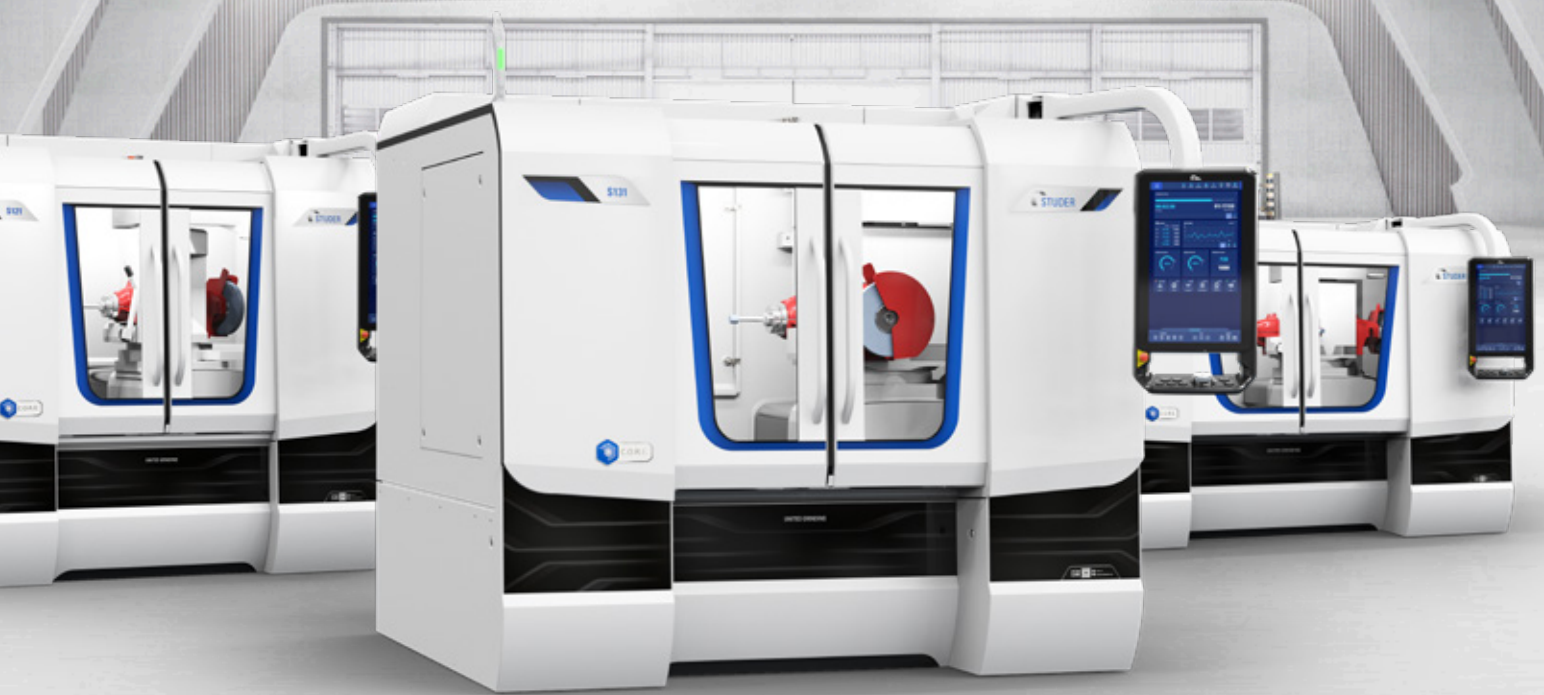
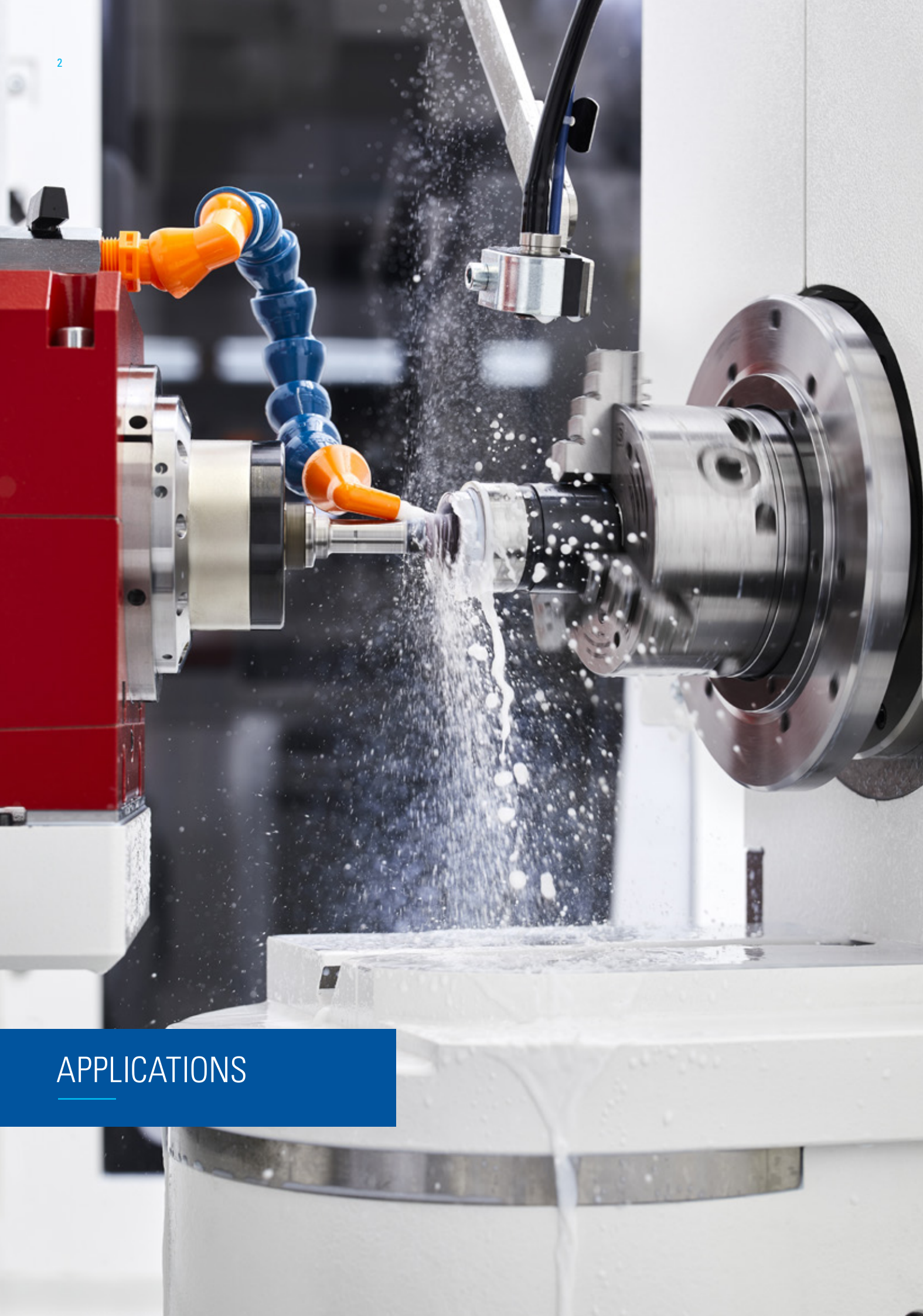


