

ULTRASONIC 10

ULTRASONIC 30 *linear*

ULTRASONIC Integration
in DMG MORI Machines

Technology leader in the machining of advanced materials

ULTRASONIC Series



ULTRASONIC Series

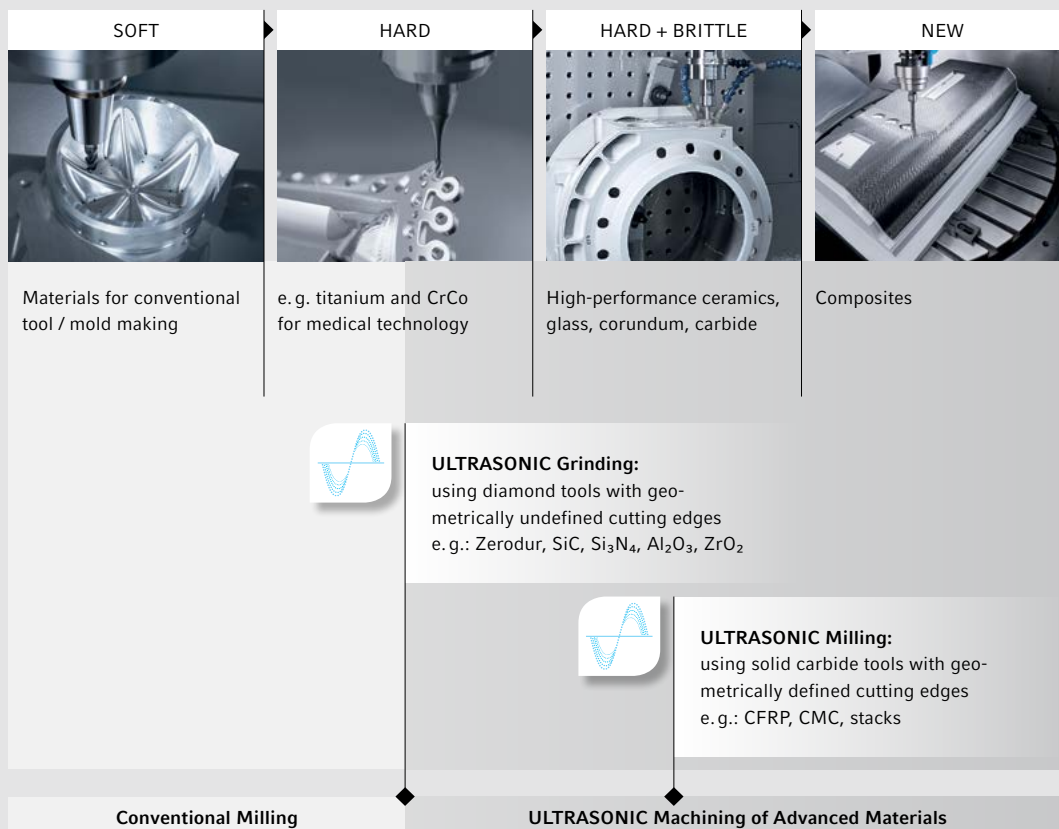
With Ultrasonic into the Future.

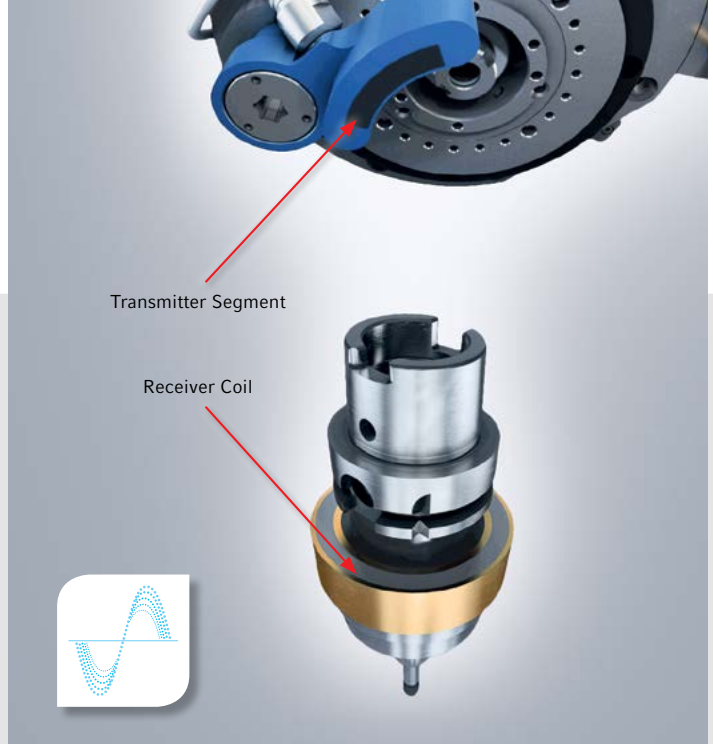
ULTRASONIC represents a pioneering technology for the production of complex geometries in high-tech materials. It has applications in almost every industry and is growing in demand. Due to the kinematic overlapping of the tool rotation with an additional oscillation, high-performance materials, which are normally difficult to machine, can be economically processed with the highest quality. The low process forces allow the production of slim bases and result in longer tool life and significantly reduced micro-cracks in the material. Depending on the material properties, outstanding surface finishes of $Ra < 0.000004$ in. can be achieved.

Thanks to the flexible integration of the ULTRASONIC HSK actuator system, ULTRASONIC and (HSC) milling can be combined on one machine. This allows operators to machine an unrivaled wide range of materials.

02

All-in-one: ULTRASONIC and 5-axis Milling





When changing to the HSK tool holder, an inductive transmission of the ULTRASONIC frequency from the fixed transmitter segment on the spindle nose to the rotating coil on the HSK holder takes place.

ULTRASONIC Target Market



Optical Industry

- + Zerodur
- + Optical glass
- + Quartz glass



Watch Industry / Precision Engineering

- + Zirconium oxide
- + Sapphire, ruby



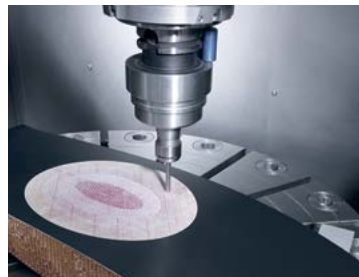
High-Performance Ceramics

- + Oxide ceramics
- + SiC, Si₃N₄



Medical Technology

- + Hipped zirconium oxide
- + Foamed materials



Composites

- + CFRP, GFRP, AFRP
- + CMC
- + Stacks

ULTRASONIC Series

Flexible ULTRASONIC integration in 5-axis milling centers from DMG MORI.

The demand for new technology solutions and economical machining procedures for challenging advanced materials is growing in all high-tech industries. This is where SAUER is well positioned to further ULTRASONIC technology through their technical expertise in ultrasound-supported hard machining of advanced materials with a universal range of products and intelligent software tools. Based on a HSK-32 / -40 / -63 / -100 tool holder, the patented ULTRASONIC actuator system can be integrated flexibly into almost all 5-axis milling centers from DMG MORI.

