An overview of ZOLLER inspection solutions

Tool measuring technology
ZOLLER solutions - comprehensive optimization of your manufacturing operations to increase quality, efficiency and productivity. To do this, ZOLLER combines measuring machines, hardware, software and services to create individual system solutions that guarantee you a sustainable and competitive advantage.

The ZOLLER company is a worldwide expert and market leader in the field of metrology for tools and tool-based manufacturing organizations. ZOLLER has been developing innovative tool presetter and measuring machines and measuring equipment as well as software for measuring, inspection and the management of metal cutting tools for over 70 years.

In close cooperation with our customers and partners, ZOLLER has developed practice-oriented and user-friendly leading edge technology at our facilities in Germany, a commitment now in its third generation of the family-run business. Certified according to DIN EN ISO 9001:2008 and DIN EN ISO 14001:2004 for quality and environmental management, we manufacture durable quality products which excel through highest precision and maximum efficiency.

Our worldwide subsidiaries and agents guarantee customer proximity and first class service in local markets. Our declared aspiration is for products with our name to fully satisfy your requirements and make a measurable contribution to your success.

Yours, the ZOLLER family
Alexander Zoller, Christoph Zoller, Eberhard Zoller
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Inspection and measurement technology? ZOLLER has the solutions

For perfect regrinding or manufacturing processes

Whether incoming tools inspection, manufacturing or final inspection: ZOLLER offers the perfect solution for checking and measuring tools. For 100% perfect tools – always and everywhere.

ZOLLER solution circular grinding
»pomDiaCheck« determines the diameters (circular grinding) of circular ground tools or blanks with high precision < 2µm.

ZOLLER solution face grinding and much more
»pomBasic« allows face grinding to be checked close to the process: the important parameters are checked quickly and easily during feeding to the CNC guided grinding machine.

ZOLLER solution rounding
»pomSkpGo« microscopically small cutting edge preparations can be checked and measured quickly and contactless.

»pomDiaCheck« determines the diameters (circular grinding) of circular ground tools or blanks with high precision < 2µm.

ZOLLER metrology ensures the quality of tools in new production runs and also reduces the start-up times for machines.

Transfer of tool data to the programming software. Complementation or new generation of the CNC program. Installation and simulation of the measuring procedures on the 3D tool model using the ZOLLER »caz« virtual system.

Re-sharpening or regrinding of tools at the universal tool grinding machine with the NC programs provided via the interface. Using the parameters from the original tool, the set-up times are reduced considerably as parameters are already known. Only the position of the cutting edge needs to be determined with the machine’s sensor. ZOLLER metrology ensures the quality of tools in new production runs and also reduces the start-up times for machines.

Using ZOLLER »genius«, tools are checked 100% prior to shipment. The measured values are collated in test reports and supplemented with further parameters if required. This enables verification of accuracy, avoids complaints, reduces costs and enhances supplier assessment.

On-time delivery of high-quality and documented tools.

1. Delivery
2. Incoming tools inspection
3. Machine programming
4. Production of tools
5. Final inspection
6. Shipment

Delivery of worn tools: cleaning and sorting.
Collection of actual data with ZOLLER »genius«, »veriScheck« or »pomBasic« series with »genius« the relevant data for the grinding program are measured automatically and transferred paperless to the corresponding programming system via the ZOLLER interface. The actual wear dimensions for regrinding of the tools are determined using »pomBasic« in order to remove as little material as possible and preserve the tools as best possible.

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On-time delivery of high-quality and documented tools.
From simple measuring tasks to highly complex challenges

The right measuring solution for every application

At ZOLLER you can find solutions ranging from simple and in-process inspection through to cost-effective and fully automated measurement of all tool parameters. With its »pom« series, ZOLLER’s proven universal measuring machines and smart automation solutions offer a broad spectrum of tool metrology ranging from entry level to superior level.

ZOLLER offers workshop-compatible and traceable compact solutions for universal tool inspection – easy to operate, adapted to your requirements and for universal use wherever measuring and inspection tasks need to be solved.

Checking

Tool management, easy measuring of the grinding wheel package, data transmission and the inspection of first grinding results are all essential for the effective set-up of grinding machines. ZOLLER offers solutions with guaranteed minimization of set-up times and maximum process safety, all based on intuitive and easy operation.

Set-up

Automatic control, traceability and documentation have become indispensable in the field of metrology. ZOLLER’s automation solution »roboSet« sets standards for efficient quality control up to 100%.

Automated quality assurance
Innovative technology for highest accuracy

Precision has a name: ZOLLER

Every detail of the ZOLLER measuring and inspection machines offers maximum quality. Innovative technologies and superior operating comfort result in precision far greater than the mere result in micros. ZOLLER achieves this precision fully automated and process-safe, with pre-structured data, proven documentation and, if required, special solutions.

1. Multi sensor technology
   Image processing systems with incident and transmitted light and special sensors for contactless and automatic detection of various tool contours, surfaces, cutting edge preparations and many other tool geometries.

2. Segmented LED ring light of the CCD camera
   Showing products in the right perspective: tool contours are displayed in minute and brilliant detail with the special LED lighting and evaluated using »pilot 3.0« image processing.

3. Automatic/Control (CNC)
   Fully automated CNC-control of the axes of the measuring machines for operator-independent full control of optional types of tools.

