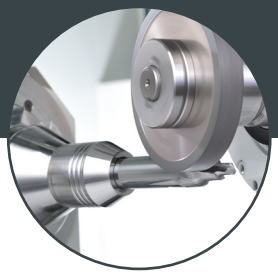
Anything but expensive: Multigrind® CA



A.HAAS

Compact exterior, vast interior.

Multi-talented: The Multigrind® CA even impresses the proverbial “Swabian housewife”

For many years now, the Swabian housewife has been recognized as the epitome of pragmatism and efficiency throughout Germany. While being frugal, she doesn’t deny herself any of life’s necessities, and is both practical and sensible. When you take a closer look at our Multigrind® CA, you’ll be convinced that a Swabian housewife played a major role in its construction.

Precision technology in the smallest of spaces

The Multigrind® CA is not only loaded with sophisticated technical features, it also looks great and offers an excellent price-to-performance ratio. The Multigrind® CA is the intelligent choice for all discerning and cost-conscious manufacturers of rotationally symmetric precision tools and profile inserts. The experience we gained by manufacturing the globally successful Multigrind® CB proved invaluable in helping us to develop a flexible and compact 5-axis grinding powerhouse for the machining of rotationally symmetric workpieces. The workpieces feature a diameter of up to 260 mm and a length of up to 450 mm and are made with the kind of high-quality precision that customers of Adelbert Haas have come to expect.

Systematic Multicube design by Adelbert Haas with generously dimensioned guides and drive components that are positioned outside the workspace: the Multigrind® CA doesn’t compromise on stability or rigidity.

Straightforward design concept and clear contours. The Multigrind® CA is a continuation of the design standards set by the Multigrind® CB. This machine will aesthetically complement every state-of-the-art manufacturing facility.

Uncompromising operational safety: double-glazed safety glass and a 4 mm-thick casing comply with the most strenuous safety standards – which is great news, even when you’re not performing high-speed grinding operations.

Ergonomics involves much more than ideal working conditions – it also refers to safety and efficiency. The electrical and maintenance cabinets blend harmoniously into the compact cabin and are easily accessible. All relevant system displays are positioned at eye level and are therefore easy to monitor.

The Multigrind® CA is available with the latest control technology as standard. The user-friendly Sinumerik 840D sl controller comes with everything a discerning user would expect to find: dynamism, precision and a user-friendly interface. Sinumerik Safety Integrated ensures that the machine meets the most exacting safety standards.

The Multigrind® CA comes with a large swivel control unit and a height-adjustable keyboard, so the user can keep an eye on both the screen and the workspace.

Compact exterior, vast interior

With a footprint of only 2,600 x 2,400 mm, the Multigrind® CA is a highly compact machine with grinding technology that only requires a small space to make a great impression. Users will be delighted by the machine's spacious workspace, which we systematically separated from the drive and supply systems. This not only improves process reliability, but also the machine's service life. And thanks to its remarkable travel range of 630 mm (X-axis), 345 mm (Y-axis) and 430 mm (Z-axis), you can even grind larger, rotationally symmetrical or cubic workpieces precisely and economically. Grinding wheels with a diameter of 250 mm also pose no problem to the Multigrind® CA.

Opens from the top

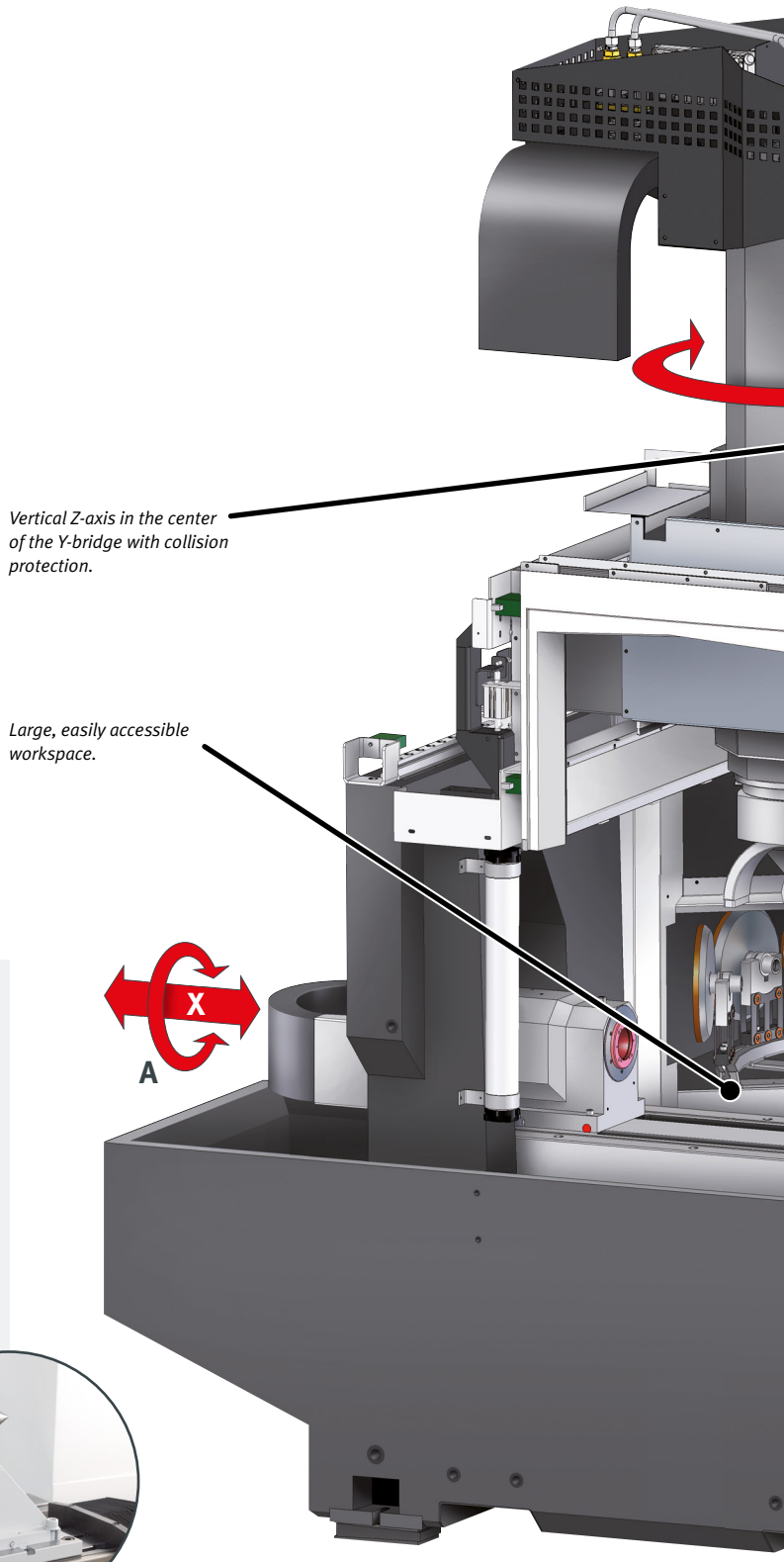
The Multigrind® CA can be opened from the top, so that very large workpieces can be easily lifted in and out with the help of a crane.

The power lies within.

Controlled movement: kinematics

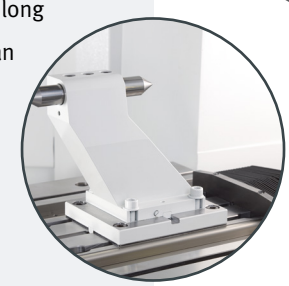
Kinema is Greek and means movement. Kinematics is the study of the motion of points and bodies through space. We further refined the Multicube to ensure that only the things that are supposed to move inside the Multigrind® CA actually move – and that only the forces we want to generate are actually generated.

