

S131/S141/S151

UNIVERSAL INTERNAL CYLINDRICAL GRINDING MACHINES



The Art of Grinding.

A member of UNITED MACHINING SOLUTIONS



APPLICATIONS

STUDER S131/S141/S151 IN USE

The S131, S141, and S151 CNC universal internal cylindrical grinding machines make up a comprehensive series designed for all internal grinding applications. Whether it's flange parts, spindle shafts, spindle housings, rotor shafts, or bushings – wherever maximum precision and efficiency are essential, these machines deliver the ideal solution. With their advanced technology, they set new standards in both precision and cost-effectiveness.





THE UNIVERSAL MODELS

The S131/S141/S151 covers a wide range of internal cylindrical grinding operations. With three machine lengths and three swing diameters available, the right machine can be configured for any application. The machines handle workpieces up to 250 kg (550 lbs) in weight and 1,300 mm (51.2") in length.

S131

The S131 has many technical refinements, with its strong point being the manufacture of flanged parts and relatively small workpieces.

S141

With its three sizes, the S141 is ideal for the grinding of spindle shafts, spindle housings, rotor shafts, and flange parts.

S151

With its two sizes, the S151 is ideal for large spindles, spindle housings, rotor shafts, and large flanged parts.

Dimensions	S131	S141
Swing diameter	250 mm (9.85")	400 mm (15.75")
Part length including clamping device, max.	300 mm (11.8")	300/700/1300 mm (11.8/27.5/51.2")
Continuously adjustable swiveling range	−10° to +20°	−10° to +20° (or +15° at 1300 mm (51.2"))
Max. weight of workpiece	125 kg (275 lbs)	250 kg (550 lbs)
Max. internal and face grinding length/diameter	160/250 mm (6.3/9.85")	250/400 mm (9.85/15.75")
Grinding length/diameter, external, max.	125/250 mm (4.9/9.85")	150/400 mm (5.9/15.75")
Spindles on turret up to max.	4	4
Internal grinding spindles	24,000 – 120,000 rpm	6,000 – 120,000 rpm
External grinding wheel	dia. 250 / 50 × 25 mm (10/2 × 1")	dia. 300 / 127 × 32 mm (12/5 × 1.25")

Dimensions	S151
Swing diameter	550 mm (21.65")
Part length including clamping device, max.	700/1300 mm (27.5/51.2")
Continuously adjustable swiveling range	−10° to +20° (+15°)
Max. weight of workpiece	250 kg (550 lbs)
Max. internal and face grinding length/diameter	390/550 mm (15.35/21.65")
Grinding length/diameter, external, max.	150/550 mm (5.9/21.65")
Spindles on turret up to max.	4
Internal grinding spindles	6,000 – 120,000 rpm
External grinding wheel	dia. 300 / 127 × 32 mm (12/5 × 1.25")

S131/S141/S151

HARDWARE

- StuderGuide® guideway system with linear drive
- Wheelhead can be configured with up to four grinding spindles
- Frequency-controlled motor grinding spindles for external and internal grinding
- Automatically swiveling workpiece table
- C-axis on workhead spindle for out-of-round and thread grinding
- Full enclosure with two sliding doors
- Granitan® S103 mineral-cast machine base
- C.O.R.E. Panel
- Portable control unit (PCU) for setting up close to the grinding process

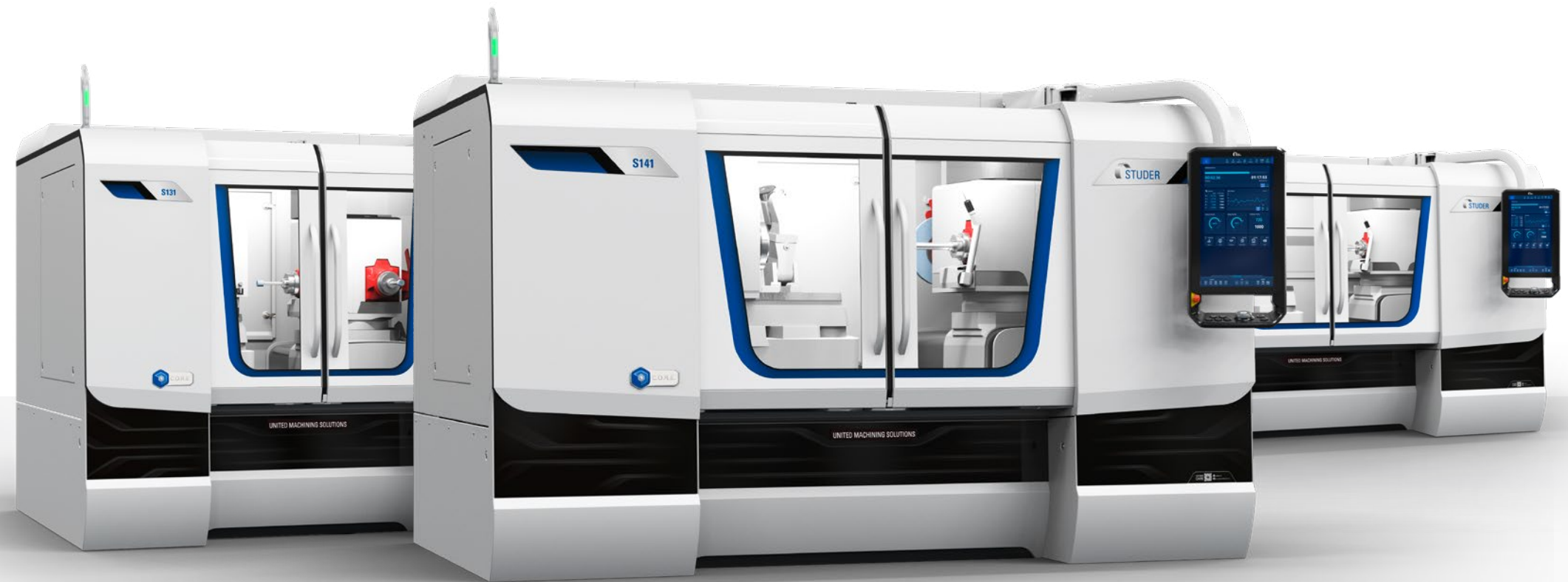
SOFTWARE

- C.O.R.E. OS operating system
- Very simple operation and programming thanks to StuderWIN
- Reduced setup and resetting times with STUDER QuickSet
- Standardized interfaces for loader and peripheral units
- Flexibly expandable with integrated software modules
- StuderWIN programming (optional) for creating grinding and dressing programs on an external PC

YOUR BENEFIT

- Short machining time thanks to complete machining
- Maximum precision due to perfect interplay between hardware and software
- 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 Digital Solutions products directly at the machine
- Fast support thanks to interaction with our Customer Care team at the machine
- Targeted measures to reduce energy consumption
- Ergonomic thanks to large sliding doors and three service doors

“The universal machines for a broad range of internal cylindrical grinding applications.”



