

***Systems specialists in
hydraulics and clamping technology***



**Wilhelm König Maschinenbau GmbH
König-mtm GmbH Spanntechnik**

A tradition of innovation

König – the international byword for precision in hydraulics



Maximum precision, even in complex machining tasks

It wasn't long before König had made a name for itself as a manufacturer of precision components with customers at home and abroad. In its modern machine park, hobbled, bored and turned parts are machined with extreme accuracy and assembled into components.

The international customers of Wilhelm König Maschinenbau GmbH appreciate the company's unique expertise in the hydraulics sector and entrust even the most complex machining tasks to the company.

For König, these challenging customer requirements are a special motivation to enhance product quality and efficiency with unrelenting innovation.

One name, two powerful partners

König consists of two independent companies. These are Wilhelm König Maschinenbau GmbH, which mainly produces hydraulic components, and König-mtm GmbH, Spanntechnik, which supplies hydraulic and mechanical mandrels and chucks under the Königdorn® product brand to leading mechanical engineering and industrial companies.

Decades of experience

The roots of the König companies go back to the middle of the last century when, over 50 years ago, they embarked with growing success on the production of oil-hydraulic valves and hydraulic components.





Products for systems all over the globe

Day after day, König products demonstrate their reliability in operation in plant and systems on all five continents. Our satisfied customers include Bosch Rexroth, Claas, Ferrari, Graziano, Index, John Deere, Liebherr, MTU Aero Engines, New Holland, Porsche, Rolls-Royce Aero Engines, Urenco and many others.

Our product sales and service are supported by a network of international agents. This means that our customers can always find a competent trading partner or contact on all important markets.

Systems specialist in hydraulic components

Wilhelm König Maschinenbau GmbH produces hydraulic valves and other hydraulic components to customer specification.

Market-leading companies value these products highly for their great precision and reliability.

Their fields of application are varied. König hydraulic components can be found in the controls of mobile hydraulics (excavators, cranes etc.), in stationary hydraulics (bridge and canal lock equipment etc.) and in industrial hydraulics (machine tools etc.).

Applications in all major industrial sectors

König products are employed in the automotive, construction and chemical industries, aerospace and other important branches of industry. The broad spectrum of applications runs from A (Airbus) to Z (Zeppelin).

In everyday service, hydraulic valves have to meet the toughest requirements. In modern container ships or on drilling platforms, for instance, they have to withstand highly aggressive environmental conditions.



Advanced machining centers

Fine machining is standard at König



Pre- and fine machining – from rough cutting to the finished product – are performed on this extremely efficient CNC turning center without extra effort for re-tooling.



Our rough turning machine with robot tooling achieves high precision and surface quality at extremely economical cycle rates.



König recognizes the importance of highly skilled employees for the company's success. In the last few years, trainees in the machining sector have received numerous awards as chamber, Land and national winners.

Innovative precision manufacture

König specializes in the high-precision machining of small and medium-size series to precise customer requirements. Available for this are a large number of advanced CNC machining centers. The possible machining processes range from turning (including rough turning), boring, hobbing and grinding (surface and cylindrical grinding) to honing and lapping.

One of König's special strengths lies in the achievement of the high surface quality necessary for hydraulic components. Dimensional accuracies that were once inconceivable are now very much reality. Modern CNC machine tools and high-precision bearings and guides have left the nearest hundredth of a millimeter behind.

Today, production tolerances of a few thousandths of a millimeter and outstandingly high radial run-out accuracies are standard practice at König. To uphold this degree of precision, we operate our own efficient tool grinding department. Thanks to our modern machine park, we are always able to ensure exceptionally cost-conscious production of the very best quality. Our customers from a huge range of industries benefit from this.





Innovative quality management

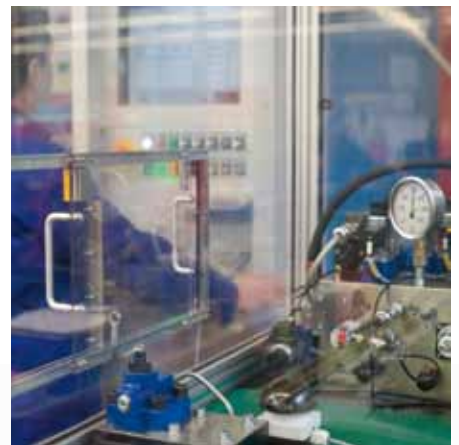
Safety, reliability and environmental awareness



On the test bench is a Königsdorn® mandrel for the production of aircraft engines. The accuracy of the mandrel is checked and documented with a high-precision measuring machine.



A precision measuring machine checks the accuracy of a hydraulic component with μ (0.001 mm) precision.



A hydraulic valve's leakage rate is determined on a performance test bench.

Quality management to ISO 9001 and environmental management to ISO 14001

Our quality management system certified to ISO 9001 and our environmental management certification to ISO 14001 form the solid basis of our quality strategy – in addition to our highly motivated and skilled employees.

Our oil-hydraulic valves and clamping elements are superlative components produced on efficient and high-precision CNC machines from high-grade materials.

To achieve matchless precision, the workpieces are meticulously checked at each stage in production and in a thorough final inspection.

Our customers benefit from the components' exceptional dimensional accuracy, high radial run-out accuracy and outstanding wear resistance.





Experience in clamping technology

For decades, König-mtm has been one of the leading manufacturers of state-of-the-art high-precision clamping devices. Its extensive product range covers such clamping tools as mandrels and chucks in hydraulic and mechanical versions.

In the mid-Sixties, König-mtm developed and patented its Königdorn®, a forward-looking hydraulic clamping tool, so that it could handle increasingly complex clamping tasks in its own production environment. From its inception, Königdorn® soon gained in popularity among a growing throng of mechanical engineering customers.

Under the Königdorn® brand, König-mtm GmbH, Spanntechnik, markets workpiece clamping tools that have become a hallmark of progressive mechanical engineering and belong to the modern equipment of leading high-precision CNC machine tools.

Hydraulic clamping tools

Conventional machining methods no longer satisfy the quality aspirations of most industries. For instance, ground gears measured on high-precision machines are common today. Quiet operation, energy savings and a long service life are the desired features. Clamping tools from König-mtm are designed for these challenging machining tasks. High-precision Königdorn® mandrels and chucks have outstanding radial and axial run-out accuracy and are capable of transmitting high clamping forces. In addition, they are easy to operate, low-wearing and insensitive to dirt.

MTU Aero Engines, one of the leading European manufacturers of aircraft engines (e.g. for Airbus), commended König-mtm as a Registered and Approved Supplier in 2006 and conferred the Supplier Award on the company in 2007.

Product features

- High precision
- High axial run-out accuracy
- Radial run-out accuracy achievable down to 0.002 mm
- High torque transmission
- Uniform cylindrical extension of the bushing over the whole clamping range
- Reduced set-up effort (high productivity and workpiece flexibility)
- Outstanding wear resistance
- High dirt insensitivity
- Easy to operate
- Low investment costs



Gearwheels for wind turbines with an outer diameter of 1 m and a weight of 1.2 t are machined with this Königdorn®. A radial run-out accuracy of ≤ 0.01 mm is achieved in the reference circle during gear grinding.

Clamping perfection

Tailor-made clamping elements

Clamping devices for market leaders

The international customers for these high-precision clamping devices include the machine tool industry, gearing industry, automotive industry and its component suppliers, the aerospace industry and numerous other sectors of industry all over the world.

The workpieces machined by customers on König precision products cover everything from components for aircraft, cars and construction machinery to gearwheels for wind turbines.

Product spectrum

- Mechanical mandrels
- Hydraulic mandrels
- Mechanical chucks
- Hydraulic chucks
- Splined mandrels
- Light-metal mandrels
- Complete holding devices
- Electronic clamping pressure control
- Special mandrels
- Clamping mandrels for hobs
- Rotor milling devices
- Special collet chucks
- Special flanges
- Spindles

Challenging requirements for clamping technology

Clamping tools are expected to meet extreme standards of precision. Radial run-out accuracies of a few thousandths of a millimeter are regularly called for.

The international aerospace industry in particular demands exceptionally high standards of manufacturing precision and material quality. Thanks to our in-depth experience, our König-dorn® mandrels can be used for producing components for aircraft engines that have to achieve a zero-error tolerance.

Individual clamping tools to customer specification

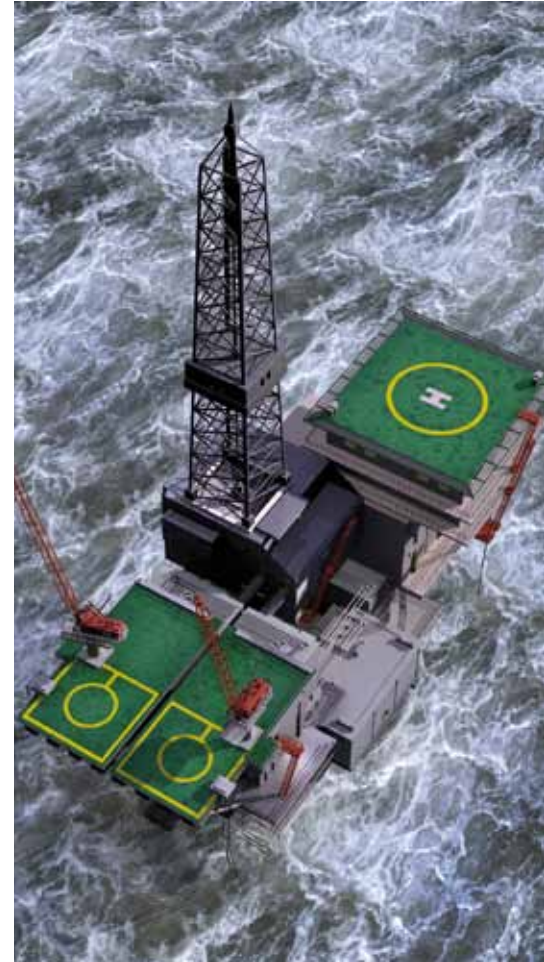
König-mtm designs and produces hydraulic clamping tools to customer specification.

These are almost always one-offs or small series tailored to the customer's specific machining tasks.

We would be happy to design and produce individual clamping tools to suit your specific requirements.



Hydraulic components and clamping tools from König have conquered a huge range of applications. These include not only offshore platforms, but also manufacturers of mobile hydraulic systems and suppliers of components for modern wind turbines.



Mobile hydraulics at a container terminal: König hydraulic components are used not only in modern ships, but also in the cranes of the transshipment facility.



The administration building and production plants of the König companies.



Wilhelm König Maschinenbau GmbH

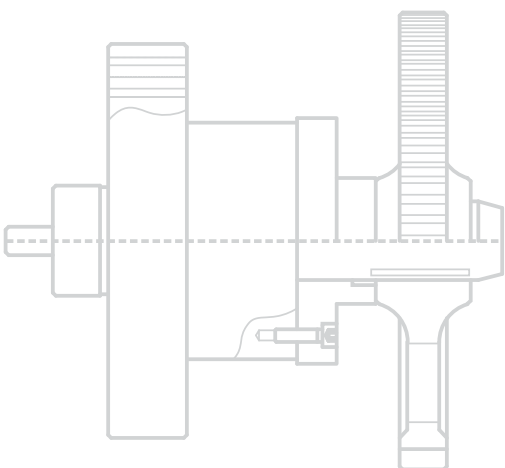
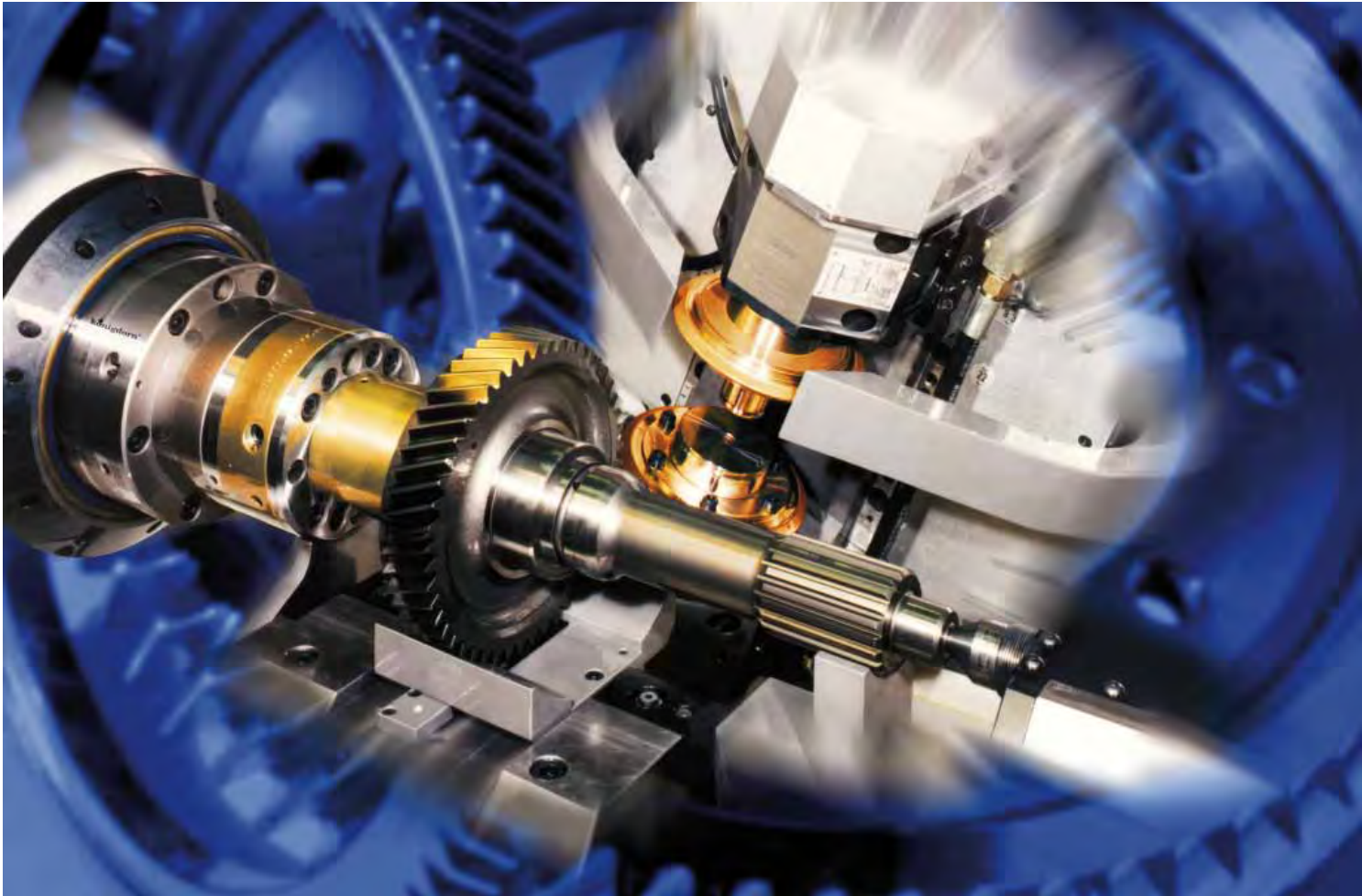
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Excellent Clamping



Hydraulic Clamping Devices

Hydraulic Clamping Devices for High Precision and High Productivity

Experience in clamping technology

For decades, König-mtm has been one of the leading manufacturers of state-of-the-art high-precision clamping devices. The extensive production program covers clamping tools such as mandrels and chucks in hydraulic, mechanical or hydro-mechanical versions.

In the mid sixties, König-mtm developed and patented their trademark Königdorn® a future orientated hydraulic clamping tool in order to solve problems within their own high precision manufacturing environment. Since its inception, the Königdorn® has become increasingly popular and valuable in international machining industries.

Clamping tools for market leaders

König-mtm's Königdorn® clamping chucks and mandrels are well known in the tool industry and are well established as original equipment on top-class high-precision CNC controlled machine tools.

The international customers for these high-precision clamping devices come from the transmission, automobile, machine tool, aircraft and other industries.

König-mtm's hydraulic clamping devices

Machining tolerances that were inconceivable years ago have become reality today. Modern CNC-controlled machine tools as well as high-precision bearings and guide ways have offered tolerances measured in microns which are a standard now in the state-of-the-art mechanical engineering.

Conventional machining technologies do not meet the present expectations. Gears ground and measured on high-precision machines are common today. Quiet operation, energy savings and long operating life are the results of these advancements.

Hydraulic clamping devices from König-mtm solve even the most pretentious machining tasks. The high-precision Königdorn® mandrels and chucks have excellent radial and axial run-out accuracy and transfer high clamping forces. They are easy to operate, wear-resistant and resistive to dirt.

Product features

- High precision
- High axial run-out accuracy
- Radial run-out accuracy up to 0,002 mm achievable
- High torque transmission
- Consistant cylindrical extension of the bushing within the whole clamping range
- Reduced tooling set-up expense (high productivity and workpiece flexibility)
- Long operating life
- High dirt resistivity
- Easy to operate
- Low investment costs



A Königdorn® can be fitted with various options. The picture shows a clamping chuck with manual clamping actuation, equipped with an Erowa quick-change plate.

The König quality strategy

While our highly motivated and qualified staff are a substantial base of our quality strategy, our quality management system is in accordance to ISO 9001:2000 standards. In addition, Koenig-mtm maintains ISO14001:2004 certification, pertaining to environmental and industrial safety, thus re-enforcing our desire and need to operate in an environmentally sustainable manner.

The Königdorn® devices are produced on efficient state-of-the-art CNC-controlled machinery with high-quality materials.

To meet the precision requirements, the functions of every Königdorn® device are controlled on modern high performance test stations in both single production steps as well as in an intensive final test.

As a result we guarantee our customers products with high run-out accuracy, best wear resistance and long operating life.



König is well aware of the importance of well-trained employees in the success of the Company. Its metal-cutting apprentices have in recent years received numerous Chamber, State and Federal vocational training awards.



A Königdorn® clamping mandrel for manufacturing aircraft jet engines at the test stand: A high-precision measuring unit controls the run-out accuracy.

Customized Clamping Devices for all Requirements

Clamping sleeve with a solid clamping surface

A Königdorn® clamping device, like a mandrel or chuck operates hydraulically without any mechanical wear. Its main characteristic is the elastic clamping sleeve with a solid clamping surface.

The clamping sleeve is pressurized by a hydraulic medium and a clamping piston which is actuated manually or by the machine. The pressure is exerted without mechanical transduction directly on the clamping sleeve. The solid bushing is expanded up to 0.3 % of the clamping area. Due to this expansion tolerance limit, workpieces can be clamped only on a surface that is already machined.

For applications requiring a wider clamping area König-mtm offers a comprehensive program of mechanical clamping devices (please ask for our special catalog).

Predestinated for almost all machining tasks

The clamping sleeve, hydraulically actuated, works on the entire clamping surface. Therefore, high load torque settings can be transferred, making Königdorn® devices suitable for almost all machining tasks.

Also for mounting operations, requiring high precision, Königdorn® devices are used successfully.

Gentle clamping and optional clamping force limitation

The closed clamping surface results in a very gentle clamping of workpiece or tool. To protect specific sensitive workpieces against damaging by overpressure, a control piston which allows the precise selection of the correct clamping force can be integrated on request. Electronic clamping pressure control, also, is available as an option (see more accessories on page 31).

Suitable for measuring and testing applications

Because of the precise manufacturing process, run-out accuracies up to 2 microns are achievable. This high accuracy allows the use of Königdorn® devices on measuring and testing systems.

Long life time, high productivity and high efficiency

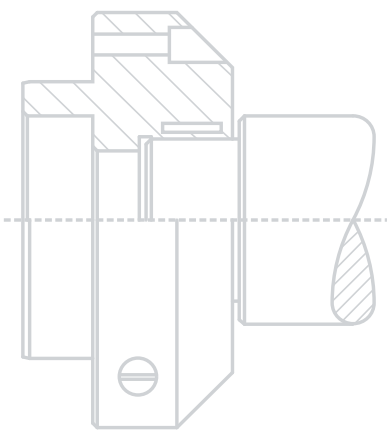
Made of high-grade materials, Königdorn® devices are very wear resistant and have a long operating life. Because of their closed system they are resistive to dirt.

High productivity and quick tooling set-up is the result of the short response times of the hydraulic system – regardless of whether it is actuated manually or automatically.

