



PITTLER T&S

COMPLETE TURNING AND SKIVING SOLUTIONS

Precision manufacturing of ring and shaft-shaped components



04

The company

PITTLER: high-precision multifunctional lathes for rotationally symmetrical components

06

Skiving

From theory to practice: The evolution of skiving and its increasing significance in modern manufacturing.

08

Hard-fine machining

The PV series machines from Pittler offer both stability and precision. The various software options make it the perfect solution for efficient machining with the hard-turning and grinding processes.

24

PV series

The versatile PV series enables the complete machining of rotatory components. Single-spindle, double-spindle, and shuttle slide machines



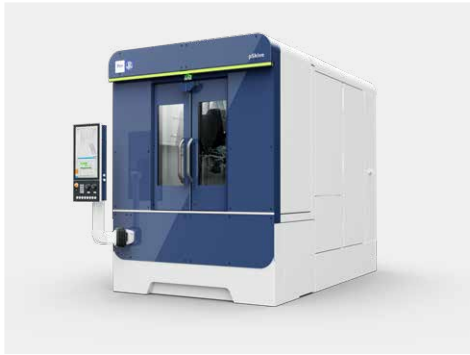
28

PVHDC series

Powerful PV machines for precise machining of large workpieces: adjustable tool carriers, optional tool magazine, and a solid, powerful headstock with high accuracy.



Contents



10 PITTLER pSkive

Modern skiving machine for high-quality internal and external gears thanks to PITTLER SKIVING Technology – New benchmarks in gear machining.

18 SkiveLine series

Highly flexible skiving machine with multi-functional head, PITTLER SKIVING software and automatic loading and unloading options for efficient and safe workpiece production.



42 PVSL series

Flexible pickup machine: up to four tool turrets, versatile turning operations. Unique combination of two workspaces. High performance, saves space, innovative.



48 V300

The multi-technology modular system for the complete machining of shafts. Turning, drilling, milling, skiving, gear hobbing: highly efficient automated manufacturing cells.



56 Operating software

User-friendly, workshop-oriented, highly efficient software solutions from PITTLER.

66 MultiTool

Flexible and standardized tool concept for cycle time optimization with soft turning.

68 PITTLER tool engineering

Optimal skiving tool concepts for the best price/performance ratio for PITTLER SKIVING technology.



PITTLER T&S

PITTLER develops and produces high-precision multifunctional lathes and skiving machines. They are optimized for soft and hard turning as well as drilling and milling rotationally symmetrical components with a diameter of up to four meters.

In the spirit of the company's founder Wilhelm von Pittler, the skiving technology was further developed into an efficient gear cutting technology, which has established itself in PITTLER's machine portfolio both in the context of complete machining as well as an individual technology.

PITTLER T&S offers the skiving process as a single process or in combination with complete machining. An integrated tool magazine makes it possible to use this efficient gear cutting technology alongside turning, milling, drilling, grinding, thread production, and measuring in a single machine without compromise. The flexible use of technology enables machining in maximum two clampings, thus guaranteeing high levels of accuracy. Coolant, oil, compressed air, or a combination thereof can be used for cooling and better chip flow.

A DVS TECHNOLOGY GROUP COMPANY

The DVS TECHNOLOGY GROUP is a group of experienced companies engaged in the machining technologies of turning, gear cutting, grinding and honen.

The DVS TECHNOLOGY GROUP employs more than 1050 staff worldwide and is considered a leading system provider of machines, tools, and manufacturing solutions for the soft and hard-fine machining of components.

The DVS TECHNOLOGY GROUP includes the following divisions:

DVS Machine:

Manufacture and sale of high-precision machine tools and automation systems

DVS International Sales & Service:

Local DVS partners for sales and service in international markets.

DVS Services & Tools:

Customer-specific development, manufacturing, and sale of machine components, tools, and abrasives and related services.

FOCUS ON CORE TECHNOLOGIES



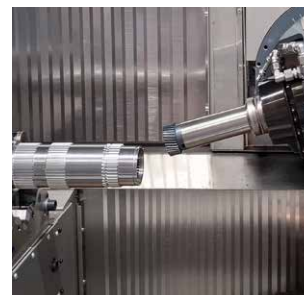
TURNING



MILLING



DRILLING



PITTLER SKIVING



GRINDING



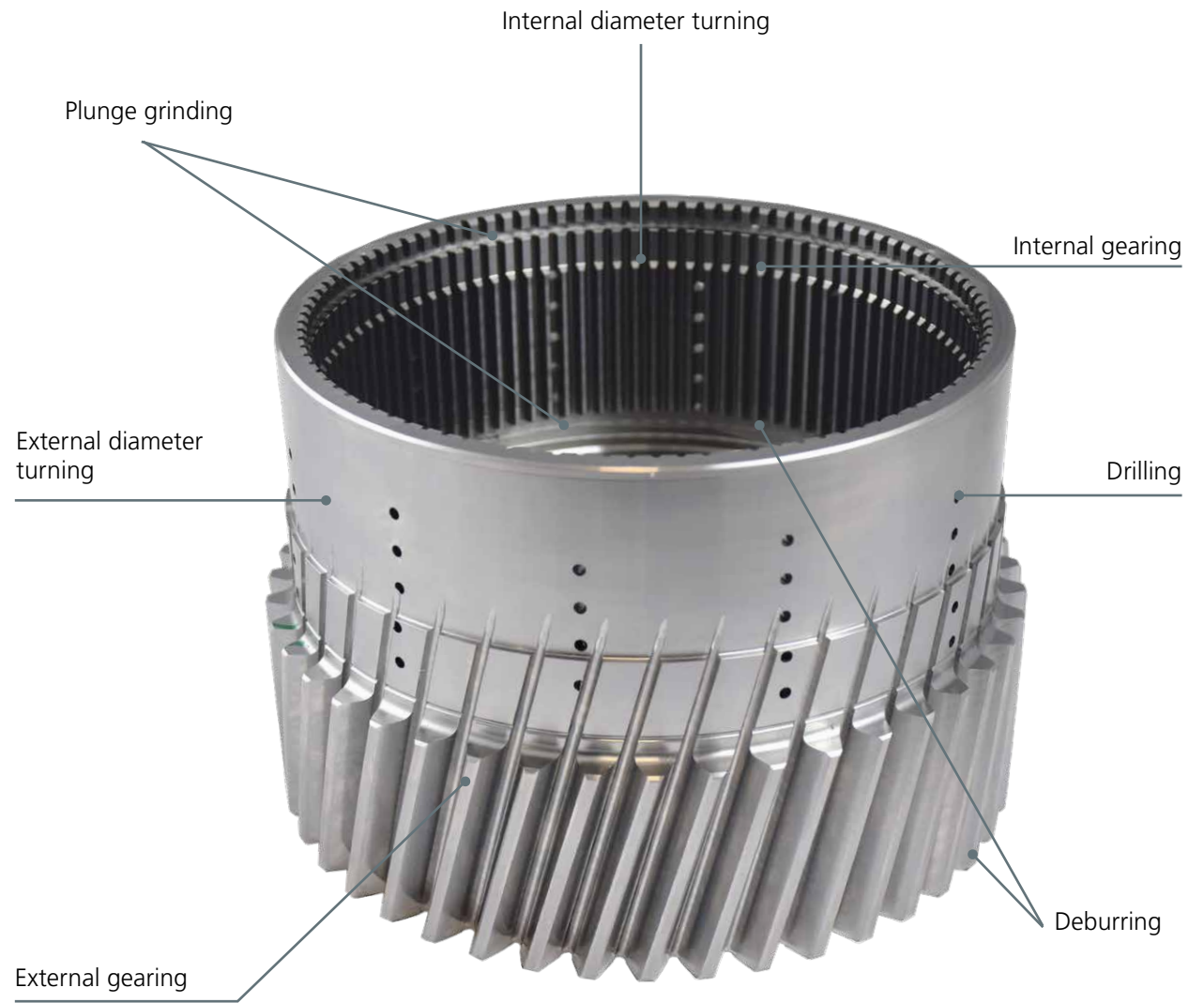
MEASURING

Skiving

Flexible and economical

Skiving is a metal cutting process for the production of gears which is based on a patent filed by Wilhelm von Pittler in 1912. The technology has emerged as an efficient and flexible alternative over recent years for the gear cutting of components.

One of the characteristics of skiving is the oblique arrangement of the tool axis to the workpiece axis. This positioning of the tool, a defined axial feed, and the coupled speed of the tool and workpiece result in a relative movement. This relative movement "peels" the tooth gap out of the workpiece along the main cutting direction.



YOUR ADVANTAGE

- High concentricity and gearing quality
- Short primary processing time
- Low process forces
- Moderate tool costs
- Can be combined with other machining methods
- Production of internal and external gears in one clamping
- Tools and technology from a single source

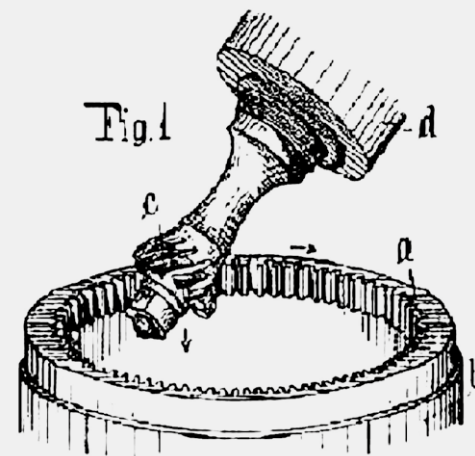


The invention of skiving

Wilhelm von Pittler was a German industrialist and engineer who lived in the late 19th and early 20th century, who had a major impact on the world of mechanical engineering. He introduced groundbreaking developments in the field of metalworking and produced numerous pioneering concepts.

One of his most revolutionary innovations was the skiving process, which was awarded a patent by the Emperor in 1912. This process was only rendered economically viable through the parallel development of electric drives, advanced production machines, modern tool materials, and innovative coatings.

With the introduction of skiving, Wilhelm von Pittler revolutionized the metal processing industry and made a significant impact on the evolution of manufacturing technologies. His creative ideas and entrepreneurial drive greatly contributed to the engineering industry.



Hard-fine machining on the PV series

Where precision meets performance

The PV series emphasizes stability. It is equally suitable for demanding machining processes in soft machining with high feeds and infeeds as well as hard-fine machining with turning and grinding. Stability is the foundation for outstanding precision and surface quality and thus the basis for even the most challenging machining tasks.

To improve user-friendliness, the PV series has been expanded to include software functions for grinding. The newly integrated functions enable precise control for various grinding tasks, such as surface grinding, diameter grinding using the plunge grinding method, or oscillatory grinding. This precision makes it possible to achieve the finest surfaces and exact shape and position tolerances and to meet the highest requirements.

The large work area opens up the possibility of using dressing tools, such as single-grain diamonds or dressing rollers. This versatility not only improves machine performance, but also increases efficiency by allowing additional processes to be integrated into the same clamping.

A core feature is flexibility, which improves cost-effectiveness. This approach ensures not only high-quality surfaces, but also flawless adherence to geometric tolerances. By producing components in a single clamping, cumulative errors during re-clamping are eliminated, resulting in superior component quality and geometry.



Seamlessly switching from hard turning to grinding in a single machine dramatically reduces setup time and optimizes production processes. Increasing process flexibility is a core principle of the PITTLER philosophy, which is epitomized by the PV series. With an integrated tool magazine and the multifunctional head that can accommodate rigid and driven tools, the machining possibilities are almost infinite. This configuration enables smooth switching between different operations, optimizes production processes, and minimizes downtime.

In short, the PV series represents the pinnacle of modern methods by combining hard turning and grinding technology in one. Based on stability, software options, and customizable

work area design, these machines offer not only advanced capabilities, but also an integrated approach to efficiency, precision, and innovation.

Experience the future of precision machining.



Compact machine

Less floor space in production
and easier transport

Cost-efficient
due to less time thanks to
fixed tools and no tool change

Ergonomic control panel

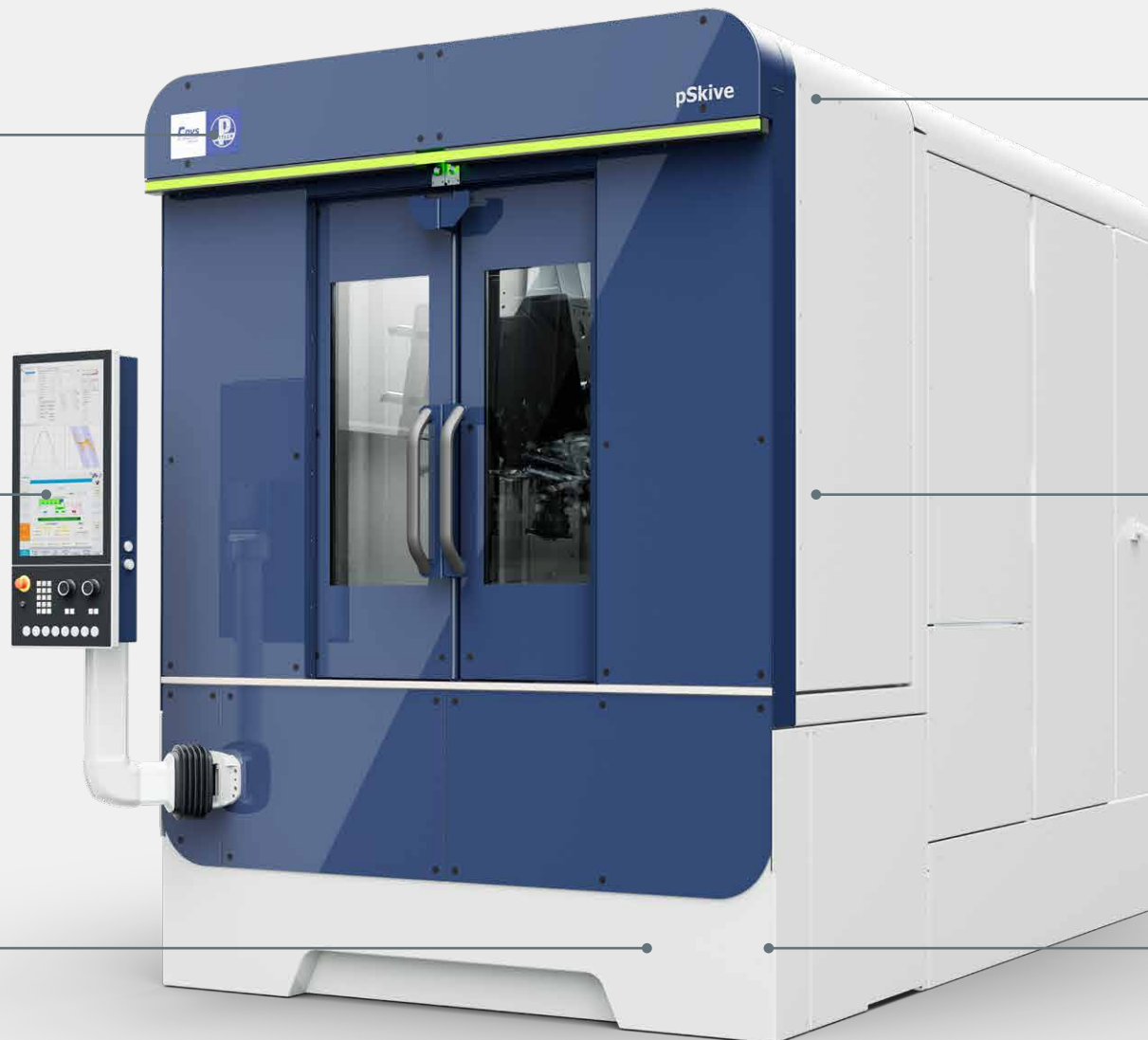
with the latest Siemens
"SINUMERIK ONE" technology

**Optimally matched
main and tool spindle**
due to single technology

User-friendly design

Ergonomic and optimal for manual
loading, optional automatic loading
with internal loader or robot

Short cycle times
as there is no tool change.



pSkive

Highest Quality for Internal and External Gears

pSkive was specially developed and built in conjunction with the PITTLER SKIVING technology. With this machine, internal and external gears can be manufactured highly productively and in exceptional quality.

