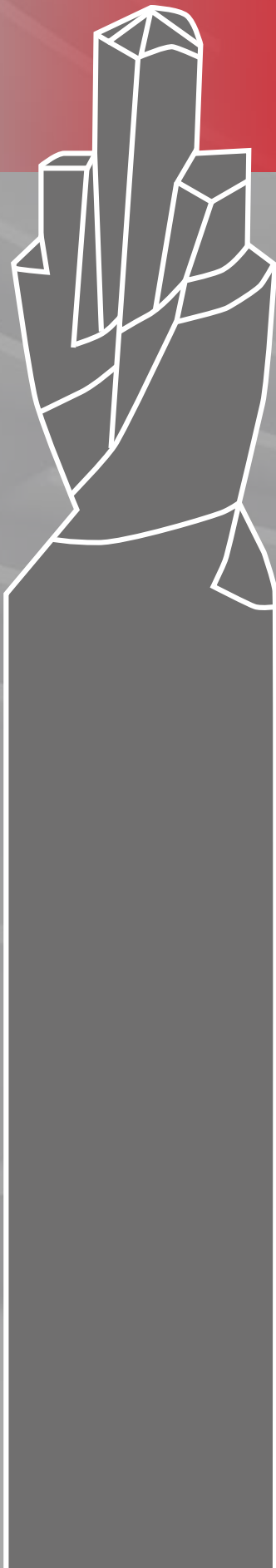




S22

The pro series
for CNC tool grinding



Automated Tool Grinding

S22

**POWERFUL, FAST, PRECISE:
UNCOMPROMISINGLY GOOD**



...WITH NEW „NUM FLEXIUM“ HIGH-PERFORMANCE CONTROL

The S22 is the perfect choice for the production of complex tools and will also master optimum resharpener.

Furnished with the overall tool grinding solution designed by NUM, the most

efficient „NUM Flexium 68“ CNC control together with the digital drives and motors as well with its integrated connection to the NUMROTO programming and simulation software provides you with a uniform system.

This platform will enable you to follow future trends in tool designing and to utilize forthcoming advantages of new IT trends.

The S22 series contains the know-how of more than 50 years of designing and building high-quality tool grinding machines. The best performance and highest grinding efficiency are to the fore with the S22 and form a basis for the economic manufacture and resharpening of precision tools.

The S22 is a trendsetter in CNC tool grinding

It combines high productivity and precision with exemplary operation and unequalled versatility. The S22 works on the basis of a patented vertical system with a vertical tool spindle and a wheel changer integrated into the machine as a standard feature.

Use in various fields of technology

An innovative grinding concept makes the S22 series a high-quality grinding centre, whose range of applications goes far beyond classical tool grinding. So, for example, demanding customers from medical engineering, the aerospace industry, motive power engineering or from tool and mould making use the S22 for the economic machining of complex and highly precise parts and components.



THE S22 SERIES - ALWAYS THE BEST SOLUTION TO YOUR GRINDING TASKS

▶ The S22 – Profitable CNC grinding

The powerful S22 series – a perfect solution to high-quality and high-precision resharpening.

