)
77/115	77/115	77/115	85/150 (125/240, ISO-B50)	85/150 (125/240, ISO-B50)
1000 x 560	1220 x 620	1400 x 620	1700 x 850	2100 x 850
1350	1700	1700	2000	3000
5	5	5	7	7
100	100	100	100	100
18 <sup>+0.006/ +0.024</sup>				
300	380	380	540	540
Heidenhain TNC 620				
6'500	8'000	8'700	18'600	18'600

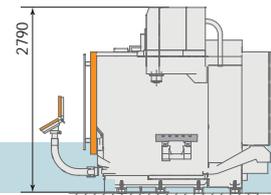
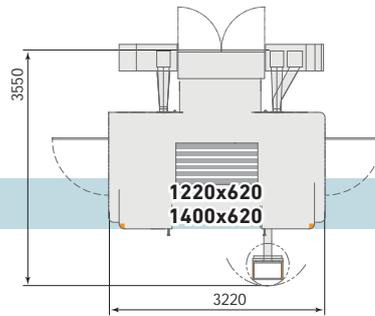
**Mikron VCE 600 Pro**    X   Y   Z  
 600 / 500 / 540  
**Mikron VCE 800 Pro**    800 / 500 / 540



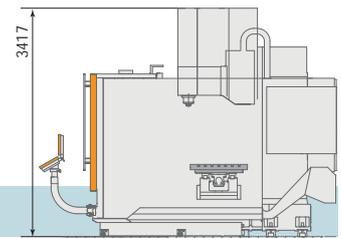
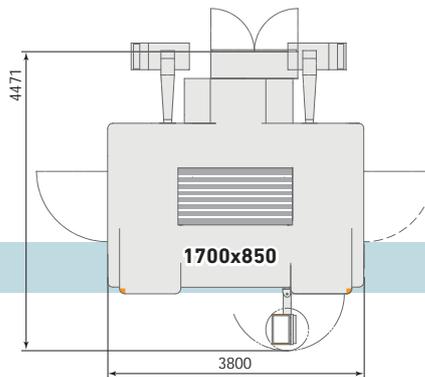
**Mikron VCE 800W Pro**    X   Y   Z  
 860 / 560 / 600  
**Mikron VCE 1000 Pro**    1020 / 560 / 600



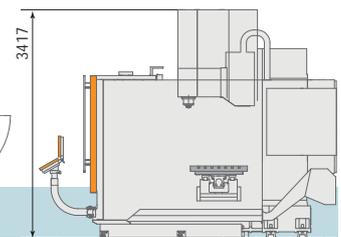
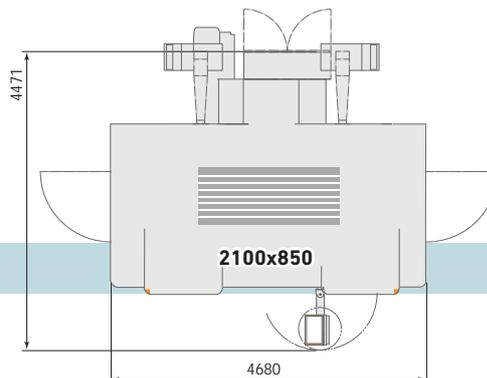
**Mikron VCE 1200 Pro**    X   Y   Z  
 1200 / 600 / 675  
**Mikron VCE 1400 Pro**    1400 / 650 / 675



**Mikron VCE 1600 Pro**    X   Y   Z  
 1600 / 900 / 800



**Mikron VCE 2000 Pro**    X   Y   Z  
 2000 / 900 / 800



**Standard equipment for all Mikron VCE 600 Pro to 2000 Pro vertical machining centers**

- + Protective enclosure
- + Two side windows, large front doors
- + Powerful fluorescent lights in the working space
- + Telescopic covers on X-, Y-, and Z-axis
- + Spiral chip conveyor with mechanical double filter
- + Automatic central lubrication
- + Side-mounted tool changer
- + Spray gun
- + Compressed-air gun
- + Operating status display
- + Working spindle 10,000 rpm
- + Spindle head cooled using cooling water
- + Regulated cooling for main spindle
- + Side-mounted flushing system  
(Mikron VCE 600 Pro to Mikron VCE 1400 Pro)
- + Coolant nozzles and air nozzles on spindle head
- + Roll out coolant tank
- + Thread cutting without compensating chuck
- + Heidenhain TNC 620 track controller
- + USB 3.0 port
- + Compatible with optional extras
- + Ethernet port
- + Mobile handwheel
- + Additional protective screen

**Accessories for all vertical machining centers**

**Mikron VCE 600 Pro to 2000 Pro**

- + Cooling through spindle (IKZ), 18 or 42 bar
- + Belt filter unit to IKZ
- + Regulated cooling for main spindle (6,000/10,000 rpm)
- + Compatible with fourth axis
- + NC indexer as fourth axis
- + Spray ring to spindle
- + Controllable coolant nozzle
- + Spray mist extraction
- + Infrared measurement and setup probe, type OMP 40-2
- + Tool touch measuring system type TS27
- + Integrated belt filter
- + BT tool version
- + Mechanical oil/coolant separator
- + Chip trolley
- + Minimum quantity lubrication
- + Compatible with angled head
- + Additional protective screen

