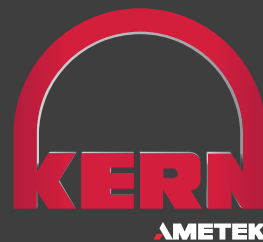

KERN MICRO HD-LINE



Kern Micro HD & Micro HD+





Kern Micro HD

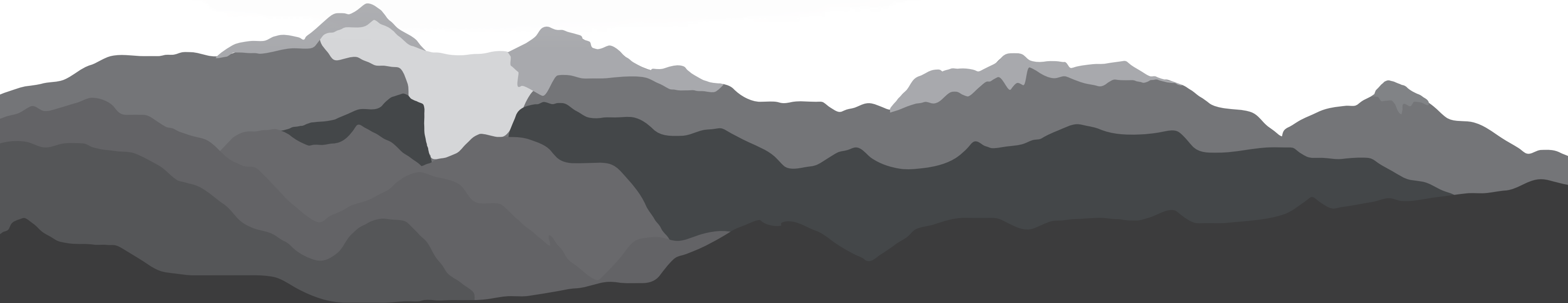


Kern Micro HD+

Kern Microtechnik

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Kern Microtechnik

WHO WE ARE

Kern Microtechnik GmbH is headquartered in Upper Bavaria in southern Germany. Located in the foothills of the Alps, we have been developing and manufacturing high-precision machining solutions for our customers around the globe for decades. With a focus on innovation, technology and close cooperation with our customers, we help them tackle the challenges of tomorrow. These include the energy transition, medical technology, the semiconductor industry and sustainable manufacturing. As part of AMETEK, we combine the agility and innovative strength of a technology company with the stability and global network of a leading international industrial group. Innovation, the courage to embrace change, and—above all—our dedicated team are the foundation of Kern’s success and resilience.



„One proof of our strong focus on technology is that we have as many people working in R&D as we have in our assembly.“

Matthias Fritz | DVP Research/Development

What sets Kern apart

In a constantly changing industrial environment, a machine must be adaptable. That’s why we offer a wide range of machining capabilities and a variety of options, allowing each machine to be configured for its specific application. Kern machines are designed with the future in mind and can be expanded or upgraded at any time.

Our commitment to ethics and sustainability is reflected not only in the way we do business, but also in how we develop our machines. We believe in honest, straightforward relationships with our customers, suppliers and partners. For us, sustainability means taking responsibility for both people and the environment. One example is our regional supply chain: 85% of our suppliers are located within 350 km (220 miles) of our headquarters. We source components from trusted partners, including suppliers in Germany, Austria, and Switzerland.

Wherever tomorrow’s technologies are being developed, quality, precision, and productivity matter today.

Through our work and our machines, we help shape the products and technologies of tomorrow — and contribute to progress across industries. That’s what drives us. We’re proud of the machines, innovations, and technology we develop, but we know that even the most accurate machine alone does not guarantee outstanding parts. Every application requires a stable, optimized process and the right expertise to achieve its full potential. That’s why Kern offers more than highly precise, highly productive machine tools. We share our expertise, support our customers in developing new products and technologies, and help them build successful, efficient processes for the long term.



„We strive to exceed our customers’ expectations and build long-term partnerships.“

Franz Guglhör | Head of Global Service

Distinctive Partnership With Customers

Sales

Our sales team listens closely and develops a deep understanding of our customers’ requirements. Innovation is often driven by customer needs. We look beyond the machine itself and consider the entire manufacturing process to provide comprehensive solutions and address challenges as quickly and effectively as possible.



„We are proud of our team and our machine technology. One indication that we’re on the right track is that there are virtually no used Kern Micro machines on the market—and no customers who are not achieving profitable results with their Kern Micro.“

Simon Eickholt | DVP Business Manager

Applications

Our applications engineering team is equipped with state-of-the-art technology and staffed by experienced, highly motivated experts. It is not a showroom or a laboratory — it is where real parts and real production requirements are used to develop robust, stable processes under real-world conditions. Customers gain a realistic, firsthand understanding of the machine’s capabilities using their own parts and applications. Together, Kern and its customers explore what is possible - and then push those limits further. This is only possible by combining Kern’s comprehensive expertise with the customer’s in-depth knowledge of their application and process.

Kern Training Center

The Kern Training Center provides thorough operator training. Courses show users how to get the most from the machine and the Heidenhain control. The program includes standard Heidenhain courses as well as specialized training in ceramics, deep-hole machining, carbide machining, and more. We also support customers with application-specific process development, maintenance, and service to accelerate the learning curve and keep machines operating efficiently.

Kern Service

Kern Service provides fast, personalized support. Whether you’re dealing with a machine issue, an error message, or a technical question, our service experts respond quickly and work with you to find the right solution. Remote support is also available to resolve issues as quickly as possible. With service technicians located nearby and backed by extensive expertise, we help keep your machines running reliably and performing at their best.



„I’m grateful to be part of this great team of inventors, pioneers, and honest, genuine people who make up the Kern family.“

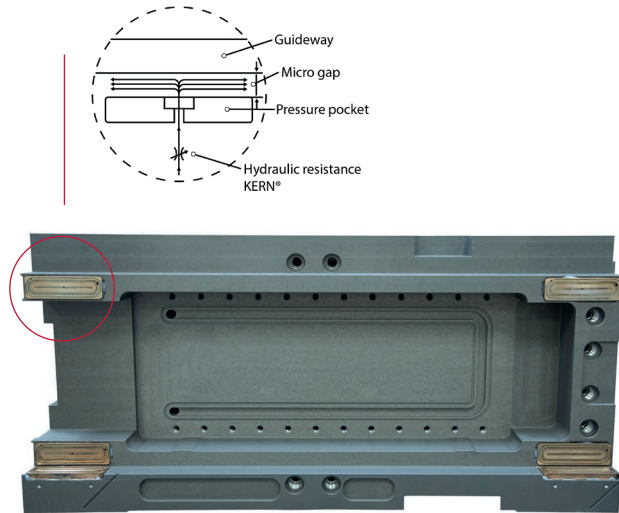
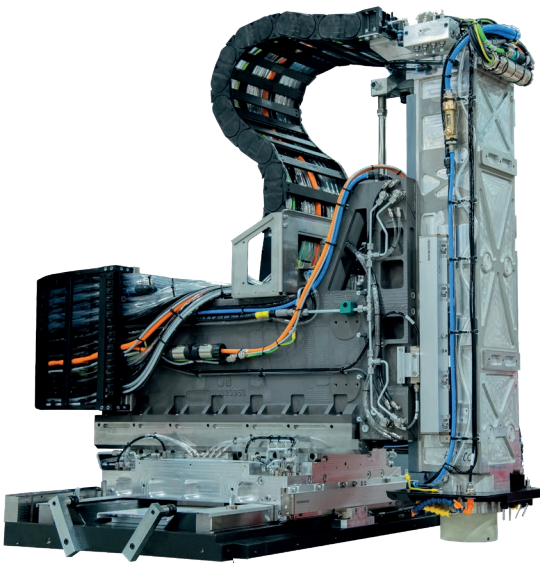
Sebastian Guggenmos | DVP Operations

Robust and high performance

MICRO-GAP HYDROSTATIC ON THREE AXES

In 2019 Kern introduced the micro-gap hydrostatic system. Ever since, this system has proven to be a rigid and powerful system for many different applications. This high-end technology is characterized by a gap height of less than 10 µm and thus saving energy, while conventional hydrostatic systems have a gap height of more than 25 µm. Above all, the micro-gap ensures highest rigidity and perfect damping properties, which is reflected in the excellent accuracy of the workpiece and the surface quality.