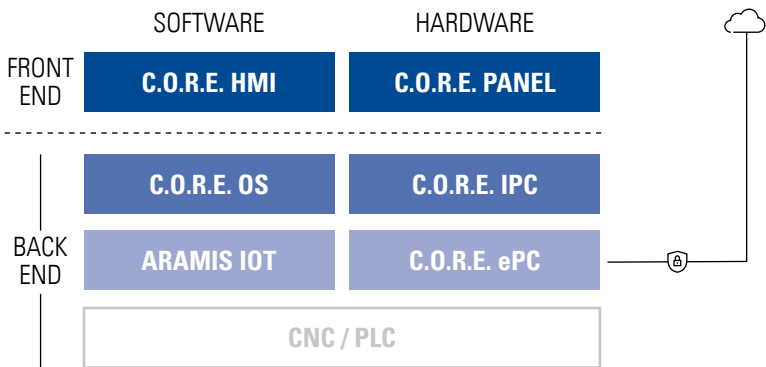
C.O.R.E. – CUSTOMER ORIENTED REVOLUTION

With C.O.R.E., we make your production fit for the digital future.

The C.O.R.E. system from UNITED GRINDING is a future-oriented hardware and software platform that takes the operation, networking and digitalization of machine tools to a new level. C.O.R.E. was developed to make our machines and your production environment fit for the digital industry of tomorrow. Operation is simple and intuitive via the multi-touch display, with a modern and customizable

user interface. Thanks to the standardized hardware and software architecture, all UNITED GRINDING machines equipped with C.O.R.E. technology are network-compatible and can be easily integrated into digital factories. All common interface formats are supported. C.O.R.E.'s modern IoT technology core also enables data-based value-added services and integration and communication with cloud-based customer platforms.

C.O.R.E. ARCHITECTURE



C.O.R.E. PANEL & HMI – NEXT-GENERATION MACHINE OPERATION

Like a large smartphone

With C.O.R.E., UNITED GRINDING has redefined the interaction between man and machine tool. Modern design combined with the most advanced technology to meet the operator requirements of tomorrow. The 24" multi-touch display enables navigation by touch and swipe gestures, similar to a smartphone. The uniform HMI for all UNITED GRINDING machines facilitates set-up, operation and general maintenance. Customizable user roles enable the display and restriction to role-relevant information and thus increase user-friendliness and safety. With the integrated front camera on the panel, assistance can be provided directly at the machine via Remote Service.

Future-proof

The digital capabilities of your machine with C.O.R.E. technology continue to grow. The C.O.R.E. HMI is continuously being expanded with new functionalities, widgets and apps to make it even more user-friendly and personalizable. The arrangement, type and size of the tiles on the HMI can be customized so that every machine operator always has the information that is important to him or her at a glance.

In future, new software updates and functionalities will be easy to install via the customer portal, so you will always be up to date.



Technical data

- 24" Full HD multi-touch display
- Override rotary switch with cycle start
- Standardized function keys
- Integrated 2-hand start
- Electronic key system (RFID)
- Integrated front camera
- Tilt adjustment

StuderWIN OPERATOR INTERFACE

The user interface StuderWIN creates a stable programming environment and contributes to efficient use of the machine. The possibility of fully integrating the in-process gauging and sensor technology for process control as well as contact detection and automatic balancing systems in the operator interface enables standardized programming of the different systems. The software of an optional loading system is also integrated. The drive elements are optimally matched to the control system.

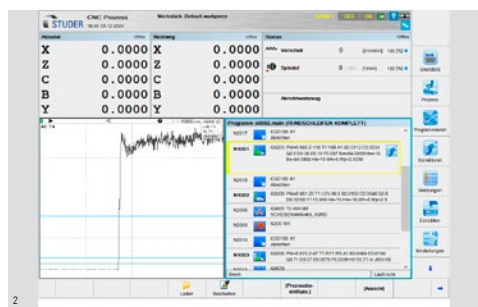
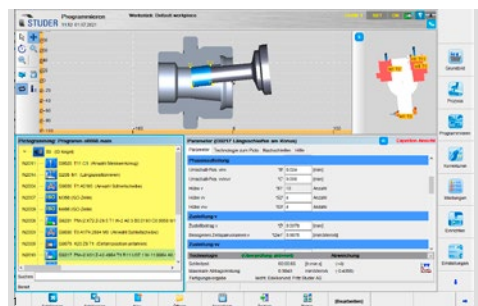
The sophisticated mechanical engineering concept of the S131/S141/S151 is completed by grinding software developed in-house by STUDER and continuously optimized in collaboration with users of the software. This software offers:

- **StuderPictogramming:** The operator strings the individual grinding cycles together – the control unit generates the ISO code.
- **STUDER QuickSet:** The software for grinding wheel measurement reduces resetting times by up to 90%.
- **Microfunctions:** Free programming of grinding and dressing process sequences for optimization of the grinding process.
- **Integrated operating instructions** assist safe machine operation.
- **InOne Grind:** The cylindrical grinding cycle can be programmed specifically for the individual grinding task via the clear menu.

- **InOne Dress:** The easy-to-use dressing cycle supports the machine operator with all dressing tasks.
- The expansion packages for InOne functions, including grinding technology calculation, optimized dressing, and contour, thread, and form grinding, further enhance the machine's capabilities.

StuderTechnology Integrated – more than 113 years of expertise

StuderTechnology Integrated drastically simplifies the operation of cylindrical grinding machines. Component quality, machining time, energy efficiency – all important production factors – with enormous benefits. What makes the software unique? Its history! Over 113 years of grinding experience have gone into it. It is a combination of grinding practice, empiricism, and years of expert knowledge. The program contains data from countless grinding tests, during which the best processing strategy was determined in each case for a wide range of components. StuderTechnology Integrated reverts specifically to these values depending on the application. This integrated grinding knowledge can be further optimized as required by the individual grinding experts and can be stored as a customer-specific production specification. This also enables grinders with little experience to benefit from STUDER expertise.



1 Programming interface with StuderPictogramming
2 Process screen
3 External programming station



Expansion packages

The wide range of Integrated Tools significantly expands the functionality of STUDER grinding machines. STUDER offers the required software packages in the form of integrated tools.