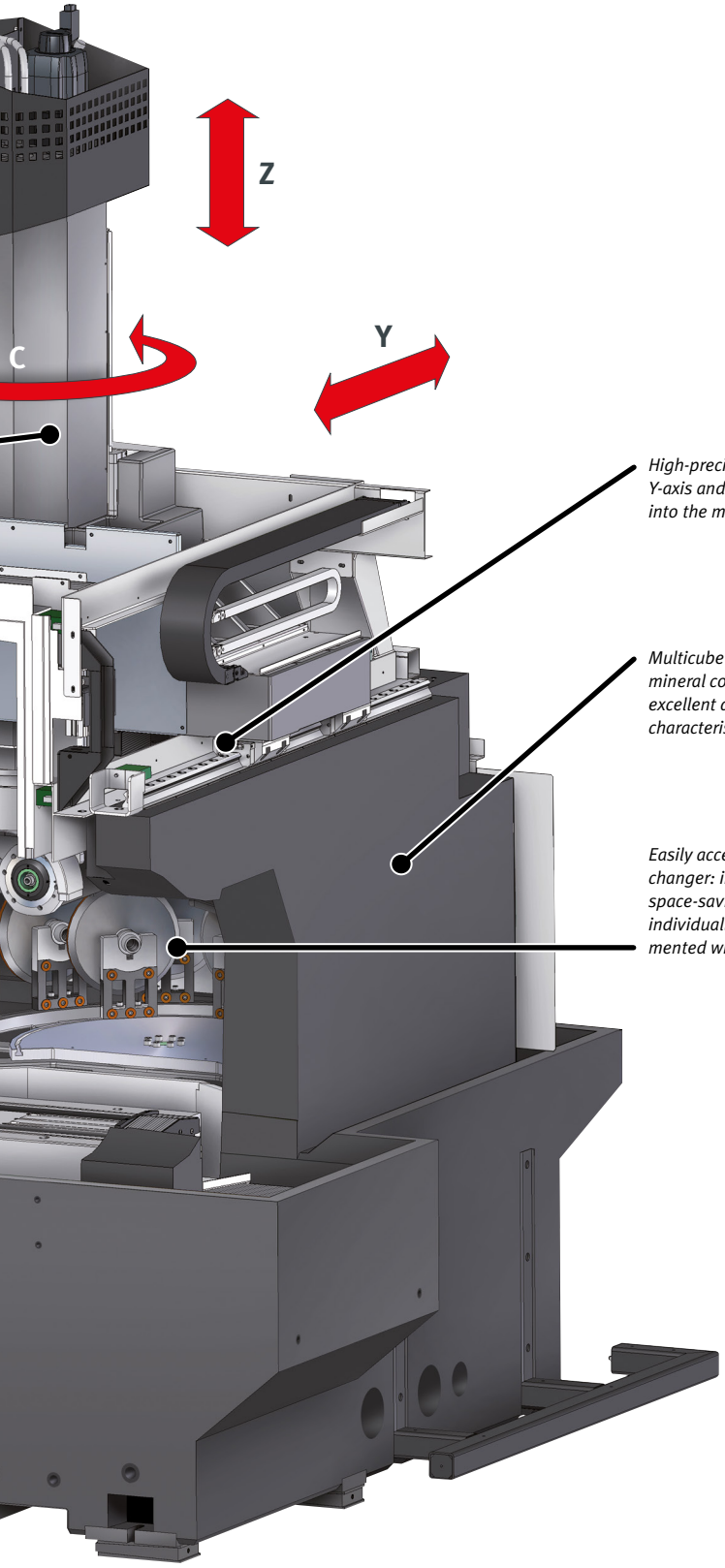
The grinding unit is positioned right in the middle of this multifunctional grinding cube made from thermo-resistant mineral composite. All axes are aligned symmetrically, and the guides are partially embedded in the shock-absorbing mineral composite base. This eliminates excess forces, vibrations and expansions that could have a negative effect on the grinding process. The Multicube design principle is what gives the Multigrind® CA its extremely high level of stability and rigidity. During operation, this means improved process reliability and increased precision.



Sophisticated concept: the machine table

The Multigrind® CA comes with a clamping surface of 1,000 x 440 mm and a very generously-sized machine table, considering its compact exterior. But all tables are different and our designers came up with something very special indeed – an integrated X3-axis with a programmable tailstock that is ideally suited to grinding tools between centers. The optimal tailstock force can be specified via the control unit. For grinding long or particularly thin tools, we also offer a support with an adjustable and programmable height. It can also be used as a precise guide when machining workpieces with a tapered diameter.





Controlled dynamics: axes

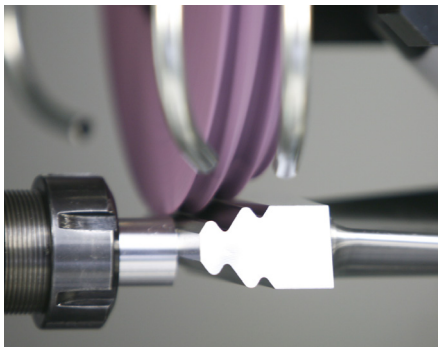
Dynamis is Greek and means “power”. Dynamics is the study of the causes of motion. In order to generate the highest possible – yet controlled – axial dynamics, the Multigrind® CA’s axes are aligned symmetrically in the center of the machine. The guide plates along the main linear X-axis (table axis), which are aligned perpendicular to the user, are molded into the composite base.

The Z-axis lies in the middle of the Y-axis bridge. The guides along the Y-axis are also perfectly molded into the composite base. Both the guides and the drive systems that power the axes are positioned in an easily accessible location outside of the workspace. Overall, the Adelbert Haas method of axial alignment and the powerful drives with a Sinamics control unit offer the best technical conditions for high dynamics and the ultimate in positioning precision when performing day-to-day grinding activities. With dimensions of 630 mm (X-axis), 345 mm (Y-axis), and 430 mm (vertical Z-axis), the machine’s travel range leaves plenty of room to maneuver, meaning that the Multigrind® CA can rise to virtually every challenge.

Multi-tasking made easy.

Grinding

Grinding involves machining with a geometrically undefined cutting edge. It guarantees maximum dimensional accuracy – on the Multigrind® CA.

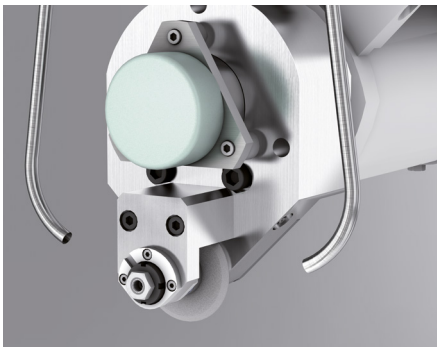


Indexable inserts and rotary precision tools, turbine blades and vanes, hob cutters and gear shafts, knee implants and hip rasps: practically every tool and workpiece can be ground using the Multigrind® CA. When used in combination with our grinding software Multigrind® Horizon, this machine is exemplary in terms of flexibility.

To assist with particularly challenging grinding tasks, we offer a wide range of clamping and tool holding equipment. The Multigrind® CA facilitates grinding with every imaginable type of grinding wheel and all kinds of grain sizes and materials for rough finishing and ultra-precise machining. Dressing is done in the machine – which not only saves time, but also ensures even greater precision.

Relief grinding

Special workpieces, special challenges – all in a day's work for the relief grinding unit.



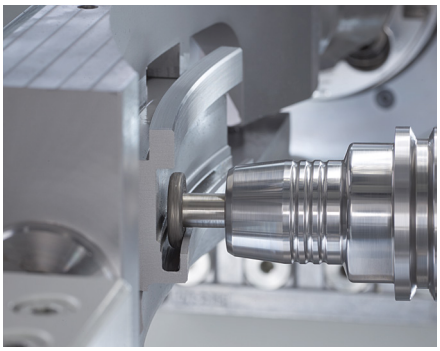
The cost-effective manufacture of small hob cutters involves rough machining with large grinding wheels and then areas that are difficult to reach are finished off using the small grinding wheels of our relief grinding unit.

The relief grinding unit ensures impeccable stability and process reliability, particularly when finishing with the help of small grinding wheels. Furthermore, the increase in rotation speed of 1:3 is particularly conducive to economic efficiency when working with small grinding wheels.

The entire relief grinding unit is treated like a grinding wheel by Multigrind® Horizon, which means that collision simulation and prevention is also performed.