The actively cooled aluminum axes and the hydrostatic media guarantee extreme stability even in non-ideal conditions and thus on-going highest quality of the parts in serial production. With hydrostatics, there is no metal to metal contact as they are separated from each other by a fine oil film and work without wear. At the same time, the system provides very good damping, reduction of vibrations, more stable machining processes and longer tool life. Another positive effect of this system is the resistance to unwanted mechanical events, such as for example collisions in the machining process. The electromagnetic field that preloads the three-axes assembly allows the collision energy to be dissipated without mechanical damage to the axes system.



Hydrostatic principle
All linear axes of the Kern Micro HD and the Micro HD+ are equipped with the Kern Micro-gap hydrostatic system

High quality and large dimensions

LINEAR DIRECT DRIVES

Linear motors are a popular drive system in machine tools with advantages in terms of dynamics and control accuracy. However, due to the enormous heat input and the resulting heat transfer, the system is only partially suitable for high-precision machines. To overcome this challenge, Kern installs high-quality, large-sized and actively temperature-controlled linear motors in the Kern Micro HD and the Kern

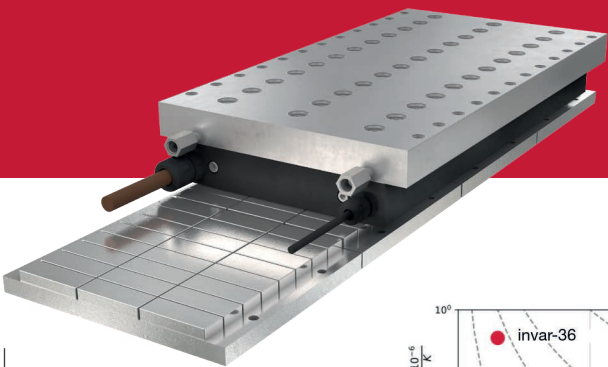
Micro HD+ for the best drive of the three-axes system in an integral design. This integration into the hydrostatic system serves to minimize heat input and eliminates unwanted side effects. The combination of the Kern micro-gap hydrostatics and the linear motors is unique and unrivaled in terms of performance.

Kern Micro HD:
Best possible productivity paired with highest precision

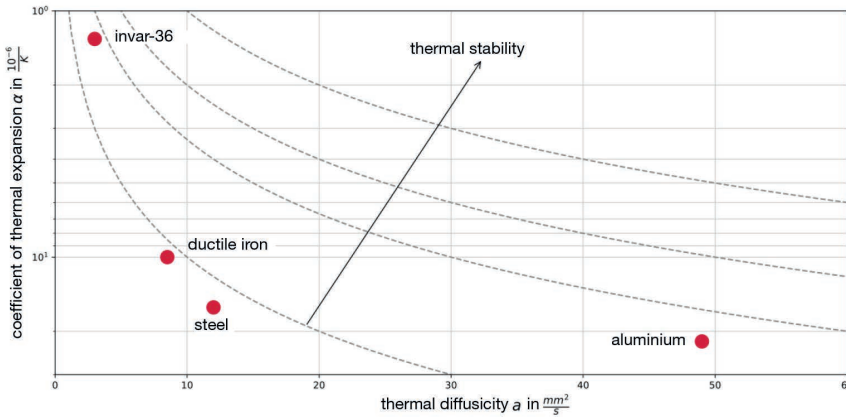
Why Aluminum? –
Utilization at Kern

What was long considered incompatible - producing highly productive, sophisticated precision parts in serial production - is now achievable with the Micro HD. Comparable machines in this segment often have to choose between speed and accuracy. With the combination of linear direct drives and the Kern micro-gap hydrostatics, this is no longer necessary when working with the Kern Micro HD line. It achieves both - outstanding precision and exceptional dynamics and productivity. This makes the Kern HD line ideal for demanding applications where both aspects are uncompromisingly important.

In order to achieve high accuracy productively, it is important to reach the thermal steady state in a short time. In the Kern Micro line, this is achieved by using high-strength aluminum alloy for the moving axes parts. The high specific stiffness as well as the good thermal conductivity in combination with the Kern temperature management lead to excellent thermal stability of the entire machine. The Kern three-axes assembly weighs just under 365 kg (805 lbs). A steel axes system would increase the weight to over 1 t (2,205 lbs).



Linear direct drives
The integral design of micro-gap hydrostatics and linear direct drives allows maximum precision and dynamics at the same time

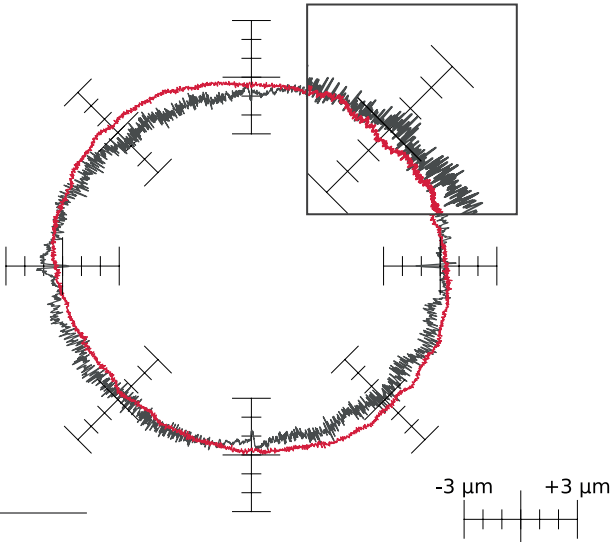


„The additional costs for the hydrostatic axes system pay for themselves in less than twelve months because of a higher performance and increased quality.“

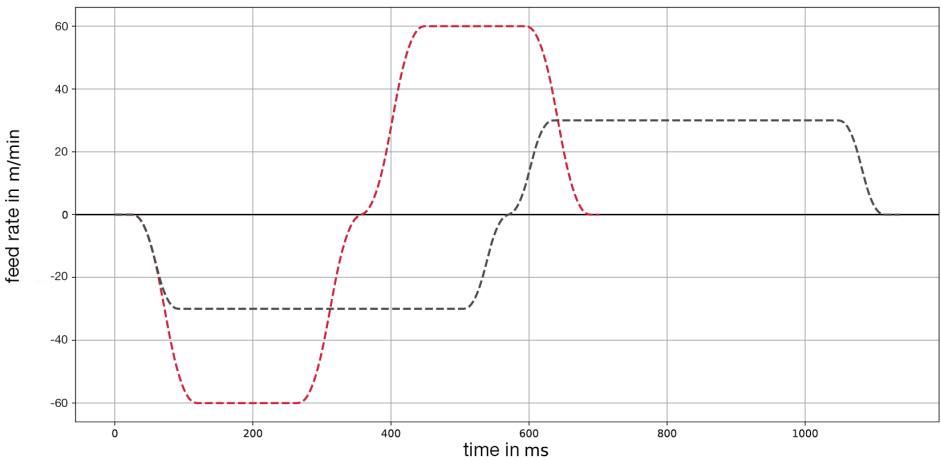
Heiko Zimmermann | Industrialization Movement Parts, IWC Schaffhausen