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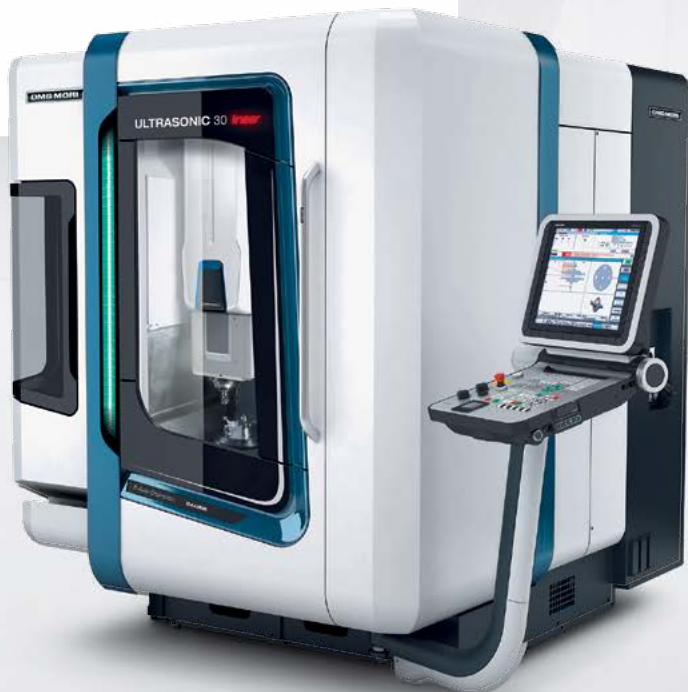
The most compact 5-axis machine from DMG MORI

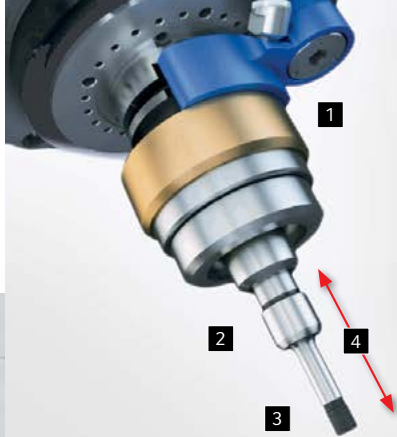
+ ULTRASONIC 10



High-precision machine with comprehensive temperature management

+ ULTRASONIC 30 linear





- Inductive Interface
- ER Interface
- Diamond Tool
- ULTRASONIC Oscillation

Operating Principle

The standard tool rotation is superimposed via the HSK-32 / -40 / -63 / -100 interface of the ULTRASONIC actuator tool holder with an additional oscillation in the axial direction (piezoelectric effect).

ULTRASONIC operating principle / benefits



Best Surface Finishes

$Ra < 0.000004$ in.
(depending on material characteristics)