4. Tool clamping
   Universal high precision spindle with integrated calibration balls and power-operated tool clamping for SK, HSK, Capto, Hydrodehn and many others, with rapid tool post change, changing precision 0.001 mm.

5. Special solutions
   The right solution for every challenge – ZOLLER!
   Even highly complex helical tools, for example hob cutters, can be measured fully automatically and precisely due to intelligent technology.

6. Automation
   Fully automated checking and inspection of serial tools for 100% final inspection and documentation.

7. Image processing/Software
   Intuitive image processing for fast and micro-precise measurement results. Perfecly matched CCD cameras, lenses and automatically controlled LED lighting ensure that ZOLLER deliver brilliant cutting edge images, provide smooth inspection within seconds as well as micro-precise contours for metrology.
Clear and intuitive software

ZOLLER makes measuring simple and safe

The benefits of simple to operate measuring solutions are obvious: with the aid of automated solutions, tools are measured reliably and accurately at the push of a button, operator-independent, and consistently repeatable. Results are recorded in their entirety and documented in detail. The advantage: expensive errors and complaints are avoided, consistent quality is achieved resulting in cost recovery and shorter delivery times.

1. Select the type of tool from the overview
2. Select the parameters to be measured and start. No programming required
3. Measured results are displayed, the actual data is archived. Descriptions can be edited using the "apus" test report.

Check profiles: "coCon" for form tools

Measurement program for scanning tool contours and calculation of contour correction using the target DXF file of eroded or ground form tools. Output of the new contour is in DXF format.

"roboSet" – the automation solution

Runs smoothly for 24 hours, 7 days a week – just by clicking the start button of the ZOLLER »pilot 3.0« image processing system. For more information on ZOLLER automation solutions see page 40.

Detailed and graphic evaluation of cylindrical hob cutters according to DIN 3968.

Documentation of the concentricity/ran-out of the hub diameters, deviation in shape/position of the rake face, deviation in shape of the cutting edge/tooth thickness, flute direction and many more parameters, including grading of the quality class.

Complete evaluation according to DIN 3968 for hob cutters

100% documentation
Tool-specific measuring procedures
Process optimization
The compact solution for universal tool inspection

»pomBasic«
»pomBasicMicro«

The ZOLLER inspection machines »pomBasic« and »pomBasicMicro« measure and check drills, milling cutters and countersinks – in all sizes, and down to micro tools. Compact and universal, the machines can be employed in the metrology room, tools receiving or directly in manufacturing.

The individually adjustable »pomSoft« image processing system with intuitive operation offers numerous measuring and evaluation algorithms with automatic cutting edge search. These are used primarily for measuring angles, distances, wear and tear, cutting edge quality and micro sections. The video microscope system with zoom optics allows for brilliant recording of the tools, adjustment of sections and thus detailed inspection.

The universal holding fixture accepts shaft tools from 2 to 40 mm. The prism can be rotated by ±90° for axial and radial measurement.

**Technical specification**

<table>
<thead>
<tr>
<th></th>
<th>»pomBasic«</th>
<th>»pomBasicMicro«</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel range X-axis</td>
<td>190 mm</td>
<td>190 mm</td>
</tr>
<tr>
<td>Travel range Y-axis</td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>Fine adjustment</td>
<td>55 mm</td>
<td>55 mm</td>
</tr>
<tr>
<td>Measurable and clampable shaft Ø</td>
<td>0.5–50 mm</td>
<td>0.5–50 mm</td>
</tr>
<tr>
<td>CCD camera Field of vision</td>
<td>6.5-fold zoom lens (color)</td>
<td>12-fold zoom lens (b/w)</td>
</tr>
<tr>
<td></td>
<td>3 x 2.5 mm – 20 x 16 mm</td>
<td>0.8 x 5 mm – 7 x 5.8 mm</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The mobile solution for measurement of the cutting edge preparation

»pomSkpGo«

The ZOLLER solution for milling tools and reversing plates scores with 100% workshop compatibility, unlimited mobility, intuitive operation and precisely traceable results. The stiff and light basic carbon design enables a high level of accuracy as well as mobile use: the machine is set up at the place of operation and can be started after only 5 minutes.

Major advantages are: easy operation, contactless measurement and fast alignment of tools. This allows even untrained operators to conduct highly accurate measurements by themselves within minutes. Easy to load tool holding fixtures and fast and universal positioning of the cutting edge under the high-resolution sensors with live image form the basis of perfect measuring results.

»pomSkpGo« with »Z3dCam« and Notebook with Software »pomSoft«.

Live image of the cutting edge preparation for fast alignment and checking of surface.

Results and evaluation

Measured results and graphic section profiles are displayed together, including evaluation of chipping and radius profile along the cutting edge.

Nominal/actual comparison and dimensioning

This function enables a target-actual comparison versus a DXF ideal contour including automatic dimensioning of the contour of the cutting edge.

The cutting edge can be displayed in different modes - as texture for the immediate recognition of possible surface indentations and surface quality, or topographically to display the height profile of the cutting edge preparation at a glance.

Free-definable forms in the configuration menu

Examples of evaluable edge shapes.