Guide system and drive - Advantages of this combination

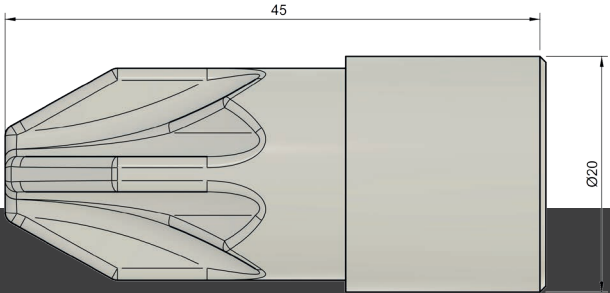
- + **No wear** – No wear is a crucial factor for the longevity of Kern machines. Wear and tear are the main reason for change over time, as anything that changes in shape also decreases in accuracy. Kern is aware of this problem and has developed a hydrostatic solution that has already proven itself hundreds of times in the real world.
- + **No stick-slip** – The stick-slip effect means that the components of the stationary and moving parts are strongly influenced by solid friction. This applies to every machine tool with conventional bearings and has a significant influence on the accuracy of machining. The non-contact supported axes of the Kern Micro HD and HD+ are not subject to this physical effect. This optimized positioning behavior allows precise changes of direction and low feed speeds, which is ideal for fine machining. With this feature, jig grinding and trochoidal milling are possible without any problems. The result is flawless machining with no reversal marks, the highest possible accuracy and no disruptive dynamic effects across the entire speed spectrum. The axis system can be moved with just one finger, which impressively demonstrates the principle of micro-gap hydrostatics.
- + **High rigidity, damping and accuracy** – Compared to steel structures, the three-axes compound made of aluminum alloy offers increased rigidity with lower mass. This ensures highest contour-accuracy of the tool path and avoids effects such as chatter marks and tool deflection. In addition, the micro-gap hydrostatics create a damping effect, which, in combination with the rigidity of the system, provides greater accuracy and precise machining.
- + **Efficiency of hydrostatic** is increased by using the magnetic forces of the linear motor, as no counter bearings are required. The system minimizes the otherwise harmful or disruptive forces and ensures that damage to the axis assembly is almost impossible, even in the event of unintentional impacts such as a machine crash. The result is a solid system that has low maintenance and operating costs.



Circularity test
Circular deviation at radius 30 mm
Feed F = 1,000 mm/min
— Kern Micro HD & HD+
— Market-leading precision machine



Maximum feed rate – comparison at max. feed rate F = 60 m/min
--- Kern Micro HD & HD+
--- Market-leading precision machine



Versatile in every material

Thanks to the extremely rigid hydrostatic axes of the Kern Micro HD, roughing is carried out efficiently and with a high material removal rate using deep grinding. The complex free-form surfaces are then machined using a diamond tool with a geometrically

defined cutting edge - the outstanding smoothness and precision of the machine and the special Kern expertise of the „ductile cutting mode“ result in better and chipping-free surfaces and edges.



Even more precise - even more reliable - even more intelligent

KERN TEMPERATURE MANAGEMENT – BETTER THAN EVER

Decades ago, Kern declared war on the negative influence of temperature deviations in the precision system of a machine tool. A perfectly adapted next-generation Kern temperature management system is installed in the Kern Micro HD and the Kern Micro HD+, which provides the greatest possible stability with significantly higher flow rates and even more precise control in the range of 0.05 K. This leads to unsurpassed accuracy in serial production and the greatest possible independence from external temperature influences. Not only the temperature medium, but also the hydraulic fluids for hydrostatics are controlled with high precision and stability.

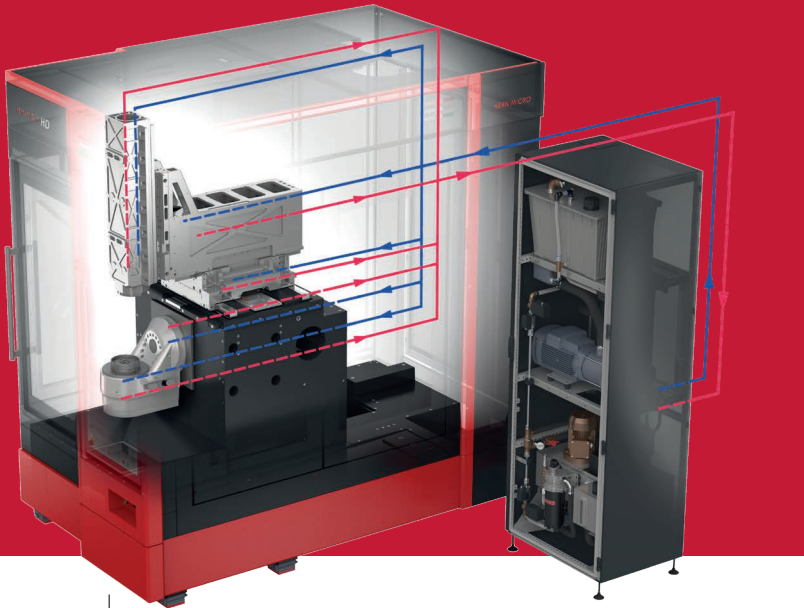
The temperature management is geared towards industrial production processes - it maintains a control accuracy of 0.05 K in all machine states - including heavy-duty operation.

Exclusively designed for the Kern Micro HD+ is a custom-made high pressure heat exchanger. It increases the control accuracy of the hydrostatics significantly and also increases the energy efficiency of the Kern temperature management system.