S121/S131/S141

RADIUS INTERNAL CYLINDRICAL GRINDING MACHINES



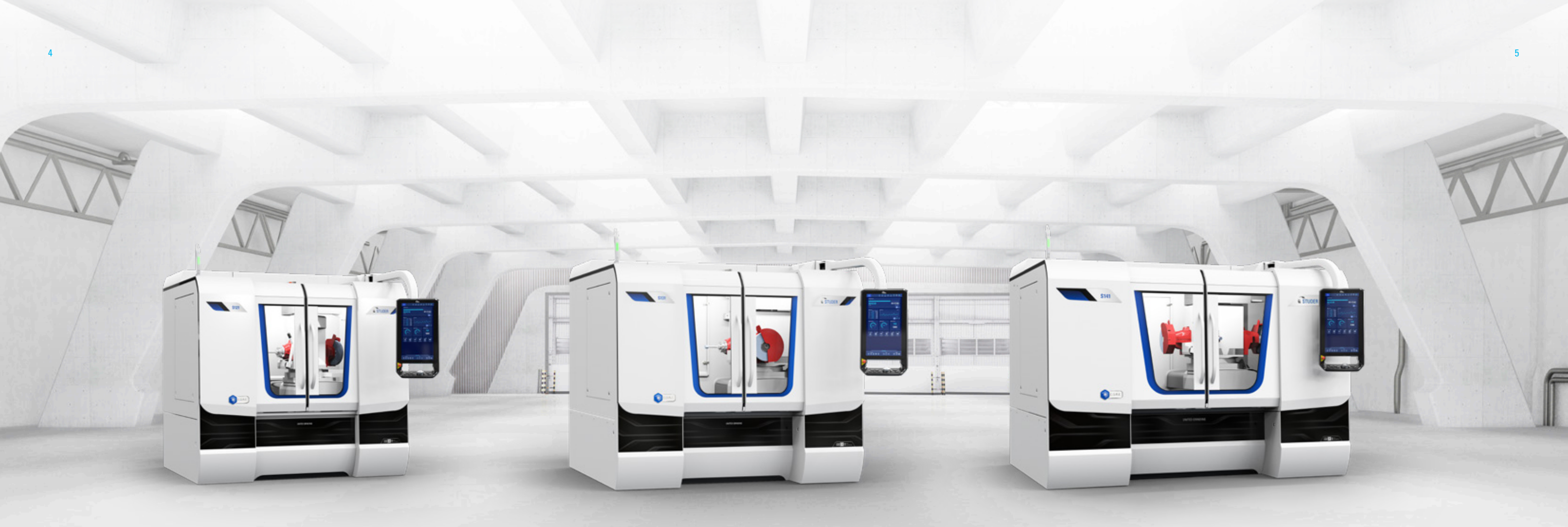


APPLICATIONS

STUDER S121/S131/S141 IN USE

The S121/S131/S141 are premium machines for internal cylindrical radius grinding. With a range of different configurations and sizes, the right machine can be defined for any application. The maximum swing diameter is 400 mm (15.75") while the maximum workpiece weight is 100 kg (220 lbs).





THE EXPERTS

The radius internal cylindrical grinding machines are the experts for high-precision internal cylindrical grinding of radii, spheres, balls, tapers, and diameters. Their main fields of application are in the manufacture of dies made of carbide and ceramics and the production of hydraulic components. They can also manufacture complex workpieces made from industrial ceramics, sapphire, and carbide for other applications.

S121 RADIUS

The S121 is especially suited for grinding complex workpieces made from very hard materials, and for general grinding tasks. It has a maximum of two spindle positions and high-precision axis drives with linear motors.

Dimensions	S121	S131
Swing diameter over the table	300 mm (11.8")	300 mm (11.8")
Swiveling range, workpiece table	−20° to +91°	−60° to +91°
Max. workpiece weight	100 kg (220 lbs)	100 kg (220 lbs)
Grinding length/diameter, internal, max.	165/250 mm (6.5/9.8")	165/300 mm (6.5/11.8")
Grinding length/diameter, external, max.	120/150 mm (4.7/5.9")	120/160 mm (4.7/6.3")
Spindles on turret up to max.	2	4
Swiveling range, wheelhead	0°/180°	−50° to +280°
Internal grinding spindles	24 000 – 120 000 rpm	24 000 – 120 000 rpm
External grinding wheel, dia. x width x bore	250 x 25 (F5) x 50 mm (10" x 1" (F 5) x 2")	250 x 25 (F5) x 50 mm (10" x 1" (F 5) x 2")

S131 RADIUS

The S131 is used for the manufacture of dies, among other things. The fully automatic B axis with direct drive and the wheelhead with up to four spindle positions provide optimum flexibility.

S141 RADIUS

With its large swing diameter, the S141 rounds off our high-precision, complex range for internal cylindrical grinding of radii, spheres, balls, cones, and diameters.

Dimensions	S141
Swing diameter over the table	400 mm (15.75")
Swiveling range, workpiece table	−60° to +91°
Max. workpiece weight	100 kg (220 lbs)
Grinding length/diameter, internal, max.	205/400 mm (8.1/15.75")
Grinding length/diameter, external, max.	120/160 mm (4.7/6.3")
Spindles on turret up to max.	4
Swiveling range, wheelhead	−50° to +280°
Internal grinding spindles	24 000 – 120 000 rpm
External grinding wheel, dia. x width x bore	250 x 25(F5) x 50 mm (10" x 1" (F 5) x 2")

S121/S131/S141

HARDWARE

- Fully automatic workpiece swivel axis with direct drive and simultaneous interpolation with the X and Z axis. Swiveling range of -20° to +91° (S121) and -60° to +91° (S131/S141)
- Wheelhead can be configured with two (S121) and up to four grinding spindles (S131/S141)
- Frequency-controlled motor grinding spindles for external and internal grinding
- Precise C axis on the workhead spindle for form and thread grinding
- C.O.R.E. Panel
- Portable control unit (PCU) for setting up close to the grinding process
- Full enclosure with two sliding doors
- StuderGuide® guideway system with linear drive
- Granitan® S103 mineral-cast machine base

