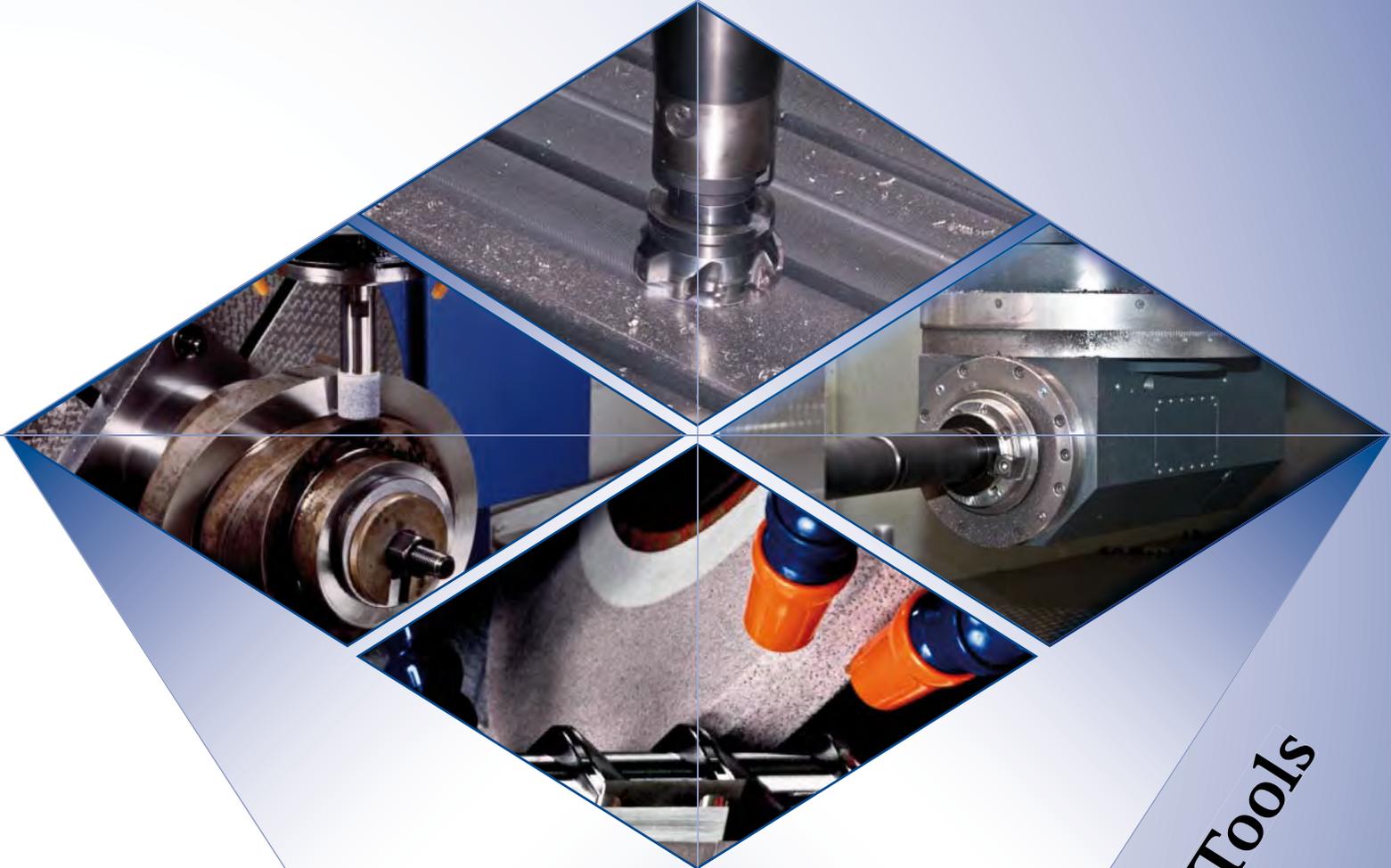
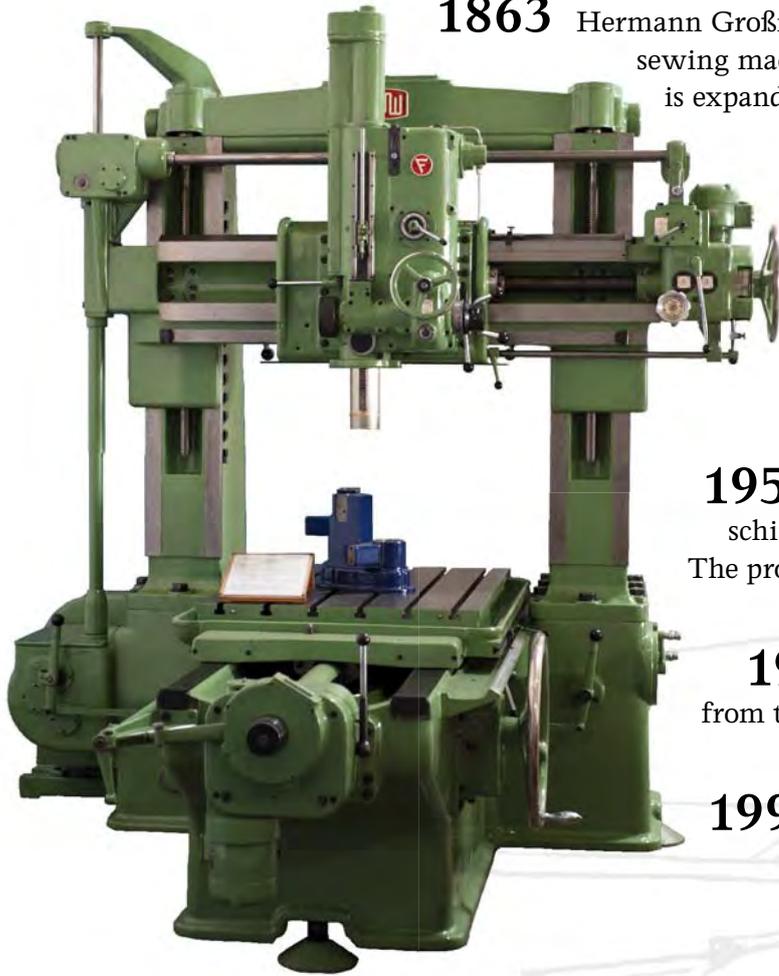


MIKROMAT



Precision Machine Tools

The productive μ ...



1863 Hermann Großmann founded a factory for the production of household sewing machines in Dresden. Soon after that, the production range is expanded to include column type lathes, polishing machines as well as boring and milling machines.

1869 The mechanic starts the production of mathematical-physical instruments and apparatus in Dresden.

1914 The Elbe-Werke are founded in Meißen. The company produces keyway-broaching machines and lathes.

1959 MIKROMAT is created in the merger of Feinstmaschinenwerke Dresden and Schleifmaschinenwerk Dresden. The production range includes, aside from jig boring machines, grinding machines and lathes, as well.

1996 MIKROMAT develops the first precision portal from two-dimensional jig boring machines for complete high-precision pentagonal processing (MIKROMAT 15 VX).

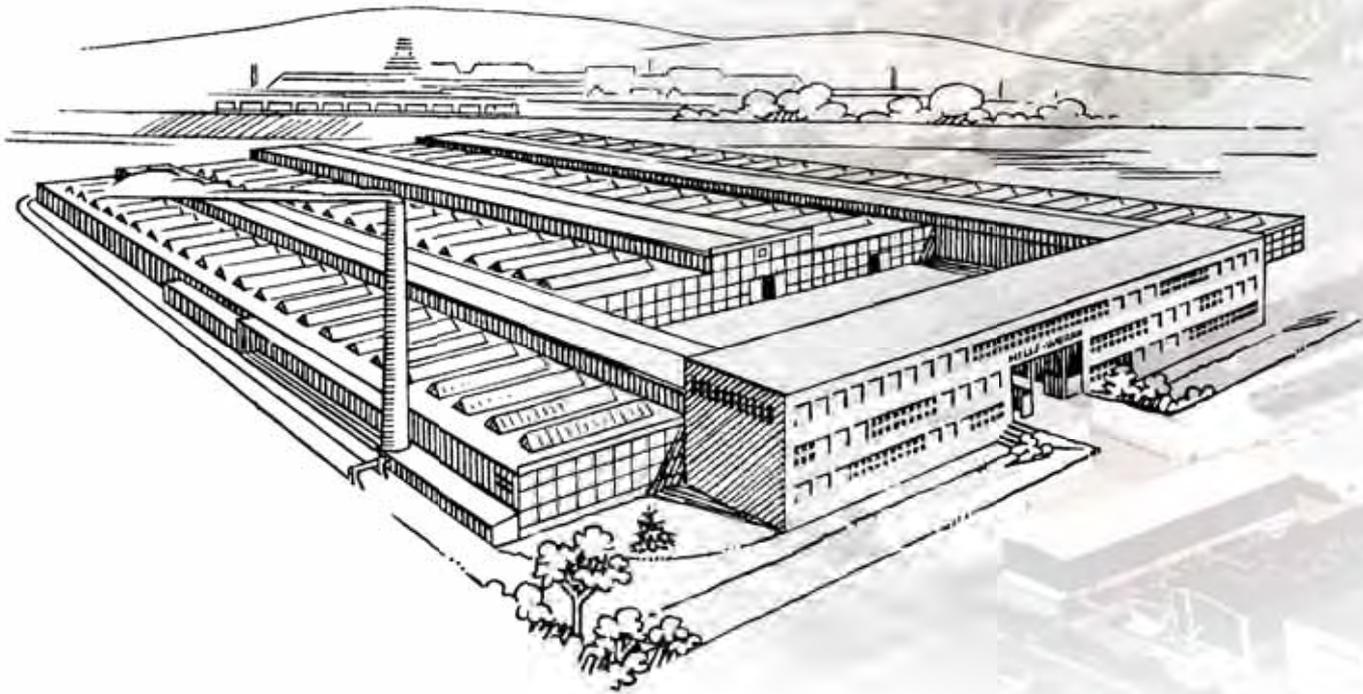
1997 MIKROMAT 20V is start of first generation precision portals 12V - 16V - 20V

2006 second generation of precision portals 12V - 16V - 20V - 40V

2011 MIKROMAT JIG portals have fully integrated vertical and horizontal boring/milling as well as JIG grinding.

...what we stand for





Knowledge preserved and passed down over generations is constantly being developed by scientific and technical progress.



