



HÖFLER

VIPER 500

CYLINDRICAL GEAR TECHNOLOGY – GRINDING MACHINES

Innovative Cylindrical Gear Machining for Flexible Requirements

All around the world, manufacturers of toothed gears and gearboxes ensure their leading edge in gear machining with innovative, advanced technology by Klingelnberg.

The [Höfler Cylindrical Gear Technology](#) division does more than just allow users to manufacture cylindrical gears economically and with high precision. All machines have been perfectly designed to work as a system family, enabling pre-machining and finishing of even the most complex gears. And high research and development standards, a global service network, and an in-house application engineering service ensure a leadership position – now and in the years to come – thanks to our decades-long expertise and high innovation capacity.

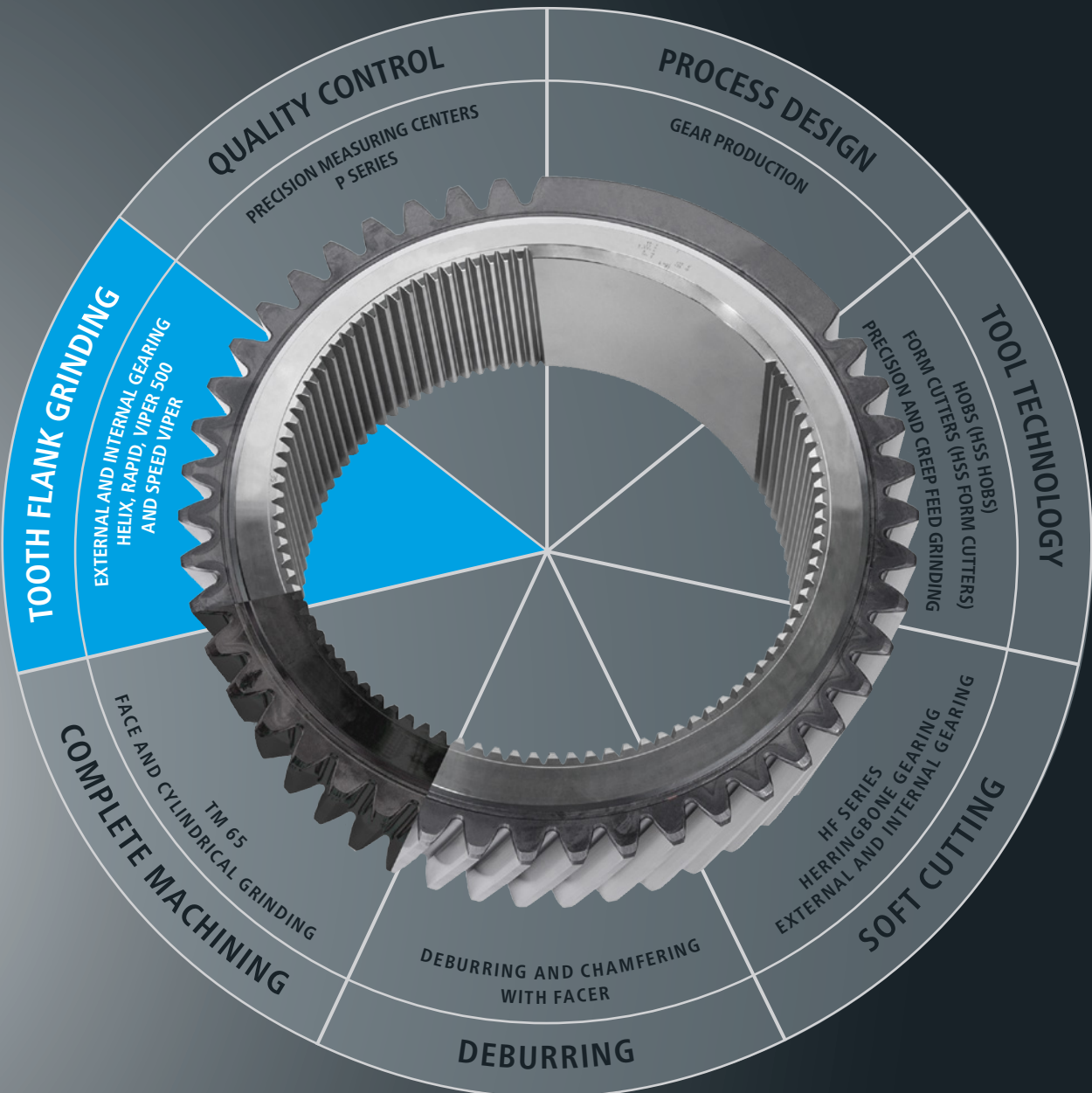
Klingelnberg offers the most advanced technology and efficient machines for each and every step in the cylindrical gear process chain: [process design](#), [cutting](#), [measuring](#), [deburring](#), [grinding](#) and [quality control](#). A key factor in the successful completion of each work step is the [Gear Production software](#), which provides optimal process control and extreme ease-of-operation to guarantee maximum efficiency in daily production routines.

