PITTLER T&S

COMPLETE TURNING AND SKIVING SOLUTIONS

Precision manufacturing of ring and shaft-shaped components
SkiveLine-Serie & V300

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SWF

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

DVS International Sales & Service:
Local DVS partners for sales and service in international markets.

FOCUS ON CORE TECHNOLOGIES

TURNING

MILLING

DRILLING

PITTLER SKIVING

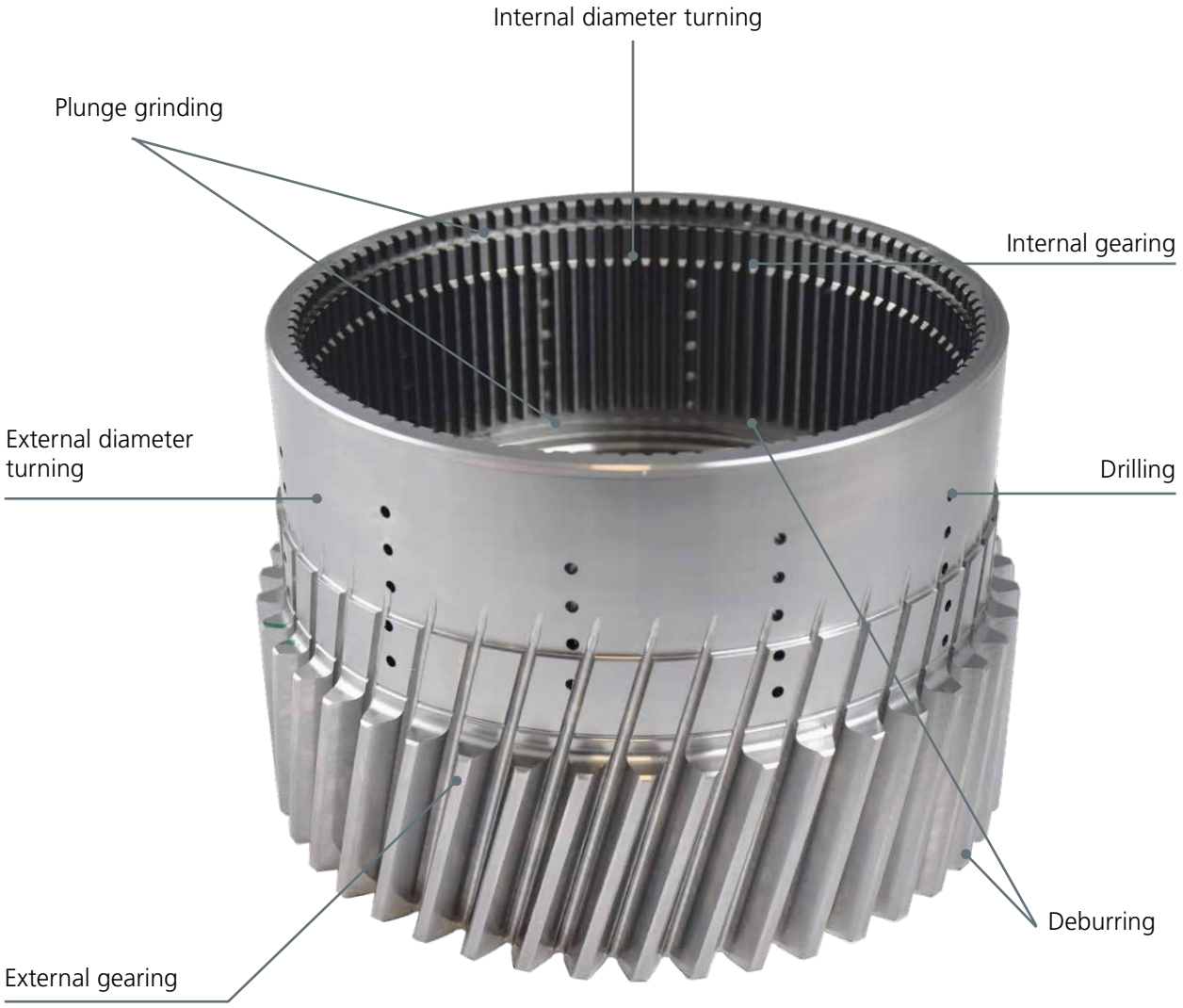
GRINDING

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

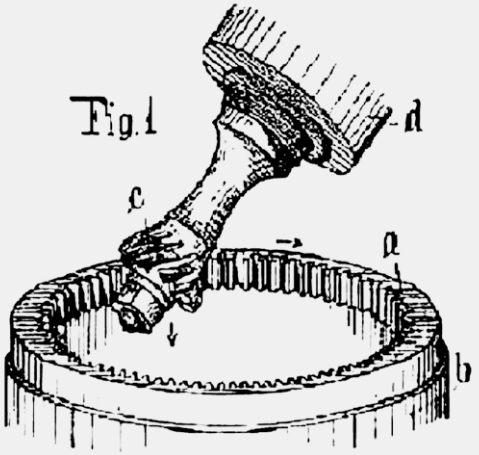