The pSkive in the PV315 version offers impressive flexibility from module 0.3 to module 5. Workpieces with a diameter

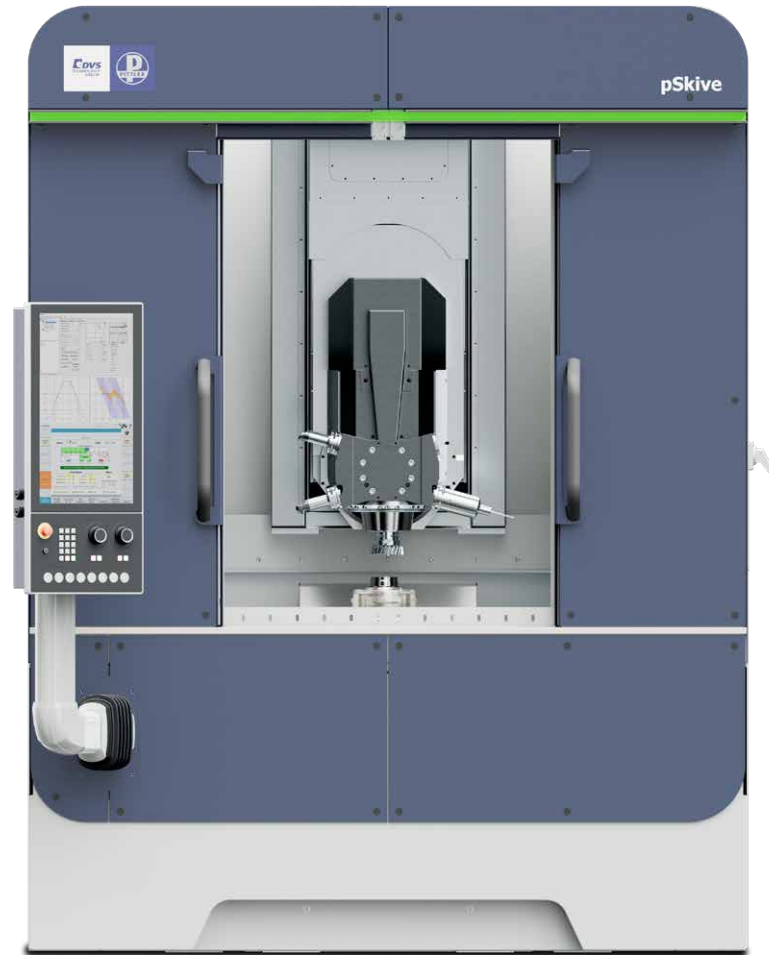
of up to Ø 315 mm can be machined. Thanks to the PITTLER SKIVING technology, internal and external gears can be produced with maximum accuracy and quality. pSkive is therefore the ideal solution for companies that want to produce high-quality geared parts in medium and large quantities.

PRECISION IN THE MICRO RANGE FROM SMALL TO MEDIUM





DUO head for
two gear cutting tools



MONO head for
individual gear cutting tools

pSkive with MONO head

The standard MONO-head variant of the pSkive offers many advantages when machining ring gears. With its driven workpiece spindle and up to four fixed mounts for turning tools and/or an in-process measuring probe, pSkive enables the efficient and precise machining of geared workpieces.

The MONO head with its “turret technology” (continuous head swivel range of $\pm 105^\circ$) has the advantage that workpieces are skived and deburred in a single clamping. Possible reference diameters and surfaces are finished with a turning tool. This yields not only highly complex gearing qualities, but also high overall component quality in terms of the shape and position tolerances.

In addition, the MONO head enables the optional use of an in-process probe. This allows measurement of the workpieces during the machining process. It ensures that specifications such as the spherical dimension and flank line of the gearing are performed efficiently. The probe also has a positive effect on the setup process after a tool change. The user interface developed by Pittler supports monitoring of the component quality.

Moreover, a sensor can also be implemented for finding the tooth gap for hard peeling. This enables precise and fully automatic control of the process when machining tempered workpieces.

The combination of all of these equipment options enables efficient processing and a high workpiece quality level. The familiar smart operation renders the pSkive skiving machine a versatile solution for rotationally symmetrical components with internal and external gears.



ADVANTAGES OF THE MONO HEAD

- Skiving and finishing turning
- Up to four fixed mounts
- Use of a measuring probe or sensor for hard peeling

pSkive with DUO head

The DUO head offers numerous advantages for ring gear production in the pSkive. With its innovative design and versatile features, the DUO head improves the efficiency and precision of the production process.

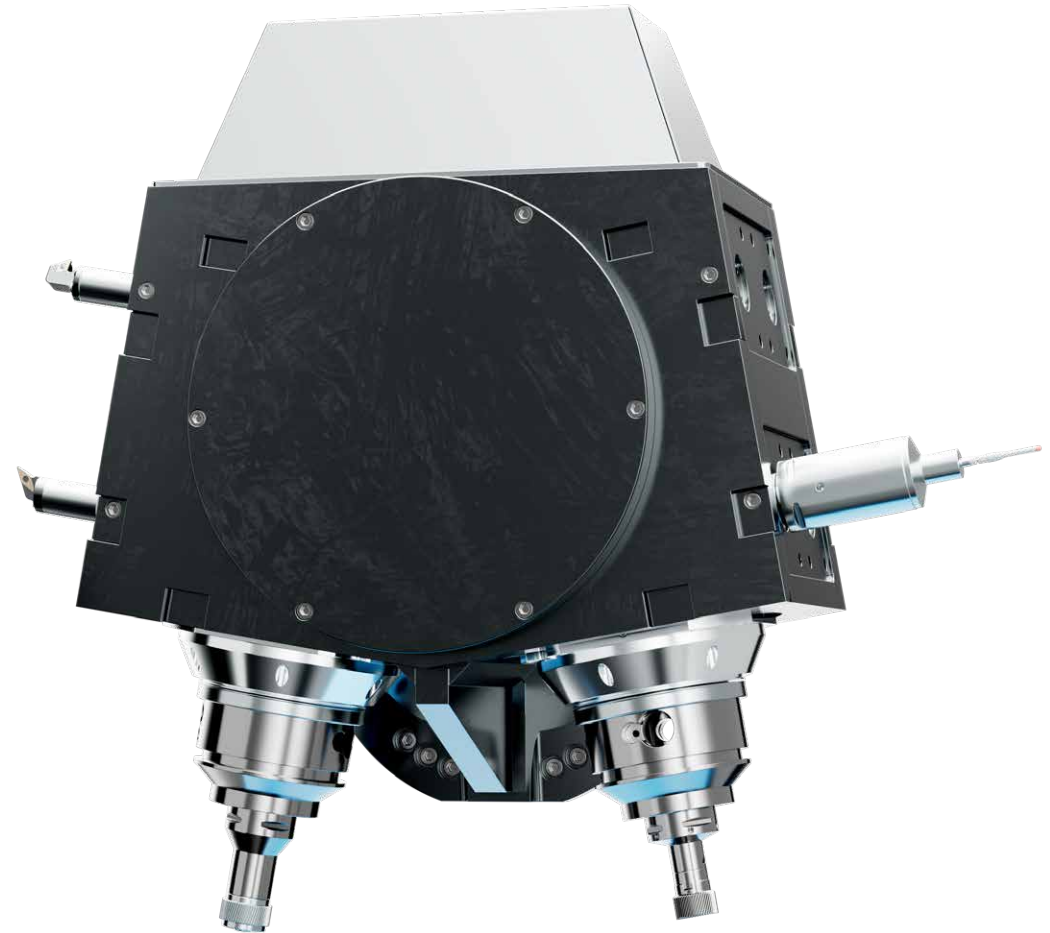
A major advantage of the DUO head are two driven workpiece spindles. This means that two skiving wheels can be mounted, which significantly increases productivity. For example, while a roughing tool (larger modules) is used on one spindle for efficient material removal, the finishing peeling wheel can be mounted on the second spindle in order to reduce component costs and protect the expensive finishing tool.

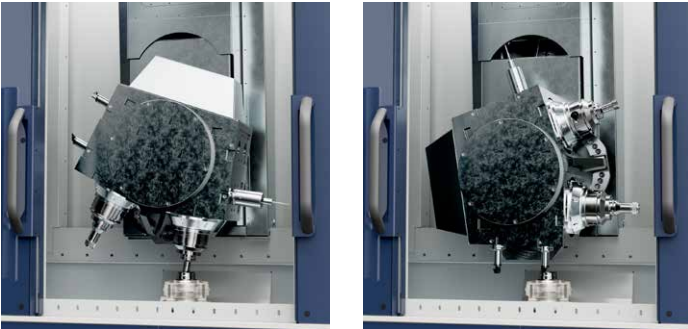
Another option for two peeling spindles is the use of sister tools or two different peeling wheels, which, for example, are required for a stepped planetary gear.

As with the pSkive with MONO head, up to four fixed mounts can be mounted on the DUO head. Further processing or component testing using a measuring probe or finding tooth gaps using a sensor are possible. This opens up a wide range of possible applications in the production of complex ring gears.

In summary, the DUO head enables efficient, precise, and versatile production in the pSkive.

With its ability to swivel to a second skiving wheel in just seconds and thus make the process even more flexible and time-saving, it is the skiving machine of the modern manufacturing industry.





ADVANTAGES OF THE DUO HEAD

Tool carrier

- Two powered tool spindles
- Up to four fixed mounts
- Integration of optional drilling spindle or grinding spindle

Possible equipment options

- Roughing and finishing peeling tools
- Separate peeling of the left and right flanks
- Two identical peeling tools (sister tools)
- Skiving in combination with drilling or grinding

pSkive DUO head in detail

Integration of grinding or drilling spindle

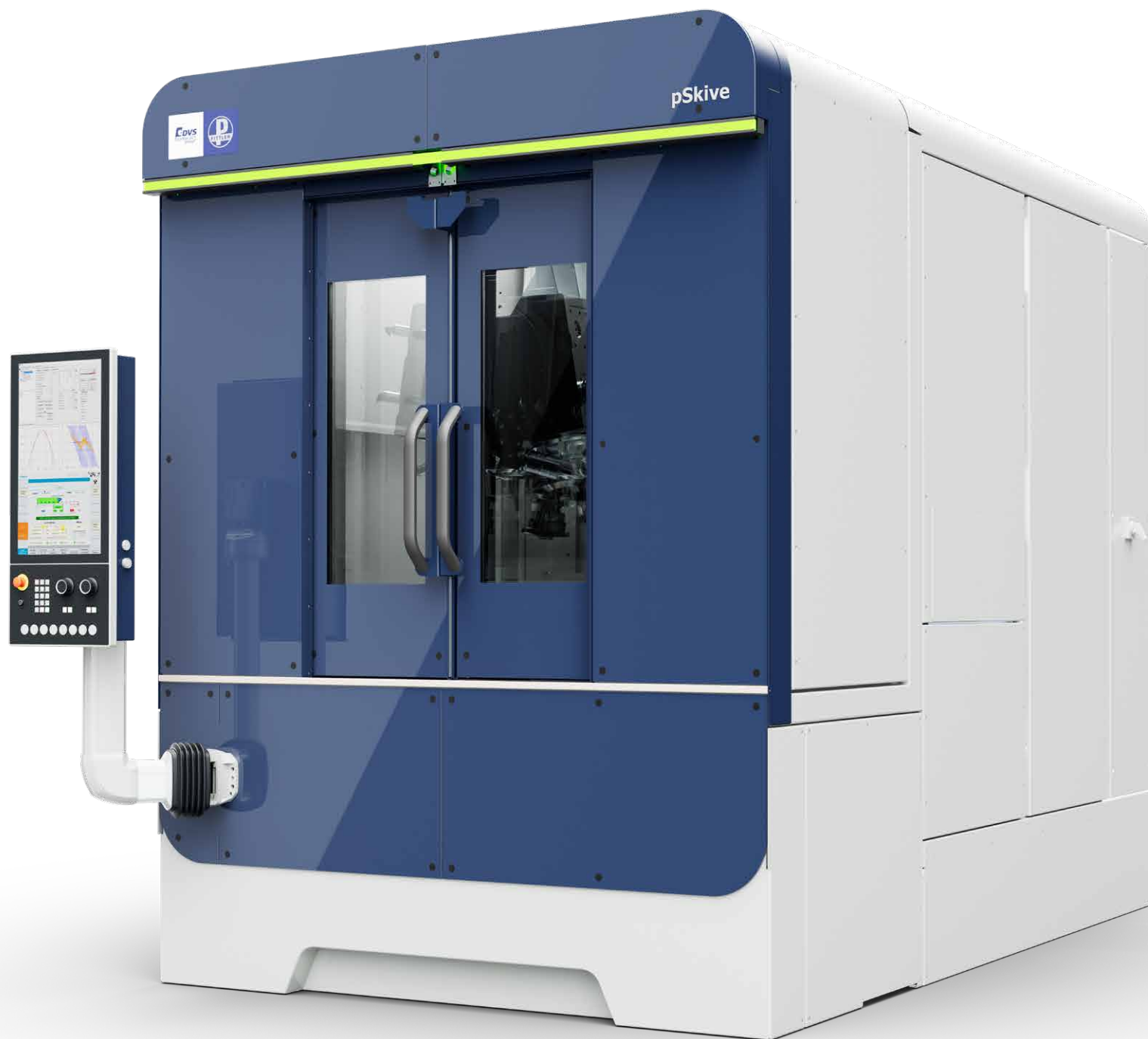


Up to four fixed mounts
for turning tools and
measuring probes

Two SKIVING spindles

Technical Data

	pSkive MONO head	pSkive DUO head		pSkive MONO head	pSkive DUO head
WORKPIECE			B-AXIS AS CLAMPED SPUR GEAR UNIT		
Max. diameter (mm)	315		Holding torque (Nm)	1200	
Max. circumferential diameter (mm)	400		Swivel speed max. (rpm)	40	
Module range (Mn)	0.3 – 5		Swivel range (o)	105	
TOOL			SKIVING SPINDLE	1x	2x
Max. diameter (mm)	150		Tool system	C5x	
Capto mount	C5x		Drive power (kW at 100% duty cycle)	36	
Swivel range (o)	+/- 105		Torque (Nm at 100% duty cycle)	120	
			Speed (rpm)	0 – 6000	
			ATTACHMENT TOOL CARRIER FOR UP TO FOUR TURNING TOOLS		
			Capto interface	C5	
			Manual	manuell	
			Other		Use of separate drilling/grinding spindle possible



**Stable multifunctional head
for highly precise machining results**

Complete machining is possible in conjunction with the tool magazine, multifunctional head with swivel axis, and a powerful tool spindle

Various cooling options

using emulsion, oil, compressed air, or combinations thereof

Flexible automation

Crane or manual loading, robot loading, optional shuttle loading, and PITTLER automation cell

Fast loading with PV315 SkiveLine

Workpiece changeover in approx. 8 seconds, Loading and unloading shuttle in combination with swivel loader on the compound slide

