

www.zorn-maschinenbau.com

31



har a sufferent at

0

zorn micro^{one}

Machining Technology for Precision Micro-Parts

ZOFN MICRO^{ONE}

5-Axis Micro CNC Precision Machining Centre

What's so special about the micro one?

The microone is the professional micro machining centre which can be adapted to a broad range of requirements in a highly flexible fashion. It's not only distinguished by its extremely compact layout and top quality design, it's also equipped with removable modules.

Modularity with a "miniature footprint". At the most, 0.9 square metres of precious floor space is all you need to invest for a full-fledged 5-axis machining centre. Plug & play not only describes the utilised product technology, it applies to transport as well: the microone fits through any standard door without a hitch.

Maximum flexibility and outstanding ease of operation were the inspiration for developing the microone.

Best possible access and an ideal view of the workpiece permit efficient and effective machine operation. The microone's worktable height contributes to ease of operation as well – it ensures good visibility and easy gripping of even the smallest components. Perfect ergonomics with a focus on the essentials at an ideal distance from the workpiece. Ample access from two sides underscores user-friendliness. The modular design makes it possible to integrate the machining module into assembly systems separately, whereas the supply unit remains outside.

The microone is currently laid out as a classic machining centre. However, further development including the integration of additional machining methods is also planned. For example, the currently used high-performance spindle can be replaced by laser optics or a dosing unit, thus making additional applications possible such as laser welding, labelling and bonding, as well as other dosing and inspection tasks.





Variants / Options

- A wide variety of expansion stages to meet your needs
- Available with 3 or 5 axes
- Tool magazine extension, measuring stylus, laser measurement
- Minimum quantity lubrication and exhaust

Tools Size comparison with a hair and a pencil tip

The Base Frame

The microone places a state-of-the-art micro-machining centre at your disposal which combines a variety of very important attributes:

Zorn micro one Features

- Footprint: < 1 sq. m
- Outstanding ergonomics
- Fully automated for variable series production
- 5-axis simultaneous machining
- Siemens 840D SL CNC controller
- Automatic tool changer
- Controlled spindle speed: 75,000 RPM
- Extremely quiet thanks to the use of linear direct drives
- Water cooling for direct drives and spindle
- Minimal current consumption thanks to less moving mass
- Ecological thanks to minimum lubrication
- CAD/CAM
- Modular design

Natural Granite – the Base Frame of the microone

The smaller the workpiece, the greater the demand for precision. The solid granite foundation absorbs all of the motion of the Zorn microone. The characteristics of natural granite, which are still unbeatable even today, have been taken advantage of by the design engineers for your microone.



0

Granite Block (natural hard rock)

- More inherent rigidity
- More thermal stability
- More mechanical stability
- Maximum repetition accuracy
- Precision ground

ZOFN MICFO^{ONE}

5-Axis Micro CNC Modular

Flexibility through Modularity

The modularity of the actual machining module makes it possible to create an ergonomic sitting workplace. The supply unit is shifted to the side or to the back in order to ensure adequate legroom. The machining module can be positioned as desired (max. cable length must be taken into consideration.)

Integration into Existing Systems

The machining module can also be integrated into assembly systems whereas the supply module remains outside.

The supply module includes electrical power supply with controller and all other auxiliary equipment. Two control cabinets at the sides accommodate electrical power supply on one side, as well as a water cooling unit for the axes and the spindle on the other side. Minimum quantity lubrication and the pneumatic system are installed in the middle section.

All supply lines are installed as a bundle between the machining level and the supply unit.

An air bearing can be included between the two modules as an option in order to protect the machining level from external impacts.

Two drawers for the keyboard and for tools and the like are included in this central space.



Machining Module





Water Cooling



Minimum Lubrication



Pneumatic Supply



Drives and Controller

Ergonomics

Ergonomics

Thanks to access from both sides and increased height of the machining level, optimised viewing and access are assured for operating personnel.



Ideal Access from Two Sides



The linear direct drives for the main X, Y and Z axes, as well as the torque drives for rotary axes B and C, are key technological features of the microone. The advantages include a very high degree of positioning accuracy thanks to the integrated displacement encoder, outstanding dynamics and acceleration, as well as excellent synchronisation characteristics. And with the direct drives there's no more backlash at all.

Higher speeds represent a further advantage for the use of direct drives in the rotary axes, which open up additional machining options, above all for the C-axis.

Both of the rotary axes are equipped with clamping systems for larger machining forces and optimum stability. Sealing air has also been included and offers protection against penetration by contamination and moisture. All of the direct drives, as well as the spindle, are water-cooled and are equipped with direct measuring systems.