Höfler cylindrical gear machines are developed with real-world applications in mind and satisfy a whole host of application industry requirements. Customers include contract gear manufacturers and gearbox manufacturers from the aviation, automotive, mining, construction, industrial gearbox, and wind power industries, among others.



Höfler cylindrical gear grinding machine VIPER 500 with ergonomically designed enclosure

Exceptional Concepts for Every Step in the Gearing Process



OUTSTANDING GRINDING TECHNOLOGY

Leading Technology for a Fast, Efficient Production Process

The VIPER 500 cylindrical gear grinding machine is designed for component diameters up to 500 mm and is optimally suited for small to medium-sized batches. To suit individual requirements, the machine is available in four different configurations: [profile grinding](#), [small grinding wheels for custom jobs and multiple-wheel technology \(K\)](#), as well as [generating grinding \(W\)](#) or [\(KW\)](#).

The VIPER 500 W / KW configuration allows both profile grinding and continuous generating grinding on the same machine – with minimal retooling time. To change the grinding technology, just swap out the grinding wheel, the grinding wheel flank, and the diamond dressing roll. On all variants, the optional internal gear grinding arm allows retooling from external to internal gearing.

Moreover, the special machine axis arrangement is a contributing factor in the machine's tried-and-tested precision and consistent quality, as well as tremendous flexibility. The highly dynamic axes allow optimized 5-axis machining of an entire range of modifications in the shortest possible grinding time. The innovative design also makes for easy cleaning and high performance capacity while achieving significant energy savings.

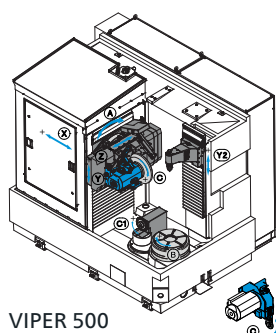
Moreover, the Gear Production software developed in-house guarantees ease-of-use, even for complex applications. (See page 10 for more information on the Gear Production software.)

- Highly adaptable machine for generating, profile, and internal grinding
- Retooling from generating grinding to profile grinding in less than 5 minutes
- Retooling to internal grinding in less than 15 minutes
- Highly dynamic axes allow stroke feeds up to 20 m / min
- Low-maintenance machine concept due to separation of working chamber from drive technology
- No pump station needed for the grinding oil Optimal energy efficiency thanks to recovery and on demand control of units

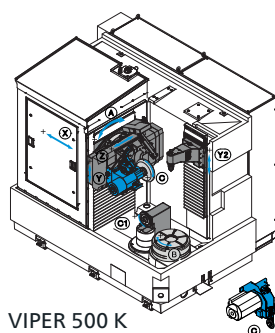
CNC Axes

X radial axis
Y lifting slide
Y₂ counter support
B machine table
A helix angle

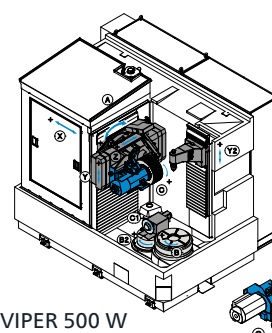
Z shift axis
C, C₁ closed-loop-controlled grinding wheel and diamond dressing roll drives
B₂ dressing device swivel



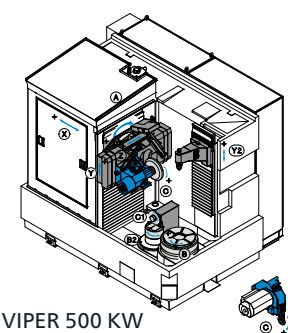
VIPER 500



VIPER 500 K



VIPER 500 W



VIPER 500 KW

All variants are also available with an optional internal grinding arm

The Right Machine Configuration for Every Requirement

VIPER 500



Profile grinding



Internal gearing

VIPER 500 K



Profile grinding



Internal gearing



Spindle option K

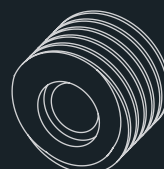
VIPER 500 W



Profile grinding



Internal gearing



Generating grinding

VIPER 500 KW



Profile grinding



Internal gearing



Spindle option K

HIGHLIGHTS

Flexible Changeover from External to Internal Gearing in Less than 15 Minutes

An additional internal gearing arm gives all variants of the VIPER 500 the optional capability of grinding internal gears as well.