Individual clamping tools according to customer's specific requirements

König-mtm designs and produces hydraulic clamping devices which are customized to special demands. Almost always they are unique tailor-made tools for customer's specific machining tasks.

We would be pleased to design your special clamping tool, according to your individual requirements.

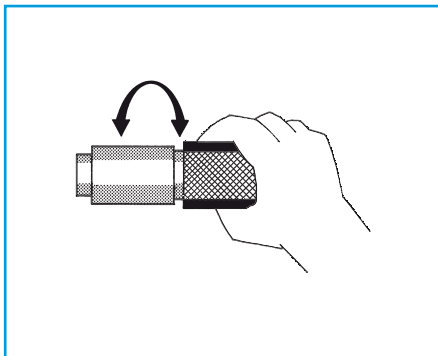


Königdorn® clamping technology

Königdorn® clamping devices are available with several different actuating methods depending on customer's machining tasks or machine layouts.

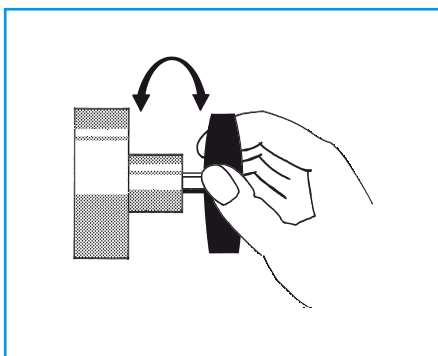
The four most common options are illustrated in the graphics below.

Manually clamping, without a wrench



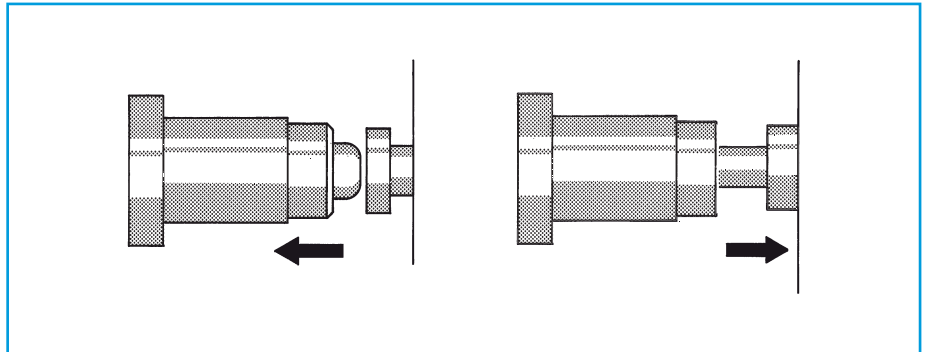
Approved method at measuring and testing mandrels, where relative low clamping pressure is required.

Manually clamping, with a wrench



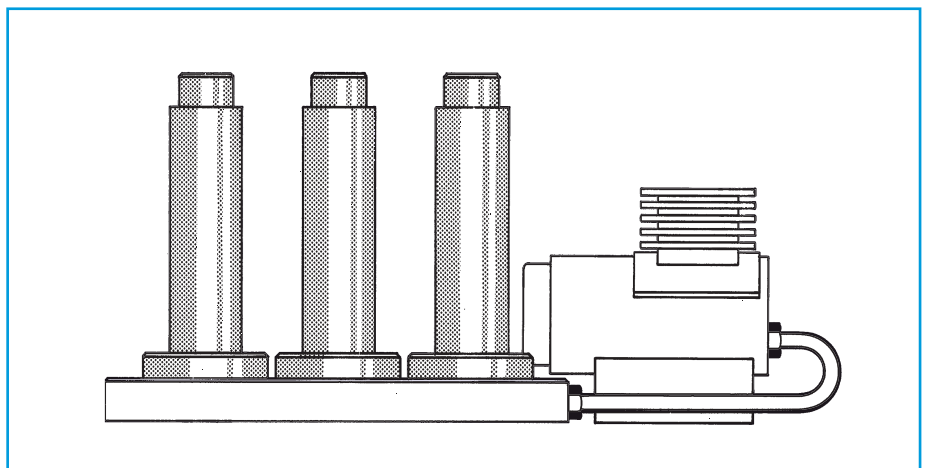
Most common process when mechanical machining requires higher clamping pressure.

Power clamping



The clamping pressure can be generated mechanically, pneumatically, hydraulically or electromagnetically by pulling or pushing the clamping piston. Therefore this process is suitable for semi or fully-automatic machine tools.

Clamping by external pressure generation



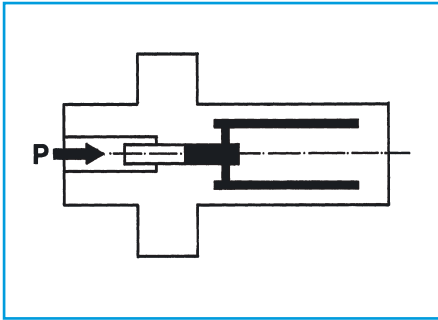
With the use of pressure pistons several Königdorn® devices can be actuated in different positions.

Königsdorn® Design Principles

Depending on machining tasks and operating conditions Königsdorn® tools can be designed in different principles.

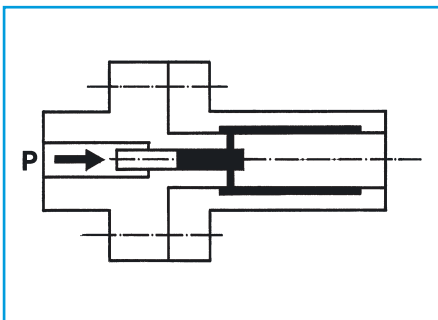
On one side they can be designed as a closed system where clamping sleeve and base are connected in a fixed manner on the other side there are open systems available where the clamping sleeve can be replaced when worn or damaged.

Closed system



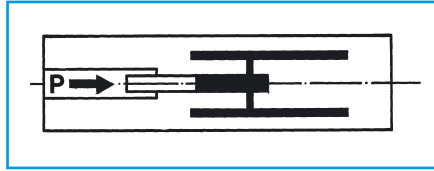
Constant connection of base and clamping sleeve.

Open system



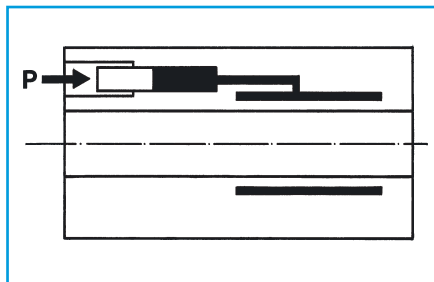
The detachable connection enables the replacement of the clamping sleeve when worn or damaged.

Central clamping force initiation



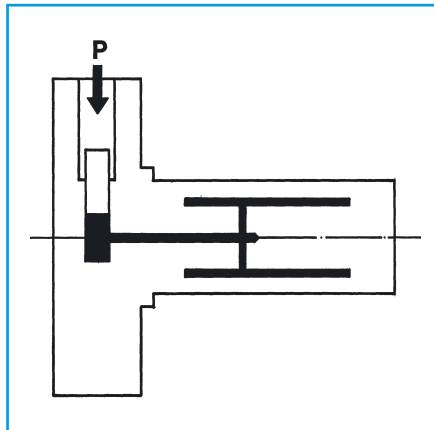
Clamping force initiation centrally from the axial center is often used with clamping mandrels.

Offset clamping force initiation



Chucks are often constructed with offset clamping force initiation (from outside the center).

Radial clamping force initiation








A radial clamping force initiation (from the outside diameter) can – according to application – be useful with both clamping mandrels as well as chucks.

This brochure introduces various applications of Königsdorn® clamping devices.

We show no measurements and technical details as the drawings are meant to stimulate the creativity of the engineer and designer.

For a better representation of functions we show graphical drawings.

Color coding for illustrations of clamping tools

-  Gray
Königsdorn® tooling
-  Blue/Light blue
Königsdorn® tooling (section)
-  Yellow
Clamping area of Königsdorn® tooling
-  Red/Light red
Workpiece (section)
-  Green/Light green
Base machine component

Hydraulic Clamping Tools

Hobbing

Workpiece clamping during hobbing

Based on its high precision and extremely small grinding stock allowance the Königsdorn® tooling as clamping mandrel or chuck is an ideal tool for hobbing.

The left drawing illustrates a clamping mandrel where the entire torque is created via radial expansion.

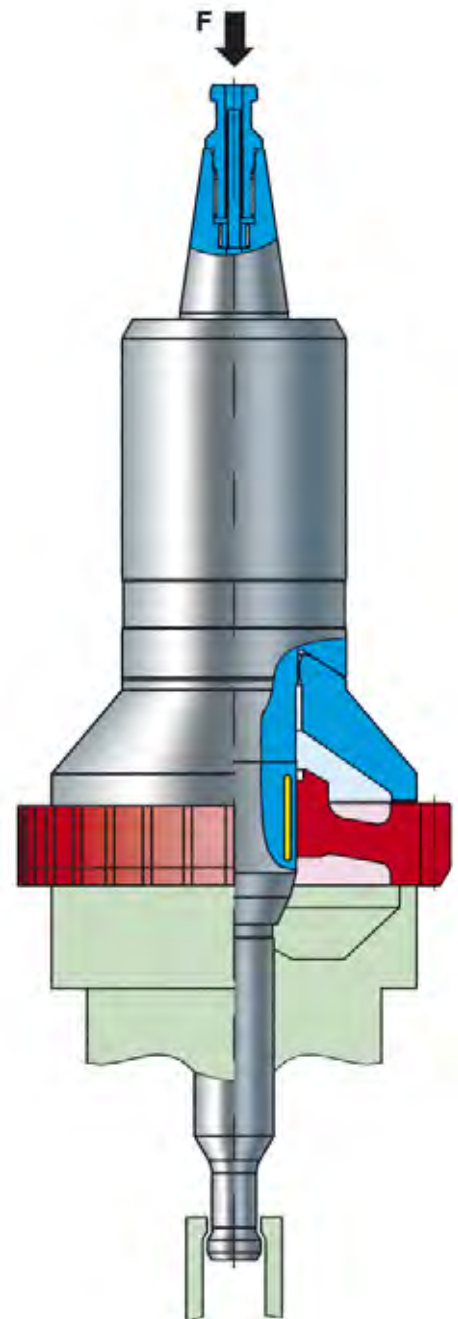
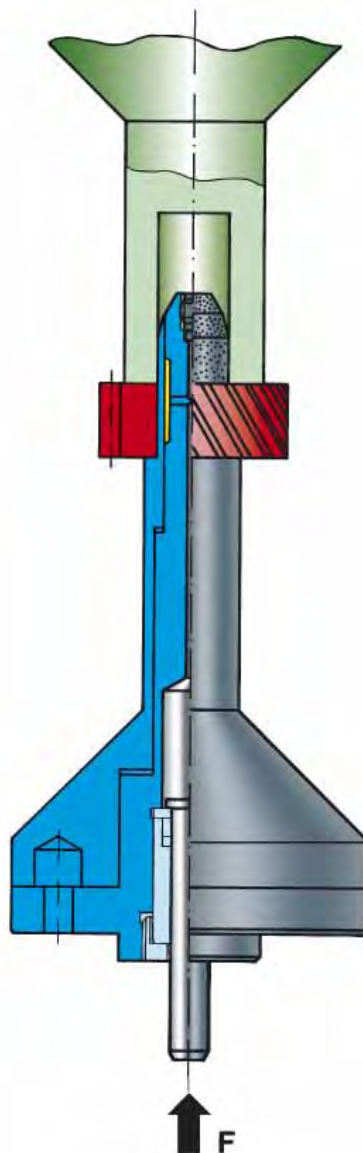
Clamping is initiated via the clamping cylinder of the machine spindle. The tailstock, which is also clamped via the clamping mandrel, only serves the purpose of stabilizing and centering the Königsdorn® device. Axial clamping is not necessary in this case.

With the help of an oil spiral groove* or a coating* on the clamping surface you can obtain high torque also with smaller clamping diameters.

The illustration downright shows a clamping mandrel with centering functions as an additional version for hobbing. Here, torque is obtained axially via a clamping bell through the draw bar. Clamping pressure is actuated via a hydraulic cylinder in the tailstock.

It is possible to obtain exact expansion with the help of a proportioning and resetting screw. The floating attachment of the backing ring will compensate for axial run-out on the workpiece.

* see more options on page 31

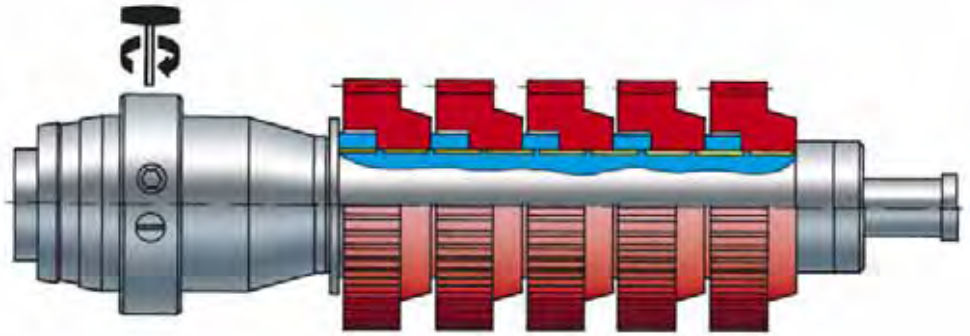


Hydraulic Clamping Tools

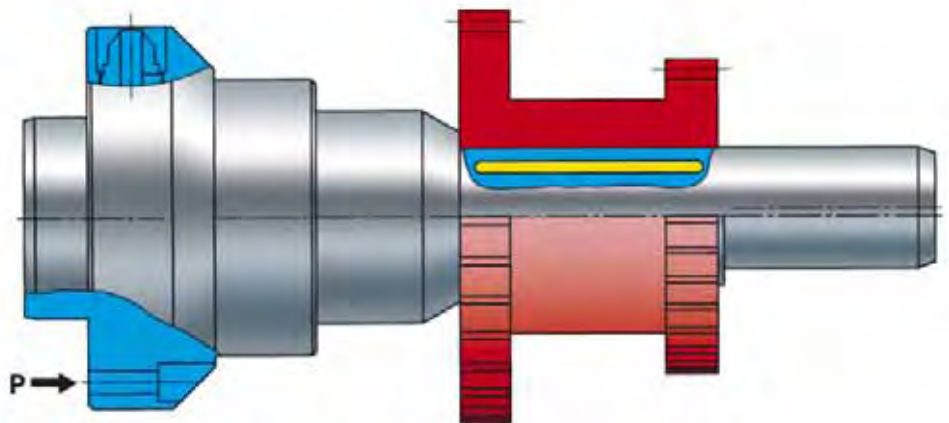
Gear Grinding

Hydraulic clamping mandrels for bore parts

The opposite drawing illustrates a clamping mandrel for clamping multiple gears during gear grinding. The gears are first aligned outside the machine in a pre-alignment station and clamped on the mandrel. Clamping pressure is initiated radially by hand or via an electrical or pneumatic screwing device. Subsequently, the prepared Königsdorn® mandrel is placed into the gear grinding machine. A taper mount in the tool spindle will ensure the required run-out accuracy of 0.003 mm.



The opposite drawing illustrates a clamping mandrel for automatic workpiece loading within the machine. The Königsdorn® mandrel is mounted firmly on the tool spindle and the clamping pressure is initiated via machine hydraulics. The mandrel itself has a built-in pressure transducer which generates appropriate clamping for the clamping diameter in question. A handling system places the workpiece on an eccentric lead-in situated in front of the clamping surface. The loading onto the clamping surface takes place through a sliding sleeve located on the tailstock.



An integrated operation indicator* increases the operating safety, as it allows the operator to check the state of operation and the mandrel condition.

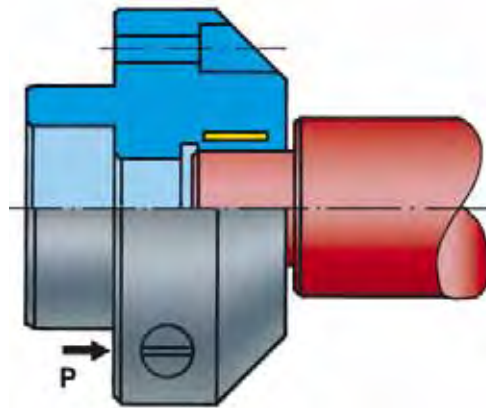
* see more options on page 31

Hydraulic Clamping Tools

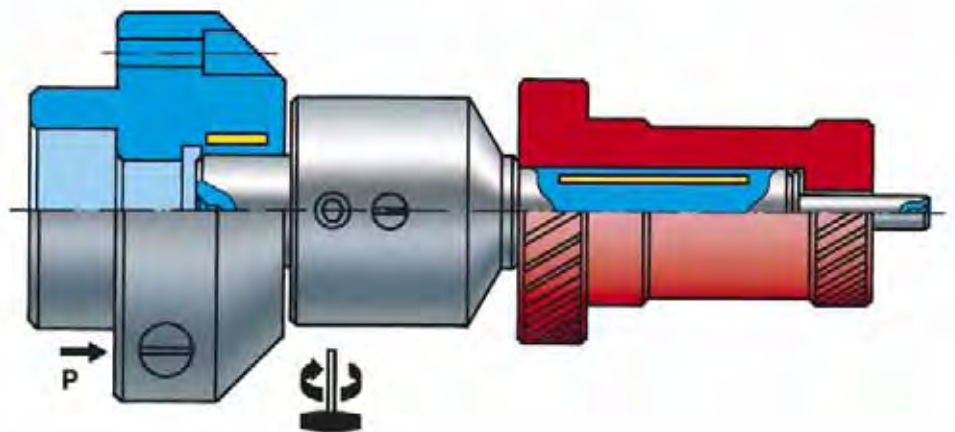
Gear Grinding

Hydraulic clamping chucks for shaft parts

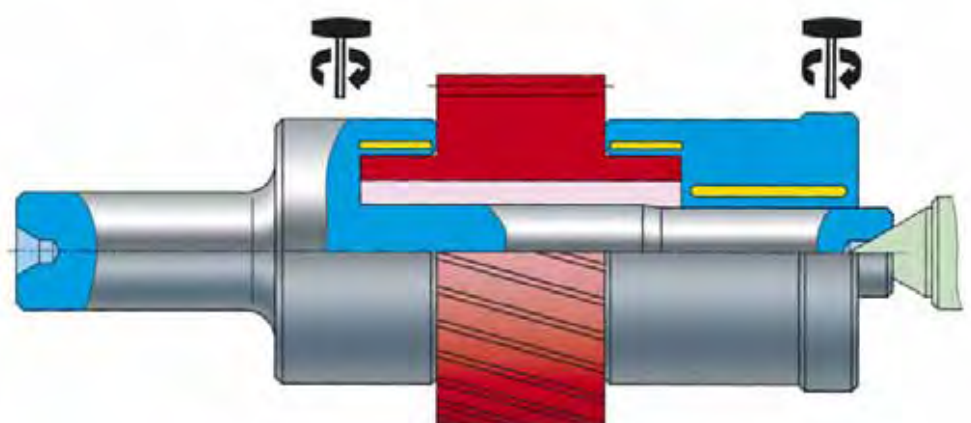
With geared shaft parts the bearing seat is frequently used as a clamping location (opposite drawing). The workpieces are manually placed on a study rest. The workpiece is loaded via a headstock sleeve and the tailstock center. The clamping force is generated via axially initiated hydraulic pressure. A pressure transducer in the chuck guarantees the necessary clamping pressure.



A frequent application during gear grinding is the mandrel-chuck clamping alternative. The hydraulic clamping mandrel, which has been prepared and clamped with the workpiece outside the machine, is placed on prisms in the machine and loaded between centers (opposite drawing). Clamping pressure is initiated via machine hydraulics.



A special application is the clamping of a pinion with two shaft stubs which are simultaneously used as bearing seats (opposite drawing). Two independent clamping cycles are manually actuated. The entire mandrel with workpiece will then again be clamped in the chuck of the machine.