Self-sharpening Effect

Micro-chipping of the diamond grains on the tool cutting edge



Process Forces

Reduced process forces and temperatures



Tool Service Life

Up to 2x longer tool life



Particle Rinsing

Improved particle rinsing in the active zone



Removal Rates

Higher removal rates compared to conventional machining

Flexible Integration in DMG MORI Machines

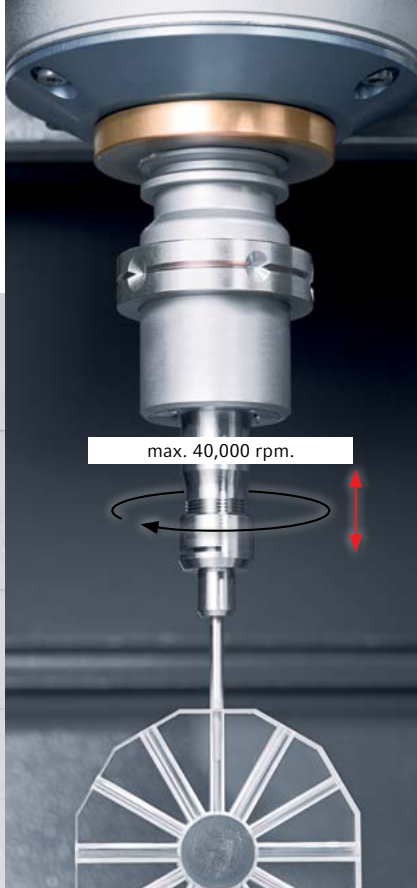
- + Universal
- + eVo linear

- + monoBLOCK®
- + duoBLOCK®

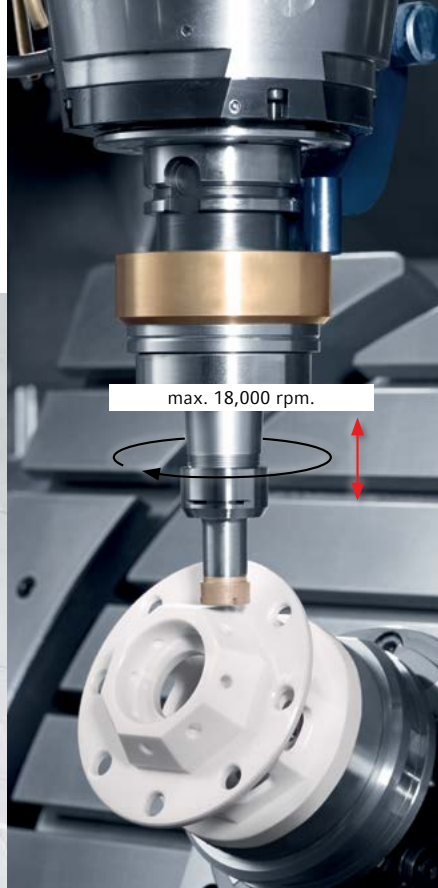
COMPOSITES

- + ULTRASONIC 85
- + ULTRASONIC 260
- + ULTRASONIC 360

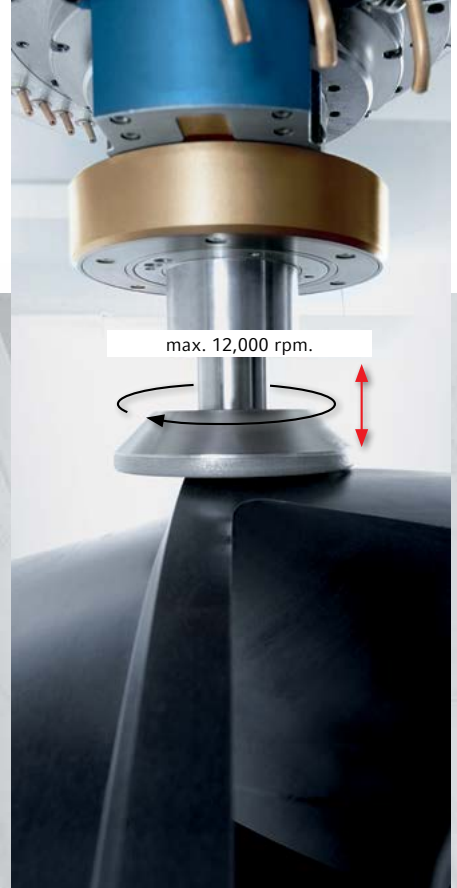




ULTRASONIC
HSK-32 / -40 actuator system



ULTRASONIC
HSK-63 actuator system

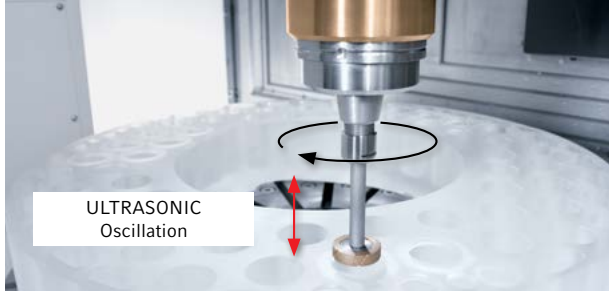


ULTRASONIC
HSK-100 actuator system

ULTRASONIC HSK Actuator Systems

		ULTRASONIC HSK-32 / -40 actuator system	ULTRASONIC HSK-63 actuator system	ULTRASONIC HSK-100 actuator system
Machine Types				
		ULTRASONIC 10 (HSK-32)	ULTRASONIC Universal	ULTRASONIC P / FD duoBLOCK®
		ULTRASONIC 20 (HSK-32 / -40)	ULTRASONIC eVo <i>linear</i>	–
		ULTRASONIC 30 (HSK-40)	ULTRASONIC monoBLOCK®	–
		–	ULTRASONIC duoBLOCK®	–
Milling				
Maximum speed	rpm.	40,000	24,000	12,000
ULTRASONIC				
Maximum speed	rpm.	10,000	8,000	8,000
		40,000*	18,000*	12,000*
Tool Interfaces				
		ER 11 / 16	ER 11 / 16 / 20 / 25	ER 16 / 20 / 25
		14 H 6	20 H 7	20 H 7
easySONIC Control				
		•	•	•

• Available, * In conjunction with "Gold Edition" actuator

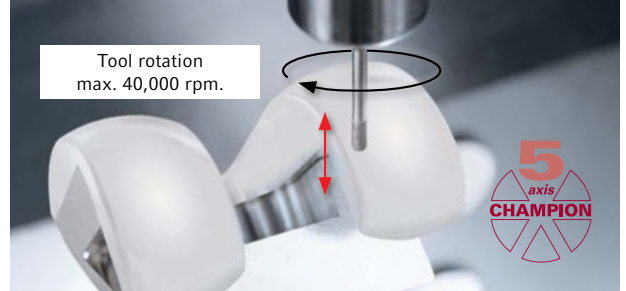


ULTRASONIC
Oscillation

ULTRASONIC-HSK 4th Generation

Actuator System

Flexible integration in 5-axis milling centers from DMG MORI (depending on machine type: HSK-32 / -40 / -63 / -100 tool holder).



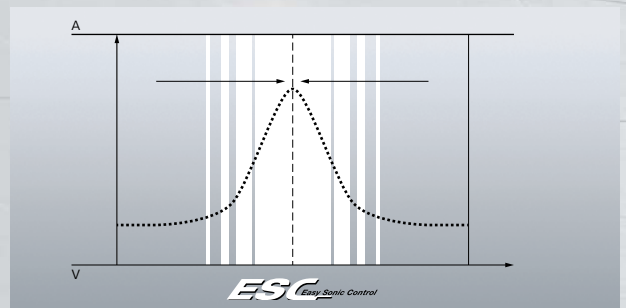
5-axis Machine Version

All machines available as a 5-axis version for the ULTRASONIC and (HSC) milling of complex component geometries on one machine.



Powerful Control System

Uniform control philosophy with 3D contouring control system SINUMERIK 840D solutionline as well as special ULTRASONIC software features.



Special ULTRASONIC Software Features

Adaptive Control (ADC) for automatic feed adaptation during the machining process as well as easySONIC Control for automatic frequency recognition.



Integrated Grinding Package

Grinding packages, specifically designed for ULTRASONIC machining. duoBLOCK® Series machines: Optional with mill-turn (FD) technology for demanding cylindrical grinding operations.



Highly Efficient Coolant Treatment

Toolsmart is a highly compact coolant treatment system, conceptualized for ULTRASONIC machining. Core modules are cooling and temperature control, dosage, filtration and separation.

ULTRASONIC 10

The most compact machining center from DMG MORI with a footprint of only 21.5 ft.²

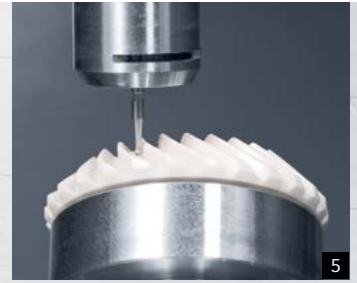
The ULTRASONIC 10, with a highly compact footprint of only 21.5 ft.² offers unique opportunities for the medical / dental industry – from the small laboratory to a large milling center – for the production of all implant / prosthetics requirements with all materials. With this 5-axis CNC milling center, SAUER serves the demand for the best possible utilization of production space. In addition, comparable applications of the ULTRASONIC 10 can be found in other markets, including the watch industry, precision engineering and tool and mold making.



Highlights

- + Highly compact 5-axis precision machine with a footprint of only 21.5 ft.² for milling and ULTRASONIC grinding on one machine
- + High-performance spindle with 40,000 rpm. (standard)
- + Integrated swivel rotary table (4th / 5th axis comes standard) with torque technology, -10° / +120° swivel range
- + 16× tool changer comes standard (60× chain magazine)*
- + Standardized automation solutions
- + User-friendly Siemens 840D solutionline CNC control system with easySONIC Control (comes standard)

* Optional



1

2

3

4

5

- 1: Work area of the ULTRASONIC 10 with integrated NC swivel rotary table
- 2: Laser tool measurement and automatic tool changer
- 3: Compact, inherently rigid mineral cast frame in the monoBLOCK® design
- 4: Complete machining of glass components in < 10 minutes
- 5: Precision machining of a gear made of hiped zirconium oxide



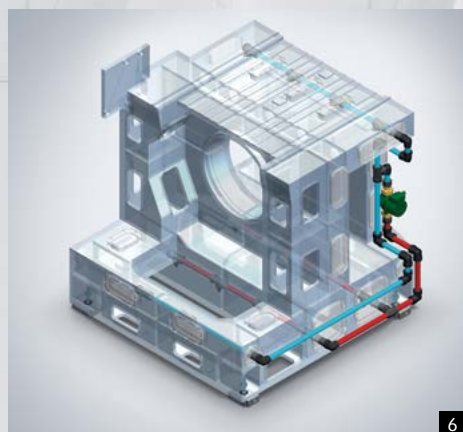
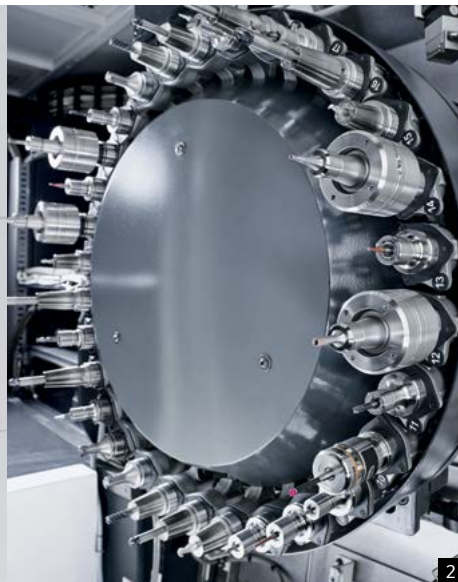
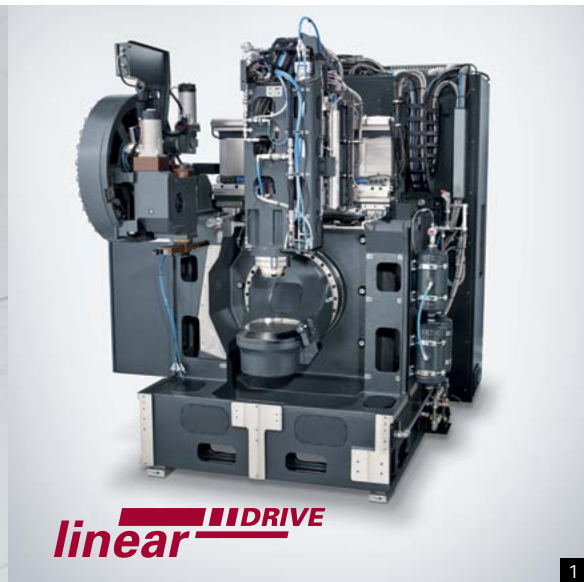
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- 6: Depositing a pallet in the rotary storage (example: dental)
- 7: Inserting a pallet in the work area (example: dental)