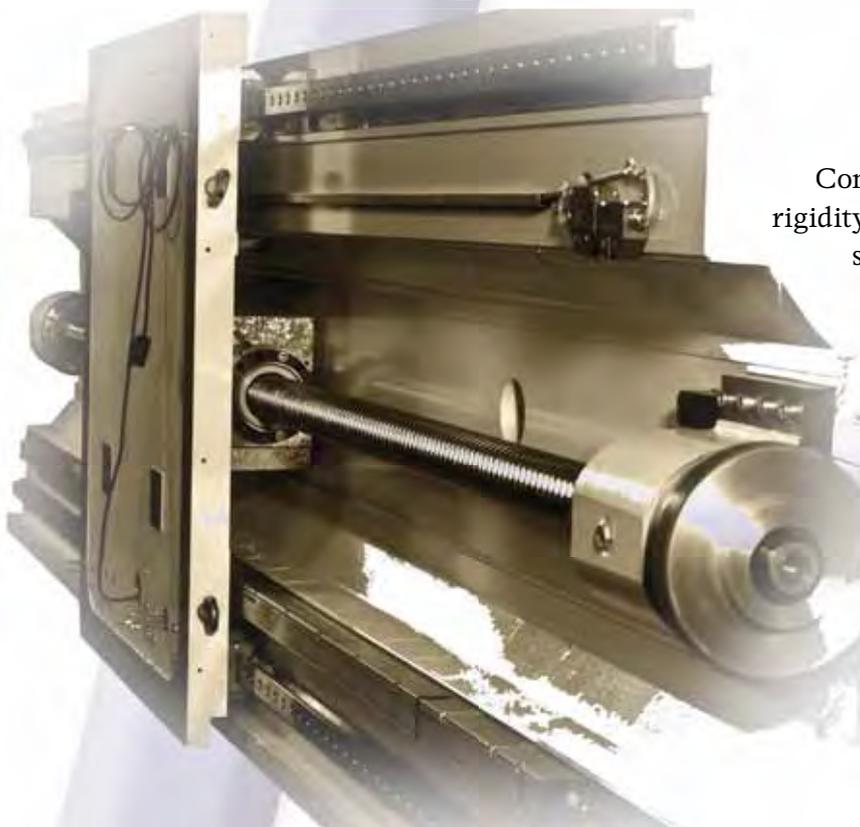
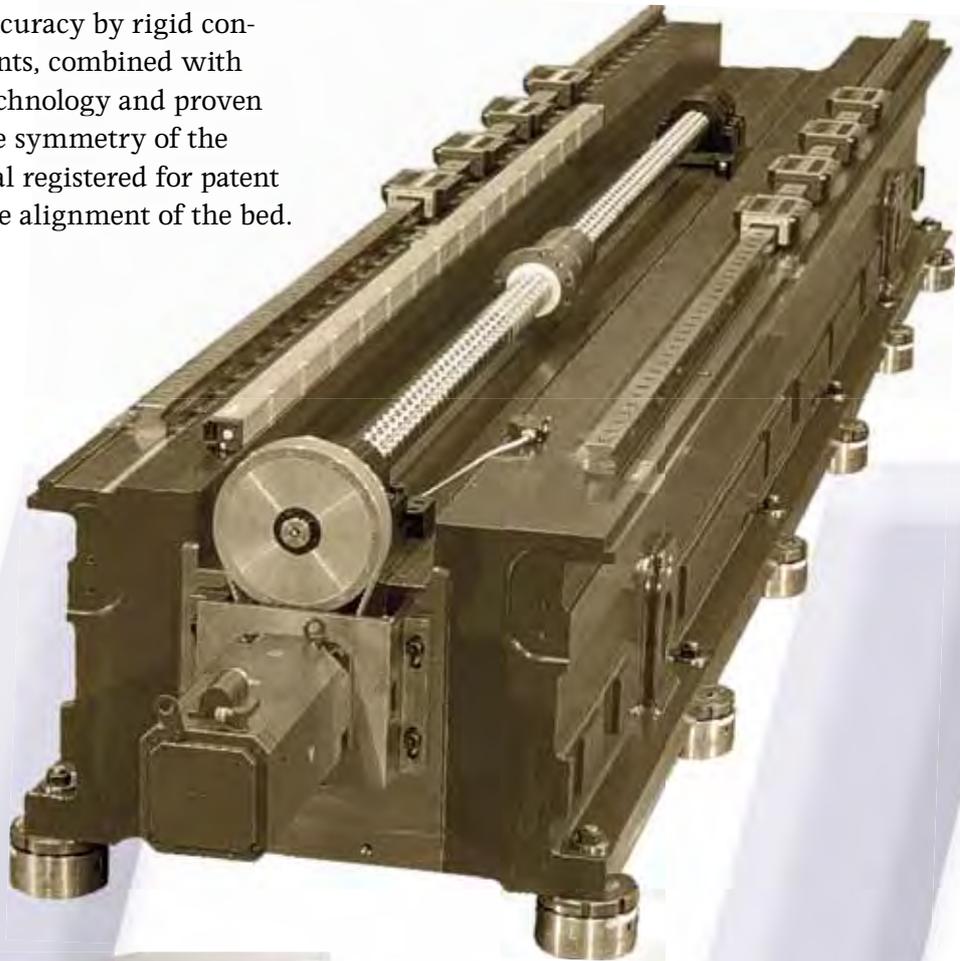
Only the use of our own private confidential work standards exceeding standardised quality assurance can guarantee precision and functional reliability at a JIG level.



MIKROMAT JIG

accuracy achieves production reliability for full lifetime.

High long-term accuracy by rigid construction of all components, combined with intelligent adjustment technology and proven principles of constructive symmetry of the precision castings. Special registered for patent technology is used for the alignment of the bed.



*Ultra precision
to the smallest detail*

Compact guide with the highest accuracy and rigidity, ball screws and ground nuts and grinded spindles with the highest torque constancy.

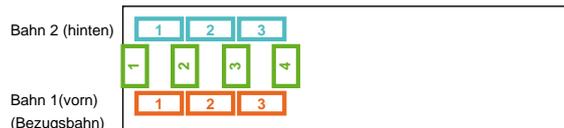
Jig boring machine precision - precision to the smallest detail, all from one hand.



The precision of the machine axes in combination with the highest level of manufacture accuracy regarding the straightness and perpendicularity of the machine axes ensures the **highest volumetric precision** in the whole working area.

Calculation of the straightness from slope measurement

Erzeugnis	Querbett 20V	
Bearbeiter	Dietrich	
Datum	29.01.2011	
Schrittmaß	200	mm
Skalenwert	1	µm/m
Temp. oben	20,0	°C
Temp. unten	20,0	°C
Bauteilhöhe	900	mm
Bahnabstand	900	mm

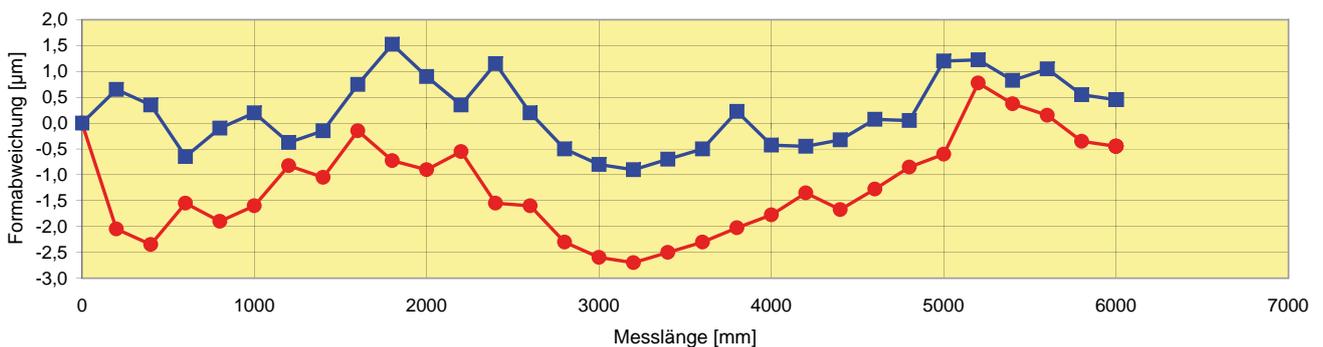


Messstelle:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
Libelle Bahn 2	10	9	10	13	13	12	13	18	14	9	11	12	8	8	10	11	14	14	14	10	13	13	14	13	17	15	11	13	10	13								
Libelle Bahn 1	10	15	16	15	17	16	14	18	14	14	15	14	14	12	14	15	15	15	18	15	16	13	17	16	17	19	12	14	12	13								
Querwaage	0	3	3	1	2	2	0,5	1	1	2,5	2	1	3	2	2	2	2	2	2,5	1,5	1	1,5	1,5	1	2	0,5	0,5	1	1	1								

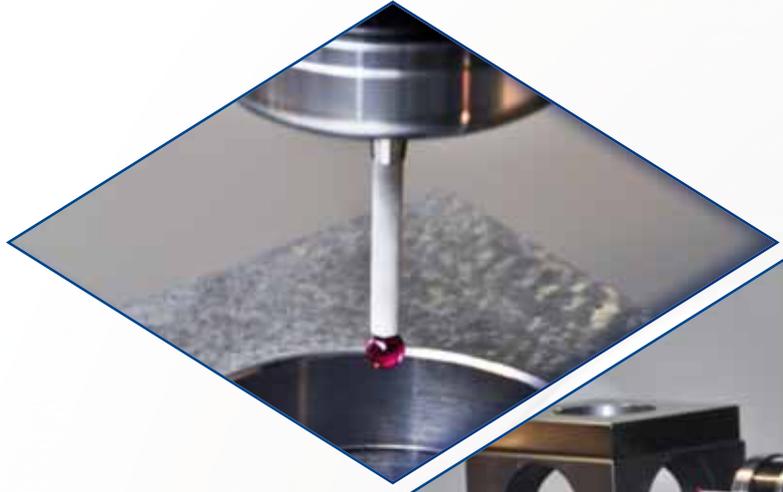
Anzahl der Querwaagenmessungen = Anzahl der Längswaagenmessungen + 1

Formabweichungen und Parallelität der Führungsbahnen (wenn am Bauteil kein Temperaturfehler vorliegt)

Formabw. Bahn 1	3,6 µm	Formabw. Bahn 2	2,5 µm	Parallelität	0,9 µm
-----------------	--------	-----------------	--------	--------------	--------



Measuring and correction
for wear by integrated tool measuring
system and calibration method
registered for patent.

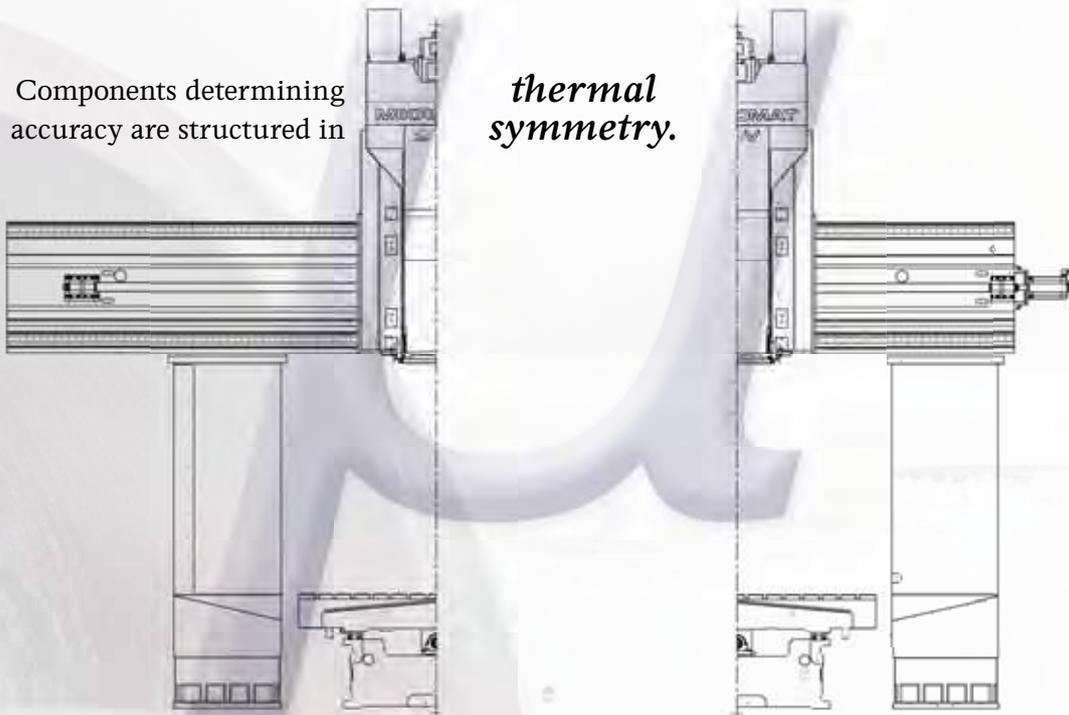


High-rigidity spindle system,
adapted for high precision 5-side
machining.

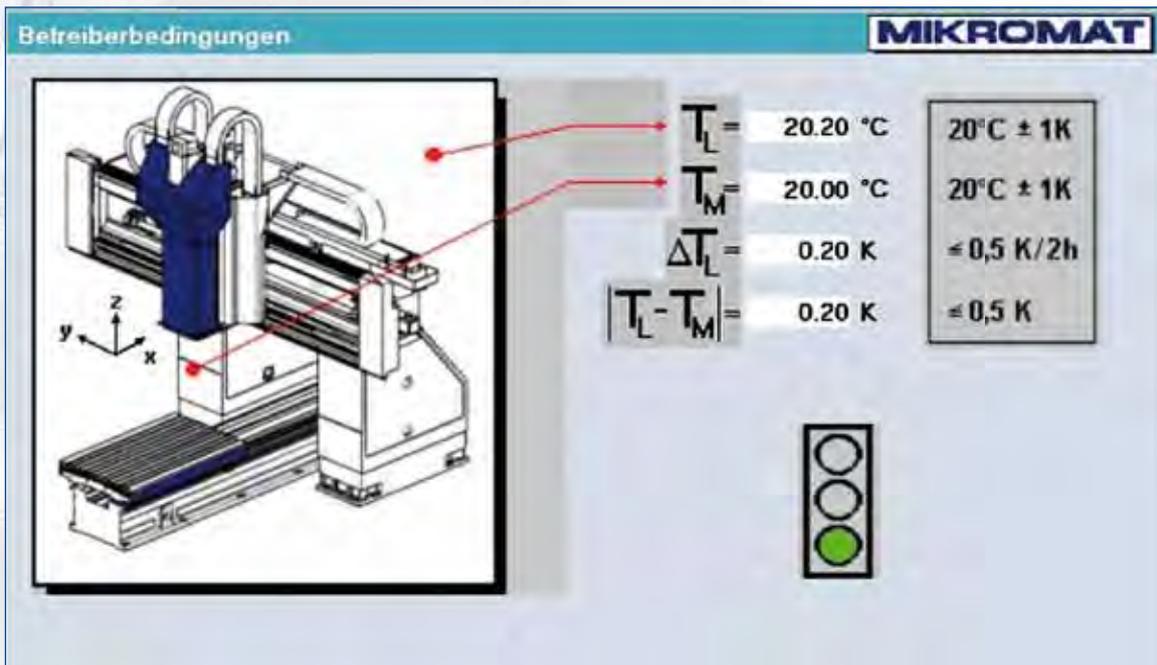


Components determining accuracy are structured in

thermal symmetry.