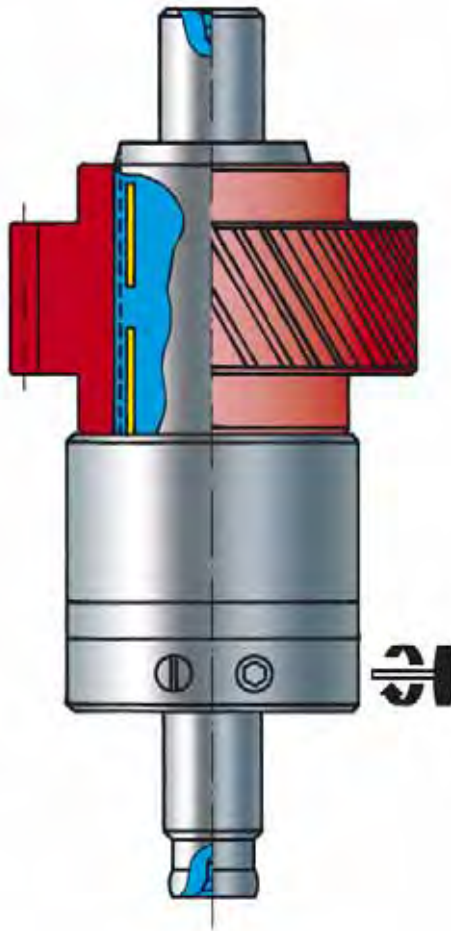
Hydraulic Clamping Tools

Gear Grinding

Hydraulic clamping mandrels for workpieces with geared and smooth bore

Königsdorn® mandrel with two clamping locations and externally geared clamping bushing for the mounting of workpieces to be ground as a helical gear (opposite drawing).

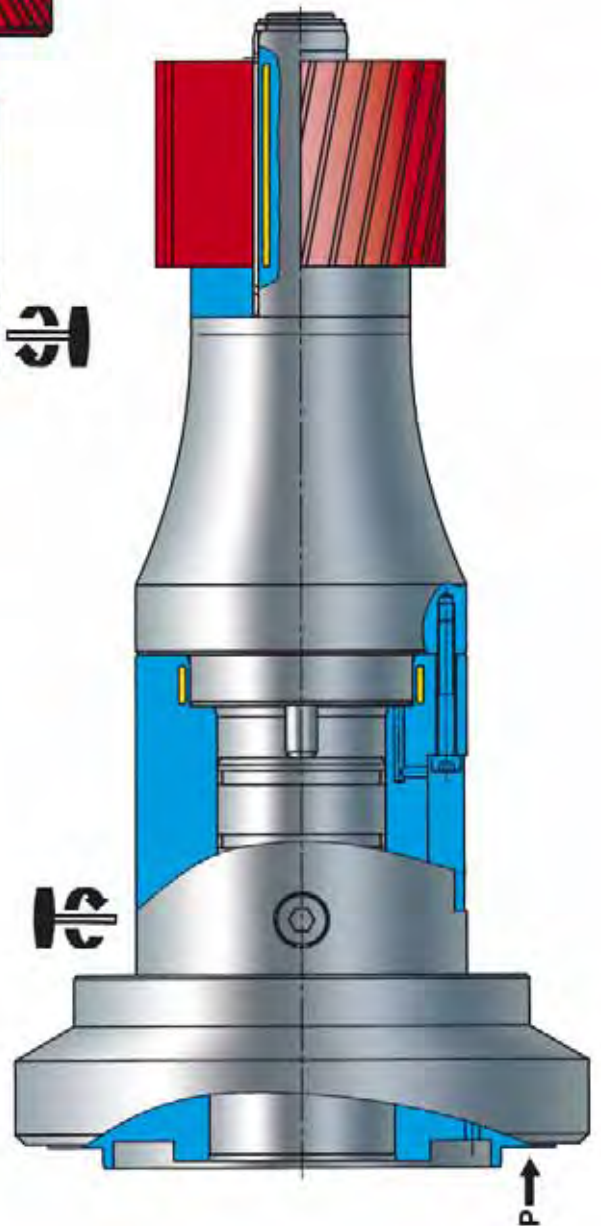
Through both clamping locations optimal centering is achieved on the entire workpiece length. Mounting between center and collet chuck, initiation of clamping force is radial by hand. Run-out accuracy: 0.005 mm.



Hydraulic clamping mandrel, mounted on a quick change chuck with integrated pressure transducer (opposite drawing). Centering of the clamping mandrel takes place via a clamping bushing in the base adaptor.

Clamping pressure is initiated radially by hand. The clamping mandrel is clamped via machine hydraulics.

Various workpiece diameters can be clamped on the mandrel via slotted intermediate bushings. Run-out accuracy: 0.003 mm.

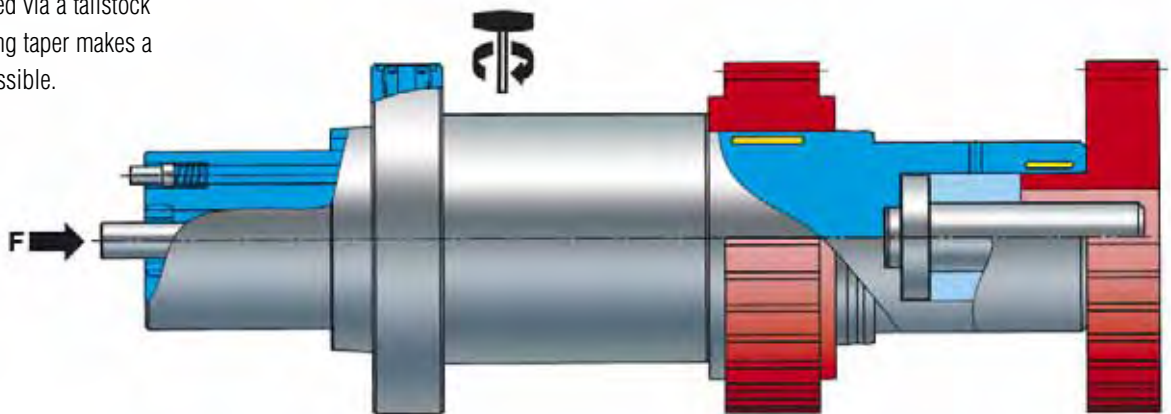


Hydraulic Clamping Tools

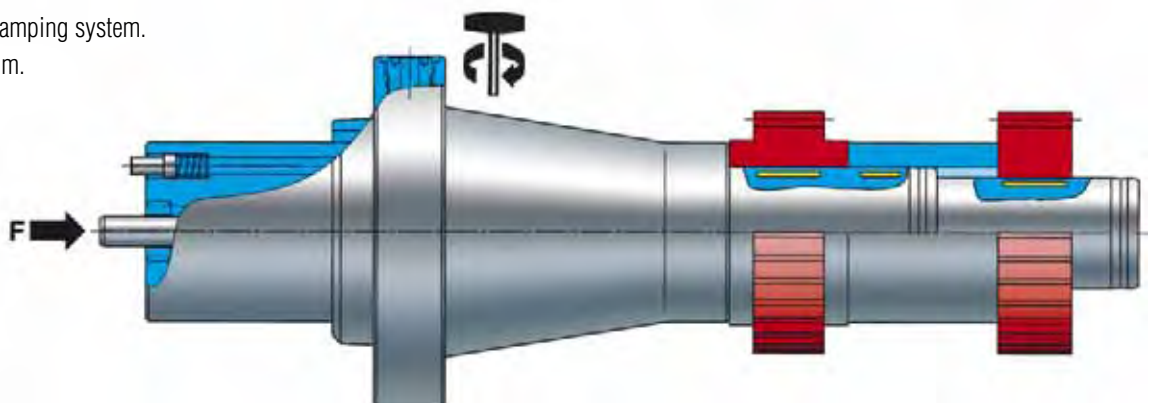
Gear Grinding

Workpiece and diamond dressing wheel clamping on one Königdorn®

Workpiece and diamond dressing wheel clamping on one Königdorn® device. With this combination Königdorn® mandrel and chuck, a hollow shank shaft and the diamond dressing wheel are simultaneously clamped. If desired, the mandrel can be braced via a tailstock center. A special mounting taper makes a run-out of 0.003 mm possible.



Hydraulic Königdorn® device for mounting workpiece, workpiece stop, and diamond dressing wheel. Dressing wheel and workpiece stop are clamped manually. Workpiece clamping takes place via the piston rod of the machine hydraulics. An additional mechanical clamping pressure control increases the operational safety of this clamping system. Run-out accuracy: 0.003 mm.

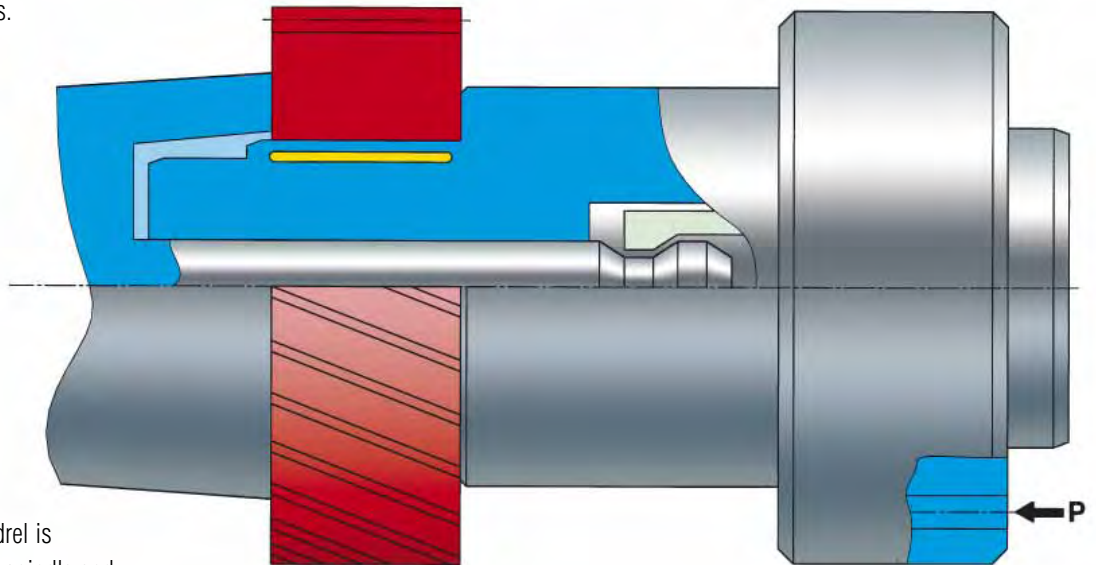


Hydraulic Clamping Tools

Coronieren® (Coronating)

Workpiece clamping for Coronating

The high machining forces of Coronating impose extreme requirements on the clamping devices. Due to the high run-out precision, the enormous achievable torque and optimal stability Königsdorn® tools are particularly suitable for this machining process.



In this example the clamping mandrel is directly mounted on the workpiece spindle and is actuated via machine hydraulics.

The built-in pressure transducer generates the necessary clamping pressure. In addition, the workpiece is pressed against a coated contact ring via an axial clamping device in order to achieve the required torque.

Run-out accuracy: 0.003 mm. An integrated operation indicator** increases the operating safety of machine and Königsdorn® tooling.

* *Coronieren® is a registered trade mark of KAPP GmbH.*

** *see more options on page 31*

Hydraulic Clamping Tools

Honing

Workpiece adapter and device in the honing wheel support

For finish machining of gears, it is important that the gears are mounted and centered exactly. Königsdorn® mandrels are superbly suited to fulfill this requirement.

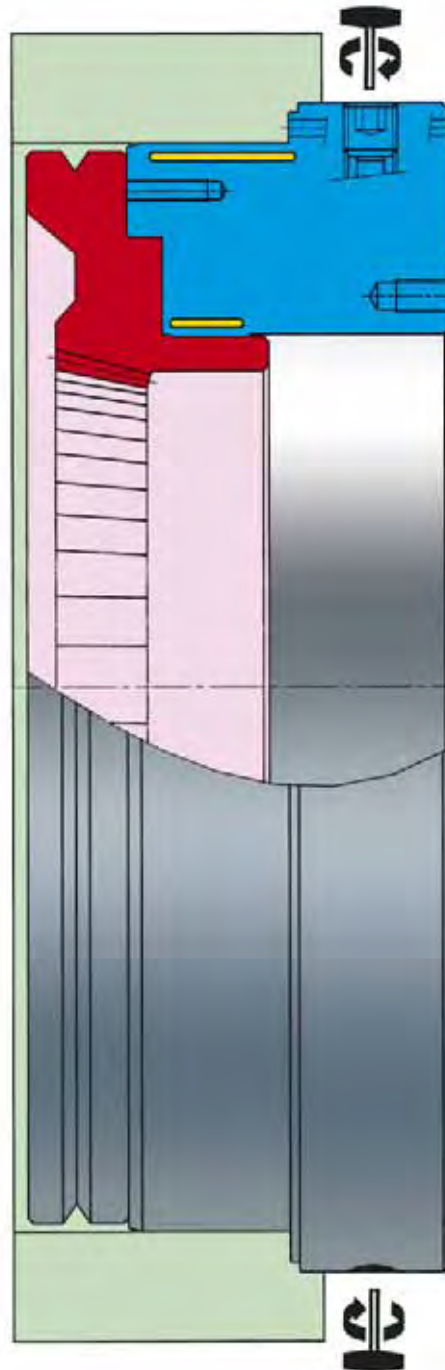
In this example, the complete clamping mandrel is installed in the honing wheel support and clamped with a hydraulic expanding chamber.

Reconfiguration for new workpieces can be accomplished without great loss of time. The workpiece is clamped via a second clamping chamber.

Since the clamping location on the workpiece is very thin-walled, the clamping pressure of the workpiece clamping is regulated via a pressure reception sensor.

The entire device as well as the workpiece can be clamped independently of each other through two separate clamping cycles which are manually actuated.

Run-out accuracy: 0.005 mm.

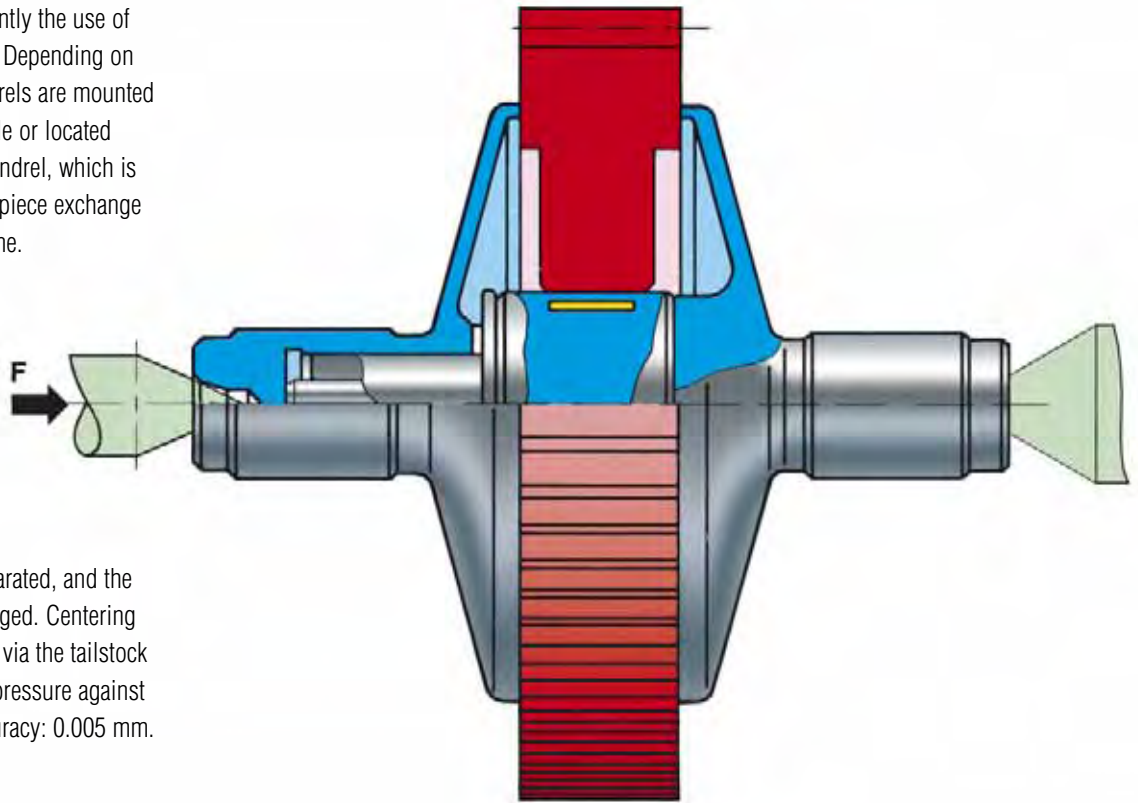


Hydraulic Clamping Tools

Gear Shaving

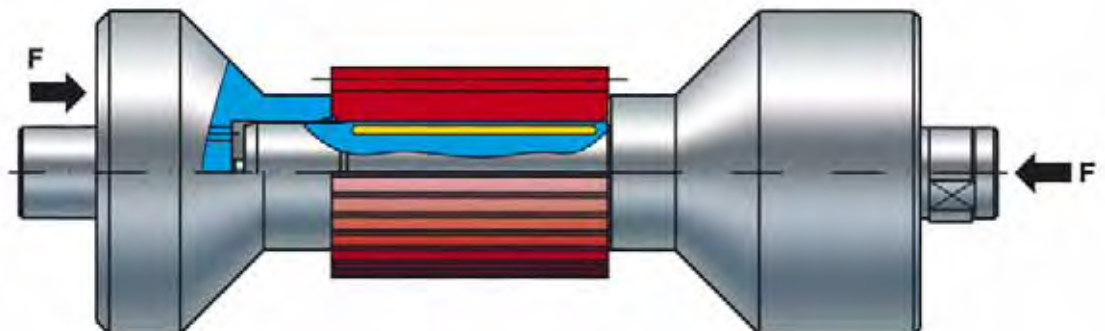
Workpiece adapters for gear shaving

Increased quality standards for shaved gears require more and more frequently the use of hydraulic clamping mandrels. Depending on the machine type, these mandrels are mounted firmly on the workpiece spindle or located between centers. With this mandrel, which is located between centers, workpiece exchange takes place outside the machine.



Both clamping halves are separated, and the workpiece can then be exchanged. Centering of the workpiece is performed via the tailstock center by simultaneous axial pressure against the contact face. Run-out accuracy: 0.005 mm.

Machines with automatic loading have both halves of the clamping mandrel mounted on the workpiece spindle. During positioning, the workpiece is set without backlash and clamped axially at the same time. Run-out accuracy: 0.003 mm.



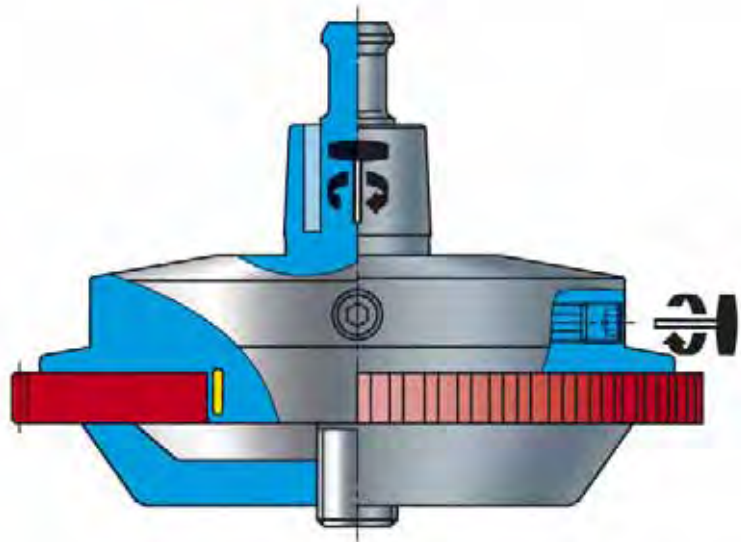
Hydraulic Clamping Tools

Gear Shaping

Tool clamping for gear shaping

The opposite drawing shows a Königdorn® mandrel which is used during gear shaping applications with radial and axial hydraulics. The shaper cutter is centered with high precision via the clamping bushing. Run-out accuracy: 0.003 mm.