Grinding pin

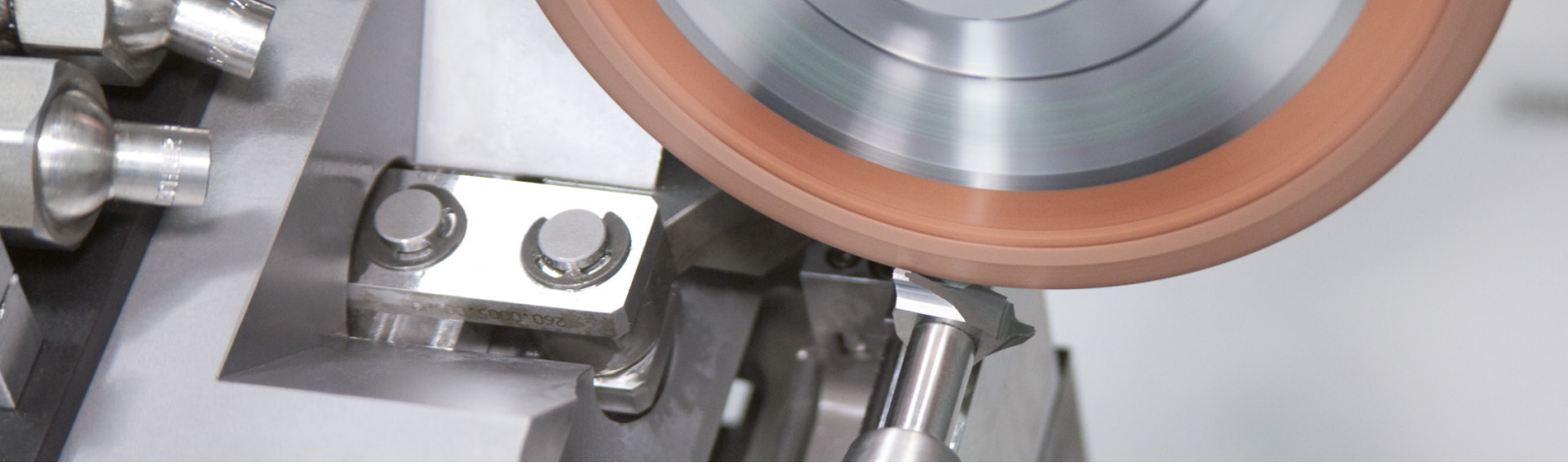
High-speed grinding of spots that are difficult to reach. Not a problem with the right grinding pins.



Sealing elements for guiding the airflow in airplane turbines are manufactured using materials that are difficult to machine. The complex geometry of such elements means that their production can be a real challenge.

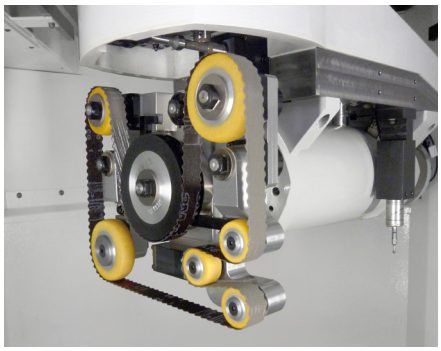
But even these kind of sophisticated workpieces with concave and convex curved surfaces can be economically machined in a single clamping operation using the Multigrind® CA. This is made possible by an intelligent clamping solution and special grinding pins that are clamped onto the high-frequency spindle.

A suitable coolant supply, special dresser unit and tool breakage monitoring system also help to further boost machining reliability and safety.



Belt grinding

Our belt grinding unit goes by the name thingamajig – and the surfaces it produces are just as remarkable as its name.



When it comes to medical implants or advanced components for the aerospace industry, the importance of homogeneous surfaces cannot be underestimated. To address this requirement, we designed and developed a pretty unique integrated belt grinding unit known as the thingamajig.

The unit is positioned in the tool changer and controlled using Multigrind® Horizon. With a belt guided via rollers, the “thingamajig” machines concave and convex areas and – thanks to intelligent 5-axis kinematics – can also reach highly inaccessible parts of the component. The process is also compatible with standard coolants and grinding oil.

Milling

The Multigrind® CA can also mill, so you can perform cost-effective, complete machining in a single clamping.

Not only can our grinding machines be used for precisely grinding solid carbide cutters, but they can also be used for milling.

The Multigrind® CA is used for milling whenever hard-to-reach areas require machining. This could involve small concave corner radii or contour transitions, to name just two examples.

The milling cycles can be easily programmed and controlled using Multigrind® Horizon.

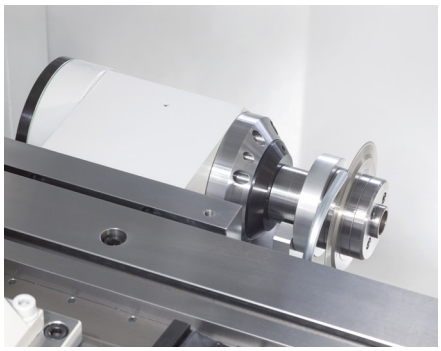
A magic cube

Cube follows function. While constructing the Multigrind® CB and Multigrind® CA we opted for the Multicube design, as it offers much greater stability, rigidity, precision and process reliability compared to the gantry design. This is due to the symmetrical alignment of axes, the thermo-resistant and shock-absorbent mineral composite base and the position of the grinding unit right in the middle of the machine’s cube.

Multi-tasking made easier.

Dressing

For precise machining results, you need precise grinding wheels – throughout the entire grinding process.

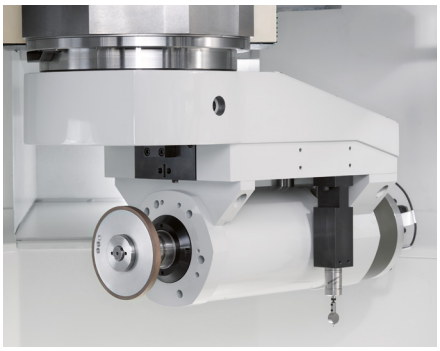


To manufacture dimensionally accurate tools and components of the utmost quality, you need grinding wheels that are optimally dressed throughout the entire grinding process. The grinding wheel must be conditioned during dressing or, in other words, returned to its correct geometrical shape.

When working with the Multigrind® CA, users can choose between two different dressing procedures. Normal dressing with parallel wheels is performed with the help of our integrated dresser unit with an output of 4 kW. For XING dressing, the wheels are positioned perpendicularly to one another, meaning that pointed wheels can be dressed in a highly reliable manner.

Grinding spindles

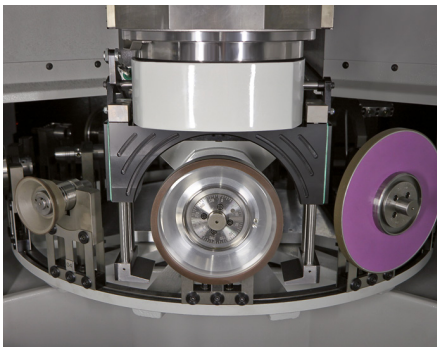
Our grinding spindles – which we design and manufacture ourselves – can master any challenge.