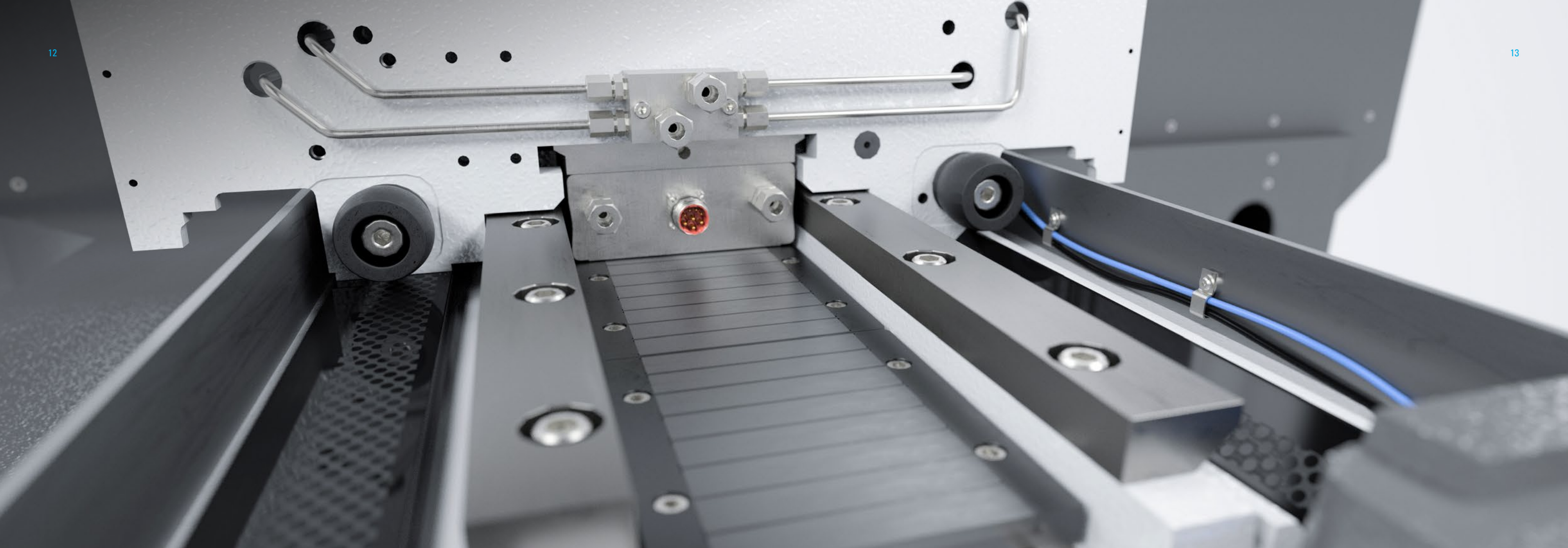
- **StuderDress Integrated** reduces the profiling time of a grinding wheel by up to 80%.
- **StuderThread Integrated**, together with InOne Thread, offers the full functionality that is otherwise only possible with a special thread grinding machine.
- **StuderContourBasic Integrated** is ideal for traversing geometry contours with the grinding wheel in an easy, quick, and safe manner.
- **StuderContourPRO Integrated** generates the complete grinding program for complex external geometries, typically for peel grinding from solid material.
- **StuderForm Integrated** is the universal out-of-round grinding software for machining curves and polygons for standard applications in low volume production.
- **StuderFormHSM Integrated** makes the out-of-round grinding process manageable even under highly dynamic process conditions and is used in both single-part and high-volume production.

TouchControl™

Workpieces are inspected directly on the machine, the results are logged and corrections are transferred to the control system.

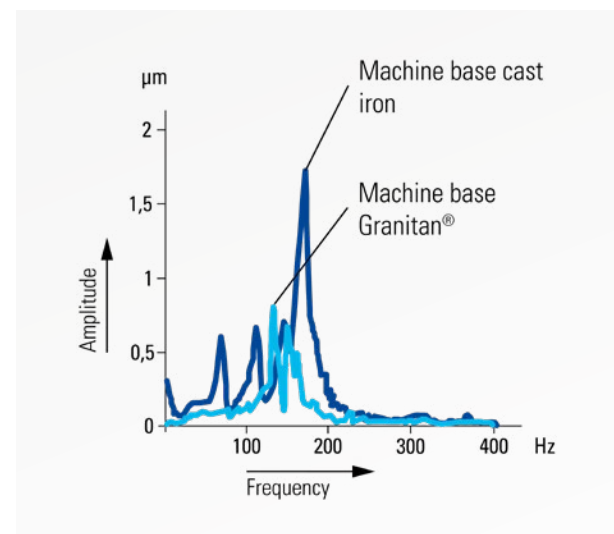
The InOne Control+ expansion package offers the following functions:

- Flexible diameter and length control measurement by means of a touch probe or laser measuring system
- Seat-specific and tool-specific calculation of dimensional deviations
- Logging of post-process control data
- Programmable cycle for automatic calibration of the touch probe to the reference diameter or length



GRANITAN® S103 MINERAL-CAST 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 largely offset 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 low-maintenance design, these excellent guideway properties remain virtually unchanged over time.

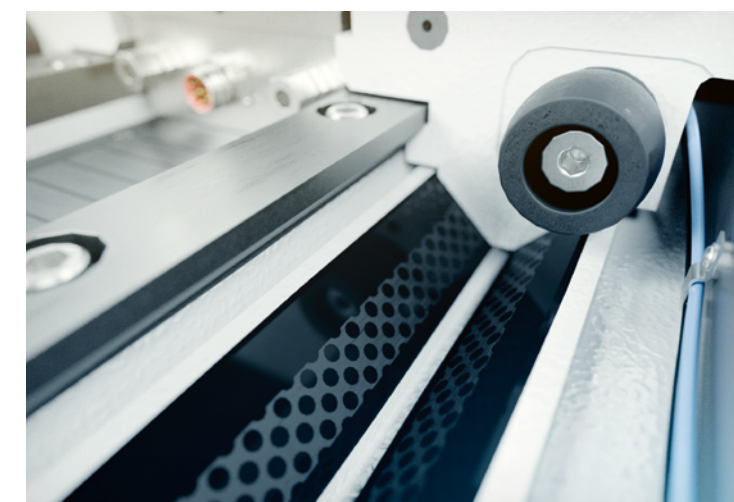


- Vibration-damping
- Thermally stable
- Wearproof

STUDERGUIDE® IN LONGITUDINAL AND CROSS AXIS

The patented 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® enhances the advantages of hydrostatic systems and guideways with specific surface structure. A huge advantage of StuderGuide® over hydrostatic guideways is the damping component in the direction of movement.