At a Glance

Active Temperature Management of the Kern Micro HD and HD+

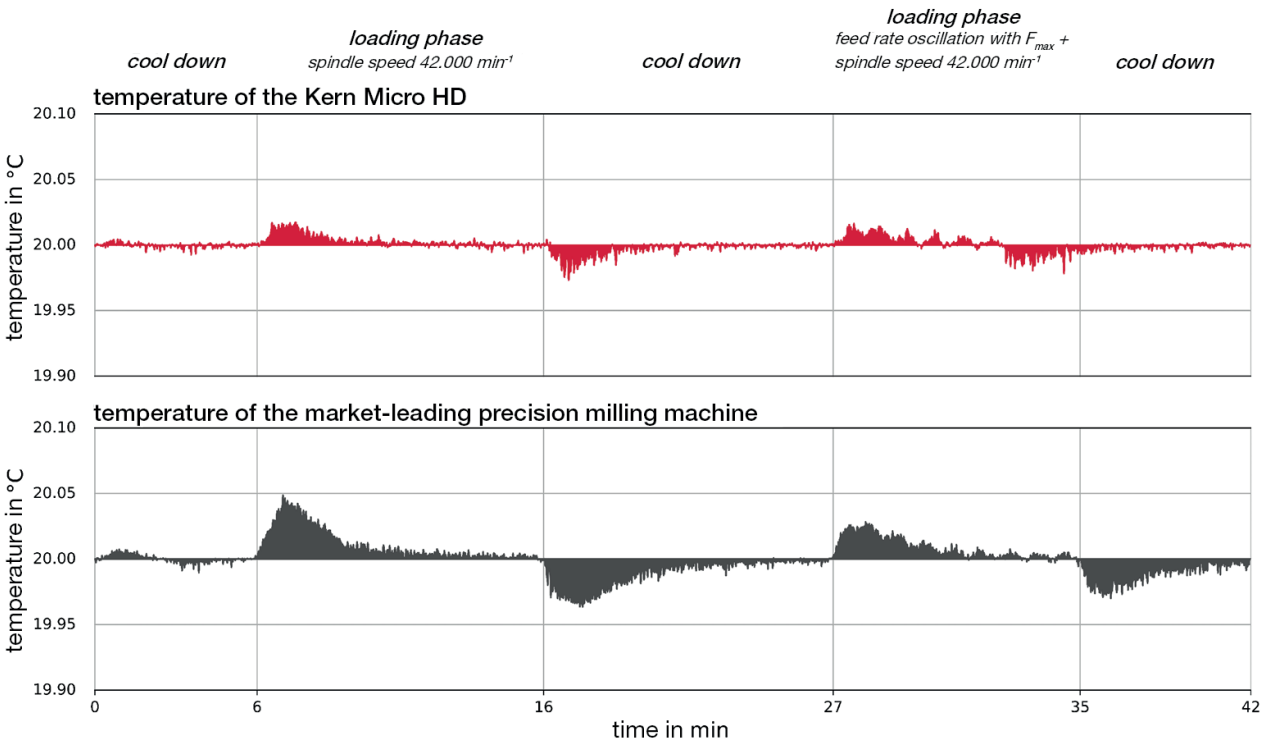
- + Machine cast made of Armorith®
- + Media and fluids (coolants & hydrostatic lubricant)
- + Control cabinet & electronic components
- + Spindle (bearings, motor, rotary union), CSC-Spindle (additional shaft cooling)
- + Rotary and swivel axes (direct drive with stator and rotor, bearing, bearing ring)
- + Linear axes (direct drive, magnetic track, magnetic coils, axes bodies)



How is the temperature being managed?

- Flow Rate: 160 – 200 l/min
- Temperature: 20°C ± 0,05 K
- Temperature difference inlet/return flow: <0,5 K

Temperature management stress test



Temperature management
The new temperature management of the Kern Micro HD & Micro HD+ is impressive in the stress test under the toughest conditions for the temperature stability of the machine.

„Even if the Kern Micro HD has not been set up in an optimally temperature-controlled room and is therefore exposed to all sorts of unpleasant environmental influences, you can rely on the quality of the HD. Its thermal stability ensures that high-precision components can be reliably manufactured in the µm range.”

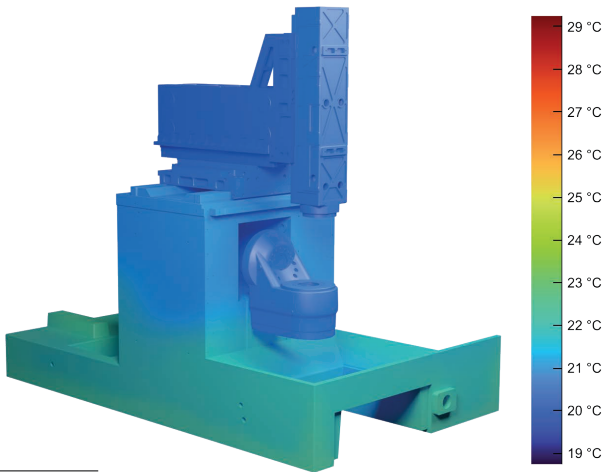
Gerhard Weber | Carl Zeiss Oberkochen

Temperature management of the axes on four levels

To achieve perfect workpiece geometries controlling the influence of temperature on a machine tool is very important. Even more so in 5-axes machining. This is the reason why Kern uses a four-level temperature management system on the linear axes of the Kern Micro HD and Kern Micro HD+.

In the first level, a major part of the heat is dissipated directly at the source, i.e. at the magnetic coils of the linear motors. In the second level, the heat from the entire magnetic track is dissipated. The third level prevents the transport of heat from the drives into the structural components of the machine. In the fourth level, the structure itself is cooled, thereby eliminating disruptive influences from operation. All four levels make the machine very resistant against changing heat influences from the workshop environment, self-controlled without human interaction.

All four levels of axes temperature control are supplied by the Kern temperature management system. This system is in a separate hybrid unit, which is placed next to the machine to avoid the transmission of disturbing vibrations.



Cooling concept
The test in the climate chamber shows the performance of the Kern temperature management system via the colour gradation



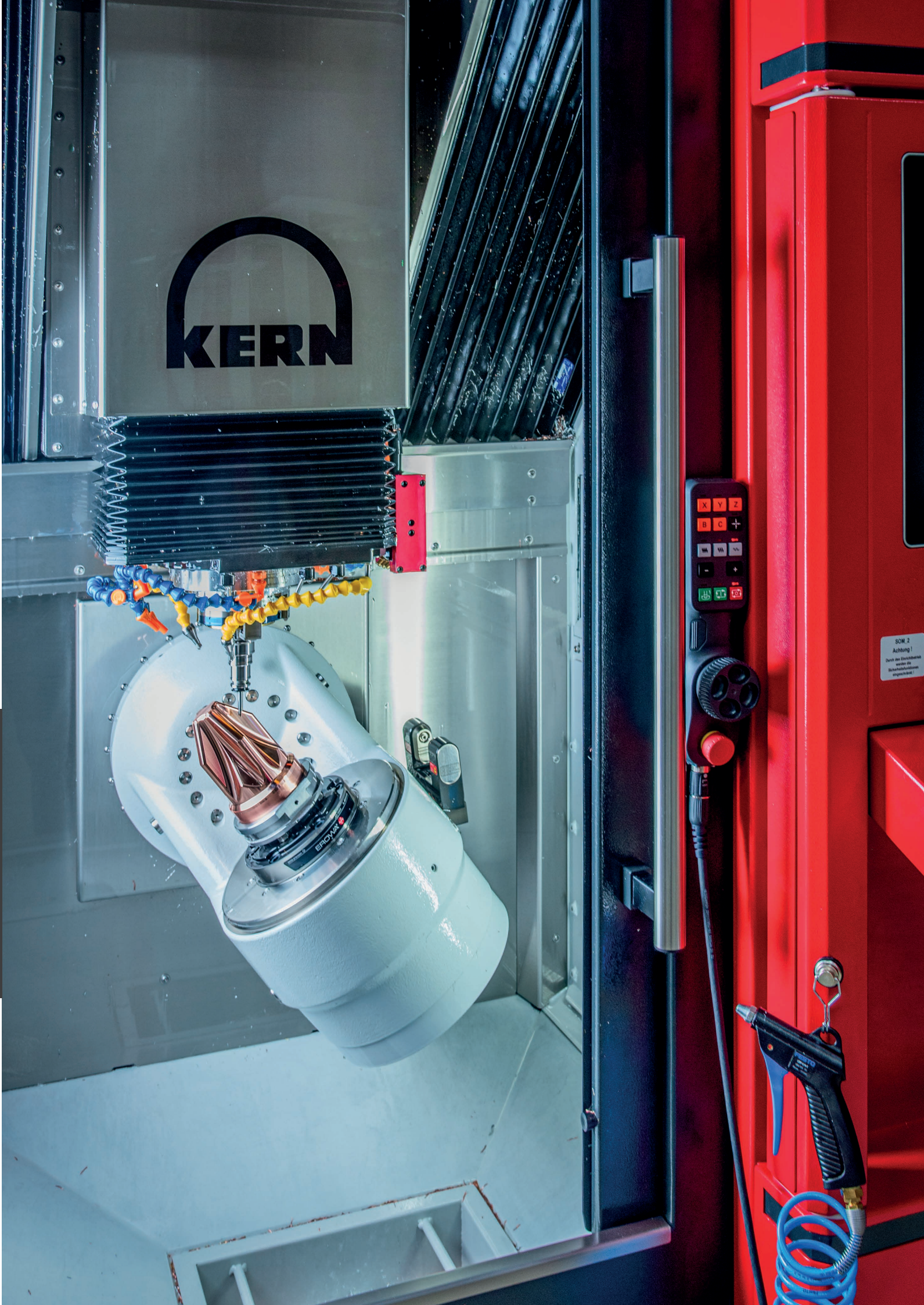
„The thermal stability and reliability of the Kern Micro HD enables us to no longer look at the machine when developing and improving processes, but rather concentrate on all other aspects of the entire process.“