- The same permanently installed dressing unit is used for dressing
- Non-dressable CBN grinding wheels can also be used
- Internal gearing can be tested with the easily adapted measuring device
- The data required for this are imported directly for the measurement from the Gear Production software

Result:

The extremely short retooling time of **less than 15 minutes** from external to internal gearing contributes significantly to **increased productivity**.

High-tech can be so easy!

"Simplified with Passion" – true to this motto, Klingelnberg is driven to provide simple, unconventional solutions to high-tech challenges. A team of engineers and technical experts makes it possible — continually striving to ensure the highest technological standards in application-matched machine concepts while maintaining ease of use.

Case in point: the VIPER 500 is based on established design concepts that are continually undergoing further development. Klingelnberg's success factors include:

- High productivity with the lowest possible per-piece costs and maximum process safety
- Comprehensive services with a broad service network
- Outstanding technical expertise, which Klingelnberg passes on to customers in technical seminars

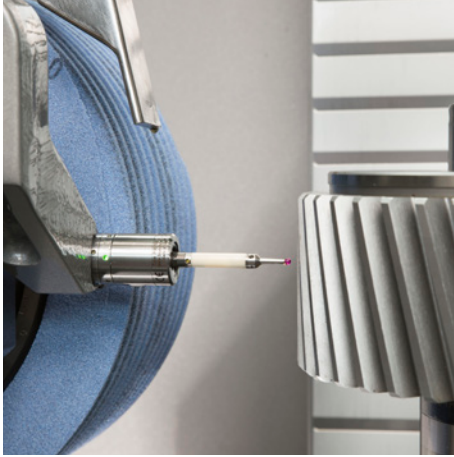


VIPER 500 W Profile and Generating Grinding Machine



Intelligent Production Process with Extremely Cost-Effective Energy Efficiency (e²)

- Productivity gains of up to 25% over comparable machines of other models
- Automatic grinding wheel threading and machine-integrated correction program
- Low tool and maintenance costs, reduced storage and variety of spare parts
- Optimal axis weight compensation, intelligent grinding oil drainage design with energy-optimized grinding oil nozzles
- Efficient energy recovery and cooling units



Dynamic, Accelerated Production Processes

- Special machine axis arrangement guarantees high reliability in the production process
- Automatic adjustment of the grinding oil nozzles ensures the same process for every grinding wheel diameter
- Automatic grinding stock analysis
- Adaptive process sequences thanks to variable stroke rate and dressing
- Measurements taken during the production process itself (including optional correction calculation in the machine) provide quick assurance of a successful production run



Convenient, Clearly Laid-Out Operating Concept

- Intelligent control technology with fast, rational and intuitive dialog input and job engineering
- Clear navigation and visual workflow support prevent user errors
- Continuous graphical display of machine statuses and processes
- Graphical display of possible workpiece clamping collisions before the problem occurs on the machine



Minimal Retooling Times

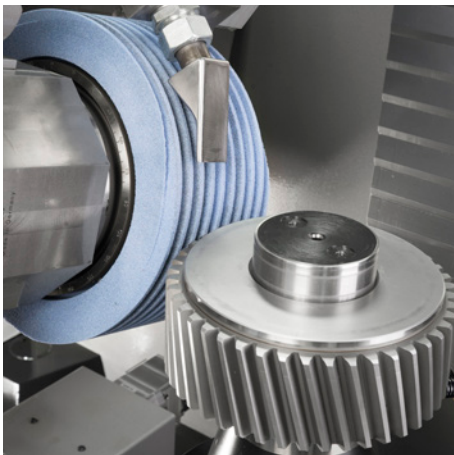
- Quick changeover from generating grinding to profile grinding just by swapping out the grinding wheel, grinding wheel flange, and diamond dressing roll in less than 5 minutes (VIPER 500 W)
- Quick grinding wheel changes using the swivel axis, which moves the grinding wheel 180 degrees toward the operator
- Tool quick-clamping system enables fast and easy tool changes (VIPER 500 W)
- Short retooling times for internal grinding in less than 15 minutes

