PRODUCT LINE

Machines | Tools | Technology | Metrology | Services | Digitisation

KAPP NILES

precision for motion

KAPP NILES is a globally operating group of companies with high-quality and economical solutions for finishing gears and profiles. More than 1,000 employees represent the innovative strength and expertise of the sustainably managed family company which has grown for over 120 years.

With production sites in Germany as well as worldwide sales and service branches, we are responsive and reliable in all major markets. KAPP NILES is partner for companies from numerous industrial sectors in our segments mobility, automation and energy.

The perfect interaction between machines, tools, and technologies enables the precise machining to a thousandth millimetre and up to a diameter of eight metres.

Each system solution is individually optimised for customer requirements and serviced by us throughout its life cycle. Highly accurate measuring equipment complements the comprehensive product range to ensure the required quality.

KAPP NILES supports efficient and stable processes with innovative services and digital solutions.

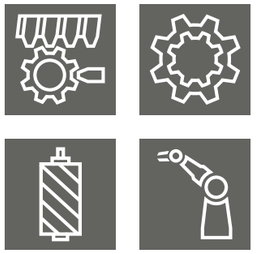
WORKPIECE RANGE

Gears and shafts
Gear related profiles
Compressor rotors
Cycloidal profiles
Ball screw tracks
Worms
Rotary pistons
Pump spindles
Gerotors
Vane pump rotors
etc.

CONTENTS

PRODUCT RANGE

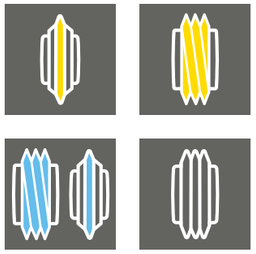
System solutions from a single source



Generating / profile grinding
External / internal gears
Special profiles
Automation system

Comprehensive standard equipment up to customer-oriented special machines

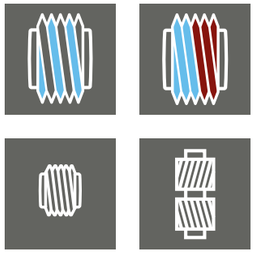
MACHINES



CBN profile grinding wheels
CBN generating grinding worms
Corundum tools
Dressing tools

Tailored to a wide range of machining processes

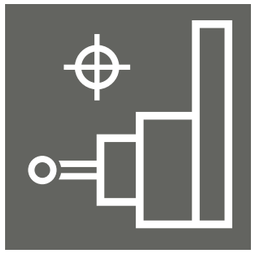
TOOLS



Topological grinding
Fine grinding | polish grinding
Use of small worms
Grinding of double helical gears

Individual solutions for for challenging tasks

TECHNOLOGY



Gear measuring machines
Portable measuring machines
Universal measuring machines
Integrated measuring systems

For the optimisation of quality assurance

METROLOGY

24/7 reachability
Smart Service
Worldwide presence
Modernisation

Comprehensive services over the entire service life cycle

SERVICES

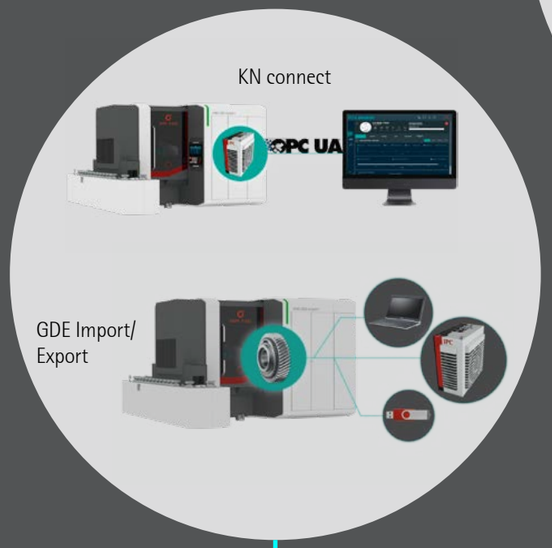
Connectivity
Production
Machine
Support

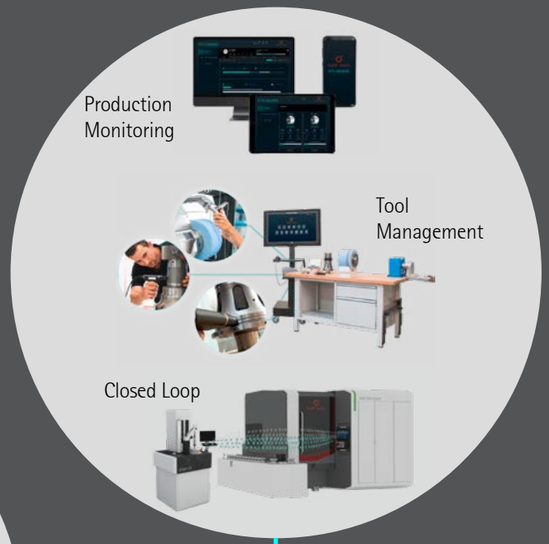
Perfect interaction for efficient processes

DIGITISATION

DIGITISATION

Perfect interaction for efficient processes



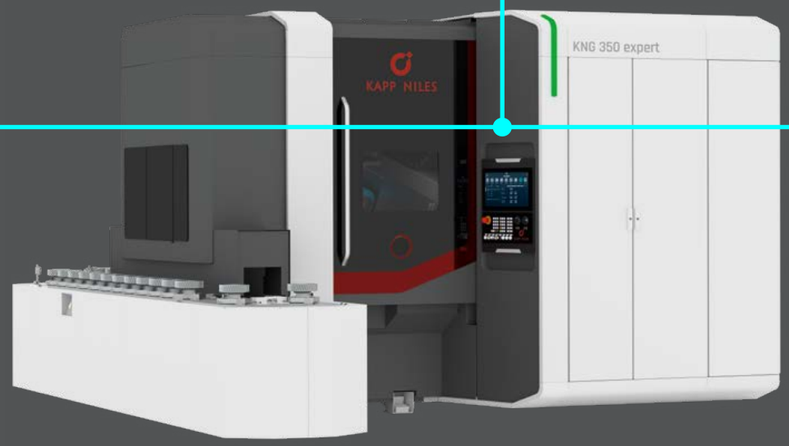


PRODUCTION

MACHINE

CONNECTIVITY

SUPPORT



Connectivity
- Seamless integration in smart factories
- Compatibility also of existing machines
- Interfaces to various customer systems

Production
- Optimisation of processes
- Improvement of quality
- Zero-defect manufacturing

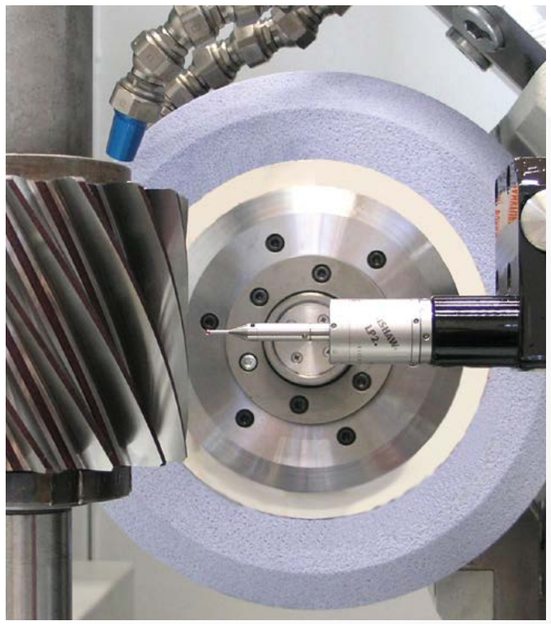
Machine
- Traceability of each component
- Monitoring of the machine and the process
- Detection of conspicuities in real time

Support
- Targeted assistance
- Fast response times
- Predictive maintenance support

The integrated electrical cabinet ensures a short commissioning time

Ergonomic control and set-up concept optimised for manual loading

Intuitive KN grind control with touch screen HMI



KNG ready

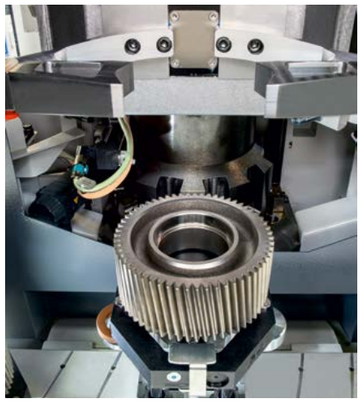
Gear profile grinding machine

The profile grinding machine KNG 3P ready offers an inexpensive entry into precision machining. It has been designed as a solution for flexible production of small and medium lot sizes. The machine is characterised by a grinding spindle with high drive power for components up to module 10 mm. The directly driven rotary table is generously dimensioned for a table load of up to 350 kg. The dresser sits stationary against the tool axis and even allows the use of small dressing wheels with a minimum diameter of 65 mm. The working area can be used without any restrictions at large helix angles.