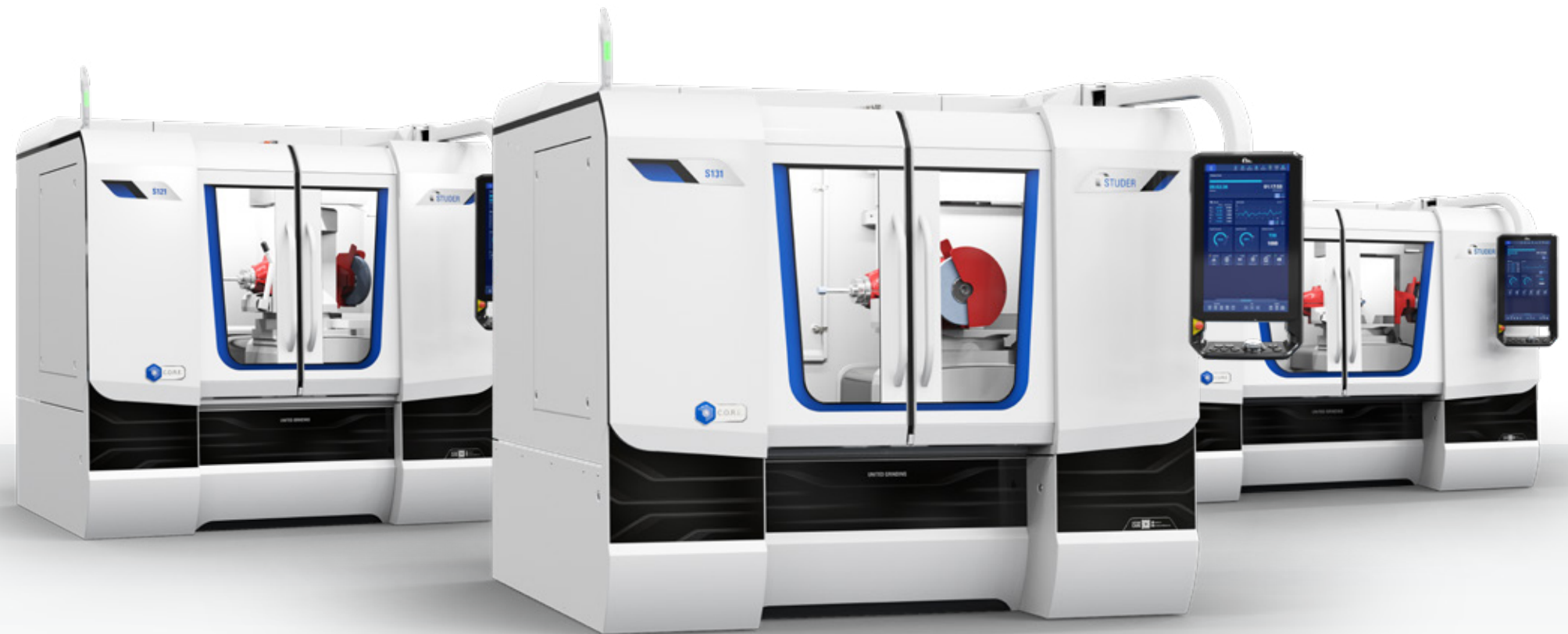
SOFTWARE

- C.O.R.E. OS operating system
- Simple operation and programming thanks to StuderSIM
- StuderSIM programming and simulation software for creating and simulating grinding and dressing programs on the machine control or on an external PC
- Standardized interfaces for loader and peripheral units

YOUR BENEFIT

- Short setup and retooling times thanks to a sophisticated setup philosophy
- Maximum precision due to perfect interplay between hardware and software
- Compact with outstanding access to the machine room from three or four sides (for maintenance and service)
- Intuitive, user-friendly, and efficient operation
- Access to important information directly at the panel (e.g., production progress, job details etc.)
- Reduced programming effort for data exchange between C.O.R.E. machines
- Use of UNITED GRINDING Digital Solutions™ products directly at the machine
- Fast support thanks to interaction with our Customer Care team at the machine
- Environmentally friendly thanks to targeted measures to reduce energy consumption
- Ergonomic thanks to large sliding doors and three service doors

«The experts for internal and radius grinding.»



C.O.R.E. – CUSTOMER ORIENTED REVOLUTION

C.O.R.E. helps us make your production fit for the digital future.

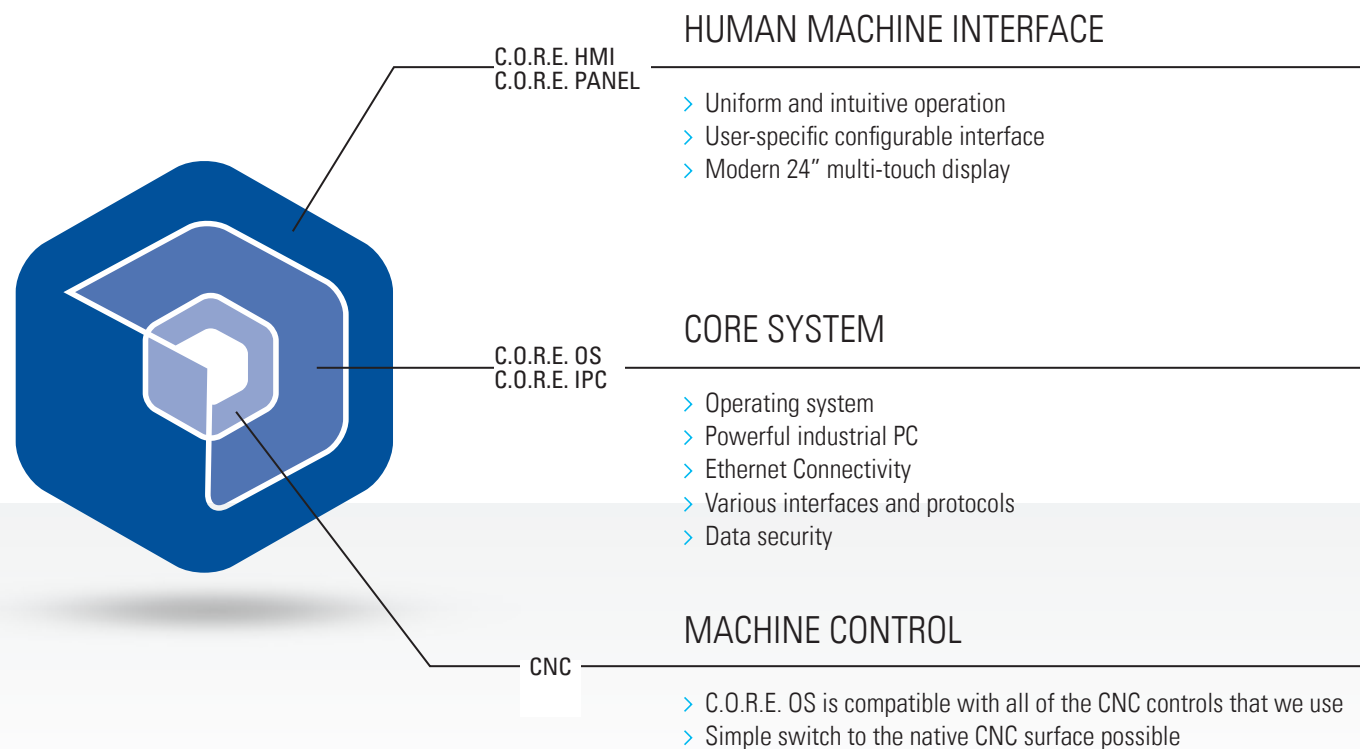
It's based on a new operating system, C.O.R.E. OS that equips the machine with intelligence.

Thanks to the uniform C.O.R.E. software architecture, exchanging data between UNITED GRINDING machines is easy. The integrated umati API can be used to communicate with third-party systems as well. It also offers access to UNITED GRINDING Digital Solutions™ products directly on the machine. C.O.R.E. not only establishes the technical foundation for this and other IoT and data applications, it also forms the basis of revolutionary yet uniform operation.

What does this mean for you?

- The user-friendly, intuitive, and uniform operation makes work easier for machine setters, machine operators, and maintenance staff
- Standardized data collection and intelligent processing of data creates transparency and supports process optimization
- The uncomplicated and consistent use of modern digital software solutions is guaranteed – directly on the machine
- The technical platform for the use of modern IoT and data applications has been established

C.O.R.E. ELEMENTS



C.O.R.E. PANEL – THE FUTURE OF OPERATION

Intuitive

Thanks to intuitive design with self-explanatory icons, navigation through the machine menu and process steps is quick and easy. Instead of buttons, the user is presented with a modern and clearly arranged multi-touch display.

User-friendly

Each user configures their own user interface individually. This is called up automatically with the RFID chip after logging in. When the user leaves the machine, the panel switches to "Dark Factory Mode." Production progress and the machine state are also clearly visible from a

distance. And thanks to the ergonomic design, the panel can be tilted and individually adjusted easily.

Efficient

The uniform and intuitive operating philosophy reduces training time. The configurable and role-specific interface helps prevent errors and increases the efficiency and quality of programming. Information can be exchanged quickly and in real-time via the front camera and Bluetooth headset. UNITED GRINDING Digital Solutions™ products can be used directly on the panel.