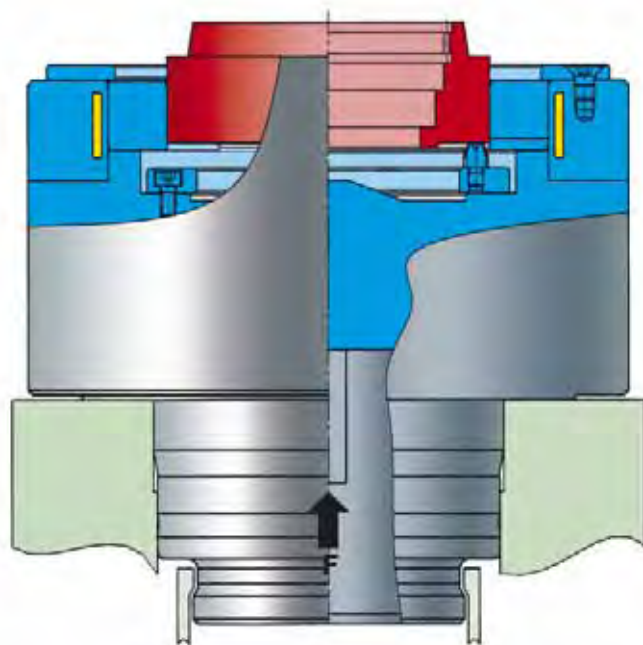
The shaper cutter is clamped with great force through the separate axial hydraulic system. A special taper is used to precisely locate the shaper cutter in the machine spindle. These large shaper cutter fixtures are generally used for external gears.



Workpiece clamping for gear shaping

This example shows a Königdorn® chuck mounted on the machine table of a Liebherr gear shaping machine.

Clamping is actuated through the hydraulic function of the clamping cylinder. By using intermediate bushings, a diameter range of approximately 15-35 mm can be covered. The workpieces are clamped with greatest run-out accuracy (0.005 mm). Automatic loading is possible.

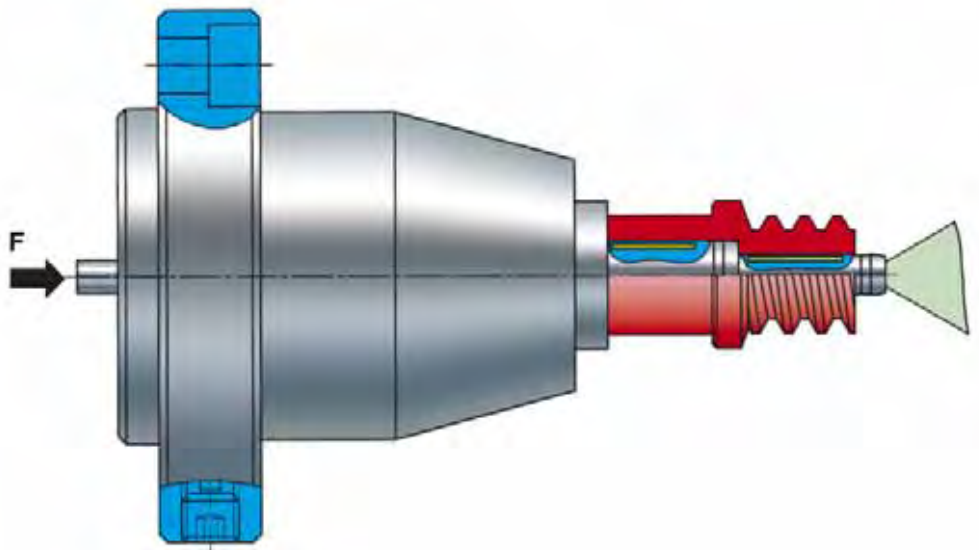


Hydraulic Clamping Tools

Worm and Rotor Grinding

Hydraulic mandrels and chucks for worm and rotor grinding

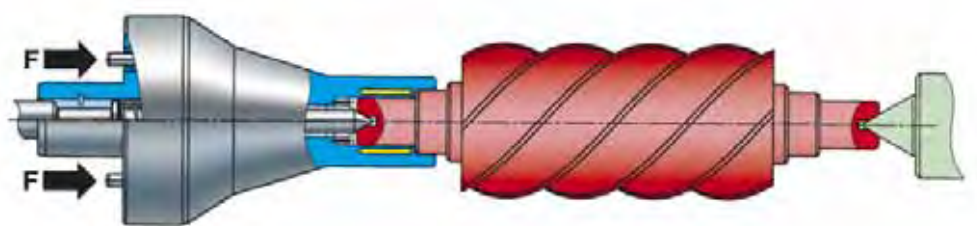
During this application of a clamping mandrel for worm grinding, a worm with two different internal diameters is clamped on a flanged mandrel. The clamping mandrel, which is firmly mounted on the machine spindle, is clamped via the clamping cylinder of the machine. Automatic loading of workpieces is possible.



The opposite Königsdorn® mandrel is loaded outside the machine. Automatic clamping by means of an electrical or pneumatic screwing device is also possible here. The clamping mandrel is clamped on the shaft in a chuck and supported via the tailstock center. Run-out accuracy: 0.003 mm.



Chuck for grinding of rotors for compressed air as well as refrigeration technology. The chuck is mounted on the machine spindle via an intermediate flange which is configured as a hydraulic chuck. The pressure pistons are actuated and the necessary clamping pressure is generated via pressure rods integrated into the intermediate flange. A spring-loaded locating center allows the automatic exchange of workpieces. The rotors are supported via the tailstock center. Workpiece exchange as well as workpiece clamping are monitored via an air inlet control device.

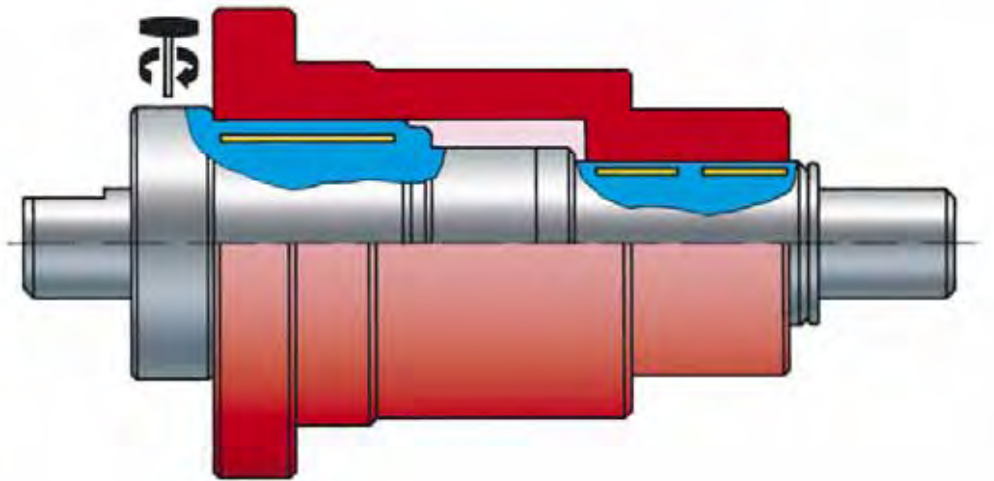


Hydraulic Clamping Tools

Cylindrical Grinding

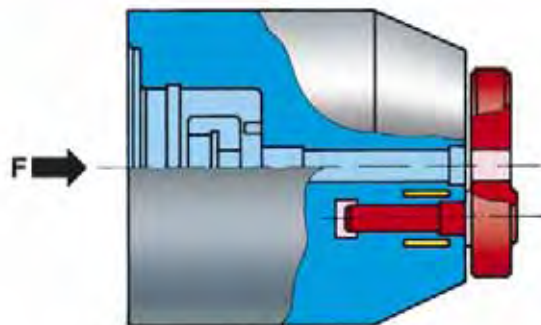
Workpiece internal clamping for external machining

This Königsdorn® mandrel was developed for external cylindrical grinding tasks on oblique recess grinding machines permitting the treatment of all flat and radial surfaces.



Workpiece external clamping for internal machining

For grinding the middle bore of a piston rod, the workpiece is clamped on the eccentrically located mandrel peg. Clamping pressure is initiated via machine hydraulics. Run-out accuracy: 0.003 mm.

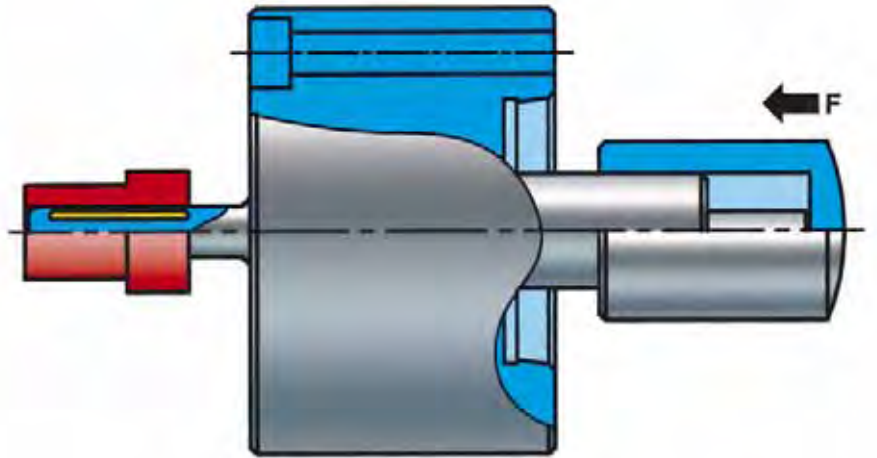


Hydraulic Clamping Tools

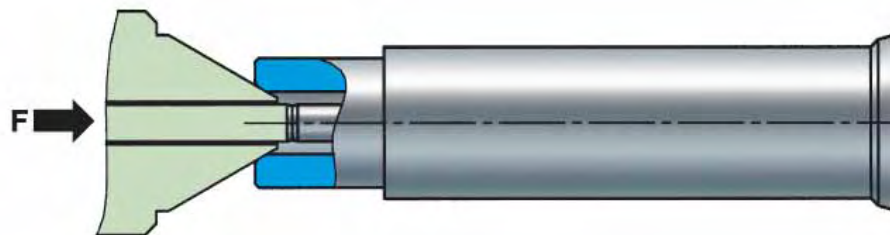
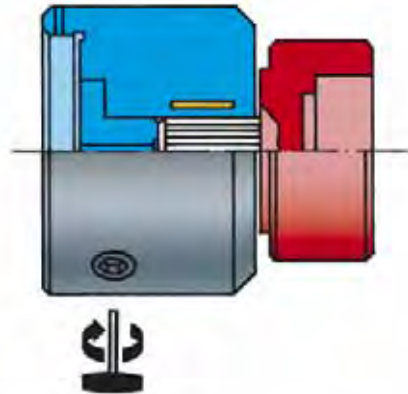
Turning

Workpiece clamping for rough turning

This Königsdorn® mandrel for surfacing hardened workpieces with high axial run-out accuracy, is flanged on a lathe and automatically actuated by means of a pneumatic cylinder.



Königsdorn® chuck for the clamping of workpieces with external gear. Clamping on the addendum circle. Turning on the outside diameter and on two inside diameters as well as on the flat surface of the workpiece. Clamping is initiated radially by hand. Run-out accuracy: 0.003 mm.



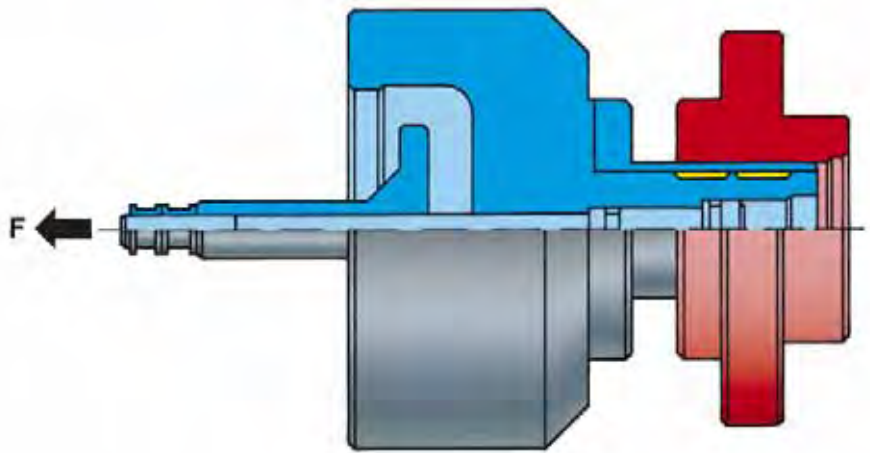
Hydraulic Clamping Tools

Turning

Clamping mandrels with expansion rates up to 1 % of the diameter

Königdorn® mandrel for clamping a workpiece where the external contour is to be machined by turning on all sides.

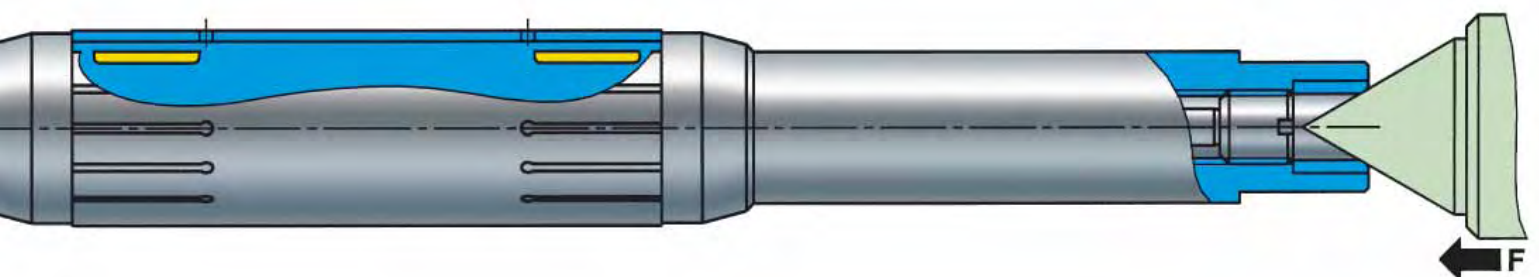
Radial clamping via two clamping chambers, axial positioning through positioning pins which are retracted upon initiation of the clamping force via machine hydraulics.



Königdorn® mandrel with highly elastic expanding bushing for expansion rates up to 1 %. In addition, slotted steel bushing to protect against wear and loss of accuracy during serial production.

The expanding mandrel is used for the turning of electrical motors (stators) and is located between centers in the machine. Clamping is performed with the clamping cylinder of the machine through a hollow point.

Run-out accuracy: 0.010 mm.



Hydraulic Clamping Tools

Hobbing/Boring

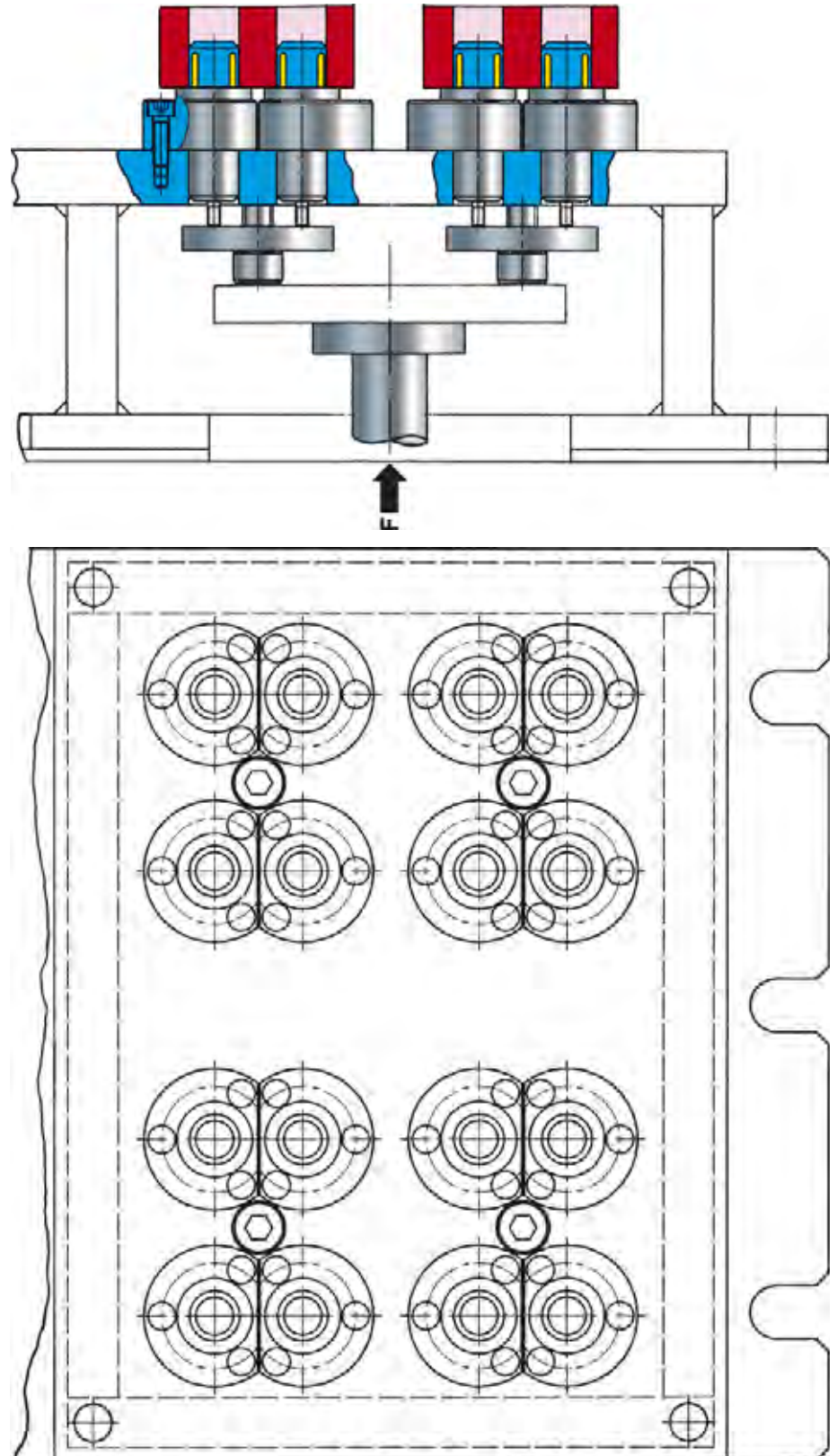
Multiple clamping device for vertical machining center

The workpieces are mounted in 2 bores without backlash and clamped.

8 workpieces are clamped in one cycle by means of a central clamping cylinder.

The flat surfaces of the workpieces are hobbled at right angles. In addition, a kidney-shaped slot is cut true to the position of the two bores.

This clamping device guarantees very exact position tolerances.



Hydraulic Clamping Tools

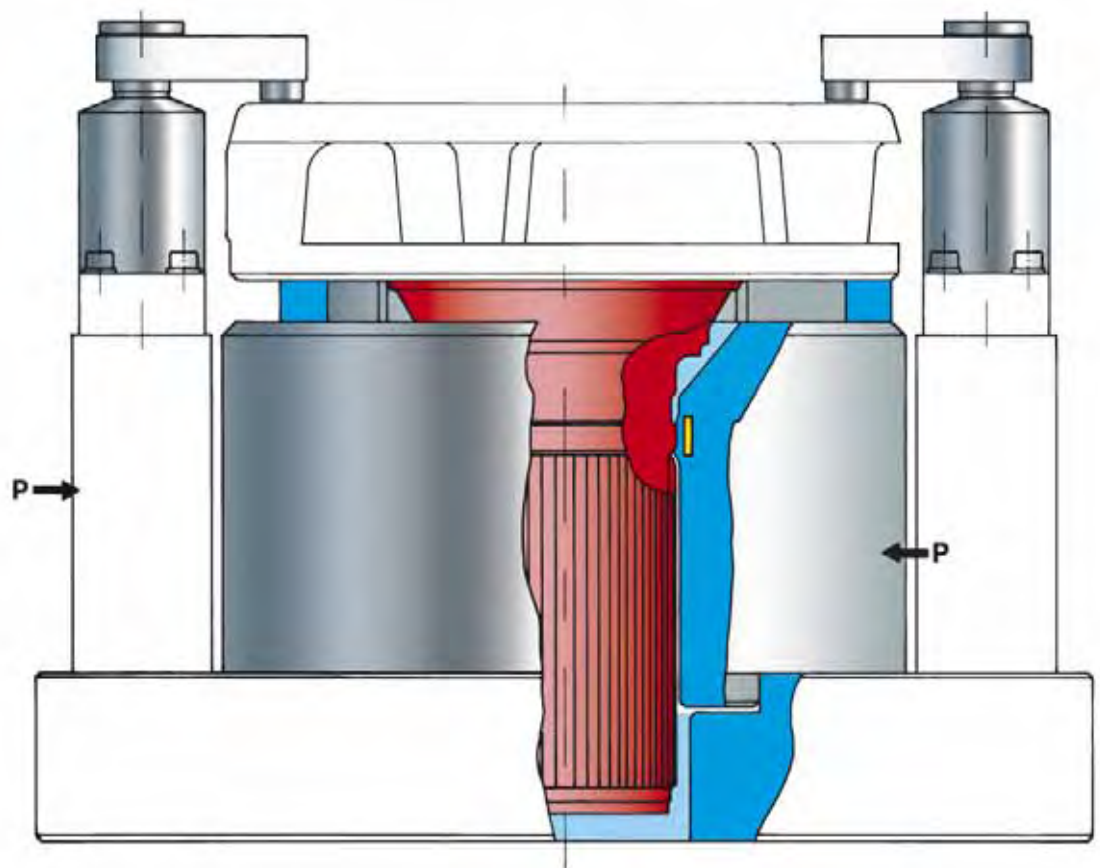
Boring, Hobbing and Spindling

Combined centering and clamping device for planetary wheel supports

Königdorn® device on a high-precision vertical machining center for boring and spindling of a planetary wheel support.

