PITTLER SkiveLine
Efficiently geared. Completely machined.
PITTLER T&S GMBH

PITTLER T&S develops and manufactures high-precision turning centres for the soft and hard turning as well as the drilling and milling of rotation-symmetrical components up to 5,000 mm in diameter.

In the spirit of the company founder, power skiving technology in particular has been developed into a highly efficient gearing technology and is established not only within the context of complete machining but also as an individual technology in the PITTLER machine portfolio.

DVS TECHNOLOGY GROUP

The DVS TECHNOLOGY GROUP is made up of experienced machining companies focussing on the turning, gear cutting and grinding technologies. The DVS TECHNOLOGY GROUP has more than 1,000 employees worldwide and is one of the leading system suppliers for machines, tools and production solutions for the machining of vehicle powertrain components before and after hardening.

The following divisions make up the DVS TECHNOLOGY GROUP:

DVS Machine Tools & Automation: Manufactures and sells high-precision machine tools, automation equipment and the associated services.

DVS Tools & Components: Develops, manufactures and sells customised machine components, tools and abrasives.

DVS Production: Series production of components for passenger cars and commercial vehicles using DVS machine tools.

DVS International Sales & Service: Local DVS Contact for Sales and Service on International Markets.
PITTLER SkiveLine – THE COMPACT MULTITALENT.

- Sturdy tool head for high-precision machining results
- Compact automation cell for fast workpiece changing in under 8 seconds
- Automatic generation of machining programs via own user interface
- Magazine for up to 20 tools and swarf-protected exchange of measuring sensors
- Cooling by emulsion, compressed air or a combination of both possible
- Design, manufacturing and conditioning of skiving tools from a single source
- Optional with integrated radial tooth-to-tooth testing device
- Efficient production of internal and external gearing within the context of the complete machining of soft and hardened components
- Efficient production of internal and external gearing within the context of the complete machining of soft and hardened components
- 4 5

Dimensions:
- 3 236 mm
- 2 804 mm
- 3 000 mm
- 1 600 mm
- 2 804 mm
Power Skiving is a machining method used for the manufacture of gear teeth, based on the patent by Wilhelm von Pittler from the year 1910. Over the past few years, the latest developments in manufacturing engineering have led to the technology becoming an efficient and flexible alternative for gear components.

Typical for Power Skiving is the diagonal arrangement of the tool axis to the component axis, known as the shaft angle. This adjustment of the tool, a defined axial feed and the coupled speed of tool and component result in a relative movement which effectively “peels” the tooth space from the component along the main cutting direction.

FLEXIBLE. EFFICIENT. POWER SKIVING.

POWER SKIVING – COMPARISON OF TECHNOLOGIES

Gear shaping

+ Flexible
+ Simple technology
+ High machining volume due to empty stroke approx. 3-8 x longer
+ Costs per workpiece higher
- Cannot be combined with other processes

Hobbing

+ High machining volume
+ Short machining time
+ Low tool costs
+ Common technology
+ Only for external gearing
+ Larger outfeed required than for skiving

Broaching

+ Extremely productive for high quantities
+ Very short machining times
+ Inflexible
- No compensation e.g. two-ball dimension
- High tool costs
- Long delivery times for tools
- Cannot be used for constraining contours
## THE PITTLER SKIVELINE-SERIES. FROM L TO XXL.

<table>
<thead>
<tr>
<th>Workpiece</th>
<th>P-SK 315</th>
<th>P-SK 630</th>
<th>P-SK 1250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. diameter [mm]</td>
<td>315</td>
<td>630</td>
<td>1250</td>
</tr>
<tr>
<td>Length [mm]</td>
<td>400</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Linear axis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis travel [mm]</td>
<td>900</td>
<td>1500</td>
<td>2200</td>
</tr>
<tr>
<td>Z-axis travel [mm]</td>
<td>800</td>
<td>800</td>
<td>1000</td>
</tr>
<tr>
<td>Y-axis travel [mm]</td>
<td>0 - 250</td>
<td>+100 - 110</td>
<td>+1 - 300</td>
</tr>
<tr>
<td>Feed force x,y,z [kN]</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>X-axis speed [m/min]</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Z-axis speed [m/min]</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Y-axis speed [m/min]</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Main spindle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle speed [rpm]</td>
<td>4000</td>
<td>1500</td>
<td>700</td>
</tr>
<tr>
<td>Main spindle drive [kW]</td>
<td>31</td>
<td>39</td>
<td>104</td>
</tr>
<tr>
<td>C-axis torque [Nm]</td>
<td>425</td>
<td>1375</td>
<td>7440</td>
</tr>
<tr>
<td>Multi-function head B-axis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pivoting angle [degrees]</td>
<td>110</td>
<td>240</td>
<td>270</td>
</tr>
<tr>
<td>Skiving drive [kW]</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Skiving spindle torque [Nm]</td>
<td>141</td>
<td>141</td>
<td>141</td>
</tr>
<tr>
<td>max. module</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

### APPLICATIONS

#### Hohlring
- **Number of teeth**: 108
- **Module**: 0.8
- **Inner diameter [mm]**: 86
- **Width of tooth [mm]**: 20
- **Tool life per regrinding**: 450
- **Number of regrinding**: 20
- **Processing time**: 23 sec.