Thanks to the low height of the machine bed and the short distance to the machine elements all operations can be carried out without requiring means.

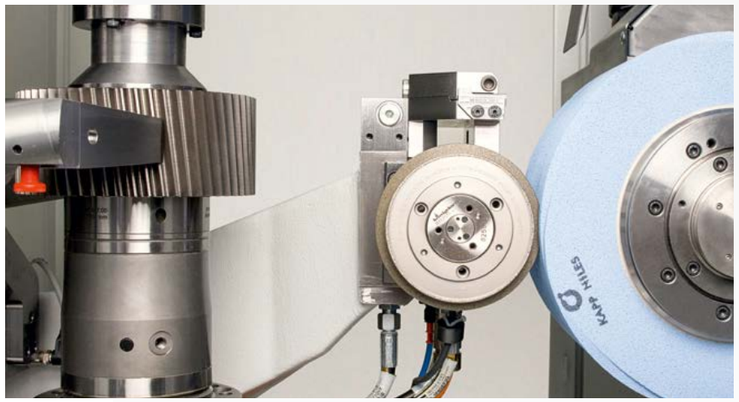
The innovative, operator-friendly user interface KN grind allows a machine-oriented and an intuitive input of all relevant project data.

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
KNG 3P ready	320	825	0.5 - 10	400	- 45 / + 135



Functional, ergonomic machine design with compact footprint

Integrated workpiece handling to ensure minimal non-productive times



Application of dressable tools with high cutting speeds

KNG 350 expert

Gear centre

DESIGN AWARD 2020

The KNG 350 expert is based on a compact, set-up-optimised machine concept and is intended for use in medium and large-scale series production of external geared components. The integrated workpiece handling ensures short non-productive times and can handle both bored parts and shafts. The new functional and ergonomic machine design paired with the innovative user-friendly interface KN grind supports the user during set-up and optimisation of grinding projects. High-performance technology options combined with application-specific aligning and measuring functions enable maximum precision and surface qualities on the workpiece. The NC-controlled aligning device adapts automatically to different workpieces.

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
KNG 350 expert	350	700*	0.5 - 6	400	±45

* depending on the loading system

Flexibility through external and internal grinding

Grinding spindle with counter bearing for large grinding worms

Digital support for optimisation of set-up process

KNG 350 flex

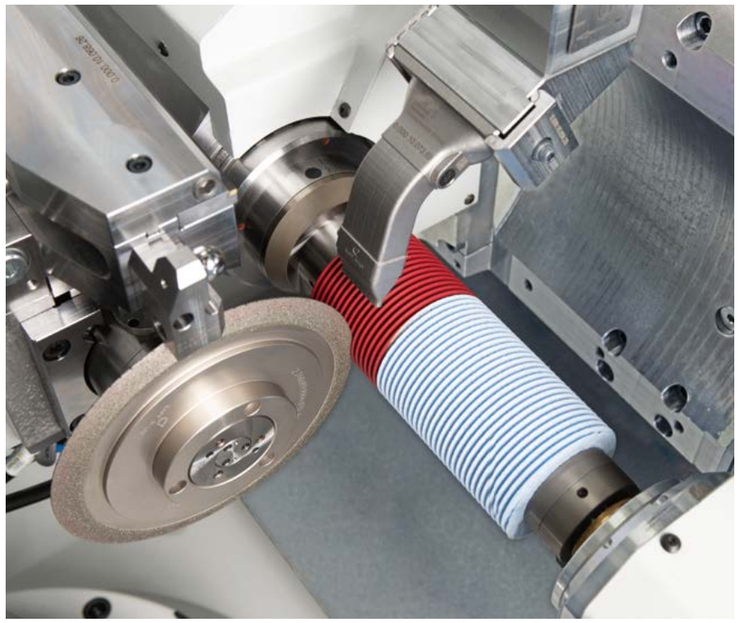
Gear centre

The KNG 350 flex is based on a compact, set-up optimised machine concept for use in the prototype sector up to large series production. Both externally and internally toothed workpieces can be machined. The performance-optimised grinding spindle with counter bearing is designed also for the use of large grinding worms with widths of up to 200 mm. This allows an efficient realisation, especially when machining of components with large modules and using 2-sector worms for fine grinding or polishing applications. From manual loading to a comprehensive automation solution, the concept offers full flexibility. The functional and ergonomic machine design paired with the innovative user-friendly interface KN grind supports the user during set-up and optimisation of grinding projects.

Due to the use of auxiliary spindles small grinding wheels can be applied. Both involute internal gears and special profiles can be machined with the internal grinding device.

	max. tip diameter [mm]	max. workpiece length [mm]	module range generating / profile [mm]	max. face width [mm]	max. helix angle [deg]
KNG 350 flex	350 (400)	700*	0.5 - 8 / 0.5 - 10	400	±45

* depending on the loading system



Highest grinding quality and productivity even when using small tools

Flexibility through generating and profile grinding

Significantly reduced non-productive times through a machine-integrated loading device

KNG 350 flex HS

Gear centre

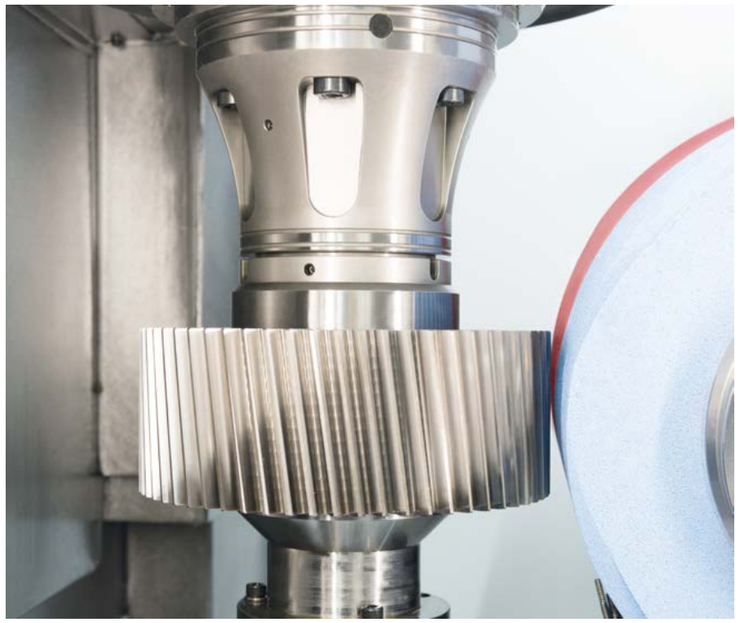
The KNG 350 flex HS is based on a compact, set-up optimised machine concept and is intended for use in small, medium and large series production of externally toothed components up to 350 mm diameter. The machine is characterised in particular by the highest grinding quality and productivity, even when machining with small tools. Using a high-speed grinding spindle (HS) with a speed of 25,000 rpm, even gear teeth with interfering contours can be ground, requiring tool diameters of min. 55 mm (generating grinding) or 20 mm (profile grinding). The concept also offers full flexibility in the selection of loading and automation solutions. From manual loading to downsize automation to robotic loading. The optionally integrated ring loader ensures the shortest non-productive times and can handle both bore parts and shaft-shaped workpieces. The new functional and ergonomic machine design paired with the innovative user-friendly interface KN grind supports the user during set-up and optimisation of grinding projects.

	max. tip diameter [mm]	max. workpiece length [mm]	module range generating / profile [mm]	max. face width [mm]	max. helix angle [deg]
KNG 350 flex HS	350	700*	0.5 - 6 / 0.5 - 8	400	±45

* depending on the loading system

KX DYNAMIC series

Gear centres



Pick-up concept and integrated automation enable fastest changing times

Automatic change of clamping devices

Multifunction-axis to discharge measured and tested parts

Intended to be used within the automotive industry, the DYNAMIC series convinces with minimal set-up and non-operational times. The concept is based on the integrated loading function and the optionally available automatic changeover of the workpiece fixtures.