Christoph Angerer | Head of Kern Training Center

One step further with the Kern Micro HD+

Here a dedicated cooling of the stator on the fourth and fifth axis is active. The lubricant of the micro-gap hydrostatic is also temperature controlled and provides a steady temperature in all moving parts of the turntable.

This results in a superior thermal stability of the rotational and swivel axes and provides the basis for future mechanical and control related improvements.



At a glance

KERN MICRO HD-LINE

- + *Compact design and small footprint* of less than 5 m² (54 sq. ft.)
- + *Highest machine stability* with improved Kern Temperature Management
- + *High dynamic and productivity* with internal linear drives
- + *Best quality of parts, no wear and tear and long durability* because of the innovative Kern micro-gap hydrostatic
- + *Operation in several shifts without operator* with integrated tool changer for up to 210 tools and 60 workpieces
- + *Certified interface* for external transformers and automation systems
- + *Non-stop control and maintenance* while machine is in operation

Kern Micro HD

Since 2020 the Kern Micro HD sets the standard for high-precision machining. With micro-gap hydrostatic, integrated linear drives and the unique Kern temperature management system the Kern Micro HD remains unmatched when it comes to precision,

long time stability and dynamic. Developed with the knowledge of our customers and our application team the Kern Micro HD is only surpassed by the Kern Micro HD+.



Kern Micro HD+

The Kern Micro HD+ replaces the roller-bearing turntable of the Micro HD with an innovative hydrostatic turntable. The plus in the name stands for an improvement in axial and radial runout, dynamics, stiffness and thermal stability - ready for tomorrow's applications.

The Micro HD+ provides best stability for processes with different combinations of machining. Furthermore, there is no wear and tear, and the fully automated serial production of extremely precise parts can be taken for granted.



Compact shaft cooling

SHAFT-COOLED HIGH - SPEED SPINDLE

In high-precision machining, the demands on the milling spindle are always increasing, and many conventional spindle concepts are reaching their limits. The new generation of the CSC spindle (Compact Shaft Cooling) with HSK 40 interface is a high-frequency spindle that stands out because of its shaft cooling, non-contact rotary union and an extended speed range of up to 45,000 rpm. The stator, front and rear bearings, the housing and, as a special feature, the shaft are being cooled. This results in less spindle growth and a minimal thermal settling time. The temperature control is in a separate unit, which can be positioned on the hybrid cabinet or next to the machine. Unlike the industry standard, this unit is being actively cooled with a very high precision.

In addition, the CSC spindle provides unrivaled performance in a wide variety of applications. The high speed, thermal stability and exceptional smooth-running push the limits of machining. The non-contact rotary union allows the use of internally cooled tools with compressed air, lubricants or oil without any restrictions.

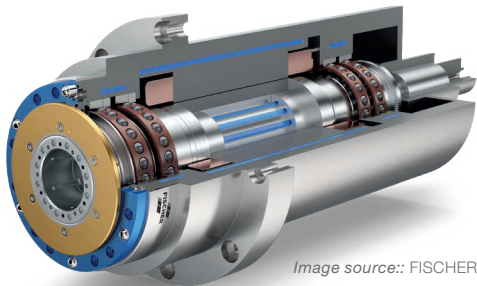
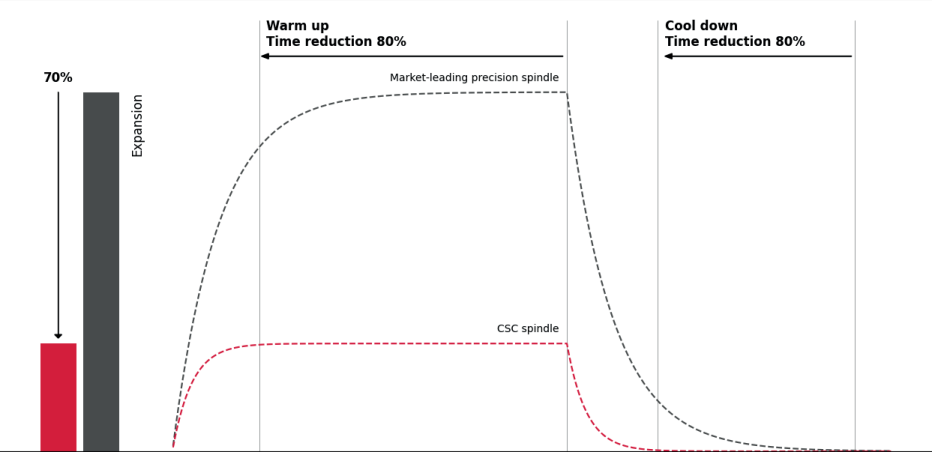


Image source:: FISCHER AG Präzisionsspindeln



Shaft cooling
Temperature curve with or without shaft cooling

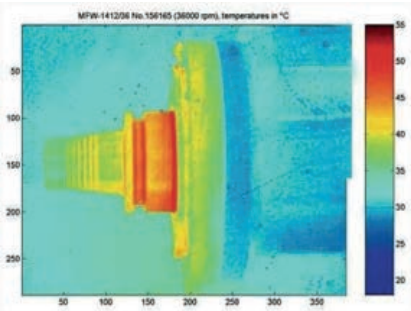
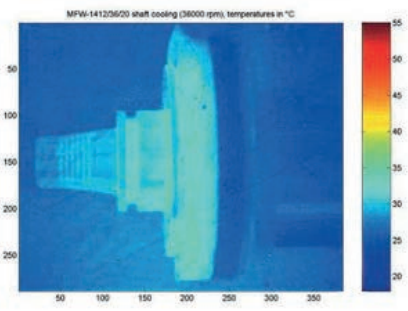