PH 2 | 120 Linear Magazine

- + Compact, integrated linear magazine
- + Loading / unloading of raw material and finished parts during machining
- + Unmanned production in multiple shifts
- + Separation of parts in the finished part storage
- + Automation can be flexibly configured (5 options)
- + Job management system for easy order management



- 1: High-precision, long-term stable gantry design with linear drives in X / Y / Z
- 2: 30× tool magazine with a double gripper comes standard (optional: 60× / 120×)
- 3: 5-axis precision machining of watch components made of zirconium oxide and sapphire
- 4: Complete machining of high-precision optical components
- 5: NC swivel rotary table with torque technology and $\pm 120^\circ$ swivel range (B-axis)
- 6: Temperature control of all precision-related machine components

Highlights

- + High-precision, long-term stable gantry design (dual drive in the Y-axis) with comprehensive temperature management: temperature control of the machine bed, all drives and guides, the switching cabinet as well as all media, with constant temperature monitoring
- + Highly dynamic, actively cooled linear drives in X, Y, Z with up to $> 1.2g$ and $1,968.5 \text{ ipm}$ rapid traverse
- + Flexible 5-axis simultaneous machining with swivel rotary table with optimal swivel range of $\pm 120^\circ$ in the B-axis
- + 25.5 hp. motor spindle with shaft cooling and rotary feed-through with HSK-E40 and 40,000 rpm. (standard)
- + 30× tool magazine with double gripper (optional: 60 / 120 tools, chain magazine)
- + Standardized automation solutions for an efficient production process in multi-shift operation
- + 3D control system Siemens 840D solutionline with Operate 4.5 and DMG ERGOline® Control*

* As of 2014 / 2015 available with CELOS

ULTRASONIC 30 *linear*

Maximum contour accuracy and surface quality of $Ra < 0.000004$ in. for advanced materials.

With its high-precision, long-term stable gantry construction and comprehensive temperature control of all precision-related machine components, the ULTRASONIC 30 *linear* offers new options for 5-axis precision machining of advanced materials. The application focus is on dimensional accuracy, contour accuracy and surface quality of $Ra < 0.000004$ in. for ULTRASONIC grinding of complex geometries in high-performance materials for the optical / watch / medical industries as well as precision mold making. The highly dynamic, actively cooled linear drives in X, Y, Z with up to > 1.2 g. acceleration and 1,968.5 ipm. rapid traverse, 40,000 rpm. (standard) as well as the optimal swivel range of $\pm 120^\circ$ in the B-axis, underpin the outstanding performance of this innovation.

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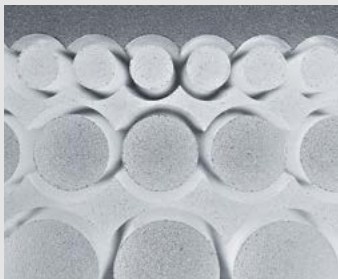


linear **II DRIVE**

Optical Industry

Under the magnifying glass – perfect results for the optical industry.

The application areas of the ULTRASONIC technology for optical industry are broad. High-precision deep hole drilling, demanding component geometries in glass, mirror supports with thin-walled light weight structures of Zerodur or rod lenses of corundum for scanner systems and endoscopy are typical applications. In this way, the ULTRASONIC Series has already advanced into the fields of projection and measurement optics, satellite construction, the manufacture of optical leveling systems and other technical and scientific application fields. The manufacture of pressing tools / molds made of carbides and ceramics rounds off the application field of the ULTRASONIC in this industry.



ULTRASONIC Benefits

- + Reduced process forces result in less sub-surface damaging
- + Feasibility of thin walls with < 0.2 in. thickness
- + Excellent surface quality with $Ra < 0.000004$ in. possible
- + Feasibility of deep hole drilling of up to 1.0 in. $\times \varnothing$
- + Everything on one machine: drilling, grinding of pockets and grooves, surface contours

ULTRASONIC Machining Strategies



■ ULTRASONIC Drilling

with longitudinal
movement kinematics



■ ULTRASONIC Grinding

of a pocket with undercut
with cross-side vibration



■ ULTRASONIC Face Grinding

with tilted cup grinding wheel
with cross-side vibration

Application Examples



ULTRASONIC 100 P duoBLOCK®

Complete machining of light weight structures for mirror supports of Zerodur

Industry	Satellite construction / telescopes
Material	Zerodur (glass ceramics)
Tools	Diverse diamond drill / grinding tools
Machining	Grinding of pockets with undercuts and thin walls (light weight structures)



ULTRASONIC 20 linear

Deep hole drilling in glass

Industry	Optics
Material	BK-7 (optical glass)
Tools	1 hollow drill
Machining	Through-hole drilling ø 0.2 x 0.9 in. in 19 seconds per drill hole



ULTRASONIC 50-5 linear

Filigree contour with radial drilling in glass

Industry	Optics
Material	BK-7 (optical glass)
Tools	3 (diamond hollow drill / grinding pins)
Machining	Complete machining in 17 machining steps in 70 minutes



ULTRASONIC 50

Thin walls with a thickness of < 0.02 in. in glass

Industry	Optics
Material	Zerodur (optical glass)
Tools	5 (diamond hollow drill / grinding pins)
Machining	Feasibility of threads and thin walls with thickness < 0.02 in.



Optical Industry

Mirror mounts with thin-walled webs and other complex geometries in Zerodur, high precision deep hole drilling in gyroscopes or rod lenses of corundum / optical glass for scanner systems / endoscopy are typical ULTRASONIC applications. In this way the ULTRASONIC Series has successfully entered the fields of projection and measurement optics, satellite construction and optical component manufacturing.

Applications and Parts

Machine and Technology

Application Areas

• High Performance Ceramics

Control Technology

Application Technology

Technical Data

High Performance Ceramics

The demand for longer tool life, increased productivity and component quality makes the use of advanced materials unavoidable. Ceramic high-performance materials, like SiC, silicon nitride (Si_3N_4) or hiped zirconium oxide (hip-ZrO_2) as well as the demand for ever more complex geometrical shapes, require high performance and economical machining procedures. This is exactly where ULTRASONIC technology offers a competitive advantage.