Parallel to grinding operation, the second pick-up axis can unload the finished workpiece and pick up an unmachined part. The workpiece is aligned outside the working area. To reduce non-productive times, the workpiece spindle can be swivelled into the working area in an already accelerated state. Continuous generating grinding with dressable grinding tools is used as machining process. For application-specific purposes, dressing tools with integrated tip dresser as well as multi-ribbed tools can be used on the dressing unit. The integrated automation reduces the space requirement to a minimum. Topological generating grinding is available as an option.

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
KX 100 DYNAMIC	125	150	0.5 - 4.5	80	±35
KX 260 DYNAMIC	260	150	0.5 - 6	100	±45

Twin spindle concept with rotary indexing table

Flexible connection to different concepts of automation

Minimal non-productive times

KX TWIN series

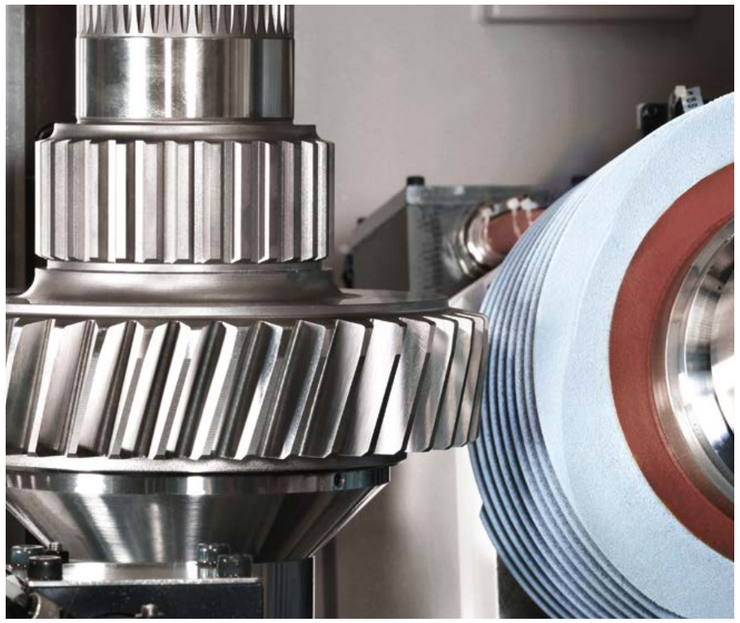
Gear centres

Machines of the KX TWIN series have been designed for continuous generating grinding with dressable and non-dressable tools. They are particularly suitable for the high production volumes in the medium and large batch production of gears and shafts. The concept includes two identical workpiece spindles arranged at opposing sides of an rotary indexing table. While machining one part, the second workpiece spindle simultaneously loads / unloads and aligns another part.

The machines are optimised for automatic loading with a standardised, cost-effective combination of pallet conveyor and gantry loader.

The profile grinding function is optionally available for the KX 260 TWIN. By using an optional high-speed grinding spindle (HS), it is even possible to grind gears with interfering edges which require a tool diameter of 55 mm (generating grinding) or 20 mm (profile grinding).

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
KX 160 TWIN (HS)	170	770	0.5 - 4.5	320 (520)	±45
KX 260 TWIN (HS)	260	770	0.5 - 6	320 (520)	±45



Direct drives in
tool spindle and
workpiece spindle

Highest flexibility
due to various
machining processes

Flexible connection to
different automatic
loading solutions

KX 300 P

Gear centre

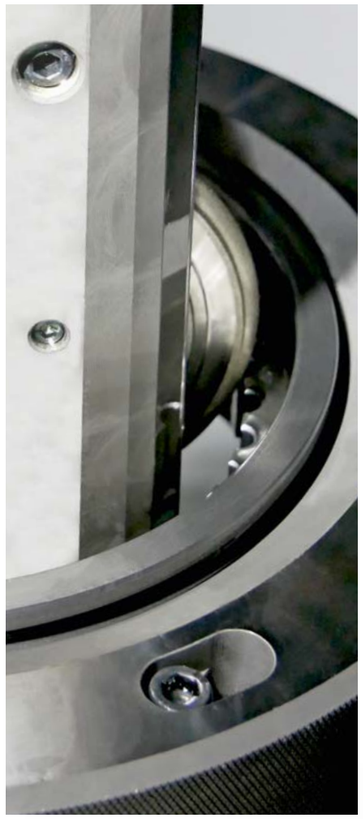
Based on different tool and process technologies, user-specific, optimal production solutions can be configured.

The tool spindle with counterbearing can hold dressable and non-dressable grinding worms or profile grinding wheels. Due to the use of auxiliary spindles small grinding wheels up to a minimum diameter of 25 mm can be used. Machines can be loaded either manually or automatically. The use of an integrated ring loader allows short loading times for both bore and shaft parts.

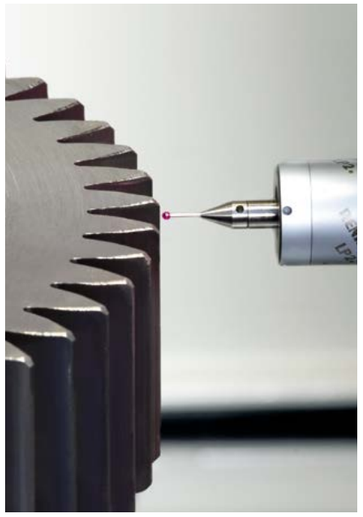
	max. tip diameter [mm]	max. workpiece length [mm]	module range generating / profile [mm]	max. face width [mm]	max. helix angle [deg]
KX 300 P	350	800*	0.5 - 8 / 0.5 - 10	320	±45

* depending on the loading system

Machining of gears and special profiles



High level of quality from prototype to serial production



Highest flexibility with the use and combination of different machining processes

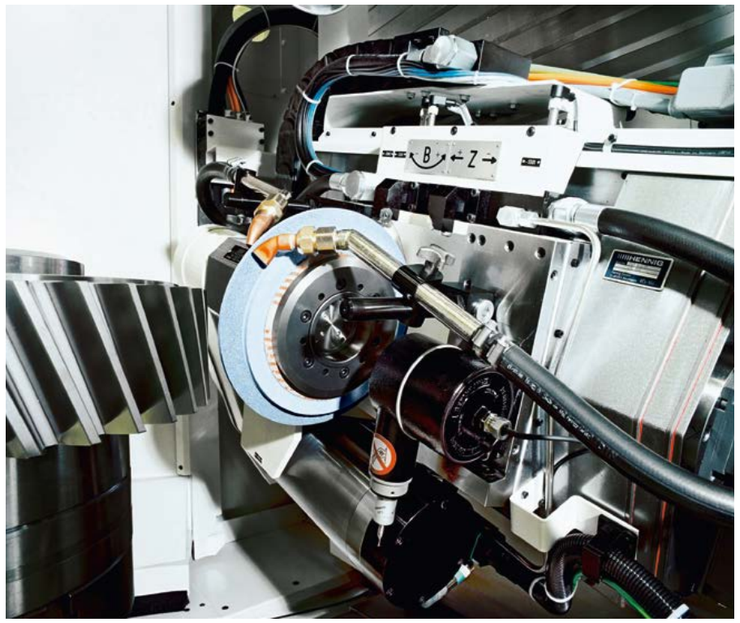
KX 500 FLEX

Gear centre

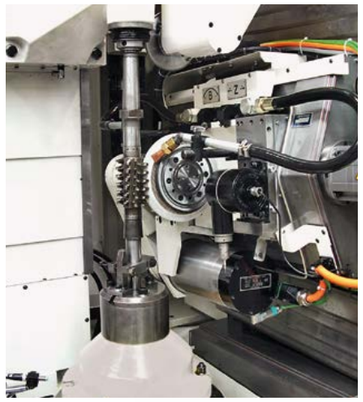
The patented KX 500 FLEX is designed for the flexible use of a wide range of tooling and machining technologies. Thus, application-specific production solutions can be configured to perform diverse processing jobs and a wide range of batch sizes efficiently and economically. Dressable tools for versatile machining processes and non-dressable CBN tools can be used for highly productive manufacturing as well as grinding of gear geometry with interfering edges. The machine concept is based on a rotary indexing table which incorporates the tailstock and dresser offset against the workpiece spindle. The dressing unit can accommodate a single or twin spindle dresser.