The slides are driven by linear motors with direct measuring systems with a resolution of 10 nanometers (0.4 mill inch). The maximum travel speed for both axes is 20 m/min (788 ipm). 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.



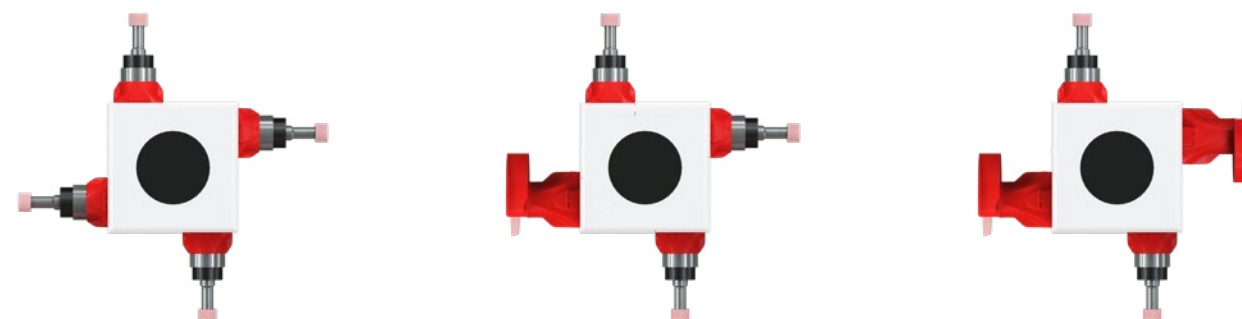
- High geometrical traverse precision
- Auxiliary scale for setup and resetting
- Effective protection of guideways



WHEELHEAD

The wheelhead with integrated swivel axis permits the use of up to four grinding spindles (of which maximum two 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 repeatable positioning accuracy of $<1''$. This allows workpieces to be machined completely in the same clamping and with minimum processing times as well as the highest precision at the same time.

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



2

1 Wheelhead
2 Wheelhead variants

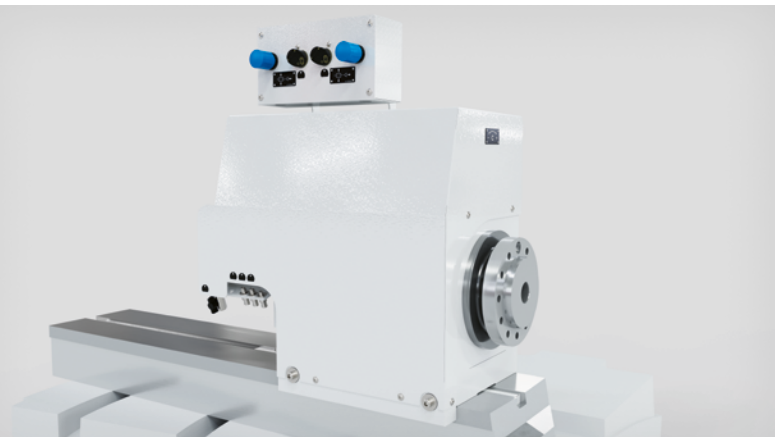
WORKHEAD

The workheads can be mounted on a swiveling table with adjustable positioning. The automatic swivel axis has a swivel range of -10° to $+20^{\circ}$. Automatic swiveling allows cylinders and various high-precision tapers to be ground in a single clamping, even parallel to the axis. The machine's design ensures optimal accessibility for the operator, whether for changing workpieces, dressing, or changing the grinding wheel. A variety of workheads are available, all equipped with air lift-off to simplify repositioning during setup and resetting.



S131 chuck workhead

The chuck workhead with preloaded precision ball bearings allows clamping of workpieces including clamping devices, with a load moment of up to 300 Nm (221 ft-lb).



S141/S151 chuck workhead

The chuck workheads with preloaded precision ball bearings allows clamping of workpieces including clamping devices, with a load capacity of up to 400 Nm (295 ft-lb).