#### Zweistufiges Planetenrad
- **Number of teeth A**: 43, 31
- **Module A**: 2.02, 1.91
- **Outer diameter [mm] A**: 104, 77
- **Width of tooth [mm] A**: 23, 24
- **Tool life per regrinding A**: 400, 450
- **Number of regrinding A**: 20, 12
- **Processing time A**: 58 sec., 55 sec.

#### Hohlring
- **Number of teeth**: 66
- **Module**: 1.755
- **Inner tip circle diameter [mm]**: 248
- **Width of tooth [mm]**: 90.8
- **Tool life per regrinding**: 70
- **Number of regrinding**: 30
- **Processing time**: 3.45 min/arc.
The tools and associated blade geometries are another important factor in Power Skiving. They are designed individually for each gear unit (module and number of teeth). Roughing tools, which are used for gear units with a module larger than 3 and which carry out approximately 80% of the machining, are equipped with standard reversible blades. Use of such blades makes a decisive contribution to reducing skiving tool wear.

Powder-metal coated cylindrical or tapered tools are used for the finishing process. At the end of tool life, these can be stripped, reground and then re-coated. PITTLER offers a complete tool service from a single source – from design of the tool to post-machining.

The key to precision can often be found in a machine’s chucking concept. PITTLER works together with SWS Spannungswerkzeuge GmbH from Schlüchtern on the development of chucking tools and Albert Klopfer GmbH from Rennlingen. Both companies develop tailor-made clamping systems which are matched exactly to your workpieces.

An in-house manufacturing depth of almost 100% guarantees the SWS quality which lays claim to guaranteeing 100% reproducibility through a significantly longer service life thanks to larger useful width.

The tool magazine of the PV-series is the key to more flexibility during production of complex parts. With room for up to 100* tools it permits the efficient implementation of upstream and downstream processes such as turning or deburring, right through to complete machining.

The tool magazine provides a special advantage for the gear cutting process since it relieves the strain on the tools during material removal. The rough skiving tool which is equipped with standard indexable inserts is loaded first and removes up to 80% of the machining volume. Then a high-quality, powder-metal-coated skiving tool is loaded. It is used for dressing only and is saved during rough skiving.

The PITTLER MultiTool increases the capacity of the tool magazine. With up to 6 turning tools on one adapter, there is more room for other tools. The PITTLER MultiTool reduces the tool change time to just 2 seconds.

*For model P-SK 1250

Significantly higher service life thanks to larger useful width

Symmetrical profile

Simple positioning and technology guiding

High flexibility

**MORE FLEXIBILITY THANKS TO TOOL MAGAZINE.**

---

**CLAMPING DEVICES FROM A SINGLE SOURCE.**

The key to precision can often be found in a machine’s chucking concept. PITTLER works together with SWS Spannungswerkzeuge GmbH from Schlüchtern on the development of chucking tools and Albert Klopfer GmbH from Rennlingen. Both companies develop tailor-made clamping systems which are matched exactly to your workpieces.

An in-house manufacturing depth of almost 100% guarantees the SWS quality which lays claim to guaranteeing 100% reproducibility through a significantly longer service life thanks to larger useful width.
PITTLER has developed the automation cell PAC for the efficient material flow of workpieces up to 270 mm in diameter. Shorter travel paths and an integrated workpiece shuttle make significantly shorter workpiece changeover times possible. In addition, the loading paths inside and outside the machine cell have been separated to a major extent in order to minimise the carrying over of chips and emulsion.

Despite the very compact design with a footprint of only 4.5 m², the loading system on the inside is easily accessible. Thanks to the open design, the PAC can be extended with additional testing or machining systems and thus be used in multi-functional applications. The automation cell is equipped with SPC discharge and NOK belt as standard.

Your advantage
- Short workpiece changeover times
- No carrying over of chips or emulsion
- Compact design with a footprint of only 4.5 m²
- Can be expanded with measuring or machining systems

Two SkiveLine machines can be loaded by one PAC cell without any affect on cycle time.

CLOSED-LOOP COMPONENT TESTING.
A radial tooth-to-tooth testing device can be integrated in the automation cell for the automatic quality testing of internal and external gearing. Gear teeth are thus inspected for manufacturing-related errors directly after machining and without leaving the machine. This guarantees a consistently high component quality, since the measured values are transmitted in real time to the machine for readjustment, resulting in correspondingly fewer faulty parts.

CUSTOMISED AUTOMATION SOLUTIONS FOR MASS PRODUCTION.
Every production plant has its own philosophy as far as achieving maximum efficiency is concerned. For this reason, PITTLER offers tailor-made automation solutions for individual companies.