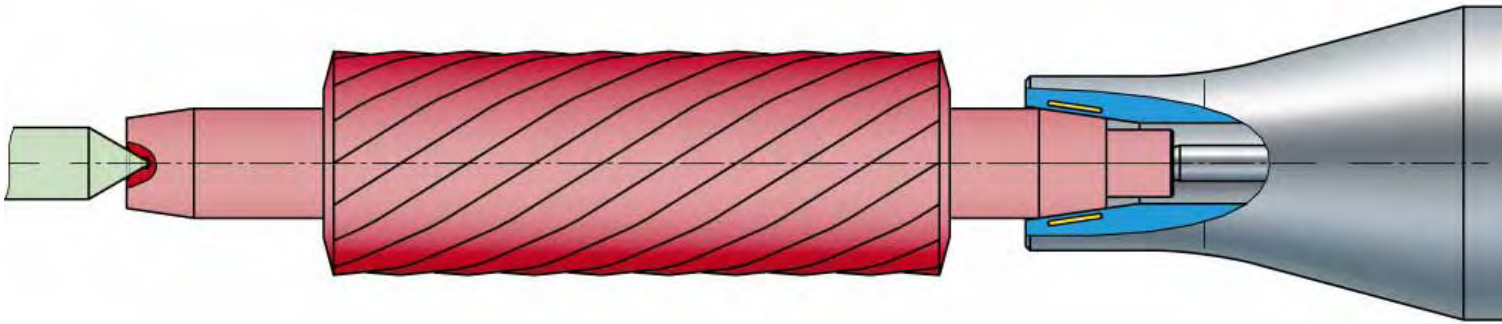
The workpiece is centered in the Königdorn® chuck by means of a sizing diameter and clamped via 2 hydraulic swivel clamping elements.

Via a tracing device, the planetary wheel support is aligned after the bore has been pre-machined.



Hydraulic Clamping Tools

Tool Grinding



Königsdorn® chuck for use on tool grinding machines

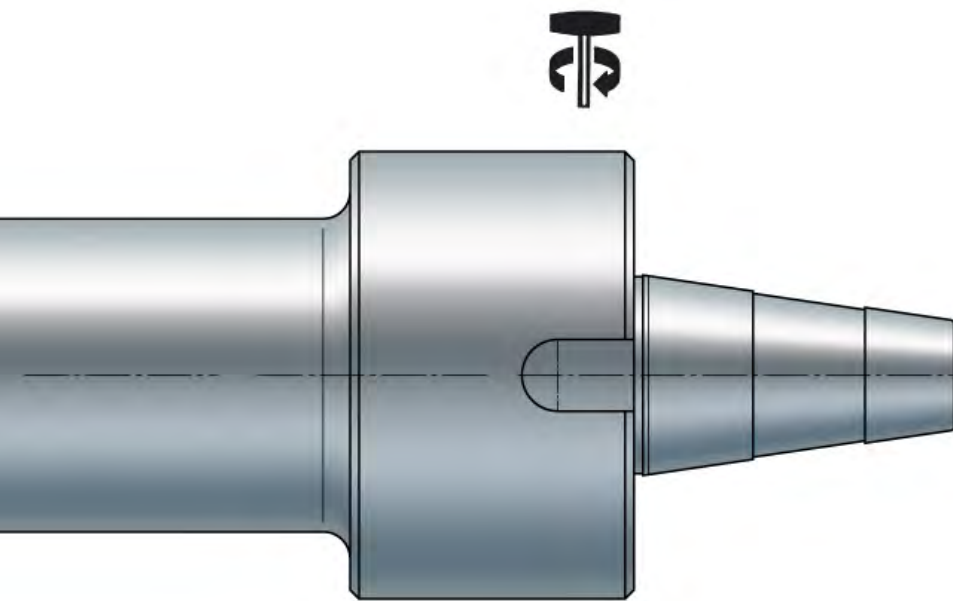
The drawing above shows the example of a hydraulic chuck for clamping of a waver hob with tapers on the end.

The operational area is the manufacturing, grinding and sharpening of this hob profile on high-precise tool grinding machines.

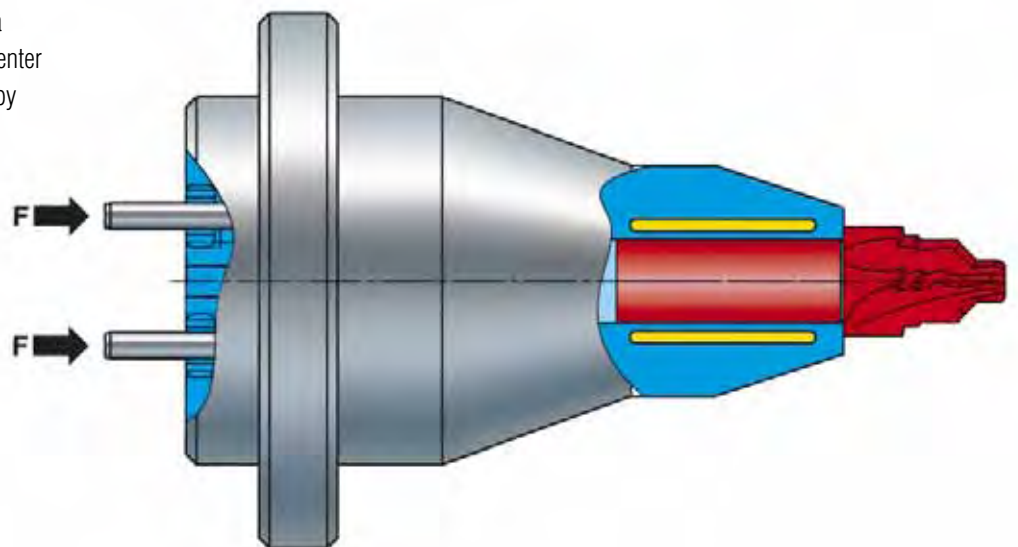
The clamping pressure is actuated by axial pushing of the waver hob by the tailstock of the machine.

Beside the clamping function, the hydraulic expanding process equalizes the angle tolerances.

An integrated ejector allows a more ergonomic tooling set-up. Run-out accuracy: 0.003 mm.



Automatic chuck for grinding and sharpening tools. The chuck is used on CNC tool grinding machines with automatic loading. The cylinder is clamped with two pistons. In addition, a cleaning device can be connected in the center so the Königsdorn® chuck can be flushed by air or coolant after each machining cycle.

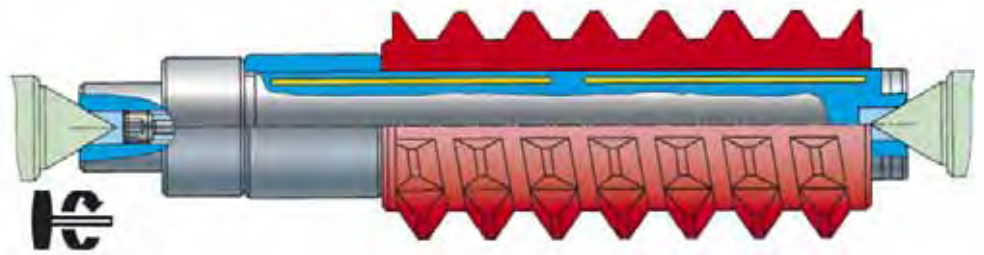


Hydraulic Clamping Tools

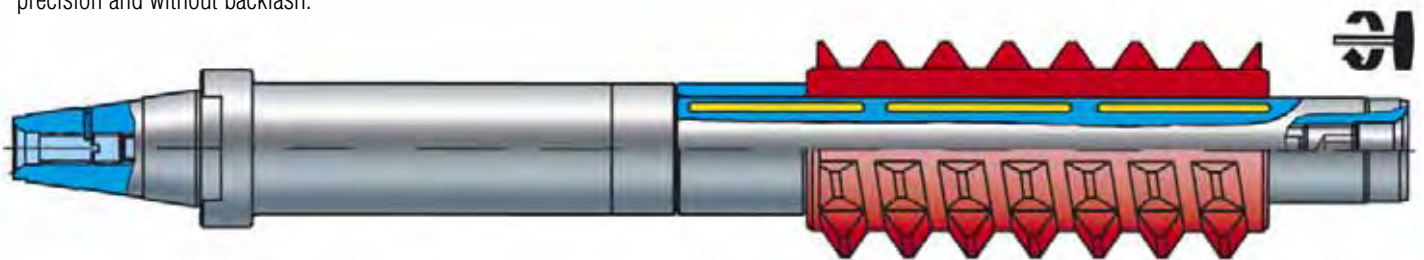
Tool Production and Tool Sharpening

Königdorn® devices for hob manufacturing

Hobs are clamped manually on a Königdorn® mandrel and located between centers in various machines. This system is used during hob manufacturing, during grinding, relief-grinding, sharpening, and inspection. Run-out accuracy: 0.002 mm.



Königdorn® mandrel for grinding and sharpening hobs on a Klingelnberg grinding machine. The hob is clamped with high precision and without backlash.



Clamping is actuated axially by hand. Run-out accuracy: up to 0.003 mm.

Hydraulic Clamping Tools

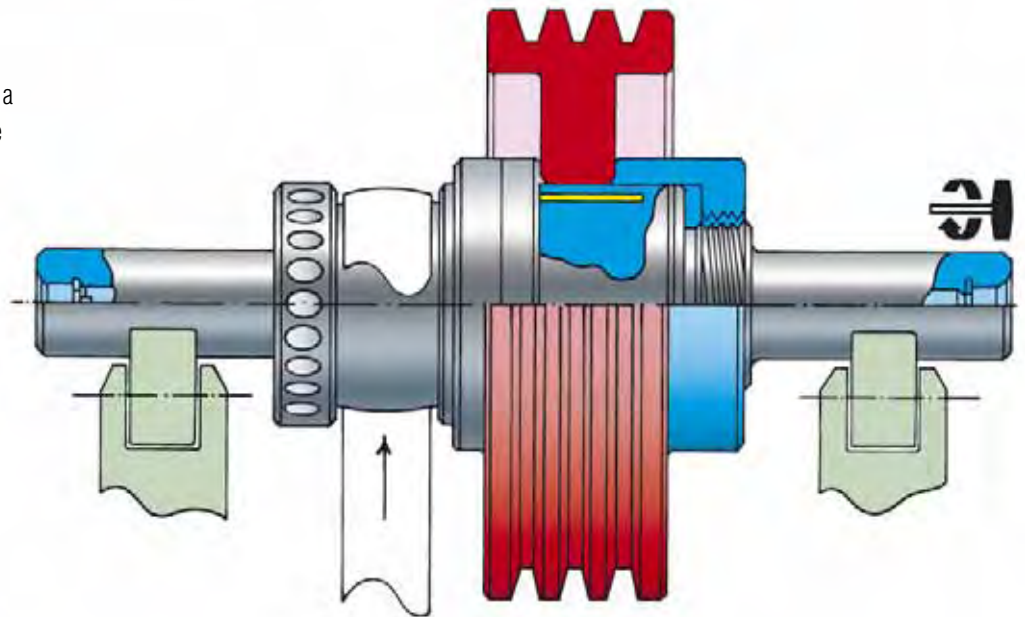
Balancing

Workpiece clamping on Königdorn® devices for balancing

In order to keep the weight as low as possible, Königdorn® devices for dynamic balancing can be manufactured from aluminum with steel clamping bushings upon request.

The system illustrated on the right is belt driven. In addition to radial clamping via a threaded ring, which is also clamped, the pulley to be balanced is pressed in a flat position.

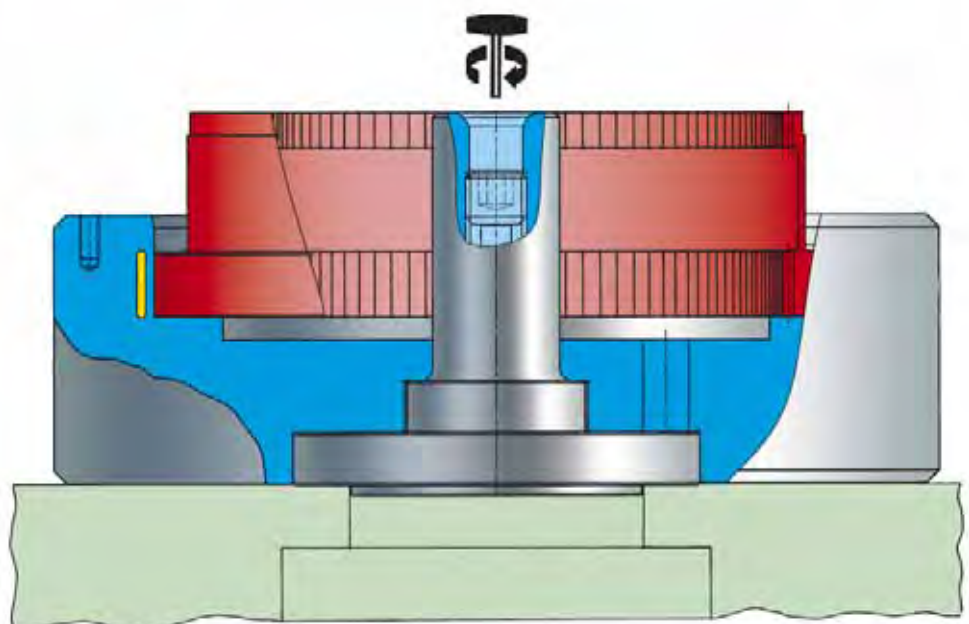
The mandrel is located on pulley blocks and is balanced by screwing in threaded pins. The clamping force is initiated axially by hand. Run-out accuracy: 0.003 mm.



The Königdorn® chuck is mounted on the drive of a balancing machine via a reducing flange.

Clamping is performed axially by hand. The workpiece is located backlashfree with high run-out accuracy. For weight reasons, the base of the chuck is made of aluminum and the clamping bushing and the threaded flange of tool steel.

With Königdorn® devices, even thin-walled and unstable workpieces can be clamped concentrically and with high run-out accuracy.



Hydraulic Clamping Tools

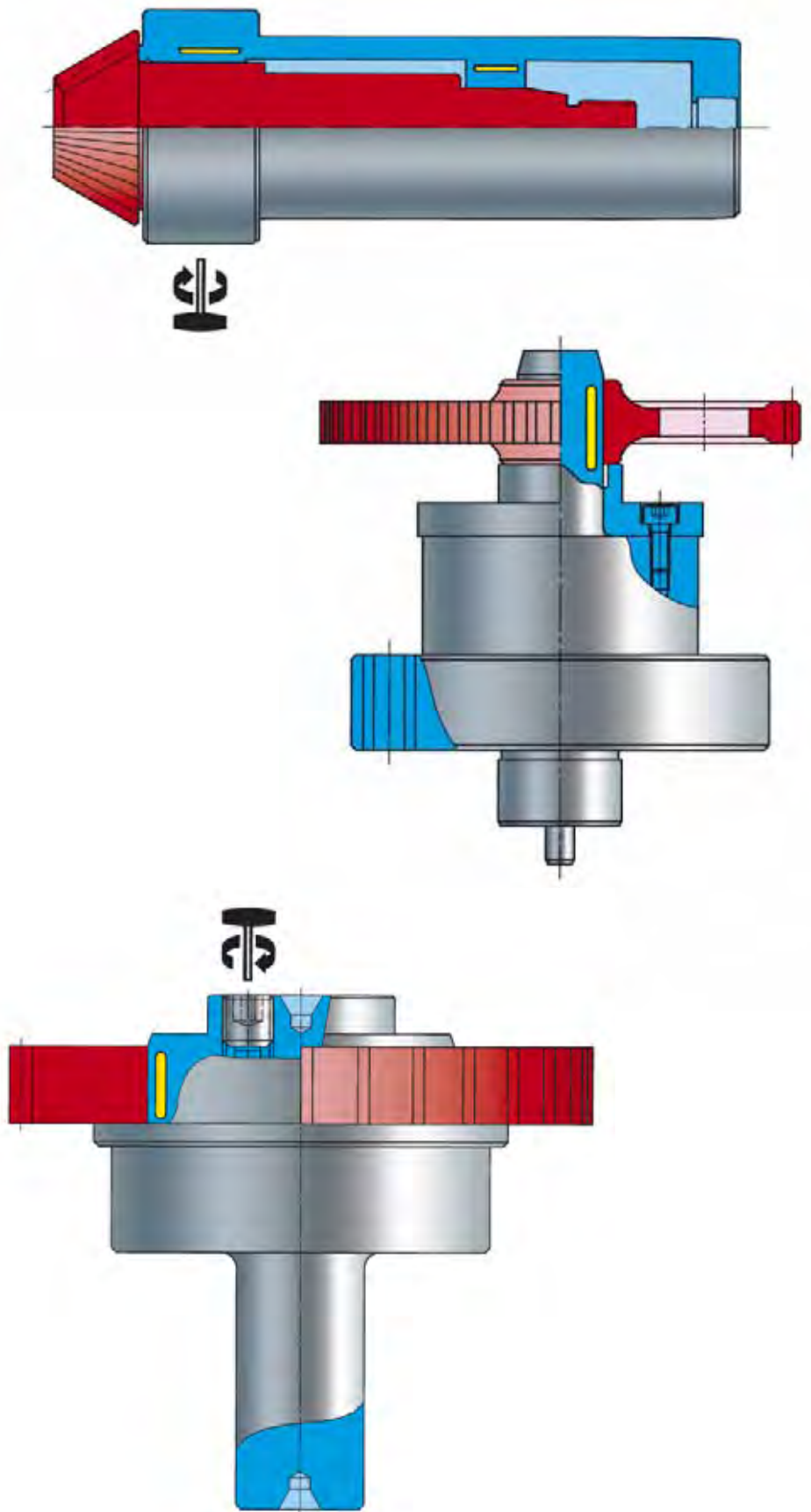
Testing

Königsdorn® chucks and mandrels on gear measuring machines

Due to the high-precision manufacture of Königsdorn® mandrels, they can also be used as measuring device. The example on the right shows the measuring of a Klingelnberg gear on a taper drive which is clamped at 2 locations and can thus achieve a run-out accuracy of up to 0.002 mm. The chuck is open toward the back in order to let the air cushion escape when positioning the workpiece. The clamping force is initiated radially by hand.

Königsdorn® mandrel for measuring an external gear on an automatic tooth profile measuring machine (middle). The mandrel is flanged on the machine and is clamped automatically by means of a pneumatic cylinder. Automatic workpiece loading is possible. Run-out accuracy: 0.003 mm.

Königsdorn® mandrel for measuring the external gear of a tooth profile measuring machine. The mandrel is located between centers in the measuring machine. Clamping is performed axially by hand. The mandrel is made of light metal, resulting in great weight savings. Clamping bushings and centers are made of highly wear-resistant tool steel. Run-out accuracy: 0.003 mm.