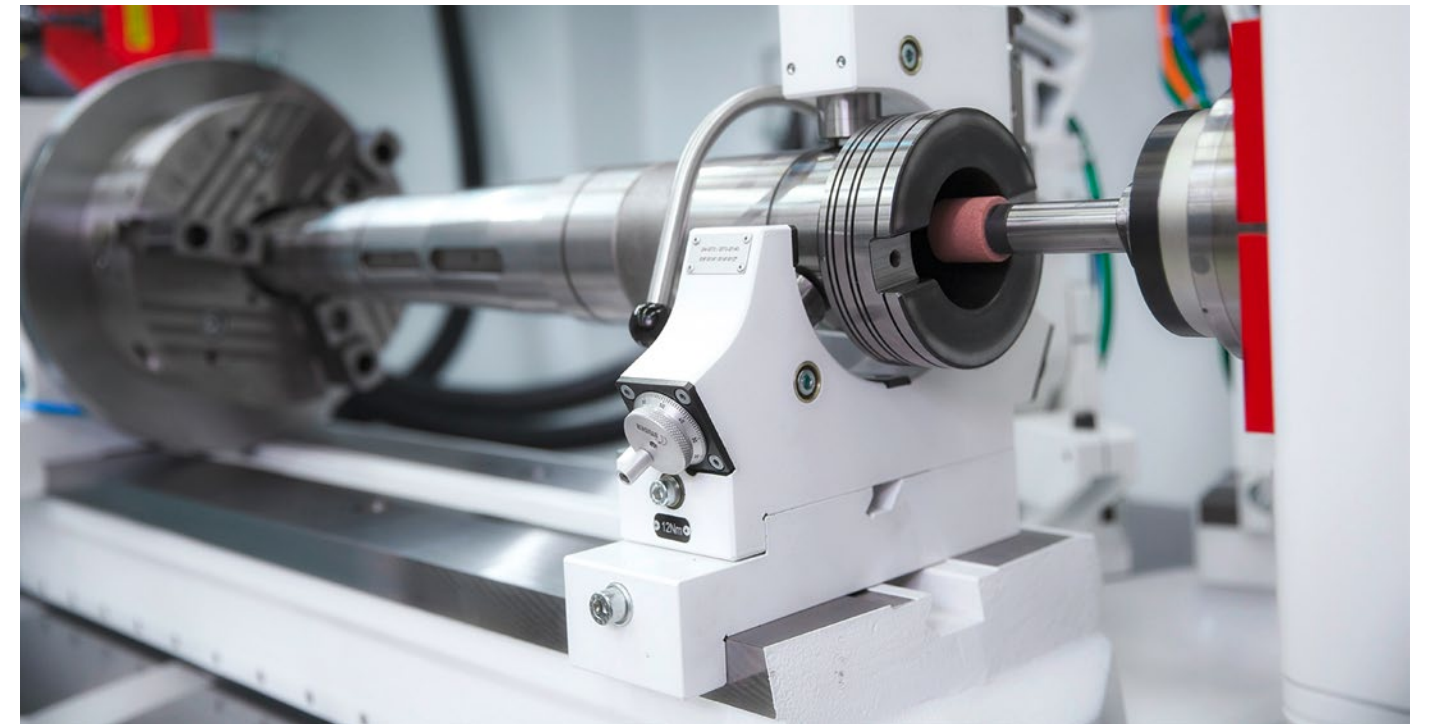


S141/S151 workhead with motor spindle

With a drive power of 10 kW (13.4 hp), the workhead features a high-precision C-axis and is ideal for out-of-round grinding applications.

STEADY RESTS

Four steady rests are available for the internal grinding platform. These steady rests can be used to set up workpieces where centers cannot be used.



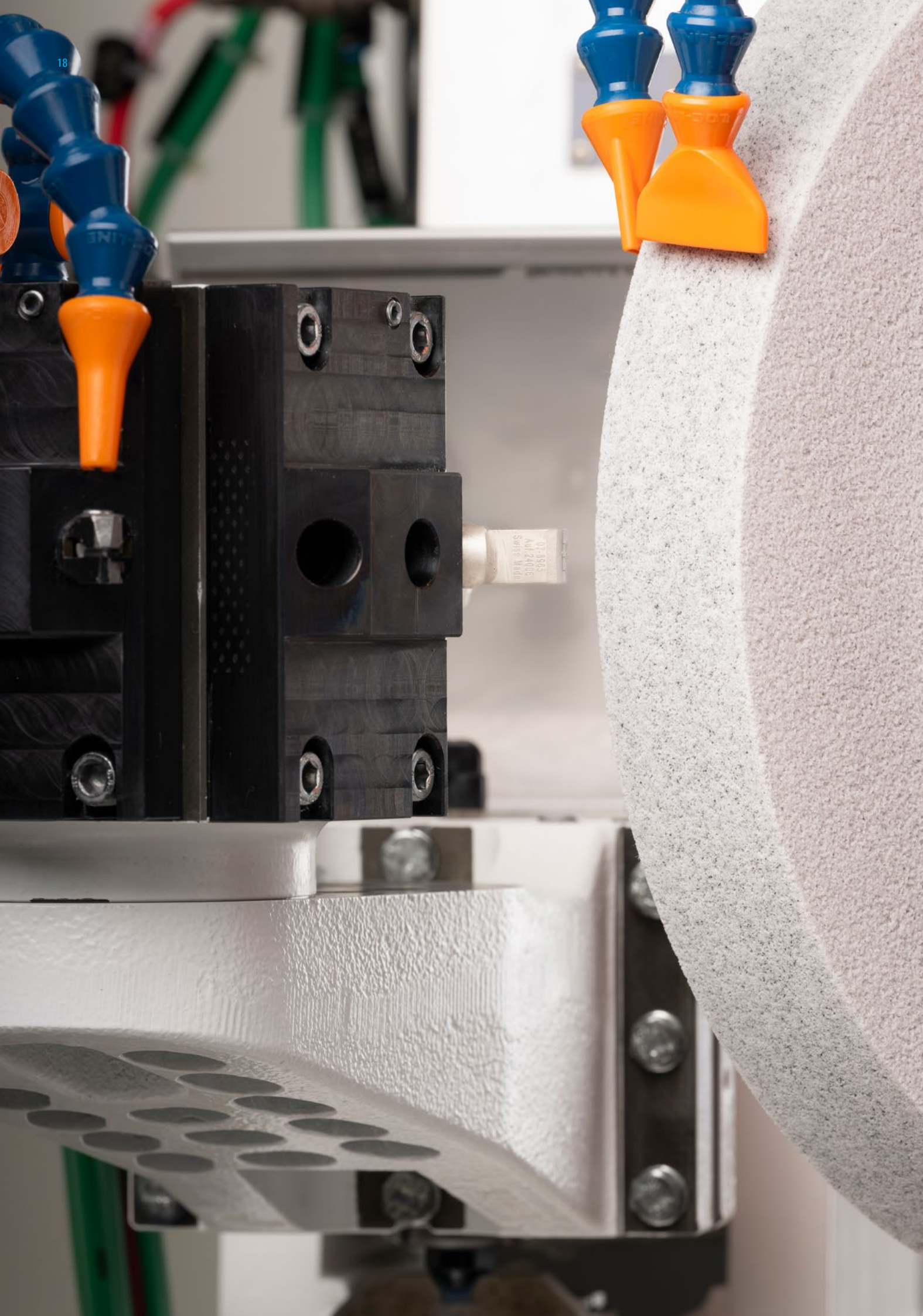
C-AXIS FOR OUT-OF-ROUND AND THREAD GRINDING

Complete machining also entails out-of-round and thread grinding operations to an ever-increasing extent. These processes are made possible by the position and speed-controlled C-axis. The standard C-axis with a measuring system on the drive motor is also suitable for thread grinding. For maximum form accuracy, a direct measuring system is mounted on the workpiece spindle (high-precision C-axis). With their high dynamic rigidity, the axis drives absorb the acceleration and grinding forces without any problem.

Out-of-round and thread grinding

The S131/S141/S151 offer axis-parallel internal grinding of fastening threads and threads of gauge quality.

Polygons, excenters, and cams can be manufactured cost-effectively and to the highest precision with High Speed Machining (HSM).



DRESSING

An easy-cutting grinding wheel is essential for cost-effective and high-quality grinding. Rotary and stationary dressing tools can be mounted on two swiveling units. This enables a flexible, optimized dressing process that can be precisely adapted to the specific characteristics of the workpiece, tool, and material. The grinding wheel profile and dressing parameters are easily defined via macros. Another STUDER speciality is the grinding wheel reference points (T-numbers). This enables programming with normal dimensions, which considerably simplifies the programming of grinding programs. A software package is available to fine-tune the dressing process and includes additional dressing functions.