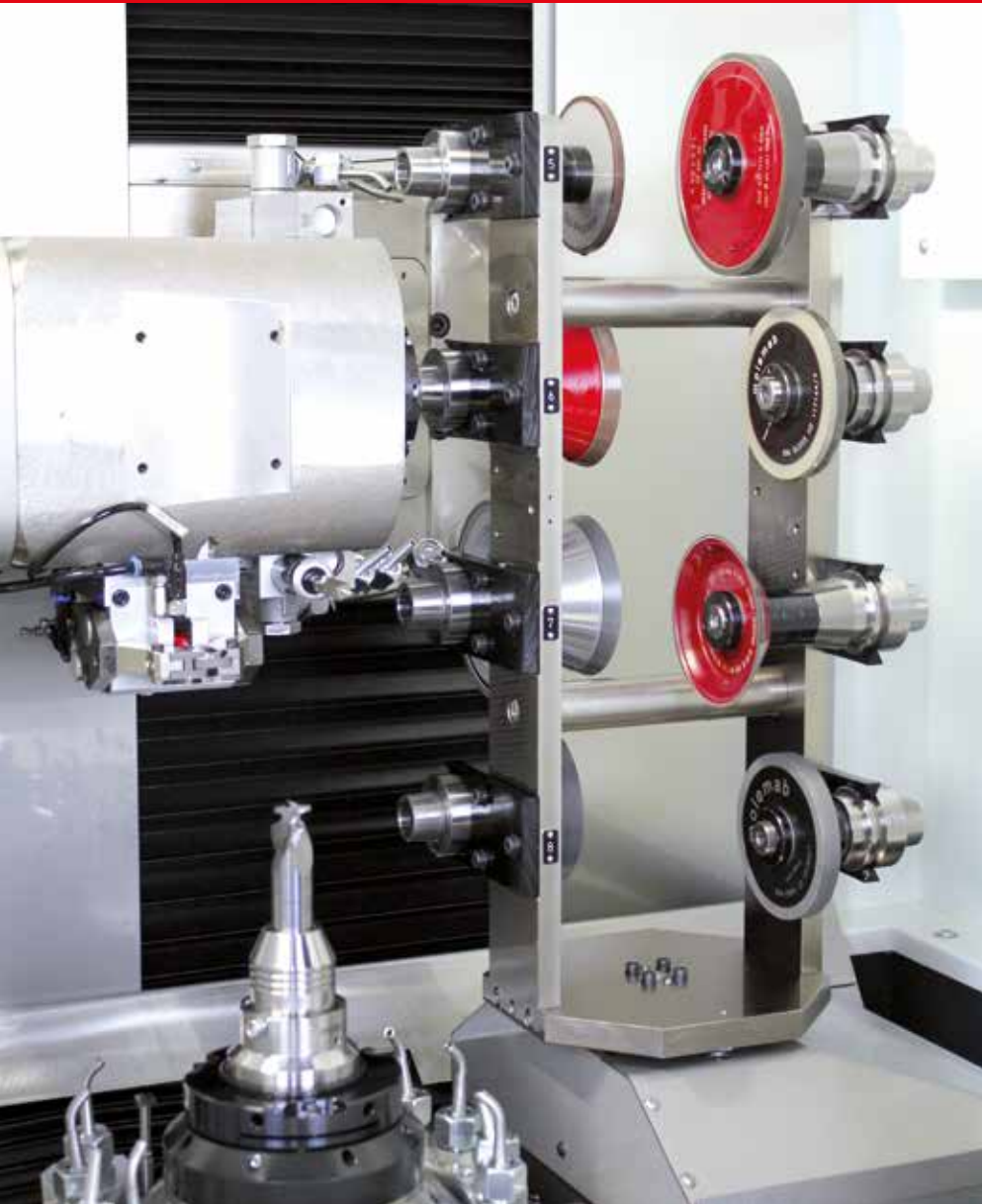
▶ The S22P – The high-end CNC grinding centre

Even stronger and much faster - the S22P for demanding tool production and parts manufacture at the topmost technological level.

▶ The S22NUM⁺ – High Performance CNC-grinding

The CNC grinding centre with NUM software and control. The precision and versatility typical for the S22 series is completed by the efficiency of the RC 1900 robotic loading cell.

INTEGRATED VERSATILITY FOR HIGH PRODUCTIVITY



The eight-station wheel changer integrated into the S22 as a standard feature.

The 8 station wheel changer which is a standard feature makes this machine a universal grinding centre allowing complex and precise tools and production parts to be completely machined or different materials to be processed (e. g. solid carbide and HSS).

Wheel changer

- ▶ Integrated in the machine
- ▶ Extremely short changing times
- ▶ Up to eight wheel packages
- ▶ Up to 24 grinding wheels
- ▶ High clamping precision due to HSK holding fixtures
- ▶ Program-controlled
- ▶ Larger versions upon request



HSK holding fixtures

With high-precision HSK holding fixtures, the selected wheel package is precisely coupled with the grinding spindle with absolutely no play.