Chamfer

- Protective chamfer
- Double chamfer
- Chamfer and rounding

Rounding

- Clearance radius
- Trumpet shape
- Waterfall

Sharp edge

100% workshop-compatible solution of a typical laboratory application.
The measuring and inspection station for milling head manufacturing

»pomZenit«

Used close to production, »pomZenit« opens a new dimension in measuring and inspection stations for manufacturing milling heads: the ergonomic measuring machine can automatically check the quality of right-angle milling heads and face milling cutters precisely without requiring an operator.

»pomZenit« convinces with automated measuring procedures, highly accurate measuring results and ease of operation for every user. Equipped with CNC controls, a high precision spindle with autofocus and the ZOLLER »pilot 3.0« image processing system, the machine determines run-out and concentricity, measures the cutting edge angles and radii, and inspects cutting edges – including automatic remeasurement from the diagram with the tolerance range.

»pomZenit« is available as tool presetting and measuring machine for production and as bench top version for inspection stations in final inspection.

Automated measuring procedures = less effort, more precision

Technical specification

<table>
<thead>
<tr>
<th></th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Max. measurable tool Ø</th>
<th>Max. tool weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>»pomZenit«</td>
<td>100 mm</td>
<td>110 mm</td>
<td>201 mm</td>
<td>20 kg</td>
</tr>
</tbody>
</table>

The software measures all cutting edges of a tool in a rotary manner and displays the measured values of every cutting edge graphically or in table form, including the tolerance range and fast remeasurement of individual cutting edges (yellow bar) directly from the diagram.

- Measurement of all cutting edges including graphic display of measured results »focus 360°«

- Automatic recording of cutting edge images with »aec«

Fully automatic single image recording of the cutting edges at incident light for checking wear.

- Machine table »pom«

- Work bench

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The ZOLLER »pomDiaCheck« allows fast and highly accurate determination of cylindrical parts diameters, turned parts or circular ground tools. The measurement is process-oriented and the range below 1. It includes information on tolerances quickly documents the measured results.

In order to measure drilling and reaming tools or circular ground blanks, the specimen is simply clamped between two tail centers, the desired measuring point is selected manually or CNC-driven, and the measured value given. Concentricity can also be measured by simply pushing a button.

The ZOLLER »pomDiaCheck« is CNC-driven and equipped with a state-of-the-art laser micrometer.

Graphical evaluation of the measurement results including tolerance range.

Highly accurate determination of diameters <1 absolutely using the snap gauge principle.

### Technical Specification

<table>
<thead>
<tr>
<th>Technical Specification</th>
<th>Diameter measurement of cylindrical objects</th>
<th>Max. resolution</th>
<th>Laser width</th>
<th>Measuring field Ø</th>
<th>Measuring accuracy</th>
<th>Measuring speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>»pomDiaCheck« vertical</td>
<td>Lmax = 300 mm</td>
<td>0.01 µm</td>
<td>0.2 mm</td>
<td>ø 0.5 µm (centered)</td>
<td>± 0.1 µm</td>
<td>1,500 Hz</td>
</tr>
<tr>
<td>»pomDiaCheck« horizontal</td>
<td>Lmax = 300 mm</td>
<td>0.01 µm</td>
<td>0.2 mm</td>
<td>ø 1 µm (centered)</td>
<td>± 0.1 µm</td>
<td>2,000 Hz</td>
</tr>
</tbody>
</table>

* Less loss in measuring range in Z direction
** < 6mm diameter cannot be clamped between centers

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The professional start to the measurement of tools and grinding wheels

»smile / pilot 3.0«

»smile / pilot 3.0« meets all manufacturing requirements and remains user-friendly despite its many high performance features. Image processing is based on modular design and its numerous measuring programs make it both individual and workshop-compatible. Grinding wheels can be measured with micro precision according to the FEPA standard, by any operator and including detailed documentation.

Angle and radius measurement
User interface »pilot 3.0« with automatic measurement of length, diameter, corner radius and cutting edge angle.

Automatic recognition of cutting edge shape and dynamic crosshairs

Simply focus – finished! Length, diameter, corner radii, cutting edge angles and measuring range are calculated instantly. Fine adjustment is not required due to the dynamic crosshairs.

Radius contour »contur«

Fully automated determination of the cutting edge profile and radius and graphic evaluation of the entire contours with tolerance range and variable setting of the angle sectors.

Numerous measuring programs included

<table>
<thead>
<tr>
<th>Technical specification</th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Tool Ø</th>
<th>Snap gauges Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>»smile 400«</td>
<td>400 mm</td>
<td>210 mm</td>
<td>420 mm</td>
<td>100 mm*</td>
</tr>
<tr>
<td>»smile 600«</td>
<td>600 mm</td>
<td>210 mm</td>
<td>420 mm</td>
<td>100 mm*</td>
</tr>
</tbody>
</table>

*Selecting “snap gauge” or “tool inspection” reduces the maximum tool diameter to 320 mm.

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The universal measuring machine for tool inspection

»smarTcheck«

»smarTcheck« is the high-performance universal measuring machine for all metal cutting tools – either as manual or 3-axis CNC version; this provides the ability to cost effectively check and document tools prior to and after grinding in accordance with the DIN EN ISO 9000 guidelines. The »smarTcheck« and swiveling incident light processing allows cost effective checking, measuring and documenting of axial and radial geometries of tools. Simply click the mouse – no special training required. The measurement of tools prior to regrinding can result in a 25% increase in productivity or potentially greater with CNC grinding machines.