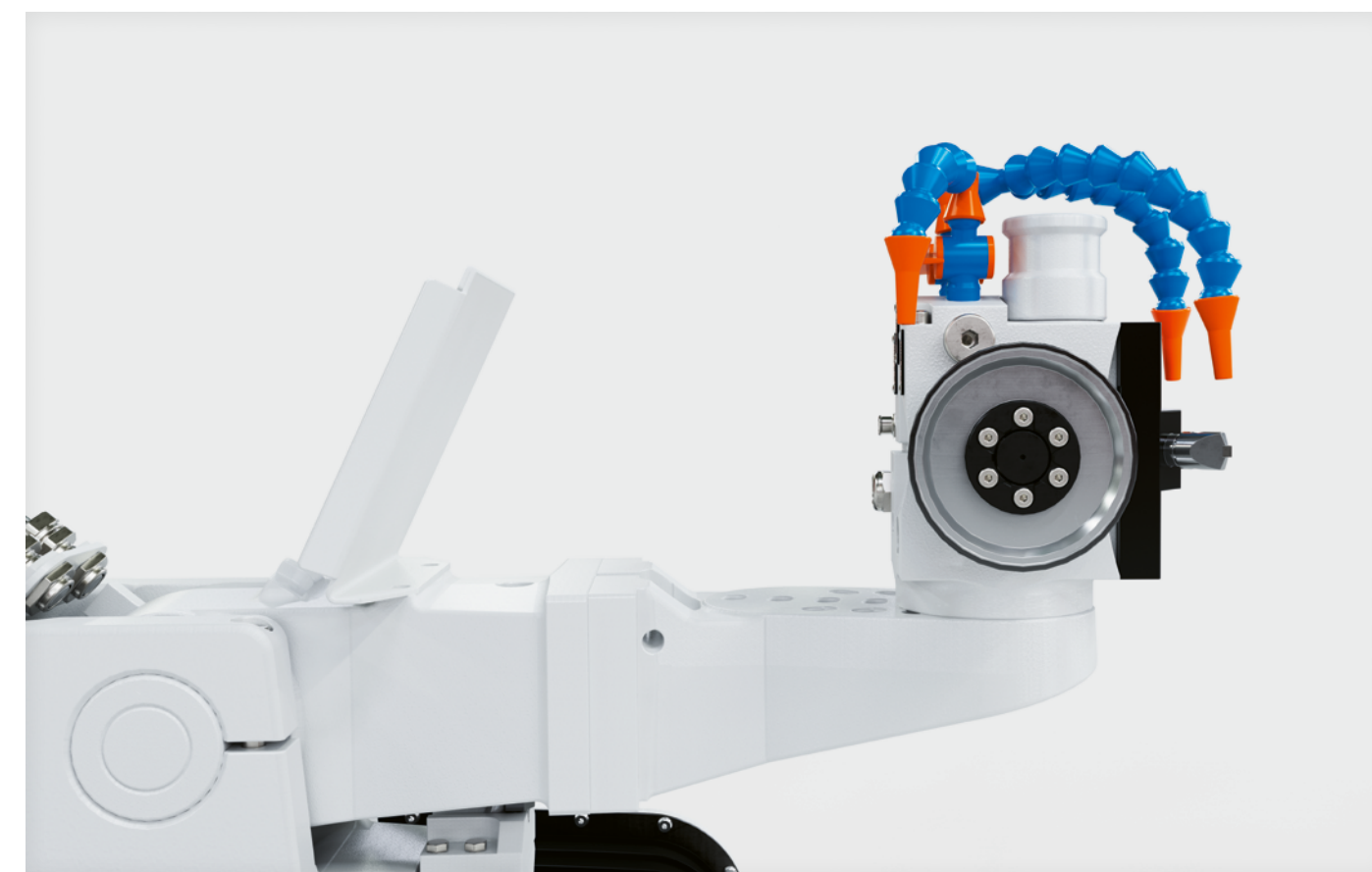
- Configurable in accordance with customer requirements
- Rotary or fixed dressing tools can be used

Rotary dressing

Swivel arm with dressing spindle and dressing wheel. Especially well suited for CBN grinding wheels.

Fixed dressing

Swivel arm with dressing tool holder for fixed dressing diamonds.



CUSTOMER CARE

WE ARE HERE FOR YOU!

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

From «Start up» through to «Retrofit» – our Customer Care is there for you throughout the working life of your machine. For this reason, you can rely on competent HelpLines worldwide and Service Engineers near you:

- We will provide you with fast, straight-forward support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

DIGITAL SOLUTIONS

Digital Solutions stand for products and services that open up the data space of your machine through IoT-based networking, enable seamless integration across the entire store floor in digital value-added networks and provide data-based value-added services and digital services – for greater efficiency, productivity and competitiveness.

You can find out more about the services of Digital Solutions on our website under the Customer Care section.



Start up
Commissioning
Warranty extension



Qualification
Training
Product support



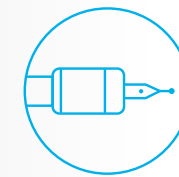
Prevention
Maintenance
Inspection



Service
Customer service
Customer consultation
HelpLine



Digital Solutions
Remote Service



Material
Spare parts
Replacement parts
Accessories



Rebuild
Machine overhaul
Assembly overhaul



Retrofit
Modifications
Retrofits

TECHNICAL DATA

MAIN DIMENSIONS	S131	S141	S151
Swing diameter over the table	250 mm (9.85")	400 mm (15.75")	550 mm (21.65")
Part length including clamping device	Max. 300 mm (11.8")	300/700/1,300 mm (11.8/27.5/51.2")	Max. 700/1,300 mm (27.5/51.2")
Grinding length internal	Max. 160 mm (6.3")	Max. 250 mm (9.85")	Max. 390 mm (15.35")
Grinding length external	Max. 125 mm (4.9")	Max. 150 mm (5.9")	Max. 150 mm (5.9")

TRANSVERSE AXIS X

Max. travel	350 mm (13.8")	425 mm (16.75")	500 mm (19.7")
Speed	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)
Resolution	0.00001 mm	0.00001 mm	0.00001 mm

LONGITUDINAL AXIS Z

Max. travel	400 mm (15.75")	500/500/700 mm (19.7/19.7/27.5")	500/700 mm (19.7/27.5")
Speed	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)	0.001 – 20 000 mm/min (0.000,04 – 787 ipm)
Resolution	0.00001 mm (0.4 mill inch)	0.00001 mm (0.4 mill inch)	0.00001 mm (0.4 mill inch)

SWIVELING TABLE

Continuously adjustable swiveling range	–10° to +20°	–10° to +20° (+15°)	–10° to +20° (+15°)
Precision of repetition	<1"	<1"	<1"
Swivel time for 20 deg	<3 s	<3 s	<3 s