Highest *thermal stability* by controlled flow of thermally stable coolant through all relevant parts and assemblies of machine like spindle stock and milling heads, maintaining a reference temperature.



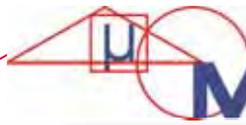
Expansion of area of application by *head and spindle exchange systems*, which allow high tool rigidity and more favourable engagement conditions, even in unusual positions.



Additional attachable equipment for automatic docking of angle boring and milling heads (multiple side processing) and spindle extension on the modified Z carriage via pick-up procedures from an appropriate storage unit. Highly accurate positioning and very rigid and failsafe equipment clamping with great force to the Z carriage guarantee dependable precision processing with all optional units.

Angle boring and milling head (WBFK)

- Spindle extension
- Exchangeable high-speed spindles
- Special drill heads and milling heads
- universal angle milling heads (UFK)
- For 5-axis machining is available a fixed integrated a 2-axis fork heads



MIKROMAT



Complete machining

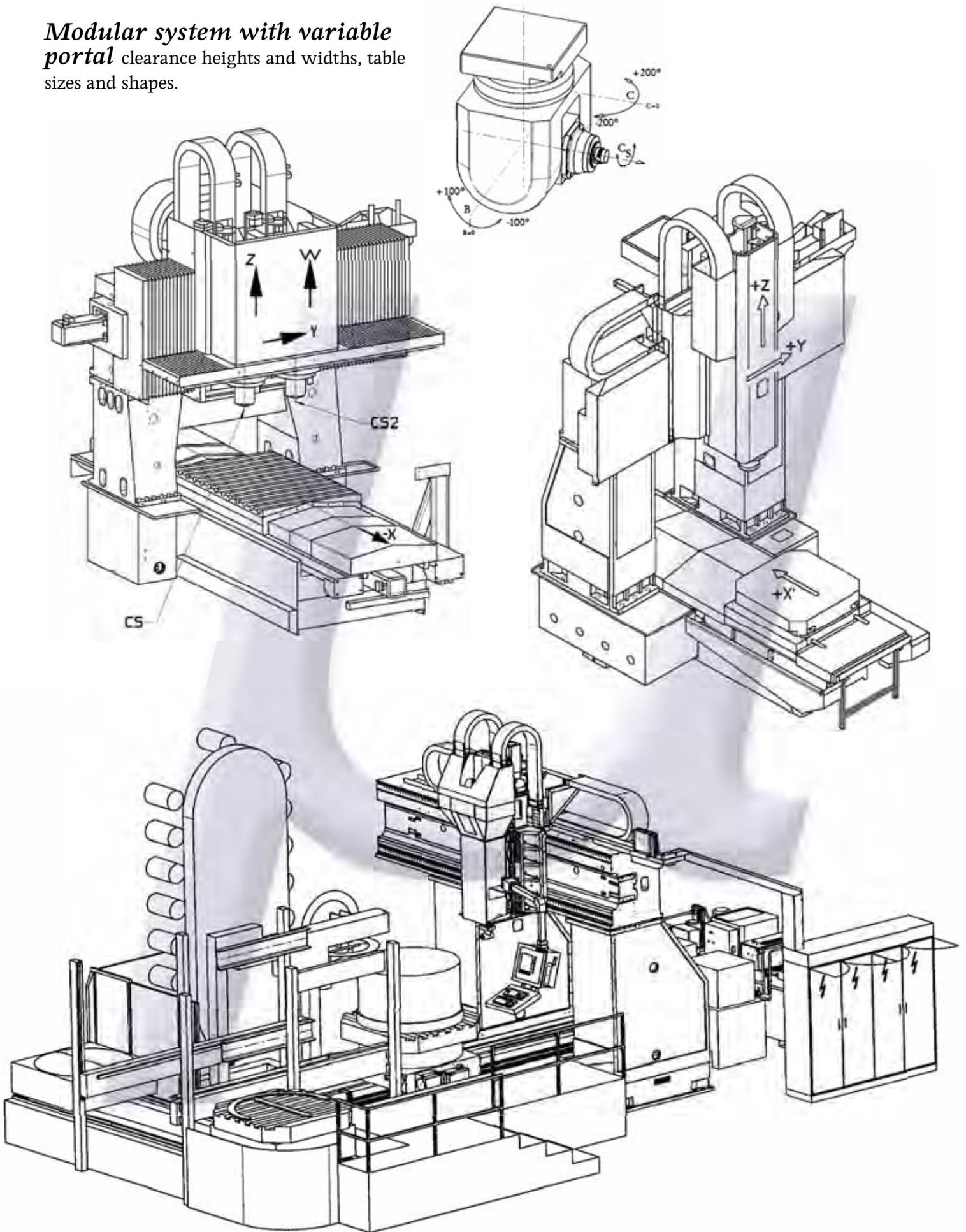
All components are dimensioned for high loads, thus it is possible to carry out roughing and finishing, if necessary.

JIG- and HSC Technology

- Increases productivity of elaborate finishing when processing free formed surfaces in die and mold production
- 5-axis roughing and finishing with torque-driven fork head and exchangeable spindle
- Hard processing of work pieces as final processing, thus no additional introduction of heat and warping.



Modular system with variable portal clearance heights and widths, table sizes and shapes.



JIG - Compact Series

MIKROMAT 8V – 8V 2S – 8V HSC



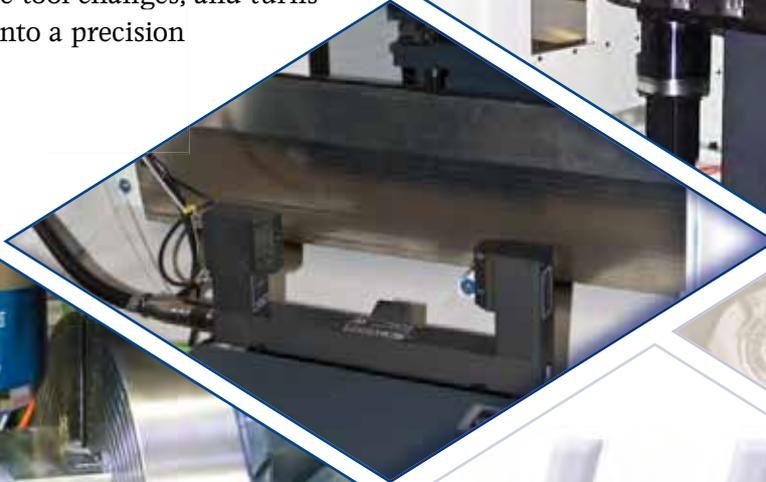
The MIKROMAT 8V, 8V 2S and 8V HSC are based on a dynamically and statically optimised design in portal style. The optimally-dimensioned machine bed and the rigid portal guarantee, in combination with the high-precision linear guidance system, long-term precision in the high accuracy range.



Laser measuring system
for automatic tool measurement and
breaking check.



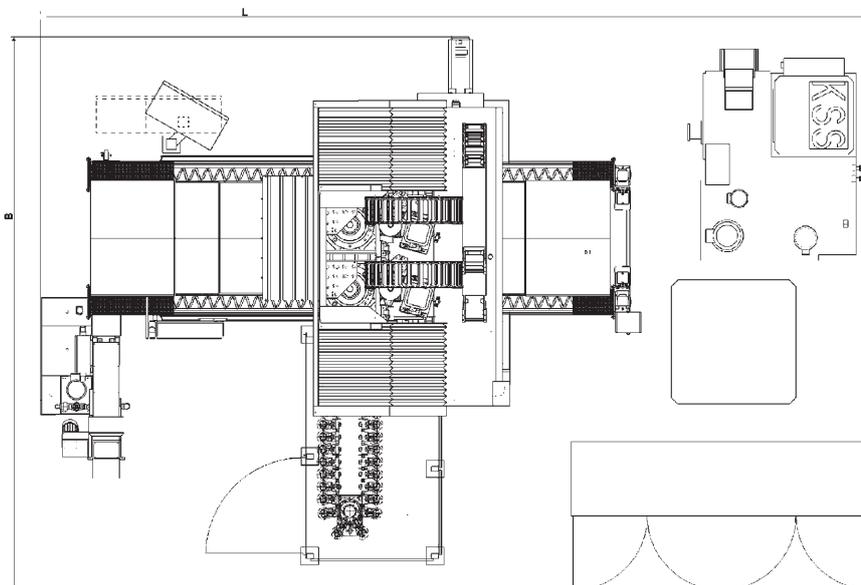
The ***ATC (automatic tool changer)*** allows quick and precise tool changes, and turns the precision machine into a precision machining centre.

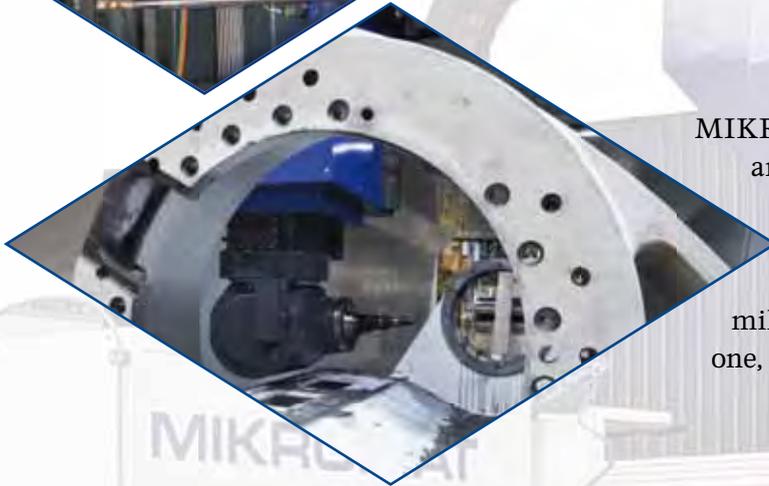
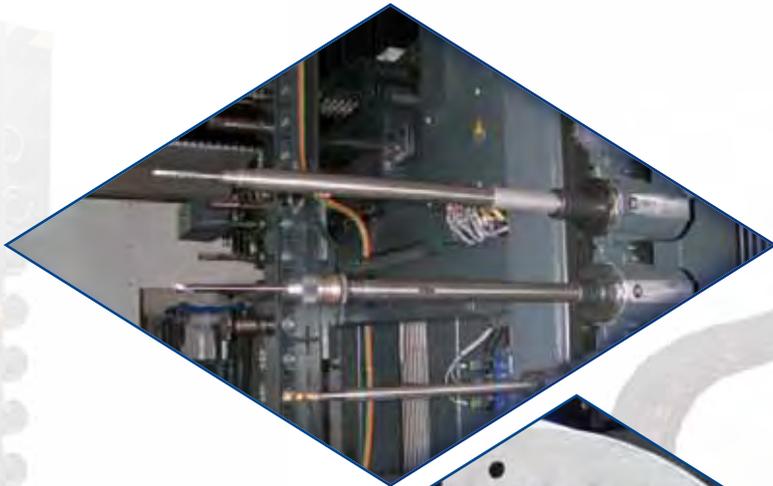


Exchangeable boring heads with face plates increase the precision machine's processing range.

		MIKROMAT 8V	MIKROMAT 8V 2S
Travel X	mm	1200	
Travel Y	mm	1000	1000 (485)
Travel Z	mm	600	600
Distance from spindle nose to table surface		100 ... 700	
Outlet portal	mm	1000	
Table size	mm	1000 x 800 optional 1000 x 1500	
Table load	kN	15	
Space requirements	L-B-H	6,5 - 4,5 - 3,9	
Net weight	kg	18000	
Feed rate X, Y, Z	mm/min	0 ... 30000	
Positional uncertainty (P) X, Y, Z	mm	0,002	
Positional scatter (P _s) X, Y, Z	mm	0,001	
Reversibility (U) X, Y, Z	mm	0,0005	
Spindle speed rate	min ⁻¹	10 ... 8000 10 ... 16000 10 ... 24000	
Power of the spindle motor 100 / 25% duty ratio	kW	44 / 66 44 / 66 18 / 23	
Torque of the spindle motor 100 / 25% duty ratio	Nm	210 / 340 210 / 340 55 / 72	
Tool shank		SK 50 HSK-A 63 HSK-A 100	

* Subject to modifications for reasons of technical progress





MIKROMAT JIG precision portals are the world-leading precision processing technology, and are vertical and horizontal jig boring machines and jig milling machines combined into one, for high-precision processing.