Proprietary clamping devices

Developed and produced by the DVS TECHNOLOGY GROUP

High rigidity

thanks to stepped design machine bed

Automatic tool change

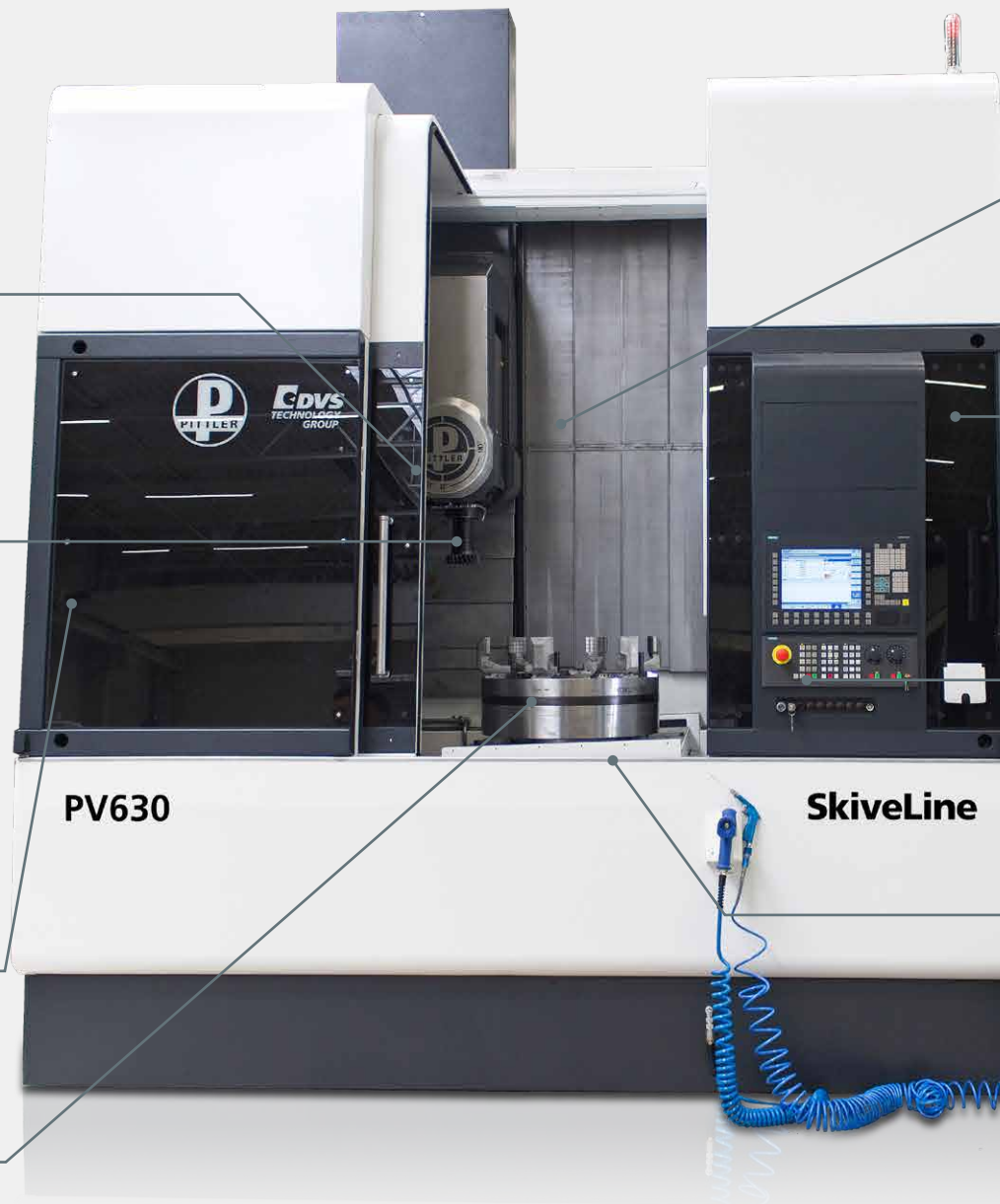
16-part disk magazine, tool change possible in 12 seconds, Tool system: Capto C6, C8, or HSK

User-friendly HMI

optionally with additional screen/monitor; Automatic generation of machining programs via your own user interface

Powerful headstock

thanks to the spindle box with y-axis, max. 400 mm stroke, linear measuring system, option: Hydraulic clamping



SkiveLine series

Complete Machining in a Single Clamping

Modern gear skiving machine with flexible multifunctional head, tool magazine, y-axis, and original PITTLER SKIVING software. This machine concept enables the flexible production of your workpieces.

The integration of an optional swivel loader in conjunction with an internal workpiece shuttle that moves between the automation unit and the work area facilitates rapid loading and unloading of components with a diameter of up to Ø 270 mm. Another option is to load and unload either the workpiece shuttle or the workpiece spindle with a robot cell.

This robot cell can be placed either on the right or left side of the machine.

The spacious work area together with a work area door, including a large safety window that allows loading from above by a crane, gives the operators a clear view of the component and the machining process.

HIGHLY FLEXIBLE FOR BATCH SIZES FROM SMALL TO LARGE



The all-rounder

The SkiveLine series offers impressive flexibility for skiving from module 0.3 to module 10. With a maximum workpiece size of diameters up to 1250 mm, industry-specific workpieces can easily be machined.

One of the outstanding features of the SkiveLine series is its enormous flexibility. Thanks to complete machining, including internal and external gearing in a single clamping, high quality requirements in terms of the gear run (e.g., for a ball bearing seat) can be achieved. This not only increases the component quality, but also saves valuable throughput times and increases productivity.

In conjunction with the multifunctional head (MFK) and the 16-compartment tool magazine (up to 150 tools on the PV1250 SkiveLine), comprehensive machining operations are possible. This means that different work steps can be combined efficiently.

The SkiveLine series is therefore a state-of-the-art and powerful solution for gear machining. With its flexibility, the large workpiece area, the tool magazine, and the possibility of complete machining, it is the ideal solution for various industry applications.



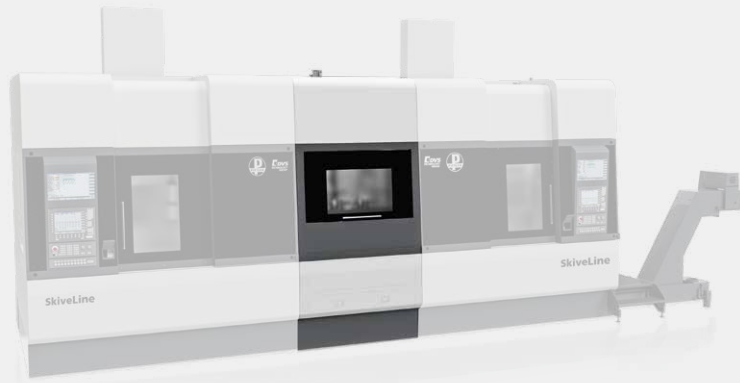
YOUR ADVANTAGE

- Flexibility through skiving from module 0.3 to module 10
- Workpiece edge data up to a maximum diameter of 1250 mm
- Universal due to tool magazine
- Enormous flexibility thanks to internal and external teeth in one clamping
- Complete machining possible with the multifunctional head

PAC – The multifunctional automation unit

PITTLER has developed the “PAC” automation cell for an efficient material flow of workpieces with a diameter of up to 270 mm. Shorter strokes and an integrated workpiece shuttle enable a significant reduction in workpiece changeover times. In addition, the loading paths inside and outside the processing cell were largely separated from each other to minimize the carryover of chips and emulsions.

Despite the very compact design of the “PAC” with a space requirement of only 4.5 m², the internal loading system is very accessible. Thanks to its open design, “PAC” can be expanded with additional testing or processing systems and can thus be used in a multifunctional way. The automation cell is equipped with SPC discharge and NIO belt as standard.



Two SkiveLine machines can be loaded from one PAC cell.



Robot-assisted loading systems manufactured individually according to customer requirements

Individual automation solutions for series production



In order to meet the requirements of every production, PITTLER offers not only standardized automation solutions, but also individually tailored loading systems.

The engineers at PITTLER draw on an extensive wealth of experience, which also includes robot-supported production islands or integrated swivel grippers with connected conveyor belts. This means that standardized and individual solutions can be offered that are optimally tailored to your specific needs.

Technical Data

	SkiveLine PV315	SkiveLine PV630	SkiveLine PV1250
WORKPIECE			
Max. diameter (mm)	400	630	1250
Workpiece height max. (mm)	400		800
LINEAR AXIS			
X-axis travel (mm)	900		2200
Z-axis travel (mm)	780		1000
Y-axis travel (mm)	0 – 200	0 – 400	+/- 300
MAIN SPINDLE			
Spindle speed (rpm)	3500	1500	700
Main spindle drive (mm)	31	39	104
C-axis torque (Nm)	425	1375	7440
MULTIFUNCTIONAL HEAD B-AXIS			
Swivel angle (degrees)	110		270
Skiving drive (kW)		29	
Skiving spindle torque (Nm)		141	
Module max.	5	6.5	10

PV315 SkiveLine



PV630 SkiveLine



PV1250 SkiveLine





Machining on up to six axes

Turning, grinding, milling, drilling, measuring,
PITTLER SKIVING with Y-axis possible,
further integration of NC axes
(tool carrier) possible

**Automatic tool
changeover with up to 150 tools**

High degree of flexibility
through numerous equipment variants

Powerful headstock
up to 23,400 Nm torque,
Optional: Hydraulic clamping, single spindle ma-
chines with Y-axis available

**Generously dimensioned work area
and good accessibility**
for optimal loadability



PV series (630 – 1600)

The All-rounder for Medium to Large Components

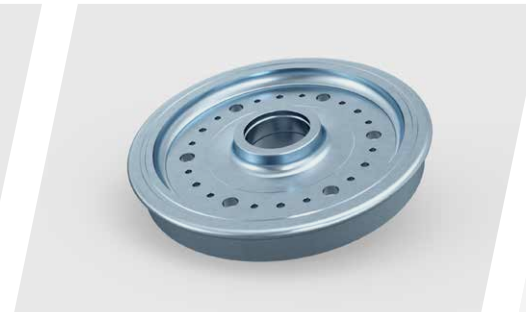
The PV series offers a compact modular system that allows configurations for multi-technology machines and the complete machining of rotary components with diameters from 350 – 1600 mm.

The series includes single-spindle machines as well as machines with two separate work spaces, each of which has its own or up to two tool carriers. There are also shuttle slide

machines that ensure an excellent balance between off-peak and main time.

Thanks to this versatile modular system, all applications, such as turning, grinding, drilling, and milling can be carried out on the machines.

COMPLETE MACHINING OF COMPONENTS WITH DIAMETERS FROM 350 – 1600 MM



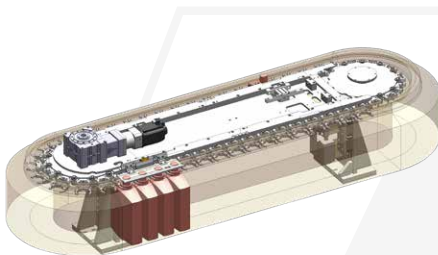
Committed to tradition

PITTLER T&S GmbH gradually developed the PV series into a turning machining center that covers a wide range of highly economical turnkey manufacturing technologies in all common workpiece sizes. Today, PITTLER is able to offer its customers the most modern machine technology as well as the latest drive and control technology in the application area of 5-axis machining up to a workpiece diameter of 1600 mm.

At the heart of the innovation are tool carrier systems for complete machining, which, in the green (soft) workpiece state use the turning, skiving, milling, drilling, thread cutting, and reaming technologies to achieve maximum economic efficiency with improved workpiece quality. The conventional vertical lathe was transformed into a fully-fledged turning machining center.

With the new PV generation, PITTLER has also entered the field of hard machining and replaced the grinding process. Thanks to the user-friendly software and the dressing cycles matched to the component and the grinding process, the PV series can handle all common grinding applications and produce the component not only in the soft state but also in the hard state with the usual precision and economy.

The PV series is a perfect “all-rounder” for medium to large workpieces that can meet any challenge.



OTHER HIGHLIGHTS AND CONFIGURATIONS

Further highlights, their technical specifications and machine bed configurations can be found from page 30.



YOUR ADVANTAGE

- Powerful headstocks
- Different tool carriers are possible
- Magazine with up to 150 tools
- Integration of grinding spindle and dressing tools
- Headstock with Y-axis available for single-spindle machines



Headstock with Y-axis

MACHINE BED

At the heart of this machine series is a stable monoblock in a stepped bed design. Precisely welded and cast with low-shrinkage concrete, this structure offers maximum static and dynamic rigidity. At the same time, it minimizes vibrations, offers optimal damping, and ensures thermal stability.

The intelligent design allows for the ideal application of force to the guide system and machine bed. What stands out in particular is the direct introduction of cutting force into the roller guide for stable machining processes. This tried-and-tested design enables a wide range of options for precise machining and superior performance in various fields of application.



Solid machine bed

with continuous guide carrier support for maximum rigidity and accuracy

Large technology toolbox,

e.g., a wide variety of tool carriers for turning, drilling, milling, grinding, with or without B-axis

Automatic tool change

via chain magazine with up to 87 slots

Powerful headstocks

with up to 72,000 Nm torque and an output of up to 300 kW; Infeeds up to 20 mm at 1 mm feed

Machining on up to four axes

Turning, grinding, milling, drilling, measuring possible, additional integration of NC axes (tool carriers) can be implemented



PVHDC series (2000 – 4000)

Large Rings Made Easy

The PVHDC machines for the machining of large workpieces with a diameter of 1000 – 4000 mm and a height of up to 1000 mm have a particularly stable machine bed with continuous support of the guide carrier for maximum rigidity and accuracy. Up to two compound slides can be installed on the machine bed guides, which can accommodate a wide range of tool carriers: from fixed tool mounts to multifunctional heads with a rotation axis and powered milling spindles. Up to two tool magazines for up to 87 tools each can be provided for automatic tool changing.

The massive headstock features a very robust and highly precise rolling bearing. The drive takes place via a gear stage and is scalable based on the number of motors installed.

The configuration options of the PV series and PVHDC series have a similar modular design.

OPTIMIZED FOR WORKPIECES WITH A DIAMETER OF 1000 – 4000 MM

Center of rotation

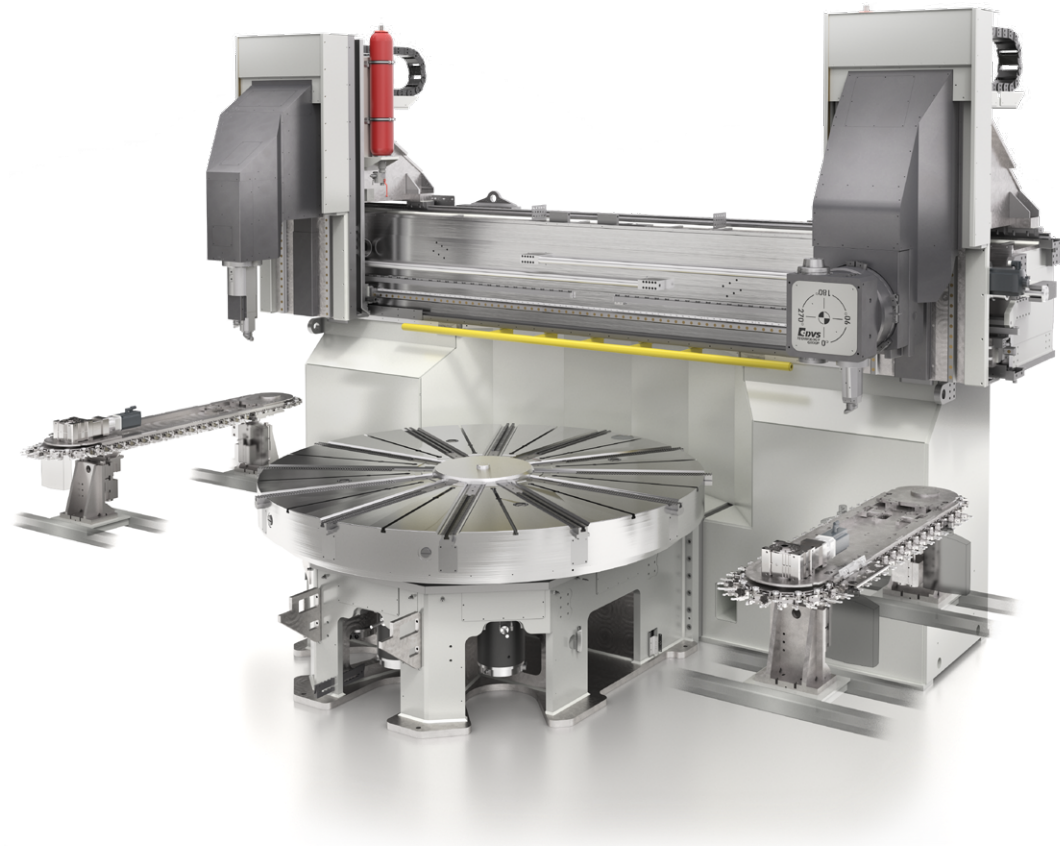
The PVHDC series impresses with powerful spindle boxes that offer an infeed of up to 20 mm at a feed of 1 mm.

The modular technology of the PVHDC series includes tool carriers that can handle turning, drilling, milling, and grinding. The optional integration of a B-axis in the tool carrier expands the machining spectrum and enables the production of highly complex geometries.

The automatic tool change is implemented via chain magazines that offer up to 87 slots. This allows different tools to be changed quickly and efficiently, thus increasing the productivity of the machine. The solid machine bed of the PVHDC series has a continuous guide carriage that ensures maximum rigidity and accuracy. This ensures precise and reliable machining results.