Patented vertical design

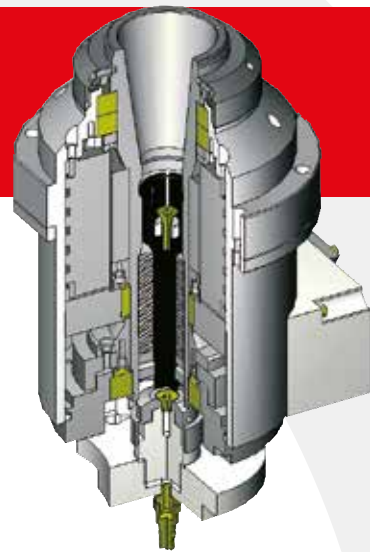
This patented vertical design with a vertical tool spindle (A-axis) is compact, facilitates better grinding results and offers considerable advantages compared with machines of conventional design:

- ▶ Optimum stiffness
- ▶ Ideal traversing of the axes
- ▶ Long grinding paths
- ▶ Short positioning paths
- ▶ Higher precision
- ▶ Easy loading and unloading

Digital drive mechanisms

– **reliable, precise, powerful**

- ▶ High spindle performance
- ▶ Infinitely variable grinding spindle speed (can be equipped with high-frequency spindle upon request)
- ▶ Highly dynamic, digital drives
- ▶ Direct measuring systems using glass scales in all axes
- ▶ High feed rates
- ▶ Fast, directly driven circular axes (torque drives)
- ▶ A-axis speed controllable up to 850 rpm for circular grinding



A-axis: torque motor



EVEN MORE HIGHLIGHTS FOR OPTIMUM PERFORMANCE



Automatic tool data acquisition

Through an electronic probe supplied as a standard feature, all essential tool data is collected – even such data as is relevant for automatic operation.

- ▶ Workpiece clamping length
- ▶ Diameter
- ▶ Tooth position
- ▶ Spiral
- ▶ Flute depth
- ▶ Flute length
- ▶ Face direction
- ▶ Uneven pitches
- ▶ Oil hole position

The measuring system is self-calibrating and allows for complete or selective acquisition of tool data.

Second probe (optional)

- ▶ For measuring the grinding wheels on the holding fixture
- ▶ Actual-data correction during automatic operation
- ▶ Measuring and compensating the dressed grinding wheel in the spindle holder
- ▶ Wear compensation
- ▶ Measuring the diameter, the width and the angle

Sturdy and compact

A robust mineral casting machine frame of concrete polymer (high mass, good vibration damping) and generously dimensioned guideways form a solid basis for high precision.

Ingenious separation between the working and the mechanical areas

Because of the separation of the mechanical area from the working area, delicate components of the S22 are given better protection.

Dressing in the machine (optional)

- ▶ IPD (in-process dressing) of grinding wheels
- ▶ Automatic, programmable dressing cycles
- ▶ Constant quality on the tool over a long period
- ▶ No interruption of the grinding process by wheel changing

Coolant ring

- ▶ Fixed coolant ring on the grinding head
- ▶ 14 adjustable nozzles
- ▶ Reliable coolant supply from different directions at a high coolant pressure
- ▶ Nozzles on the indexing head upon request

Flushing nozzle (optional)

- ▶ For difficult machining such as flute grinding
- ▶ Extremely high coolant pressure up to 50 bar with 17 l/min
- ▶ Perfect cooling and reliable flushing of the grinding wheel



AUTOMATION: ALWAYS THE OPTIMUM SOLUTION

The modular design of the S22 series allows for perfect matching of ingenious automation solutions to your needs.

You can choose from a low-cost PickUp loader integrated in the machine, a chain loader system for versatile

automation, a pallet system or other customised solutions for even larger workpiece quantities.

Retrofitting automation systems from specialised manufacturers is also possible without any problems.

Highly productive automation by the RC1900 robotic loading cell.

- ▶ Practical pallet system.
- ▶ Robust FANUC robot.
- ▶ For up to 640 workpieces per pallet (depending on the workpiece diameter).
- ▶ With optional spring collet change.