Due to the use of auxiliary spindles small grinding wheels can be applied. Both involute internal gears and special profiles can be machined with the internal grinding device.

	max. tip diameter [mm]	max. workpiece length [mm]	module range generating / profile [mm]	max. face width [mm]	max. helix angle [deg]
KX 500 FLEX	500	1,000	0.5 - 8 / 0.5 - 12	520	±45



Special spindles for various machining tasks



External and internal gears as well as special profiles

Small footprint and optimal accessibility

ZE series

Gear profile grinding machines

The gear profile grinding machines in the ZE series are used for high-precision machining of external and internal gears. The machine concept stands for maximum quality, very straight forward handling and compact design. The machines are equipped with a dresser, counter support, integrated measuring device, balancing unit and comprehensive software for grinding and measuring of involute profiles, which enables machining of a wide range of applications.

Easy accessibility provided by doors that open wide, and operation from the hall floor allow easy set-up for machining individual parts and small-scale serial production. The machines feature generously dimensioned rotary tables with electrical direct drive and deep rotary table bores. All machines of the ZE series can be equipped with internal grinding units.

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
ZE 400	400 (500)	1,100	0.5 - 20 (25)	400	-45 / +120
ZE 630 / 800	650 / 800	1,100	0.5 - 20 (25)	600	-45 / +120
ZE 1000 / 1200	1,000 / 1,200	1,100	0.5 - 20 (25)	600	-45 / +120

Highest quality already at lot size 1

Optional hydrostatics in the rotary table

Wide guides and high drive power

KNG master series

Gear profile grinding machines

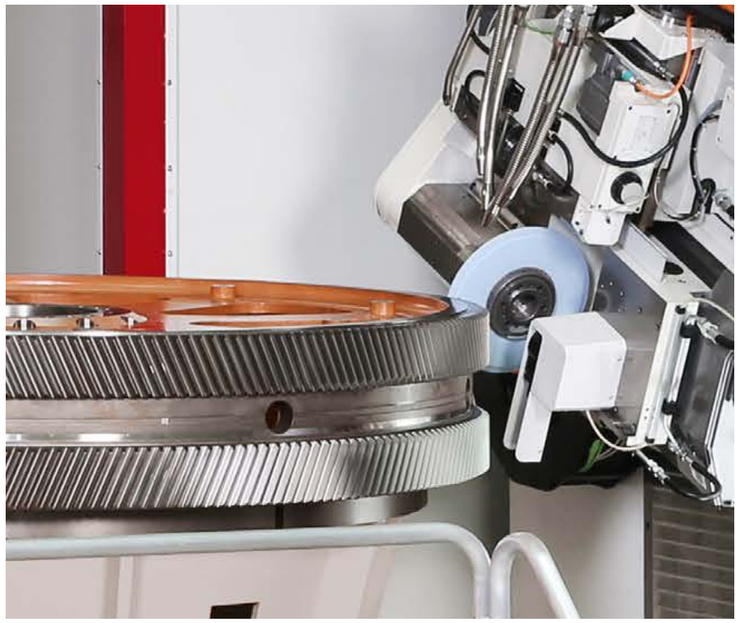
DESIGN AWARD 2020

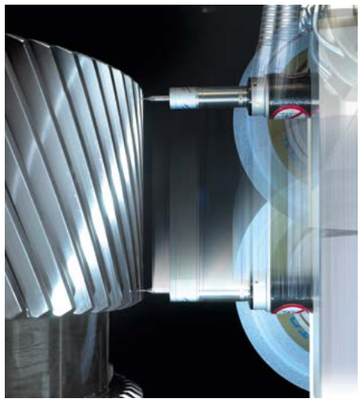
The machines in the master series are perfect for high-precision machining of external and internal gears as well as special profiles.

The machine concept stands for maximum workpiece quality. High thermal stability and rigidity are achieved through an optimised design and matching components. The inherently rigid machine base enables easy installation without anchoring in the hall floor. The dressing and grinding spindles are equipped with state-of-the-art direct drives.

The new functional and ergonomic machine design paired with an innovative user-friendly interface supports the user during set-up and optimisation of grinding projects. High-performance technology options and application-specific alignment and measuring devices mean that maximum quality can be achieved even with batch size 1.

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. face width [mm]	max. helix angle [deg]
KNG 10P master	1,000	1,545	0.5 - 35	1,000	+45 / -120
KNG 12P master	1,250	1,545	0.5 - 35	1,000	+45 / -120





External gears and internal gears, special profiles

Maximum precision

Special spindles (option) for the use of small grinding wheels

ZP series

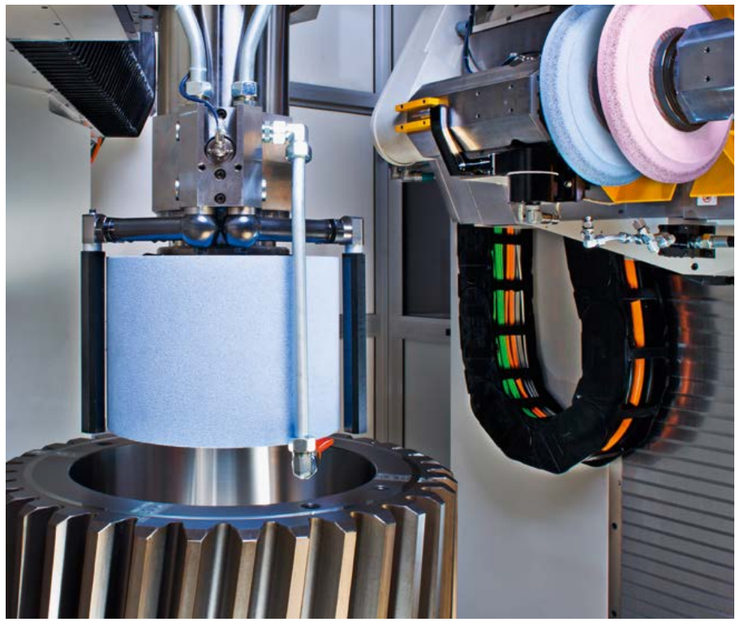
Gear profile grinding machines

The machine concept stands for maximum workpiece quality, flexibility and a long service life. The basic machines are equipped with a dresser, integrated measuring device, balancing unit and comprehensive software. The machines feature generously dimensioned rotary tables with electrical direct drive and large rotary table bores. Hydrostatic bearings and guides allow for precise positioning, excellent load capacity and a virtually unlimited service life. Due to state-of-the-art drive and control technology, even the most challenging applications can still be machined using 5-axis interpolation. All machines of the ZP series can be equipped with internal grinding attachments. Different spindle variants are available for grinding external gears.

	max. tip diameter [mm]	max. workpiece length [mm]	max. module [mm]	max. face width [mm]	max. helix angle [deg]
ZP 10 / 12 / 16	1,000 / 1,250 / 1,600	1,700 (2,050)	40	1,000 (1,500 / 1,800)	-45 / +120
ZP 20 / 24	2,000 / 2,400 (2,800)	1,700 (2,050)	40	1,000 (1,500 / 2,000)	-45 / +120
ZP 30 - 80	3,200 / 4,000 / 5,000 / 6,000 / 8,000	on request	50	1,000 (1,500 / 2,000)	-45 / +120

ZP special machines

Gear centres / Gear profile grinding machines



ZP B for external gears, bores and end faces in one set-up

ZP I/E with grinding arm that can be swivelled quickly for machining internal and external gears with large modules and gear widths

ZP E/I with changeover between external and internal machining that does not require set-up