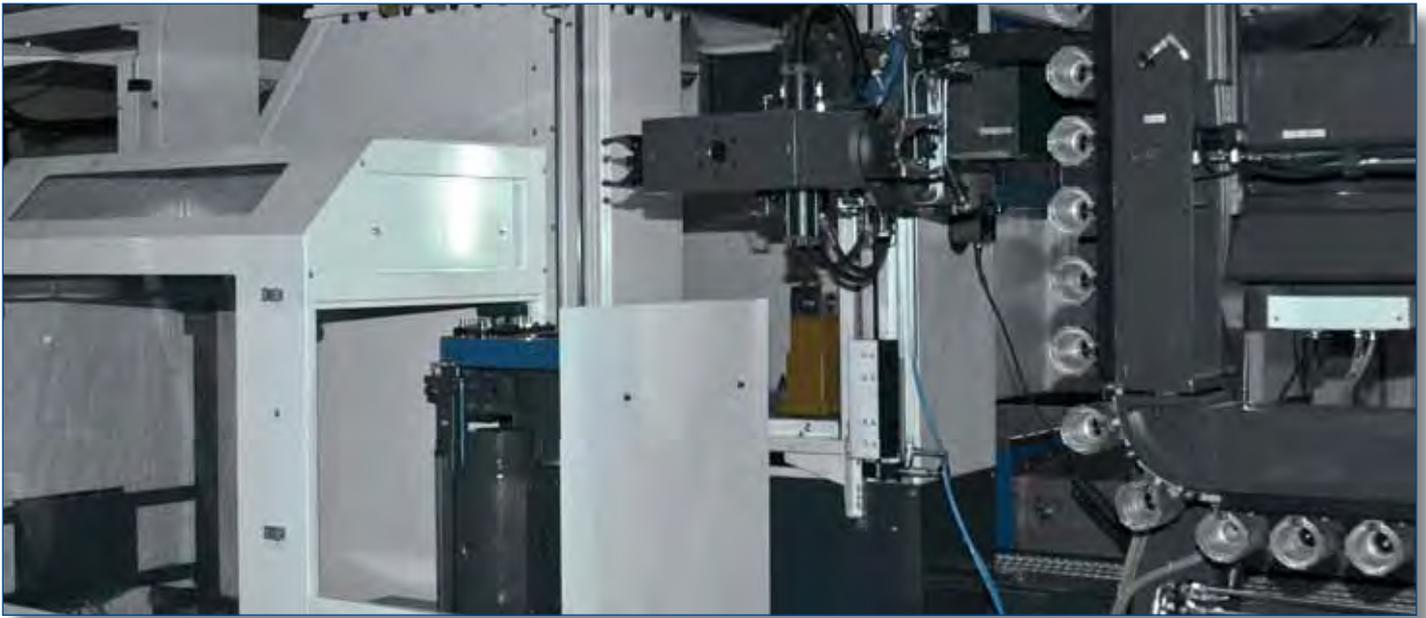
JIG - Precision portals MIKROMAT 12V - 20V



Decades of experience in the production and use of vertical and horizontal jig boring machines and jig milling machines have defined a new type of machine for JIG 5-side and 5-axis machining. Precision is determined by the totality of the finishing process. The complete finishing of the work piece in once clamping is the most efficient way for high precision. Extended axis in combination with head and extension system achieve maximum work space at a minimum machine size. Boring, milling and grinding technologies are all fully integrated.

Fully-integrated two-axis fork heads for use as a *5-axis simultaneous machine*.





With the use of an automatic tool changer (ATC), a higher level of system automation can be achieved. The automatic tool change can take place in the vertical main spindle as well as in the horizontal or vertical machining heads. The number of tool stations of the magazine is variable. The tools are changed outside the working area, thereby allowing the full working area to remain usable, and collisions are avoided.



The most varying range of *machine options and additional equipment* offer a variety of options for processing the most different work pieces.



A central *power interface* with automatically-pluggable media coupling for all equipment functions and technical procedures (internal and external cooling). The direction of all drill and milling heads is configured automatically.

		MIKROMAT 12V	MIKROMAT 12V 5D	MIKROMAT 20V	MIKROMAT 20V 5D
Travel X	mm	2700		4700 5700	
Travel Y	mm	2200		3000 3400	
Travel Z	mm	1050		1250	
Travel B	grad	--	+/-95	--	+/-95
Travel C	grad	--	+/-360	--	+/-360
Table size	mm	1250 x 2000		2000 x 4000 2400 x 5000	
Table load	kN	50		120 150	
Table slot /distance	mm	22 / 100		22 / 160	
Max. portal width	mm	1600		2650	
Distance from spindle nose to table surface	mm	100 ... 1150	-100 ... 950	100 ... 1350	-70 ... 1180
Space requirements	L-B-H	9,5 - 4,5 - 5,1		11,5 - 6,4 - 5,5	
Net weight	kg	32000		48000 80000	
Feed rate X, Y	mm/min	0 ... 30000		0 ... 22000 0 ... 30000	
Feed rate Z	mm/min	0 ... 25000			
Max. feed force X, Y, Z	kN	15			
Max. torque B, C	Nm	--	2000	--	2000
Max. clamping torque B, C	Nm	--	7000	--	7000
Positional uncertainty (P) X, Y, Z B, C	mm	0,0025 / 0,0025 / 0,0025		0,006 / 0,006 / 0,003	
	grad	--	0,003	--	0,003
Positional scatter (P _s) X, Y, Z	mm	0,0015 / 0,0015 / 0,0015			
Reversibility (U) X, Y, Z	mm	0,0005 / 0,0005 / 0,0005		0,001 / 0,001 / 0,001	
Spindle speed rate	min ⁻¹	10 ... 6000	10 ... 24000 10 ... 7000	10 ... 6000	10 ... 24000 10 ... 7000
Power of the spindle motor S1 / S6 40%ED	kW	37 / 56	34 / 43 42 / 55	37 / 56	34 / 43 42 / 55
Torque of the spindle motor S1 / S6 40%ED	Nm	800 / 1250	72 / 91 400 / 525	800 / 1250	72 / 91 400 / 525
Tool shank		SK 50	HSK-A 63 HSK-A 100	SK 50	HSK-A 63 HSK-A 100

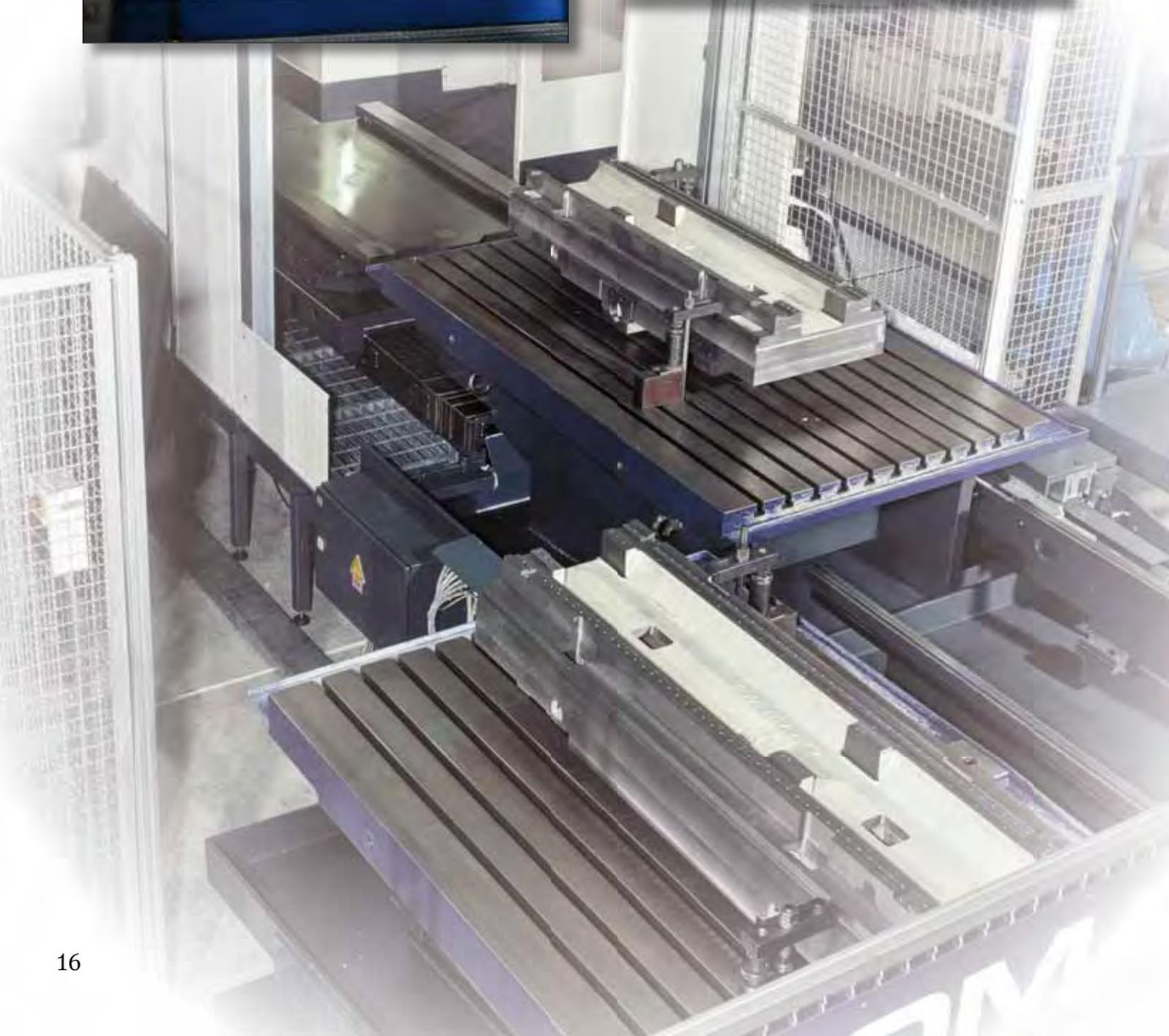
* Subject to modifications for reasons of technical progress

+X'

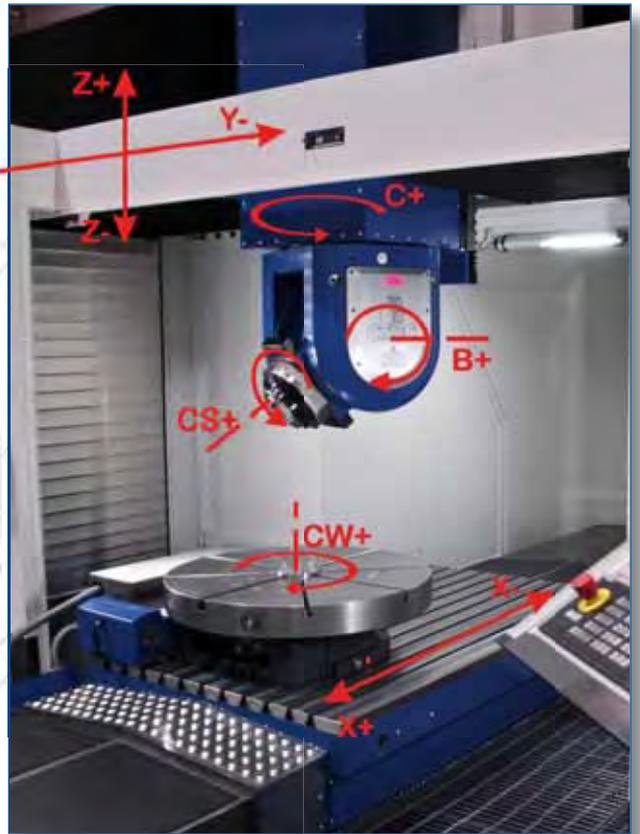
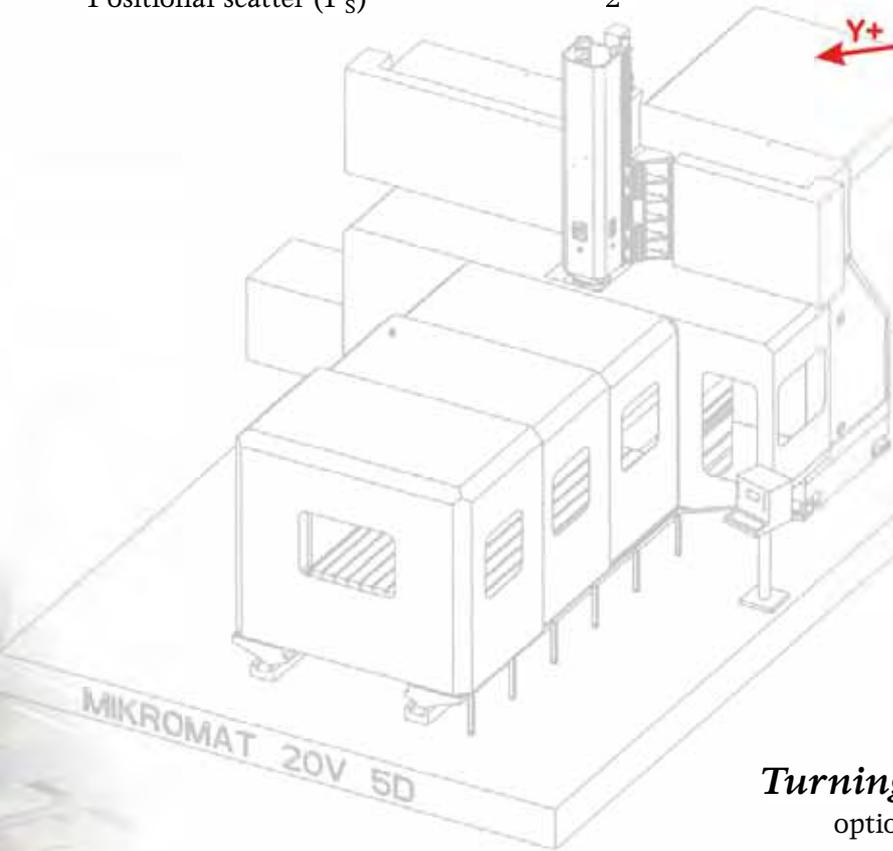
-Z



Pallet changer and zero-point clamping systems for efficient production through parallel set-up and processing times.