Grinding applications can also be integrated as in the PV series. This enables hard-fine machining. This function can be used to machine workpieces with special requirements on hardness, precision, and surface quality.

Overall, the PVHDC series is a proven machine solution. Thanks to powerful headstocks, versatile machining capabilities, automatic tool change, a solid machine bed, and the ability to integrate grinding applications, it is the perfect solution for demanding applications in the fields of wind energy, aerospace, construction and commercial vehicles, as well as industrial transmissions.



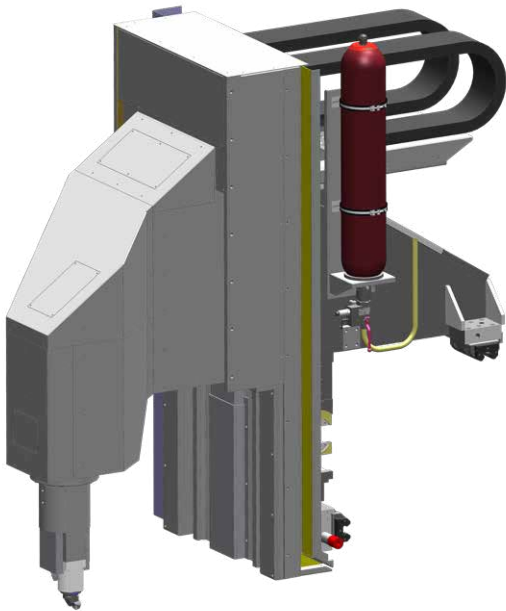
YOUR ADVANTAGE

- Powerful headstocks: S1 torques up to 72000 Nm and S1 powers up to 300 kW
- Infeeds up to 20 mm at 1 mm feed
- Technology toolbox consisting of a tool carrier and B-axis for complex geometries
- Automatic tool change via chain magazine with up to 87 slots
- Solid machine bed with continuous guide carriage for maximum rigidity and accuracy

COMPOUND SLIDE UNIT

The compound slide features a sophisticated design with its durable cast iron construction, reinforced with ribs, and direct connection to the central lubrication system. It is arranged vertically and features carefully sized roller guides that ensure low-friction movement, as well as telescopic covers that protect the X-axis slides and extend their life.

The driving force is transmitted via extremely resilient ball screws, which are driven by highly dynamic and maintenance-free three-phase feed motors: this guarantees quick and reliable movements.

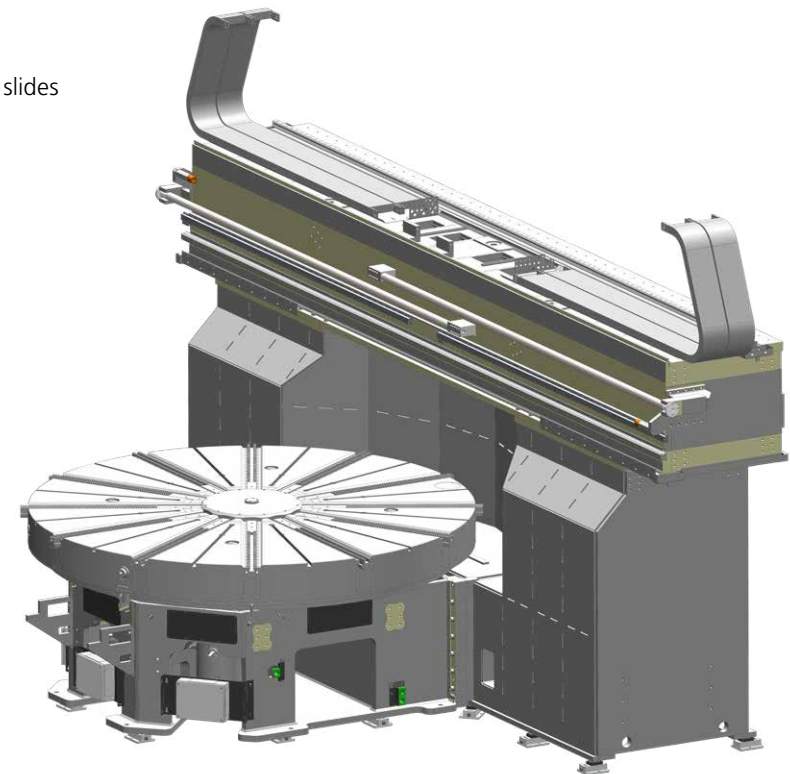


Tool carrier

The well thought-out placement of the guide rails of the compound slide with a generous Y-distance is an ideal weight balance for the stable tool carriers. This enables the effective absorption of tilting moments and the forces of the tool carrier, which optimizes the precision and stability of your machining processes. The entire construction of the compound slide is designed for torsional rigidity, which forms the basis for the highest level of precision and reliability.

Overall, the compound slide combines high rigidity with balanced power transmission and is therefore a key element for top-notch machining results and quality.

Compound slides



Overview of modular system

The process-oriented configuration of the modular system offers numerous advantages for manufacturing. Thanks to the wide range of different variants and a machine portfolio specifically adapted to the customers' requirements and component-specific challenges, PITTLER offers many different options for the complete machining of your workpieces. This creates an optimal cost-benefit ratio and allows you to save investment costs for an additional machine.

The individually adapted structure also improves the workpiece quality by reducing clamping errors. Short throughput times and simple production planning are made possible by combining several processing steps in one machine. Changeovers and/or workpiece changes during production minimize downtime. Another option for the PV machine series is to implement a second tool carrier and thus realize four-axis machining, or to include special applications such as grinding in the machining portfolio.

In summary, the modular design enables the efficient use of resources, faster product delivery, and cost reductions. Companies can improve their product quality, increase productivity, and become more competitive through process-oriented configurations.



MACHINE BED 1-1

- 1 spindle | 1 compound slide
- Standard version
- Optionally available with Y-axis



MACHINE BED 1-2

- 11 spindle | 2 compound slides
- 4-axis simultaneous machining for reduction of main time or special tool carriers for special applications
- Optionally available with Y-axis



MACHINE BED 2-1P SHUTTLE SLIDE VERSION

- 2 spindles| 1 compound slide
- Manual loading and unloading as well alignment and/or conversion on spindle 1 while spindle 2 is machining



MACHINE BED 2-2P SHUTTLE SLIDE VERSION

- 2 spindles| 2 compound slide
- Manual loading and unloading as well alignment and/or conversion on spindle 1 while spindle 2 can machine in four axes



MACHINE BED 2-2

- 2 spindles| 2 compound slide
- Two machines in one: significant investment savings, capacity expansion

More highlights



Headstock

- Different headstocks or power spindles with and without Y-axis available



Turret

- Eight- or twelve-head turret with different tool systems (fixed or driven)



Standard multifunctional head

- Multifunctional head with two separate tool mounts:
one for turning tools (fixed mount),
one power spindle for driven tools
- With stepless A- and B-axis



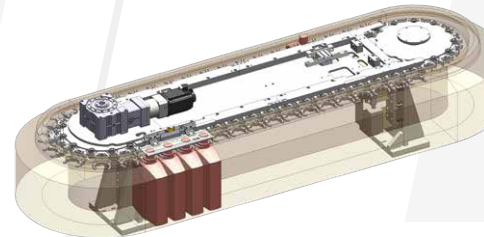
Multifunctional head with additional A-axis

- Multifunctional head with two separate tool mounts:
one for turning tools (fixed mount),
one power spindle for driven tools
- With stepless A- and B-axis



Single tool mount

- Single tool mount fixed or driven; With the driven version, the spindle is clamped through hydraulic expansion when turning
- Can be combined with tool magazines for automatic tool changing



Chain drive hoist magazines

- Tool magazines in different lengths with up to 87 tools and a wide variety of tool systems such as Capto or HSK



Tower tool magazine

- Tool magazine with setup position for up to 150 tools and a wide variety of tool systems such as Capto or HSK

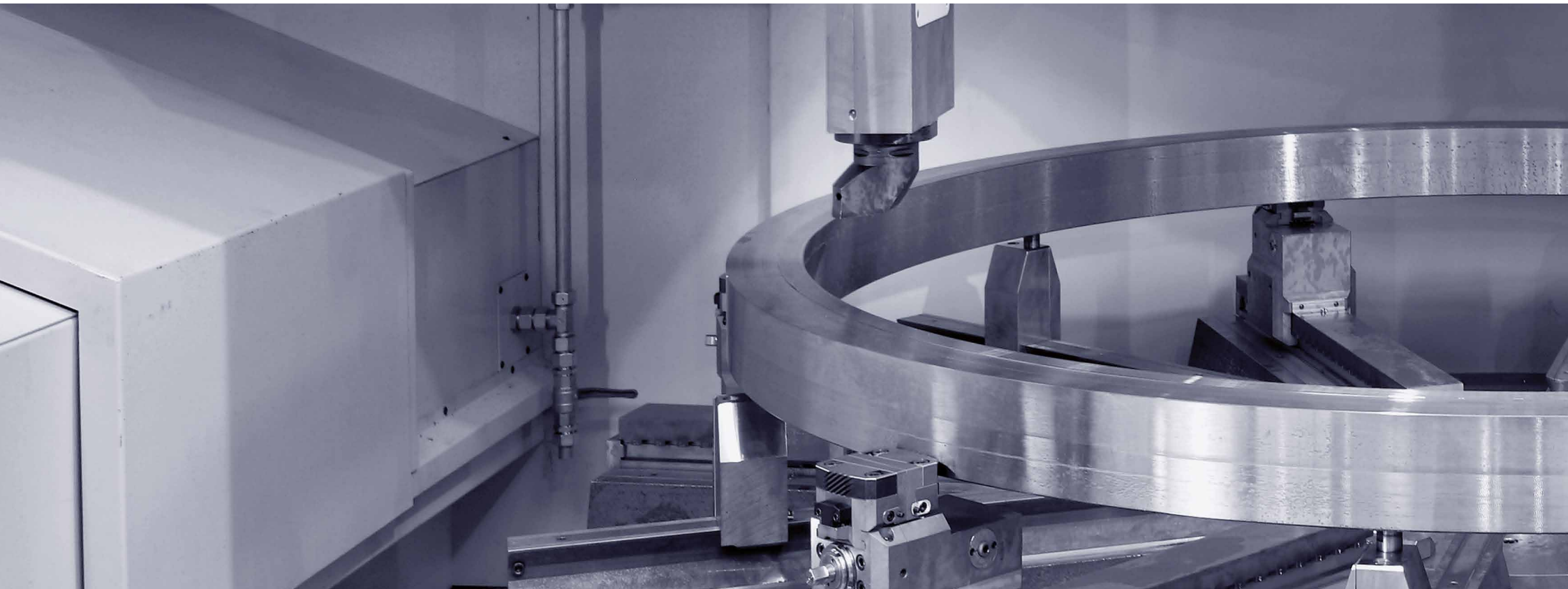
Specific tool carriers of the PVHDC series

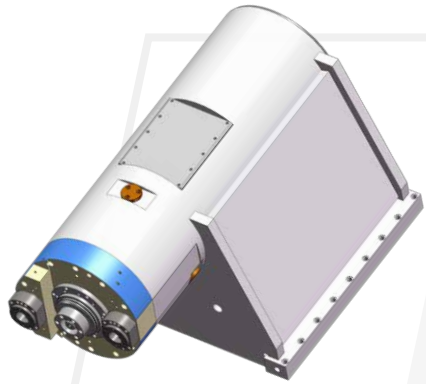
The universal tool carriers are selected depending on the application. In addition to the familiar systems, HDC-specific tool carriers are also available:

The Tertia head integrates two rigid swivel mounts (one for internal and one for external machining) and offers extremely powerful power spindle variants. The processing head with an integrated ram offers optimal performance even for tall components. Its additional 750 mm Z-axis in combination with the usual high rigidity offers the solution for tall workpieces. Tool

mounts such as Capto and/or HSK are used in all tool carriers in the HDC series. Depending on the machine size and cutting task, a size between C6 and C10 or HSK63 and HSK100 is used.

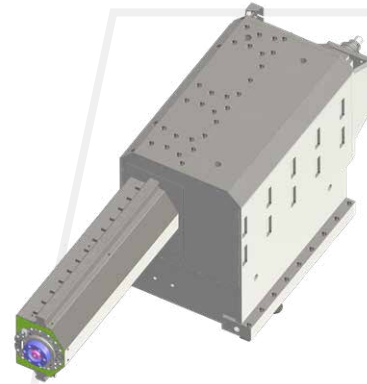
The mechanically operated tool clamps for automatic tool changing are integrated. No additional intermediate units or adapters are required. For some tool carriers, a powerful variant with a driven power spindle is available, which is clamped hydraulically if necessary and can thus also be used as a turning tool mount.





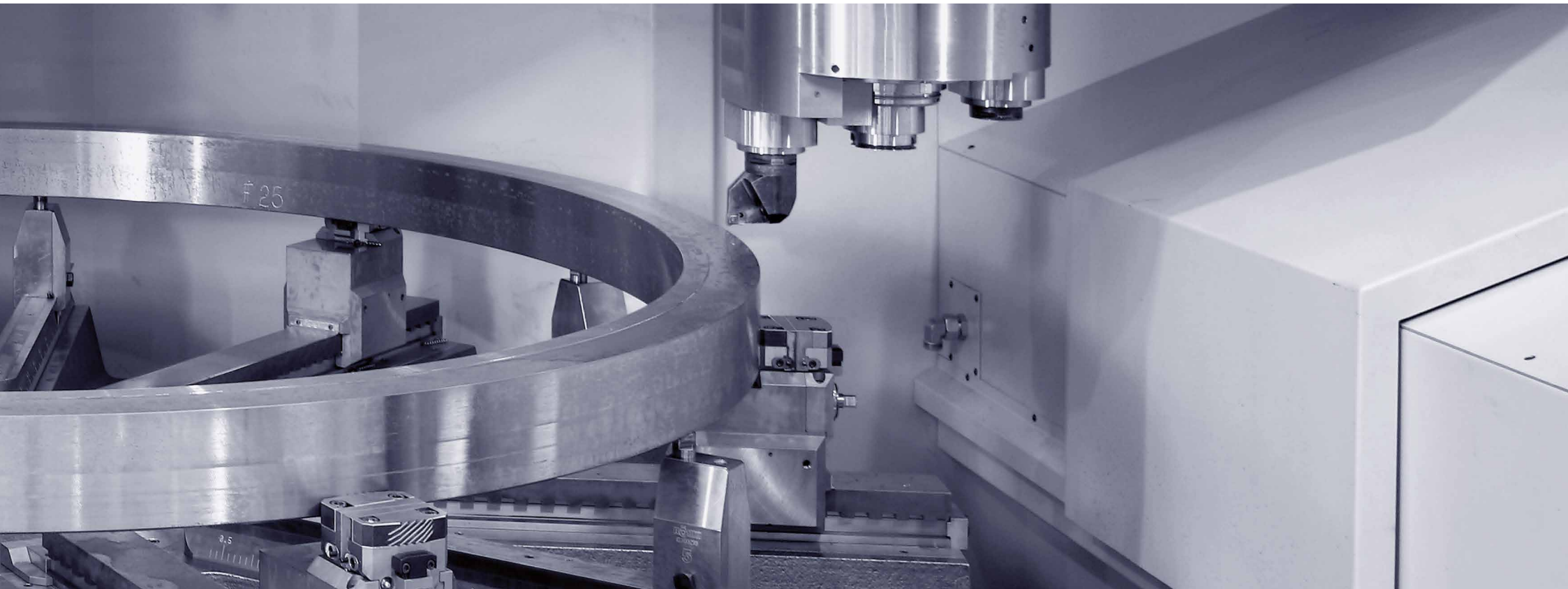
Tertia head

- Two rigid rotating mounts: one for internal and one for external machining
- A high performance power spindle for powered tools



Ram

- Additional fixed 750 mm Z-axis implemented as a ram
- Total travel path of the Z axis 1750 mm