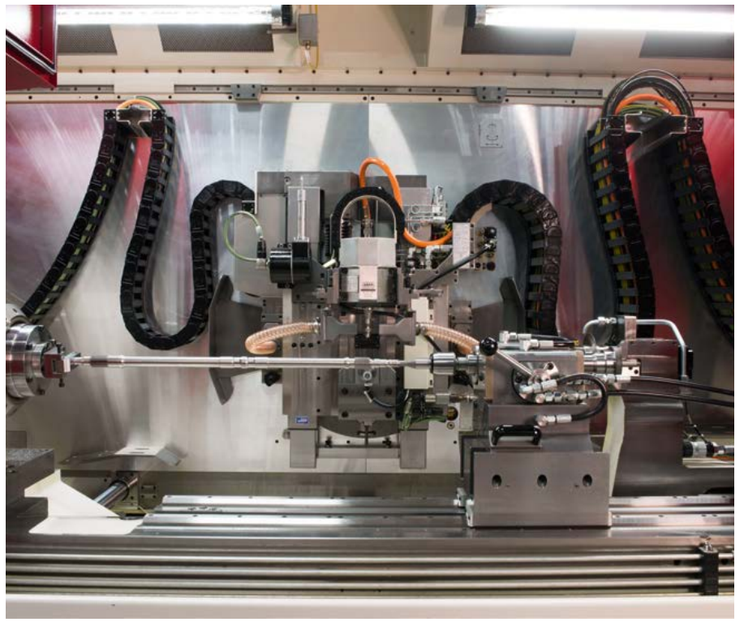
Based on the well-known ZP series, application-specific solutions have been developed. The machines of the **ZP B model** have been designed for complete hard finishing (gearing and reference surfaces) of external planetary and bull gears with a tip diameter of up to 3,000 mm. The combination of machining processes ensures a high potential for optimising workpiece quality while at the same time reducing set-up and machining times.

The machines of the **ZPI model** are developed for profile grinding of highly precise internal gears with large modules. Especially the series production in the wind energy sector requires higher stiffness and stronger grinding power. A heavy internal grinding device was developed especially for this purpose, with the greatest emphasis on the rigidity of the grinding spindle bearing.

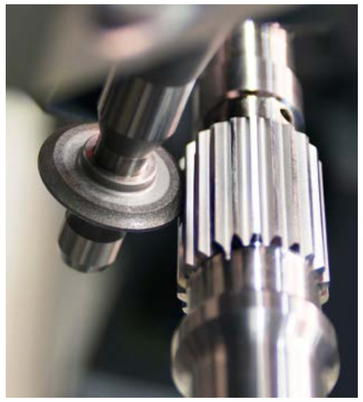
The measuring device is permanently integrated in the grinding head which leads to a reduction of set-up times to a minimum.

The machines of the **ZP I/E model** are used for high precision profile grinding of internal gears with large modules with a root diameter of up to 2,900 mm. The grinding arm is designed to allow it to rotate by 180°, thus the machine can be refitted for grinding external gears and special profiles within 30 minutes. The basic machines are equipped with a dresser, integrated measuring device, a balancing unit and comprehensive software.

The concept of the **ZP E/I model** is based on the use of two independent grinding columns. Thus, these machines will be used by job shops primarily. The use of a common rotary table and the peripheral units such as cooling lubricant system significantly reduces the investment cost and floor space compared with two individual machines. Different rotary tables and column bases of the ZP series are available.



Machining parts of complex geometry



Suitable for prototyping and small batch production

External, internal, spur and helical gears as well as special profiles

VX series

Gear profile grinding machines

The profile grinding machines of the VX series are extremely suitable for meeting the highest requirements concerning the final quality of the produced gears. Both dressable tools and non-dressable CBN tools may be used in the process. As the grinding adapter can be fitted with two exchangeable grinding spindles, the cutting passes can be realised with the sequential use of roughing and finishing tools in one workpiece set-up. As an alternative, multiple gears can be machined in one set-up.

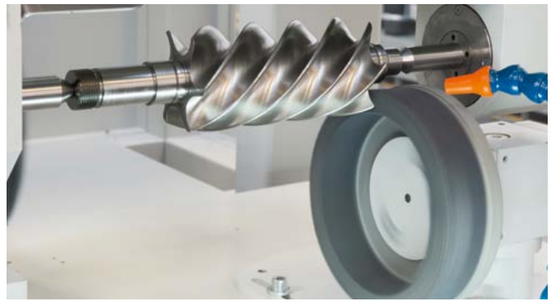
VX machines configured for the use of dressable tools feature integrated dressing equipment producing any type of grinding wheel profile. The dressing and grinding programme is generated automatically based on the gear data. The combination of measuring system and profile dressing equipment also allows for automated machining according to the so-called GMG-strategy (grinding - measuring - grinding).

	max. tip diameter [mm]	max. workpiece length [mm]	module range [mm]	max. feed travel [mm]	Swivel range of grinding head [deg]
VX 55	500	1,100	0.5 - 16	700	±90
VX 59	630	1,650	0.5 - 16	1,020	±90

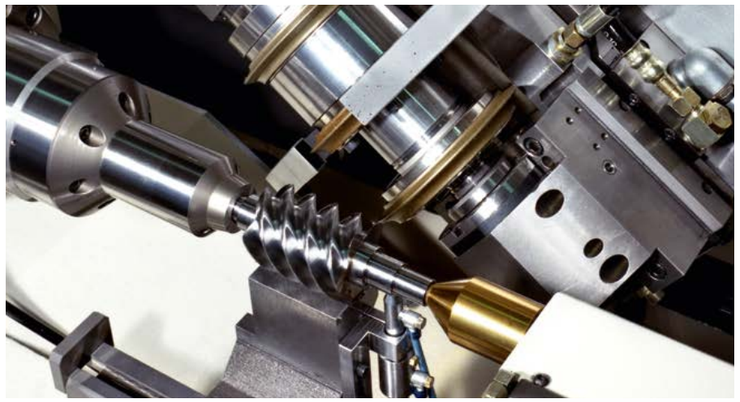
RX series

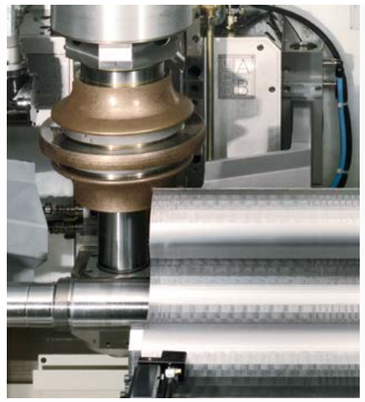
Rotor grinding machines

RX 120 with compact automation concept with integrated deburring station



Roughing and finishing in one set-up





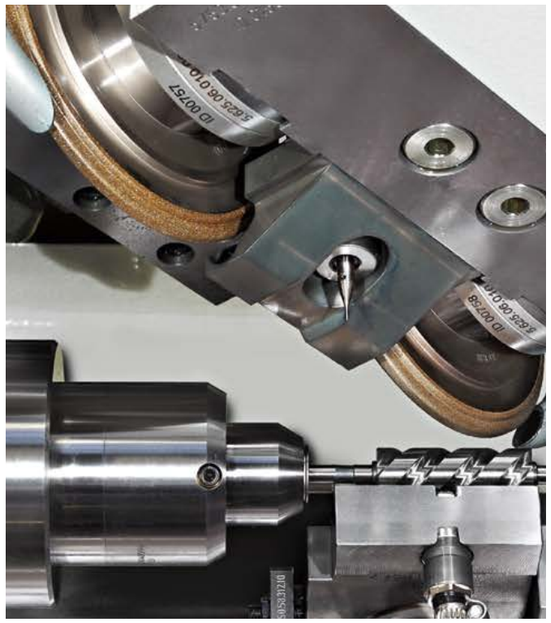
The machines of the RX series are used for pre-finish and finish grinding of pre-profiled steel and cast iron screw rotors. Due to the innovative drive concept on the tool side, a maximum drive power of 46 kW is reached. Especially for roughing, this high performance results in extremely high stock removal rates and shortens machining times considerably. In combination with an optimally adapted tool technology, a highly productive and efficient working process will be guaranteed.