**Almost boundlessly universal
– the chain loader system**

- ▶ Attached to the machine and space-saving
- ▶ 155 workpiece locations with their individual codes to be assigned (can be extended upon request)
- ▶ Changing time approx. 12 sec
- ▶ Taking off or loading and unloading of parts possible during automatic operation
- ▶ Coding of the workpiece locations, i. e. the workpieces can be called in any sequence for machining, with empty locations being acceptable
- ▶ Machine malfunctioning reports via SMS

Pickup loading unit with chain loader sleeves

- ▶ mit Greifer am Schleifkopf (Ø 5–32 mm)
- ▶ mit Wechselteller: 16 Plätze für Verwendung von Standard Kettenladerhülsen Ø 2–32 mm



EFFECTIVE DETAILS FOR ANY DEGREE OF AUTOMATION

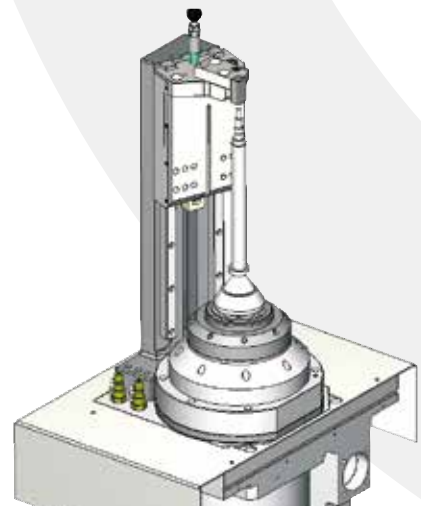


Automatic sleeve changing

- ▶ Facilitates the use of hydraulic expansion chucks for chaotic manufacturing
- ▶ Different sleeves are automatically loaded
- ▶ Cost reduction as only one reduction sleeve per diameter is required
- ▶ One gripper changes both sleeves and tools
- ▶ Diameter range from 3 to 32 mm

Safe machining of long tools (optional)

- ▶ Reliable clamping of long and slim tools between centres
- ▶ Fully automatic machining is possible
- ▶ Face machining is possible by a halved tail centre
- ▶ Support by an automatically applicable rest



The S22 automation system relies on components which positively influence accuracy and profitability, thereby increasing versatility.

The workpiece to be loaded is precisely positioned by a gripper attached to the grinding head and by the highly accurate machine axes within a range down to the micrometer.



Gripper on the grinding head

- ▶ High positioning accuracy
- ▶ Reliable changing into hydraulic expansion chucks and sleeves is possible



Blank being taken from chain loader.



Pre-positioning for blank changing.



Reliable changing into hydraulic expansion chuck.

Runout measurement

The measuring position, the runout tolerance and the number of measuring points can be freely defined in the software.



PERFECTION IN THE HARD- UND SOFTWARE

The versatility of the S22 machine series is logically expanded by the availability of various control and software alternatives.

You can choose between two leading control and software packages: the MTS software or the AXIUM Power P2 NUM control with the NUMROTO®-plus tool grinding software.



Multifunctional operator panel

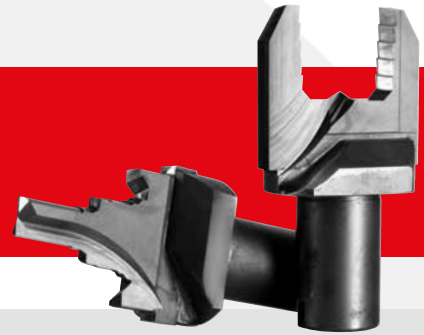
- ▶ Clearly arranged and functional
- ▶ Height-adjustable
- ▶ Tilting 15 in. TFT colour display unit
- ▶ For non-tiring and reliable working
- ▶ Workshop keyboard
- ▶ Trackball mouse
- ▶ Direct access to significant function switches

Modem for remote diagnosis

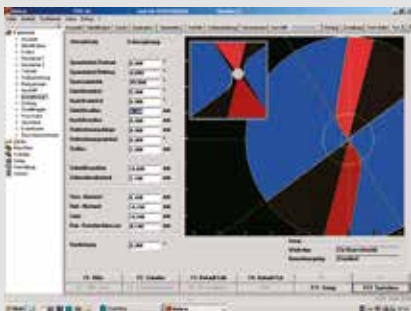
- ▶ Application-related support
- ▶ Quick and inexpensive troubleshooting assistance
- ▶ Easy transmission of updates



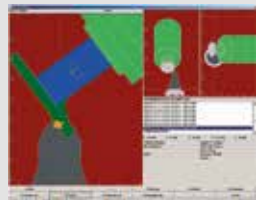
No matter whether you decide on the „turbo“ or „NUM“ version, you will always work on high-performance PCs using Microsoft® Windows XP Professional or Windows 7 as operating system.