WHEELHEAD

Spindle design	Turret	Turret	Turret
Max. number of spindles	4	4	4
Swivel range	–50° to +280°	–50° to +280°	–50° to +280°
Repetition accuracy	< 1"	< 1"	< 1"
Swivel time for 180 deg	< 3 s	< 4 s	< 4 s
Resolution	0,00005°	0,00005°	0,00005°

Internal grinding

Mounting bore	dia.100/dia.120 mm	dia.120/dia.140 mm	dia.120/dia.140 mm
Speeds	24 000 – 120 000 rpm	6,000 – 120,000 rpm	6,000 – 120,000 rpm
Grinding mandrel length (can be swiveled on the turret)	Max. 175 mm (6.9")	Max. 265 mm (10.4")	Max. 405 mm (15.95")

External Grinding

Circumferential speed	50 m/s (9842 sfpm)	50 m/s (9842 sfpm)	50 m/s (9842 sfpm)
Fitting taper	HSK-C50	1 : 10/ 40 mm	1 : 10/ 40 mm
Grinding wheel	dia. 250/50 × 25 mm (10/2 × 1")	dia. 300/127 × 32 mm (12/5 × 1.25")	dia. 300/127 × 32 mm (12/5 × 1.25")

Options

Probe
Manual balancing

CHUCK WORKHEAD	S131	S141	S151
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Speed range	1-1,500 rpm	1 – 500 min ⁻¹	1 – 500 min ⁻¹
Holding fixture	A4 as per DIN / ISO 702-1 / MT5	A8 as per DIN / ISO 702-1	A8 as per DIN / ISO 702-1
Bar capacity	35.5 mm (1.4")	40 mm (1.575")	40 mm (1.575")
Drive power	3 kW (4 hp)	3 kW (4 hp)	3 kW (4 hp)
Load during live spindle grinding	300 Nm (221 ft-lb)	400 Nm (295 ft-lb)	400 Nm (295 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			
High-precision, direct measuring system	0,0001°	–	–

WORKHEAD WITH MOTOR SPINDLE ISO50

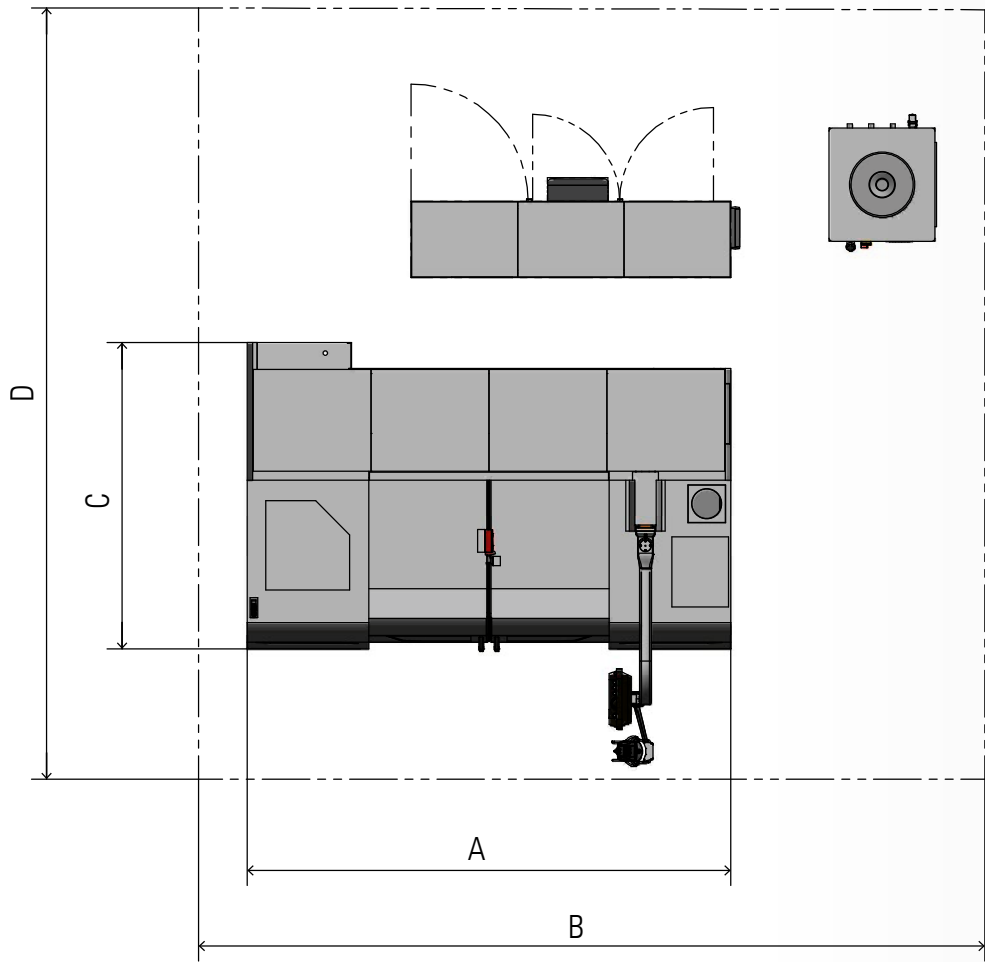
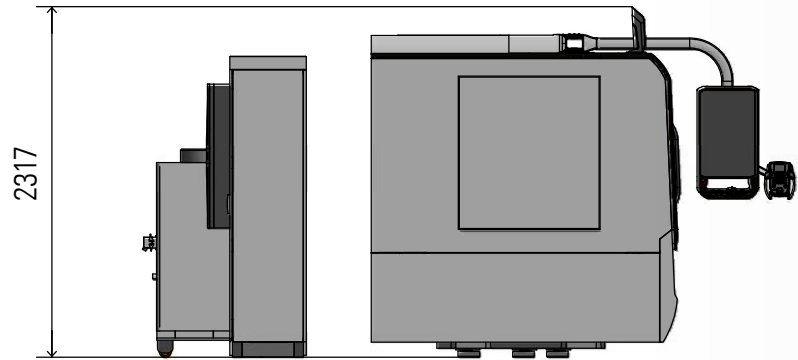
Speed range	–	1 – 1,500 rpm	1 – 1,500 rpm
Fitting taper/cylindrical external mounting	–	ISO50/dia. 110 mm (4.33")	ISO50/dia. 110 mm (4.33")
Bar capacity	–	dia. 50 mm (1.97")	dia. 50 mm (1.97")
Drive power	–	10 kW (13.4 hp)	10 kW (13.4 hp)
Load during live grinding	–	500 Nm (368 ft-lb)	500 Nm (368 ft-lb)
Roundness accuracy during live spindle spindle grinding	–	0.0004 mm (0.000,016")	0.0004 mm (0.000,016")
Option	–	0.0002 mm (0.000,008")	0.0002 mm (0.000,008")
C-axis for out-of-round grinding			
High-precision, direct measuring system	–	0,0001°	0,0001°