INDUSTRIAL
MULTI-TOUCH DISPLAY

INTEGRATED
FRONT CAMERA

SELF-EXPLANATORY
ICONS

USER-CONFIGURABLE
DISPLAY

STANDARDIZED
FUNCTION KEYS

ERGONOMIC
OVERRIDE SWITCH

Technical Specifications

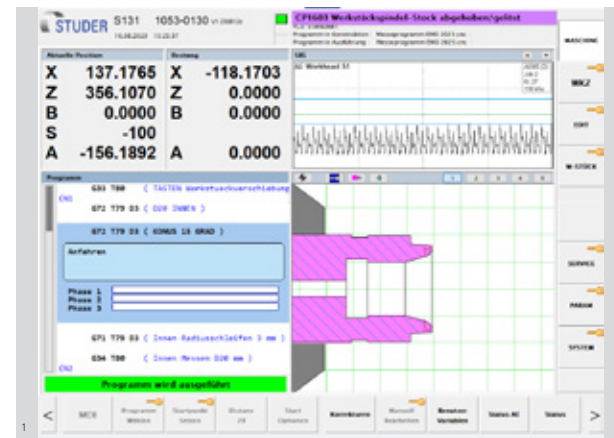
- 24" Full HD multi-touch display
- 16-position rotary override switch
- Electronic key switch (RFID)
- Integrated front camera
- 2x USB 3.0 ports
- Adjustable tilt



USER INTERFACE StuderSIM

The machine control uses the StuderSIM operating system. This system, developed especially for internal grinding applications, enables programming of all basis cycles for grinding, dressing, and measurements to support the process. The basic cycles, such as face, bore, taper and thread grinding, as well as dressing and measuring, are defined by parameter input windows. This type of programming ensures maximum flexibility and remains very user-friendly and workshop-oriented.

- Simple operating and programming thanks to HMI StuderSIM
- StuderSIM programming and simulation software for creation and simulation of grinding and dressing programs on the machine control or an external PC



- 1 Programming interface with SBS Mini View
- 2 External programming station
- 3 Ring sensor
- 4 Grinding wheel contact signal in case of contact detection
- 5 Measuring probe

SENSOR/ MEASURING PROBE

STUDER places a high emphasis on optimized grinding processes. Sensor technology plays a major role, especially in internal grinding. Three main objectives are pursued:

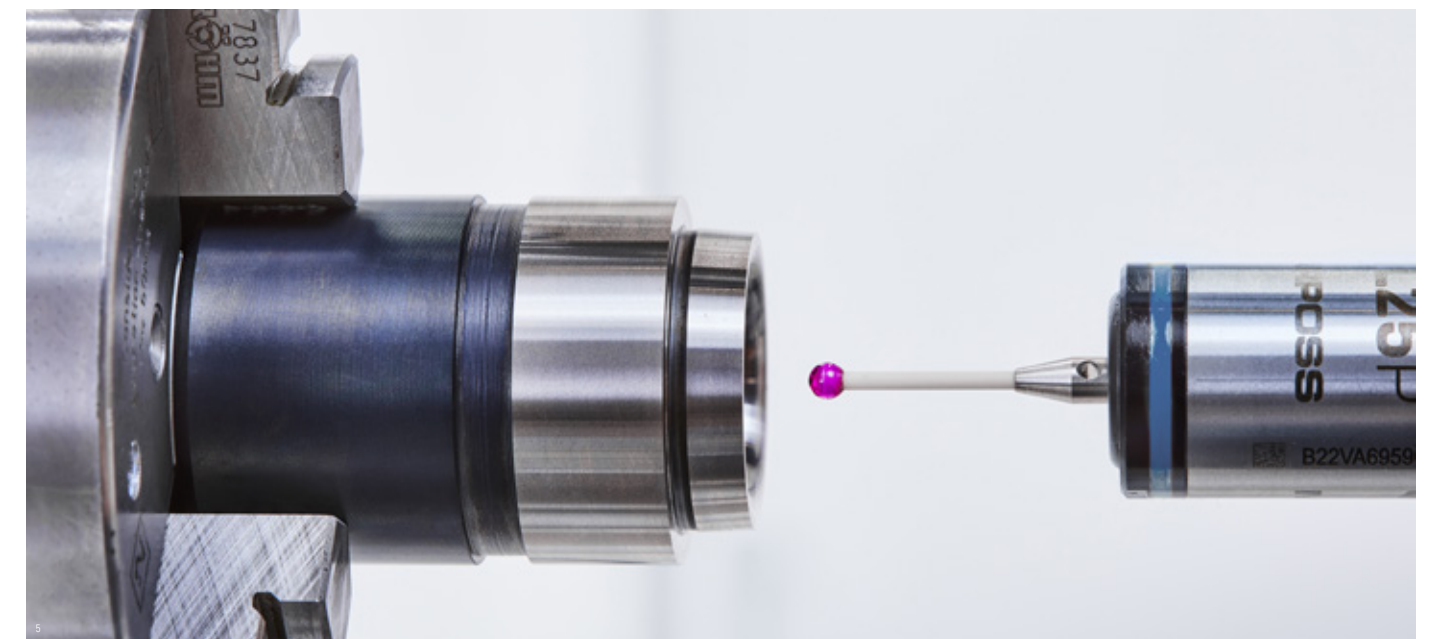
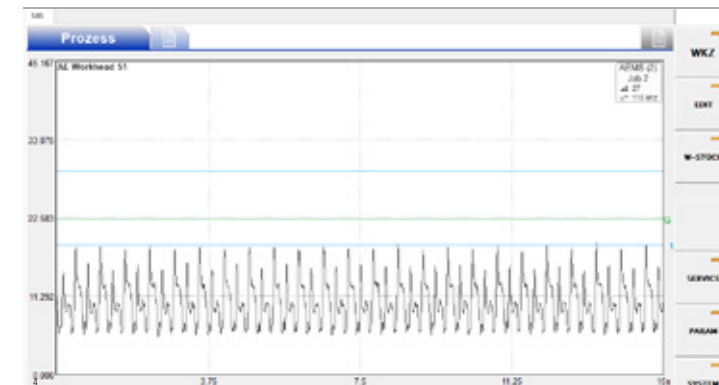
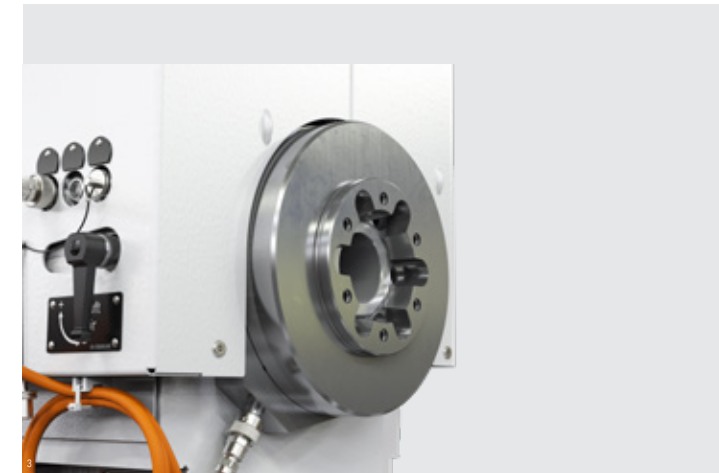
- Air gap bridging for cycle time reduction
- Process monitoring when grinding and dressing
- Simple registration of grinding wheel and workpiece

It is a special challenge to pick up a usable contact signal in small bores. STUDER accomplishes the best results with a ring sensor, comprising of a rotating transmitter ring and a fixed receiver ring. The signal transmission between the two rings is contact-free.

TouchControl™

For flexible post-process control measurements with the touch probe. Measurement deviations can be offset automatically against the corresponding tool.