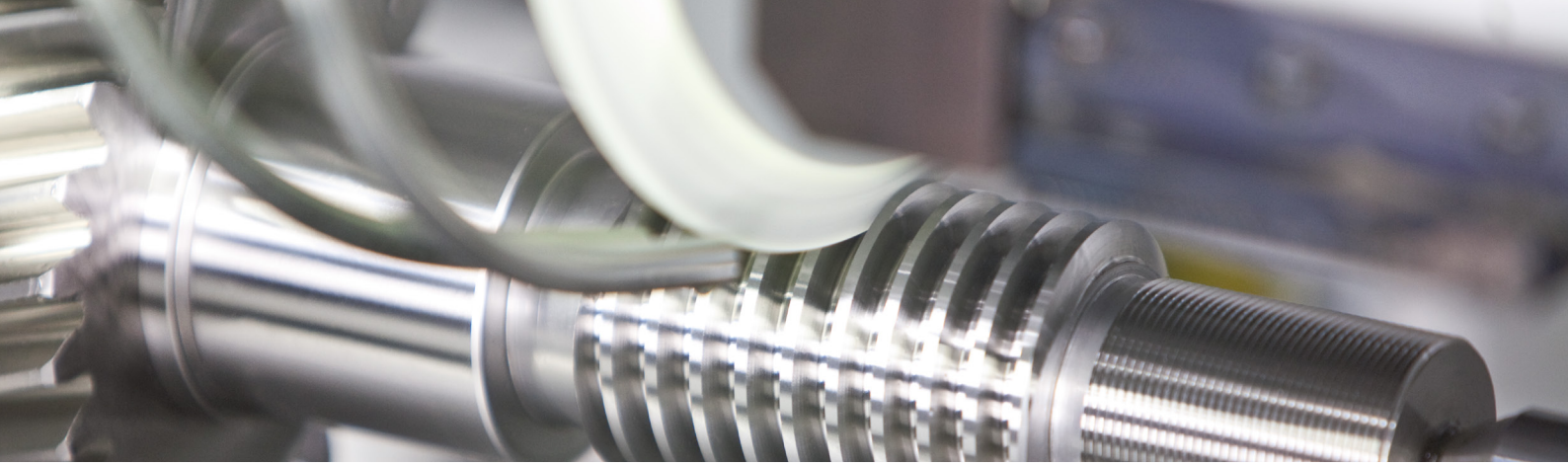
Our high level of vertical integration is one of the cornerstones of our success. We're not saying that there's no pleasing us, but we're pretty demanding in this regard, which is why we insist on constructing all the main components of our machines ourselves – such as the powerful, direct drive grinding spindles in the Multigrind® CA. These components are extremely compact and have plenty of power in reserve. All rotating parts are finely balanced and some feature hybrid bearings, thereby ensuring precision down to the exact micrometer. The standard version of the Multigrind® CA comes with a 12 kW (8,000 rpm) double-ended grinding spindle. In conjunction with the automatic tool changer, the Multigrind® CA comes equipped with a spindle (8,000 or 18,000 rpm), one grinding wheel head and an auto-clamping HSK 50 E taper.

Coolant nozzles

The first automatic height-adjustable cooling unit. A special solution for an underrated technical aspect.

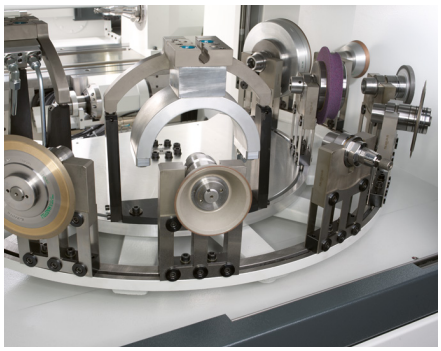


One of the drawbacks of switching between grinding wheels with different contours and diameters is that the coolant nozzles are usually no longer positioned correctly after the switch. Eager to alleviate this problem, our designers put their heads together and devised a technically elegant solution – the world's first fully automated, height-adjustable cooling unit. This patent-pending system automatically exchanges the coolant nozzles when the grinding wheel guard is switched. The coolant nozzles are always automatically adapted to suit the respective wheel diameter and the system also allows the front and rear coolant nozzles to be operated separately. In addition, Adelbert Haas provides various interchangeable, fixed coolant nozzles that are directly integrated into the tool changer.



Tool changer

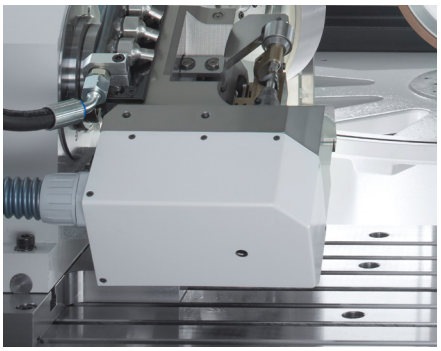
Twice as good for automated series production: the patented double-wheel pickup tool changer by Adelbert Haas.



The automated series machining of diverse workpieces calls for the use of grinding wheels of various shapes and designs. The integrated, patented tool changer by Adelbert Haas features a single or double segmented wheel and can be loaded with different grinding wheels. The Multigrind® CA can perform a complete tool change in just 10 seconds, whereby the spindle retracts into the magazine. This is a very elegant procedure, but above all, it's quicker and safer. If you are using fewer grinding wheels, you can use the second individually-powered segment wheel for storing workpieces.

Sixth axis

Sometimes all good things come in sixes – especially when complete machining profile inserts.



Thanks to its sixth axis, the Multigrind® CA is ideal for the complete machining of profile inserts with a complex geometry in a single clamping. The optional sixth axis is mounted on the Multigrind® CA's A-axis, meaning that the workpiece can be pivoted by ± 45°. This allows the periphery, profile, and chip surface of the profile insert to be ground in a single clamping.

Uncluttered maintenance cabinet

Admittedly, an uncluttered maintenance cabinet is not exactly crucial to delivering excellent grinding results, but here at Adelbert Haas, we don't believe in cutting corners. After all, we're talking about a state-of-the-art grinding powerhouse. All the displays are arranged ergonomically and all the filler nozzles are optimally positioned for easy access, so the machine operator can easily keep an eye on everything.

The Epitome of Flexibility.

Tool Magazine for 70 Grinding Wheels

The tool changers we usually equip our Multigrind® CA grinding machines with are enough for most applications. But the pressure of rising costs is now forcing manufacturers of aerospace components, medicinal products and machining tools – to name just three industries – to seek out new opportunities to save. So we developed the Adelbert Haas tool magazine with an unbelievable 70 spaces.

Tool magazine minimizes setup costs

Minimizing setup costs is one option for reducing unit costs. In other words, workpieces should be machined in a single clamping if at all possible. All of the necessary grinding or milling tools therefore need to be at the ready in the tool magazine, for tool changing in a flash. Further benefits include increased dimensional accuracy and thus product quality, as errors resulting from re-chucking are eliminated.

Tool change in ten seconds

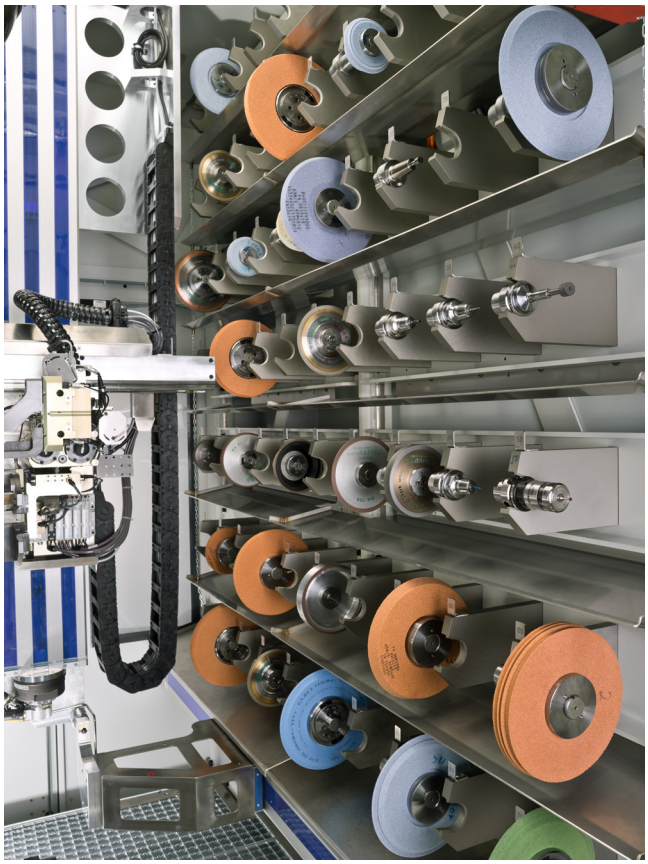
One side of the tool magazine (1,600 x 2,400 x 3,200 mm, L x W x H) offers space for 70 grinding wheels with diameter of 250 mm. The other side features 20 coolant nozzles. The tool magazine stands on four levelling feet at the back of the Multigrind® CA, but is not mechanically connected to it. It goes without saying that the tool magazine is integrated into Multigrind® Horizon.