- High concentricity and gearing quality
- Short primary processing time
- Low process forces
- Moderate tool costs
- Can be combined with other machining methods
- Production of internal and external gears in one clamping
- Tools and technology from a single source

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.



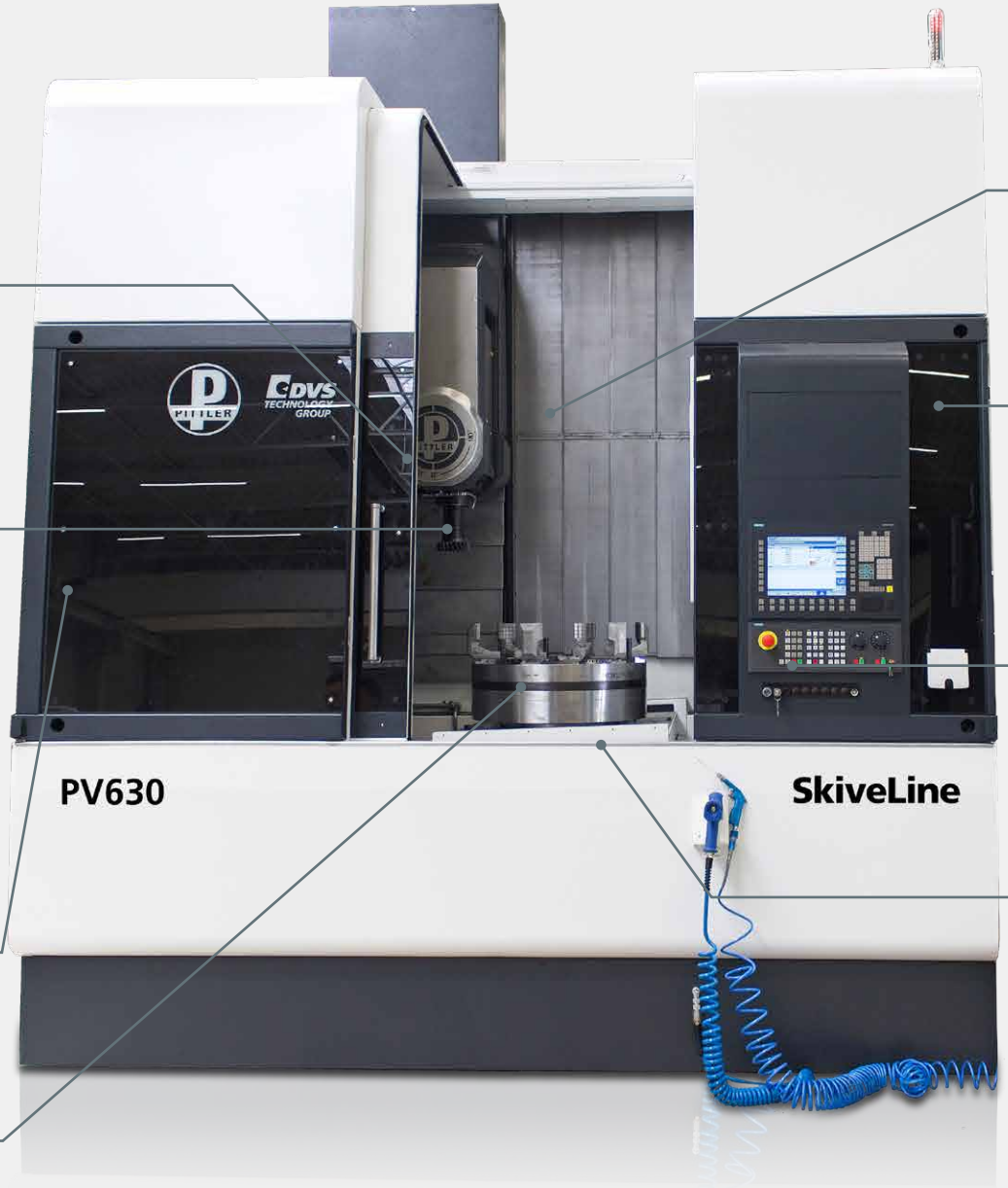
Stable multifunctional head for highly precise machining results
Complete machining is possible in conjunction with the tool magazine, multifunctional head with swivel axis, and a powerful tool spindle