The »smarTcheck« with swiveling tool inspection camera for fast and universal inspection.

For the automatic generation of 2D sectional drawings or 3D (CAD) graphics from the measured actual dimensions on step tools or die plates.

For the automatic determination of tool contours, radii, angles, distances, chamfer widths as well as wear and other parameters with incident and transmitted light.

Fully automatic determination of concentricity with graphic analysis of the contour profile, including target-actual comparison and subsequent automatic concentricity and wobble compensation.

For scanning of arbitrary tool or workpiece contours and generation of a target–actual comparison on the basis of a DXF target contour with variable tolerance range.

CAD function for generating and dimensioning the actual contours.

Technical specification

<table>
<thead>
<tr>
<th>Range</th>
<th>Travel range</th>
<th>Travel range</th>
<th>Max. tool Ø</th>
<th>Snap gauges Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>»smarTcheck 450«</td>
<td>450/600 mm</td>
<td>175 mm</td>
<td>350 mm</td>
<td>35 mm</td>
</tr>
<tr>
<td>»smarTcheck 600«</td>
<td>600/800 mm</td>
<td>320 mm</td>
<td>370/540 mm</td>
<td>80/35 mm</td>
</tr>
<tr>
<td>»smarTcheck 800«</td>
<td>600/800/1000 mm</td>
<td>550 mm</td>
<td>1000/1200 mm</td>
<td>80/0 mm</td>
</tr>
</tbody>
</table>

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The universal measuring machine for precision tools

»genius 3s«
»genius 3m«

ZOLLER »genius 3s« is the universal measuring machine for metal cutting tools. The »genius 3m« version can also be used for micro-geometries. Five CNC-guided axes enable extensive, precise and fully automated measuring procedures.

Tools are checked quickly, easily and with the highest precision, starting with individual criteria through fully automated and operator independent complete checks. The measured results are documented in detail and can be transferred to the grinding machines at the push of a button. Thus »genius 3s« saves valuable time during work preparation and programming, excludes resworking and complaints and provides excellence in quality.

»genius 3s« with full housing to protect against dirt and extraneous light.

For measuring the chip space (see above), the circumference and the face of tools. The measuring procedures and parameters can be freely defined, selected via the Checkbox and saved for the tool.

Regardless of the incident light measurement used, the configuration assistant carries out the measuring window sizes, lighting optimization and positions live and once only and then automatically stores the data.

This function allows data in the ZOLLER »pilot 3.0« to be imported and exported in XML file format at the push of a button.

The groove/chip space contour is scanned contactless automatically and displayed graphically. It can be exported as DXF/XML and subjected to a target-actual comparison.

Editable test report for arbitrary and savable adaptation of the scope and descriptions.

Scan, compare - finished! Whether drills, countersinks, milling cutters or cutting inserts: simply enter the start and end points, the scan is performed automatically and the actual contour is compared with the target contour with micro-precision.

<table>
<thead>
<tr>
<th>Technical specification</th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Tool Ø</th>
<th>Snap gauges Ø</th>
<th>Max. tool length for axial incidental light measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>»genius 3s«</td>
<td>600 mm</td>
<td>175 mm</td>
<td>50 mm</td>
<td>340 mm</td>
<td>100 mm</td>
<td>500 mm</td>
</tr>
<tr>
<td>»genius 3m«</td>
<td>600 mm</td>
<td>175 mm</td>
<td>50 mm</td>
<td>340 mm</td>
<td>70 mm</td>
<td>500 mm</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.

Greater productivity through latest technology and ergonomics

— Photo-realistic input dialog »fored«
— Configuration assistant »expert«
— Data import/-export XML
— »apus« test reports
— Contour check - form tools
The modular universal measuring machine for precision tools

»genius 4«

ZOLLER »genius 4« continues the success story of the universal measuring machines for metal cutting tools in the fourth generation.

Any type of metal cutting tool can be measured accurately and fully automatically with »genius 4« due to five CNC-driven axes. The design of the »genius 4« was designed to meet the increasing requirements. In addition to the established and proven functions of the »genius«, the new platform includes universal extension stages. Furthermore, the look of the compact measuring machine was adapted to the new ZOLLER design line.

»genius 4« with »pilot 3.0« electronics saves space and looks attractive.

Subject to technical modifications. The depicted machines may include options, accessories and control variants.

"Interactive configuration assistant »expert""

For measuring the chip space, the circumference (see above) and the face of tools. The measuring procedures and parameters can be freely defined and selected individually via the Checkboxes.

"»expert« measuring menu"

Live image and virtual joystick with navigator allow very easy definition of the measuring position.

"»genius« tool analysis/chip space"

The contactless and automatically scanned tool surfaces can be displayed to give three-dimensional information on the calculation of the effective cutting angles or draft angles.