The Adelbert Haas tool magazine turns our Multigrind® grinding machines into completely automated production units.

For manufacturers that need to produce wide range of parts or require more than 15 grinding wheels for individual workpieces, our tool magazine is very interesting.

Intelligently linked

The interface to the grinding machine is the shuttle table in the machine. The tool magazine's linear handling is responsible for transporting grinding wheels and coolant nozzles. The linear axes offer a speed of 60 m/min and acceleration of 5 m/s^2. The magazine is loaded via the loading door. Grinding wheels and coolant nozzles are lined up one behind the other and, once the door is closed, selected by the handling system and placed at the specified location. The machine's shuttle table replaces the usual tool changer and, with a linear and swivel axis, takes over grinding wheel and coolant nozzle handling in the workspace. A safety door protects the tool magazine from oil mist. All in all, it only takes the grinding machine ten seconds to change the tool!



Space for 70 grinding wheels and 20 coolant nozzles. Impressive!

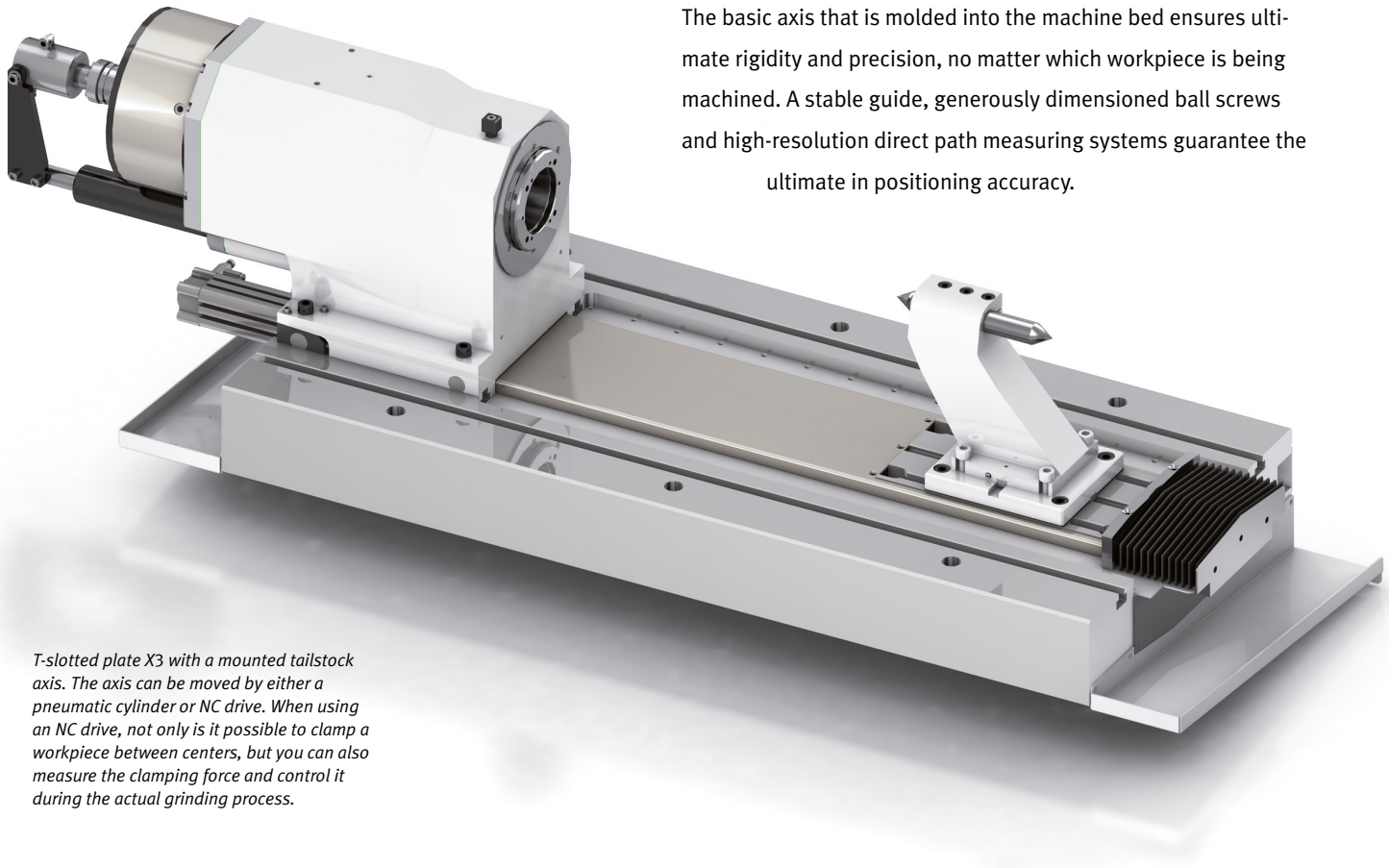
Care to reserve a table?

The table maketh the machine

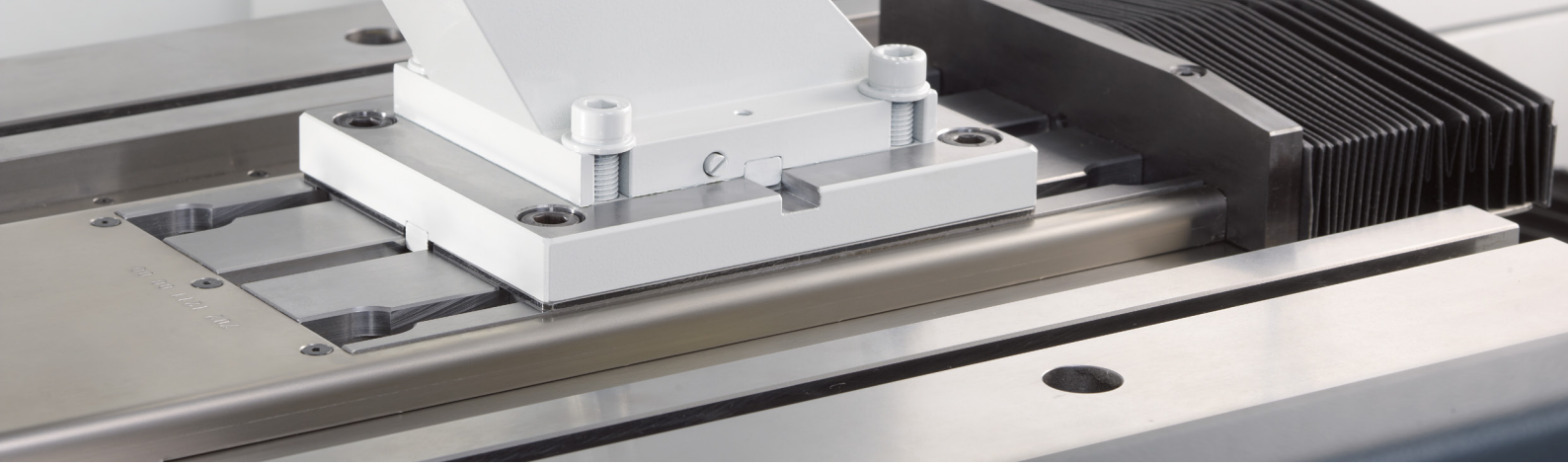
The Multigrind® CA is a modular all-rounder and always has the right table for every job. By selecting the appropriate machine table, you can transform the Multigrind® CA into a surface or profile grinding machine, or even into a six-axis grinding center for the complete machining of profile inserts.

Thanks to this flexible concept, the Multigrind® CA can be used for a variety of diverse tasks – from grinding the most minute precision tools through to huge roller cutters. This machine can handle workpieces with a maximum diameter of 260 mm and a maximum length of 450 mm between centers. The table can support a maximum load of approximately 190 kg.

The basic axis that is molded into the machine bed ensures ultimate rigidity and precision, no matter which workpiece is being machined. A stable guide, generously dimensioned ball screws and high-resolution direct path measuring systems guarantee the ultimate in positioning accuracy.