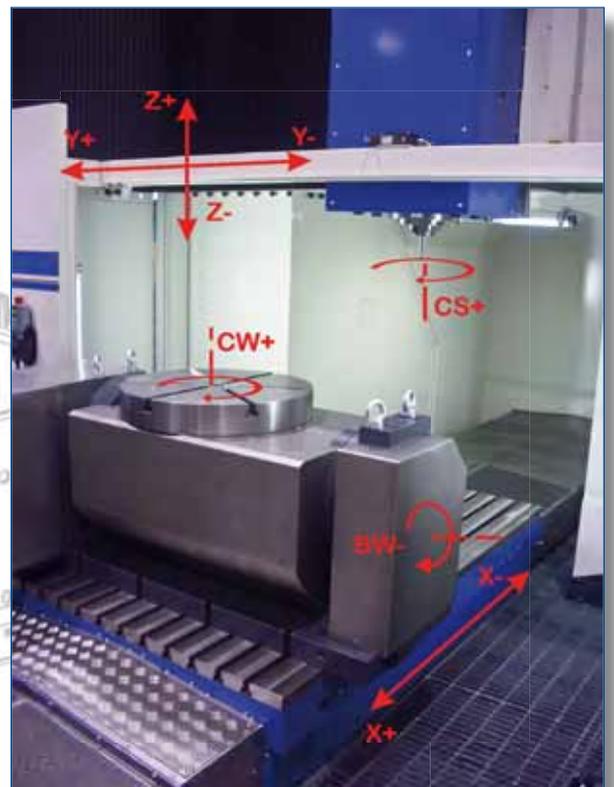
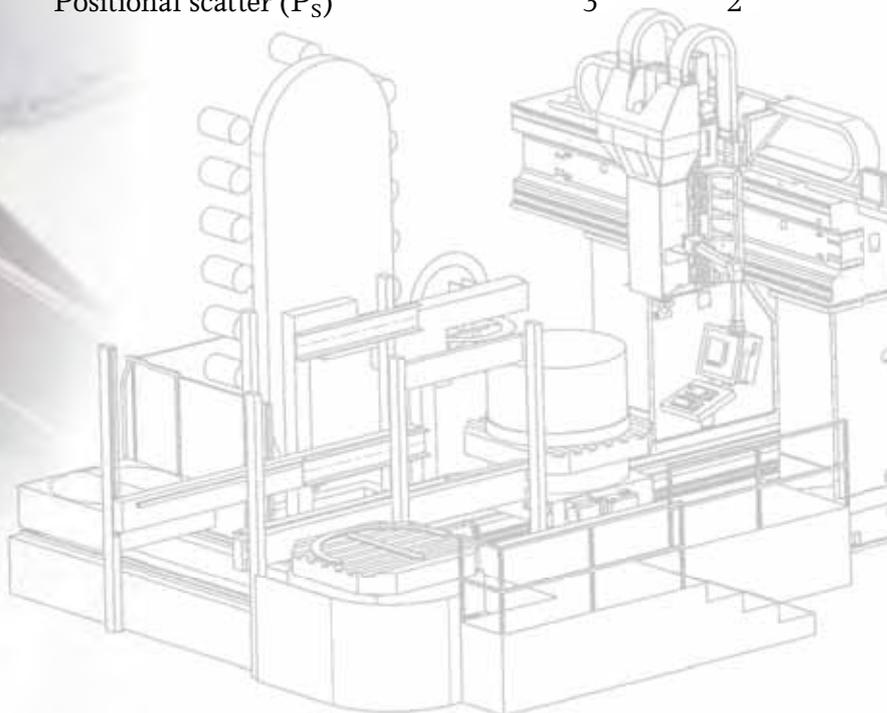


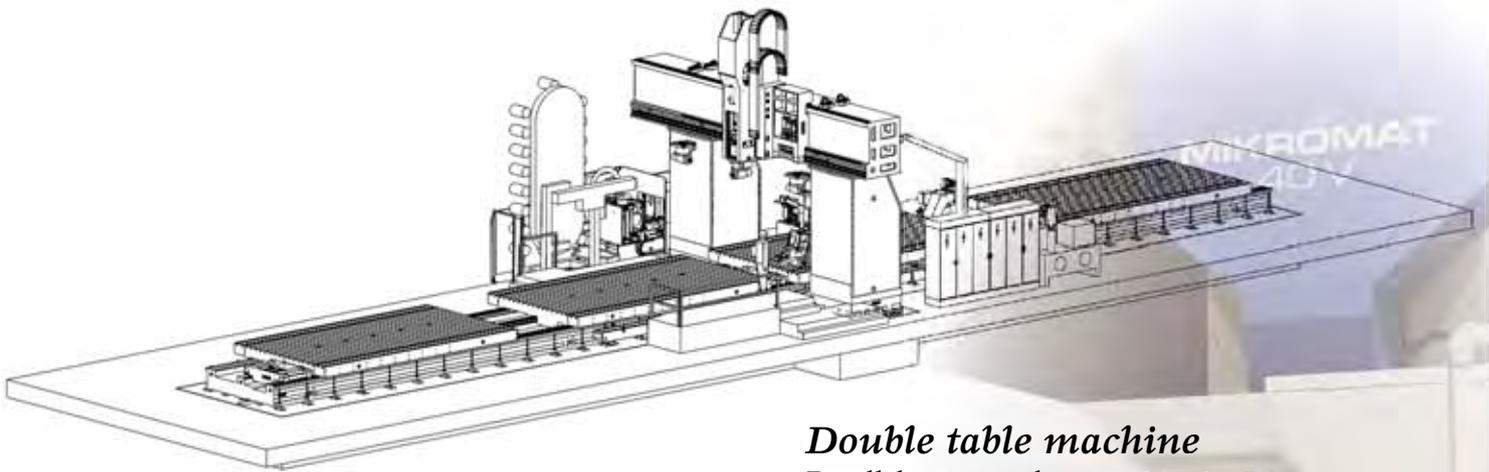
	CW
Positional uncertainty (P)	3''
Positional scatter (P _S)	2''



Turning and rotary-/Swiveling tables as an option for machining of workpieces in every position.

	BW	CW
Positional uncertainty (P)	5''	3''
Positional scatter (P _S)	3''	2''

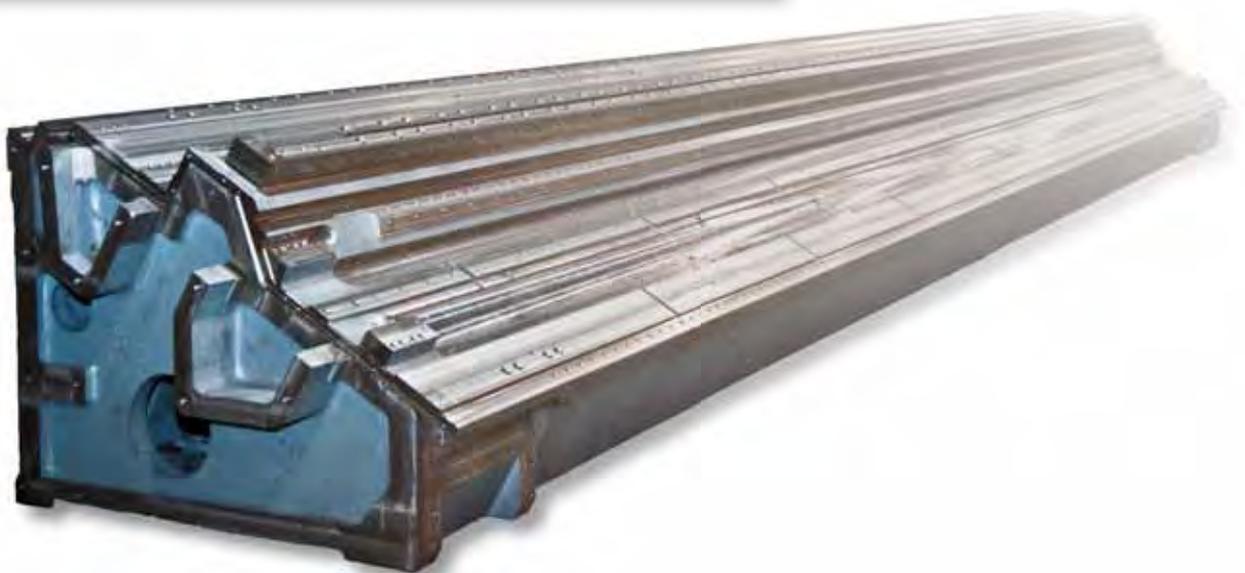




Double table machine

Parallel set-up and processing times

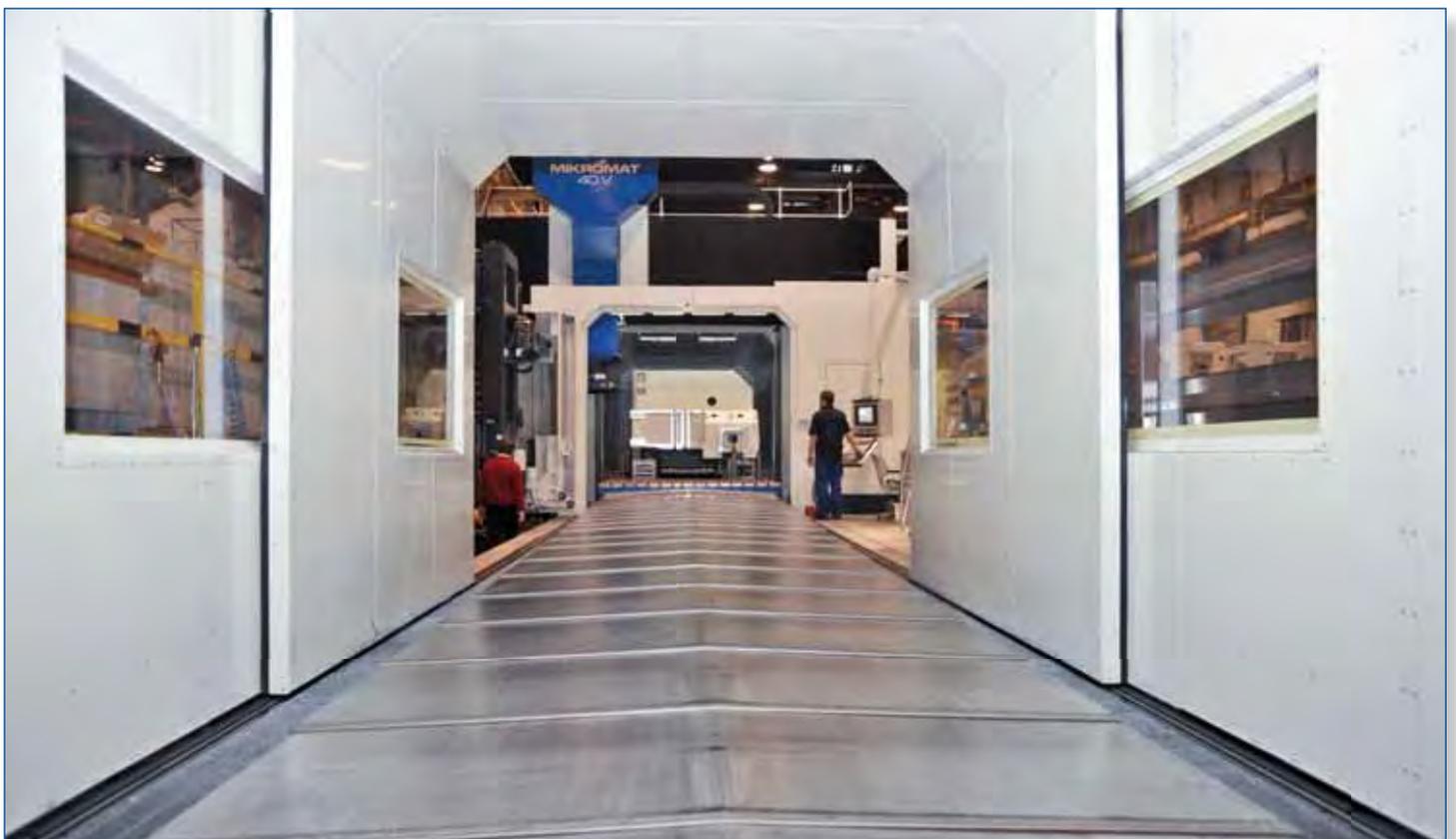
Machining extremely large parts of up to 17m