The engineers at PITTLER have a huge range of experience to draw on, which includes robot arm-supported manufacturing islands or pivoting grippers with connected conveyor belt integrated in the work chamber.
SKIVING USER INTERFACE FOR SIMPLE GEAR CUTTING.

Thanks to the easy navigation of the skiving user interface, which can be used to control both gear cutting and measuring processes, PITTLER Skiving Centers can be operated without in-depth programming knowledge being necessary. Once the geometry and process data have been entered, the control software automatically calculates the program and starts machining.

To monitor quality, various measuring processes can be controlled and evaluated with the aid of the skiving user interface. Thus the two-ball dimension and the quality of the flank line can be evaluated. Corrections as well as specific corrections of the profile and flank line angle are possible.

Programmübersicht

Your advantage

- Simple operation possible without in-depth programming knowledge
- Profile faults on the tool are easy to compensate
- Straightforward control and evaluation of integrated measuring processes
- Specific offset of the flank line possible.

GLOBAL SERVICE

PITTLER machines are in use wherever top performances are required. In order to guarantee the reliable fulfilment of these requirements long-term, customer-friendly service is an important factor in our products.

The objective of all our services is to increase our customers’ yield sustainably and satisfy customer requirements and expectations faster and better all the time. In order to achieve this objective, we offer numerous service products which are developed and constantly adapted in cooperation with our customers.

To make your machine life cycle as long as possible, we offer the following services:

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

Trainings

Maintenance / Service
Mitglieder der DVS TECHNOLOGY GROUP
Members of the DVS TECHNOLOGY GROUP

DVS MACHINE TOOLS & AUTOMATION

BUDERUS Schleiftechnik GmbH | www.buderus-schleiftechnik.de
Innenrundschleifen – Außenrundschleifen – Gewindeschleifen – Bohrungshonen – Hartdrehen
I.D. grinding – O.D. grinding – Thread grinding – Bore honing – Hard turning

DISKUS WERKE Schleiftechnik GmbH | www.diskus-werke.de
Planseiten-Schleifen – Doppeln-Schleifen – Sonderbearbeitung
Face grinding – Double face grinding – Special machining

DVS Universal Grinding GmbH | www.dvs-universal-grinding.de
Kombinierte Hartfeinbearbeitung für Klein- und Mittelserien
Combined Hardfine Machining for small and medium size batches

PITTLER T&S GmbH | www.pittler.de
Vertikal-Drehbearbeitungszentren & Pick-up-Systeme – Verzahnungszenren
Vertical turning centers and Pick-up systems – Gear cutting centers

PRAEWEMA Antriebstechnik GmbH | www.praewema.de
Verzahnungshonen/-schleifen – Verzahnungsfräsen – Anspitz-/Hinterlegungsfräsen
Internal and External Gear honing – Gear grinding – Hobbing/Fly-cutting – Chamfering

WMS Werkzeugmaschinenbau Sinsheim GmbH | www.wms-sinsheim.de
Service-Dienstleistungen – Generalüberholungen – Reparatur von Baugruppen
Maintenance – Machine Retrofit – Repairs

WMZ Werkzeugmaschinenbau Ziegenhain GmbH | www.wmz-gmbh.de
Dreh- & Kombinationsbearbeitung wellenförmiger Bauteile – Motorspindeln
Turning & Combined machining of shafts – Motor spindles

DVS TOOLS & COMPONENTS

DVS TOOLING GmbH | www.dvs-tooling.de
Werkzeuglösungen und Technologiesupport für das PRAEWEMA Verzahnungshonen
Tool solutions and technology support for PRAEWEMA gear honing

NAXOS-DISKUS Schleifmittelwerke GmbH | www.naxos-diskus.de
Konventionelle Schleifwerkzeuge – CBN & Diamantwerkzeuge
Conventional grinding tools – CBN & Diamond tools

DVS PRODUCTION

DVS Production GmbH | www.dvs-production.de
DVS Technologien in der Serienfertigung für PKW-Komponenten
DVS Technologies in mass production for passenger car components

DVS Production South GmbH | www.dvs-production-south.de
DVS Technologien in der Serienfertigung für Nutzfahrzeug-Komponenten
DVS Technologies in mass production for commercial vehicle components

DVS INTERNATIONAL SALES & SERVICE

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

DVS TECHNOLOGY CHINA
DVS Technology (Shenyang) Co., Ltd. | www.dvs-technology.com
DVS Sales & Service in China

DVS TECHNOLOGY EUROPE
DVS Technology Europe GmbH | www.dvs-technology.com
DVS Sales & Service in Europe

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

Tel +49 (0) 6074 4873 - 0
Fax +49 (0) 6074 4873 - 294
Mail info@pittler.de
www.pittler.de

www.dvs-technology.com

klimaneutral
natureOffice.com | DE-654-372066

Tel +49 (0) 6074 4873 - 0
Fax +49 (0) 6074 4873 - 294
Mail info@pittler.de
www.pittler.de