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

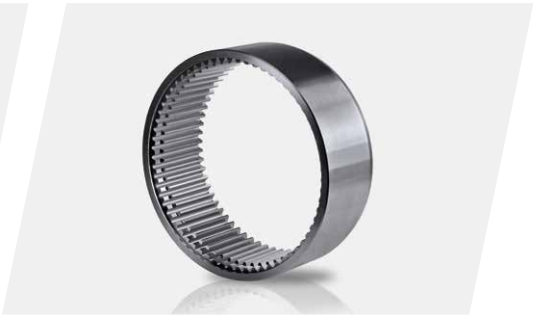
The all-rounder

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.



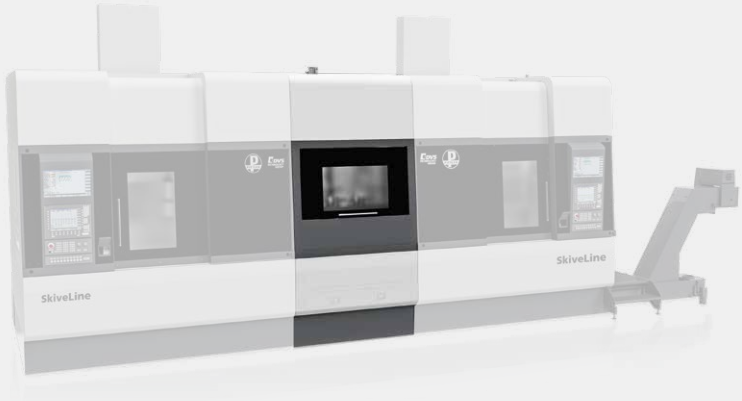
YOUR ADVANTAGE

- 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

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.