Technical Data

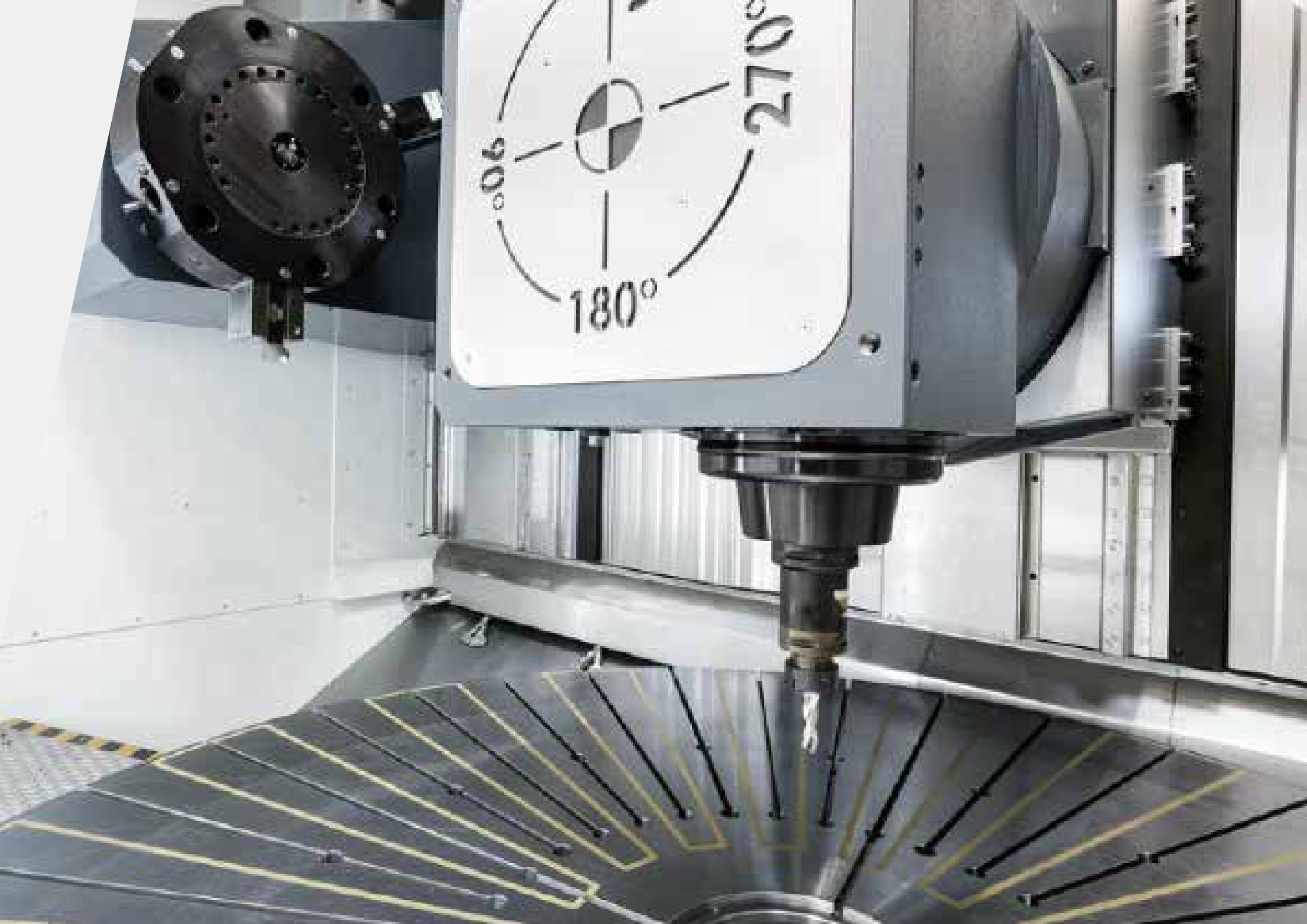
	PV630	PV1250	PV1600
WORKPIECE			
Max. length (mm)	500	500 (1000)	500 (1000)
Max. weight (kg)	1000	3000	5000
TECHNOLOGIES	Turning, grinding, milling, drilling, measuring		
MACHINE COMPONENTS			
Spindle flange Ø (mm)	380	520	800
Thrust bearing Ø (mm)	240	460	670
Power at 100% duty cycle (kW)	39	104	208
Torque at 100% duty cycle (Nm)	1375	12000	23400
Speed (rpm)	1000	500	400
Y-axis (mm)	+250 / -150	+ -300	+ -300
Turning Ø	630	1250	1600

PV1250



PV1600





Technical Data

	PVHDC2000	PVHDC3000	PVHDC4000
WORKPIECE			
Max. table/chuck diameter (mm)	2000	2500	3800
Max. workpiece diameter (mm)	2200	3000	3800
Max. arc	2500	3200	4000
Distance of table top to tool holder	800 – 1200		
Workpiece height	600 – 1000		
MACHINE (WITH 1/2 SUPPORTS)			
Length without chip conveyor (mm)	6600	7000 / 7400	9600
Length with chip conveyor (mm)	8600	7400 / 11400	11800
Height (without/with ram) (mm)	5300 / 6000		5700 / 6500
Depth (mm)	5000		6000
Weight (t)	50 – 100	95 – 130	150 – 250

PVHDC2000



PVHDC3000



PVHDC4000

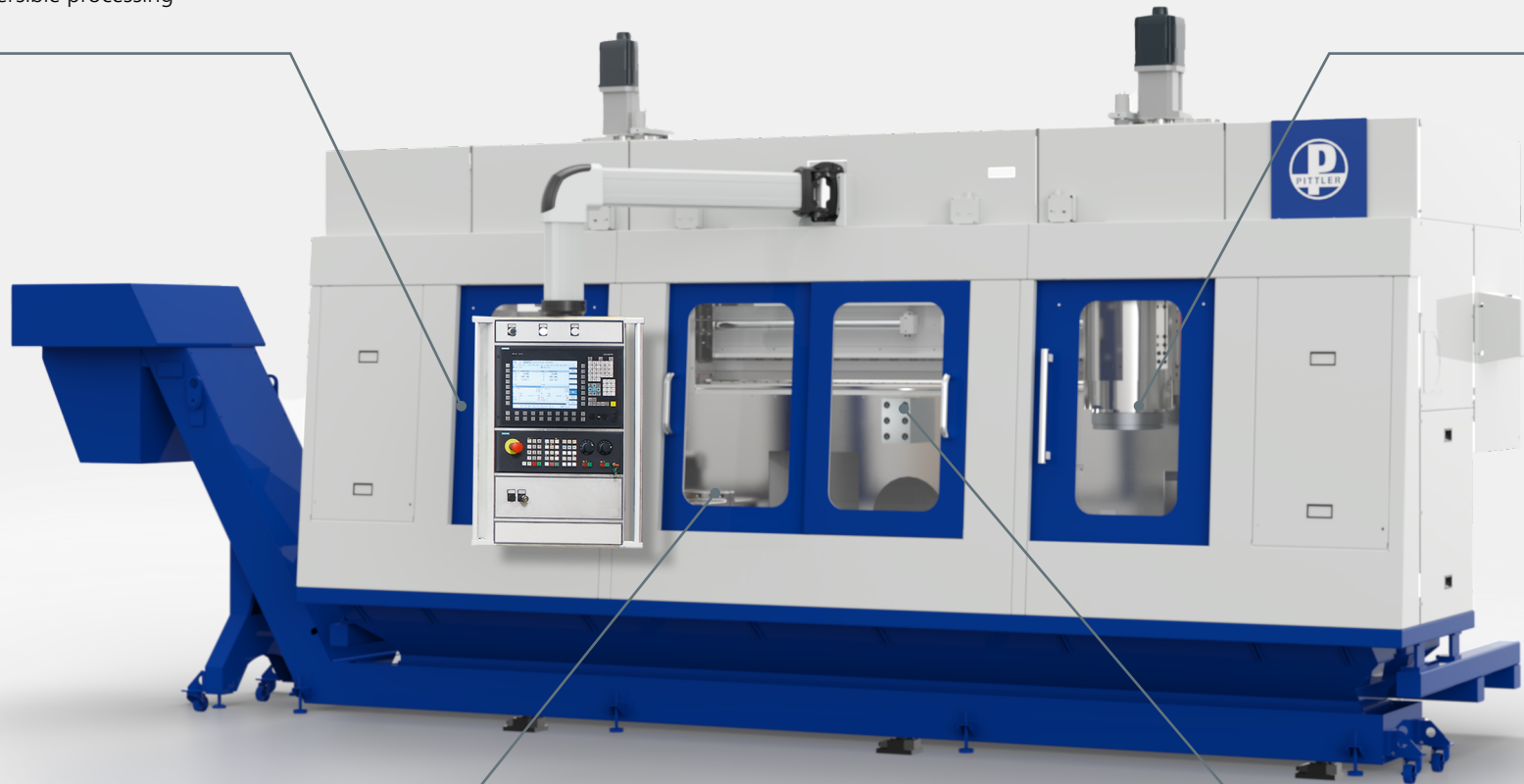




Process flexibility

Parallel or reversible processing possible

Modular work area,
for example, integration of a
NC lifting holder for the
machining of brake discs



Simplified workpiece infeed

Lateral infeed of workpieces with
PVSL N1, with PVSL 450 the infeed
of workpieces takes place from all sides

Simple chaining
of systems and versatile
component feeding solutions
for raw and finished parts

PVSL Series

Vertical Pick-up Lathes

The PITTLER PVSL series offers an incredible amount of technology in a very small space. With up to four tool turrets, it offers a wide range of possible uses for both soft and hard machining.

The PVSL series combines two workspaces in one machine and uses a turning station to turn the component by 180°. The tried-and-tested pick-up technology eliminates the need for external automation, as the components are automatically picked up by the spindles from the raw part conveyor/blank part conveyor.

External automation and robot cells can optionally be added to further optimize your production processes. The combination of short strokes and the efficient pick-up loading system enables short cycle times even when producing complex components in series. With the PVSL series you get an innovative manufacturing solution that not only saves space, but is also powerful and extremely flexible.

SHORT LOADING TIME THANKS TO THE PICK-UP SYSTEM



Discover the PVSL series

Your solution for versatile vertical pick-up turning!

Our PVSL series offers a vertical pick-up lathe with a flexible infeed of the workpieces directly into the machine's automation room. This intelligent design optimizes the use of space and enables extremely efficient workpiece feeding.

As a standalone machine, the PVSL 450 is particularly easy to automate, as two systems can be operated back to back with one automation cell. In the PVSL N1, the automation is positioned at the front and the workpieces are fed into the automation chamber from the side.

The seamless integration of an NC lift-off holder, multi-spindle drilling head, and a second turret for four-axis turning is just a small example of a wide range of additional applications that can be integrated into the work area.

The PVSL series features innovative parallel and turn-over machining, which allows you to machine two workpieces at the same time. This function significantly reduces the throughput times and increases the productivity of your manufacturing processes.

Whether you want to machine complex workpieces with different requirements or a large number of parts, the PVSL series is the ideal choice. Our vertical pick-up lathe not only offers maximum precision and quality, but also flexibility and efficiency in your production. Invest in the PVSL series and benefit from the numerous advantages that this machine can offer for your production. Increase your competitiveness and set new standards in vertical turning.



PVSL 450 - 2

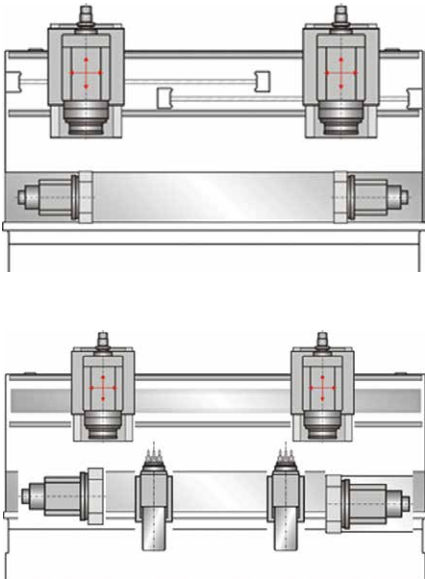
YOUR ADVANTAGE PVSL N1

- Loading via storage for autonomous machining
- Automatic parts separation: no defined setting down of raw and finished parts necessary
- Easy to set up: changeover to a new workpiece in less than 15 minutes

YOUR ADVANTAGE PVSL 450

- Generously sized work area, with space for additional equipment such as NC lift-off holders, multi-spindle drilling head, and a second turret
- Suitable for heavy machining
- Shuttle loading possible from all sides for maximum flexibility when integrating the machine into a production line

MACHINE BEDS PVSL N1 AND PVSL 450



Two-spindle design with two independent compound slides

- For subsequent or parallel processing
- Feed drive by either ball screw or linear motor
- Additional units such as multi-spindle drill head in middle and large series
- Alternative: two-spindle drilling with tool turret for programmable pitch circle
- PVSL N1 available in two different bed lengths: 2400 mm and 3000 mm

INDIVIDUAL ROBOT CHAINING FOR THE PV SL SERIES

PITTLER T&S offers tailor-made automation solutions for chaining several PVSL series machines. The selection ranges from belt automation with storage to robot-assisted loading to meet the specific requirements of customers.

Particularly with the PVSL 450, rear loading enables a straightforward connection to other machines. The production facility, e.g., for differential housings, is linked by a robot, which offers additional advantages. The measuring and marking stations are also automatically loaded by robots to make the process even more efficient.



Technical Data

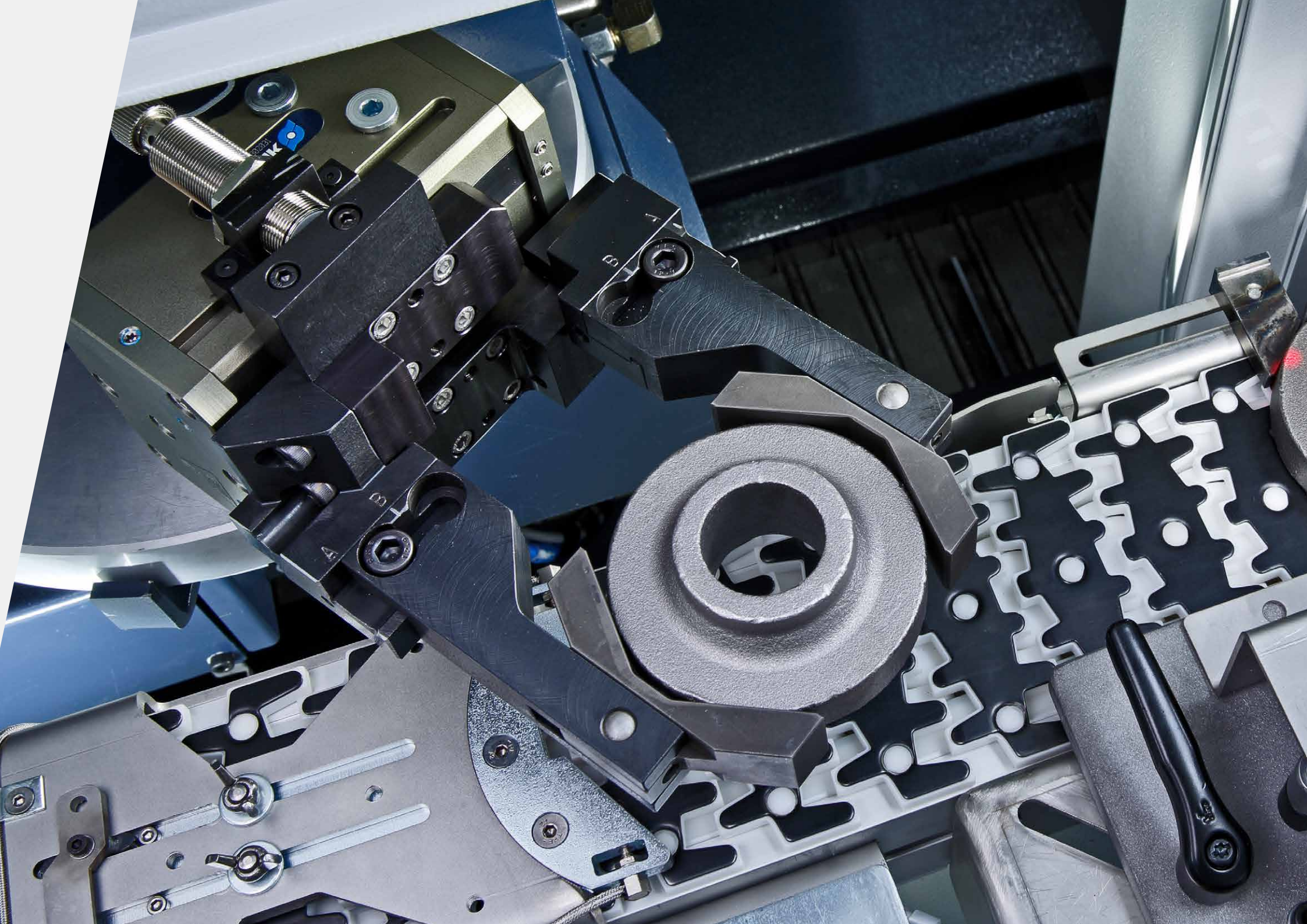
	PVSL N1 / 2-2 2400	PVSL N1 / 2-2 3000	PVSL 3 / 2-2	PVSL 450 / XL
WORKPIECE				
Max. diameter (mm)	140	280	450	550
Length (mm)	80		280	450 / 550
MAIN SPINDLE				
Swing Ø up to (mm)	350		530	550
Spindle nose Ø (mm)	182	220	300	KK A8
Power 100% duty cycle under full load 40% duty cycle (kW)	29 / 34	67 / 80	64 / 80	
Max. torque (Nm)	484	885	1220	
Speed (rpm)	4500	4000	3500	
TECHNOLOGIES				
	Turning, drilling, milling			
S1 - Max. torque of the main drive [Nm]	194		820	



PVSL N1



PVSL 450



**Turning, milling, and gear cutting
of shafts in a single clamping**

Skiving and hobbing up to module 6 with the robust powered milling spindle

Automatic tool changeover in 12 seconds
with disk magazine in work area, supported if necessary through background magazine

6-sided machining
with robust and powerful powered milling spindles and turrets for main and counter spindles



Center drive technology

Highly efficient complete machining of shafts through simultaneous processing of the two shaft ends by turning, milling, and gear cutting

Fast workpiece changeover
through integrated automation

V300

The All-rounder for Geared Shafts

The V300 enables versatile configurations for multi-technology complete machining of geared shafts from small to very large quantities. With up to two work spindles and four tool carriers on a robust machine bed, you can turn, drill, mill, skive, and hob, all on a single machine. The center drive enables precise and quick machining of the workpiece ends. Combined with a second machine for processing the workpiece center, it is possible to realize extremely efficient, automated, yet easily convertible production cells for complete machining.