HIGHLIGHTS



Maximum Production Technology, Minimal Footprint

- Small setup dimensions means less floor space needed at the installation location
- Self-contained construction for ultra-easy machine transport and setup
- Fast cleaning time, since all installations are accommodated outside the working chamber
- All machine components are quickly and easily accessible
- Easy, ergonomic adjustment of the oil supply



Technology Platform for Profile and Generating Grinding

- Extensive configurations enable profile and continuous generating grinding on the same machine (VIPER 500 W)
- Application-appropriate machine design allows tremendous variety in the work range
- Easy, ergonomic handling ensures quick and seamless product changeover
- Powerful dressing unit for cost-effective, precise dressing of the grinding wheels with all the usual modifications
- Highly dynamic drives for maximum precision



Closed Loop Quality Control in Line with Industry 4.0

- Central gearing and process design
- Networked connection in the Klingelnberg production system (GearEngine®)
- Knowledge management with central production data acquisition
- Digitization of gear production through automated machine correction

Numerous Performance Profiles and Custom Options Provide greater Flexibility in the Grinding Process

Standard Performance Profiles

- All profile and flank modifications
- Topologically correct grinding
- Adaptive dressing
- Expanded grinding stock analysis
- Variable stroke rate adjustment
- Process data wizard

Optional Performance Profiles

- HsG – High-speed Grinding
- BfG – Best-fit Grinding
- DLC – Dresser Live Control
- Topological flank modification
- Point-by-point and scanning measurement
- Asymmetrical involutes
- Multiple-wheel grinding

Custom Options – Specifically for Contract Gear Manufacturers

Tool sharpening:

- Hobs
- Revacycle

Clutch gearing:

- Hirth
- Involute and straight, inside-, outside-, and flank-centered spline shafts
- Splined hubs

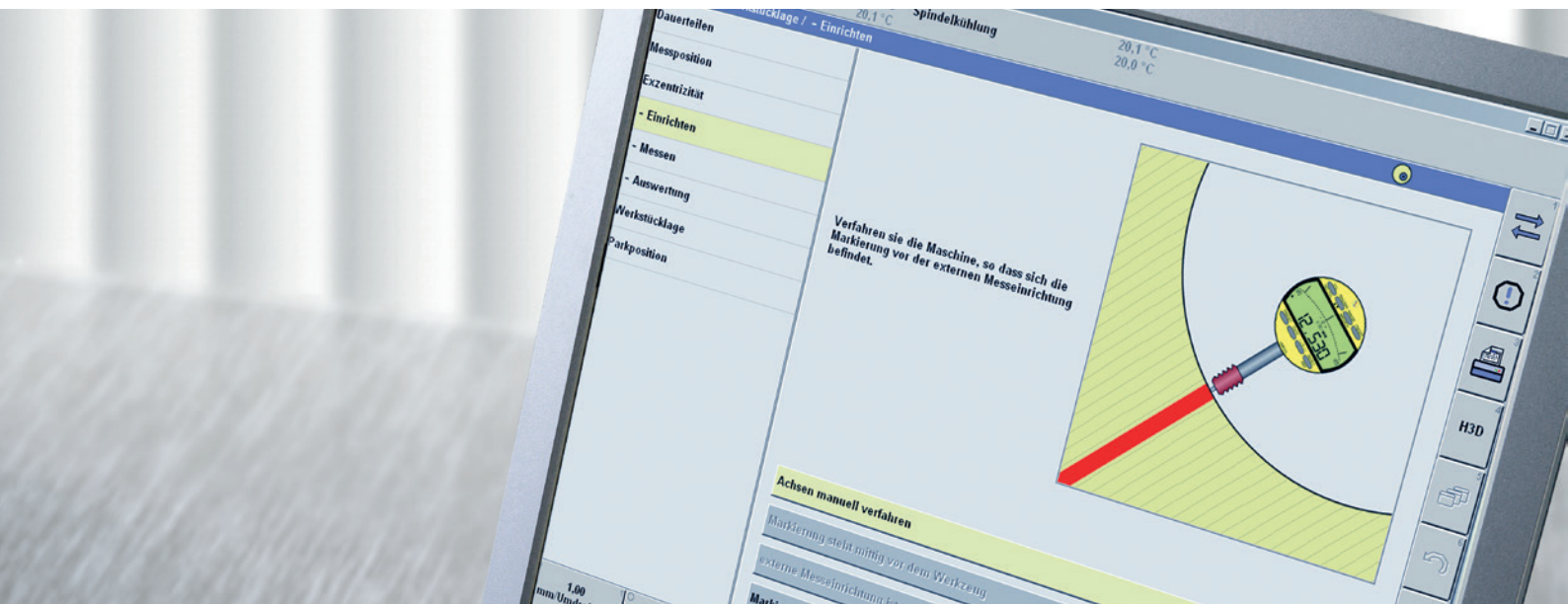
Free profiles:

- Sprocket wheels
- Cycloid gears
- Feather keys and keyways
- Custom root radiusing



Further options on request

USER-FRIENDLY SOFTWARE CONCEPT



Real Productivity Gains with Gear Production Software

Höfler gear grinding machines don't just stand apart due to their reliable, advanced hardware. The Gear Production software, developed in-house, guarantees convenient machining of even the most complex topographies and ensures maximum efficiency in daily use. Only Gear Production delivers concentrated knowledge of state-of-the-art machining strategies and process sequences right to the user's hands.

And with its numerous options, Gear Production plays an active role in increasing productivity. Software modules with best-fit, high-speed and adaptive grinding and dressing were developed to enable significant reductions in production times.

Job Engineering Pre-analysis:

- Exact process time calculation with original machine data
- 3D analysis of the planned process steps for the working range and possible interference contours
- Pre-analysis of tool wear
- Geometric production simulation with 3D analysis of the simulated flank topography
- Calculation and export of optimized tool profiles

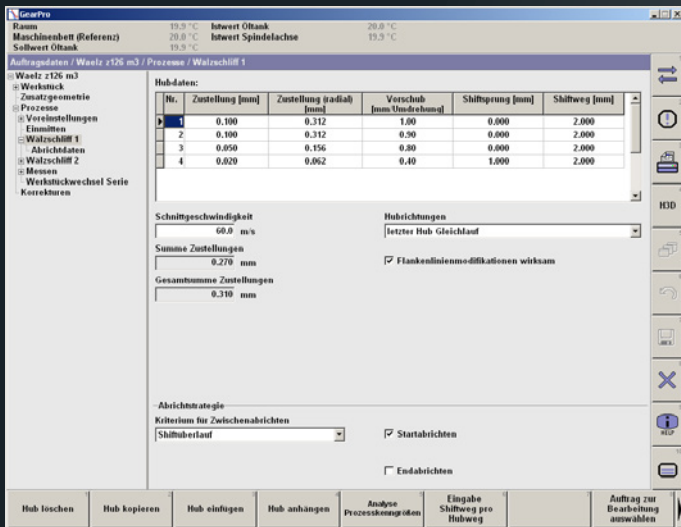
Data Input/Operator Guidance:

- Easy navigation through clearly structured interface areas
- Well-organized Microsoft® Windows®-like data management
- Intuitive data input from a graphical display
- Clear operator guidance from an automatically generated list of process steps
- Easy-to-understand input of even complex flank topographies and profile forms thanks to numerous context-sensitive wizards
- Various technology wizards for a range of tried-and-tested process variants

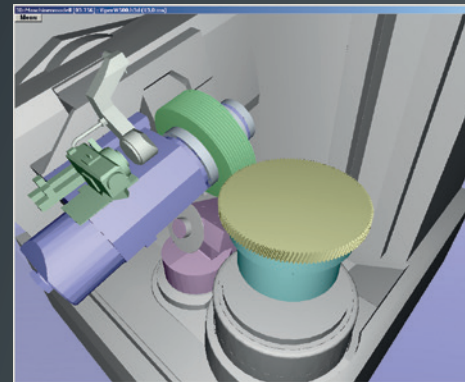
Automatic Archiving:

- Stocks per flank and leads for the blank
- Performance indicators for grinding
- Wear indicators for dressing
- Test diagrams of finished part

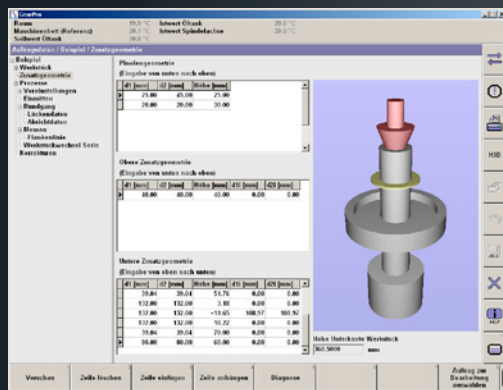
Maximum Process Efficiency with the Gear Production Software