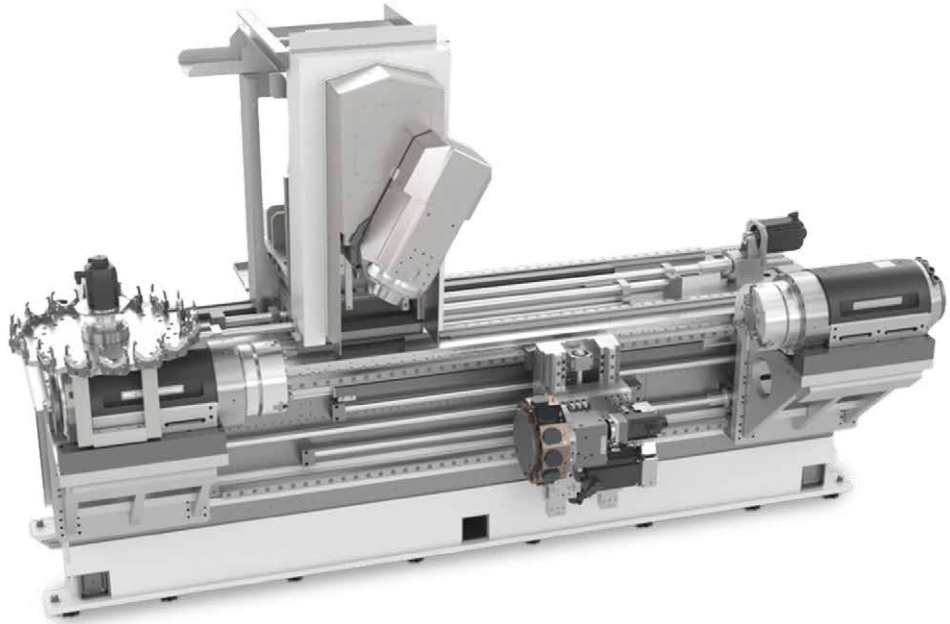
FOR DIAMETERS UP TO A MAXIMUM OF 350 MM

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

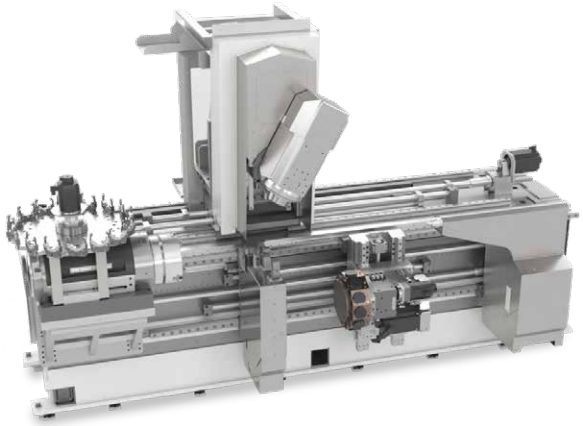
Machine with portal for top loading and external measuring station

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.

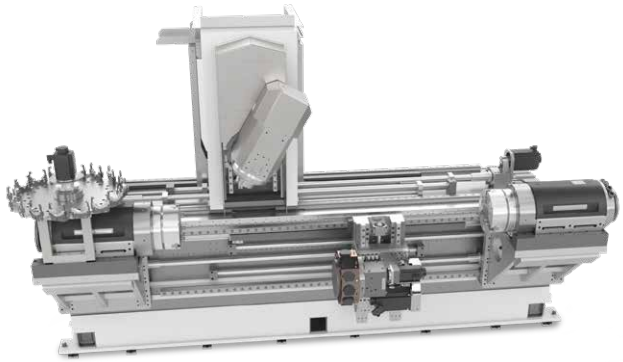
Regardless of whether it is used as a single-purpose machine with a main spindle and a multifunctional head for gear cutting on workpieces or whether it produces highly complex workpieces with four different tool carriers simultaneously on the main and counter spindle or the center drive: The V300 is 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.