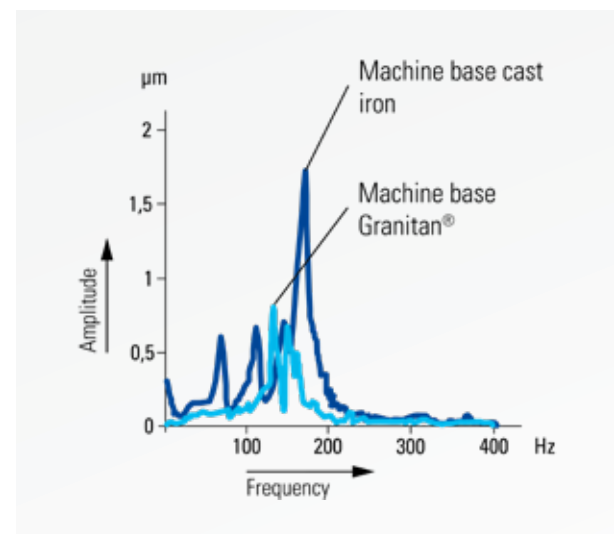
- Measurement of offset from workpiece centerline reference point to B5 axis pivot point (ZB distance)
- Longitudinal positioning
- Measurement of non-interrupted internal and external diameters
- Compensation for wheel wear when using non-dressable grinding wheels
- Optimized grinding cycles
- Process monitoring





GRANITAN® S103 MINERAL CASTING MACHINE BASE

The material structure developed by STUDER on the basis of the company's own formula, which has proven its worth over many years, is produced in a plant using the most modern industrial techniques. The excellent damping properties of the machine base ensure that an outstanding surface quality is achieved in the ground workpieces. The service life of the grinding wheel is also increased, leading to reduced downtimes. Temporary temperature fluctuations are extensively compensated by the favorable thermal behavior of Granitan®. This results in a high level of dimensional accuracy throughout the day. The StuderGuide® guide system for the longitudinal and cross slides is molded directly into the machine base and finished with a wear-resistant Granitan® S200 surfacing material. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway properties are hardly subject to wear.

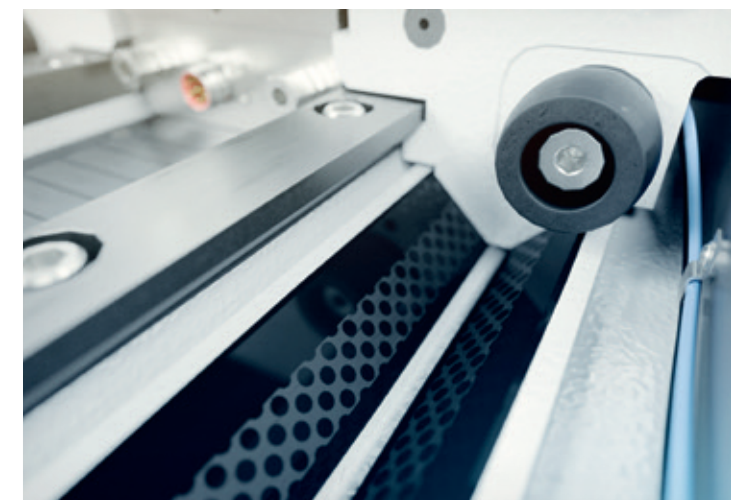


- Vibration-damping
- Thermally stable
- Wear-free

STUDERGUIDE® IN LONGITUDINAL AND CROSS AXIS

The StuderGuide® guideway system for the X and Z axis is coated with hard-wearing Granitan® S200 guideway surface material and offers the highest possible accuracy through the entire speed range with high load capacity and dampening levels. StuderGuide® extends the advantages of hydrostatic systems and guideways with patented surface structure.

A huge advantage of StuderGuide® over hydrostatic guideways is the damping component in the movement direction. The slides are powered by linear motors with direct measuring systems with a resolution of 10 nanometers (0.4 mill"). The maximum travel speed for both axes is 20 m/min (788 inch/min). This lays the basis for high-precision and efficient grinding with the shortest possible auxiliary times. The combination of StuderGuide®, linear motors and direct measuring systems guarantees the highest interpolation accuracies.



- High geometrical traverse accuracy
- Effective protection of guideways



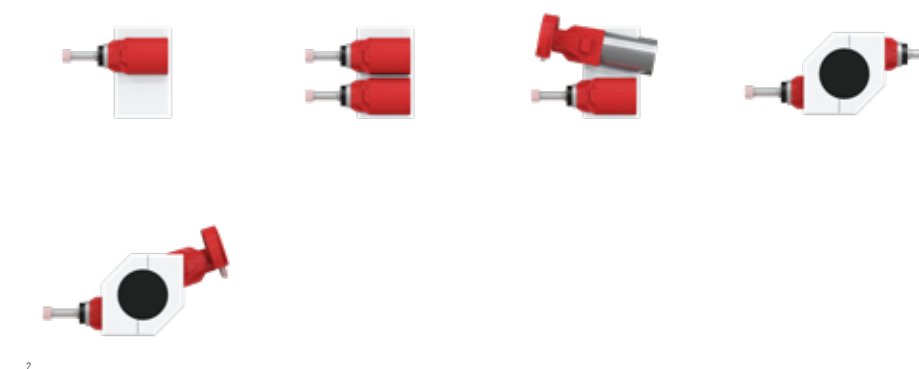
WHEELHEAD

The wheelhead on the S121 is hydraulically swiveled 180° degrees to fixed stops. It can be fitted with two grinding spindles (of which one an external grinding spindle). The S121 can also be equipped with one or two fixed grinding spindles in a linear arrangement.

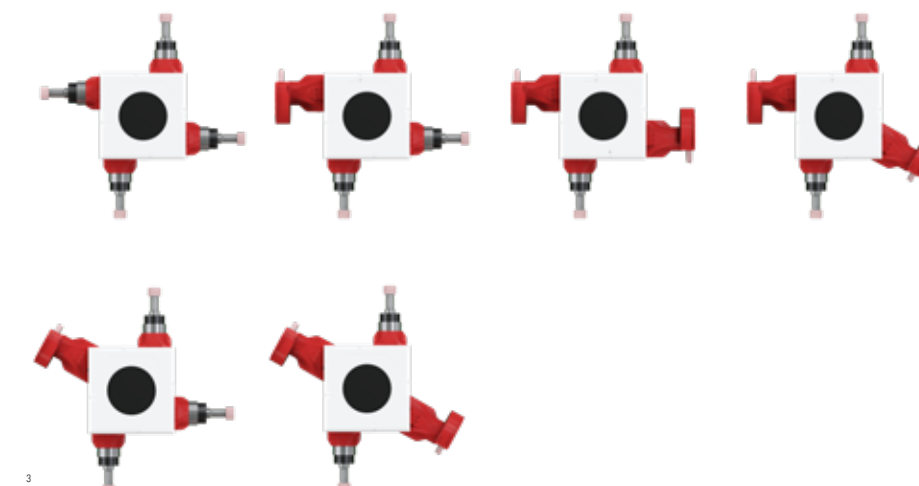
The wheelhead on the S131/S141 with integrated swivel axis permits the use of up to four grinding spindles (of which maximum 2 external grinding spindles) and a universally useable measuring probe. The swivel axis has a direct drive capable of rapid and precise positioning. The high resolution direct measuring system guarantees a positioning accuracy of < 1 arc seconds. This allows workpieces to be machined completely in the same clamping and with minimum processing times and maximum precision.

- Complete machining
- Wide range of grinding spindles
- Change of external grinding wheel in just a few steps

S121



S131 / S141



- 1 Wheelhead with internal and external grinding wheel
 2 Wheelhead variants S121
 3 Wheelhead variants S131/S141

WORKHEAD

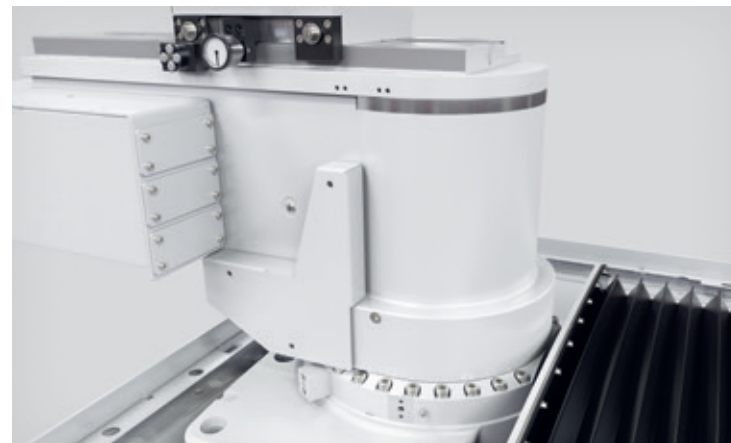
The high-precision workhead is fitted with special bearings and guarantees maximum accuracy of roundness. The A4/MT5 spindle nose is consistent with standard DIN/ISO 702-1. The air lift makes it easier to move the workhead during setup and resetting. A high-precision C axis with a direct measuring system on the workhead spindle is available for form and thread grinding.