Swivel and Rotary Axis with Workpiece



Measurement

Spindle, Tool Changer, Workpiece Measurement

The microone is currently equipped with a tool changer for 12 tools. The tool holder can be fully replaced by the quick clamping device. 3, 4 and 6 mm tool shanks can be clamped.

The ingenious clamping system makes it possible to do away with cost-intensive tool holders. The ground circumferential groove in the shaft is used for tool orientation. All of this results in the advantage of not having to apply any additional loads to the tool shank. This minimalistic approach assures reduced vibration. The tool changer is positioned by the main axis. The structural design of the moving magazine permits extremely short tool changing cycles.

The user can easily expand his tool magazine to include several additional magazine plates in order to increase the number of tools.



Optimised Measuring of Tools and Workpieces with Highly Precise 3D Measuring Equipment or Laser

Advantages

- No additional tool holders
- Optimum balance quality
- No setup time for tools
- Expandable tool magazine





zorn micro^{one}

Automation Module

A special module has been developed in-house for automated production with the microone. Its size and design are matched to the microone. Thanks to the fact that the robot is mounted to the ceiling, all of the module's floor space is available for your products.

A further extraordinary characteristic of the module has proven itself highly valuable: The utilized robot is capable of reaching out of the cell on all sides and can thus be used with three microone systems! Consequently, roughly 1.8 square metres of valuable floor space is all that's required in order to automate a single microone, or roughly 6.5 square metres with a maximised layout for three microone systems.





Automation

Modular, Flexible, Compact

As a rule, the automation module is used as a feed and removal unit. Several feed technology variants are available to this end. As an alternative, or as a supplement to this type of use, it's also possible to incorporate other manufacturing processes and to link up other modules instead of additional microone systems.



Example of a workpiece carrier



ZOLU WICLO

Automation

Everything from a Single Source

- No coordination and scheduling problems we automate and equip your new machining centre in accordance with your requirements.
- Special solutions are our strength.
- Turnkey projects or minor requests we're open for everything.
- No external suppliers.

During development of the microone, careful attention was already given to getting everything ready for future automation. 30 years of experience in the field of special machinery manufacturing at Zorn Maschinenbau GmbH has clearly made an impact in this regard. A great wealth of experience is available, especially where the handling of small parts is involved.



Laser processing

Cutting or welding with all degrees of freedom of a moder processing center in the smallest space with the highest precision.

The parts feed, placement and / or also visual component measurement can be integrated according to your requirements.





Options

Complete Packages

Corresponding modification of the machine is an important part of the ideal automation solution – with precise matching to the materials to be machined. Whether blast air fed through the centre of the spindle in order to clean the clamping device or an exhaust system for the machine is involved, you get a complete solution. If flammable materials will be machined, we can also provide a suitable fire extinguishing system. We work with specialists from the respective industry sector to this end.



Installed extinguisher with suction system





Control Technology

CAD / CAM supported



hyperMILL[®] is a modular, flexible CAM solution which integrates strategies for 2.5D, 3D and 5-axis milling, as well as mill/turning and machining operations such as HSC and HPC, into a single interface. hyperMILL[®] makes numerous high-performance 5-axis strategies available for micro-machining.

OPEN MIND Technologies AG is one of the world's most in-demand suppliers of powerful CAM solutions for machine and controller-independent programming. The company develops ideally matched CAM systems with high levels of unique innovation for significantly improved performance – for programming as well as for machining.



hyperDENT[®] is the world's leading software system in the dental CAM market and is particularly appreciated in expert circles due to its modular product structure. Our customers receive specific CAM solutions, which exactly match the respective field of use and application. Irrespective of the company's size, FOLLOW-ME! offers the appropriate hyperDENT[®] product bundles for milling centers, as well as for dental and practice laboratories for a perfect interaction between CAM and machines.



Sinumerik 840D sl – a Perfect Match for the microone!

The Siemens premium class drive-based CNC controller supports the microone machine concept with maximum performance.

The Sinumerik supports flexibility and open structures, as well as the use of technologies for multi-tasking concepts.