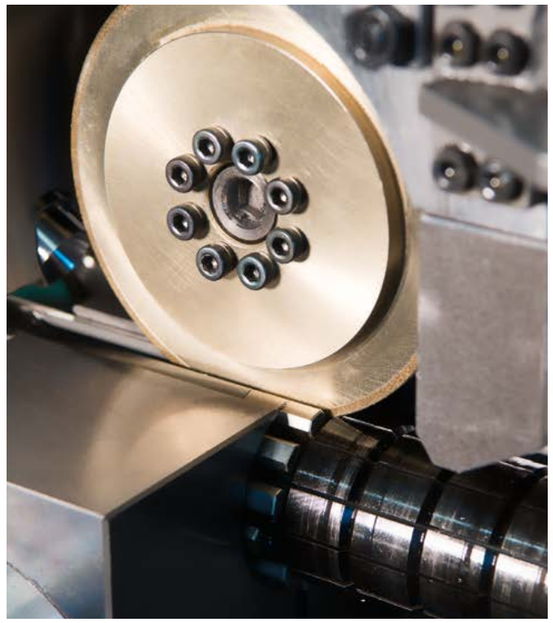
With regard to pre-grinding, the patented rotor grinding machine RX 120 provides the option to use the advantages of continuous generating grinding instead of profile grinding in manufacturing rotor profiles. For the finishing operation, only profile grinding is used. By applying the generating grinding process as the pre-grinding process, a reduction of up to 40 % in grinding time can be realised compared to conventional machines and processes.

	max. outer diameter [mm]	max. workpiece length [mm]	max. profile length [mm]	max. profile width [mm]	max. profile depth [mm]
RX 120	120	425	220	80	30
RX 55	320	1,200	550	180	80
RX 59	320 (400)	1,650	850	180	80

GAS | GIS | HGS

Special machines





Individual solutions for special profiles, external and internal threads

Use of non-dressable CBN grinding wheels

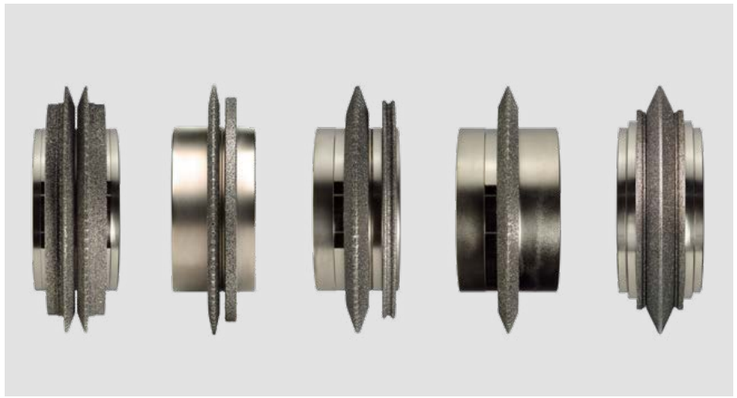
Machines from the **GAS series** are used for processing external threads and similar profiles. Typical components for these machines are external ball screws for automotive steering systems, as well as drive worms, small pump and metering components.

GIS machines are used for the hard finishing of internal threads in ball screw tracks or similar profiles. Typical applications besides vehicle steering are recirculating ball screws in the field of drive technology.

The high-speed grinding machine **HGS** is mainly used for the grinding of slots in pump rotors from solid, through-hardened material. Slot widths within the range of 0.5 to 2.0 mm can be produced with high efficiency due to package clamping and automatic unloading and loading. The in-process measuring control ensures maintaining slot width tolerances. The HGS uses non-dressable CBN profile grinding wheels only.

DRESSING TOOLS

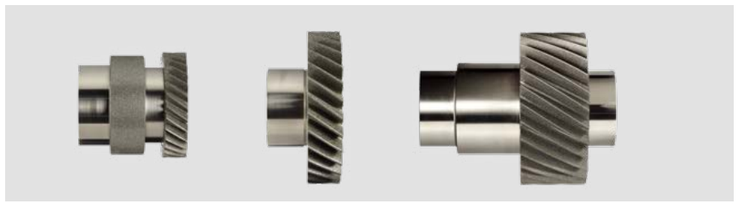
Diamond profile rolls and diamond form rolls



Long service life due to highly wear-resistant CVD inserts

Highest profile precision possible

Repeatedly regrindable and replateable tools



Diamond profile rolls and diamond form rolls for generating grinding for flexible or topological dressing of vitrified corundum grinding worms or dressable CBN worms for the continuous generating grinding of external gears.

For serial production, an integrated tip dresser is used for defined grinding of the gear root area.

Diamond form rolls for profile grinding in sintered design for profiling dressable profile grinding wheels.

Either as an economic version with natural diamond or as a long life tool with handset CVD diamond. These tools can be reground several times and are characterised by a long life time.

Multi-ribbed diamond profile rolls for generating grinding for high efficiency dressing of vitrified grinding worms in large batch production.

Full profile rolls are produced in galvanically negative design for a wide range of modules and rib numbers.

Diamond dressing gears for gear honing for profiling dressable honing rings.

This type of tool is also available as a tool set consisting of dressing gear and integrated tip dressing roll to move back the tip of the tooth at the honing ring.

Worldwide replating close to the customers

Application-specific design and manufacturing

Maximum level of quality and several decades of experience

GRINDING TOOLS

Non-dressable CBN grinding wheels and grinding worms

KAPP NILES manufactures non-dressable, electroplated CBN tools for hard and soft finishing of gears and profiles. Our tools have been rated among the top products worldwide for decades. They are used whenever the highest quality standards, performance and efficiency are required.

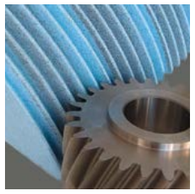
CBN profile grinding wheels in single or multi-ribbed roughing or finishing design, for grinding of
- External and internal gears in automotive (passenger car, commercial vehicle) and aircraft industry
- Radial, screw, rotor and worm profile wheels
- High speed grinding of profiles and gears
- Plunge grinding, abrasive cutting and cylindrical grinding

CBN grinding worms as roughing and finishing worms. In cylindrical form for highly efficient grinding of external gears and other profiles as well as in globoidal form for continuous profile grinding of external gears with interfering contours. Grinding worms and profile grinding wheels are often used in combination.

Ceramic grinding tools
In addition to non-dressable CBN tools, dressable tools made by renowned manufacturers can be used with our machines. Vitrified corundum grinding tools have been dominant for this purpose. Due to its good stability and grinding performance, the use of sintered corundum is preferable for grinding steel. It is recommended to machine grey cast iron with fused aluminium oxide as grinding material.

TECHNOLOGY

Innovative solutions for challenging tasks



The prevention or targeted manipulation of process-related bias presents a challenging requirement for the production of gears. Due to the user-friendly guidance and machine-internal calculation of dressing and grinding paths, this method has found its way into the field of serial production.

TOPOLOGICAL GENERATING AND PROFILE GRINDING

With the demands for higher flank load capacity of gears and efficiency increases of gear boxes, fine and polish grinding has become more and more established. By integrating these downstream processes, surface finishes of Rz < 1 µm or Ra < 0.2 µm can be achieved on conventional gear grinding machines.

FINE GRINDING | POLISH GRINDING

Using high-speed grinding spindles on the KX 160 / 260 TWIN HS and KNG 350 flex HS machines, gears with interfering edges which could previously only be machined with the profile grinding or honing process can now be machined with the generating grinding process. This new development offers high potential for optimisation.

GENERATING GRINDING USING SMALL TOOLS

Cycloidal gearboxes distinguish themselves by high transmissible torques, better rigidity and low wear. For high precision profile machining of the two main components of a cycloidal gearbox - cycloidal disk and ring gear housing - high performance technologies from KAPP NILES are available.