Universal, wear-resistant and durable.

Where conventional materials quickly reach their limits, everywhere where extreme strains due to chemicals, high temperatures, friction forces or electricity are present, even within the human body – this is where the wear-resistant and durable products made from technical ceramics find application. The application fields reach from ceramics components for pumps / valve parts, the textile industry, the semi-conductor / automotive / aerospace industry up to everyday consumer goods.

If highest demands are placed on shape contours, materials and surface structure, the ULTRASONIC Series is exactly the right solution for you. Especially when quality may not be at the expense of production costs, or when complex shapes must be created by means of grinding, drilling or milling in the shortest period of time.



ULTRASONIC Benefits

- + Economic, shaping hard machining of sintered, even hipped ceramics – also of difficult to machine non-oxide ceramics like SiC, Si₃N₄
- + Excellent surface quality of Ra < 0.000008 in. is possible (depending on the ceramic grit) for direct machining or finishing of pre-sintered ceramic components
- + Feasibility of free form surfaces
- + Universally applicable for the most diverse machining tasks from drilling to complex geometries

Watch industry / precision engineering


Symbiosis of precision, functionality and aesthetics.

Watch housings, bezels and crowns made of black, scratch-resistant zirconium oxide, dials made of ceramics or mother-of-pearl, as much as the watch components made of sapphire, ruby or glass ceramics, have already been established in the manufacturing scope of luxury watches. Besides the numerous positive, material characteristics, these high performance materials excel with aesthetics, functionality and long service life. This is exactly where the ULTRASONIC 10 as well as the new 5-axis precision machine ULTRASONIC 30 *linear* excel with many machine features like precision, dynamics, stability and flexibility.



ULTRASONIC Benefits

- + High-quality ULTRASONIC precision machining of black zirconium oxide, sapphire and glass ceramics: creating miniature drill holes, grooves, pockets and free form surfaces
- + All-in-one: The technology combination of ULTRASONIC and high-speed cutting, with up to 40,000 rpm. on a 5-axis precision machine, allows the machining of all watch component materials
- + Standardized automation solutions with highly compact linear magazine handling
- + Surface quality $Ra < 0.000008$ in. and component precision < 0.0004 in. possible



Watch industry / precision engineering

The use of the innovative ULTRASONIC technology for watch components made of zirconium oxide, sapphire or glass ceramics is crucial. Numerous renowned manufacturers of luxury watches manufacture intricate components on ULTRASONIC machines from DMG MORI.

Medical Technology

Hardly any other industry continuously shows growth like medical technology, especially in the sector of orthopedic implants. Precision and surface quality are probably the most important component criteria for this industry. The new ULTRASONIC 30 *linear* 5-axis precision machine is well suited for this industry and can even machine PMMA through titanium up to hipped zirconium oxide.



Progress for health – better implants for healthier patients.

Extreme precision and achievement of defined surfaces in the machining of advanced materials is an important prerequisite for the manufacture of medical products. High performance materials are not only used in the manufacture of orthopedic and dental implants, but also in magnetic resonance tomography, X-ray technology and in the manufacture of medical equipment.

As a result of the low process forces of ULTRASONIC machining, deep material damage is avoided and the open pore structure of specific implant materials is guaranteed.



ULTRASONIC Benefits

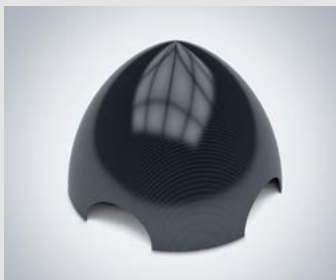
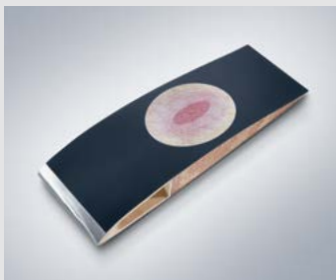
- + Unrivalled wide spectrum of materials, from PE – through titanium – up to hipcoated zirconium oxide: all dental and medical applications in all materials
- + Highest contour and fit accuracy as well as excellent surface quality of $Ra < 0.000008$ in.
- + Reduced process forces for less deep material damage as well as retention of the open pore structure
- + Universally applicable for the most diverse machining tasks from drilling to complex free forms

Composites / fiber composites

Double feeds and reduced process forces thanks to ULTRASONIC.

Fiber composites are ideally suited for the production of lightweight components, due to their high strength and minimal weight. The use of CFRP and GFRP in civil aviation continues to grow and all premium manufacturers in the automotive industry produce important structural components out of fiber reinforced plastics. Even in the field of wind energy, all aerodynamic components today are made of composite materials. In addition to the actual production applications, there is also an ever-growing demand for automated, economical machining options for maintenance and repair (repair & rework) of damaged fiber composite components.

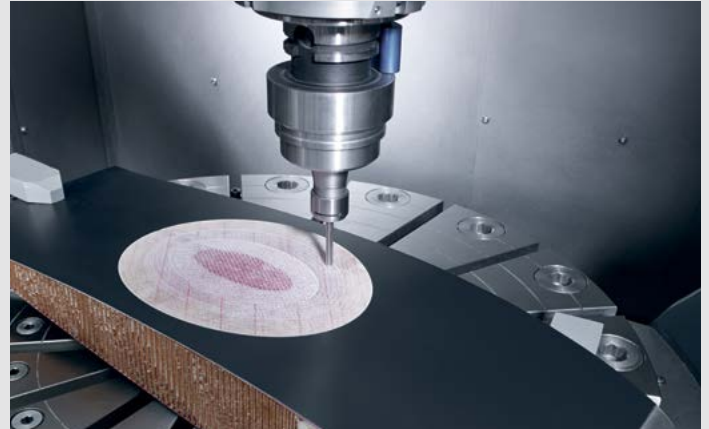
In both cases, the use of ULTRASONIC technology along with SAUER's comprehensive process approach, offers a breakthrough solution for very efficient machining of these high-performance materials with optimal component quality.



ULTRASONIC Benefits

- + Up to 40 % reduced process forces to prevent delamination and fiber tearing
- + Double feeds possible through ULTRASONIC
- + Longer tool life by preventing built-up edges
- + Optimal particle removal from the active zone
- + Excellent component quality: sharp edges, clean exposure of individual laminate layers, perfect surfaces

Two segments: Serial production and repair & rework



Serial production

Trimming and drilling of CFRP / GFRP / AFRP components in serial production

- + Trimming with optimal surface quality without chipping or chatter marks for the subsequent joining process
- + Creation of drill holes or rivet holes with the best possible surface finishes, diameter tolerances in the in. range as well as reduced chipping on the drill entry and exit side
- + Feasibility of through-hole and blind hole drilling, threads, grooves, pockets and other geometric free forms
- + Full cut machining without fiber tearing or delamination

Repair & rework

Scarfig by means of accurate exposure of individual laminate layers

- + Full cut scarfig without fiber tearing or delamination
- + Reverse engineering: Integrated laser scanner for surface recognition, feedback and measuring
- + Integrated atmospheric pressure plasma: Surface activation / cleaning for optimal preparation for subsequent reconstruction processes
- + Stationary as well as mobile (special request) possible