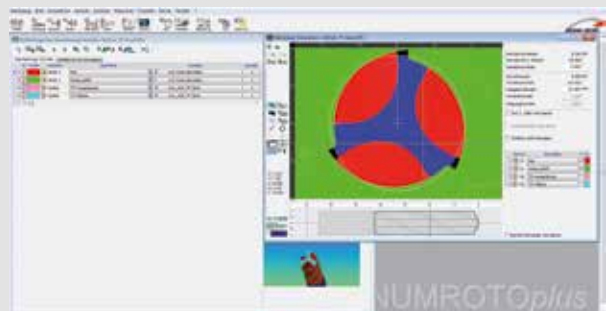
Tool-kit PROFESSIONAL from MTS AG



- ▶ Diverse program packages for various tool families
- ▶ Easy input and programming
- ▶ Quick program generation by a default function
- ▶ Simple tool and wheel management
- ▶ Integrated 2D simulation
- ▶ Linking with collision monitoring as a standard feature



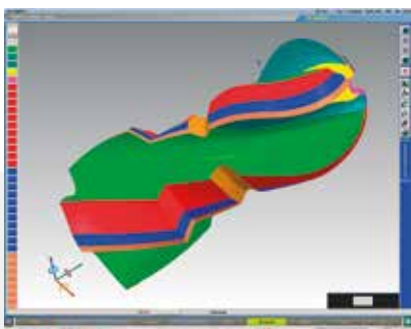
NUMROTOplus® from NUM AG



- ▶ Extensive software for almost any grinding task
- ▶ Exact and quick 2D section simulation at any position
- ▶ Flexible and logical programming
- ▶ Help screens for any input value
- ▶ Sensing and compensation of radial eccentricities
- ▶ Job manager for un-manned operation
- ▶ Continuous program updating with full compatibility
- ▶ 3D simulation (as an option)

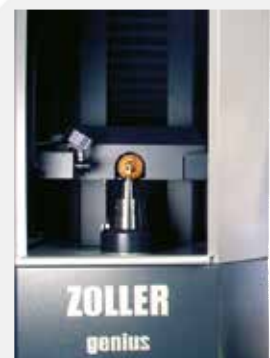
3D simulation „tool-kit 3D-view“ (optional)

- ▶ Interfaces for Tool-kit PROFESSIONAL
- ▶ Easy constructing of complex tools
- ▶ No machining time losses



Measuring machines

- ▶ Interface for the „genius 3“ ZOLLER 5-axis measuring machine
- ▶ Non-contact, automatic complete measuring
- ▶ Reliable documentation
- ▶ Measuring of grinding wheels and wheel radii
- ▶ Transmission of correction data directly to the machine



SPECIAL APPLICATIONS AND SPECIAL TOOLS

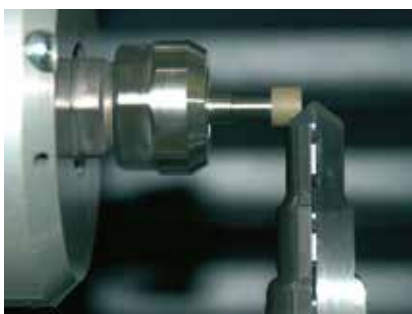
The S22 is suitable for the machining of various kinds of tools and workpieces with a wide range of different materials. Please feel free to ask us for our assistance in solving your product problems.



Example of a customer requirement:
Complete machining of blanks for PCD-tipped tools.

The S22 dual grinding head can solve this problem.

- ▶ Pre-machining with the S22 main spindle.
- ▶ Grinding in the highly precise PCD cutting tip seats using the HF spindle.



Optionally available with automatic grinding point changing.



The HF spindle with automatic grinding point changing is another extra, and automatic measuring by the „second (infrared) measuring probe“ option is also possible.