"Automatic dimensioning of actual contours"

The actual contours are automatically dimensioned and evaluated in accordance with the given target contours.


table

<table>
<thead>
<tr>
<th>Technical specification</th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Tool Ø</th>
<th>Snap gauges Ø</th>
<th>Max. tool length for axial incidental light measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>»genius 4«</td>
<td>600 mm</td>
<td>235 mm</td>
<td>50 mm</td>
<td>400 mm</td>
<td>100 mm</td>
<td>500 mm</td>
</tr>
</tbody>
</table>

Options

- Measuring sensor for axial measurement, for example, pitch or form/position tolerance of hobbing machines.
- Swiveling optical carrier for distortion-free measurement and checking of helical tools with transmitted light.
- Micro sensor for measuring micro-geometries, i.e. protective and supporting chamfers.
The universal measuring machine specifically for threaded tools

»threadCheck«

»threadCheck« is the ZOLLER measuring machine for the distortion-free and accurate measurement of threaded tools.

Six CNC-driven axes and the fully automatic swiveling optical carrier enable complex measurement of thread geometries, threaded drills, milling cutters and formers as well as numerous other metal cutting tools. The full housing protects against dirt and extraneous light. All measured results are recorded in detail and the photo-realistic and modular selection of »pilot 3.0« measuring programs enable »threadCheck« to meet a host of requirements.

»threadCheck« can also be used as a universal measuring machine for metal cutting tools in general.

<table>
<thead>
<tr>
<th>Measuring program for threading tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>For operator-independent and automatic measurement of threaded tools.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Automatic contour scan and status display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic display of measuring status and scan taking pitch and rotation angle into account.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outer measurement of drop</th>
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<tbody>
<tr>
<td>Fast focusing and measuring of drop due to simultaneous CNC drive.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring status and automatic measurement of thread geometries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual-target contour comparison »lasso« for thread formers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluation of results including test report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete documentation of measurements through automatic evaluation and output as PDF or printed test report.</td>
</tr>
</tbody>
</table>

- Measuring program for threading tools
- Automatic contour scan and status display
- Outer measurement of drop
- Determination of contour profile and transfer of target contour in »lasso« for thread formers.
- Evaluation of results including test report

**Technical specification**

<table>
<thead>
<tr>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Measurable tool Ø</th>
<th>Max. tool length for axial incidental light measurement</th>
<th>Measurable snap gauge Ø</th>
<th>Swiveling device for optical carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>»threadCheck«</td>
<td>600 mm</td>
<td>235 mm</td>
<td>± 50 mm</td>
<td>400 mm</td>
<td>60 mm</td>
<td>± 30°</td>
</tr>
</tbody>
</table>

Optional: without protective housing and/or with tailstock

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The solution for the 3D digitalization of workpieces and tools
»3dCheck«

The »3dCheck« is the perfect inspection machine for fast and process-oriented 3D digitalization and opens up completely new avenues for the measurement of tools and workpieces such as turbine blades and similar objects.

The ZOLLER »3dCheck« combines the benefits of a 3D sensor with high-precision CNC axes and fully automated transmitted light processing. In addition, coordinate measurements and reverse engineering can be conducted in the fields of quality assurance and R&D through to fast and process-oriented 3D simulation. The user interface is equipped with a CNC joystick, scan plan, teach display and evaluation function.

With the ZOLLER »3dCheck«, 3D models of tools, plate pockets, implants, turbine blades or similar objects can be generated quickly and without requiring major effort.

Technical specification

<table>
<thead>
<tr>
<th></th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Measurable tool Ø</th>
<th>Measurable snap gauge Ø</th>
<th>Swivel range of sensor</th>
<th>Max. object Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>»3dCheck«</td>
<td>600 mm</td>
<td>235 mm</td>
<td>± 50 mm</td>
<td>600 mm</td>
<td>60 mm</td>
<td>±35° to ± 90°</td>
<td>70 mm</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The high-end inspection and measuring machine for all precision tools

»titan«

In the world of tool metrology, the new ZOLLER universal »titan« machine is unsurpassed in its flexibility and precision. The ergonomic and easy operation of a measuring machine of these dimensions offers an unbeatable advantage in terms of cost-efficiency and quality in the micro-precise measurement of metal cutting tools. The five to seven CNC-driven axes of the ZOLLER »titan« measure every type of metal cutting tool fully automatically and with the highest precision, ranging from measuring the outer contours, operator-independent complete control through extensive documentation. The vibration-reduced base is designed to fit further axes and sensors so that, for example, cutting edge preparation can be measured fully automatically and with unique repeatability.

<table>
<thead>
<tr>
<th>Technical specification</th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Measurable tool Ø</th>
<th>Measurable snap gauge Ø</th>
<th>Max. tool length for axial incidental light measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>»titan«</td>
<td>600 mm</td>
<td>110/75° mm</td>
<td>± 100 mm</td>
<td>250/150° mm</td>
<td>80 mm</td>
<td>400 mm</td>
</tr>
</tbody>
</table>

* Optional with optical carrier CNC swiveling device

The certified FKM gauge, which can be traced to the national standard, automatically determines a range where the true value of the measured dimension lies, with a probability of 95%. A measuring uncertainty of at least $E = 1.8 + (L/250 \text{ mm}) \mu \text{m}$ is achieved with the »titan«.

- Cutting edge preparation »skp« in »expert« mode
- Graphic »skp« display
- Measuring machine ability »titan«
- Incidental and transmitted light measurement
- Edge rounding

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The solution for the fully automated measurement of cylindrical hobbing machines

»hobCheck«

The »hobCheck« opens up unprecedented opportunities for fully automated, cost-effective and complete measurement of hobbing machines – and much more!