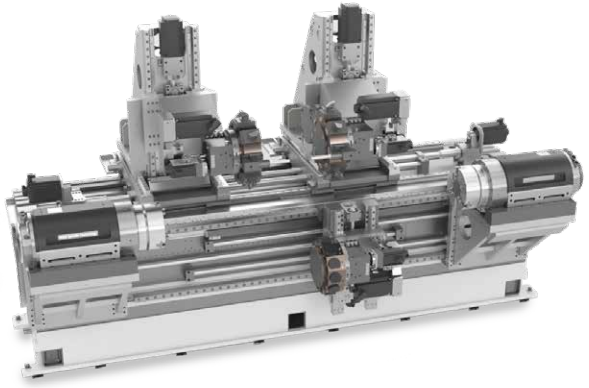
V300 S

- 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



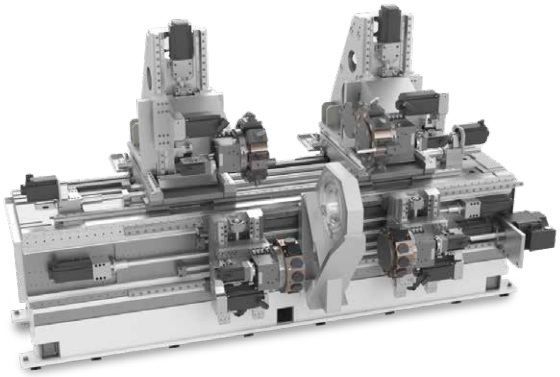
V300 MT

- 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

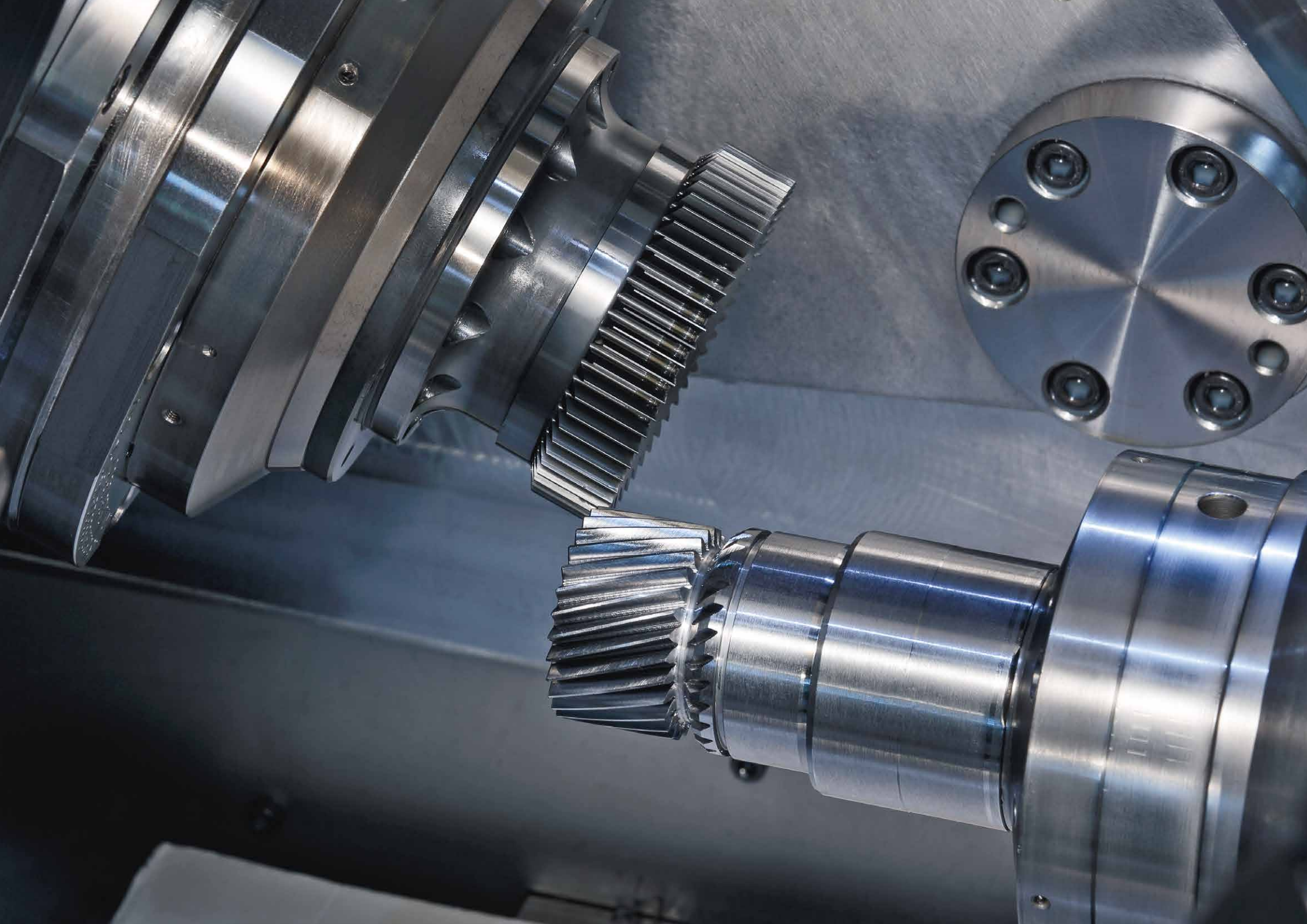


V300 CT

- 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



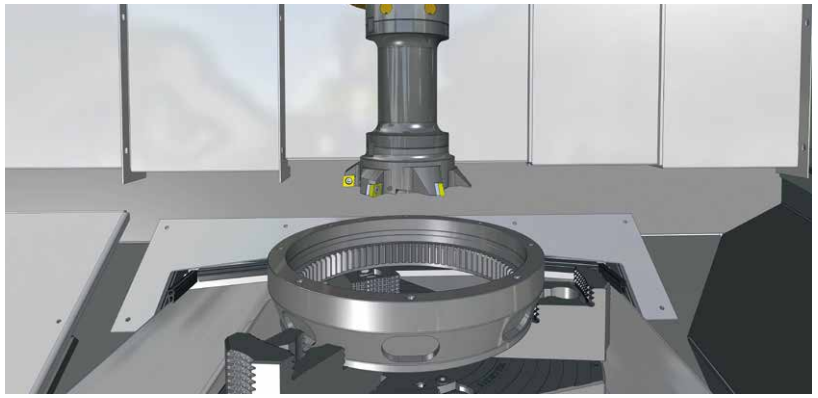
Pittler MultiTool

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

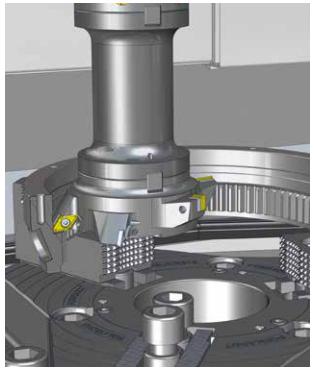
- Up to six turning tools in a reduced tool inventory
- Tool change in just 0.3 seconds
- Higher outputs thanks to shorter non-pro ductive times
- More space for sister tools
- HSK or Capto compatible