FOR DIAMETERS UP TO A MAXIMUM OF 350 MM

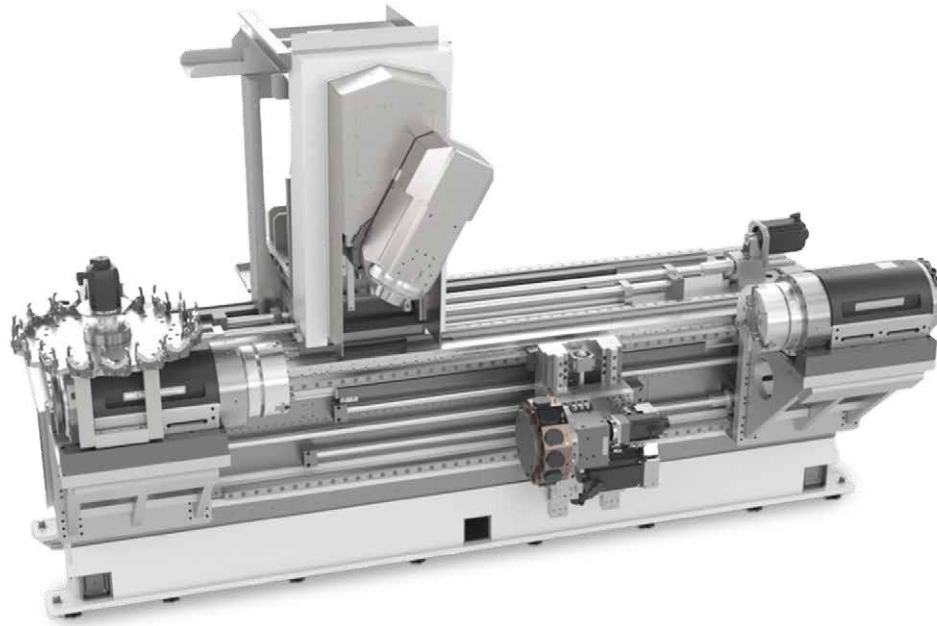


The all-rounder for shaft-shaped components

This machine design was adopted by our sister company WMZ and specifically matched to the requirements of our customers. Like the entire series, the V300 is characterized by its versatility when processing highly complex shaft-shaped components. With a multifunctional head and a magazine, the tried-and-tested PITTLER SKIVING technology can be implemented in high quality and with maximum productivity.

The V300 offers even more: it can be equipped with up to four supports and two main spindles. The efficient center drive technology can also be integrated into the machine.

Overall, the PITTLER V300 is the ideal solution for the processing of shafts. Thanks to the modular system, high flexibility and diverse software options tailored to the needs of the operators, the V300 is a perfect and powerful horizontal machine for the complex machining of shaft-shaped components.



YOUR ADVANTAGE

- Turning, milling, and gear cutting of shafts in only a single clamping
- Simultaneous machining of both shaft ends thanks to center drive technology
- 6-sided machining in main and counter spindle with up to four tool carriers
- Automatic tool changeover in 12 seconds with disk magazine
- Integrated automation for quick workpiece changes

Internal loader with external magazine



Machine with portal for top loading and external measuring station

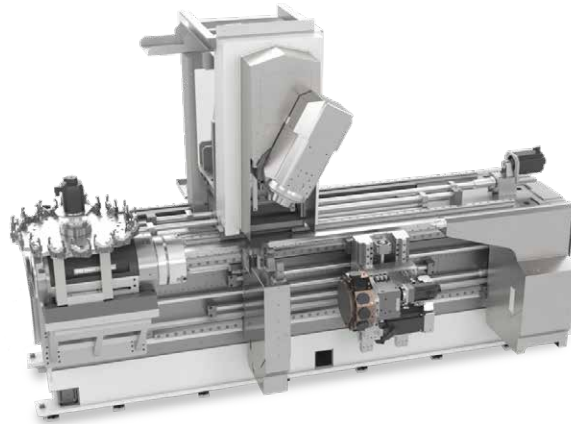


Overview of modular system

The PITTLER V300 features not only process-optimized performance but also diverse configuration options, which are perfectly tailored to the workpiece and customer requirements. This means it offers an unbeatable price-performance ratio.

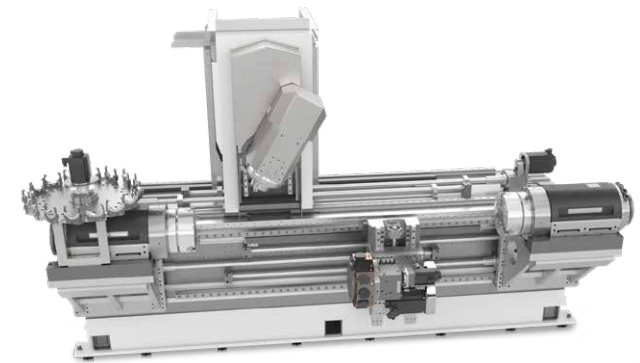
Regardless of whether it is used as a single-purpose machine with a main spindle and a multifunctional head for gear cutting on workpieces or whether it produces highly complex workpieces with four different tool carriers simultaneously on the main and counter spindle or the center drive: The V300 is able to adapt flexibly to the requirements of modern production with the highest quality and based on the customer's needs.

The modular system enables work-piece-adapted production. This reduces production times and thereby the cost per unit. Our priority is to increase the workpiece quality and the optimal use of resources, which was consistently implemented from the start in the development of the PITTLER V300.



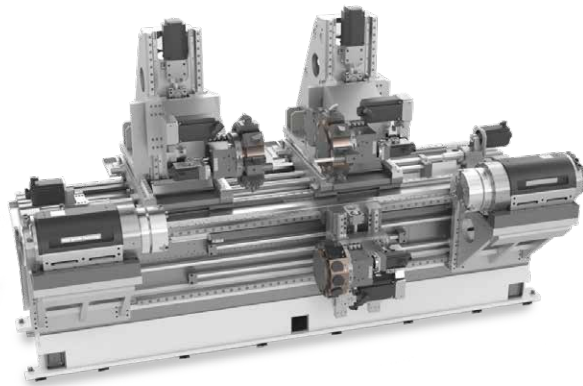
V300 S

- Powerful milling spindle with B-axis; In conjunction with a 16-slot tool magazine
- Lowerable steady rest: Switching between steady rest and headstock
- Lowerable tailstock: axial machining with milling spindle
- Powerful lower turret



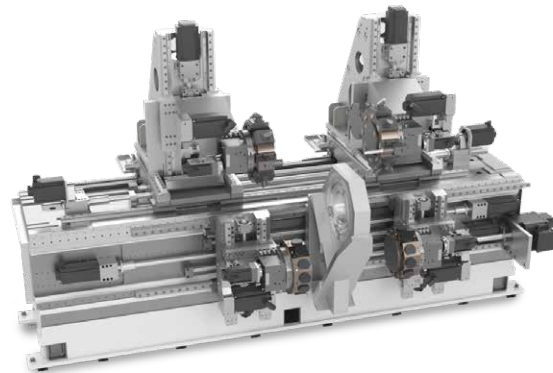
V300 MT

- 6-sided workpiece machining
- 5-axis machining
- Main and counter spindle
- Powerful milling spindle with B-swivel axis; WZM with 16 tools and Y-axis
- Lower turret optionally with driven tools in axis with milling spindle



V300 O

- 6-sided workpiece machining
- Main and counter spindle
- Three turrets optionally with powered tools
- Y-axis optionally on upper slide

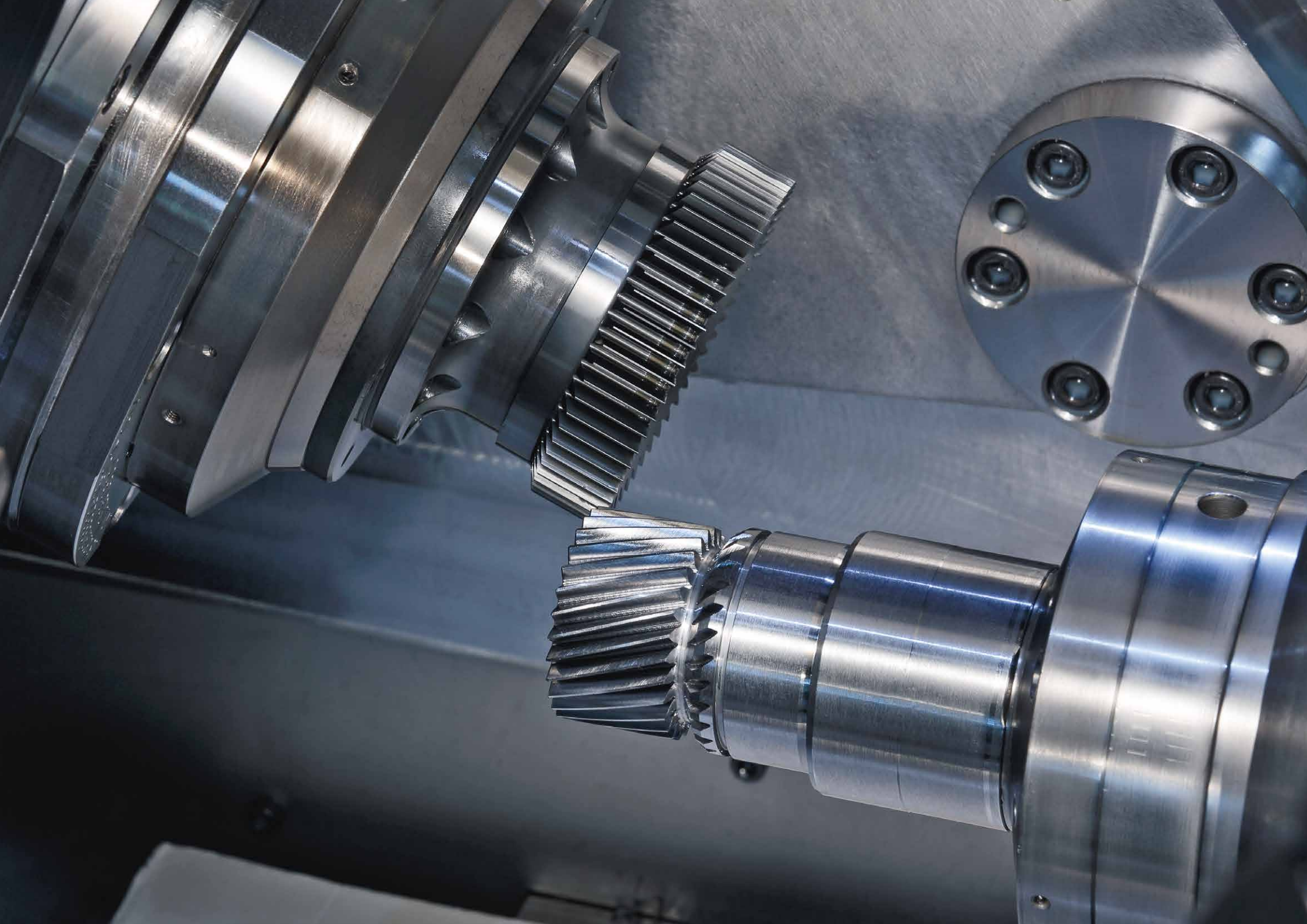


V300 CT

- 6-sided workpiece machining in a single setup
- Two upper turrets on a compound slide with X- and Z-axes and optional Y-axis
- Two ZX lower turrets with optional Life tools
- Highly efficient machine for processing the shaft ends in one clamping with the highest precision

Technical Data

	V300 S	V300 CT	V300 MT	V300 O
WORKPIECE				
Max. diameter (mm)	250	150	300	250
Length (mm)	1500	700	Process dependent	Process dependent
TECHNOLOGIES	Turning (XZ / XYZ), five-axis milling (XYZBC), gear-cutting			Turn (XZ/XYZ), three-axis milling (XYZ)
Drive	Spindle tailstock	Center drive	Main and counter spindle	Main and counter spindle
S1 - Max. torque of the main drive [Nm]	820		290	820



Pittler MultiTool

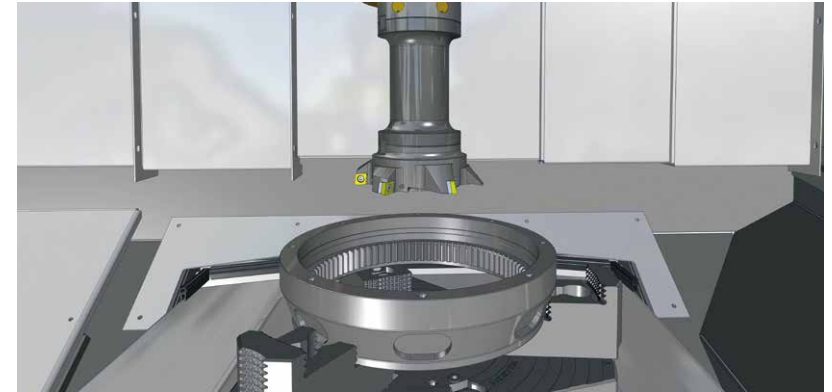
Saves Space, Time, and Money

The PITTLER MultiTool is a real multi-tasking talent. With up to six cutting edges on a tool, the tool change is carried out on the workpiece. This saves processing time and space in the tool magazine. Thanks to different adapter lengths that are perfectly matched to the geometry of the component, external, internal and facing operations, undercuts, or recesses can be implemented highly efficiently. Equipped with either an HSK or Capto interface, the PITTLER MultiTool fits perfectly into the processing concept of the PV315 / 630 SkiveLine.



YOUR ADVANTAGE

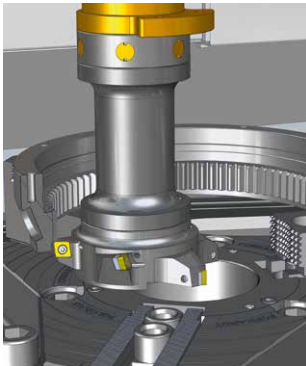
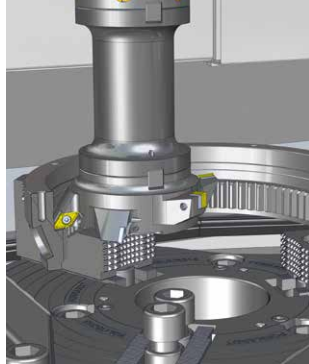
- Up to six turning tools in a reduced tool inventory
- Tool change in just 0.3 seconds
- Higher outputs thanks to shorter non-productive times
- More space for sister tools
- HSK or Capto compatible



The true potential of the PITTLER MultiTool becomes apparent in practice, as shown by the example of a hollow planetary gear ring that has already been implemented. This extremely precise gear part requires both internal and external machining to be carried out in a single setup, including roughing and finishing.