Equipped with a CNC-driven swiveling optical carrier, electronic measuring sensor, transmitted light processing and incident light camera, it can measure parameters such as tooth profiles, concentricity/wobble, pitch etc. Over 200 measured values can be evaluated and the calculation of the quality grades and graphic documentation is fully automatic. Additionally, the »hobCheck« offers convenient wear determination.

**Technical specification**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Travel range Z-axis</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Measurable tool Ø</th>
<th>Measurable snap gauge Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>»hobCheck«</td>
<td>600/800 mm</td>
<td>200 mm</td>
<td>± 40 mm</td>
<td>400 mm</td>
<td>60 mm</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.

---

- **Target-actual comparison tooth profile**
  - Evaluation of tooth form via variable measuring windows at the flanks, including automatic target-actual comparison.

- **Measuring program “Protuberanz” for hob cutters**
  - For the measurement of cylindrical hob cutters including calculation of the amount, height and angle of protuberance.

- **Wear Inspection »aec«**
  - The »aec« function automatically records the circumferences of an optional number of teeth and thus provides a quick overview for finding and targeted checking of major wear to ensure that neither too little or too much is removed during resharpening.

- **Display of results according to DIN 3968**
  - Graphic display of the measured results according to DIN 3968 with tolerance check and information on the quality grade achieved per parameter.

- **Test reports including tolerance graphs**
  - Exact and complete documentation, competent and clear.

- **Fully automatic measurement of hobbing machines**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum measuring depth sensor</td>
<td>25 mm</td>
</tr>
<tr>
<td>Maximum measuring length of face</td>
<td>200 mm</td>
</tr>
<tr>
<td>Swiveling device for optical carrier</td>
<td>± 30°</td>
</tr>
<tr>
<td>Tool lengths tailstock (option)</td>
<td>200–600/800 mm</td>
</tr>
</tbody>
</table>

- **Technical specification details**
  - Measurable tool Ø: 400 mm
  - Measurable snap gauge Ø: 60 mm

- **Wearing inspection »aec«**
The measuring and inspection machine for the complete check of precision saws

»sawCheck«

ZOLLER »sawCheck« optimizes the precise and cost-efficient manufacturing and regrinding of precision saws. The saw blades are checked fast, reliably and precisely and are extensively documented – regardless of the clamping.

The saw blades are clamped via universal reducers and the run-out for the saw body is documented automatically. Subsequently, it is compensated when measuring the teeth. The manually operated -90°/0°/+90° incident light image processing system is available for tooth inspection (radial/axial).

The universal clamping system of the »sawCheck« provides optimal, distortion-free clamping and measurement through horizontal holding of the saws.

»metis« tool analysis

Radial measurement of the saw tooth with incidental and transmitted light and direct display of the measured contour.

Measuring program "Tooth shape"

For fully automatic generation of measuring procedures and programs in »pilot 3.0«, including calculation of the intersection points, distances, angles and much much more.

Display of results including dimensioning

Complex dimensioning of distances and contour elements, illustrated here the tooth shape "Thin kerf precision saw".

Technical specification

<table>
<thead>
<tr>
<th>Technical parameter</th>
<th>sawCheck</th>
<th>Travel range X-axis</th>
<th>Travel range Y-axis</th>
<th>Measurable tool Ø</th>
<th>Incident light camera Ø</th>
<th>Width of saw blade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-axis</td>
<td>450 mm</td>
<td>200 mm</td>
<td>450 mm</td>
<td>300/800 mm</td>
<td>200 mm</td>
<td>1.5–8 mm</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
The automation solution for companies with high tool throughput levels

»roboSet«

»roboSet« loads your ZOLLER measuring machine 24/7. Complex measuring tasks can be processed fully automatically with 100% checking guaranteed.

»roboSet« can load virtually any CNC-driven ZOLLER measuring machine equipped with automatic power-operated clamping and »pilot 3.0« with shaft tools. It is easy to operate – simply push the start button to start the automatic operation. ZOLLER »roboSet« offers a high level of process safety due to the automatic path correction of the robot during every single feeding procedure. In addition, mechanical disconnection from the measuring device assures the highest standards of measuring accuracy.

Fit for every requirement with »pilot 3.0« – fast and simple. Ideal for fully automatic CNC-driven measuring machines with the »roboSet«.

Online status display: status on view for 24 hours.

Technical specification

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Positioning accuracy</th>
<th>Maximum load</th>
<th>Working area</th>
<th>Number of pallets</th>
</tr>
</thead>
<tbody>
<tr>
<td>»roboSet«</td>
<td>700 mm</td>
<td>±0.02 mm</td>
<td>5 kg without gripper</td>
<td>1050 x 350 mm</td>
<td>3 pieces</td>
</tr>
<tr>
<td>»roboSet«</td>
<td>900 mm</td>
<td>±0.03 mm</td>
<td>5 kg without gripper</td>
<td>1050 x 350 mm</td>
<td>3 pieces</td>
</tr>
</tbody>
</table>

Subject to technical modifications. The depicted machines may include options, accessories and control variants.
For smooth production processes

Process optimization with ZOLLER

Growing demands are being placed on grinding and sharpening businesses as well as tool manufacturers. 100% checking, traceability and process safety are increasingly becoming standard. The following pages demonstrate how these changes can easily be managed with ZOLLER:

The ZOLLER interfaces are the basis for smooth operations and offer you entirely new savings potentials: the grinding program simultaneously creates the data set for the measuring machine from which the fully automatic ZOLLER measuring procedure is generated. Depending on the interface, the measured data are resent to the programming system or the grinding machine and the grinding program is corrected temporarily. This way the programming requirements and machine downtimes are reduced to a minimum. You save time and costs - and also avoid errors in data entry and in generating a new grinding program.