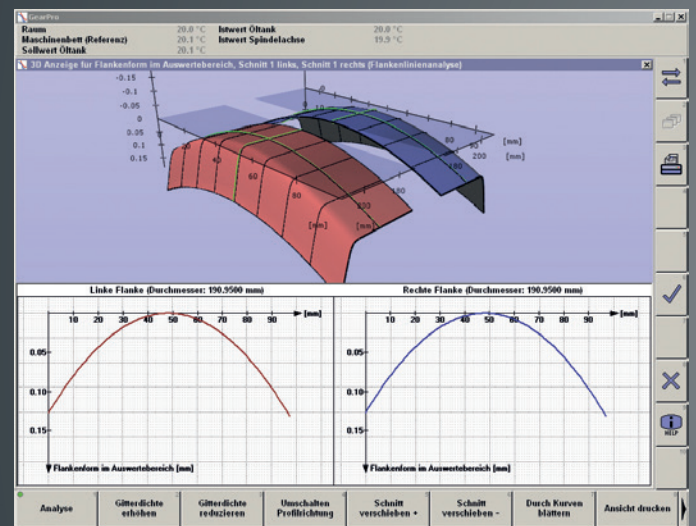
Input of process data for generating grinding



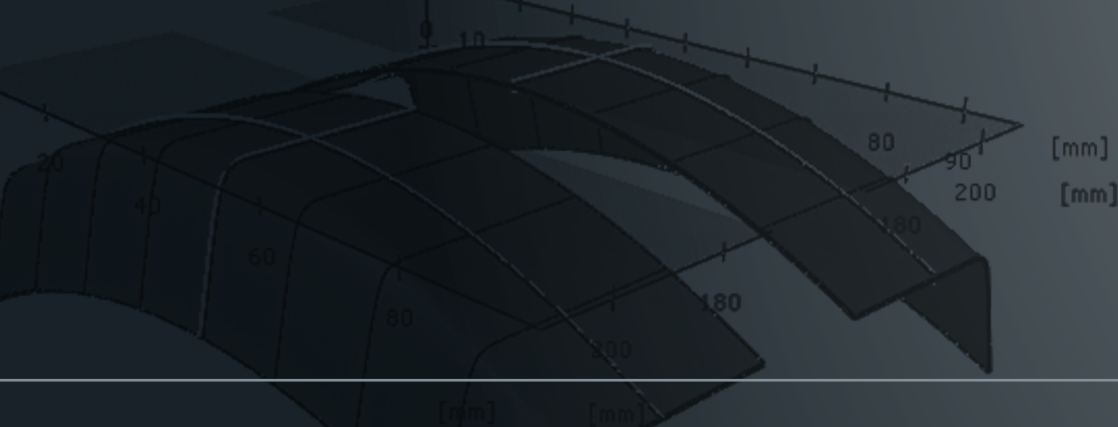
3D display of Gear Production-internal machine model



Graphical input of additional geometry



3D analysis of the simulated flank profile

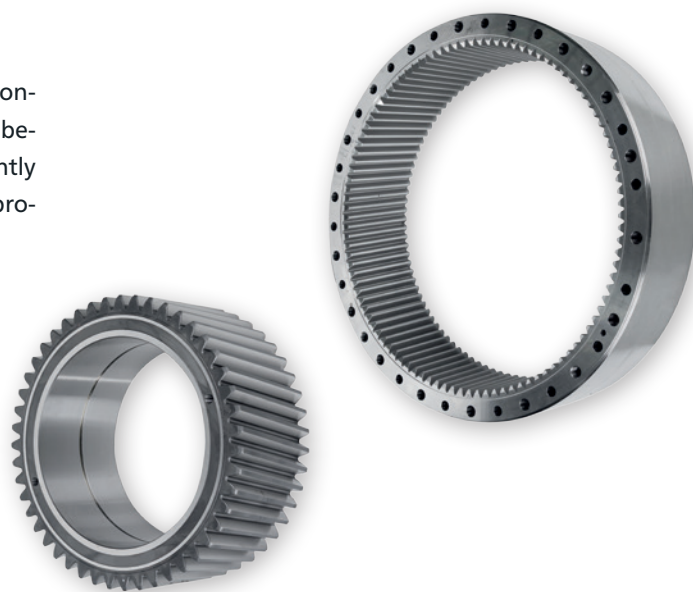


Optimal Jobbing Performance – a Sure Thing Thanks to Drive Components with Guaranteed Quality

With the VIPER 500 variants and the internal gearing option, KlingelInberg has developed a modular technology platform that gives contract gear manufacturers in particular a leg up against the competition with maximum process efficiency and unparalleled production quality.