Image source: FISCHER AG Präzisionsspindeln



With
shaft cooling

Spindle Options

+ HSK-E 25: 50,000 rpm,
6 kW (S1) ball bearing



Image source:
FISCHER AG Präzisionsspindeln

+ HSK-E 40: 42,000 rpm,
15 kW (S1) ball bearing

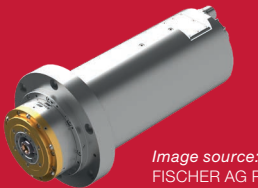


Image source:
FISCHER AG Präzisionsspindeln

+ HSK-E 25: 80,000 rpm,
5,5 kW (S1) air bearing

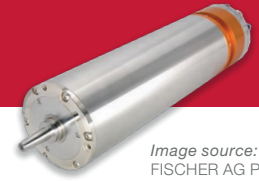


Image source:
FISCHER AG Präzisionsspindeln

+ HSK-E 40: 45,000 rpm,
15 kW (S1) ball bearing (CSC)



Image source:
FISCHER AG Präzisionsspindeln

Ergonomic & User-Friendly

HEIDENHAIN CONTROL TNC7

With Heidenhain's TNC7 control, operators are supported throughout the entire machining process, from the initial idea to the finished part— whether producing a single part or a series. The TNC7 is fully optimized for touch-screen operation, making the software intuitive and easy to use. Its hardware and software are designed to work seamlessly together, providing a comfortable and ergonomic operating experience. Kern has integrated the new high-resolution widescreen displays into a folding and swiveling control panel, positioning them for easy access.

All future technology upgrades will be developed exclusively for the TNC7. The Heidenhain control's fast block processing and advanced path planning enable highly precise, high-speed simultaneous 5-axis machining. Combined with Kern's machine concept, this makes it possible to economically produce even the most challenging parts.

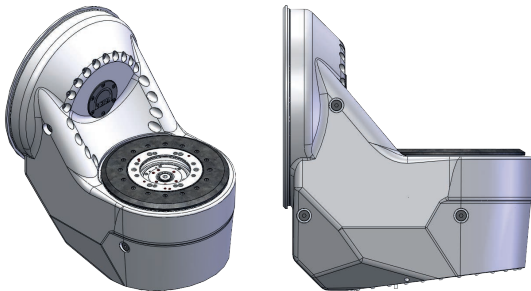


Technological leap

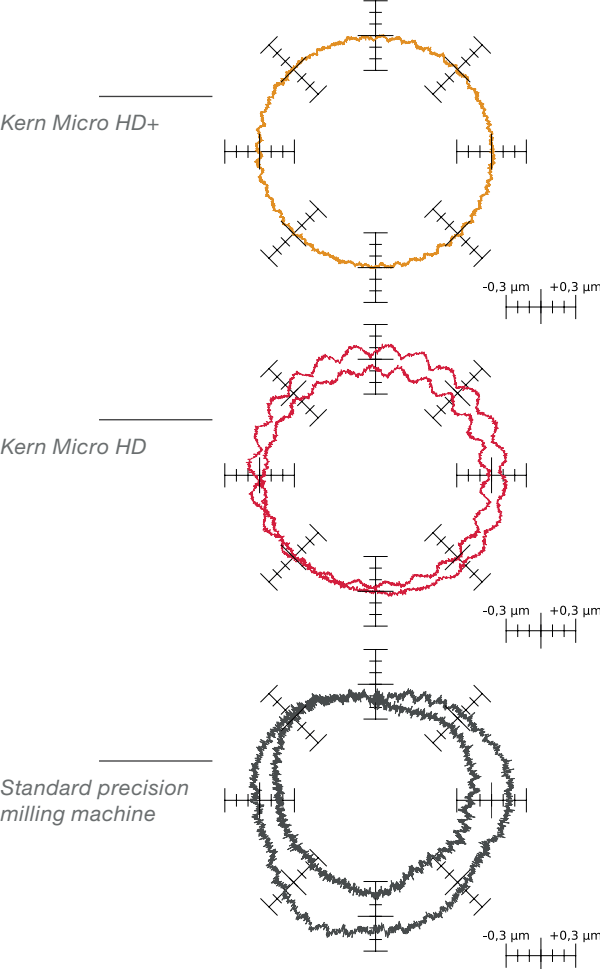
REVOLUTIONIZING THE ROTARY AND SWIVEL AXES

In high-precision five-axis machining, there is always a high pressure to innovate and the need to always be faster, more precise and more stable. To become significantly better, it is often not enough to optimize details or improve existing systems. That's why Kern decided to take a technological leap forward. The development of the hydrostatic turntable at Kern is based on pure pioneering spirit. Based on our experience over the last few years, we have been able to identify roller and ball bearings as the cause of displacements in the sub-micrometer range. They are a limiting factor for the machining quality in many processes.

Kern's Micro HD+ is the most accurate, most dynamic and most productive industrial 5-axes milling machine. The integration of Kern's micro-gap technology into the rotary and swivel axis leads to a significant improvement in all key performance metrics - in particular runout, stiffness, thermal stability and dynamics.



Radial guide accuracy
in X direction



“Hydrostatic micro-gap bearing supports enable the design of highly rigid rotary axes with running properties that cannot be achieved with conventional rolling bearing supports. Combined with the wear-free bearing principle, these form the basis for a highly precise and robust rotary and swivel unit.”

Fabian Tripkewitz | Development Engineer

At a glance

Advantages of a turntable with micro-gap technology

+ Improved Runout

The high-precision bearings, which are manufactured in-house in the sub-μm range on a Kern machine, offer the best conditions for outstanding accuracy of flatness and runout. The hydrostatic system creates an additional averaging effect of the bearings, which neutralizes any remaining shape deviations and shifts the running accuracy into the nanometer range.

+ Higher Dynamics

By installing more powerful motors with higher nominal and peak torques as well as an improved topological structure, the Kern Micro HD+ achieves significantly higher dynamics than comparable turntables. In combination with Kern's temperature management, dynamic machining takes place at high speeds over a long period of time with excellent machining accuracy.

+ High Stiffness

A real advantage of the hydrostatic micro-gap turntable is the stiffness. Combined with improved topology of the housing and reinforcement of the swivel housing, we provide steadfast rigidity. The use of hydrostatic bearings also contributes significantly to the stiffness. This system is designed to provide highest precision even under high loads.

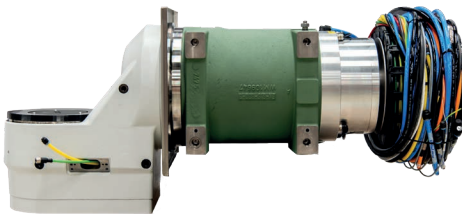
+ Best Thermal Stability

Another advantage is the increased thermal stability. While systems with roller bearings only cool the bearing plate and the stator, the HD+ also actively cools the bearing and housing in the swivel axis and the bearing shaft, bearing and stator in the rotation axis. The improved temperature management significantly increases the performance of the machine, even when machining processes are changing fast, and conditions are not perfect.

One-sided Mounting

An important principle of precision engineering is the so-called „exact constraint design“ (also known as „kinematic design“), i.e. maintaining the static determinacy of the system. If more degrees of freedom are blocked than is required for static determinacy, this results in increased rigidity, but also causes constraint forces. An overdetermined system reacts unpredictably to geometric errors in the components, e.g. from manufacturing and assembly errors, as well as environmental influences such as temperature changes. The rotary and swivel unit of the Micro HD series therefore offers the significant advantage of reproducible and robust behavior under a variety of influencing factors from the production environment. The design also offers improved ergonomics and

accessibility for workpiece handling and process control, allowing the processes in the work area to be controlled in the best possible way.