Traditionally, six different turning tools would be necessary, occupying six slots in the tool magazine and having to be changed in and out in the work area several times.

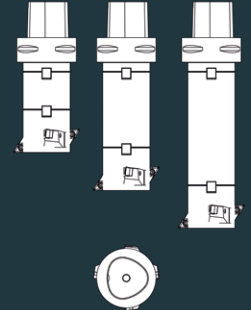
The MultiTool combines these tasks in a single tool.



The MultiTool head rotates the required cutting edge geometry into the processing plane in just 0.3 seconds. This facilitates longitudinal and facing operations as well as undercuts and grooving with different tool geometries. Alternatively, geometrically identical tools can be used at the cutting positions, which are rotated in at the end of the tool life.

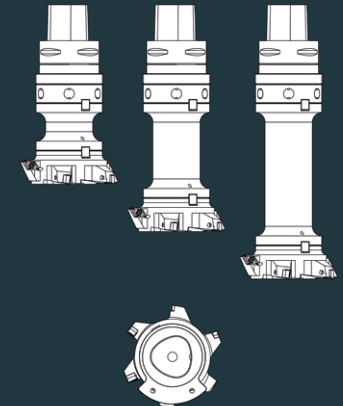
CONNECTION CAPTO C6 / HSK 63

Total length	Variable depending on requirements		
Extensions (mm)	40	80	120
Coolant (optional)	Coolant on all cutting edges		
Cutter head	four tools		
Cutter head ø (mm)	48 – 100		



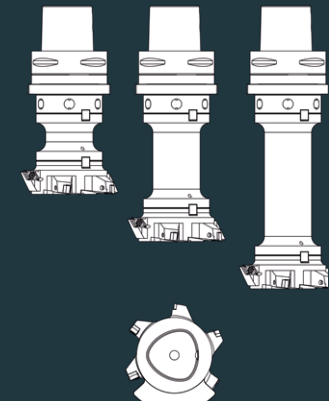
CONNECTION CAPTO C6 / HSK 63

Total length	Variable depending on requirements		
Extensions (mm)	50	100	150
Coolant (optional)	Coolant per cutting edges		
Cutter head	six tools		
Cutter head ø (mm)	100 – 120		



CONNECTION CAPTO C6 / HSK 63

Total length	Variable depending on requirements		
Extensions (mm)	50	100	150
Coolant (optional)	Coolant per cutting edges		
Cutter head	six tools		
Cutter head ø (mm)	100 – 120		





Large image: cylindrical peeling tool
Small image: Roughing tool with V-inserts

PITTLER tool engineering

Intelligent, individual, and cost-saving

Another important factor for rolling formwork is the tools and their cutting geometry. These are designed individually for each gearing (module and number of teeth). Roughing tools that are used for gears with a module greater than 3 are equipped with standard indexable inserts. They have a significant impact in terms of reducing wear on the skiving tools.

The finishing process is carried out by means of cylindrically or conically shaped, powder-metallurgical coated tools or carbide tools. At the end of their service life, these can be stripped, sanded, and re-coated. PITTLER offers turnkey tooling services from a single source, from tool design to finishing.

CONICAL SHAPED SKIVING TOOL

- Symmetrical profile
- Easy positioning and technology guidance
- High flexibility

CYLINDRICALLY SHAPED SKIVING TOOL

- Significantly longer service life due to larger usable width
- Profile consistency through regrinding
- Complex profiles possible (e.g., protuberance)

Pittler Indexable Inserts

The Solution for High Demands



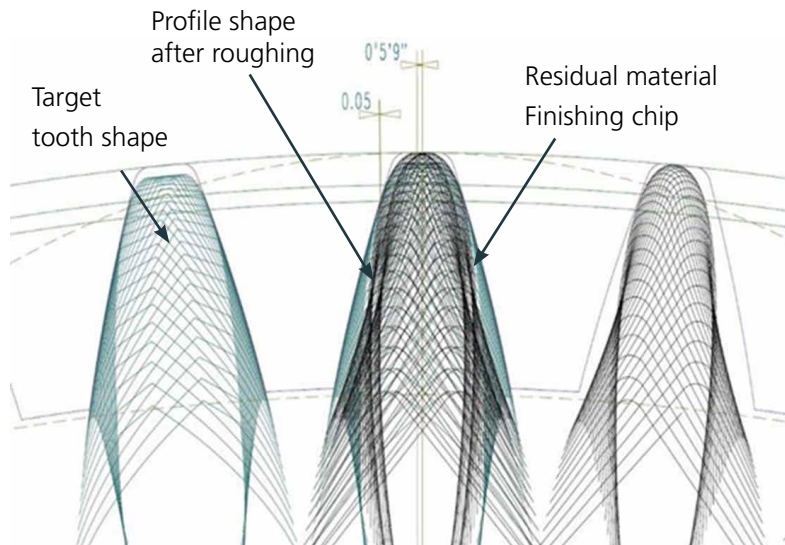
The use of PITTLER indexable inserts from module 4 opens up new possibilities in production. Here, the “large modules” are considered standard. At least one roughing tool and one finishing tool are used. But for special quality requirements, even two finishing tools with a single-flank cut can be used. However, previous approaches with V-shaped indexable inserts led to unfavorable results.

The V-shaped indexable inserts have suboptimal service lives in roughing machining due to their poor profile shape for skiving. The flank allowances are uneven and jagged flank profiles arise. These defects lead to a shorter service life of the expensive finishing tools. Furthermore, the full gap depth cannot be reached due to the limited insert height.

The answer to these challenges comes in the form of the PITTLER standard indexable insert. It features a near-evolute insert profile, which results in near-evolute workpiece profiles. A particularly uniform flank allowance is achieved, which in turn results in a longer service life of the finishing tools. These optimized inserts are ideal for roughing modules 4 to 10.

The innovation is that specific inserts have been developed for modules 4 – 6 and 6 – 10 respectively. This not only enables targeted adaptation to the different requirements of the modules, but also leads to faster cycle times compared to previous V plates. This is due, among other things, to the larger head radius. The cost structure is also optimized by these indexable inserts: The improved cycle times and downtime make the new solutions more attractive in terms of pricing.

Overall, the PITTLER standard indexable inserts are a groundbreaking innovation that skilfully overcomes the weak points of conventional V-shaped indexable inserts. They not only enable more efficient production, but also improved cost efficiency and product quality.



YOUR ADVANTAGE OVER SOLID TOOLS

- No regrinding process
- No large amount of capital tied up
- Does not require new setup with WKZ preset or profile correction
- No risk of transport damage
- No logistic organization
- Significantly less damage if a tooth breaks in the process

CHALLENGE

- At PITTLER, anything above module 4 is considered a 'large module'.
- Generally speaking, at least one roughing tool and one finishing tool are used.
- Two finishing tools with single-flank cut for special quality requirements
- Previously, V-shaped inserts were often used for rough machining

DISADVANTAGES OF V-SHAPED INSERTS

- Poor service life due to unfavorable profile shape for skiving
- Uneven flank dimensions and jagged flank profiles
- Shorter service life of expensive finishing tools
- In some cases the full gap depth cannot be achieved due to the limited insert height

SOLUTION: PITTLER STANDARD INDEXABLE INSERTS

- Near-involute indexable insert profile
 - Leads to near-involute workpiece profiles
 - Very even flank measurement
 - Cost savings due to longer service life of the finishing tools
- Roughing from modules 4 to 10
 - Two different indexable inserts for modules 4–6 and modules 6–10
- Faster cycle times than with V-plates
 - Due to larger head radius
- Lower cost due to better cycle times and downtime



SIMULINER OPERATE 08.09.23 16:33

Eingabe Schnittaufteilung

Zustellung (WKS mit Y - eingabe mm)

Werkzeug 1
 3 0.850 OFF ohne Ausgleich Zahnücke

Verzahnung 1
OFF OFF OFF

✓	E/A	ap.Y	ap.C1	mm/U	U/min	m/min	U/min	%	min	sek	AKW	Kappa	C	PART
	1	0.400	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	2	0.725	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	3	0.850	0.000	0.400	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	

✓ E/A ap.Y ap.C1 mm/U U/min m/min U/min % sek AKW Kappa C PART

0 0.000 0.000 0.000 0 0.0 130.0 0 0 0.0 0.000 0.000 0.000

55 0.000 0.000 0.000 530 2952.9 0.0 0 0 0.0 0.000 0.000 0.000

OFF

hz [WKS] 0.850 mm Zeit: 0.31 min -KSS- Ventil.Nr.: -LUFT- Ventil.Nr.:

25

0

^ Geladen 2023-08-08 16:33:30

Leerschritt	Werkzeug 1	Werkzeug 2	Werkzeug 3	Werkzeug 4	Werkzeug 5	Werkzeug 6

Exit

Zurück

Due to the fact that the PITTLE Skiving software generates the NC program fully automatically after the gear data, tool data, and cutting parameters have been entered, no specialized gear expert is required. Of course, the operator can easily and efficiently select various strategies, such as roughing and finishing with different tools, blank cut after deburring, etc., which enables the correct machining options to be carried out. This saves time and resources.

The PITTLE skiving software also boasts the "SkiveExpert" options for beginners and "free cutting data input" for gear experts.

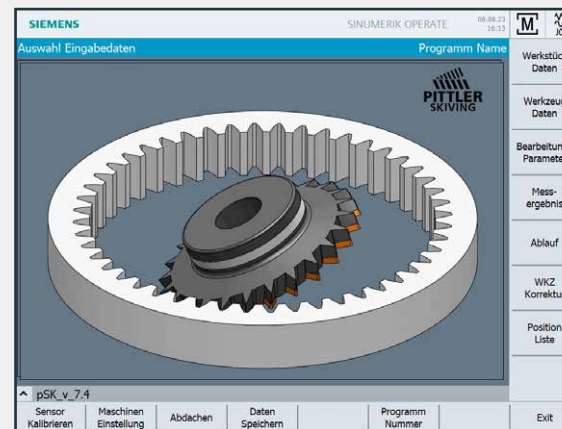
62

to adapt and optimize it perfectly for each component. With these versatile functions, the PITTLER skiving software offers an outstanding solution for high-quality and demanding gear cutting applications.

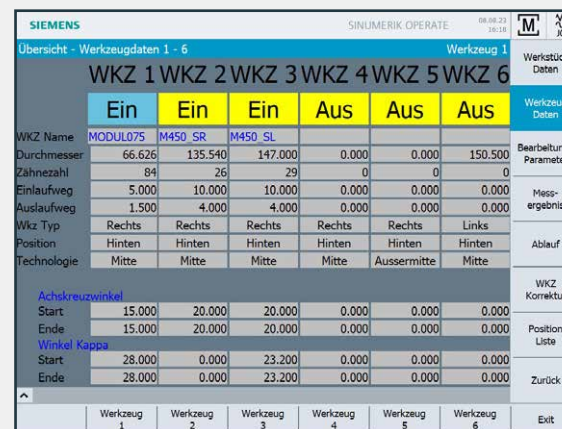
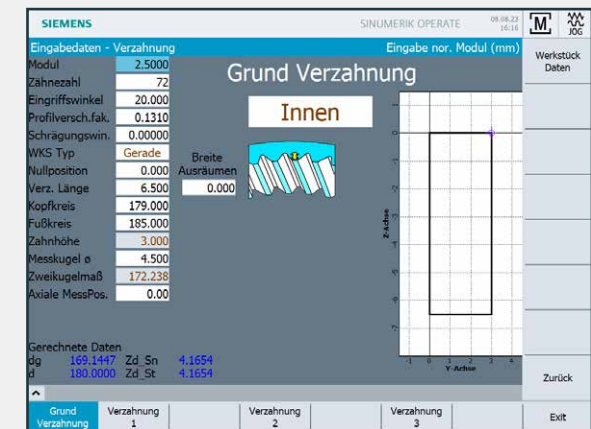
YOUR ADVANTAGE

- Workshop-oriented user interface for internal and external gears
- Integrated plausibility check of entered values
- Optional roughing-finishing strategy
- Automatic NC program generation, no gear expert required
- Pittler SkiveExpert with cutting strategy suggestion

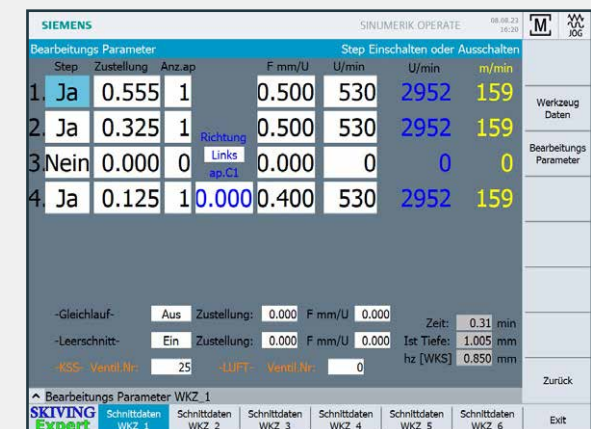
Call up the PITTLER SKIVING software



Enter the geometry data of the workpiece



Enter the geometry data of the tools



Enter the processing parameters

SkivingExpert

SIEMENS SINUMERIK OPERATE 08.08.23 16:23

Bearbeitungs Parameter

Step	Zustellung	Anz.ap	F mm/U	U/min	U/min	m/min
1.	Ja	0.175	2	0.377	397	2215 120
2.	Ja	0.245	1	0.330	397	2215 120
3.	Ja	0.105	1	0.320	397	2215 120
4.	Ja	0.149	1	0.000	0.160	397 2215 120

Werkzeugdaten
Durchmesser: 66.626
Achskreuzwinkel: 15.000
Zahnezahl: 84

Auswahl Werkzeug
Werkzeug 1
WKZ - Werkstoff: PM
Zugfestigkeit Werkstück: 1300 N/mm²

Zeit: 1.14 min
Ist Tiefe: 0.850 mm
hz [WKS]: 0.850 mm

Werkzeug Auswählen Info Daten Zurück Exit

YOUR ADVANTAGE

- Ideal for skiving beginners
- Self-explanatory user interface
- With just five parameters for gearing:
 - Specification from the tool manufacturer
 - Workpiece-specific information
- Subsequent optimization of the cutting strategy suggestion is possible

Simple corrections

SIEMENS SINUMERIK OPERATE 08.08.23 16:23

Eingabe - Werkzeugkorrektur Radiale Werkzeugzustellung (über Y-Achse)

Links Rechts

Y 0.000 Y 0.000

0.000 Ce 0.000 0.000 Ce 0.000

b L_{Ce} 0.000 Linear 0.000 L_{Ce} 0.000

C_β 0.000 C_β 0.000

19.000 Ce 0.000 Zwei - Flankig 0.000 Ce 19.000

Flankenlinie Soll Verz. 1 Flankenlinie Korrr. Verz. 1 Flankenlinie Soll Verz. 2 Flankenlinie Korrr. Verz. 2 Flankenlinie Soll Verz. 3 Flankenlinie Korrr. Verz. 3

Zurück Exit

SIEMENS SINUMERIK OPERATE 08.08.23 16:28

Eingabe - Werkzeugkorrektur Mdk Ist

Werkzeugkorrektur - Verzahnung

	1.	2.	3.
Mdk Soll	353.101	308.890	198.497
Mdk Ist	353.101	308.890	198.497
Mdk Abw.	0.000	0.000	0.000
Mdk Korrektur	0.085	-0.306	0.000

Istmaß Abweichung Flankenlinie fhβ Profilwinkel fhα Mdk Korrektur Meßtaster Korrektur Zurück Exit