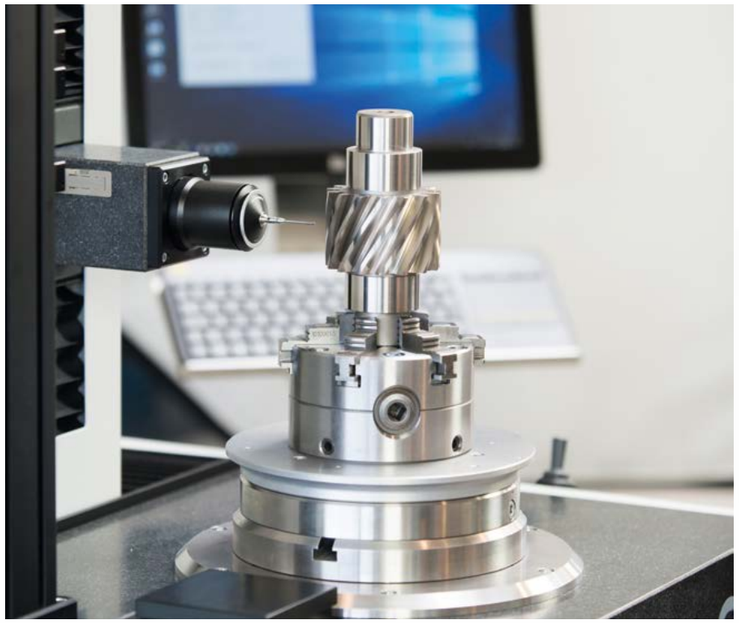
CYCLOIDAL GEARBOX

KAPP NILES offers a wide range of machine concepts for grinding double helical gears in all different sizes. Whether equipped with a horizontal or vertical workpiece axis, the hardware / software of all machines can be upgraded with innovative solutions for grinding helical gears.

DOUBLE HELICAL GEARS

Innovative quick change clamping system for reduction of non-productive times

Smart tailstock for optimal loading and to expand the work area



Compact design and quick measuring procedure

KNM 2X | 5X | 9X

Analytical measuring machines for small and medium-sized workpieces

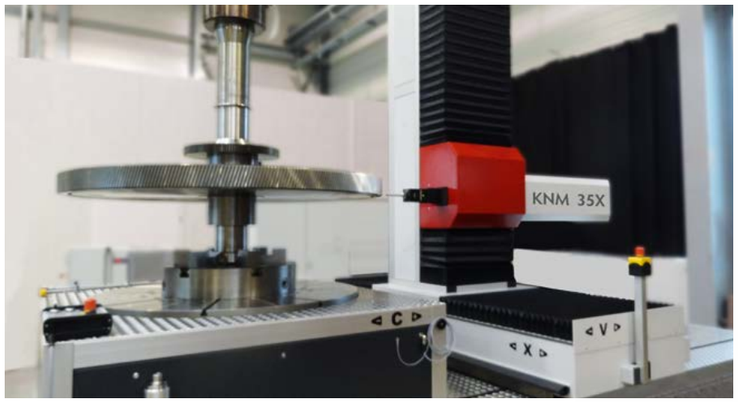
The KNM 2X / 5X / 9X analytical measuring machines are designed for high-precision measurements of gears, gear tools and rotationally symmetric workpieces. All guides and base plates made of granite are extremely stable in the long-term and have identically low expansion coefficients. Air bearings with emergency operation properties ensure perfect and wear-free guides without short-term errors. Air spring elements underneath the base plates safely shield from jolts and vibrations.

Separate bases are not required. Non-ferrous linear and torque motors of the rotary tables ensure ultimate position precisions and path accuracy. Despite the compact design, spacious travel ranges ensure a tangential generating motion towards the base circle for any profile. Based on the requirements, different scanning touch probe systems can be used. The control cabinet can be arranged freely.

	max. workpiece diameter [mm]	max. measurable workpiece length internal / external [mm]	counter support L / D [mm]	max. workpiece weight [daN]
KNM 2X	300	450	480 / 300	80
KNM 5X	650	400 / 800	800 / 650	500
KNM 9X	1,250	400 / 1,000	1,200 / 1,000	2,000

No separate foundation required in the measurement or production area

Motor-driven positioning of the measuring unit (V-axis) to the current workpiece diameter



For the use in various applications, e.g. spur gears, bevel gears, shafts, tools, bearing rings

KNM X series

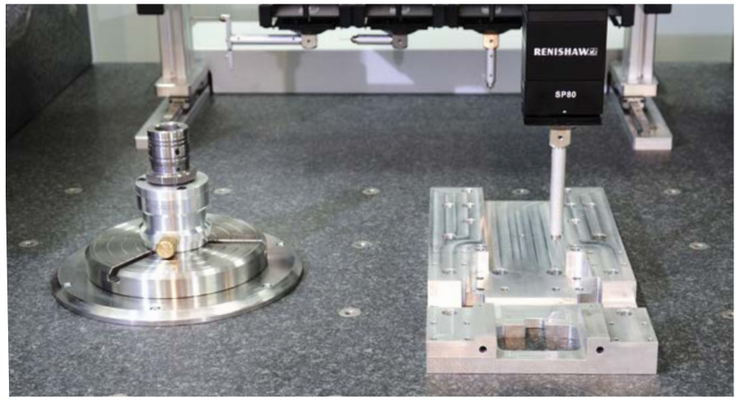
Measuring machines for large workpieces

According to customer-specific requirements, the KNM X series can be either designed as a stationary machine for medium and larger sized gears, or as a docking station. For this purpose, any size of the machine base can be combined with a rotary table and a transportable 3-axes measuring device. The KNM X machines boast high-precision mechanics with optimal accessibility, laser-based safety equipment, large bearing clearances and generously dimensioned guiding cross-sections.

Linear motors are used in all linear axes. High-precision rotary tables with air or hydrostatic bearing (diameter of 500 to 1,800 mm) feature direct drives / through-holes. Controlled air spring elements underneath the base plates safely shield from jolts and vibrations. No separate foundations are required. The use of drives close to the centre of gravity ensures a low level of dynamic distortions.

	max. workpiece diameter [mm]	measurable workpiece length [mm]	number of machine axes	max. workpiece weight [daN]
KNM X series*	6,000	1,000 - 2,100	3+1 | 4+1	1,500 - 40,000

* customised design



Air bearing guide elements in all axes for wear-free and smooth operation

Specially designed high-precision mechanics with optimal accessibility

KNM C series

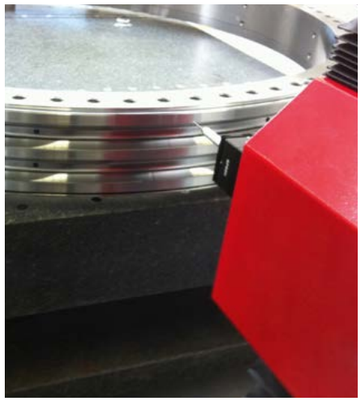
Measuring machines for complex workpieces

The machine has been optimally adapted for the determination of geometrical errors at bearing rings, slewing rings and cylinder-shaped workpieces. The CNC-controlled 4-axis structure allows for the expansion to a significantly larger component range, such as gears or gear cutting tools. All machines of the KNM C series are equipped with state-of-the-art drive technology (linear motors), and feature generously dimensioned guiding cross-sections and large bearing clearances.

The base plate, vertical columns and axes are made of granite. This ensures stable thermal behaviour. Air spring elements underneath the base plate safely shield from jolts and vibrations. The raised Y-guide and a drive close to the centre of gravity reduce the dynamic distortions to a minimum. Measurement uncertainties are at $MPE_E \geq 0.6\ \mu m + L/400$ | $MPE_{THP} \geq 0.8\ \mu m$. Reliable software is available for fully automated measurement cycles.

	max. workpiece diameter [mm]	max. measurable workpiece length [mm]	rotary table diameter [mm]	travelling paths [mm] X-axis	Y-axis	Z-axis	rotary table load [daN]
KNM 5C	500	450	300	500	600	450	500
KNM 7C	700	550	300	600	750	550	500
KNM 11C	1,100	700	800	800	900	700	2,000
KNM 16C	1,600	700	800	1,000	1,200	700	2,000

State-of-the-art software KN inspect for fully automated measurement cycles



X- and Z-axes made of granite with air bearing, thus wear-free operation

Base plate (Y-axis) as steel construction with high-precision mechanical bearing

KNM P series

Portable measuring machines for gears and diverse components

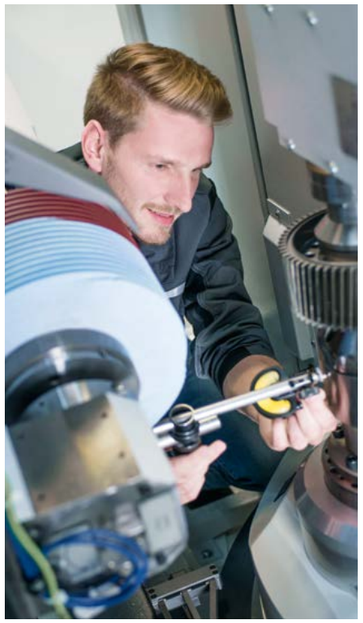
The equipment of the KNM P series has been optimally adapted directly to the production machine according to the specific customer requirements regarding the autonomous measurement of gears, ring-shaped workpieces such as bearing rings, housings etc. The combination of base plate and rotary table in a customised design (docking station) forms a full-featured 4-axis measuring device. Measurements can even be carried out without rotary table directly in the workshop area. In the KNM P machines, specially designed high-precision mechanics add to optimal accessibility with state-of-the-art drive technology (linear motors). The CNC-controlled 3-axis structure allows for checking all gear parameters or general workpiece profiles. Arbitrary workpiece diameters and easy transport are especially worth emphasising. The measuring equipment is placed on a sturdy base connected directly to the production machine or foundation.