Like no other company, KlingelInberg stands for intelligent solution concepts for just about every requirement. Thanks to a unique interplay between technology and software, machining jobs are made significantly easier – allowing for high productivity in mass production while also providing tremendous flexibility in small-batch applications.

With its one-of-a-kind machine design, the new generation of VIPER 500 closes a gap by providing cutting edge technology to ensure the precision, reliability, and efficiency that are indispensable for contract gear manufacturers and gearbox manufacturers worldwide.



Industrial gear units



The industrial gear unit sector comprises many different applications, all of which place great demands on the reliability of gear wheels. The cylindrical gears for these sectors are often produced by companies specializing in small batch sizes and a variety of products. A rigid machine design and flexible, cost-effective tool systems are the keys to success for ranking among the market leaders in these sectors.

VIPER 500 W

Agriculture



In tractors, cylindrical and planetary gears are used in manual transmissions and countershaft transmissions as well as planetary gears to transmit power to the enormous drive wheels. Because of ever-increasing requirements, these drives must be capable of transmitting increasingly large outputs within limited space. The cylindrical and planetary gears they use must be efficient, smooth-running, and low-maintenance. Reproducible quality in standard production with the fastest possible production times are key requirements in this industry.

VIPER 500 W

Mining/material handling



Gear components used in production technology must withstand extremely challenging environmental conditions and service conditions. When used in belt drives, such as those used in brown-coal production, strong temperature fluctuations and vibrations are the order of the day. Moreover, the cylindrical gears used in these gearboxes are subjected to intermittent, abrupt loads. Robustness and adequate load-bearing capacity are paramount requirements for these gear components.

VIPER 500

Aviation



Cylindrical gears used in airplanes must meet the highest quality standards in terms of pitch and concentricity (DIN 1-3) and must also execute rotational movements with absolute reliability. Just as important are other geometrical features such as surface finish, root geometry, rotational errors, high strength and low weight. Frequently used in this industry are specialty materials, which place extreme demands on tools and processes.

VIPER 500 K

Wind Power



Only optimally cut cylindrical gears can be used in wind power applications. That's because only perfectly ground gear geometry provides optimal transmission of force for highly efficient wind power installations while ensuring extremely quiet running. With Klingelberg solutions, high-precision gearing quality is a matter of course. It increases the service life of individual gearbox components, thereby significantly reducing maintenance costs.

VIPER 500

Maritime Propulsion Technology



The cylindrical gears used in shipbuilding must demonstrate great reliability and durability even under the most extreme external conditions. The wide range of component diameters requires extensive expertise for controlling the production process. Klingelberg's many years of experience and its certification by all major classification societies are the customer's guarantee of the utmost product quality.