Machine adaptation and process optimization



Basic Machine Design

- + Rigid and thermo-symmetrical machine design for maximum precision during continuous operation
- + All drives and guides (except for the Y-axis) are encapsulated outside of the machining area
- + Specially adapted COMPOSITE milling spindle with permanent grease lubrication with 18,000 rpm. (24,000 / 35,000 rpm.)*

* Option



5-axis and device design

- + Integrated technology framework: Dynamic machining through the gantry drive in the A-axis combined with a B-axis swivel head (5-axis machining)
- + Weight-optimized device design: Simple, ergonomic loading through vacuum clamping and a rotating device




Extraction design

- + Enclosed work area ideally suited for integrated extraction
- + High-performance extraction unit with integrated fine dust monitoring, as well as heat recirculation
- + Explosion-proof filter system with stable filter performance



Tool design

- + Optimal tool design: Use of very abrasive and viscous materials; different materials in the core and outer layers
- + Tool change on demand: the self-teaching system monitors the process even for varying process forces (integration in HMI of the control system)



Composites / fiber composites

ULTRASONIC starts where conventional machining processes reach their technical limits: double feeds, clean edges, no fiber tearing or delamination, optimal surfaces, prevention of build-up edges and a comprehensive extraction concept with fine dust monitoring – these are only the most obvious highlights of this technology innovation.

ULTRASONIC Series

Advanced CNC control technology for perfect ULTRASONIC performance.

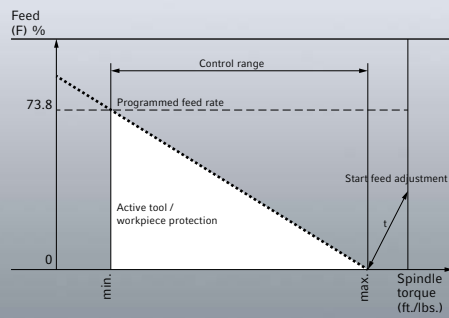
All machines* of the ULTRASONIC generation are equipped with the DMG ERGOline® Control featuring a 19" screen and are available with the Siemens 840D solutionline. Special ULTRASONIC software tools such as ADC and easySONIC support user-friendly and target-oriented ULTRASONIC machining and have a direct impact on workpiece quality and process safety.

* Except for: ULTRASONIC 10 with SLIMline® panel and 15" screen



Siemens 840D solutionline

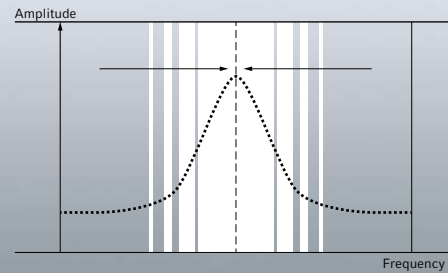
- | | |
|---|---|
| ■ Screen angle:
continuously adjustable
from 5–30° | ■ Keyboard angle:
continuously adjustable
from 15–70° |
| ■ Screen surface:
easy to clean, flat
screen surface | ■ DMG SMARTkey®
with transponder:
customized authorization
of users with relevant
access rights to the control
and machine |
| ■ DMG SOFTkeys®:
programmable hotkeys
for frequently used
screen selections or
operational sequences | |



ADC Adaptive Control

ADC – Adaptive Control

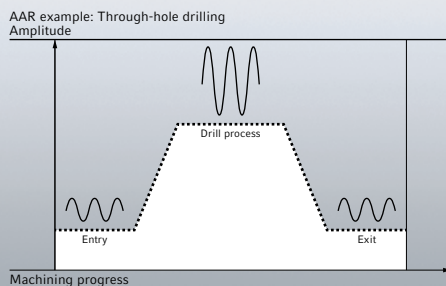
- + Automatic feed adaptation during the machining process
- + Control variable: Spindle torque in ft./lbs.
- + Definition of a minimum value and a maximum value: If the max. value is exceeded the feed is automatically reduced and damage to the workpiece or the tool is thereby prevented
- + Standard for all ULTRASONIC machines



ESC Easy Sonic Control

easySONIC-Control

- + Automatic ULTRASONIC frequency recognition for all ULTRASONIC-HSK actuators of the 4th generation (automatic scan to determine the resonance frequency / optimal operating frequency)
- + No action by the machine operator required, uniform interface for the operator, irrespective of machine type
- + Simplified operator interface clearly shows the essential functions and parameters
- + Standard for 4th generation (optionally available as retro-fit kit)



AAR Automatic Amplitude Regulation

AAR – Automatic Amplitude Regulation

- + Integration of a special amplitude cycle in the CNC program (allows the utilization of different amplitudes within a specific machining task)
- + Optionally available for all ULTRASONIC machines



Upgrade to high speed actuators

- + Upgrade of your installed ULTRASONIC machine to the latest, performance-optimized high speed actuators
- + Higher cutting speed thanks to higher tool speed:
 - max. 40,000 rpm. with HSK-E32, HSK-E40
 - max. 18,000 rpm. with HSK-A63
 - max. 12,000 rpm. with HSK-A100

ULTRASONIC

Creation of complex geometries
in advanced materials

The reduced process forces due to the use of ULTRASONIC technology allow the manufacture of thin-walled webs and other complex geometries in demanding technical components of Zerodur and high-performance ceramics. Depending on the condition of the material, surface qualities of $Ra < 0.000008$ in. can be achieved.





1: View of the
ULTRASONIC showroom
2: SAUER ULTRASONIC
in Stipshausen, Germany
3+4: ULTRASONIC
technology seminars
in the showroom



ULTRASONIC excellence

- + More than 30 years experience in machining hard-brittle and difficult to machine materials
- + More than 400 installed ULTRASONIC machines (worldwide)
- + Strong, competent team of application engineers
- + Feasibility studies, process development / optimization, complete turn-key solutions

ULTRASONIC Series

Expert advantage in ULTRASONIC machining of advanced materials.

Take advantage of the technical expertise of our competent team of application engineers and the numerous unique selling points of the ULTRASONIC Series – visit SAUER ULTRASONIC in Stipshausen, Germany. Besides the actual production of machines, SAUER supports its customers with feasibility studies, process optimization and turn-key technology solutions by SAUER's development and application department. In addition, SAUER regularly organizes ULTRASONIC technology seminars for customers and interested parties on the demonstration machines in a modern ULTRASONIC showroom.



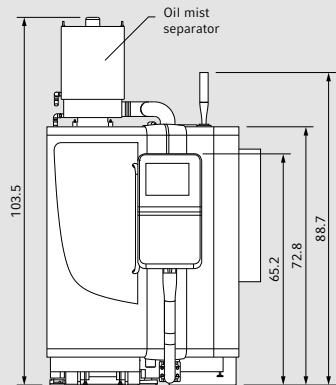
5: The SAUER LASERTEC location in Pfronten, Germany represents itself with 5-axis laser machining machines in the four technology fields Shape (3D machining, texturing), PrecisionTool (PCD / CVD-D / CBN precision tools), FineCutting (3D fine cutting parts) and PowerDrill (turbine components).