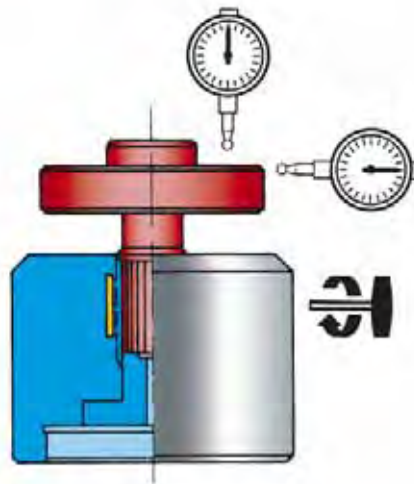
Hydraulic Clamping Tools

Testing

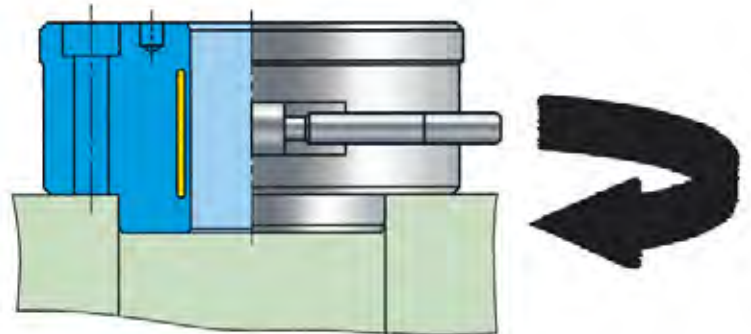
Königsdorn® chucks on testing devices and measuring machines

Königsdorn® measuring device with internal helical gear ground into the clamping bushing.

The workpiece is measured on the radial and flat surfaces. The clamping force is initiated radially by hand.



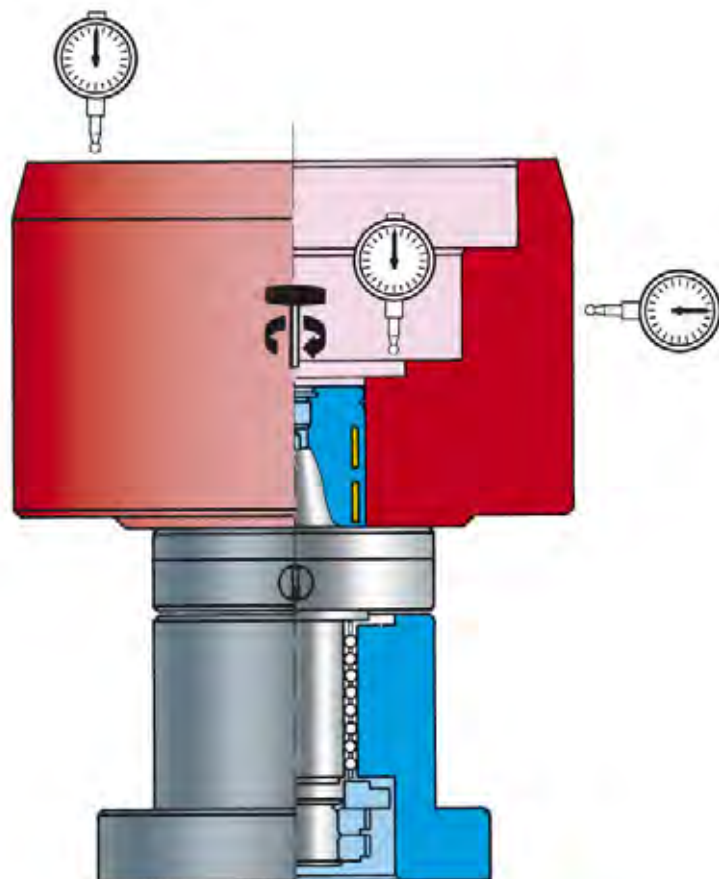
Use of a Königsdorn® chuck as base chuck on a tooth profile measuring machine. Centering points for measuring gears and various accessories are clamped into this chuck on mandrels between centers. This base chuck has a run-out accuracy of 0.001-0.002 mm and is clamped manually with a lever. This clamping mechanism guarantees simple and very fast operation.



Königsdorn® measuring device for mounting heavy workpieces with 2 clamping chambers in the mandrel on a clamping surface.

The mandrel rests in a revolving ball cage which permits a run-out accuracy of 0.005 mm.

The clamping force is initiated axially by hand. Measuring of all machined radial and flat surfaces is possible.



Hydraulic Clamping Tools

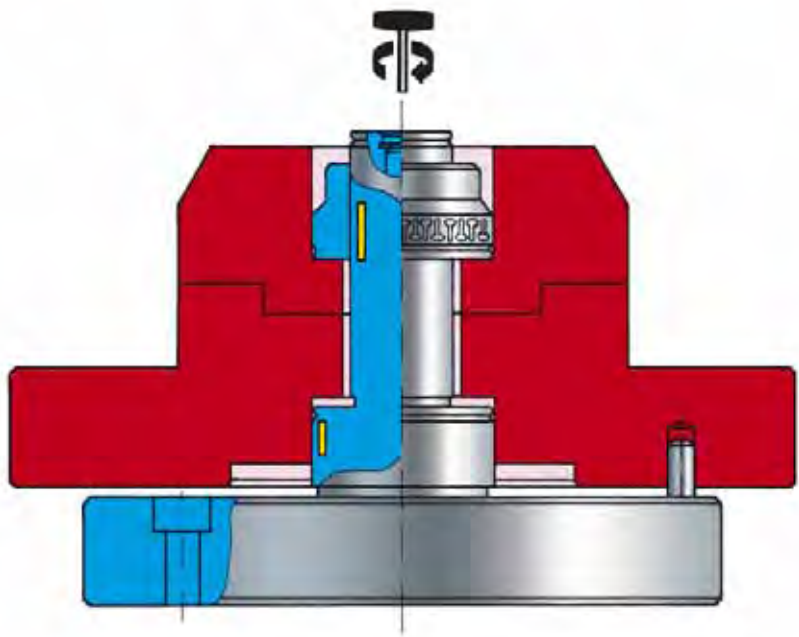
Mounting

Königsdorn® mandrels as mounting devices

Königsdorn® mandrel as device for mounting two individual parts which are removed from the device after boring and screwing.

Positioning of the lower part takes place via the mandrel and an eccentrically located sizing pin. Positioning of the upper part through a slotted clamping bushing which has been placed above the mandrel in addition.

The clamping force is initiated axially by hand, allowing simultaneous clamping of both clamping locations.

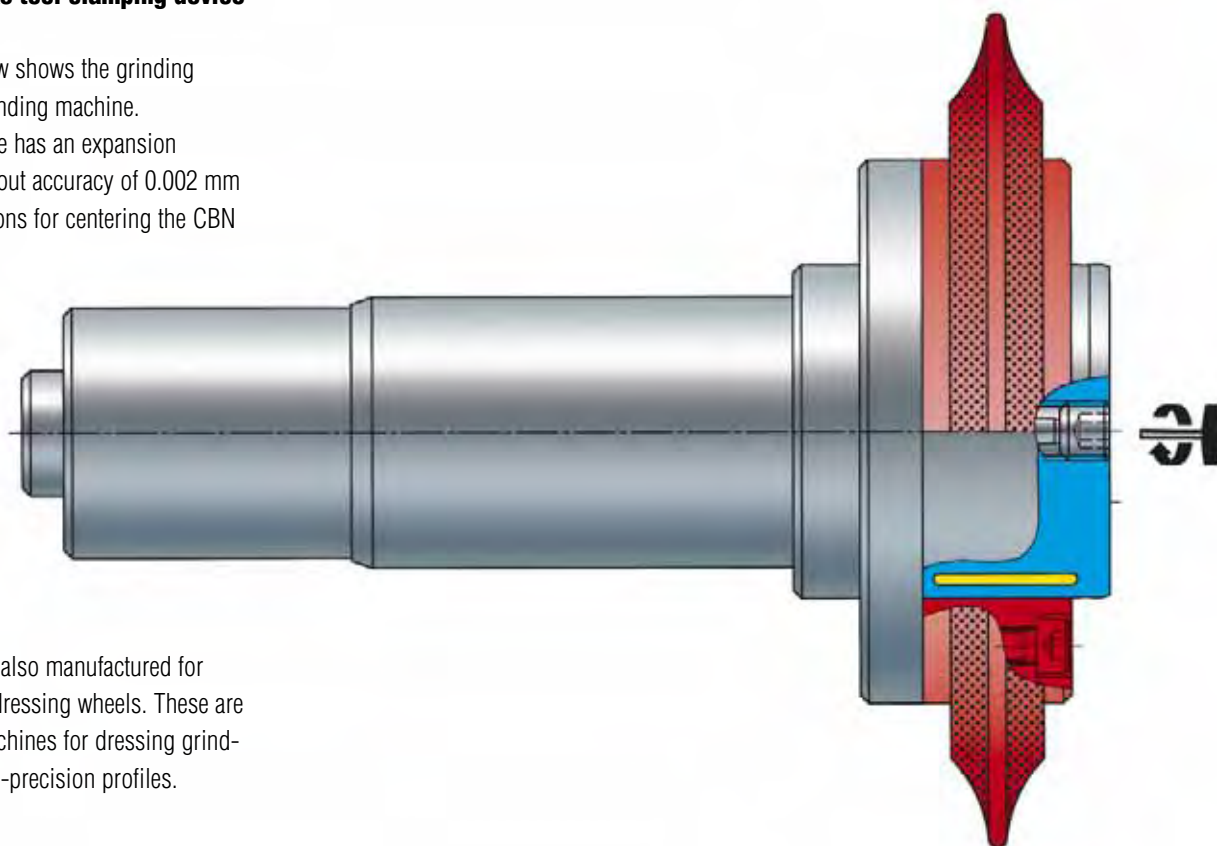


Hydraulic Clamping Tools

Machine Elements

The Königdorn® as tool clamping device

The illustration below shows the grinding spindle of a gear grinding machine. This grinding spindle has an expansion chamber with a run-out accuracy of 0.002 mm to the bearing locations for centering the CBN grinding wheel.

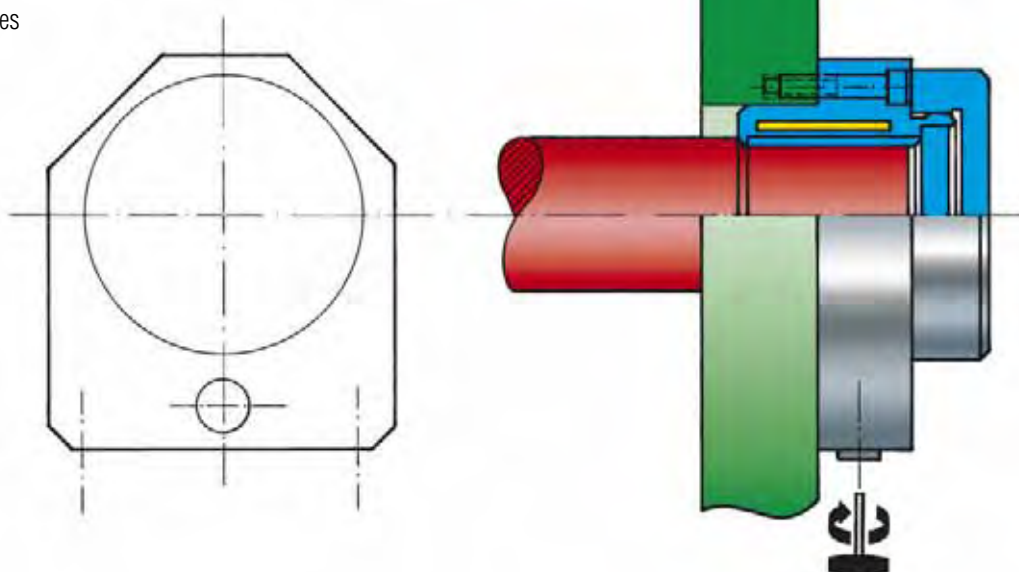


Similar spindles are also manufactured for mounting diamond dressing wheels. These are used in grinding machines for dressing grinding wheels with high-precision profiles.

The clamping system of Königdorn® devices can easily be transferred to elements of general machine construction.

The clamping force is initiated here, as with most Königdorn® devices, manually with a tool at the most accessible locations.

The illustration on the right shows a Königdorn® chuck for backlash-free centering of a tailstock center.



Options for Hydraulic Clamping Tools

Electronic Clamping Pressure Control

Electronic clamping pressure control of Königdorn® mandrels and chucks with König-mtm's pressure tester dms1

Why electronic clamping pressure control?

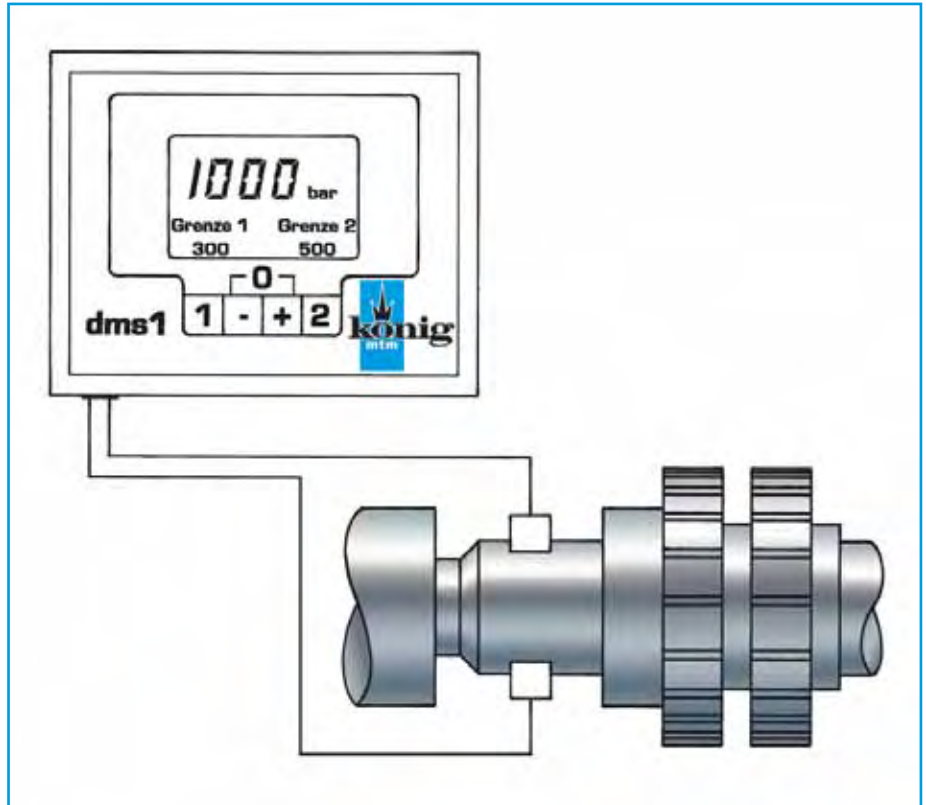
The expansion of mandrels and chucks falls into a range of up to a maximum of 0.3 % of the clamping diameter. This fact leads to optimal clamping for every mandrel and chuck with a certain clamping pressure.

With manual clamping in particular, it is easily possible to select a clamping pressure which is too high or too low. Both possibilities have disadvantages.

If the clamping pressure is too low, the workpiece on the mandrel can shift radially or axially, resulting in the destruction of either the workpiece or the tool during the machining process.

If the clamping pressure is too high, sensitive workpieces can be deformed, i.e. workpieces can be stretched so that specified tolerances cannot be kept after machining has been completed.

Layout and display of the Königdorn® clamping pressure control dms1



Thus, without clamping pressure control, it cannot be assured that the same workpieces and the same machining process will result in the same quality of the finished product. In order to improve clamping pressure monitoring, the electronic clamping pressure control system was developed by mtm.

This system always guarantees the same clamping pressure in a Königdorn® mandrel or chuck.

In addition to these advantages, expensive tools or manufacturing devices are protected against damage.

If you have any questions regarding electronic clamping pressure control, do not hesitate to contact us. We will be glad to advise you.

The functions of the system

The Königdorn® mandrel is equipped with a pressure sensor. The pressure tester dms1 is connected via dirt-insensitive magnetic contacts. If the clamping screw on the mandrel is manually actuated, the internal pressure of the mandrel can be read digitally on the tester. Thus, the clamping pressure can be controlled and reproduced at any time.

For automatic clamping, an upper and lower limit is determined in the control instrument. The device can be connected to the machine via a pressure-free outlet so that disturbances can be recognized immediately by the machine control system. The measured pressure is displayed from 0-1,000 bar.

Options for Hydraulic Clamping Tools

Various Application Specific Additions

Oil spiral groove

An oil spiral groove on the clamping surface improves clamping safety and improves torque during certain machining tasks.

Coatings

Various optional coatings offer the possibility to reduce wear and thereby increase the operational life of Königdorn® devices. Furthermore, the machining torque can be increased through an appropriate coating.

Automatic adjustment device

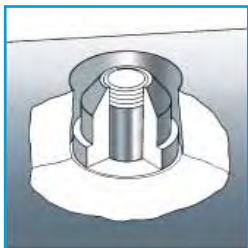
With power-operated clamping devices, manual adjustment can be avoided and the operating life of Königdorn® clamping devices can be increased through this system.

Pendular device/wobble plate

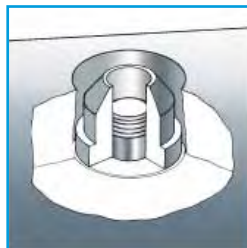
With workpieces where the flat surface is not machined precisely, i.e. not precisely enough, axial and radial run-out can be improved with a pendular device.

Operation indicator

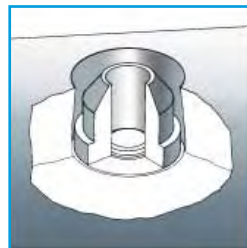
Through an indicator pin on the Königdorn® device, the operator can recognize if the mandrel or chuck is clamped or not clamped. A mark on the pin indicates when the clamping device has to be readjusted. The operation indicator can only be installed in mandrels and chucks with external oil supply.



Königdorn®, clamped



Königdorn®, unclamped



Königdorn® clamping has to be readjusted



Königdorn® for the operation on a gear honing machine. The mandrel is actuated through its own spring and is unclamped through the machine cylinder.

Transport and storage box

Specially manufactured solid wood containers are used for proper storage and transport of Königdorn® devices.





The König Group is located in Wertheim, the most northern town of Baden-Württemberg.

Lying on the confluence of the Main and Tauber rivers, the former seat court of the Count of Wertheim has a particular atmosphere with its ancient lanes, half-timbered houses and the castle ruin from the 12th century.



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Production Program

Mechanical mandrels

Hydraulic mandrels

Mechanical chucks

Hydraulic chucks

Splined mandrels

Light-weight mandrels

Complete holding devices

Electronic clamping pressure control

Special mandrels

Clamping mandrels for hobs

Rotor milling devices

Special collet chucks

Special flanges

Spindles

**Quality management:
ISO 9001:2000 certified**

**Environment management:
ISO 14001 certified**

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Products and methods are subject to change without notice.

Fast and Safe Change



König Quick-Change Chucks

Reduced tooling expenditure and set-up costs at high machining accuracy via easier and faster change of clamping mandrels or chucks



More Productivity for your Machine Tools

Experience in clamping technology

For decades, König-mtm has been one of the leading manufacturers of state-of-the-art high-precision clamping devices. The extensive production program covers clamping tools such as mandrels and chucks in hydraulic or mechanical versions.

Clamping tools for market leaders

König-mtm's clamping chucks and the Königdorn® are well known in the tool industry and are well established as original equipment on top-class high-precision CNC controlled machine tools.

The König quick-change chuck

For today's machine tools the complexity of machining tasks, the variety of workpieces and accordingly the number of clamping tools increase permanently.

Resulting from substantial experience in clamping technology König-mtm has developed a new generation of quick-change chucks. These chucks minimize tooling expense as well as changeover times. This yields reduced costs and higher productivity, meeting the basic requirement of more efficient machining operations.

Better workpiece flexibility

Machine tools equipped with König-mtm's quick-change chucks allow faster change of clamping tools versus machines with conventional chucks.

Accordingly, as lot sizes decrease the number of machine tools operating in frequent change-over environments is increasing.



The hydraulic König Quick-Change Chuck



One connection for all clamping tools

By harmonizing the adaption configuration, a simple effortless change of the clamping device is possible.

Easy and safe operation

The quick-change chuck is operated manually by a hexagonal key. By means of the pressure being built up within the clamping sleeve, the mandrel or chuck is centered, clamped and axially located against the flange with positive force. This results in solid full-contact clamping which assures an absolutely deflection-resistant connection between quick-change chuck and workpiece clamping tool.

Operation of clamping tools as usual

Usually, the clamping mandrels and chucks are operated directly by the hydraulic system of the machine or by a pressure transmitter which is integrated in the quick-change chuck.

On relaxing, integrated springs push the piston back to the starting position.