T-slotted plate X3 with a mounted tailstock axis. The axis can be moved by either a pneumatic cylinder or NC drive. When using an NC drive, not only is it possible to clamp a workpiece between centers, but you can also measure the clamping force and control it during the actual grinding process.



T-slotted plate

The gold standard of stability and power.

Machine tables from Adelbert Haas offer the ultimate in rigidity. Like all our tables, the basic T-slotted plate version is manufactured from ultra-robust, ribbed spherulitic graphite iron.

The T-slotted plate has seven 12H7 T-slots positioned at intervals of 50 mm. With a length of 1,000 mm and a width of 440 mm, even large components or rotation axes (for tailstocks or supports) can be clamped safely and easily.

T-slotted plate X3

With variably driven X3-axes for even greater flexibility.

The X3 T-slotted plate allows you to clamp an additional tailstock axis on the table. The axes can be driven either pneumatically or via the NC drive. If the X3 axes are driven pneumatically, supports for clamping fixtures can be added or removed in a flash when retooling. Furthermore, workpieces of varying length can be easily clamped between centers.

Grinds away. Night and day. The Multigrind® CA with robot unit.

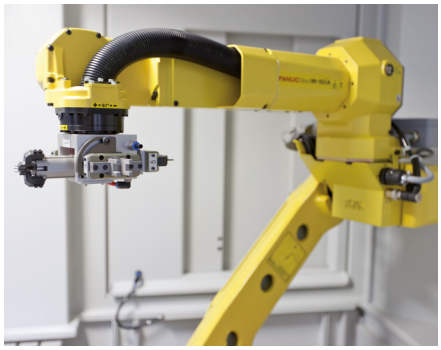
Automated cost-efficient grinding

Our customers usually expect much more than just an excellent grinding machine. In fact, they expect us to deliver a comprehensive, process-capable and cost-efficient grinding process. A typical customer request in our field might be something like: “I need to manufacture several thousand worm drives per year at a competitive unit price.”

Taking the workpiece drawing as their starting point, our specialists then develop the appropriate grinding programs in conjunction with an automation concept. Our experienced grinding and automation experts provide ongoing support – from the initial idea, right through to the moment the grinding machine and robot unit go to work.

Robot unit

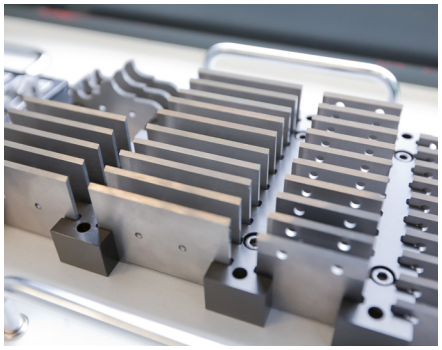
Economical, safe, versatile: 6-axis robot unit for loading, orientation and testing.



Our years of experience in the design of compact and powerful grinding machines is evident in the construction of the automation booth for the robot unit. The booth of the Multigrind® CA offers plenty of space for the six-axle robot unit, workpiece deposits, pallets and additional modules. Once all the pallets are loaded, our fully automated robot unit takes over the loading and unloading of the machine according to precise instructions provided by Multigrind® Horizon, and can also carry out preparatory work during the main operation. With this kind of unmanned series production, you can significantly increase productivity without sacrificing quality. And for support and maintenance, you can rely on the team at Adelbert Haas.

Pallets

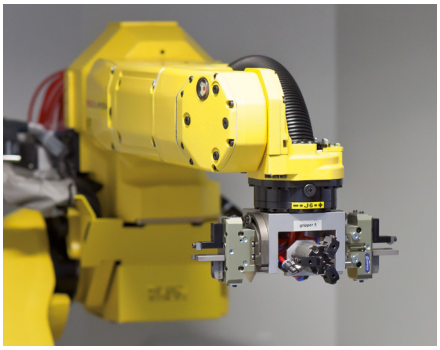
Powerful and flexible loading: pallets and workpiece carriers.



In combination with our automation solution, you can use your own pallets and workpiece carriers or those from Adelbert Haas. No matter what your production strategy is, we've got the perfect solution. Parts made from different materials can be arranged upright or flat, oriented or non- oriented. Our solution is also flexible in relation to the shape of the parts (round, flat, etc.) and the size of the pallets and workpiece carriers. Modification and conversion to various other pallets is easy thanks to the adjustable slot nuts. Latches that can be fixed in place allow you to change the pallets quickly and exactly without any tedious realignment.

Additional modules

Exact alignment with a firm grip: gripper fingers and additional modules.

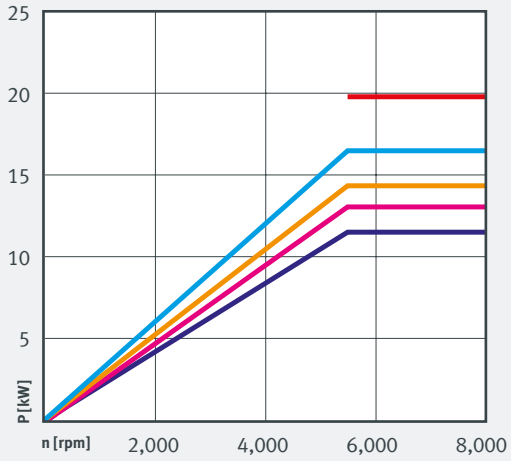


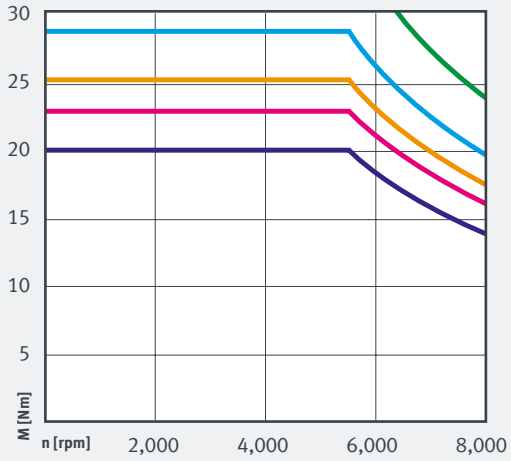
Users can choose from a wide range of grippers for handling parts (magnetic, centric, with one, two or three fingers). Solutions by Adelbert Haas feature as standard a blowing device for cleaning parts and a laser measuring bridge for controlling the gripper. Beyond that, we offer a range of tools such as turning stations and modules for the orientation and alignment of workpieces (i.e. for preparing workpieces before they are clamped onto the machine). An integrated camera system determines the position of the parts so that they can be correctly added to the grinding process.

Comparison of spindle drives.

HSK 50 E

Spindle speed	8,000 rpm
Power rating P_N	11.5 kW
Torque rating M_N	20 Nm

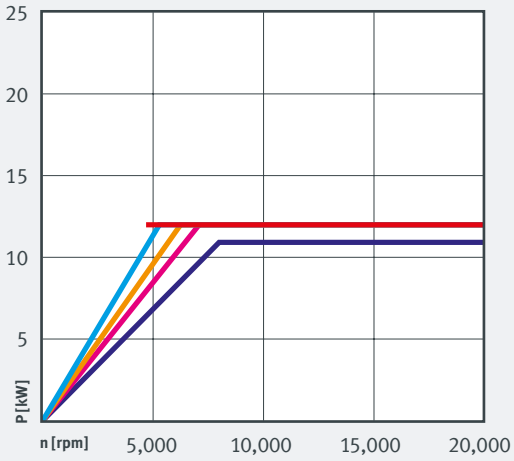


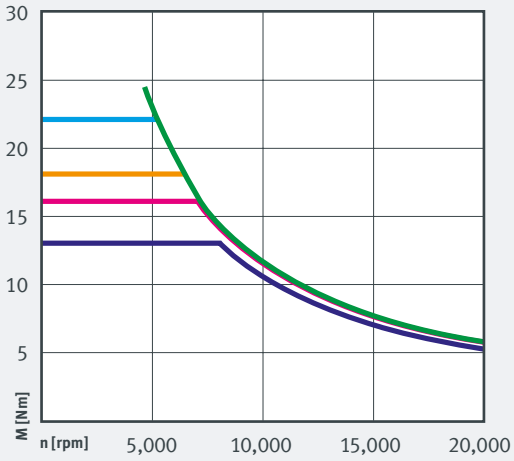


P-limit
M-limit
S6-25 % (55A)
S6-40 % (44A)
S6-60 % (37A)
S1 (30A)