- High roundness accuracy
- Low-maintenance
- Air lift



B5-AXIS

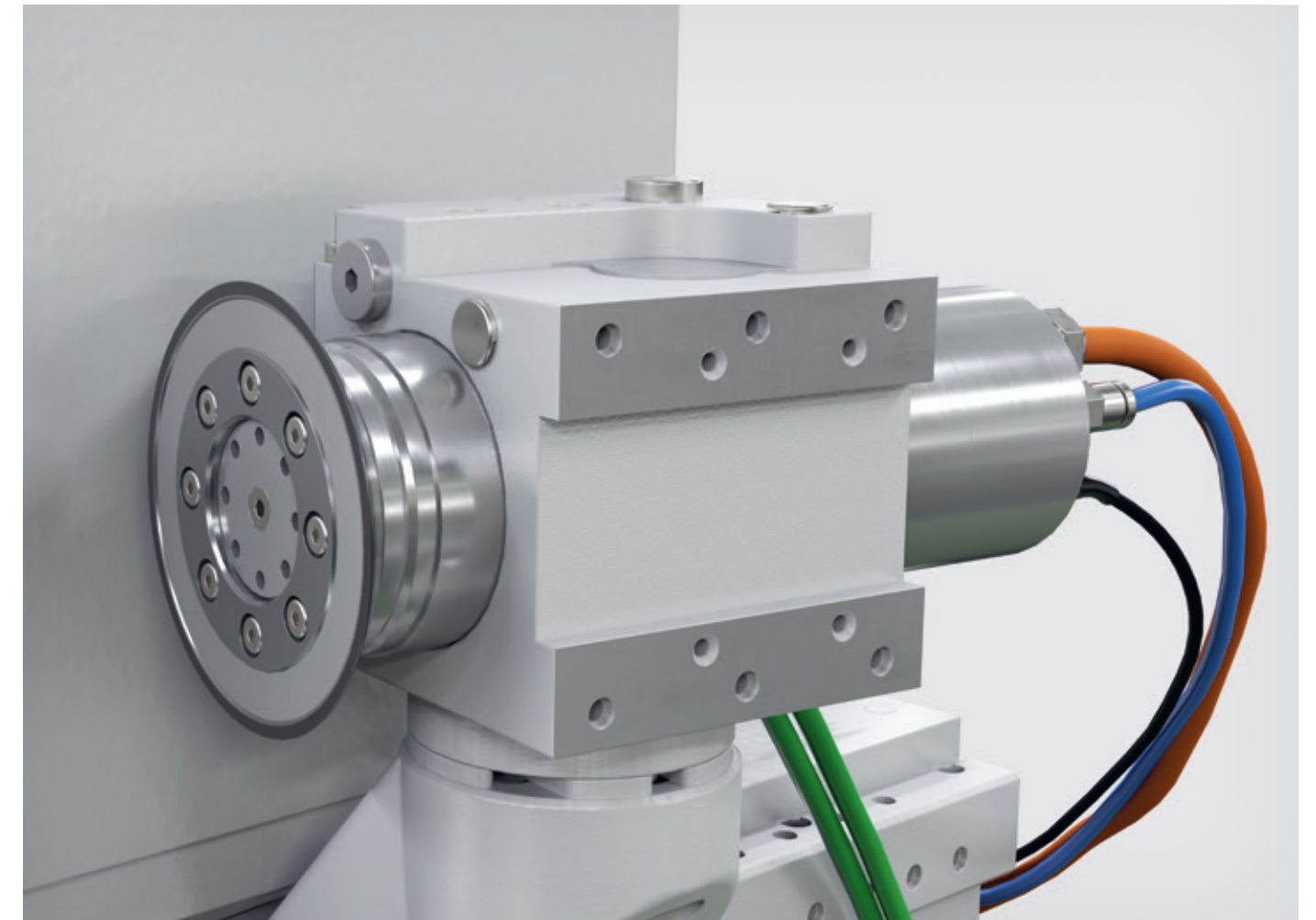
The automatic B5 axis with a swiveling range from -60° to $+91^\circ$ has a direct drive capable of ultra-rapid and accurate positioning. This permits highly accurate grinding with interpolation of the B5 axis for machining radii. The high-resolution direct measuring system guarantees a positioning accuracy for the high-precision B5 axis of < 1 arc second.. The B5 axis is completely enclosed and maintenance-free.



DRESSING

An easy-cutting grinding wheel is essential for cost-effective and high-quality grinding. STUDER offers a large selection of dressing units, to adapt the dressing process flexibly and optimally to the workpiece, tool, and material-specific properties. In addition to the fixed dressing units, fixtures for holding rotating dressing tools can also be fitted. The latter are ideal for dressing ceramic-bonded CBN grinding wheels. In combination with acoustic touch sensors a precisely defined minimum amount can be dressed off CBN wheels using touch dressing.

- Configurable in accordance with customer requirements
- Suitable for rotating or fixed dressing tools





AUTOMATION

For the radius internal cylindrical grinding machines, STUDER has developed the roboLoad, based on a robot cell, a specific loader solution for this market segment. The automation solution is suitable for chuck parts up to a part length of 100 mm (3.94") and a part diameter of max. 260 mm (10.2") thus covering a large part of the range of parts produced on these machines. Parts are supplied via a standardized, adaptable grid storage system. The enclosure of the basic module, adapted to the machine design and fitted with a loading hatch as standard, enables a safe and clean operation of the system. The radius internal cylindrical grinding machines can also be fitted with special solutions thanks to the availability of standard loader interfaces.

- Standard automation for a large part spectrum
- Trend-setting setup assistant for quick and easy setup
- Quick setup and reset in less than 15 minutes.
- Extremely simple workpiece supply
- No robot programming knowledge required
- Short delivery times thanks to standardization
- Upgradeable for future customer needs



CUSTOMER CARE

CUSTOMER CARE – WE ARE HERE FOR YOU

Our products are designed to meet customer demands for as long as possible, to operate efficiently, reliably, and be available at any time.

From “start up” to “retrofit” – our Customer Care is there for you throughout the working life of your machine. That’s why over 200 expert service contacts working around the world in 10 different languages are available locally.

- We provide fast, uncomplicated support.
- We help to increase your productivity.
- We work professionally, reliably, and transparently.
- We provide professional solutions to your problems.

UNITED GRINDING DIGITAL SOLUTIONS™

We develop solutions to support you in simplifying processes, boosting your machines’ efficiency and increasing overall productivity under the “UNITED GRINDING Digital Solutions™” brand.

We are continuously expanding our solution portfolio in the key areas of CONNECTIVITY, USABILITY, MONITORING, and PRODUCTIVITY to make your work in the digital age significantly easier.

Find out more about UNITED GRINDING Digital Solutions™ services on our website in the Customer Care section.