CONTROL UNIT

Fanuc Oi-TF PLUS (optional: Fanuc 31i-B PLUS)

CONNECTED LOAD

Total connected load	36 kVA	36 kVA	36 kVA
Air pressure	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	5,600 kg (12,320 lbs)	8,100/9,100/11,400 kg (17,820/20,020/25,080 lbs)	9,200/11,600 kg (20,240/25,520 lbs)



VERSION S131

	A	B	C	D
S131 – workpiece length 300 mm (11.8")	2 270 mm (89")	4 600 mm (181")	2 030 mm (80")	4 790 mm (189")

VERSION S141

	A	B	C	D
S141 – workpiece length 300 mm (11.8")	2 800 mm (110")	5 190 (204")	2 110 (83")	5 125 (202")
S141 – workpiece length 700 mm (27.6")	3 200 (126")	5 550 (219")	2 025 (80")	5 040 (199")
S141 – workpiece length 1,300 mm (51.2")	4 160 (164")	6 500 (256")	2 025 (80")	5 040 (199")

VERSION S151

	A	B	C	D
S151 – workpiece length 700 mm (27.6")	3 255 (128")	5 600 (220")	2 140 (84")	5 400 (213")
S151 – workpiece length 1,300 mm (51.2")	4 160 (164")	6 500 (256")	2 140 (84")	5 400 (213")

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, colors, 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 113 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 113 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.



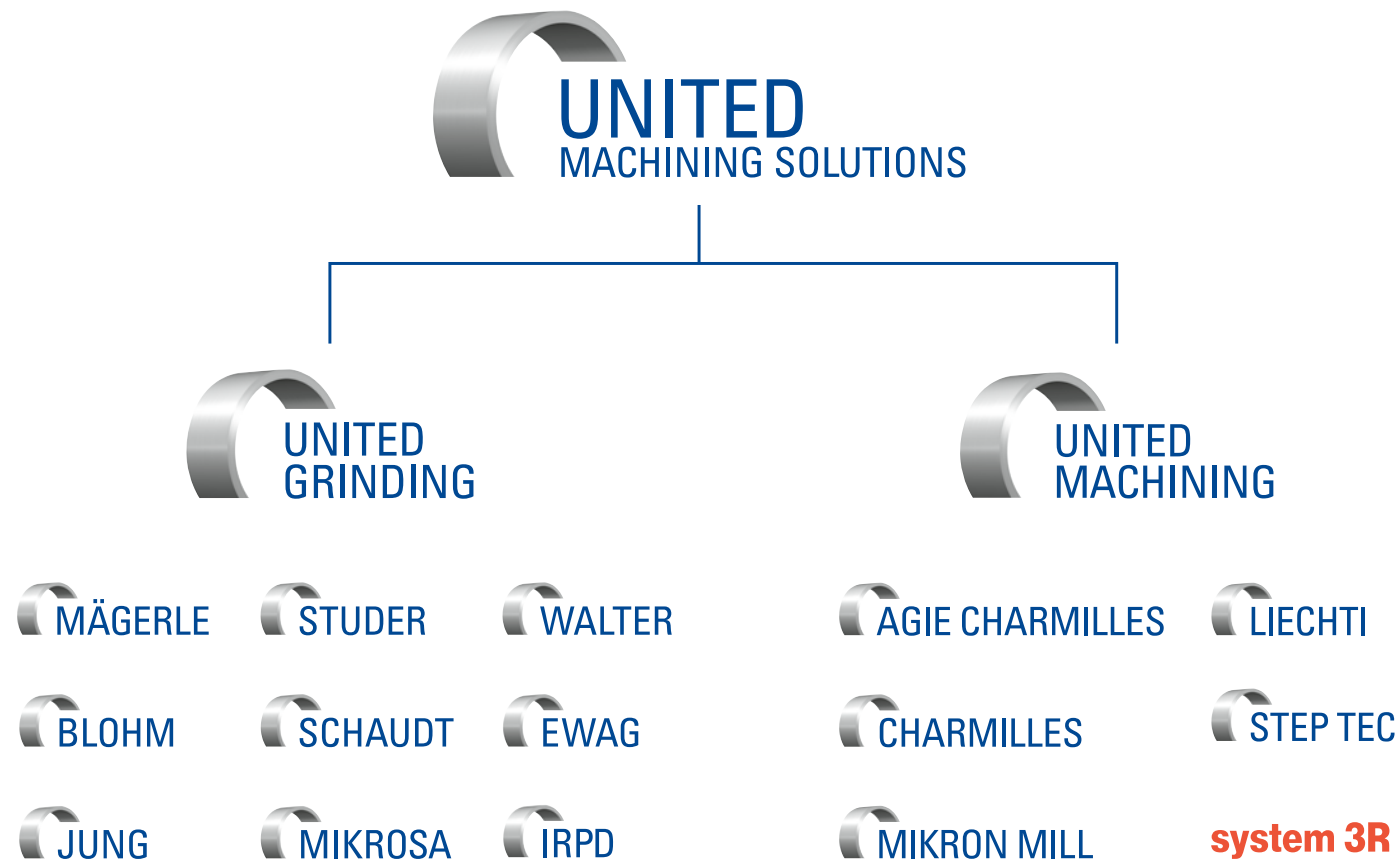
UNITED MACHINING SOLUTIONS

UNITED MACHINING SOLUTIONS is one of the largest machine tool manufacturers in the world. With around 5,000 employees at over 50 global production, service and sales locations, UNITED MACHINING SOLUTIONS is close to its customers and highly efficient. The group is organized into two divisions: UNITED GRINDING and UNITED MACHINING.

UNITED GRINDING includes the brands MÄGERLE, BLOHM, JUNG, STUDER, SCHAUDT, MIKROSA, WALTER, EWAG and IRPD. Its technologies include surface and profile grinding machines, cylindrical grinding machines, machines for tool machining and machine tools for additive manufacturing.

The UNITED MACHINING division includes the brands AGIE CHARMILLES, CHARMILLES, MIKRON MILL, LIECHTI, STEP TEC and SYSTEM 3R. It includes machines for EDM (Electrical Discharge Machining), high-speed milling and laser technology as well as spindle production and automation solutions.

«We want to make our customers even more successful»





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VDA6.4
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