	max. workpiece diameter [mm]	max. measurable workpiece length [mm]	number of axes	travelling paths [mm] X-axis	Y-axis	Z-axis
KNM 67P	variable	700	3	400	600	750
KNM 1612P	variable	1,200	3	700	1,600	1,200
KNM 1814P	variable	1,400	3	700	2,800	1,400
KNM YZP	variable	Customised designs available				

Individual consultation and support

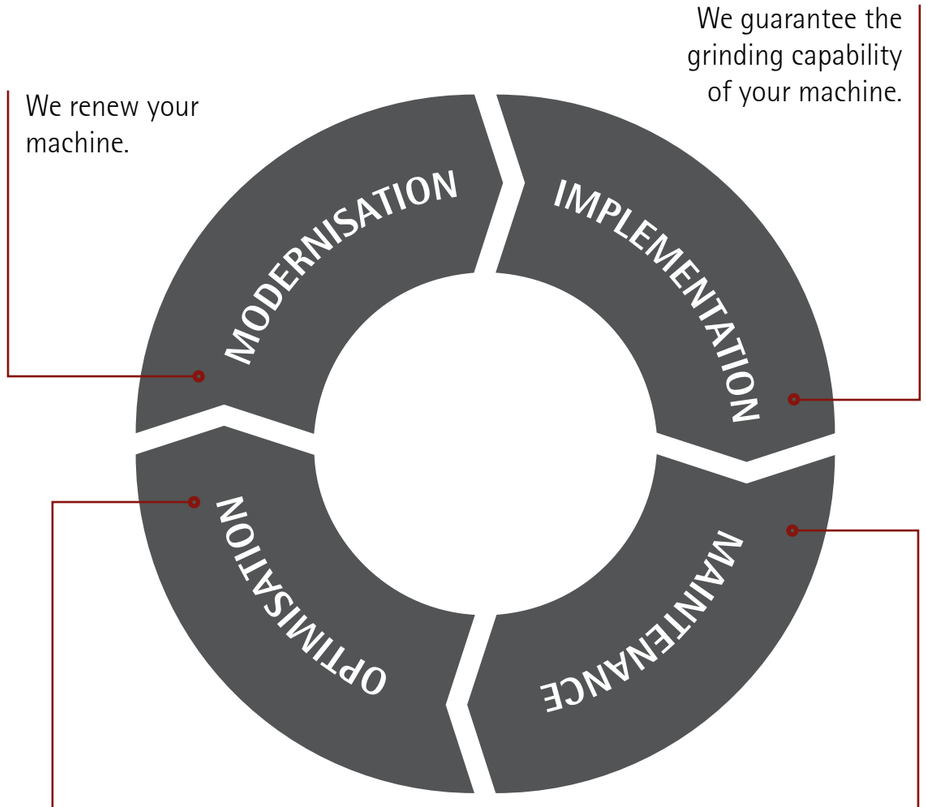
All services from a single source

Future-oriented digital service solutions



SERVICES

Comprehensive services over the entire life cycle



Implementation
- User training
- Collision tests and macro analyses
- Equipment for additional applications

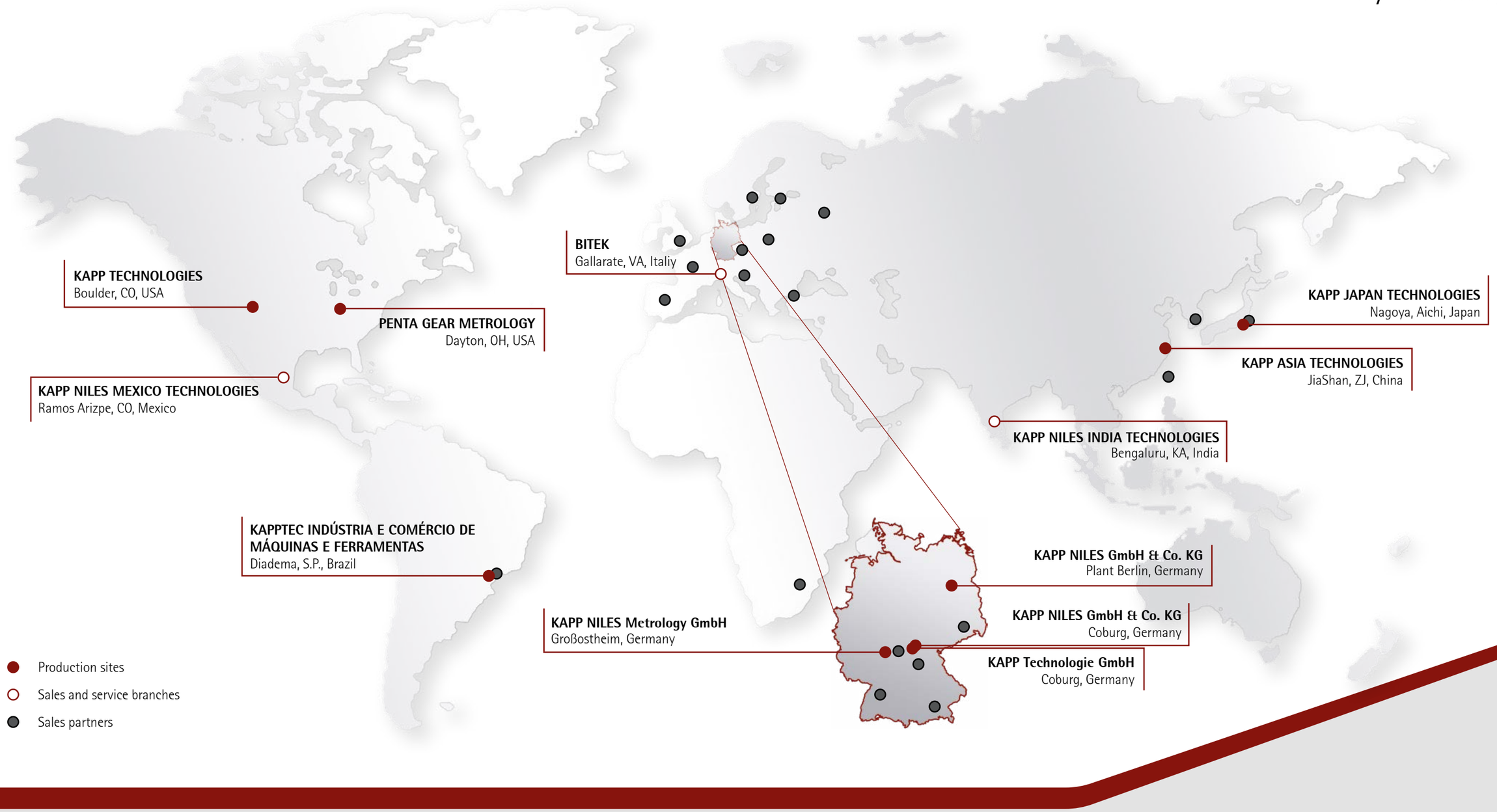
Maintenance
- Condition-oriented maintenance and inspection
- Prompt delivery of spare parts
- Remote / Technical support

Optimisation
- Continuous updates / upgrades
- Process and production optimisation
- Technology training

Modernisation
- KN Retrofit
- KN Refit
- KN Recontrol

KAPP NILES WORLD WIDE

Everywhere close by



With numerous locations all over the world, we are quick and reliable in all key markets on site.

Tool and spare parts deliveries as well as technological support from our competent regional staff ensure smooth process flows for our customers worldwide.

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IFD_900_Product_line_en Stand: 06.02.2023