JIG - Präzisions - Portal MIKROMAT 40V - 40VF

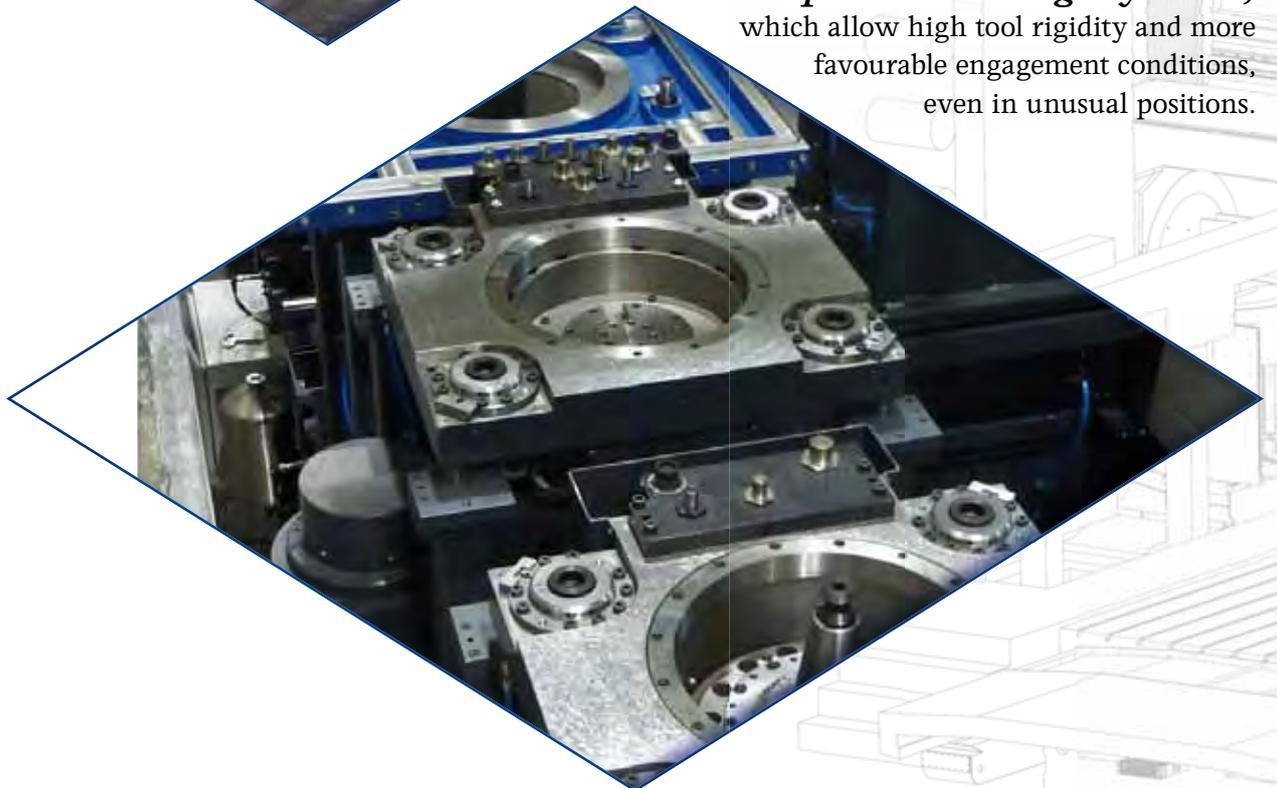


The MIKROMAT 40V was developed along ambitious guidelines derived from the parameters of the previous, smaller precision portal machines, in order that highly-precise measurements, shapes and positions could be achieved with large work pieces. Equipped with 2 tables which can be used alternately or simultaneously, a whole new dimension of machine was created for precision processing.





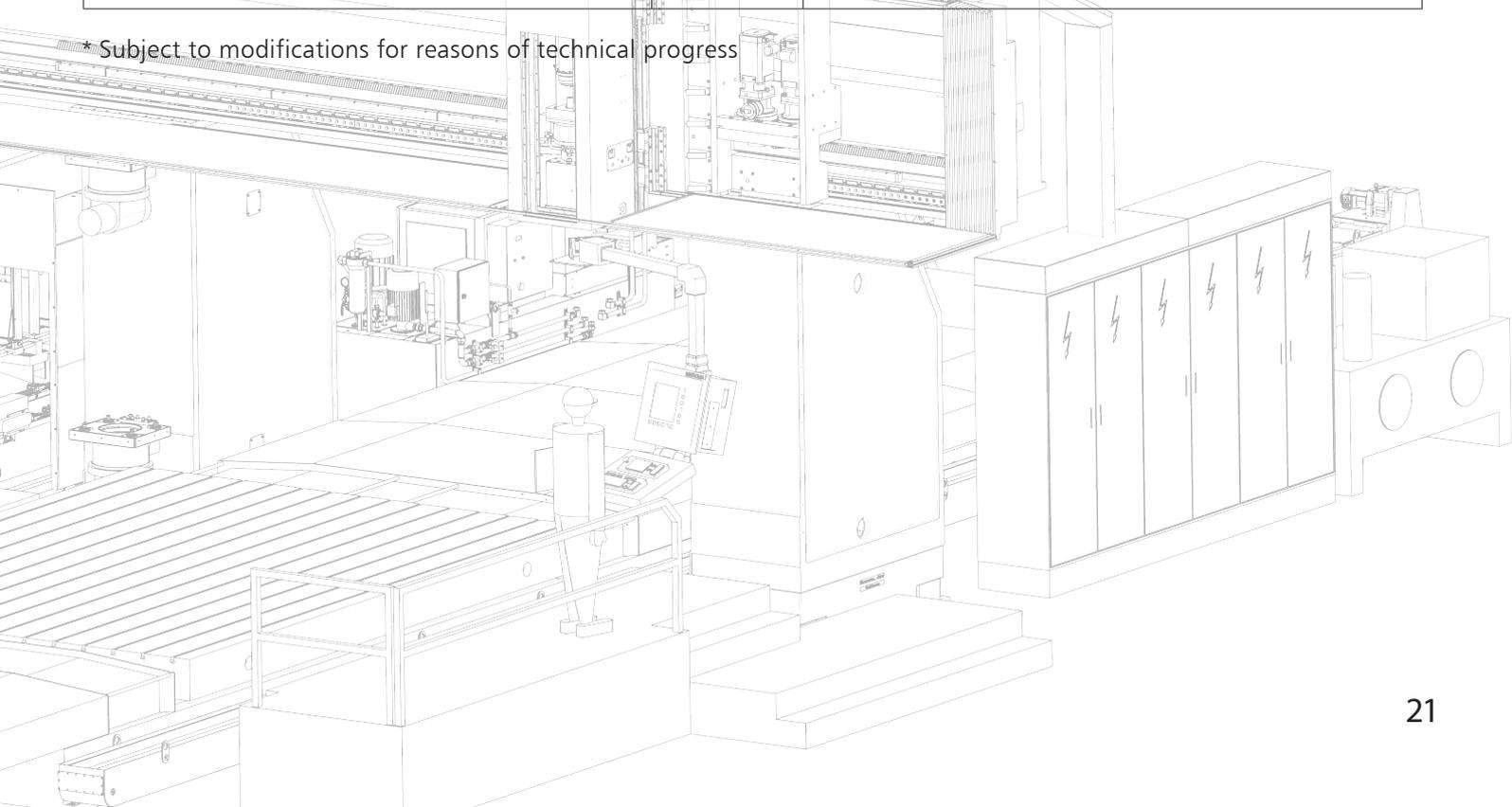
The compact design of the Z carriage can travel 2000mm, and can be equipped with either a gear-driven or motor spindle.

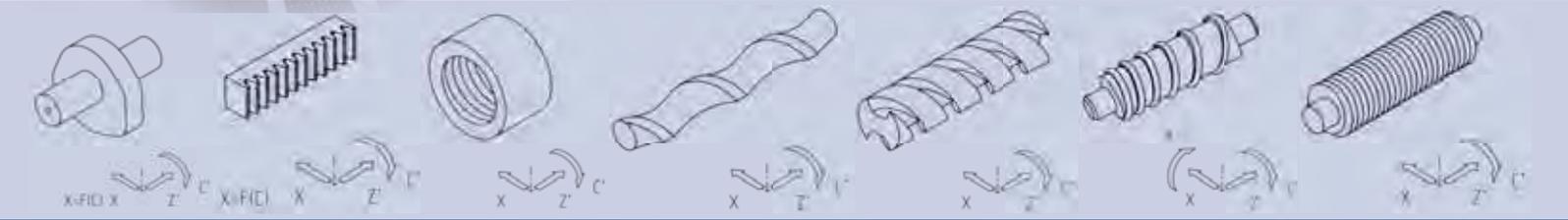
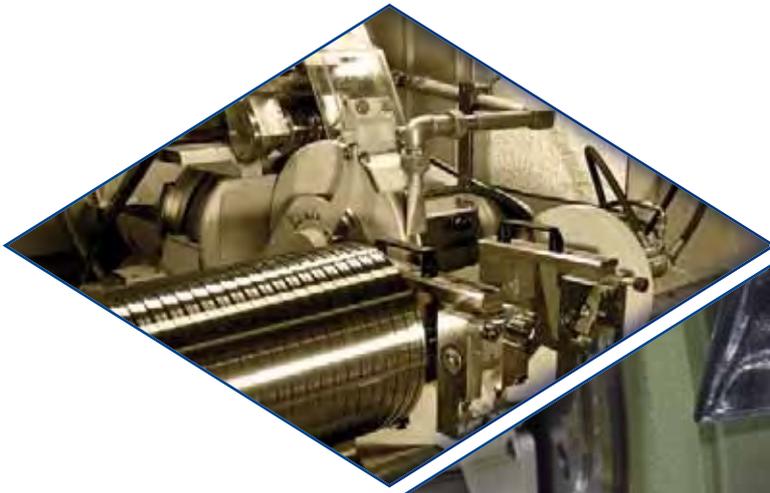


Expansion of area of application through the head and *spindle exchange systems*, which allow high tool rigidity and more favourable engagement conditions, even in unusual positions.

		MIKROMAT 40V	MIKROMAT 40VF
Max. travel X	mm	9000	16800
Max. travel Y	mm	5400	
Max. travel Z	mm	2050	
Max. table size	mm	2400 x 8000 3800 x 6000	2400 x 7000/7000 3800 x 7000/7000
Table load	kN	200	400
Table slot / distance	mm	28 / 200	
Max. portal width	mm	4650	
Distance from spindle nose to table surface	mm	500 ... 2550 900 ... 2950	
Space requirements	L-B-H	19,7 - 10 - 9	36,8 - 10 - 9
Net weight	kg	148000	220000
Feed rate X, Y	mm/min	0 ... 22000 0 ... 30000	
Feed rate Z	mm/min	0 ... 20000	
Max. feed force X, Y, Z	kN	15	
Positional uncertainty (P) X, Y, Z	mm	0,014 / 0,008 / 0,005	
Positional scatter (P _s) X, Y, Z	mm	0,005 / 0,003 / 0,003	
Reversibility (U) X, Y, Z	mm	0,003 / 0,003 / 0,003	
Spindle speed rate	min ⁻¹	10 ... 6000	
Power of the spindle motor S1 / S6 40%ED	kW	37 / 56	
Torque of the spindle motor S1 / S6 40%ED	Nm	800 / 1250	
Tool shank		SK 50	

* Subject to modifications for reasons of technical progress





Rotational form and thread grinding machine MIKROMAT 3G - 5G - 10G - 15G - 20G - 60G

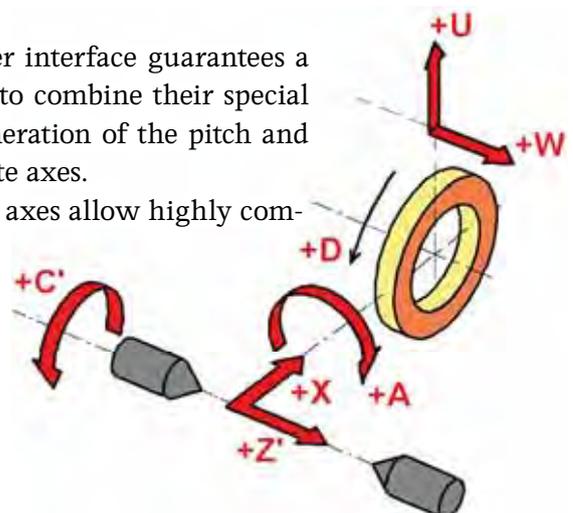


The rotational form and thread grinding machines are characterised by their high production quality, performance, universality and comfort. Due to the technical parameters, the machines can be used efficiently for the intensive and finishing grinding of various work piece geometries, with high effectiveness and the highest level of precision.