James Clerk Maxwell, 1890 [MAX90]: „Hence if a solid piece is constrained in more than six ways it will be subject to internal stress and will become strained or distorted, and this in a manner which, without the most exact micrometrical measurements, it would be impossible to specify.” *

Combining different Technologies all in one Process

JIG GRINDING

Why Jig-Grinding?

The jig grinding option on the Micro HD allows not only high-precision milling but also grinding in one clamping.

Jig grinding is not only an additional option for the Kern Micro HD and HD+. Kern is also realizing the goal of building the most powerful 5-axis milling machine with market-leading grinding technology. The integration of grinding, milling and drilling in one system significantly increases capacity and flexibility and at the same time provides optimized machining for the entire process.

The grinding strikes not only with an extreme speed, but also with an exceptional cost-effectiveness and productivity. The combination of milling and grinding is now providing a level of precision in machining which was previously not reachable.

Optimized cycles for different grinding applications are integrated directly into the Heidenhain TNC7 control and simplify the entire process. This is essential for efficient machining with highest accuracies.



Modularity for maximum flexibility

The jig grinding options are modular and can be selected with a rotating or fixed diamond dresser or grinding pins and a dressing spindle that is directly integrated into the machining process.

Benefits & Solutions

- + **Highest accuracy** in jig grinding, without high additional investments
- + **Wear-free** because of the specially developed machine concept
- + **Combined machining** of grinding, milling and drilling in one clamping
- + **Machine savings** because several processes are running on one machine
- + **Diverse applications** with 5-axes technology, ideal for complex geometries and free-form surfaces
- + **Integrated sensor technology** for automated and reliable processes



dressing spindle



fixed dresser



scraper block

Best process control

Acoustic Emission Sensors (AE Sensor):

Our AE sensors work like microphones, detecting frequencies that detect changes in the process when the grinding pin touches the workpiece or the grinding process is complete.

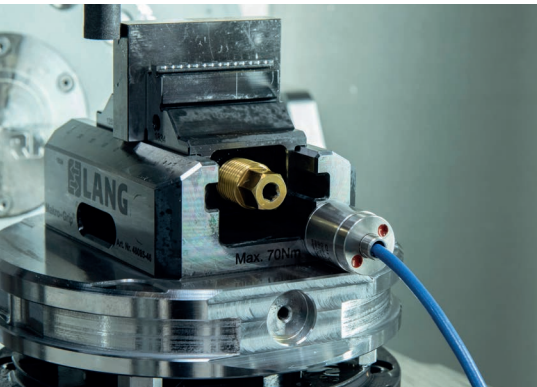
- Advantages:
- + **Real-time process monitoring and optimization**
 - + **Extremely helpful when dressing to determine the exact time of completion**



1. Fluid sensors:

A machining medium is directed at the workpiece during machining. When the workpiece and tool touch each other, the sound waves are fed back via the fluid jet – very helpful for automated 5-axes machining.

Advantage: Non-contact measurement



2. Magnetic sensors/solid-state sound sensor:

The sensor is attached directly to the workpiece using a magnet. The touches can thus be measured precisely. (Piezo element)

Integration of the sensors directly into the machine: optimization of the entire processing.

Pentalobe

- + **Material:** Carbide K40UF
- + **Technology:** Jig Grinding & 5-Axes Grinding
- + **Surface:** Ra 0,02 µm



MORE OPTIONS

Filtration

- + **Band filter:**
Available with low- or high-pressure systems up to 1,160 PSI (80 bar) for through-tool coolant delivery, with a 130-gallon (490 L) tank. Band filters are available in different configurations and can be tailored to specific applications.

Cooling, Lubrication, Chip Management

- + **Through -Tool Coolant Delivery::**
Rotary union for through-tool coolant delivery using air, emulsion, or oil, in combination with a paper band filter. Pressure: coolant 1,160 PSI (80 bar) /compressed air 87 PSI (6 bar).
- + **BEMA nozzles:**
Coolant nozzles automatically adjust to the individual tool length for best possible cooling.
- + **Chip conveyor:**
Integrated chip conveyor with discharge at the rear of the machine. Available only in combination with a band filter.
- + **Internal chip container:**
The temperature-controlled chip collection bin has a capacity of 26.4 gal (100 L). It is connected to the machine's central thermal management system. Coolant flow rate: 6.6 GPM (25 L/min) at 5.8 PSI (4 bar).
- + **Minimum quantity lubrication:**
Micro-dosing pumps with dual dosing units and two coaxial nozzle arms with stainless-steel nozzle tips. Oil flow is easily adjusted from the Heidenhain control to match the application. Oil reservoir capacity: 0.4 gal (1,5 L).

Integrated Tool Management System

- + **Tool Identification DMC Scan:**
Each time the tool changer door closes, the system automatically scans all toolholders and tools and retrieves the stored data for each tool.
- + **Tool cleaning:**
Automated in-machine cleaning removes oil and debris from cutting tools immediately before laser measurement, helping ensure reliable measurement results.
- + **3D Tool Comp:**
Provides powerful 3D tool-radius compensation and allows measurement of 3D tool geometries. Tool compensation tables can be used to define angular delta values that describe deviations from the tool's ideal circular profile. The system can also compensate for the radius at the tool's current contact point with the workpiece.
- + **Spindle Control:**
Innovative visualization and evaluation software for DIGILOG laser measuring systems from BLUM. An analysis of critical vibrations of the entire system consisting of spindle, tool holder and tool itself is carried out. In the next step vibrations are tested at different speeds and in a last step the process is optimized by shifting the spindle speed away from a critical range.
- + **Form Control X:**
User-friendly measurement and automation software for automated quality control of parts in both single-part and series production. It helps maximize productivity and minimize scrap by enabling in-process and post-process inspection, measurement-based process control, and rework without removing the part from its original setup.
- + **BLUM Laser LC50 with Digilog function:**
Digilog technology uses a scanning measurement process with higher sampling rates, reducing measurement and inspection times by up to 60%. It also improves process reliability when chips or coolant build up on the cutting edge.

Automation

- + **Integrated workpiece changer:**
Multi-shift operation without operator with integrated changer for up to 60 workpieces.
- + **External automation:**
as described on page 25

Productivity

- + **Kern Advanced Surface:**
The machine's capabilities translate directly into exceptional surface quality.
- + **Kern Adapted Machining:**
A combination pack of the highest possible surface quality combined with the Kern machine's specialization in machining. This allows for optimization of machining with a focus on either speed, surface quality or best contour accuracy.
- + **Energy Saving Pack:**
To optimize overall energy consumption and to increase productivity and provide ideal machine availability.
- + **Kern Active Thermal Calibration:**
Thermal compensation for heat generated by individual machine components helps maintain high accuracy and productivity while significantly reducing warm-up time.

Safety

- + **Collision Monitoring – DCM V2:**
Software for real-time monitoring of components within the machining area. Predefined clearance zones are continuously checked against machine movements. If a collision is imminent, machining is automatically stopped.
- + **Fire Suppression:**
Fire protection system with an adjustable activation temperature from 122°F (50°C) to 302° F (150°C).
- + **Teleservice:**
Kern Service can remotely access the Heidenhain control and other machine components through the internet and the customer's network, enabling fast diagnostics and troubleshooting.