1) Call-up of interface and enter target data.

2) Programming and conducting measurements.

3) Measured results and resending of data.

Whether »genius«, »smartCheck« or »smile«: all ZOLLER machines can transmit the tool target/actual data paperless (depending on the scope of performance/measurement).

ZOLLER offers the matching interfaces for virtually all systems involved in the grinding process, for example GDX 2.0, NUMROTO, Anca, MTS, and many more.

Automatic generation of measuring procedure for measuring and inspecting tools from grinding programs

-Fully automatic contour correction for form tools »coCon«

-Fully automatic measurement and data transfer of the grinding wheel sets

-Marginal programming requirements for regrinding of metal cutting tools

-Complete documentation with automatically generated and saved test reports
ZOLLER measuring technology is your quality guarantee for precision in manufacturing. The measuring uncertainty of the ZOLLER inspection and measuring machines is verified with certified test mandrels, angle, step and radius gauges, image processing is calibrated accurately and the suitability of the measuring machine is established 100%. The result is traceable and documented precision which meets the product-specific requirements of metrology. This guarantees our customers permanent traceable measuring reliability.

1. **Angle gauge**
   - For checking angle measurement precision of the measuring machine, for draft angles and effective cutting angles.

2. **FKM gauge**
   - Calibration gauge made of fiber ceramics for calibration of absolute accuracy and determining the measuring uncertainty $E = 3 + (L/250 \text{ mm}) \mu \text{m}$.

3. **Step gauge**
   - For verification and checking of diameter precision.

4. **Calibration gauge »pilot 3.0«**
   - For calibration of the image processing system »pilot 3.0« with transmitted and incident light.

5. **Radius gauges**
   - For checking measuring precision at the radii.

6. **Test mandrels**
   - For verification of parallelism and concentricity with high-precision interfaces for ZOLLER universal spindles.
Processing of nominal data which has been programmed with NUM, MTS, Anca, Schütte etc.

New tools

Recording a complex form tool for production or correction

Form tools

1. **Data transfer/Programming/Definition**
2. **Manufacturing and measuring tools**
3. **Retransfer of the measured actual data**
4. **Serial production with corrected actual data**
5. **Random sampling incl. test report**
6. **Transfer of corrected tool actual data**
7. **Start of serial production**
8. **New tool measuring**
9. **Shipments of finished tools**
10. **Random sampling according to test protocol**

**Transfer of NC program**

**Check**

**Transfer corrected data**

**Generation of ZOLLER test report**

**NQC**

**Random sampling according to test plan**

**Generation of ZOLLER test report**

**NQC**

**Random sampling according to test protocol**

**Generation of ZOLLER test report**

**NQC**

The NC program for tool grinding is transferred to the NC grinding machine. At the same time the programming system sends a measurement data file to the «genius» from which ZOLLER generates a fully automated measuring procedure.

The new tool is ground on the CNC grinding machine. This is then immediately measured fully automatically and with micro precision with the ZOLLER «genius» and recorded as complete contour profile with thousands of coordinate points. Only the start and end points of the measuring task are adopted via playback input.

The contours of the form tool are scanned fully automatically and with micro precision with the ZOLLER «genius» and recorded as complete contour profile with thousands of coordinate points. Only the start and end points of the measuring task are adopted via playback input.

The automatically scanned contour in the «genius» is exported in DIF format. The file is transferred to the programming system or directly to the machine controls.

Based on the contour profile provided by the «genius», the programming system generates the NC program for the grinding or erosion machines.

The first ground tool is scanned automatically by the «genius» together with a target-actual comparison with the target contour in DIF. Using the «coCon» software, deviations are inverted and the newly calculated correction contour (new path) exported.

The corrected files are resent to the programming system or transferred directly to the machine. The second tool is manufactured with an optimized program so that the errors in the grinding wheel or technical deviations of the machine are taken into account.
Determining measuring tasks directly with the 3D model of the tool

»caz« for tool manufacturers

Measuring program for precise recording of individual parameters for grinding wheels

Measurement of grinding wheels

Tools are developed with CAD software and the 3D model transferred to »caz«. Prior to fabricating a prototype, the tool is analyzed in an FEM application using the 3D model. The data is then transferred to the ZOLLER database. Milling or grinding of the tool on the CNC machine is performed according to the 3D model or NC program. Selection of grinding wheels can be selected on the ZOLLER »smile«, compiled as a package and saved.

After measuring and corrected tolerance check on the »genius«, the tool is ready for shipment. After entering and confirming the values in the input dialog, the measuring run can be started. The X and Z target positions are positioned automatically and measured.

A printout of the measured values can be added at any time as accompanying documentation.