**Cutting data for CK 45 1.1191  
(approx. 800 N/mm<sup>2</sup>)**

		<b>Mikron VCE 600 Pro to VCE 1000 Pro</b>	<b>Mikron VCE 1200 Pro to VCE 2000 Pro</b>
<b>Milling:</b>			
<b>HM blade head / five blades</b>			
		10'000 rpm	10'000 rpm
HM tool		Flat-face mill 45°	Flat-face mill 45°
Tool diameter	mm	63	63
Cutting speed	m/min.	160	160
Speed	rpm	809	809
Feed rate	mm/min.	809	809
Plunging depth	mm	5,5	6
Plunging width	mm	63	63
Chip volume	cm <sup>3</sup> /min.	281	305
Spindle load	%	120	120
<b>Drilling:</b>			
<b>Insert drill / two blades/ Ø 38 mm</b>			
		10'000 rpm	10'000 rpm
Cutting speed	m/min.	220	220
Speed	rpm	1843	1843
Feed rate	mm/min.	221	221
Spindle load	%	80	65
<b>Thread cutting:</b>			
<b>HSS tap / M24</b>			
		10'000 rpm	10'000 rpm
Cutting speed	m/min.	10	10
Speed	rpm	133	133
Feed rate	mm/min.	398	398
Plunge depth	mm	36	36
Spindle load	%	45	40

# 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.



## Tooling and Automation

### System 3R Tooling, Automation 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 Tooling, Automation and software solutions ranging from simple workpiece pallet and electrode changers through to flexible manufacturing and robot handling systems are guaranteed to help you increase their competitive advantage.



## Milling

### Mikron MILL S (high-speed Milling), Mikron MILL P (high-performance Milling) and Mikron MILL E (high-efficiency Milling)

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 MILL S, Mikron MILL P and Mikron MILL E 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 GF 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

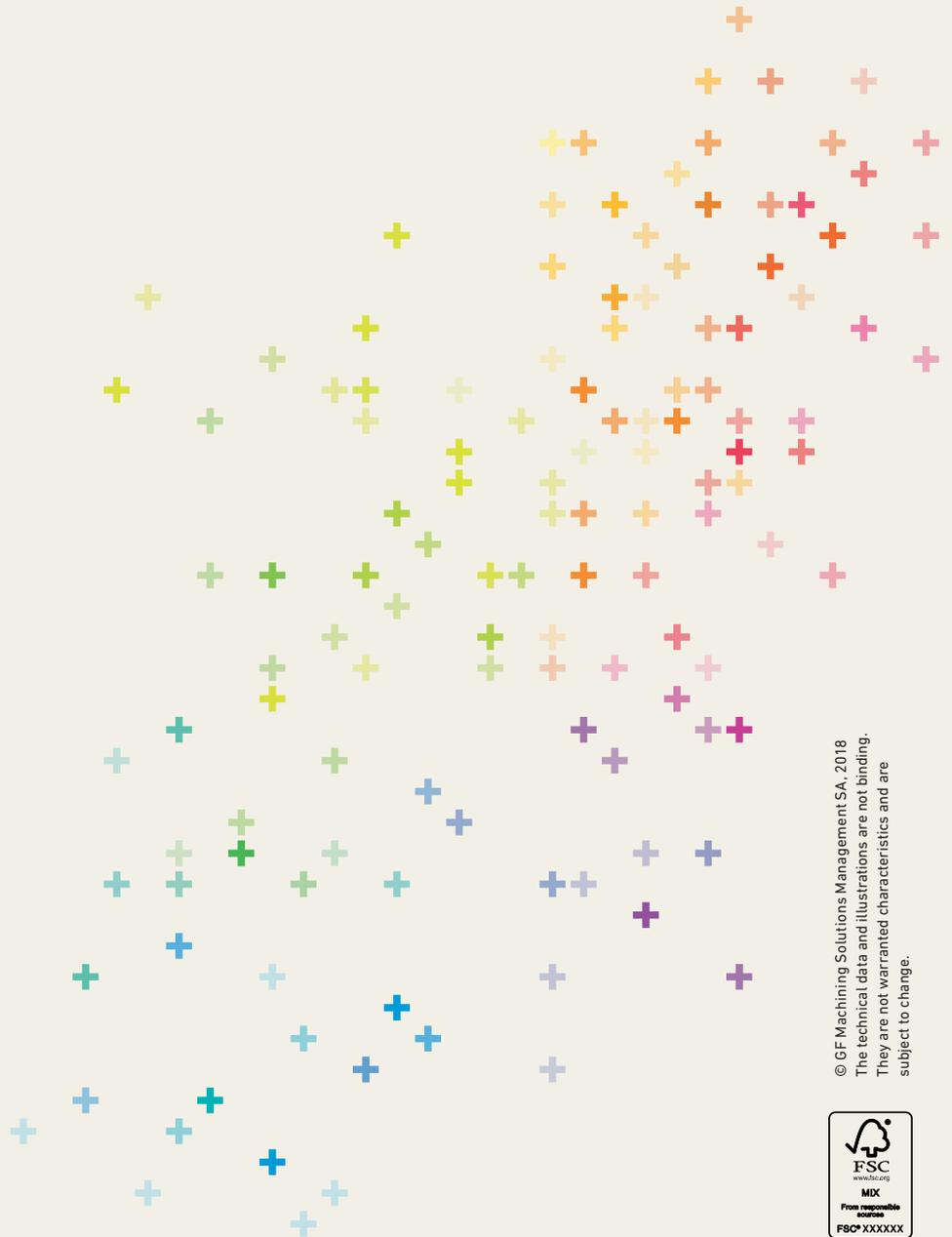
To help you get the most and the best from your machine tools and equipment, we offer three levels of support. Operations Support covers our range of original wear parts and certified consumables (EDM wires, filters, resins, electrodes etc.) to ensure that your machines are performing at the highest 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, Additive Manufacturing, Spindle, Tooling and Automation solutions. A comprehensive package of Customer Services completes our proposition.

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