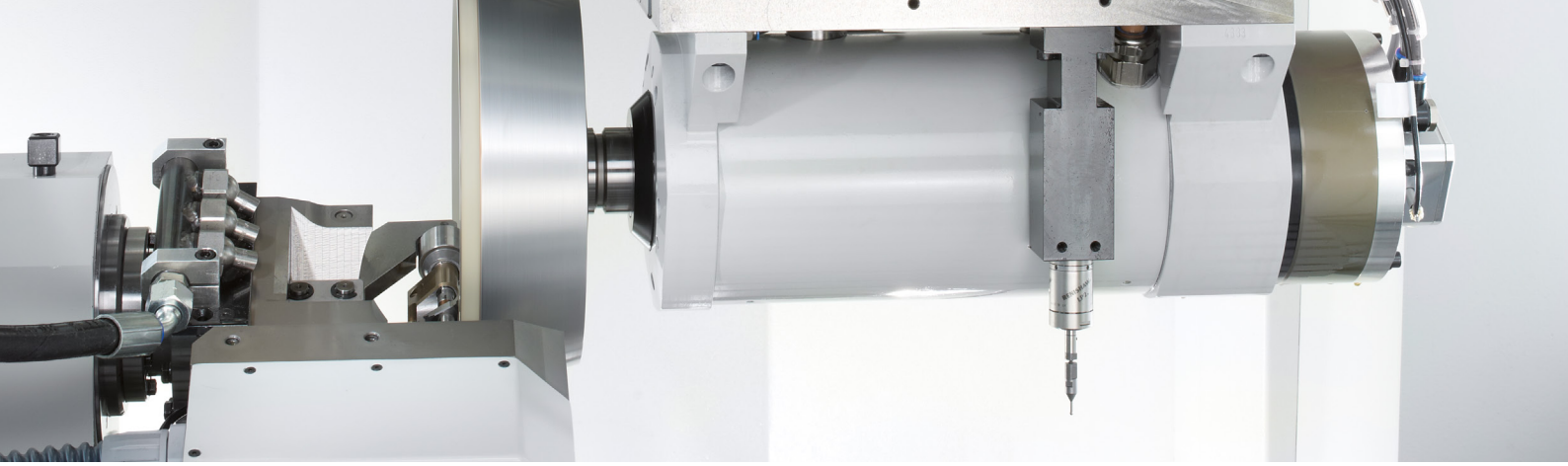
HSK 50 E

Spindle speed	18,000 rpm
Power rating P_N	11 kW
Torque rating M_N	13 Nm



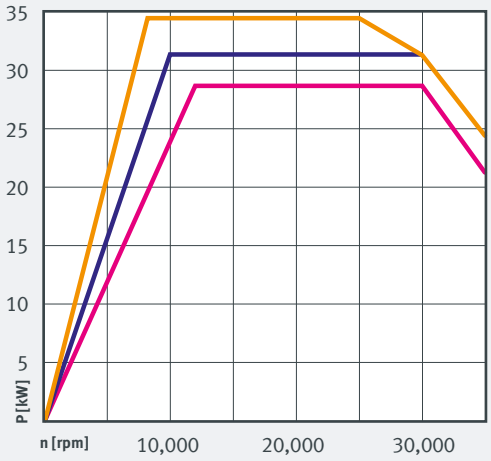


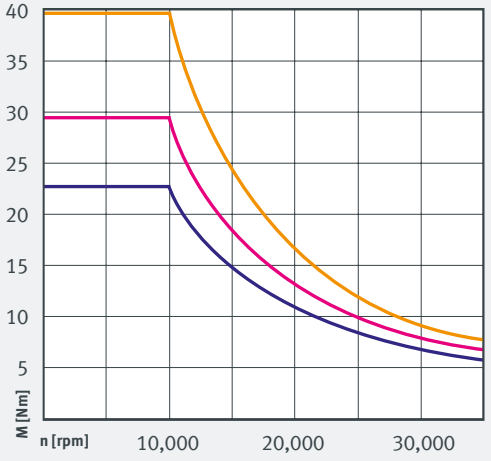
P-limit
M-limit
S6-25 % (33A)
S6-40 % (26A)
S6-60 % (22A)
S1 (20A)



HSK 50 E

Spindle speed	35,000 rpm
Power rating P_N	21 kW
Torque rating M_N	20 Nm

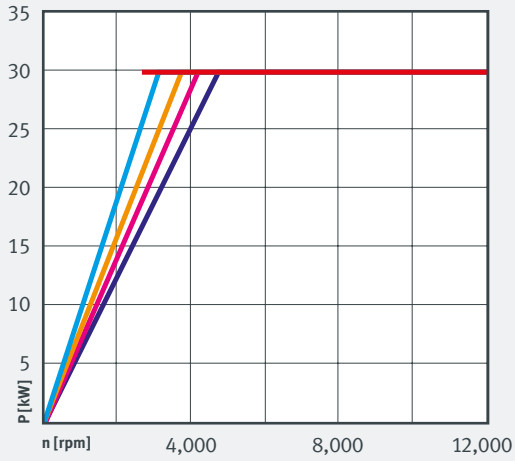


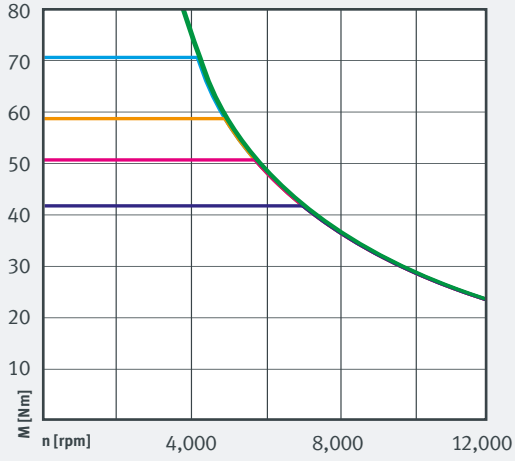


Maximum torque (108A)
S3-60 % 1 Min (71,1A)
S1 (55,5A)