Technical Specifications

Tool Grinding Center Type S22

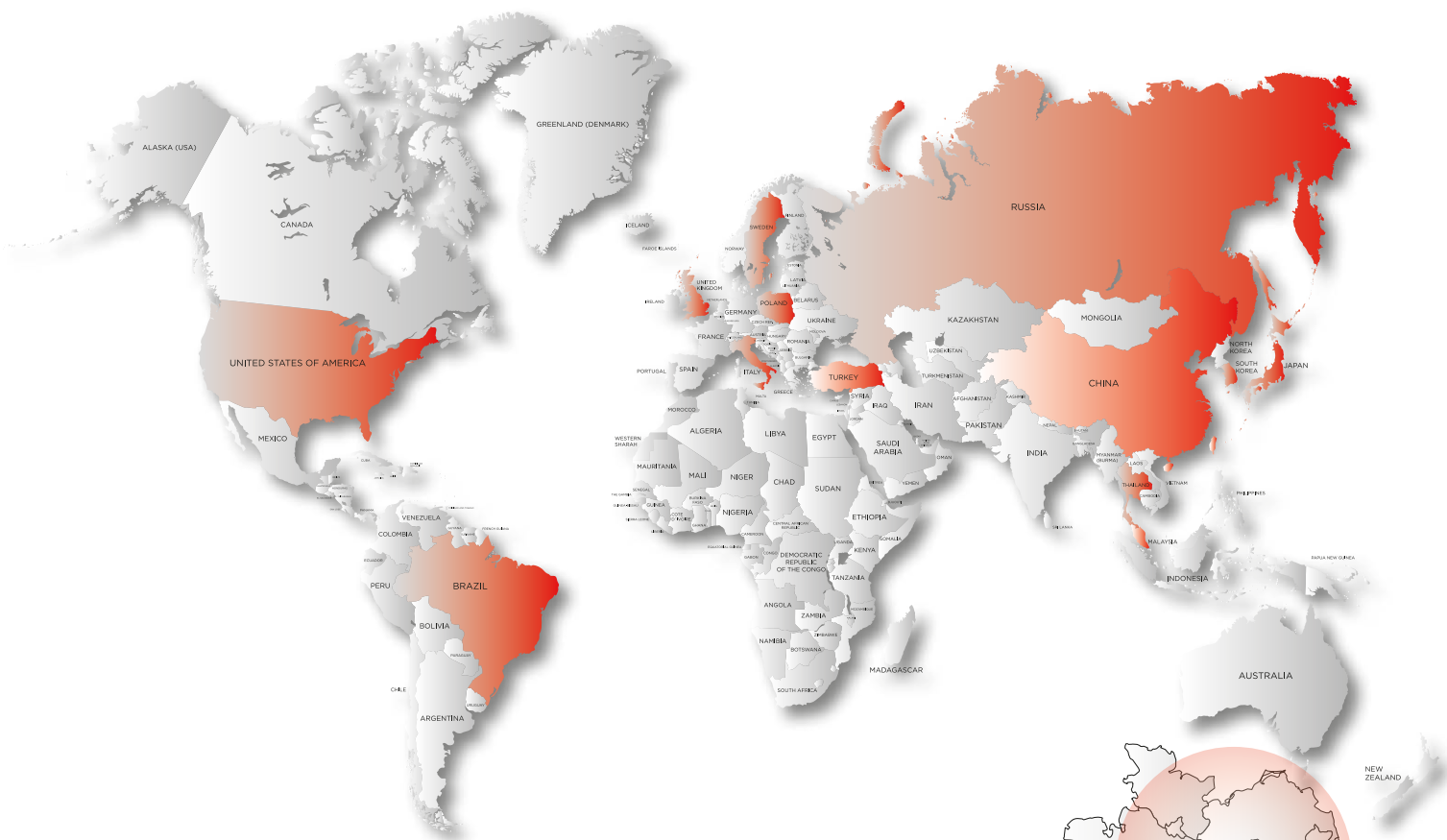
Version	S22E-turbo	S22E-NUM	S22P-NUM	S22NUM+	
Wheel changer					
hydraulically supported	eight-wheel type				
Spann- und Schleifbereich					
Max. workpiece diameter ¹⁾	approx. 250 mm				
Max. workpiece length ²⁾	approx. 900 mm				
Max. workpiece length for face grinding ³⁾	400 mm				
Max. tool weight	50 kg (max. 100 kg ⁵⁾)				
Traversing range/measuring system					
X-axis	Grinding stroke	400 mm			
	Feed rate	12 m/min	20 m/min	12/20 m/min ⁶⁾	
	Drive	digital controller with AC motor			
	Torque	2.2 Nm	4.3 Nm	7.4 Nm	5.0 Nm
	Measuring system	direct/glass scale			
Y-axis	Grinding stroke	310 mm			
	Feed rate	12 m/min	20 m/min	12/20 m/min ⁶⁾	
	Drive	digital controller with AC motor			
	Torque	2.2 Nm	2.0 Nm	6.0 Nm	5.0 Nm
	Measuring system	direct/glass scale			
Z-axis	Grinding stroke	400 mm			
	Feed rate	12 m/min	20 m/min	12/20 m/min ⁶⁾	
	Drive	digital controller with AC motor			
	Torque	2.2 Nm	2.0 Nm	6.0 Nm	5.0 Nm
	Measuring system	direct/glass scale			
A-axis	Grinding stroke	400 mm			
	Feed rate	12 m/min	20 m/min	12/20 m/min ⁶⁾	
	Drive	digital controller with AC motor			
	Torque	2.2 Nm	2.0 Nm	6.0 Nm	5.0 Nm
	Measuring system	direct/glass scale			
A-axis	Resolution	0.0001 mm			
	Grinding stroke	400 mm			
	Feed rate	12 m/min	20 m/min	12/20 m/min ⁶⁾	
	Drive	digital controller with AC motor			
	Torque	2.2 Nm	2.0 Nm	6.0 Nm	5.0 Nm
A-axis	Measuring system	direct/glass scale			
	Resolution	0.0001 mm			
	Freely rotating, modulo function (counting from 0 to 360°)	360°			
	Feed rate (speed at rapid traverse)	500 rpm ⁴⁾	850 rpm ⁴⁾	500 bzw. 850 rpm ⁴⁾	
	Drive	digital controller with torque motor			