MIKROMAT-specific software with a user interface guarantees a high level of workshop acceptance, and enables the user to combine their special grinding skills with MIKROMAT's know-how. The generation of the pitch and profile is achieved by electronic coupling of the appropriate axes.

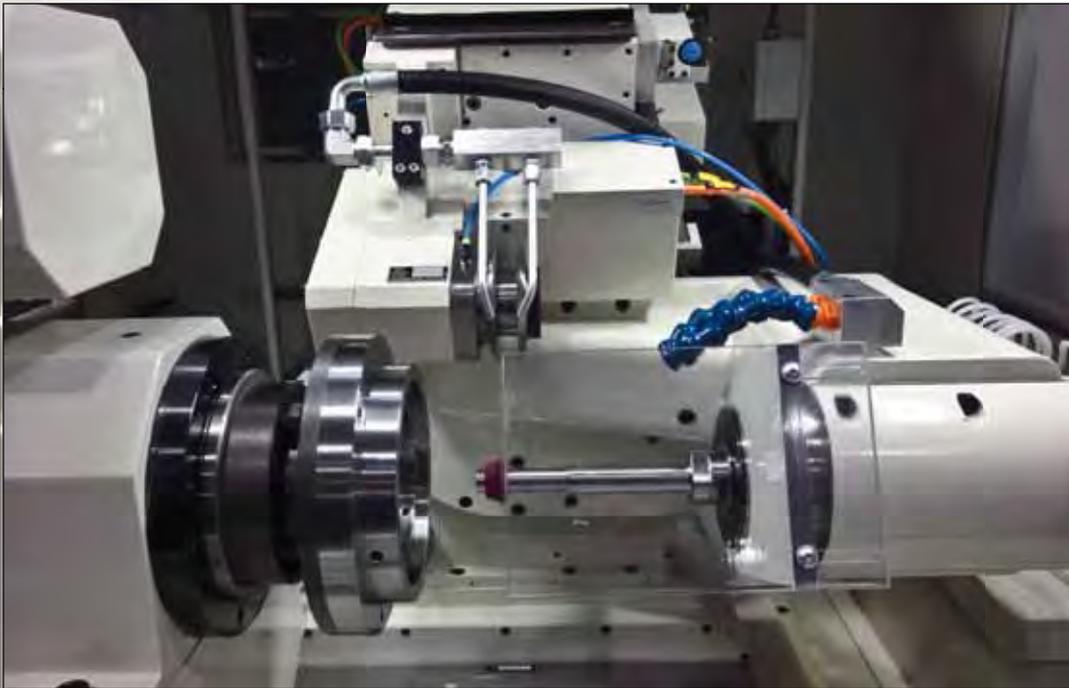
The rotational form and thread grinding machine's 6 NC axes allow highly complex shape elements to be designed.



Optimal dressing of grinding tools is provided for all grinding jobs: NC dresser, dressing unit with diamond wheel, steel pressure roller and conventional dressers. Preliminary machining of contours of any kind by means of other machining processes is no longer necessary. The machine allows automatic complete grinding of work pieces. A modern, thermally-controlled, high-capacity coolant system creates the preconditions required for highly productive intensive grinding with constant accuracy.



Automatic adjusting
in pre-machined work pieces for
efficient grinding of highly-precise
small and medium series.



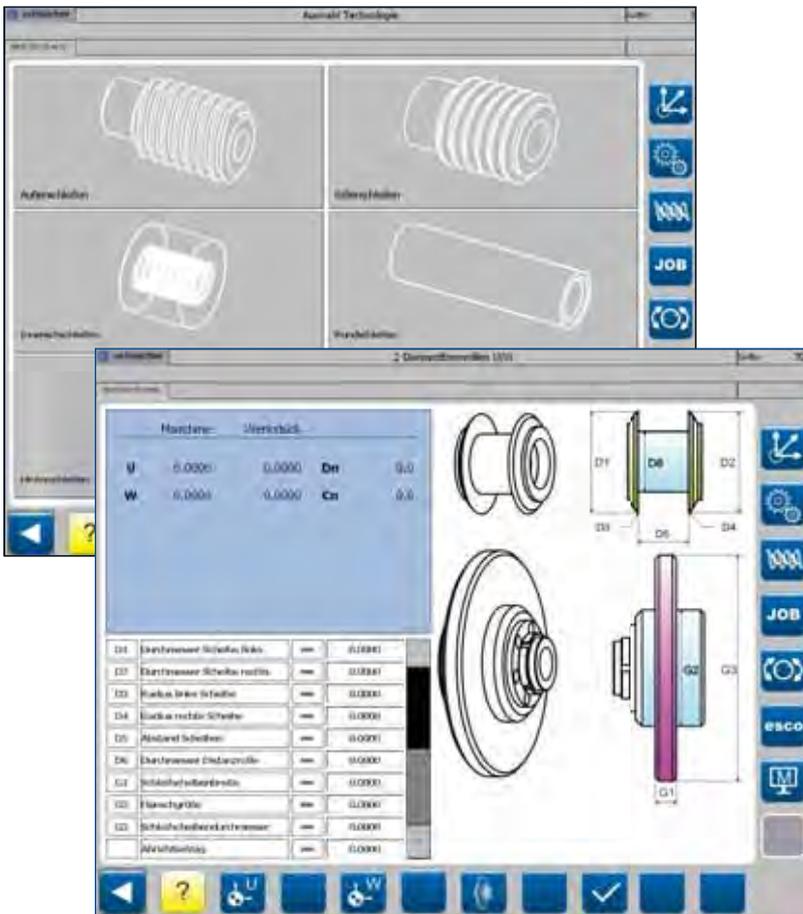


The high level of
universality of the modular series
with additional equipment allows

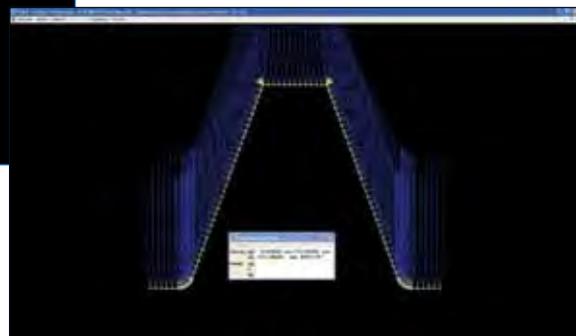
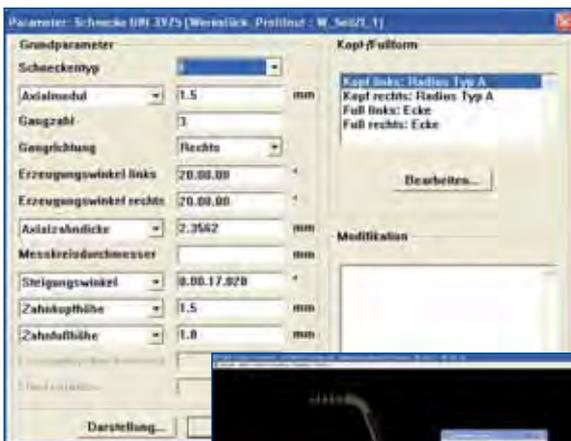
- internal grinding
- relief grinding
- axially-parallel grinding
- pitch- and diameter progressive grinding



The integrated *automation systems for loading and unloading work pieces* allow the efficient machining of highly-precise medium and large series.



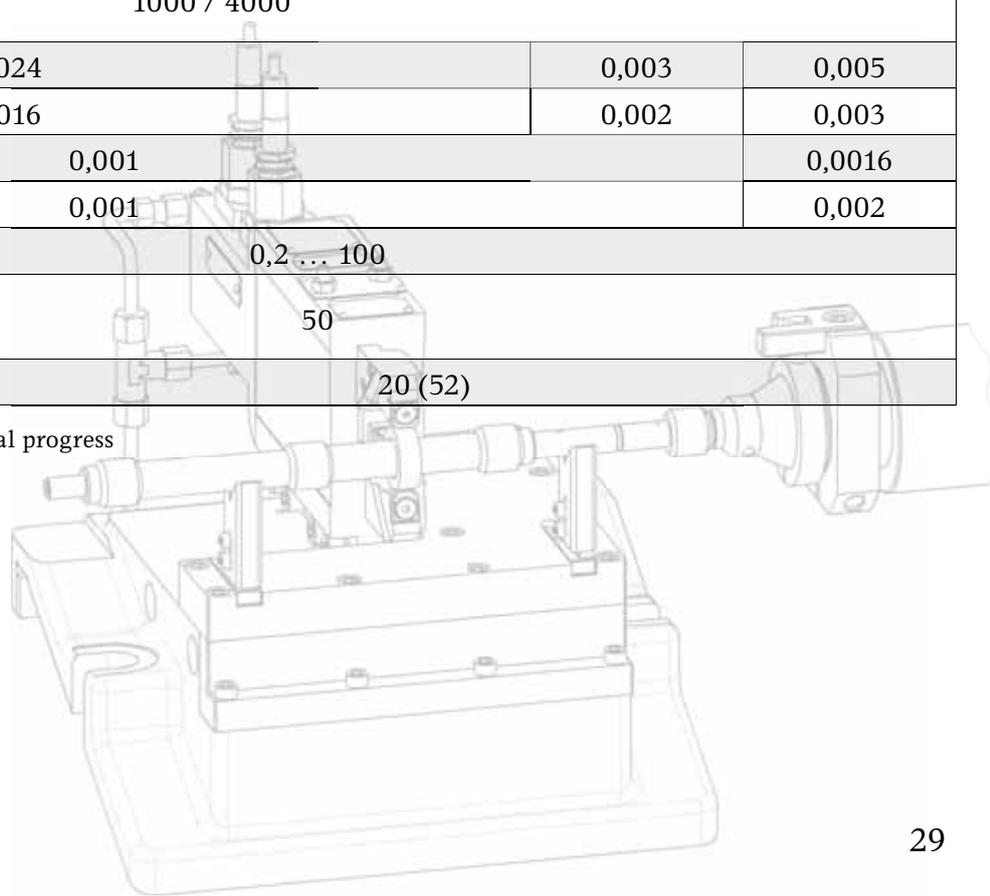
Grinding of precision threads requires experience and mechanical knowledge. Programming skills are not necessary, since drawing specification are entered directly.

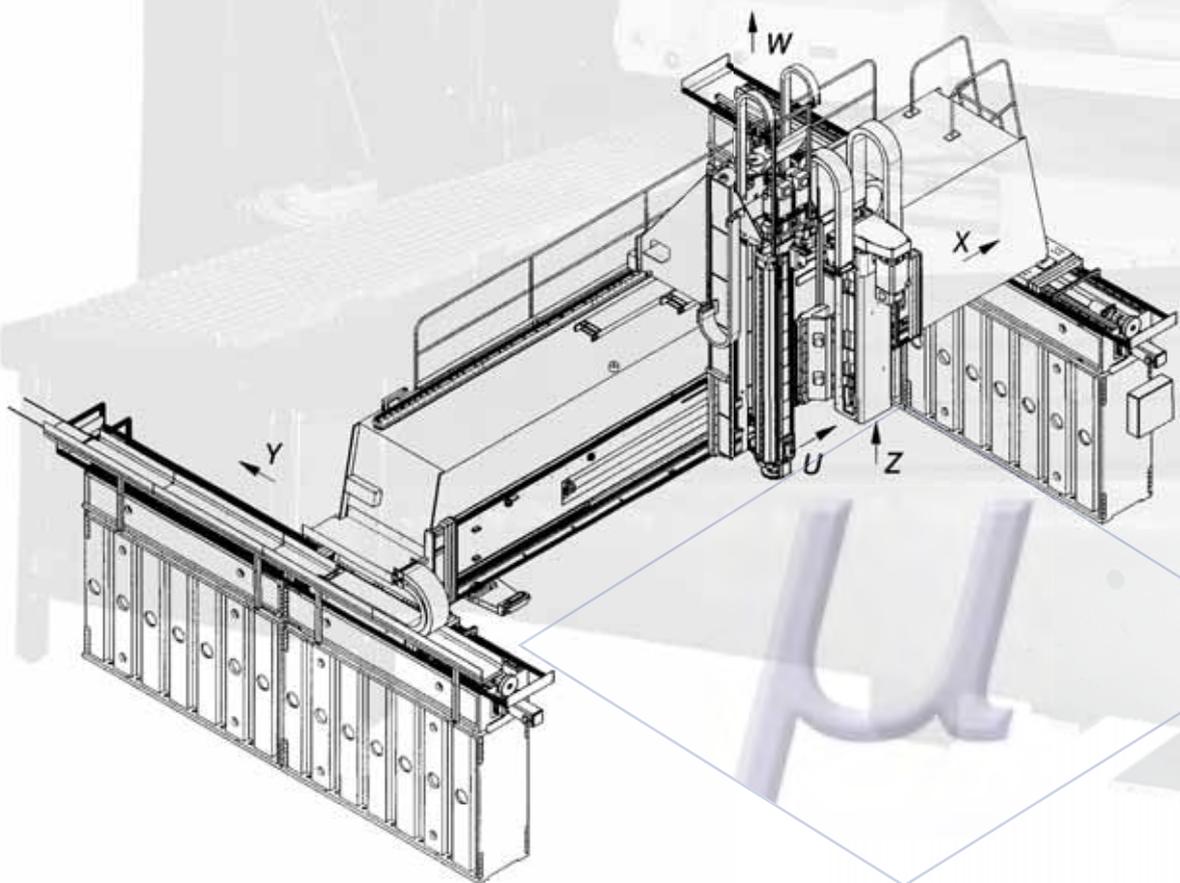


Max. grindable workpiece diameter external	mm
Max. grindable workpiece diameter internal	mm
Max. sgrindable thread length, single profile external	mm
Max. grindable thread length, single profile internal	mm
Max. work piece length with internal thread	mm
Max. distance between centres	mm
Max. weight of work piece between centres	kg
Grinding wheel adjustment range	mm
Grinding wheel diameter min./max.	mm
Grinding wheel width min. /max.	mm
Space requirements	L-B-H
Net weight	kg
Feed / rapid traverse Z axis	mm/min
Feed / rapid traverse X axis	mm/min
Positional uncertainty (P) X, Z / U, W	mm
Positional scatter (P _S) X, Z / U, W	mm
Reversibility (U) X, Z / U, W	mm
Positional deviation (P _a) X, Z / U, W	mm
Spindle speed rate	min ⁻¹
Grinding wheel drive, max. grinding speed	m/s
Capacity of grinding wheel drive 100%	kW