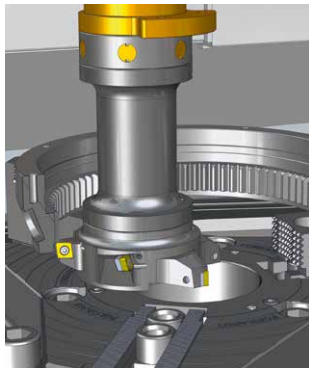


The true potential of the PITTLER MultiTool becomes apparent in practice, as shown by the example of a hollow planetary gear ring that has already been implemented. This extremely precise gear part requires both internal and external machining to be carried out in a single setup, including roughing and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

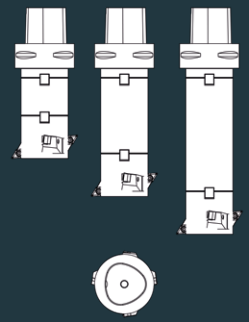
The MultiTool combines these tasks in a single tool.



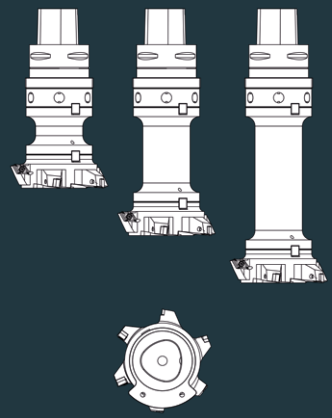


The MultiTool head rotates the required cutting edge geometry into the processing plane in just 0.3 seconds. This facilitates longitudinal and facing operations as well as undercuts and grooving with different tool geometries. Alternatively, geometrically identical tools can be used at the cutting positions,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

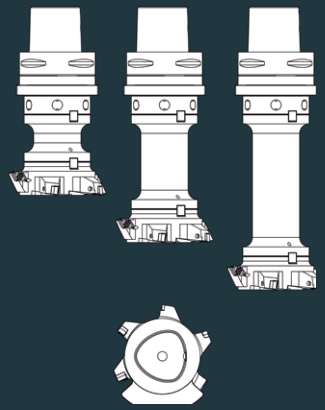
CONNECTION CAPTO C6 / HSK 63			
Total length	Variable depending on requirements		
Extensions (mm)	40	80	120
Coolant (optional)	Coolant on all cutting edges		
Cutter head	four tools		
Cutter head ø (mm)	48 – 100		



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

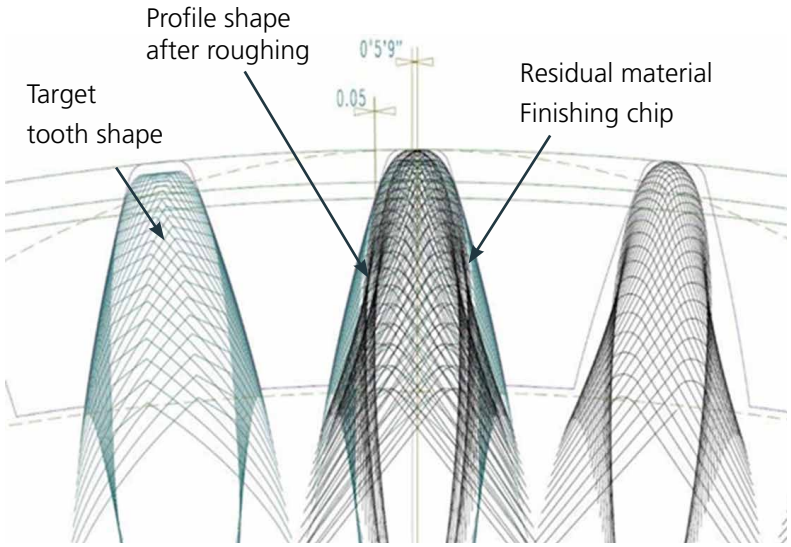
The use of PITTLER indexable inserts from module 4 opens up new possibilities in production. Here, the "large modules" are considered standard. At least one roughing tool and one finishing tool are used. But for special quality requirements, even two finishing tools with a single-flank cut can be used.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