A-axis	Torque	25 Nm	40 Nm	25 bzw. 40 Nm ⁶⁾	
	Measuring system	direct/encoder			
	Resolution	0.0008°	0.0005°	0.00005°	0.0005° bzw. 0.00005°
	Swivel range	224°			
	Feed rate (speed at rapid traverse)	40 rpm	60 rpm	40/60 rpm	
C-axis	Drive	digital controller with torque motor			
	Torque	120 Nm	190 Nm	120/190 Nm ⁶⁾	
	Measuring system	direct/HR encoder			
	Resolution	0.0001°	0.00005°	0.0005° bzw. 0.00005° ⁶⁾	
	Control System				
Operating System	Windows 7 Ultimate				
CNC	NUM-Axium Power		NUM-Flexium		
Grinding spindle					
Drive motor	synchronous direct drive				
Power	10 kW at 100 % c. d. f. / 15 kW at 100 % c. d. f.				
Peak power	18 kW ⁵⁾ / 27 kW ⁵⁾				
Coolant	oil or emulsion				
Sense of rotation	clockwise and anticlockwise				
Speed	infinitely variable from 1,000 to 8,000 rpm / optional: higher speed ranges				
Dimensions					
Weight	approx. 4,000 kg				
Size (depth x width x height)	approx. 1.800 x 1.800 x 2.150 mm		approx. 1.930 x 2.400 x 2.300 mm		
Robotic Loading Cell					
Robot model				RC 1900 Fanuc M10iA/10S	
Number of controlled axes				6	
Dimensions (depth x width x height)				approx. 1,320 x 1,410 x 2,300 mm	
Weight				880 kg	
Repeatability				± 0,05 mm	
Max. carrying load				10 kg	

Explanations: 1) depending on tool type 2) max. projection length from taper adapter upper edge 3) depending on workpiece position, grinding wheel holding fixture and grinding task 4) depending on moment of inertia 5) up to 30 sec.

Subject to modifications consistent with technical advance and errors excepted.

The representations and descriptions in this brochure include options with costs.

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