VIPER 500

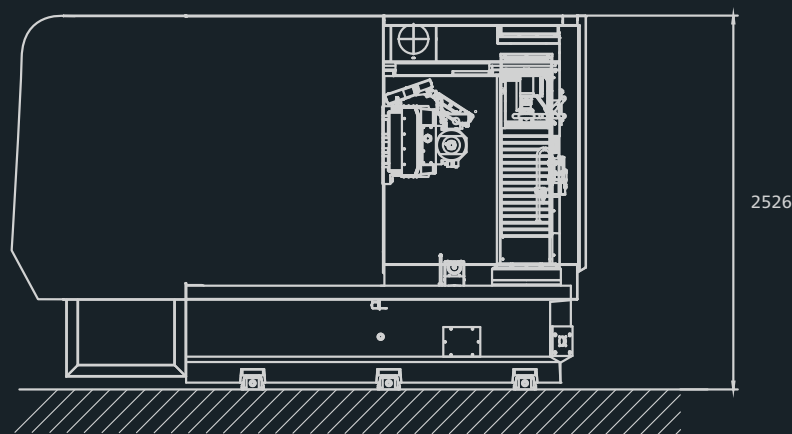
TECHNICAL DATA

	VIPER 500	VIPER 500 K	VIPER 500 W	VIPER 500 KW
Workpiece diameter (max.)	Ø 500 mm			
Grinding stroke (max.)	500 mm	430 mm	500 mm	430 mm
Work area over table (min. – max.)	300 – 800 mm	370 – 800 mm	300 – 800 mm	370 – 800 mm
Distance between center above table (min. – max.)	442 – 1,042 mm			
Module	0.5 – 22*		0.5 – 13*	
Swivel angle (min. – max.)	- 180° / + 45°			
Grinding wheel diameter (min. – max.) (grinding worm diameter) (min. – max.)	Ø 206 – 400 mm	Ø 25 – 300 mm	Ø 221 – 350 mm (Ø 221 – 350 mm)	Ø 25 – 300 mm (Ø 110 – 200 mm)
Grinding wheel width (max.) (grinding worm width) (max.)	75 mm	60 mm	75 mm (150 mm)	60 mm (80 mm)
Grinding spindle	24 kW	35 kW	37 kW	35 kW
Grinding wheel speed (max.)	5,000 rpm	17,000 rpm	6,000 rpm	17,000 rpm
Table diameter	Ø 400 mm			
Table load (max.)	500 kg			
Table hole (diameter x depth)	150 x 500 mm			
Table rotation speed (max.)	120 rpm		1,000 rpm	
Axial feed rate (max.)	20,000 mm / min			
Radial feed rate (max.)	12,000 mm / min			
Tangential feed rate (max.)	20,000 mm / min			
Total connected load	60 kVA			
Machine dimensions (L x W x H) approx.	4,220 x 3,120 x 2,526 mm			
Filter unit dimensions (L x W) approx.	3,450 x 2,100 mm		3,490 x 2,250 mm	
Net weight approx.	15,000 kg		15,500 kg	

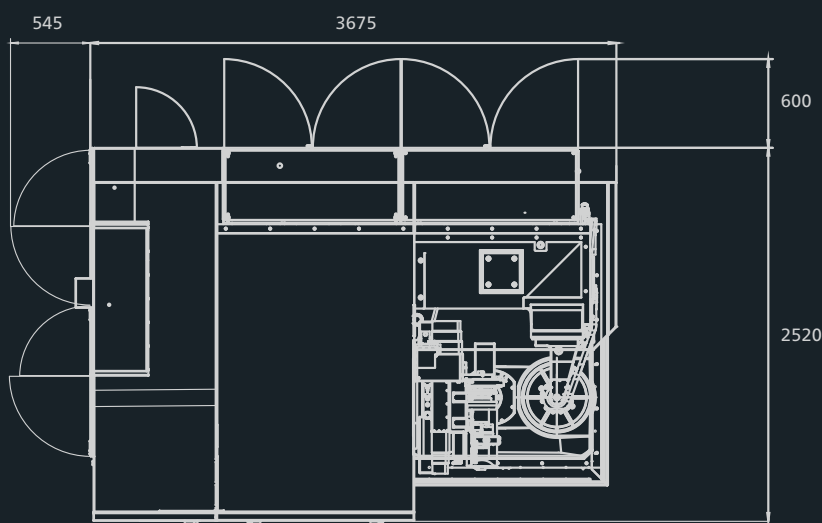
* depends on gear geometry

Installation Dimensions

VIPER 500: FRONT VIEW



VIPER 500: TOP VIEW



all specifications in mm

KLINGELNBERG Service

The Klingelberg Group is a world leader in the development and manufacture of machines for bevel gear and cylindrical gear production, precision measuring centers for gearing and axially symmetrical components, and the production of customized high-precision drive components. In addition to the headquarters in Zurich, Switzerland, further development and production facilities are located in Hückeswagen and Ettlingen, Germany, and in Győr, Hungary.

The company also has sales offices and service centers and numerous trade representatives worldwide. On this basis, Klingelberg offers users a comprehensive range of services for all aspects of toothed gear design, manufacturing, and quality inspection. The spectrum includes technical consulting, on-site machine acceptance, operator and software training as well as maintenance contracts.

KLINGELNBERG Solutions

Klingelberg solutions are used in the automotive, commercial vehicle, and aviation industries, as well as in shipbuilding, the wind power industry, and the general transmission manufacturing industry. With numerous R&D engineers around the globe and over 200 registered patents, the company consistently demonstrates its capacity for innovation.

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You can also find your local contact for sales advice at www.klingelberg.com/contact.