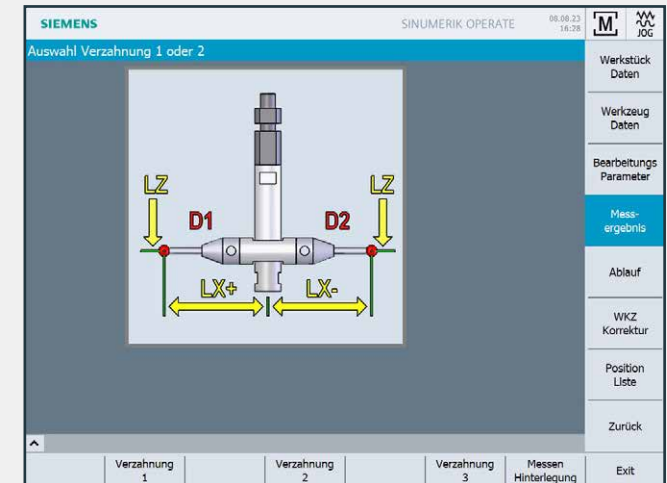
YOUR ADVANTAGE

- Simple operation possible without in-depth programming know-how
- Symmetrical/asymmetrical correction Flank line corrections
- Correction of diametrical two-ball measurement
- Targeted corrections of flank line angle such as end retracts possible
- Crowning corrections of flanks possible
- Preservation of dimensional deviations before a subsequent heat treatment

Operating software extensions

Measuring:

- In-process measurement of gearing
- Simple control and evaluation of integrated measurement processes
- Measuring of:
 - MDK, two-ball measure
 - Angle of the flank line or helix angle
- Automatic correction of measurement characteristics



Alignment with sensor:

- Easier setup
- Reduction of setup time for skiving with multiple tools
- Subsequent corrections of the tooth positions possible



Custom cutting data input

YOUR ADVANTAGE

- Every cut from 1–54 can be freely entered; This ensures a uniform, linearly degressive infeed without intermediate
- Almost every cutting parameter can be freely entered
- Ideal for large-module gears with a lot of roughing
- Ideal when using multiple tools, e.g., an indexable insert roughing tool and two finishing tools
- Many additional options such as rinse stop, alternating decreasing speed, rotation of the workpiece, or tool axis

SIEMENS

Eingabe Schnittpaufteilung

SINUMERIK OPERATE

08.03.2023 16:33

M

JO

Werkzeug 1

3 0.850 OFF ohne Ausgleich Zahnflücke OFF OFF OFF

Verzahnung 1

ON ON ON

Zustellung (WKS mit Y - eingabe mm)

0

	E/A	ap.Y	ap.C1	mm/U	U/min	U/min	m/min	U/min	%	sek	AKW	Kappa	C	PART
✓	1	0.400	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	2	0.725	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	3	0.850	0.000	0.400	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
✓	E/A	ap.Y	ap.C1	mm/U	U/min	U/min	U/min	%	sek	AKW	Kappa	C	PART	
○	0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000	
○	55	0.000	0.000	0.000	530	2952.9	0.0	0	0	0.0	0.000	0.000	0.000	

hz [WKS] 0.850 mm

Zeit: 0.31 min

-KSS- Ventil.Nr.: LUFT- Ventil.Nr.: 25 0

△ Geladen 2023-08-08 16:33:30

Leerschnitt ○ ✓

Werkzeug 1 Werkzeug 2 Werkzeug 3 Werkzeug 4 Werkzeug 5 Werkzeug 6

Einlaufverschiebung

Ausräumen

Rechnen



Position Liste

Zurück

Exit

Overview of input the custom cutting data table

- Custom entry of cutting parameters, cuts 1–54
- Option of entering two blank sections, e.g., when using two finishing tools

SIEMENS 08.08.2023 16:31  

eingabe Schnittaufteilung **Verzahnung 1** **Zustellgeschwindigkeit mit Y - eingabe mm)**

Werkzeug 1 **ohne Ausgleich Zahnflücke** ✔ ✔ OFF OFF OFF

E/A	ap.Y	ap.C1	mm/U	U/min	U/min	m/min	U/min	%	sek	AKW	Kappa	C. PART
1	0.400	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000
2	0.725	0.000	0.500	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000
3	0.850	0.000	0.400	530	2952.9	130.0	0	0	0.0	15.000	28.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000
0	0.000	0.000	0.000	0	0.0	130.0	0	0	0.0	0.000	0.000	0.000

E/A **ap.Y** **ap.C1** **mm/U** **U/min** **U/min** **m/min** **U/min** **%** **sek** **AKW** **Kappa** **C. PART**



0 0.000 0.000 0.000 0 0.0 130.0 0 0 0.0 0.000 0.000 0.000

55 0.000 0.000 0.000 530 2952.9 0.0 0 0 0.0 0.000 0.000 0.000

hz [WKS] 0.850 mm Zeit: 0.31 min **-KSS- Ventil.Nr.: -LUFT- Ventil.Nr.:**

25 **0**

Geladen 2023-08-08 16:33:30

Werkzeug 1	Werkzeug 2	Werkzeug 3	Werkzeug 4	Werkzeug 5	Werkzeug 6
 					

Exit

Alternating speed input

To enable a percentage, e.g., 5%, and a time in seconds, e.g., 0.5 seconds, enter in the white field in the desired cut.

Function: The speed is first reduced by 5% for 0.5 seconds and then increased again to 100% for 0.5 seconds (in constant alternation).

ProAC Software

Profile Angle Correction



ProAC is a software program from PITTLER that was specifically developed to calculate the machine parameters to reduce profile angle errors when skiving (PITTLER SKIVING).

To access ProAC, the DVS Connect portal is used. This requires either a computer or a mobile device, such as a cell phone or tablet. In the future it will also be possible to call up ProAC directly on the machine tool. This is made possible by the DVS Edge through a separate IPC that is connected to the Internet.

A big advantage of direct installation is that ProAC directly accesses the machine's gearing and tool data. The operator only has to enter the measured error of the profile angle. This simplifies operation and reduces potential sources of error.

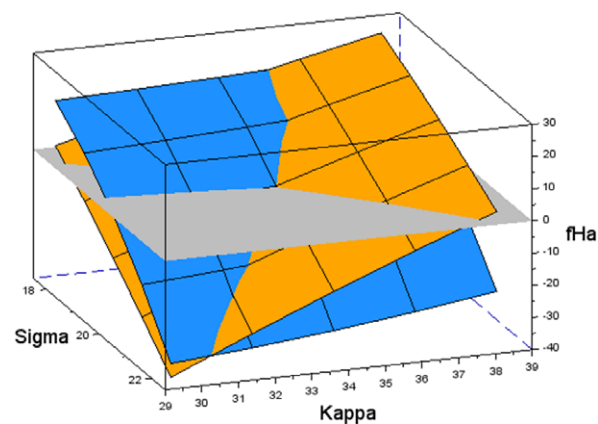
For a calculation with PITTLER ProAC, it does not matter whether cylindrical or conical tools are used. It is also irrelevant whether the profile angle error comes from tool production or is caused by the regrinding of the conical tools. ProAC can handle both variants and delivers reliable results.

Thanks to ProAC, companies can benefit from more precise profile angle calculation, resulting in improved quality of the workpieces produced. The software simplifies the process, saves time, and minimizes potential sources of error, which ultimately contributes to more efficient and economical production.

Function

ProAC is based on the concept of approximation through iterative calculation. Various variable parameters, such as the axis crossing angle (sigma angle) and the kappa angle, are varied according to a specific logic. The intersection points of the two profile lines are then compared with a zero degree profile angle error. In the ideal case, these three surfaces meet at one point, which theoretically results in a profile angle error of 0°.

Additionally, limit values are monitored to ensure that the tool does not collide with the workpiece if there is too much change in sigma or kappa.



GEMESSENE DATEN

Verwendeter ARW λ [°]: 20.0 Verwendeter Kappa K [°]: 34

Auswertebereich Kopf (mm): 183.8 Auswertebereich Fuß (mm): 189.5

fHa links [μm]: -5.0 fHa rechts [μm]: 5.0

EINGABEDATEN SPEICHERN EINGABEDATEN LADEN Flankenkorrektur: beide **START PROAC CALCULATION**

KORREKTURPARAMETER


Achskreuzwinkel Σ [°]: 0 Kappa K [°]: 0

Erwarteter fHa links [μm]: 0 Erwarteter fHa rechts [μm]: 0

Veränderung Auslaufweg [mm]: 0

MACHINING EXAMPLE

- Measurement result of the first component
- Quality profile angle error **fHa 7**

DIN 3961/62	Q	[...]	x	#63	#42	#22	#1	Zahn	#1	#22	#42	#63	x	[...]	Q	
	7	-12/12	6.8	6.2	7.8	6.4	6.6	fHa	-1.0	3	2.6	3.3	1.3	-12/12	5	
I=8	I=8	6	0/20	8.2	7.1	8.2	8.0	9.4	Fa	4.0	2.8	4.9	5.5	4.4	0/20	5
=7	=5	5	0/16	5.3	5.3	5.1	5.1	5.5	Fa	4.3	2.8	3.5	3.9	3.6	0/16	5

- Measurement result of the second component after calculation with ProAC
- Quality profile angle error **fHa 4**

DIN 3961/62	Q	[]	x	#63	#42	#22	#1	Zahn	#1	#22	#42	#63		x	[]	Q
	3	-9/9	0.0	1.9	2	-4	-1.8	fHa	1.1	-6	-2.2	-5		-6	-9/9	4
	5	0/14	5.1	4.7	5.0	5.7	5.1	Fa	4.5	4.0	3.5	3.9		4.0	0/14	4
	5	0/11	4.9	4.3	4.9	5.3	5.0	fHa	4.2	3.7	2.3	4.1		3.6	0/11	5

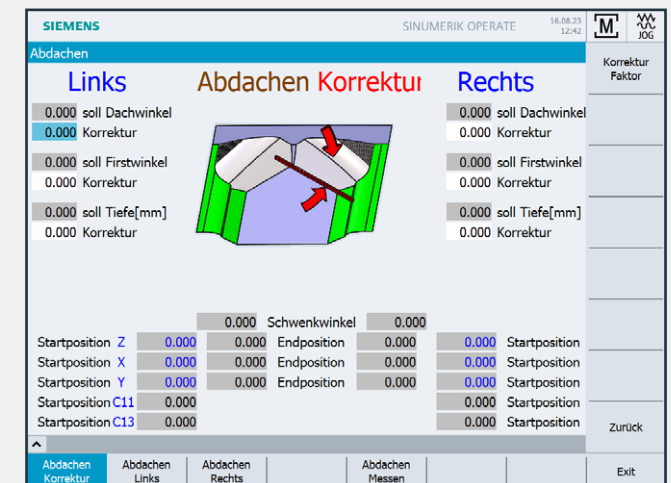
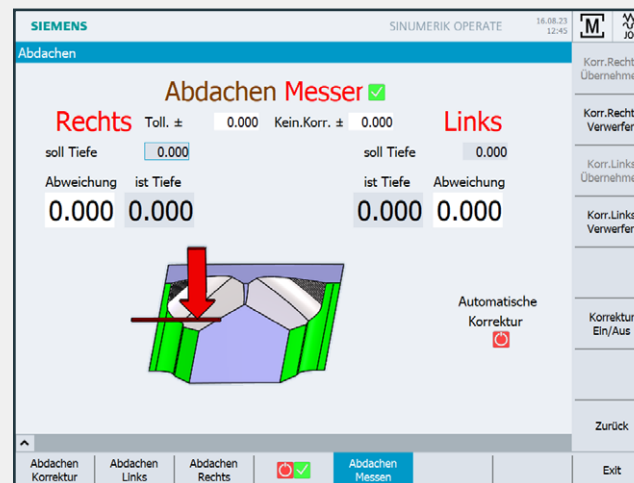
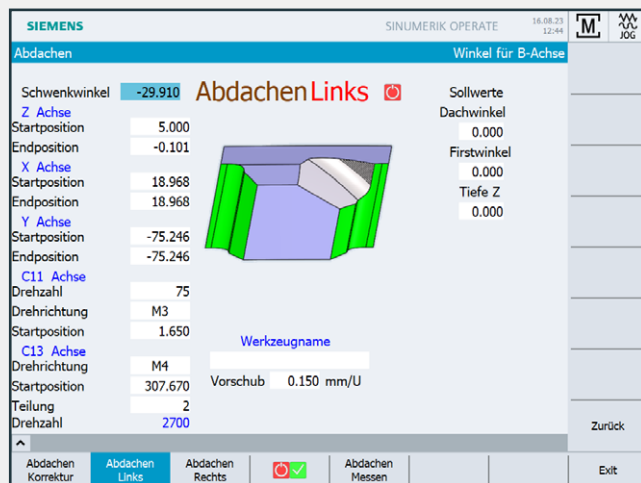
PITTLER SKIVING and PITTLER ProAC reduce waiting times, avoid unnecessary calculations, and good parts can be used from the second workpiece and tools despite fHa errors.

YOUR ADVANTAGE

- Easy to use (through the use of actual values)
- No complex calculations by operators necessary
- No more trial and error, operator errors are reduced
- Visual display for the operator or message if no improvement in the profile angle error is possible
- Reduction in the number of setup parts
- Reduces setup time
- Tool errors are compensated for and service life can be increased
- Both conical and cylindrical tools can be compensated
- Increasing machine availability through reduction in waiting time
- Can be used flexibly, i.e., machine-independently

Additional gearing processes

Another possible use for the PITTLER SKIVING software is pointing. Using the input masks specially developed by PITTLER, the use of the complex pointing kinematics is simplified and the process is more accessible for the operator.



Pointing:

- Self-explanatory user interfaces
- Integration of another manufacturing process without re-clamping
- No re-clamping error
- Easier setup
- Reduces setup time

Pointing correction and measuring:

- Defined tool corrections
- Correction of pointing angle, ridge angle, pointing depth
- In-process measurement of pointing
- Automatically correct while processing
- Measuring the pointing depth

Worldwide Service

Maximum Performance and Sustainability

PITTLER machines are used whenever performance is the top priority. In order to reliably and sustainably ensure this, customer-oriented service is an important aspect of what we do.

The aim of all our services is to sustainably increase our customers' earnings and to meet customer needs and expectations faster and better. To achieve this goal, we offer a variety of service products that are developed and constantly adapted in collaboration with our customers.

To ensure the longest possible life cycle for your machine, we offer the following services:

- Repair
- Maintenance
- Remote diagnosis
- Spare parts supply
- Training
- Production support
- Retrofit



Contact us:



Pittler T & S GmbH
Johannes-Gutenberg-Straße 1
63128 Dietzenbach
Germany

Tel. +49 (0) 6074 4873-0
Fax +49 (0) 6074 4873-294
info@pittler.de
dvs-technology.com/pittler

Members of the DVS TECHNOLOGY GROUP

DVS MACHINE



BUDERUS Schleiftechnik GmbH | dvs-technology.com/buderus-schleiftechnik
I.D. grinding – O.D. grinding – Bore honing – Hard turning



PITTLER T&S GmbH | dvs-technology.com/pittler
Vertical turning center and Pick systems – Gear cutting for complete machining



PRÄWEMA Antriebstechnik GmbH | dvs-technology.com/praewema-antriebstechnik
Gear honing – Gear grinding – Hobbing/Fly-cutting – Chamfering



rbc robotics GmbH | dvs-technology.com/rbc-robotics
Camera-guided robot automation systems

DVS INTERNATIONAL SALES & SERVICE



DVS Technology America, Inc. | dvs-technology.com
DVS Sales & Service in USA, Canada & Mexico



DVS Technology (Taicang) Co., Ltd. | dvs-technology.com
DVS Sales & Service in China

DVS SERVICES & TOOLS



DVS TOOLING GmbH | dvs-technology.com/dvs-tooling
Tool solutions and technology support for PRÄWEMA gear honing



NAXOS-DISKUS Schleifmittelwerke GmbH | dvs-technology.com/naxos-diskus
Conventional grinding tools – CBN and diamond tools



Werkzeugmaschinenbau Ziegenhain GmbH | dvs-technology.com/wmz
Motorspindles & Components



DVS Service GmbH | dvs-technology.com/dvs-service
Maintenance – Complete overhauls – Repairs



DISKUS WERKE Schleiftechnik GmbH | diskus-werke.dvs-gruppe.com
Face grinding – Double face grinding – Special machining

DVS PRODUCTION



DVS Precision Components (Taicang) Co. Ltd.
Precision powertrain components in series production for passenger cars and trucks on DVS machines