Start up
Commissioning
Warranty extension



Qualification
Training
Product support



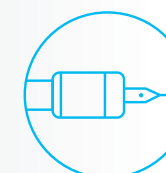
Prevention
Maintenance
Inspection



Service
Customer service
Customer consultation
HelpLine



Digital solutions
Remote Service
Service monitor
Production Monitor



Material
Spare parts
Replacement parts
Accessories



Rebuild
Machine overhaul
Assembly overhaul



Retrofit
Modifications
Retrofits

TECHNICAL DATA

MAIN DIMENSIONS

	S121	S131	S141
Swing diameter over the table	300 mm (11.8")	300 mm (11.8")	400 mm (15.75")
Max. workpiece weight including clamping device	100 kg (220 lbs)	100 kg (220 lbs)	100 kg (220 lbs)

CROSS SLIDE: X AXIS

Max. travel	350 mm (13.78")	350 mm (13.78")	500 mm (19.685")
Speed	0.001 – 20 000 mm/min (0,004 – 788 inch/min)	0.001 – 20000 mm/min (0,004 – 788 inch/min)	0.001 – 20000 mm/min (0,004 – 788 inch/min)
Resolution	0.00001 mm (0.4 mill")	0.00001 mm (0.4 mill")	0.00001 mm (0.4 mill")
Distance between guideways	285 mm (11.2")	285 mm (11.2")	285 mm (11.2")

LONGITUDINAL SLIDE: Z AXIS

Max. travel	400 mm (15.75")	400 mm (15.75")	500 mm (19.685")
Speed	0.001 – 20000 mm/min (0,004 – 788 inch/min)	0.001 – 20000 mm/min (0,004 – 788 inch/min)	0.001 – 20000 mm/min (0,004 – 788 inch/min)
Resolution	0.00001 mm (0.4 mill")	0.00001 mm (0.4 mill")	0.00001 mm (0.4 mill")
Distance between guideways	350 mm (13.78")	350 mm (13.78")	450 mm (17.7")

WHEELHEAD

Spindle arrangement	Linear/revolver	Turret	Turret
Max. number of spindles	2	4	4
Swivel range	0° / 180°	– 50° to +280°	– 50° to +280°
Repetition accuracy	< 1 arc sec.	< 1 arc sec.	< 1 arc sec.
Swivel time for 180 deg	< 4 s	< 3 s	< 3 s
Resolution		0,00005°	0,00005°

Internal grinding

Mounting bore	dia. 100 / 120 mm	dia. 100 / 120 mm	dia. 100 / 120 mm
Speeds	24 000 – 120 000 rpm	24 000 – 120 000 rpm	24 000 – 120 000 rpm
Grinding mandrel length (max. that can be swiveled on the turret)	180 mm (7")	180 mm (7")	220 mm (8.65")

External Grinding

Circumferential Speed	50 m/s (9,840 sfpm)	50 m/s (9,840 sfpm)	50 m/s (9,840 sfpm)
Fitting taper	HSK-C50	HSK-C50	HSK-C50
Grinding wheel, dia. x width x bore	250 x 25(F5) x 50 mm (10" x 1" (F 5) x 2")	250 x 25(F5) x 50 mm (10" x 1" (F 5) x 2")	250 x 25(F5) x 50 mm (10" x 1" (F 5) x 2")

Options

Probe	Yes	Yes	Yes
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SWIVELING TABLE

Swivel range	– 20° to +91°	– 60° to +91°	– 60° to +91°
Repetition accuracy	<1"	<1"	<1"
Resolution	0,00005°	0,00005°	0,00005°

CHUCK WORKHEAD

	S121	S131	S141
Speed range			
High precision	1 – 1 200 rpm	1 – 1 200 rpm	1 – 1 200 rpm
Standard version	1 – 1 500 rpm	1 – 1 500 rpm	1 – 1 500 rpm
Holding fixture	A4 in accordance with DIN ISO 702-1 / MT5	A4 in accordance with DIN ISO 702-1 / MT5	A4 in accordance with DIN ISO 702-1 / MT5
Spindle bore (feedthrough)	dia. 35.5 mm (1.4")	dia. 35.5 mm (1.4")	dia. 35.5 mm (1.4")
Driving power	3 kW (4 hp)	3 kW (4 hp)	3 kW (4 hp)
Load during live grinding	300 Nm (220 ft-lb)	300 Nm (220 ft-lb)	300 Nm (220 ft-lb)
Roundness accuracy during live spindle grinding	0.0004 mm (0.000,016")	0.0004 mm (0.000,016")	0.0004 mm (0.000,016")

C-axis for form grinding

Standard, indirect measuring system	0,0001°	0,0001°	0,0001°
High-precision, direct measuring system	0,0001°	0,0001°	0,0001°

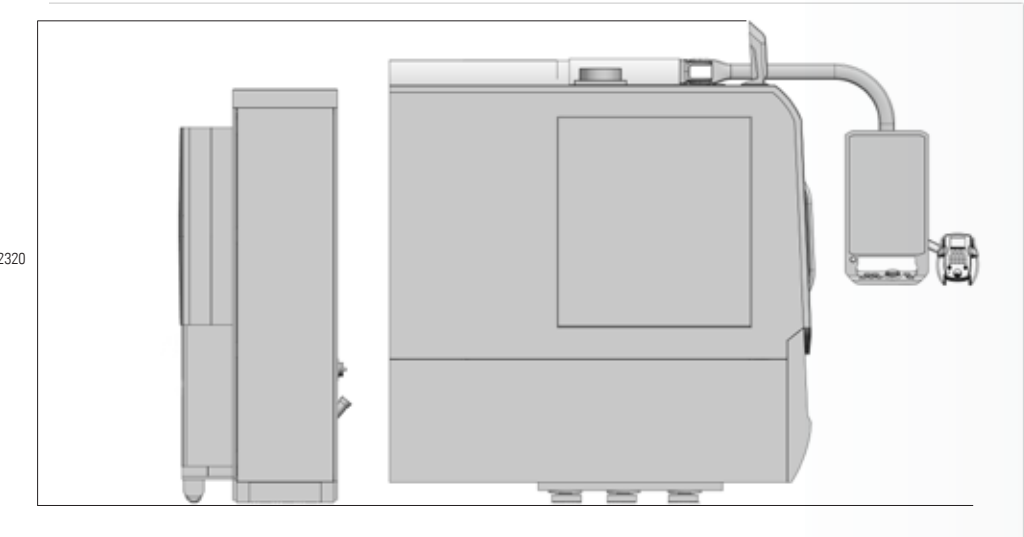
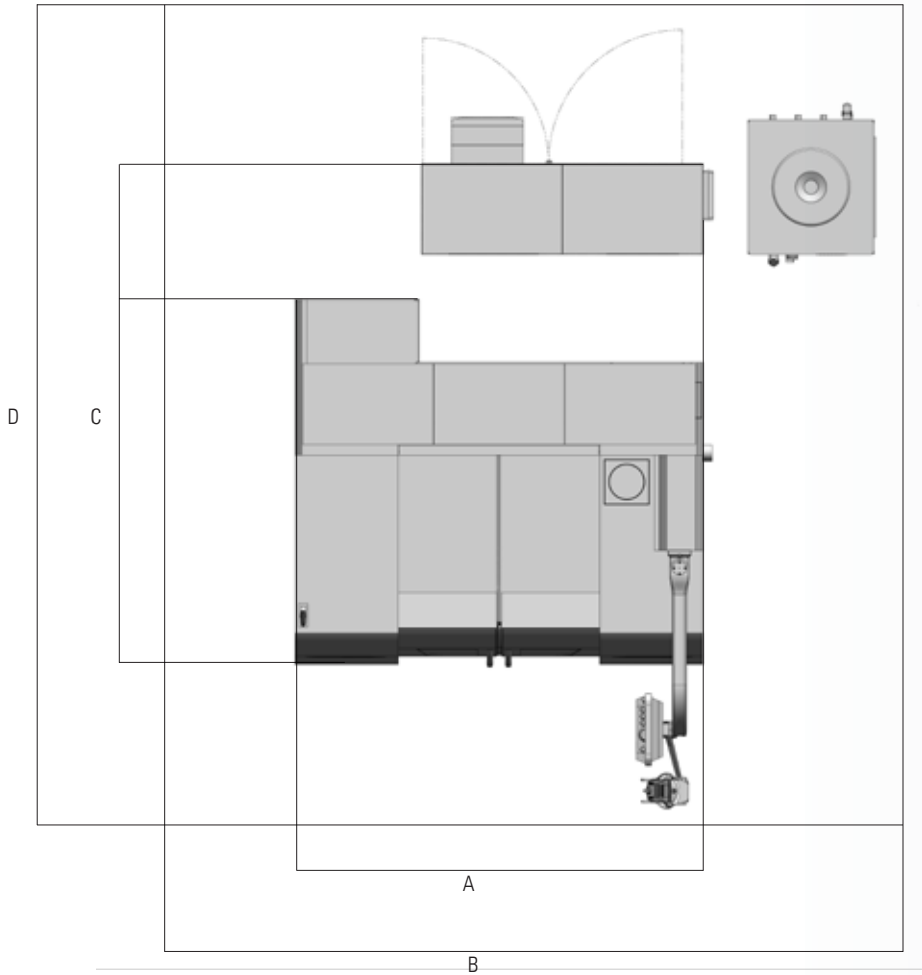
CONTROL UNIT