ULTRASONIC Series

Floor plans

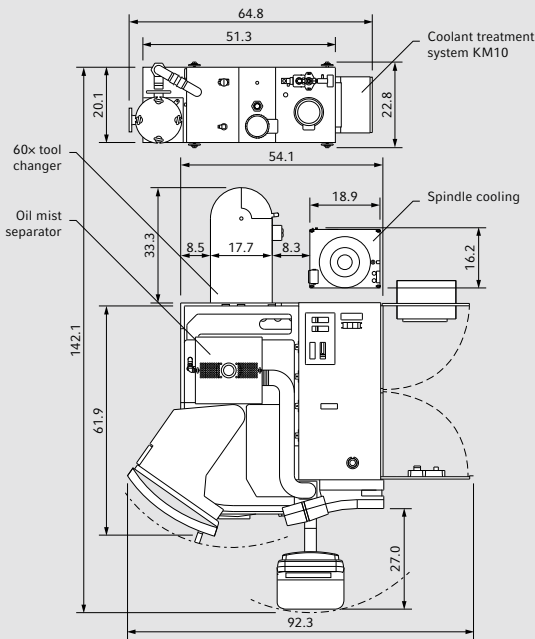
Floor plan for ULTRASONIC 10

Front view



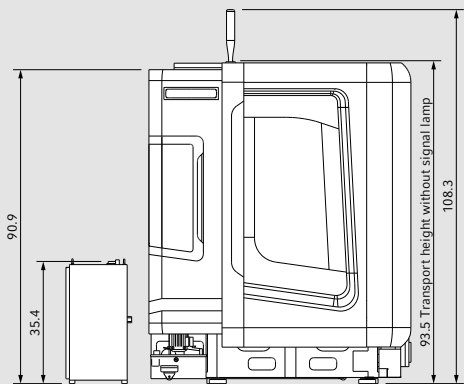
Presentation of floor plans with optional swivel rotary table, 60x tool changer and oil mist separator

Top view



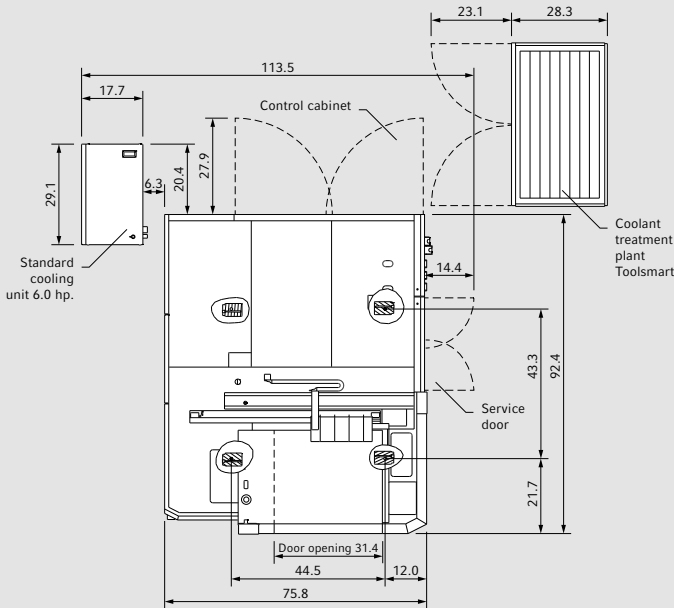
Floor plan for ULTRASONIC 30 linear

Front view



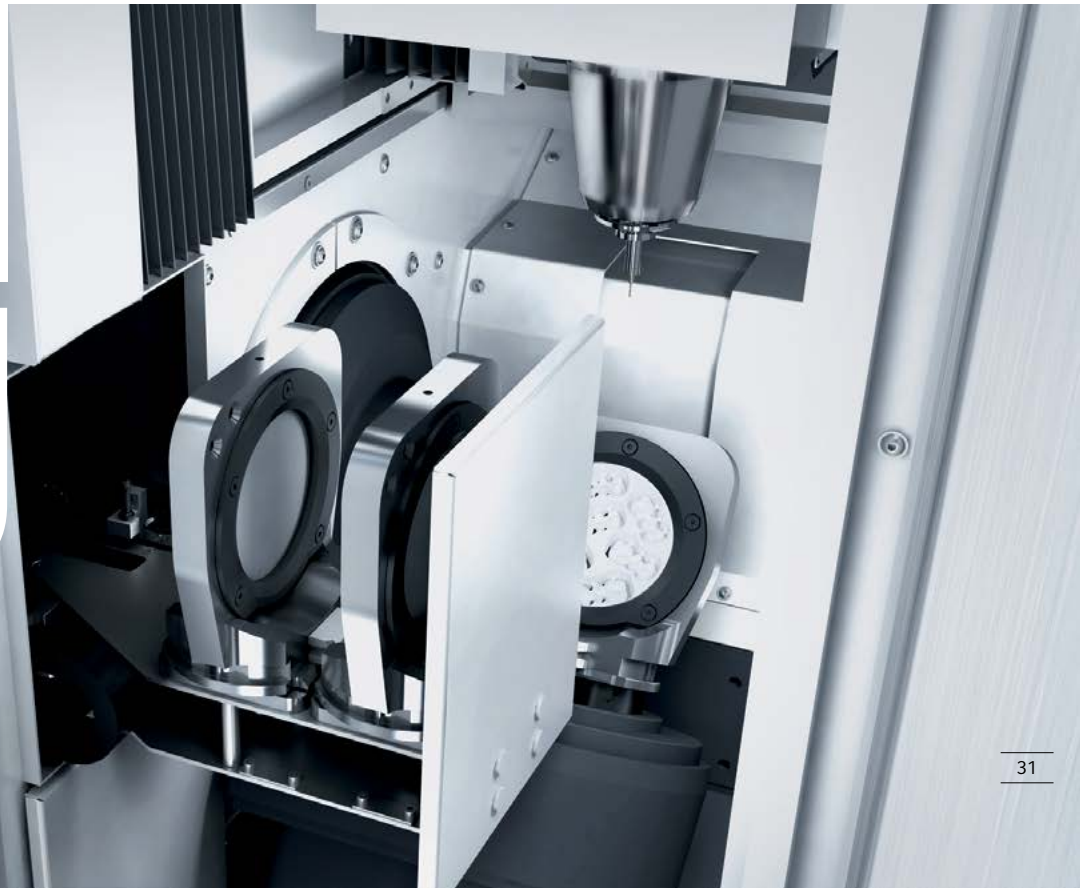
Presentation of floor plans with optional swivel rotary table

Top view



Standardized automation solutions

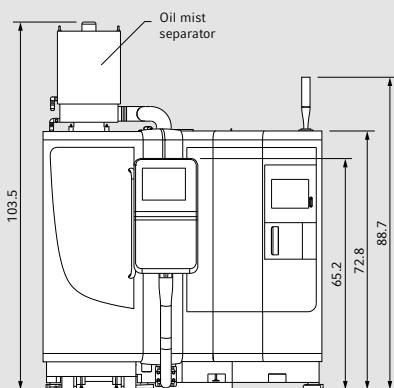
Besides the PH 21120 linear magazine, the ULTRASONIC 10 is optionally available with an integrated 4x pallet handling system. All other ULTRASONIC machines are available with standardized automation solutions (pallet or workpiece handling systems).