1. Programming and analysis
2. Analysis and generation of measuring procedure
3. Test production
4. Shipmet of tools and tool measurement
5. Check incl. test report

1. Selection of types of grinding wheels
2. Measurement
3. Control-specific data output
Satisfied customers speak for themselves – and for ZOLLER

Success is the best reference

AIRBUS
ALSTOM
ALCATEL
ANCA
ANTON HÄRING
AUDI
BARMAG
BMW
BÖRING
BOERBOOM SONDERWERKZEUGE
BOMBARDIER TRANSPORTATION
BOEING
BRAUN
BRITISH AERO SPACE
CATERPILLAR
CHIRON
CONBRACO
CONSOLIDATED DIESEL
CONTINENTAL TEVES
DAF
DAIMLER
DAEWOO
DANFOSS
DEMA
DEMAG-SMS
EDS
EMAG
ENGEL
EUROCOPTER
FERRARI
FICHTEL & SACHS
FLENDER
FORD
FRANKA
GENERAL ELECTRIC
GENERAL MOTORS
GENEX
GIOTOOL
GP SYSTEM
GRÖHE
GRUNDfos
GÜHRING
HAERING
HAMESQ
HANNA TOOLS
HÄN
HAYES LEMMERZ
HEIDELBERGER DRUCK
HELLER
HONDA
HUFCSMIED
HYUNDAI
IHYA MAKINA
IKO LEASING
INF
ISCAR
IFCO
JOHN DEERE
K2 MEDICAL
KARAT PRECISION TOOLS
KARAN KESEI TAKI
KAVO
KENNAMETAL
KNORR-BREMSE
KOMET
KÖNNSBERG
KRONES
LASCO
LEITZ
LEUCO
LIEBHERR
LIND
LUCAS GIRLING
LUX
MAHLE
MAN B+W DIESEL
MANNESMANN
MAZAK
METABO
METALDYNE
MICHAEL DECKEL
MORI SEIKI
MTU
NEUBER INDUSTRIAL DIAMOND
NEW HOLAND
NIPPON ABS
NISSAN
NOMOS GLASHÜTTE
PEUGEOT
PIERBURG
PORSCHE
PRATT & WHITNEY
PSA [FRANCE]
REIS
RENAULT
ROHDE & SCHWARZ
ROLLS ROYCE
SAAB SCANIA
SAAKE
SAMSUNG
SANDVIK
SCHÜTTE
SECO
SIEMENS
SMITH & NEPHEW
STARRAGHECKERT
STÖRK-WÄRTSILÄ
SULZER
TAEGUTEC
TOYOTA
TRUMPF
VOITH
VOLKSWAGEN
VOLLMER
VOLVO
WEBB WHEEL
ZF FRIEDRICHSHAFEN
ZUMTobel
YG-1
AND MANY MORE.

Christel and Ralph Hufschmied, Hufschmied Zerspanungssysteme GmbH

„In the field of metrology there is an increasing
demand for 100% documentation and traceability.
Therefore we need to automate more and more.
We operate ZOLLER »roboSet« in combination
with »genius« in 3 shifts, they run day and night
and give us time savings of approximately 30%.”

Jean Madern, Managing Director Madern International B.V., Netherlands

„The ZOLLER »genius« can really measure all the
relevant parameters of the milling tools: this applies
both to the cutting edges at the circumference and
the helix, as well as effective cutting angles and
draft angles, face geometries and the diameters at
any point for tapered tools. By using this universal
measuring machine we can now better understand the
wear process and improve our knowledge in the field
of grinding technology decisively.”

Paul Lanza, sales employee and operator,
Neuber Industrial Diamond Company, Burlington, MA, USA

„All we need to do is place the tool into the »pomBasic«, position it,
measure it – and finished. It is so simple: automatic finding of the cutting
edges for high accuracy, it is like an assisted measuring process.
And we get the test reports at the click of a mouse.”

Paul Lanza, sales employee and operator,
Neuber Industrial Diamond Company, Burlington, MA, USA

Frank Höhnel, Project Manager Nomos Glashütte, Glashütte

„If you are looking for a measuring machine for convenient
and fully automated measuring of metal cutting tools,
there is really only one choice: the ZOLLER »genius«.”

Frank Höhnel, Project Manager Nomos Glashütte, Glashütte
At your call everywhere
At home in Germany –
At your call worldwide

ZOLLER offers you unique support and service – worldwide. This starts with preventive maintenance for a long service life, precision and reliability. It is complemented by quality certificates, calibration services and targeted training measures to ensure that our hardware and software are always in top condition. Customer service trained and equipped ZOLLER service employees are available to install and service the measuring machines.

For low downtimes and first class service.

The competent ZOLLER hotline offers you support in all questions pertaining to applications and services. A call is all it takes.

Training and courses in numerous application fields Full service maintenance in contract ISO 9000 check with calibration certificate Measuring machine capacity test Machine calibrating

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Telephone +1 734 332-4851
Economical solutions for all applications

Unless stated otherwise, the tool presetter and measuring machines as well as the measuring and inspection devices are equipped with ZOLLER »pilot 3.0« image processing. The »pilot« series is equipped with ZOLLER »pomSoft« image processing.
ZOLLER solutions – comprehensive optimization of your manufacturing operations. ZOLLER combines hardware, software and services to individual system solutions to improve quality, efficiency and productivity. Customers of ZOLLER will benefit from our knowledge as a market leader in the field of tool measurement technology. As a family-run business, ZOLLER guarantees to provide a sustainable and competitive advantage thereby making a measurable contribution to your success.