Technological advantages

- Easy changeover of the clamping tools (no screws – no bolt on)
- Good radial and axial run-out accuracy
- Excellent wear-resistance

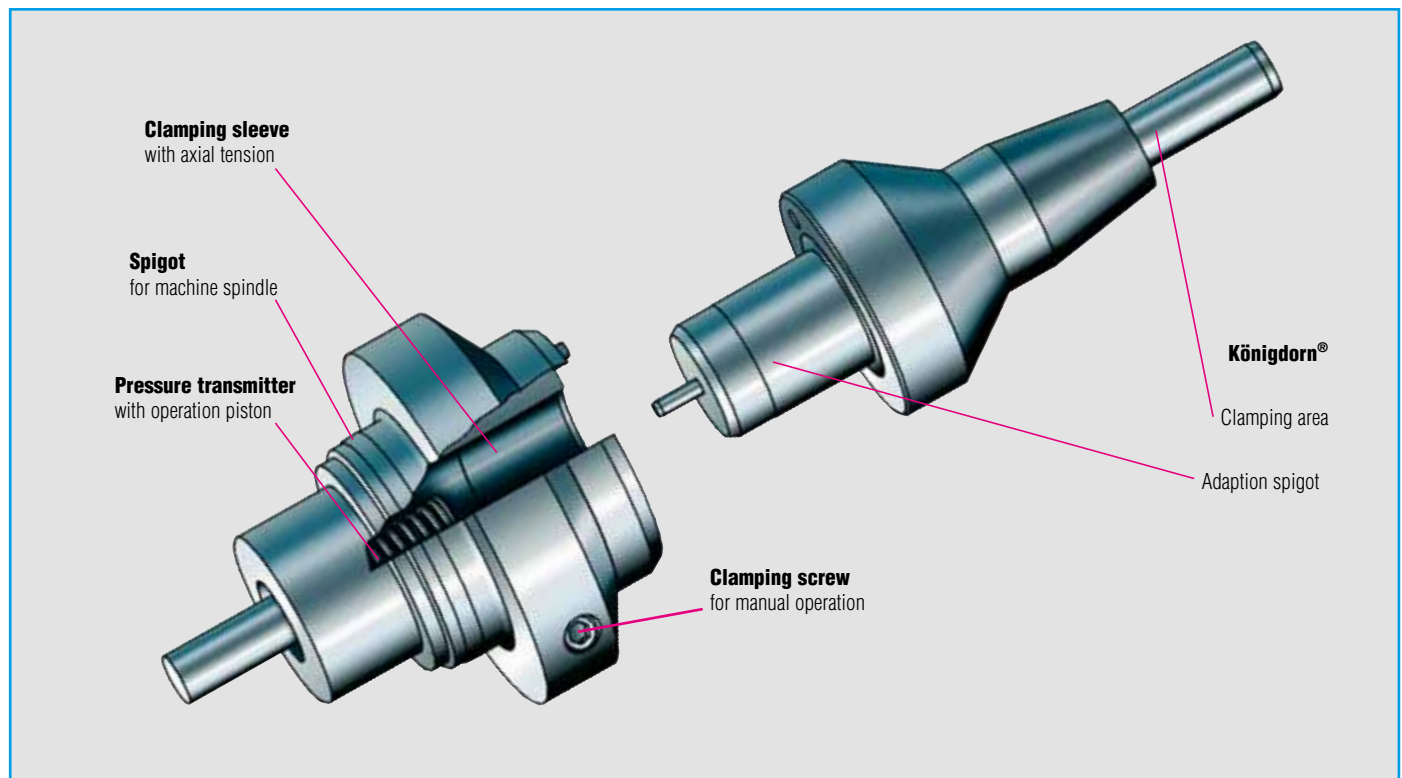
Economic advantages

- Reduced effort during set-up changes of tooling
- Reduced retooling times
- Reduction of tooling costs
- High workpiece flexibility
- Increased productivity

Made-to-measure for every machine

The type as well as the specific design of the quick-change chuck is individually tailored to the construction of the machine tool, the machining tasks and the shape of the workpieces.

The design of the König quick-change chuck





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Hydraulic mandrels
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Complete holding devices
Electronic clamping pressure control
Special mandrels
Clamping mandrels for hobs
Rotor milling devices
Special collet chucks
Special flanges
Spindles



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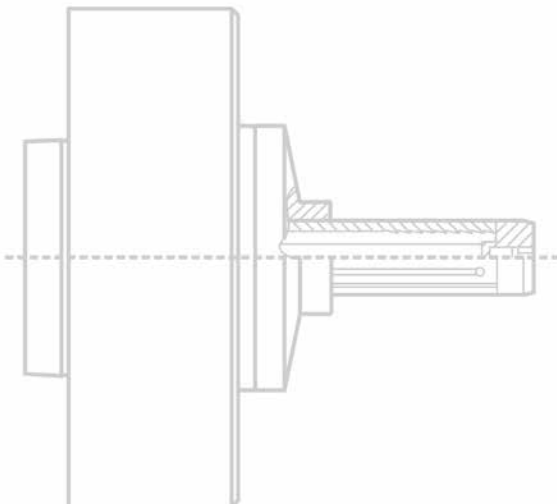
**Quality Management:
ISO 9001:2008 certified**

**Environment Management:
ISO 14001 certified**

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Products and methods are subject to change without notice.

Excellent Clamping



**Mechanical
Clamping Devices**

Precise Mechanical Clamping Devices for All Requirements

Experience in clamping technology

For decades, König-mtm has been a leading manufacturer of state-of-the-art high-precision clamping devices.

The extensive production program covers clamping tools such as mandrels and chucks in hydraulic, mechanical or hydro-mechanical versions.

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Mechanical clamping tools made by König-mtm

For today's machine tools the complexity of machining tasks, the variety of workpieces and subsequently, the number of clamping tools are increasing permanently.






Resulting from substantial experience in clamping technology König-mtm is developing tailor-made mechanical clamping tools, that cover a wide range of workpiece geometries by means of high loading clearances.

This high workpiece flexibility leads to reduced tooling expenses and higher productivity, meeting the basic requirement of more efficient machining operations.

We would be pleased to design and produce your tailor-made clamping tool, according to your specific requirements.

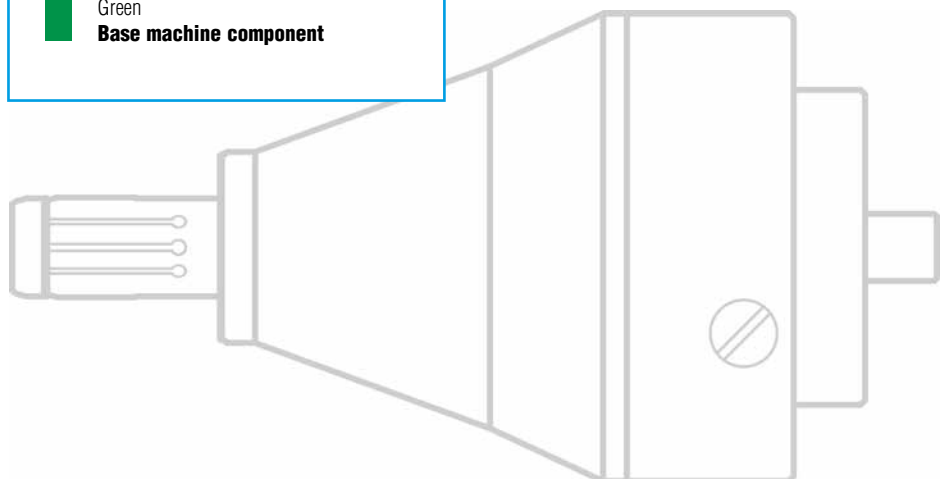
The following pages introduce some examples of clamping tools of our production. For a better representation of function we show graphical drawings.

Color code of clamping tool drawings

	Grey Königdorn®
	Blue/Light blue Königdorn® tooling (sectioned)
	Yellow Clamping areas of tooling
	Red Workpiece (partially sectioned)
	Green Base machine component

Advantages

- High loading clearances
- Reduced tooling set-up expense, high productivity (high workpiece flexibility)
- Short clamping lengths
- High workpiece tolerances possible
- Run-out accuracies up to 0,003 mm attainable
- High lateral rigidity due to flat-face contact of the workpiece
- High torque transmission
- Symmetrical expansion of clamping collet
- Quick change-over to other clamping diameters possible

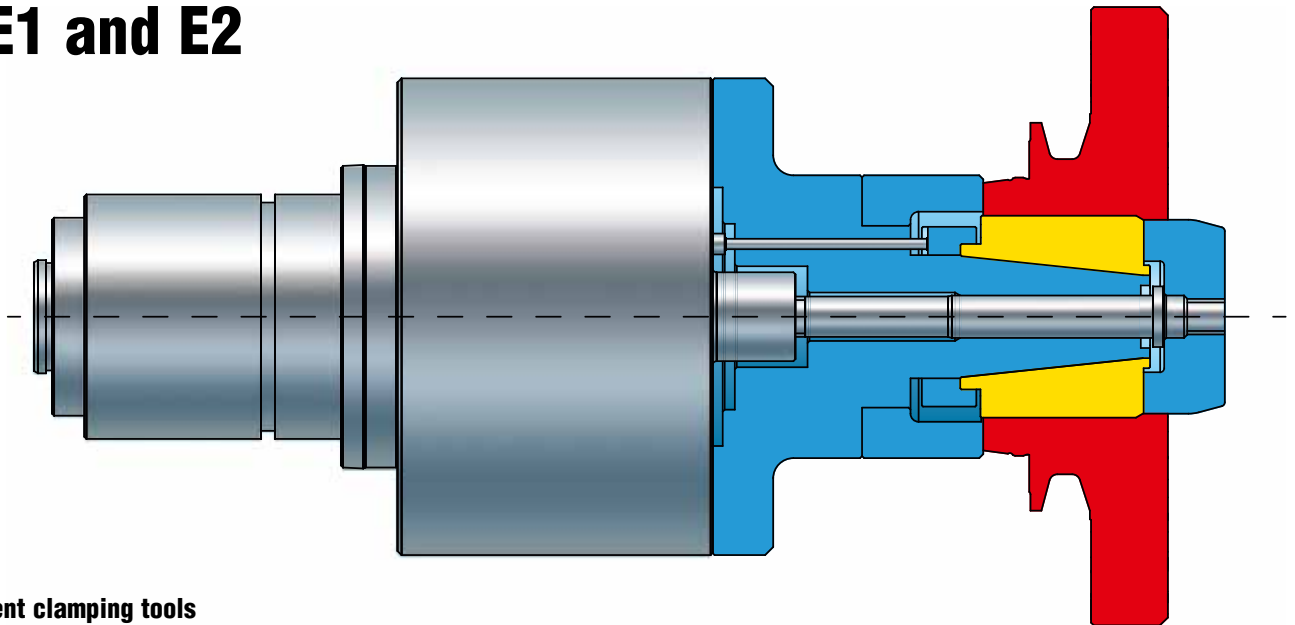


Mechanical Clamping Tools

Element Clamping Tools

Mechanical mandrels with fully segmented clamping bushings

Type E1 and E2



Special element clamping tools

To meet and exceed your requirements for higher work-piece tolerances and increased loading clearances, König-mtm has developed new mechanical mandrels with fully segmented collet elements.

The segmented clamping bushings consist of a combination of a high-quality tool steel and a high-tech elastomer.

These mechanically expanding clamping tools are ideally suited for medium and large clamping diameters and offer, depending on their size, expansion rates of 0.5 up to 1.3 mm. The actuation can be initiated by hydraulic pressure, pull rod or an internal spring package.

Each of these element clamping devices are tailor-made and precisely machined to your exact specifications and demands and can easily be adapted to almost every available high-precision machine tool. You benefit from the high precision, increased workpiece flexibility, and reduced lead time for a new device.



Type E1 segmented clamping bushings are especially suitable for large and medium clamping diameters e.g. for large workpieces with higher weight.

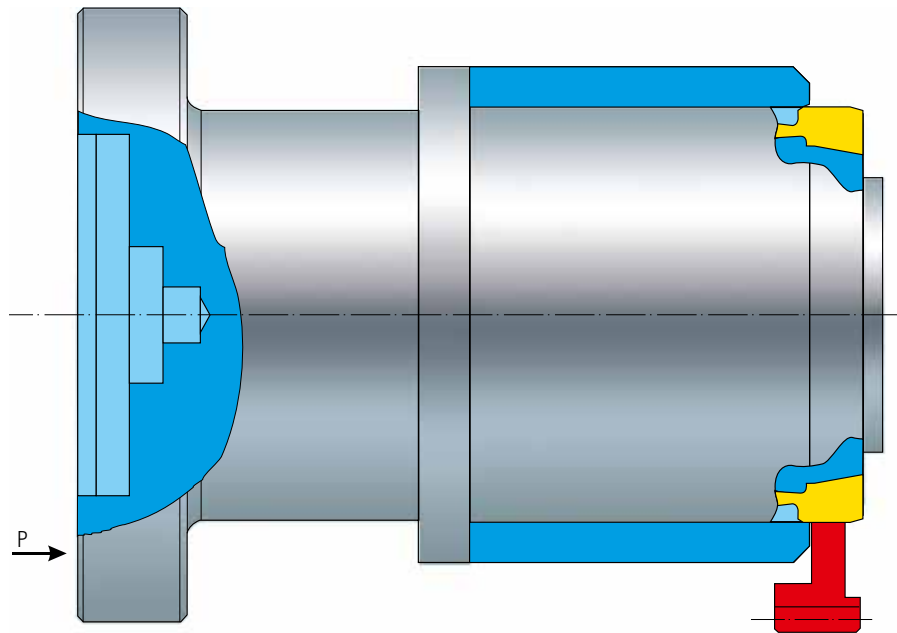


Type E2 segmented clamping bushings are suitable for compact workpieces with smaller diameters.

Mechanical Clamping Tools

Single-Taper Clamping Tools

Single-taper mandrel



This solution is used for components with short clamping lengths and/or large diameters as well as for workpieces that require higher clearances for automatic loading.

The mandrel is directly mounted on the machine spindle and is actuated via the machine hydraulics. For clamping, a slotted collet will be expanded over the single taper. A secure process is guaranteed by additional holes for part present control.

Mechanical Clamping Tools

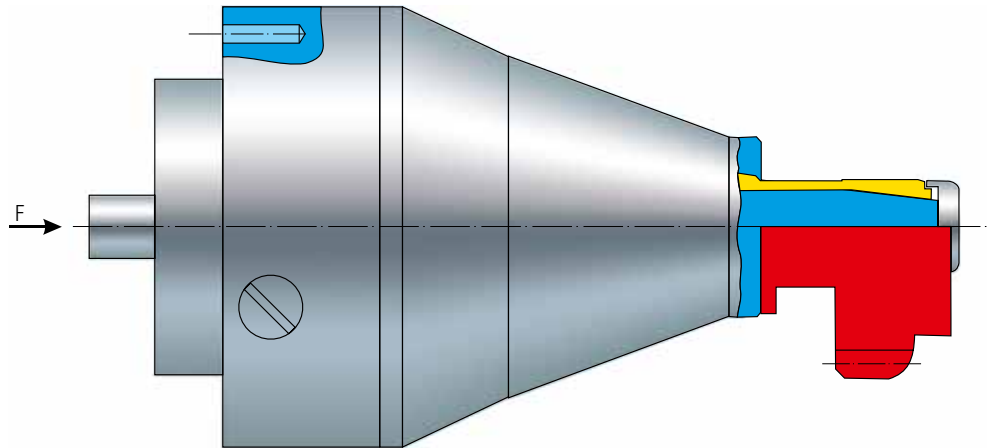
Single-Taper Clamping Tools

Single-taper mandrels

Clamping with single-taper and push rod

This mandrel is actuated by the push rod of the machine.

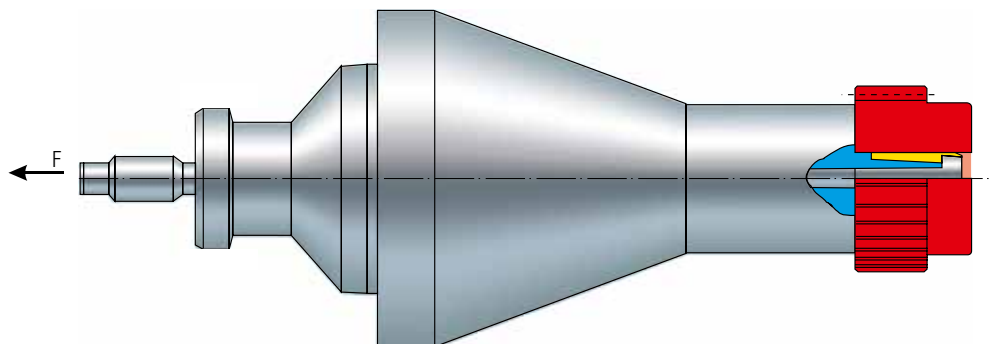
By means of integrated springs the Königdorn® relaxes automatically.



Clamping with single-taper and pull rod

Mechanical mandrel axially actuated by the pull rod of the machine.

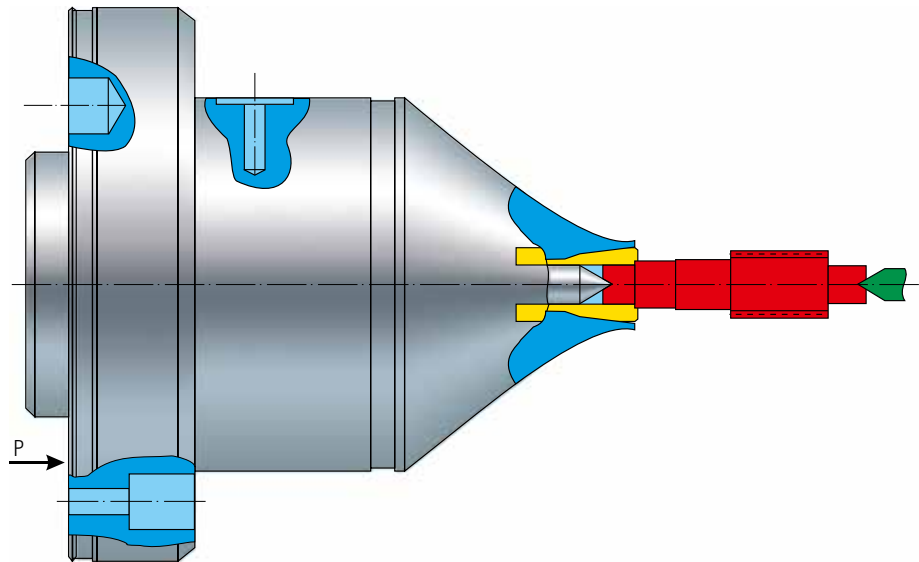
- Changeable clamping sleeves ensure high flexibility
- Increases in torque transmission are achieved due to axial contact force



Mechanical Clamping Tools

Single-Taper Clamping Tools

Single-taper chuck



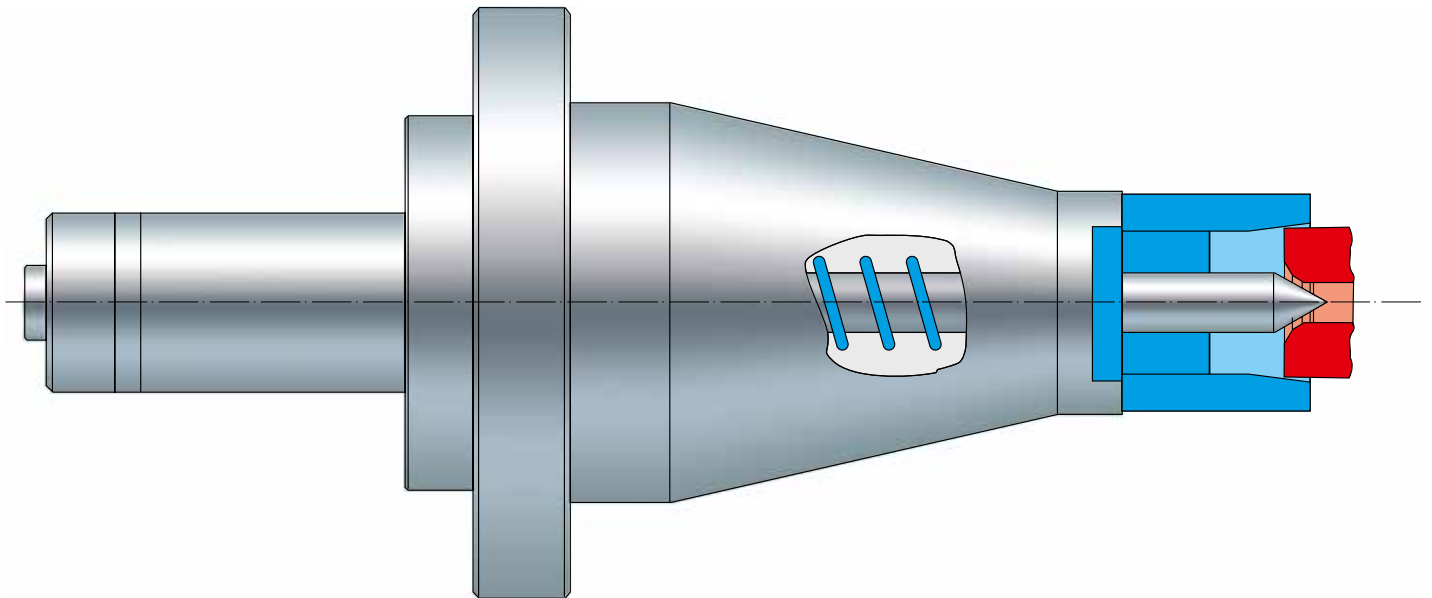
Example for a gear grinding application:
mechanical Königsdorn® chuck for machining
pinion shafts.