HSK 80 E

Spindle speed	12,000 rpm
Power rating P_N	30 kW
Torque rating M_N	42 Nm

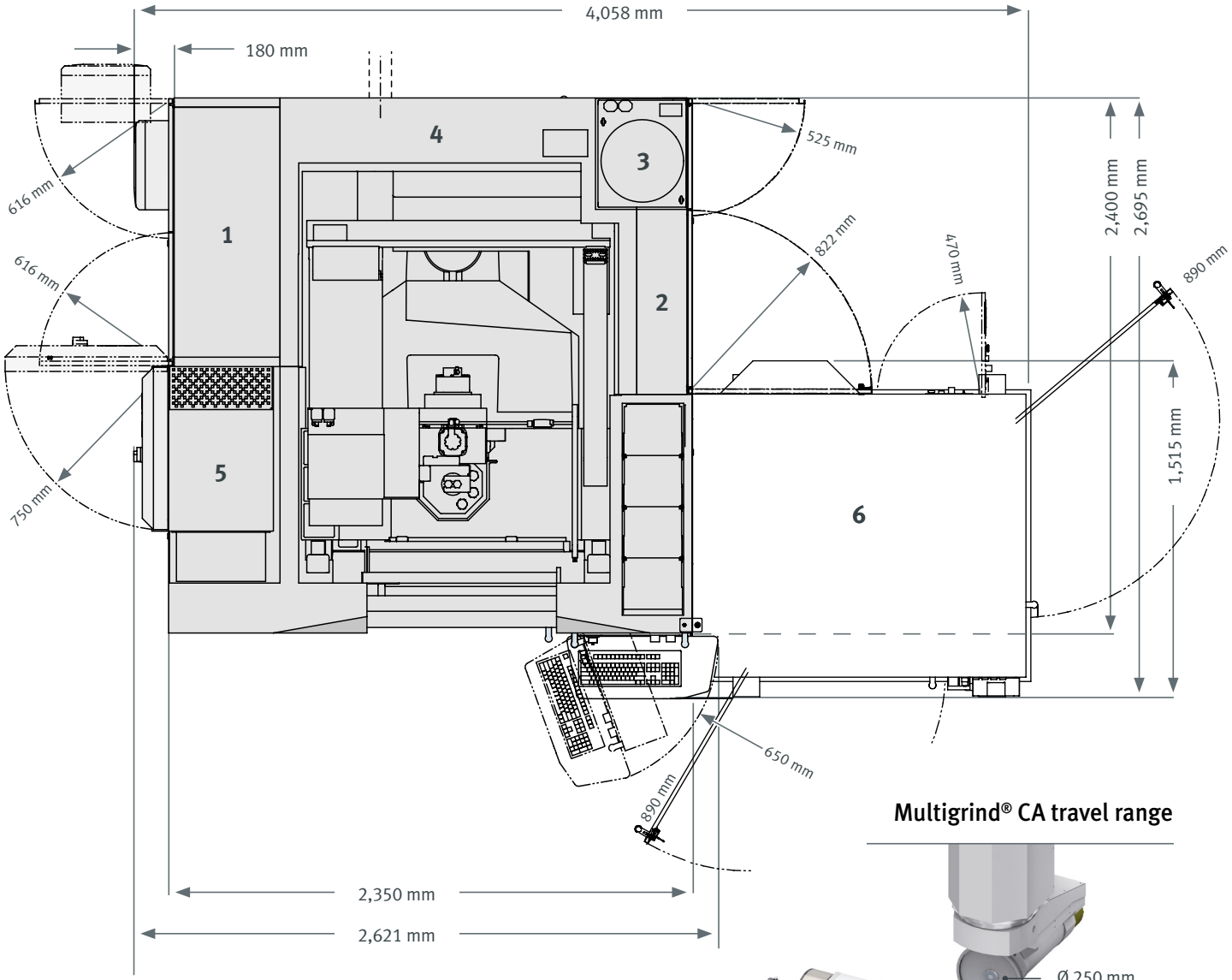




P-limit
M-limit
S6-25 % (120A)
S6-40 % (97A)
S6-60 % (81A)
S1 (65A)

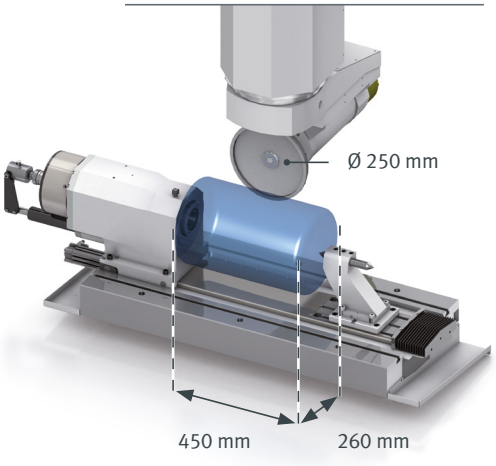
Technical data

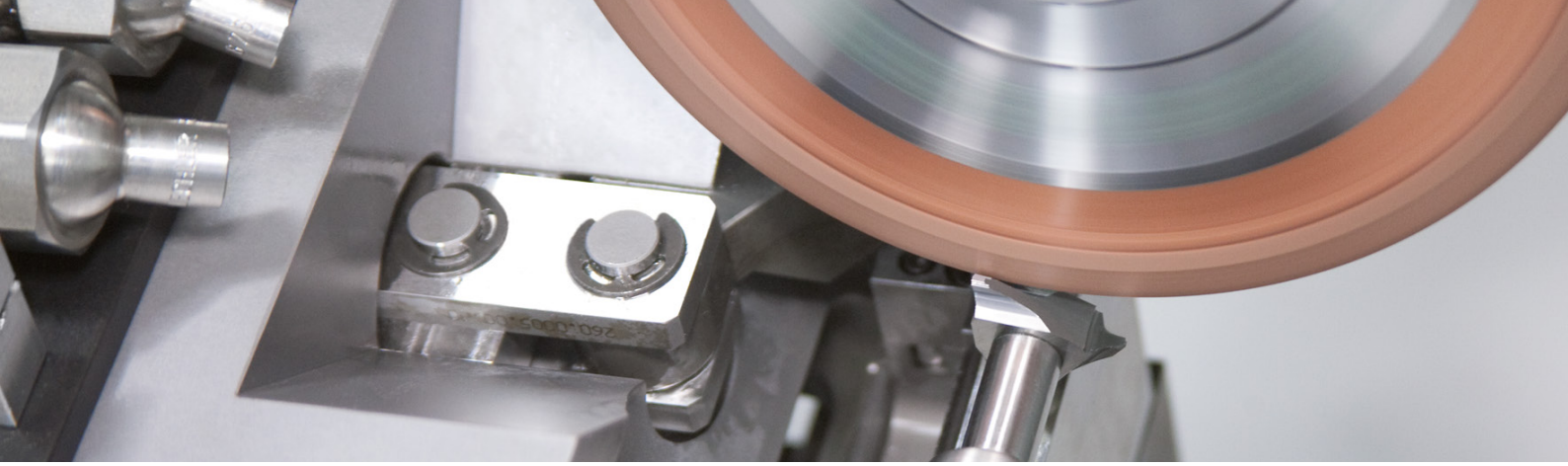
Multigrind® CA dimensions



1 - Electrical cabinet
2 - Supply cabinet
3 - Cooling unit
4 - Tool changer
5 - Oil mist extraction
6 - Space for optional automation unit

Multigrind® CA travel range





Grinding spindles

Interface HSK 50 E	
Power 100 %	11.5 kW
Standard rotation speed	8,000 rpm
Interface HSK 50 E	
Power 100 %	11 kW
Standard rotation speed	18,000 rpm
Interface HSK 50 E	
Power 100 %	21 kW
Standard rotation speed	35,000 rpm
Interface HSK 80 E	
Power 100 %	28.8 kW
Standard rotation speed	12,000 rpm
Optional: high frequency spindle	available upon request

Machine table

Clamping surface		1,000 x 440 mm
T-slots:	Quantity	7
	Distance	50 mm
	Width	12H7 mm

Travel range

X-axis	630 mm
Y-axis	345 mm
Z-axis	430 mm
C-axis rotation range	300°

Option: X3-auxiliary axis

Travel range	400 mm

Measuring system and feed

Linear axis resolution	0.0001 mm
Linear axis rapid feed	30,000 mm/min
Rotary axis resolution	0.001°
C-axis speed	150 rpm

Rotary axis (A-axis)

Standard center height	175 mm
Speed as a spindle	1,000 rpm
Optional	*2,600 rpm*
Standard taper	ISO SK 50 / center 70H5
Frontal drill pattern:	pitch circle Ø 85 M8 (x4)
	pitch circle Ø 79 M5 (x6)

Tool magazine options

Single-wheel tool changer (without coolant nozzles)	
Tools: quantity / Ø	8 / 250 mm to 15 / 100 mm
Double-wheel tool changer (without coolant nozzles)	
Tools: quantity / Ø	12 / 250 mm to 25 / 100 mm
Tool magazine HSK 80 E	
Tools: quantity / Ø	70 / 250 mm
Coolant nozzles: Quantity	20 Spaces

Workpiece size

Ø	260 mm
Length	500 mm
Length between the tips	450 mm
Max. workpiece weight between the tips	190 kg

Electrical supply

Voltage rating	400 V/50 Hz fused with 63 A

Control

Siemens continuous path control system	
	Sinumerik 840D sl

Pneumatics

Operating pressure	6 - 10 bar

Weight

Total weight depending on equipment	from 8,500 kg

Space required

Length x width	2,621 x 2,400 mm
Height during operation	3,200 mm

Errors, omissions, and technical changes excepted. Updated 1/2023

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