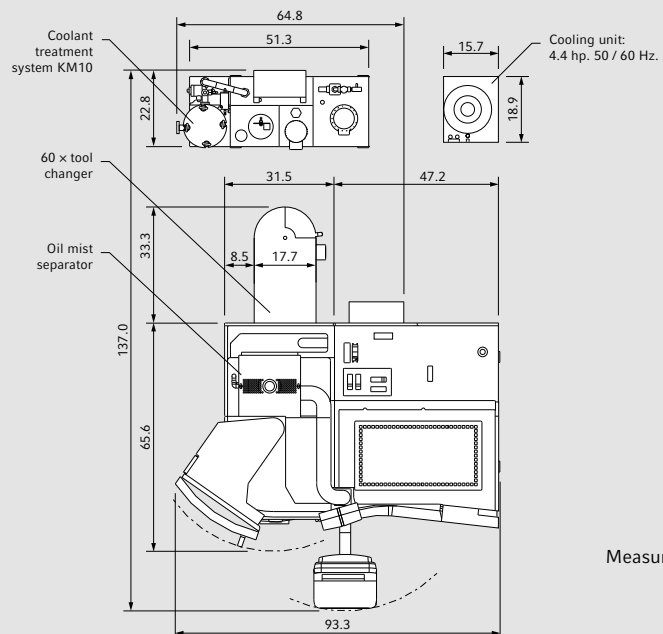
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Floor plan with automation featuring PH 21120 (ULTRASONIC 10)

Front view



Top view



Floor plans of the HSC *linear* / eVo *linear* / monoBLOCK® / duoBLOCK® machine versions in the relevant product brochures

Measurements in inches

ULTRASONIC Series

Technical Data

		ULTRASONIC 10	ULTRASONIC 30 <i>linear</i>
Travel			
X- / Y- / Z-axis	in.	4.7 / 4.7 / 7.9	12.6 / 11.8 / 11.0
A- / B-axis	Degrees	-10° to 120°	±120°
C-axis	Degrees	360°	360°
Main drive			
Max. speed range ULTRASONIC	rpm.	40,000	40,000
Max. speed range milling	rpm.	40,000	40,000
Positioning accuracy in X / Y / Z	in.	P 0.0004	P 0.0002
Repeatability accuracy in X / Y / Z	in.	P 0.0003	P 0.0001
Feed			
Feed range up to	ipm.	393.7	472.4
Rapid traverse X / Y / Z	ipm.	393.7	1,968.5
Working table			
Clamping surface rigid table	in.	–	15.7 × 15.0
Max. table load	lbs.	–	440.9
Clamping surface NC swivel rotary table	in.	ø 7.5	ø 9.8
Max. table load	lbs.	22.0	176.4
Max. speed of rotational axes (A / B / C)	rpm.	100 / 150	100 / 100
Positioning accuracy (A- / B- / C-axis)	in.	0.0002	0.0002
Tooling			
Tool holder spindle	Type	HSK-32	HSK-40
Tool magazine (standard / optional)	Positions	16 (60 chain magazine)	30 (60 / 120 chain magazine)*
Tool magazine (standard)	Type	Changer wheel (horizontal)	Changer wheel (vertical)
Max. tool length at full capacity and max. speed	in.	5.1	9.8
Max. tool diameter at full capacity and max. speed	in.	1.2	2.6
Chip-to-chip time	s.	15	6
Options			
Workpiece measurement	Type	DMG PP-400	DMG PP-400
Tool measurement	Type	RS NC-4	Blum NT, RS NC-4
Coolant treatment system	Type	KM10, Toolsmart	Toolsmart
Floor plan and connection data / basic machine			
Footprint	ft. ²	< 21.5	< 49.5
Dimensions L / W / H (incl. signal lamp)	in.	69.9 / 60.2 / 88.7	92.4 / 75.8 / 108.3
Space requirement L / W / H (incl. access to all service doors)	in.	161.4 / 3145.7 / 90.6	173.2 / 165.4 / 110.2
Weight	lbs.	3,968.3	14,991.4
Power rating	kVA.	25	54
Operating voltage / max. fuse rating	V.	400 (N/PE) / 50 A	400 (N/PE) / 100 A
Required compressed air connection	psi.	87.0	87.0
Average air consumption	ft. ³ /hr.	706.3	2,472.0
Control Systems			
DMG SLIMline® Control with 15" screen		Siemens 840D solutionline	–
DMG ERGOline® Control with 19" screen		–	Siemens 840D solutionline

* When using ULTRASONIC tool holders, only every second magazine position can be occupied.
The intermediate positions can be used with conventional HSK holders.

Technical data of the HSC *linear* / eVo *linear* / monoBLOCK® / duoBLOCK® machine versions in the relevant product brochures.

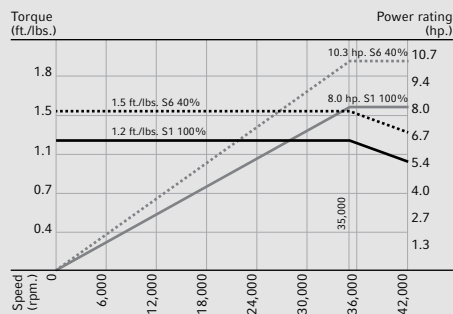
		PH 214	PH 21120
Automation			
Available for		ULTRASONIC 10	ULTRASONIC 10
Automation type	Type	Integrated blank automation 4-fold	Linear magazine
Max. handling weight	lbs.	4.4	4.4
Workpiece change time	s.	≤ 30	≤ 55
Integrable pallet types			
Blank automation holder (BH)		Yes	Yes
Max. number		4	13
Glass ceramics holder (GCH)		No	Yes
Max. number		–	50 / 250*
Finished parts storage (FPS)		No	Yes
Max. number		–	150
Base configuration (BH / GCH / FPS)		4 / – / –	10 / – / 150
Mixed operation		No	Yes
Option 2 (BH / GCH / FPS)		–	10 / 50 / 100
Option 3 (BH / GCH / FPS)		–	– / 150 / –
Option 4 (BH / GCH / FPS)		–	28 / 12 / 60
Option 5 (BH / GCH / FPS)		–	34 / 39 / –
Floor plan / basic machine and automation			
Footprint	ft. ²	< 21.5	< 43.1
Dimensions L / W / H (incl. signal lamp)	in.	69.9 / 60.2 / 88.7	69.9 / 78.7 / 88.7
Space requirement L / W / H	in.	161.4 / 145.7 / 90.6	161.4 / 157.5 / 90.6
Weight	lbs.	4,188.8	5,952.5
Job management system		No	Yes

DMG MORI
recommends



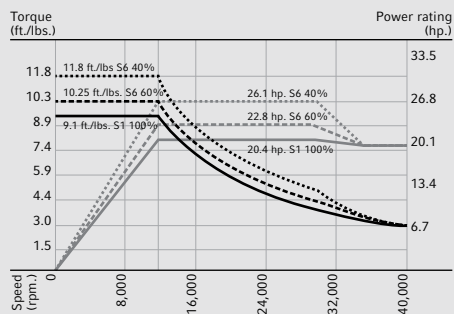
Motor spindle HSK-32

42,000 rpm. / 10.3 hp. / 1.5 ft./lbs.



Motor spindle HSK-40

40,000 rpm. / 26.1 hp. / 11.8 ft./lbs.



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