An internal center aligns the pinion shaft.
The clamping function occurs by means of a
tapered collet, activated by the machine
hydraulics.

The additional use of a machine tailstock
allows a perfect gear grinding operation.

The components are located between centers.
An integrated pressure spring package allows
a perfect relaxing of the chuck.

Friction taper chuck



Chuck for applications with small shaft components and limited space for the clamping device

Quick and simple clamping is achieved by using a friction taper that provides sufficient torque transmission.

A live tailstock center is used to set the workpiece in the internal taper with sufficient force to achieve the required torque transmission capability.

- High run-out accuracy
- Workpiece ejector available on request

The Function Principle of Multi-Taper Clamping Tools

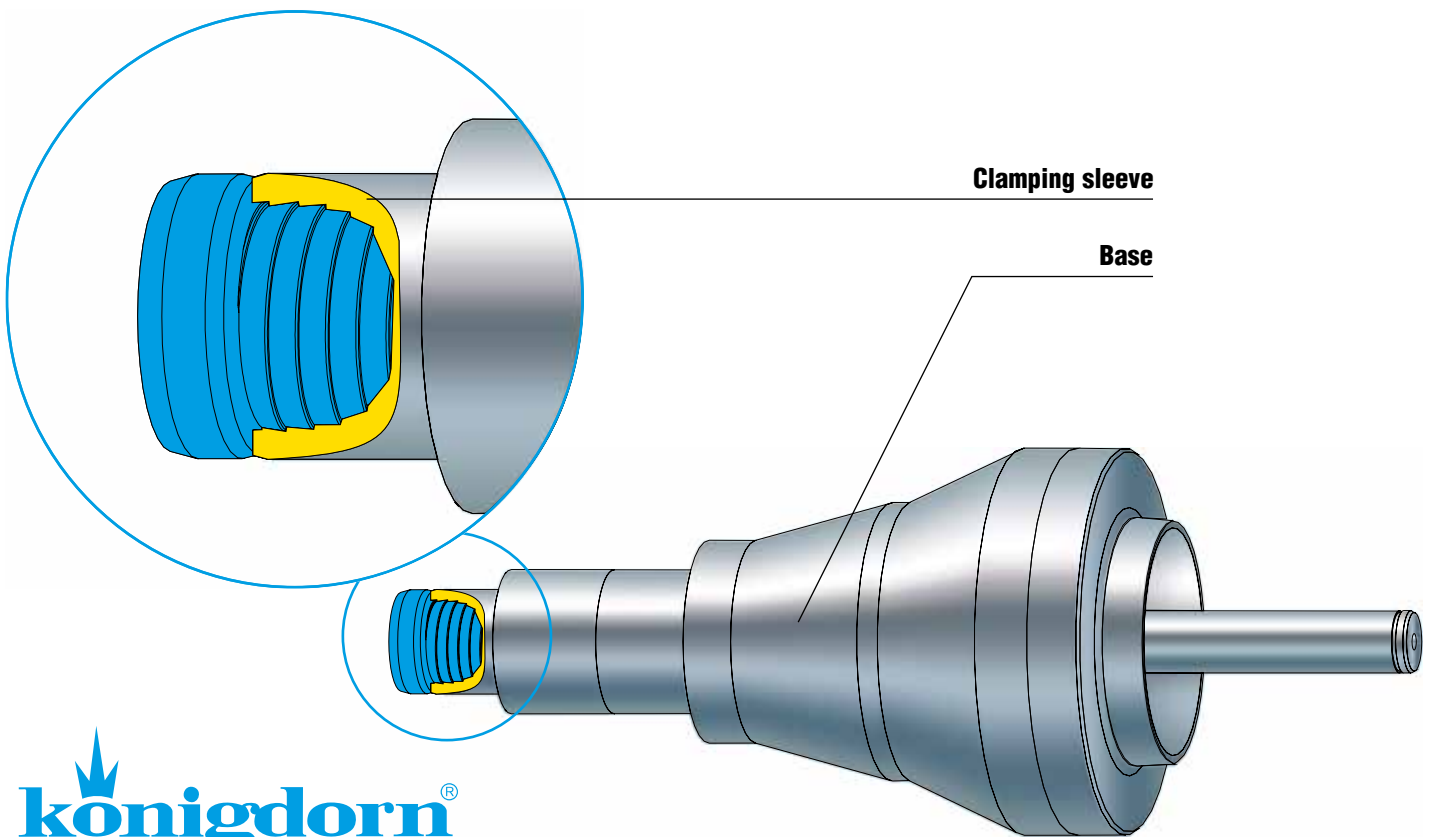
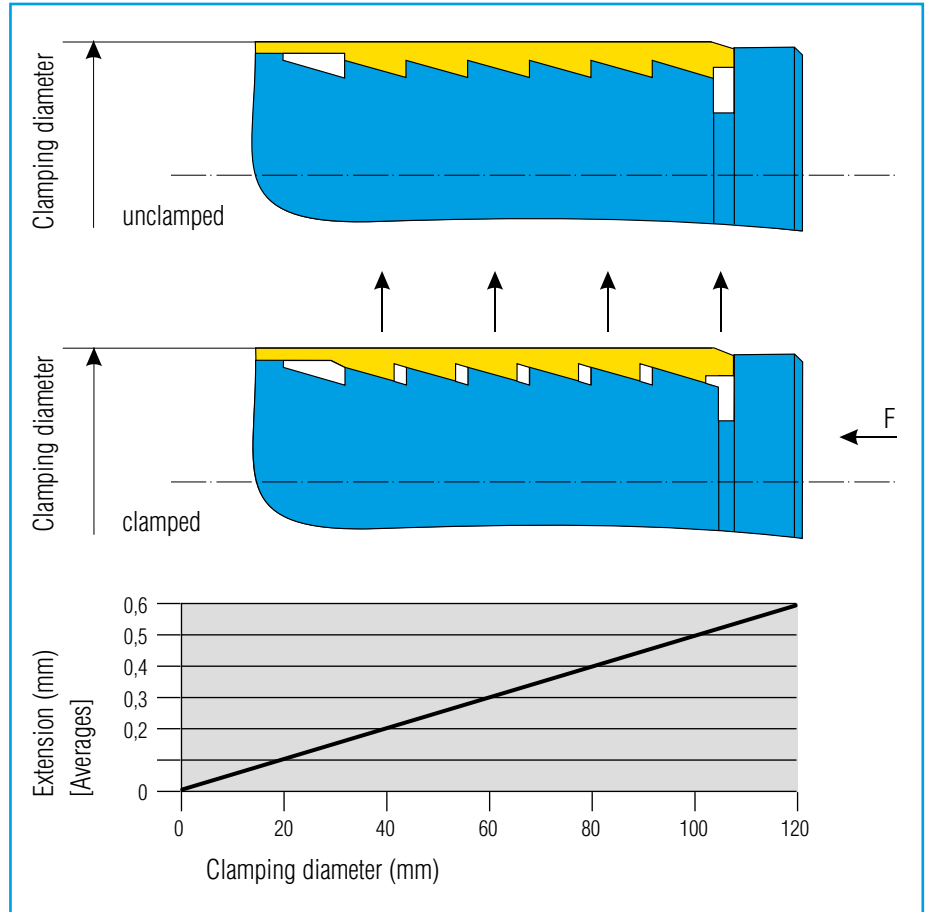
Multi-taper clamping tools are the best choice in case of greater tolerances and more loading clearance

In the automated process the demand for high loading clearance intends to cover a maximum part range without retooling.

The function principle of multi-taper tools allows higher loading clearances than conventional hydraulic expansion tools.

The clamping sleeve is mounted on the base body. Due to a special thread profile and axial force the clamping sleeve moves axially. The result is a fully cylindrical expansion which leads to workpiece clamping. Depending on the application and the clamping diameter, tolerances up to IT 13 can be obtained.

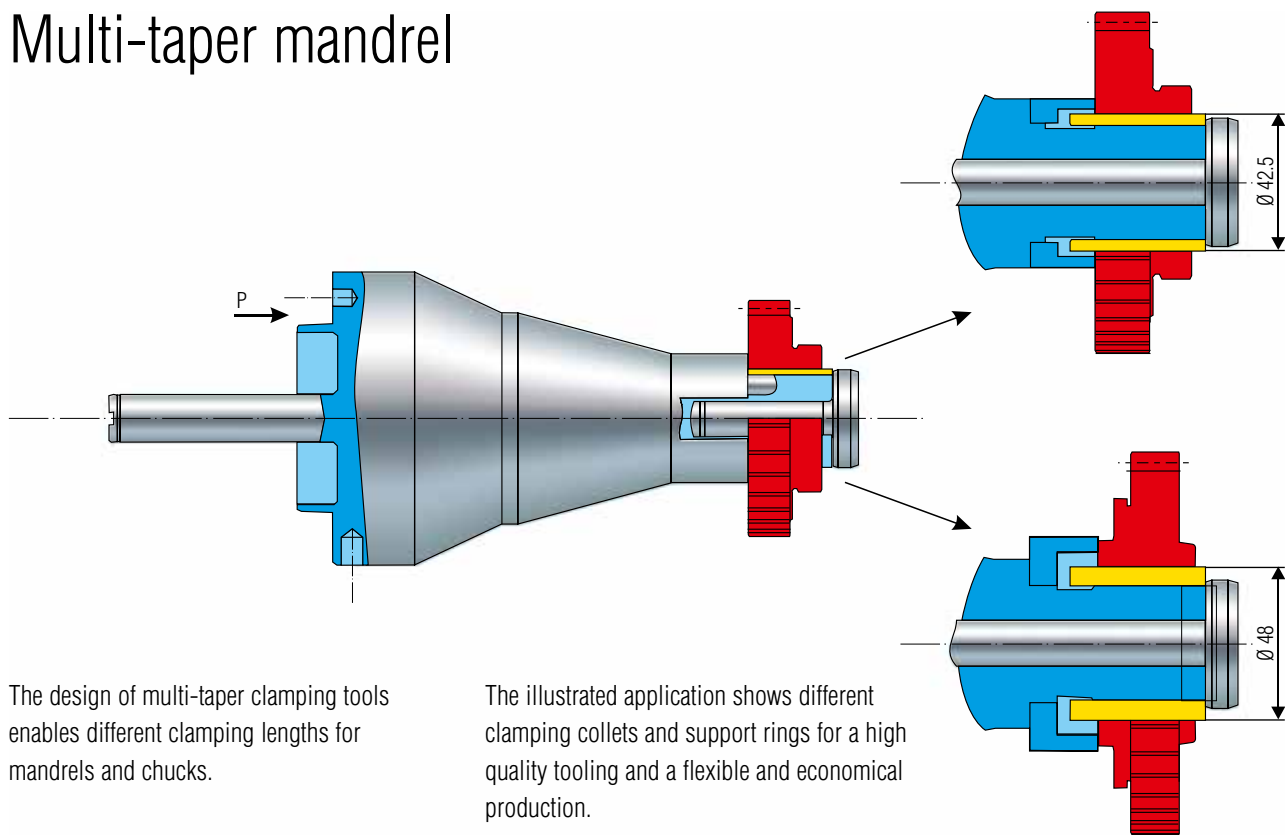
The cylindrical extension of a multi-taper clamping tool



Mechanical Clamping Tools

Multi-Taper Clamping Tools

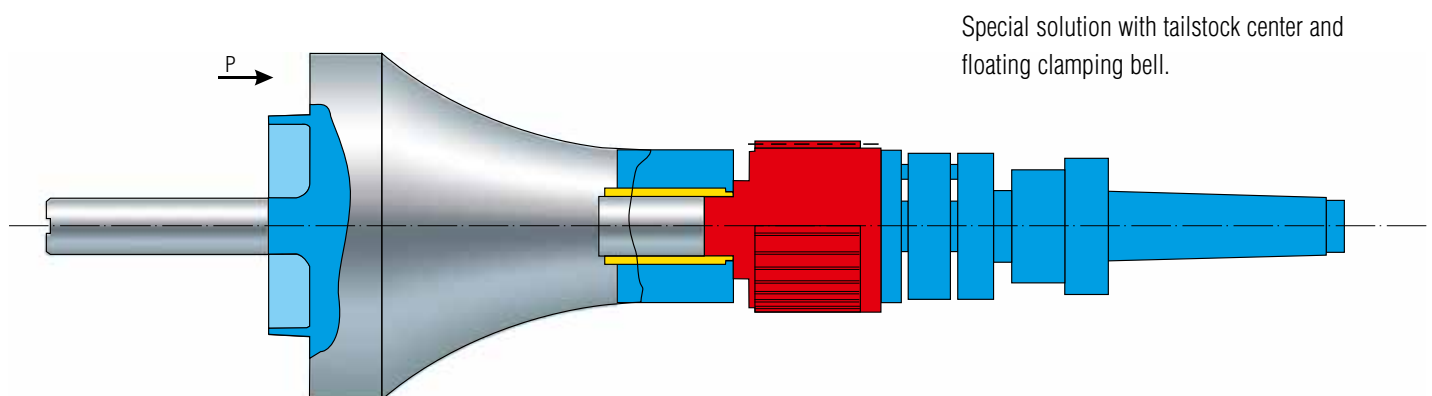
Multi-taper mandrel



The design of multi-taper clamping tools enables different clamping lengths for mandrels and chucks.

The illustrated application shows different clamping collets and support rings for a high quality tooling and a flexible and economical production.

Multi-taper chuck



Special solution with tailstock center and floating clamping bell.

Mechanical Clamping Tools

Quick-Change Systems

Mechanical Quick-Change System

Quick and easy tool change

The mechanical quick-change clamping system of König-mtm provides an extremely fast and very easy change of the clamping device and a high degree of processing precision.

This results in a reduction of set-up efforts and set-up time as well as a prevention of possible assembly errors. Therefore, the efficiency of the production line can be significantly increased.

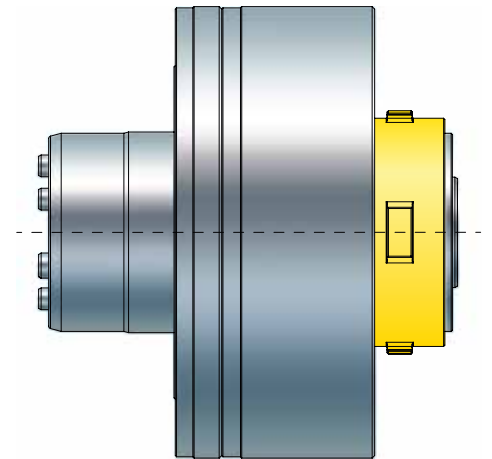
The integrated permanent clamping system enables secure clamping even in the event of a machine malfunction.

Special suitability for vertical hobbing machines

The mechanical quick-change clamping system was designed for the special use on vertical machine tools in connection with mechanical clamping devices made by König-mtm.

It can be used on all common hobbing machines due to the extremely flexible design. The machines need a pressure/pull rod with two functions.

- Ease of handling (no bolting-on)
- High workpiece flexibility
- Improved productivity
- High radial and axial run-out precision
- Robust construction
- High pull-down force
- Short tooling effort/time
- Especially suitable for mechanical clamping devices



Mechanical Clamping Tools

Quick-Change Systems

Zero-point quick-change chucks

König-mtm is presenting clamping tools with zero-point quick-change system. High-precision quick-change chucks based on the zero-point pallet system are combined with Königdorn® clamping tools (hydraulic or mechanical mandrels or chucks).

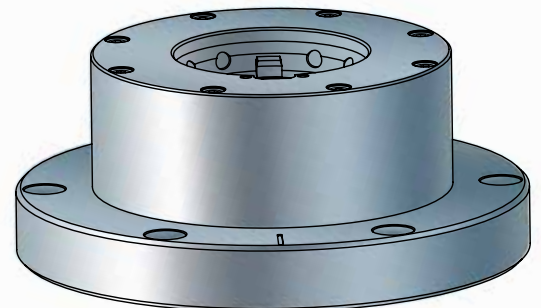
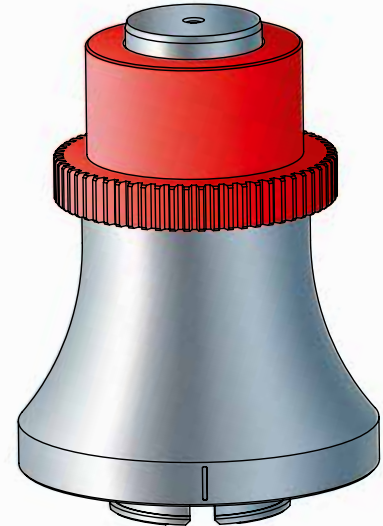
Zero-point clamping systems facilitate extremely fast and simple tool change with maximum precision.

The newly developed, extremely sturdy and deflection-resistant joint between the clamping tool and pallet achieves outstanding repeat accuracy in both radial and axial run-out and is thus ideally suited for a wide range of machining processes, e.g. turning and hobbing through to high-precision gear grinding.

The zero-point quick-change chuck is permanent clamped (pneumatic unclamping automatically via machine tool or manually via blow gun).

The Königdorn® clamping tools are operated via the machine tool's hydraulics (by push-rod or oil pressure).

- Ease of handling (no bolting-on)
- High workpiece flexibility
- Improved productivity
- Maximum radial and axial run-out precision (repeat accuracy $\leq 3 \mu\text{m}$)
- Amenable to automation
- Minimal tooling effort/time
- Suitable for all clamping devices



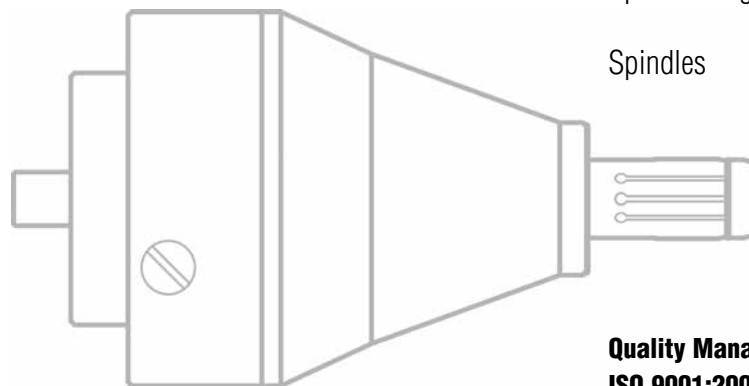


The König Group is located in Wertheim, the most northern town of Baden-Württemberg.

Lying on the confluence of the Main and Tauber rivers, the former seat court of the Count of Wertheim has a particular atmosphere with its ancient lanes, half-timbered houses and the castle ruins from the 12th century.

Production Program

- Mechanical mandrels
- Hydraulic mandrels
- Mechanical chucks
- Hydraulic chucks
- Splined mandrels
- Light-weight mandrels
- Complete holding devices
- Electronic clamping pressure control
- Special mandrels
- Clamping mandrels for hobs
- Rotor milling devices
- Special collet chucks
- Special flanges
- Spindles



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**Quality Management:
 ISO 9001:2008 certified**

**Environment Management:
 ISO 14001 certified**

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