MIKROMAT						
3G	5GI	5G (P)	10G (P)	15G (P)	20G (P)	60G (P)
250	400	320				
-	320	280				-
300	-	500	1000	1500	2000	6000
-	300	-	50	150	250	-
-	350	-	150	450	700	-
400	-	750	1250	1750	2225	6250
50	80	160	160	240	300	1000
265						
200+2x Profilhöhe / 350	13 / 32	300+2x Profilhöhe / 500				
8 / 30		8 / 60				
2,2 - 3,0 - 1,6	7,0 - 4,0 - 3,0			8,0 - 4,0 - 3,0	9,0 - 4,0 - 3,0	
5000	9000			12000	15000	20000
5000 / 15000						
1000 / 4000						
0,0024					0,003	0,005
0,0016					0,002	0,003
0,001					0,0016	
0,001					0,002	
0,2 ... 300	0,2 ... 100					
60	50					
12	15	20 (52)				

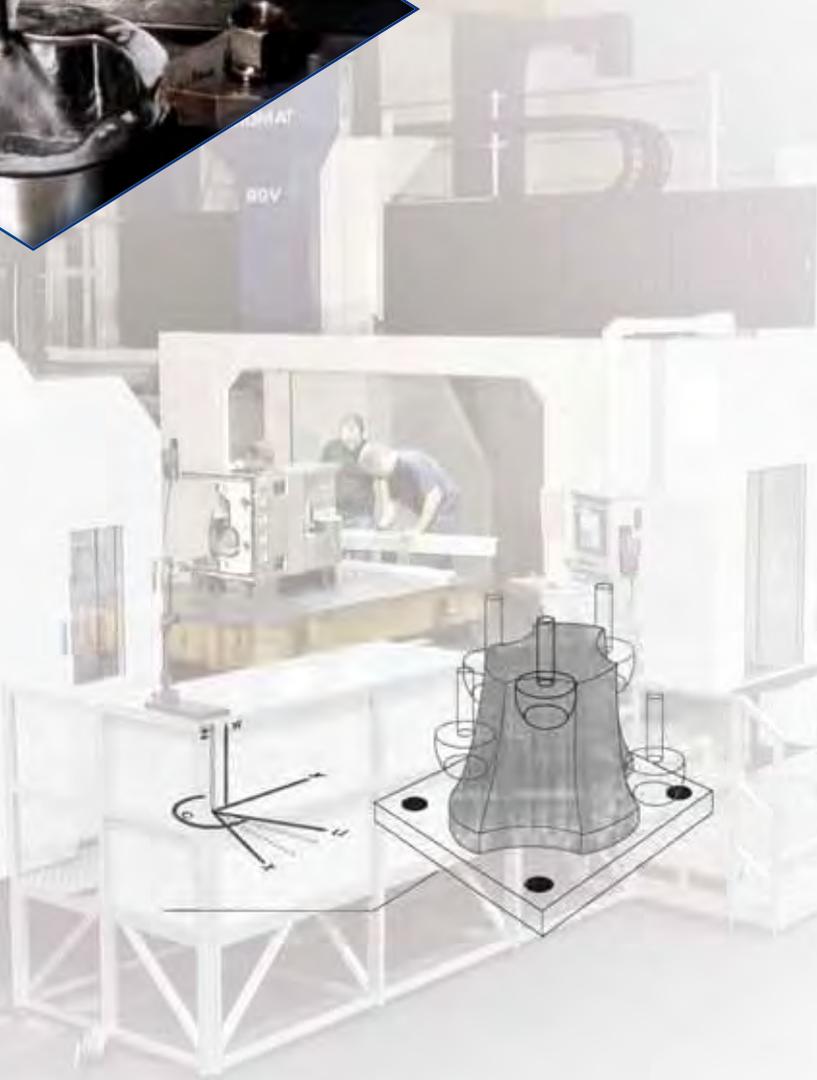
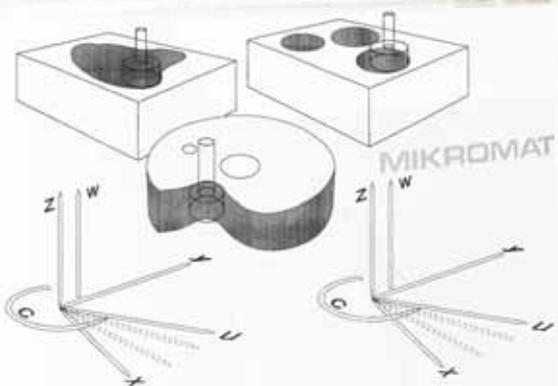
* Subject to modifications for reasons of technical progress





Special machines / Special solutions





MIKROMAT Technology Development



Machine tools solve technical problems. An educated decision about technology positively influences the amortisation period. All MIKROMAT solutions are developed by technical demands. For this, we manufactured our own equipment, which is available to you for your investment preparation. Our application engineers are ready to carry out your technical jobs in economic processes. We always aim to improve the overall process, including assembly and service. Higher precision allows us to interchange components. This saves storage capacity and processing time, and at the same time saves money. This allows separate machining which can often be carried out with smaller machines, depending on component size. The advantage resulting from this is that smaller machines reduce space and effort on the operator's part, not to mention investment costs. To improve the full process including assembly and service is our goal.

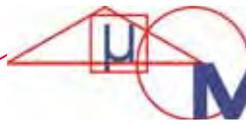
Good investment preparation allows for a short amortisation time. Qualified application engineers and a fully-equipped technology centre (production preparation, machines in a temperate environment, measurement) are ready to take on your jobs.

MIKROMAT Technology Centre

Procedure	Description	Processing area	Precision
Precision milling and drilling	MIKROMAT BkoW 1000	X = 1200 • Y = 1000 • Z = 900	+/- 0,003
	MIKROMAT 12V 5D	X = 2200 • Y = 2150 • Z = 900	+/- 0,003
	MIKROMAT 12V	X = 2700 • Y = 1900 • Z = 1050	+/- 0,003
	MIKROMAT 20V	X = 5200 • Y = 3400 • Z = 1250	+/- 0,003
	MIKROMAT 20V	X = 5700 • Y = 3400 • Z = 1250	+/- 0,003
	MIKROMAT 40VF	X = 14700 • Y = 4600 • Z = 2100	+/- 0,003
Grinding	MIKROMAT 60 SC	X = 1000 • Y = 800 • Z = 550	IT 4
	MIKROMAT 10G	Ø 340 x 1000	IT 4
Measuring	MMZ - G	X = 3000 • Y = 6000 • Z = 2000 + 700	



Alongside experience, the Mikromat Technology Centre also possesses an inexhaustible potential for testing technologies and alternatives.

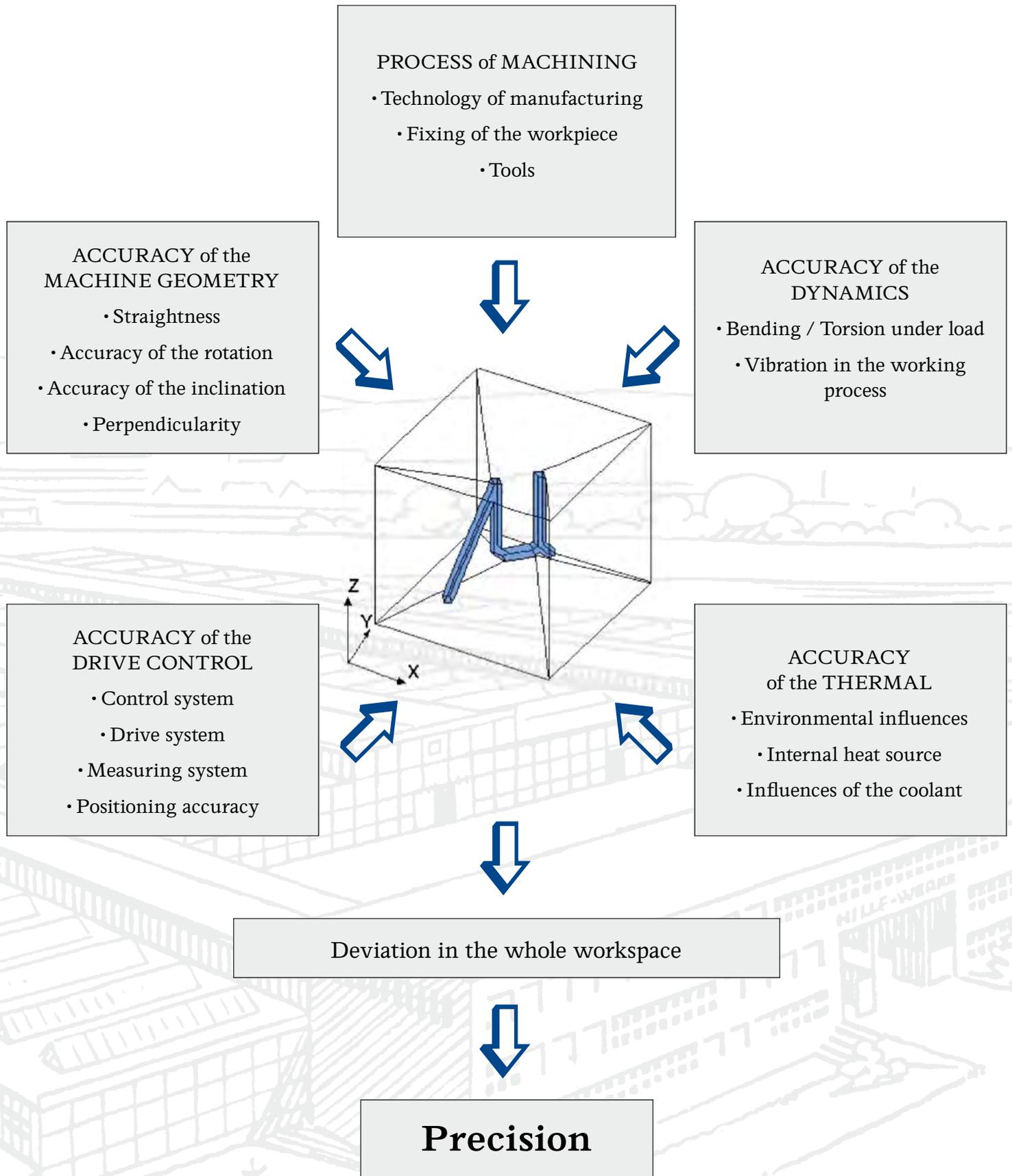


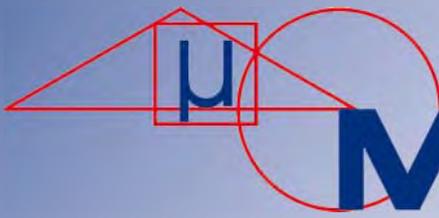
*The
productive μ*

We aim to always design the „ μ “ for our customers more productively and economically.



Experience in Precision





MIKROMAT



The productive μ

EN

MIKROMAT GMBH
Niedersedlitzer Strasse 37
D 01239 Dresden
Fon: + 49 (0) 351 / 2861 0
Fax: + 49 (0) 351 / 2861 107
www.mikromat.net