5-axis simultaneous machining with optimised kinematics opens the door to a great variety of parts machining applications.





zorn micro^{one}

Technical Data

Dimensions / Footprint		
microone (standalone)		1100 x 770 x 2040 mm (W×D×H)
Transport dimensions		1170 x 775 x 2040 mm (W×D×H)
Weight		Approx. 1250 kg
microone machining module		1100 x 770 x 1050 mm (W×D×H)
Machining module weight		Approx. 850 kg
microone supply module		1100 x 770 x 990 mm (W×D×H)
Supply module weight		Approx. 400 kg
Ergonomics		
Worktable height		1360 mm
Clearance from both sides to the workpiece		Approx. 300 mm
Electrical System / Pneumatics		
Electrical system	Supply power	3 x 400 V AC
	Connected load	6.0 KVA
Pneumatics	Compressed air supply	Min. 5.5 bar
Axis Travel		
X-axis	Linear drive	190 mm
Y-axis	Linear drive	140 mm
Z-axis	Spindle drive	170 mm
Optional B-axis	Torque with clamping	+110/-10°
Optional C-axis	Torque with clamping	360°
Rapid Traversing Axes		
X / Y / Z-axis		30 metres per minuten
Optional B-axis		130 RPM
Optional C-axis		1300 RPM
Axis Acceleration		
X / Y / Z-axis		5 m/s ²
Axis Feed Force		
X / Y / Z-axis		550 Nm
Optional B-axis		7.5 Nm
Optional C-axis		2.5 Nm
Axis Positioning Accuracy per VDI /	DGQ 3441	
Direct measurement systems in all axes	with the highest precision	
Workpiece Size / Clamping Surface		
Max. diameter		100 mm
Max. height including clamping medium		80 mm
Max. weight including clamping medium		1.0 kg
Controller		
Siemens		840 D sl

Main Spindle Type: Class C 62 VA33		
Max. speed	75,000 RPM	
Collet chuck diameter	3 / 4 / 6 mm	
Max. torque, S1	0.16 Nm	
Power, S1	1.0 KW	

Water Cooling Unit for Main Spindle and Axis Drives

Tool Changer

Number of tools	12
Diameter	6 mm depending on spindle
Max. workpiece length	50 mm
Tool balancing quality	DIN ISO 1940, quality class G 2.5
Special tool shank with retaining slot	See specification
Tool changing time	< 3 seconds
-	
Options	

hypermill[®]

CAD/CAM

	hyperdent®	
	SprutCAM	
Minimum lubrication		
Exhaust units		
Central lubrication		
Workpiece measurement		
Laser tool measurement		
Tool magazine		
Extinguishing system		U U U
Blast air, spindle centre		
Laser		ć
Bar feeder		
Automation		- Joe



Why our strength becomes apparent in the details ...

Our team of highly motivated employees and a network of creative partners have been implementing standard solutions as well as individualised projects in accordance with customer specifications for decades.

The machinery manufacturing division evolved from the production equipment fabrication department of an incandescent filament lamp factory. All of the fixtures and machines required for the production of precision miniature incandescent lamps were developed and manufactured in-house over a period of decades. Initial systems used for the processing of glass and wire were followed by many other special machines for precision engineering assembly tasks. Today as well, wire in a wide variety of formats is routinely processed with our systems. This includes feeding as well as assembly and further processing of small and miniature parts, for example by means of bending, riveting, swaging, soldering, welding, labelling and much more.

Industrial production has changed significantly during the last 25 years. Companies are required to manufacture and assemble their products inexpensively, even if the quantities make this problematic at times. Flexible, reusable and of a very high quality: this can and must be the answer in response to this requirement. Critical processes must also be automated in order to assure more reliability in production, combined with manual procedures where necessary.

Zorn Maschinenbau GmbH has aligned itself to these tasks and offers solutions which are specifically matched to the customer's product. Zorn Maschinenbau GmbH employs roughly 35 persons and has been a member of the inpotron Schaltnetzteile GmbH group since 2013.

In order to provide our customers with even more comprehensive support, the micoone was developed as a miniature machining centre which can be used as a stand-alone version, or as an individual module on our assembly systems. As a result, machining in combination with one of our assembly machines is made possible for the first time.

zorn micro^{one}







inpotron Group

inpotron Schaltnetzteile GmbH

Hebelsteinstraße 5 78247 Hilzingen, Germany T +49 7731 9757-0 F +49 7731 9757-10 info@inpotron.com www.inpotron.com

Your specialist for the development and production of customer-specific switched-mode power supplies and power supply solutions.

exscitron

exscitron GmbH

Uhlichstraße 13 09112 Chemnitz, Germany T +49 371 355860-10 F +49 371 355860-20 info@exscitron.com www.exscitron.com

ZORN Maschinenbau

A subsidiary of inpotron Schaltnetzteile GmbH

ZORN Maschinenbau GmbH Höllstraße 11 78333 Stockach T +49(0)7771-87373-0 F +49(0)7771-87373-290 zorn@zorn-maschinenbau.com www.zorn-maschinenbau.com

Revision level: 09/2019