Information

- + **PDA interface - 3 signals can be selected:**
The machine provides key operating and status data for digital production monitoring. Operators have a clear view of machine status and can adjust processes as needed to keep production running efficiently.
- + **OPC UA interface:**
A secure, reliable interface for integrating modern industrial applications. Standardized interfaces simplify integration and allow multiple systems to be connected as needed.
- + **DNC 18:**
Software function for communication between a cell controller and the Heidenhain control.



The Kern Micro HD & Micro HD+

FEATURES



Best conditions
Compact

Powerful and space saving with the one – box design. All units are integrated into the machine and hybrid unit, resulting in a footprint of 5 m² (54 sq ft), low height of 2,74 m (9.0 ft), and a narrow width of only 1,64 m (5.4 ft). Including the hybrid unit the weight is 5,9 t (13,0073 lbs.).



Fully accessible
Productive management

The well-structured and fully accessible maintenance area on the side of the machine allows checking and filling of lubricants without the need of a machine stop. In addition, necessary maintenance work can be identified immediately.



Effective and prepared
Fully automated

Often, full automation is the key to profitability. Whether with integrated workpiece changer for up to 60 parts or external solution – Kern Micro HD and Kern Micro HD+ are perfectly prepared for shifts without operators.

The Kern Micro HD & Micro HD+

FEATURES



Perfectly prepared
External automation

The Kern Micro HD and Kern Micro HD+ are easily compatible with external automation for optimum workpiece changeover. Both machines are perfectly prepared and suitable for unmanned operation.

Hybrid Unit

... of Kern Micro HD

Best quality and flexibility for the set-up. The hybrid unit of the Kern Micro HD includes the Kern temperature management system as well as the hydraulic system and reliably separates the source of vibrations from the machine's cast. The hybrid unit can be placed anywhere around the machine, providing even more flexibility.



... of Kern Micro HD+

The hybrid unit of the Kern Micro HD+ is a little wider than the standard hybrid unit. This unit provides more space for the upgraded Kern temperature management system of the Kern Micro HD+ and for the cooling of the turntable.

At a Glance

TECHNICAL DETAILS

Linear Axes

Travel X/Y/Z: 350/220/250 mm (13.8/8.7/9.8 inch)
Feed Rate: 60 m/min (2362 inch / min)
Acceleration: up to 20 m/s² (2 g)

Rotary and Swivel Axes

Rotary axis: 360° infinite / 200 min⁻¹
Swivel axis: ± 110° (opt. -180°) / 100 min⁻¹
Clamping force swivel axis: 300 Nm (HD+: 450 Nm)

Max size of workpiece

max. volume of workpiece: Ø 350 x 200 mm
(13.8 x 7.9 inch)
max. weight of workpiece: 50 kg (110 lbs.)

Accuracy

(VDI/DGQ 3441) (X/Y/Z)

Position Accuracy P: < 1 µm
Repeatability Ps: < 0,5 µm

Accuracy (ISO 230-4)

Circular shape deviation Gyx: ≤ 1,5 µm
Circular shape deviation Gxy: ≤ 1,5 µm

Tool Changer

Tool Changer HSK 40: 90x, 102x,
186x and 210x
max. tool diameter: 70 mm (2.76 inch)
max. tool length: 155 mm (6.10 inch)
Option: Upgrade to combined tool and
workpiece changer

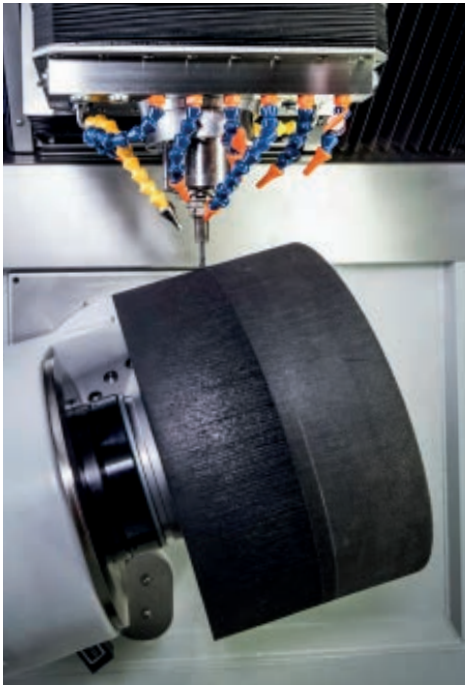
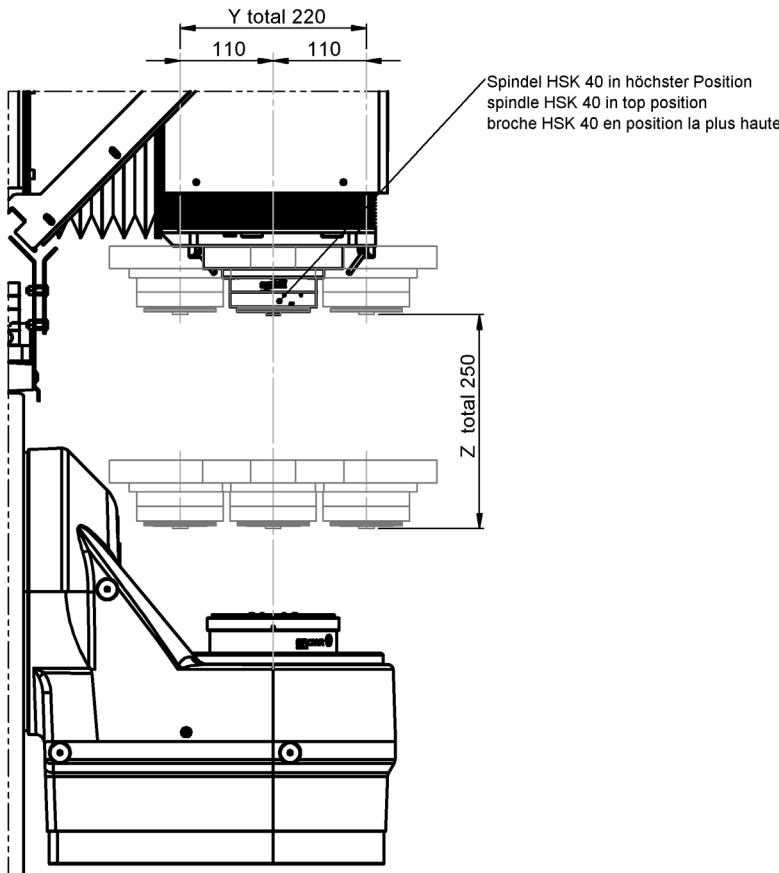
Technical concept

Internal temperature management
with ±0,05 K steady state
5-axes simultaneous machining
Heidenhain Control TNC7
Ultra compact one-box design with hybrid unit
Integrated design with micro-gap hydrostatic and
linear direct drives

Dimension and weight

Weight: 5.500 kg (12,000 lbs.)
(+ hybrid unit 400 kg (882 lbs.)
min. footprint W/D/H: 1,64 x 2,80 x 2,74 m
(5.4 x 9.2 x 9.0 ft.)

Status 08/2026
Subject to technical changes



Front view

Left side view



Right side view



*Source S. 19:
MAX 90 Maxwell, J.C.: General considerations concerning Scientific Apparatus. In: Niven, W. D.; The Scientific Papers of James Clerk Maxwell. Band 1. Cambridge, UK: University Press, 1890.



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