Fanuc Oi -TF

Option for HSM: Fanuc 31i - B PLUS

CONNECTED LOAD

Total connected load	32 kVA	32 kVA	32 kVA
Air supply	5,5 bar (80 psi)	5,5 bar (80 psi)	5,5 bar (80 psi)
Extraction capacity for cooling lubricant mist	1 200 – 1 800 m³/h (706 – 1060 cfm)	1 200 – 1 800 m³/h (706 – 1060 cfm)	1 200 – 1 800 m³/h (706 – 1060 cfm)
Total weight	5 050 kg (11,133 lbs)	5 700 kg (12,566 lbs)	7 400 kg (16,314 lbs)



VERSION S121	A	B	C	D
	2110 mm (83")	4000 mm (157.5")	2535 mm (100")	4260 mm (168")

VERSION S131	A	B	C	D
	2270 mm (89")	4000 mm (157.5")	3045 mm (120")	4785 mm (188")

VERSION S141	A	B	C	D
	2800 mm (110")	4550 mm (179")	3305 mm (130")	5050 mm (199")

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

FRITZ STUDER AG

The name STUDER stands for more than 110 years of experience in the development and production of precision cylindrical grinding machines. "The Art of Grinding." is our passion, highest precision is our aim and top Swiss quality is our benchmark.

Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition, we offer software, system integration, and a wide range of services. As well as receiving a complete tailor-made solution, the customer also benefits from over 110 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive, tool and die the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job shops. They value maximum precision, safety, productivity and longevity. As one of the market and technology leaders in universal, external, internal cylindrical, and contour grinding, with 25,000 systems delivered, STUDER has stood for precision, quality, and durability for decades. STUDER's products and services include hardware, software, and a wide range of services in the pre-sales and after-sales sector.

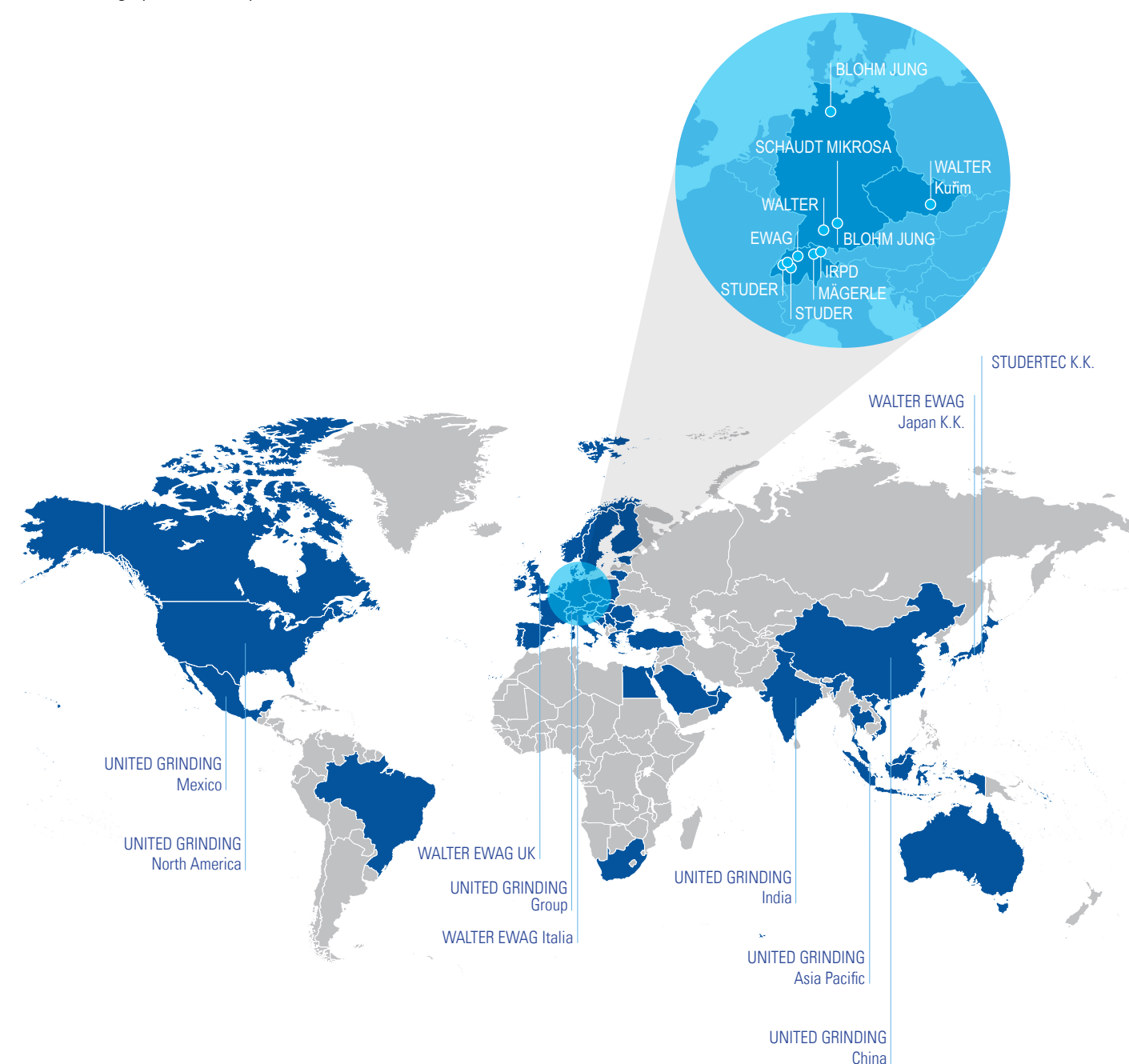


UNITED GRINDING GROUP

UNITED GRINDING Group is one of the world's leading manufacturers of grinding, eroding, laser, and measuring machines, as well as machine tools for additive manufacturing. With roughly 2,300 employees at more than 20 manufacturing, service, and sales locations, the group is organized in a customer-oriented and efficient way.

Through its MÄGERLE, BLOHM, JUNG, STUDER, SCHAUDT, MIKROSA, WALTER, EWAG, and IRPD brands, as well as competence centers in America and Asia, UNITED GRINDING offers broad application expertise, a large product portfolio, and a full range of services for the production of high-precision components.

«We want to make our customers even more successful – UNITED FOR YOUR SUCCESS»





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studer.com



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