The Universal Measuring Machine for the Complete Inspection of Gear Cutting Tools



# hobCheck



## We Stand for Smart Progress

ECONOMICS

The »hobCheck« universal measuring machine from ZOLLER opens up unprecedented possibilities for the fully automatic and complete measurement of gear cutting tools, threading tools and cutting tools of all kinds.

Invest in the compact top class with the »hobCheck« for the complete measurement of gear cutting and cutting tools. With this shop-floor-ready and cost-effective solution, you can solve complex challenges reliably and with µm accuracy. The swiveling »orthoScan« optics carrier guarantees distortion-free measurement of the tooth contour for tools with a pitch, allowing you to achieve highly precise measurement results.

Fully automatic measuring technology

Comprehensive complete measurement

**Certified safety** 





## Detailed Measurement of Gear Cutting Tools

With the ZOLLER »hobCheck«, the quantum leap for your production, you are perfectly equipped for inspection tasks through to fully automatic complete inspection of all types of gear cutting tools. Benefit from higher quality of tools, shorter set-up times on machines, less stock removal during resharpening and complete documentation.

Thanks to the intelligent combination of image processing technology, CNC axes and measuring probes, all important parameters can be measured fully automatically. The distortion-free measurement and inspection of tools with pitches and precision tools of all kinds makes the ZOLLER »hobCheck« the universal genius.



Calibrating measuring machines on site with certified inspection tools and reference standards is an important part of quality assurance at E. ZOLLER GmbH & Co. KG. This enables us to guarantee reliable measurement results and the high precision of your products in accordance with applicable standards.

TÜV





Accredited calibration laboratory according to DIN EN ISO/IEC 17025:2018



Quality Management/Environmental Management according to ISO 9001, VDA 6.4 and ISO 14001 »hobCheck«

## We Stand for Unmatched **Precision**

TECHNOLOGY

Manufacturing and measuring gear cutting tools is extremely demanding and requires technology at the highest level. The ZOLLER »hobCheck« delivers this level of innovation and precision in every detail and, thanks to its mechanical basis and intelligent clamping technology, guarantees outstanding tool quality.

Every »hobCheck« is a promise to our customers. The functional ergonomics of the machine make it easy to use and maintain. For example, the »cockpit« operating unit can be individually adapted to the needs of the operator. Quick adjustment of the tailstock allows sensitive entry into the tool center, and the automatic pressure build-up ensures that the tools are held securely with constant force and without distortion.

Gear cutting technology is an impressive manufacturing process in itself. Its control requires intelligent measuring technology that checks the quality of every tooth and thus optimizes it. This is how precision works.

WILHELM RAU Part of the ZOLLER assembly team



### Universal Top Class

### »hobCheck« TÜV and UL/CSA Approved

Every »hobCheck« measuring machine is certified according to international standard IEC/EN 61010-1 and cNRTLus.

Proven and certified safety.





**Optics carrier** – with integrated CNC-controlled Y-axis and swiveling device for incident light camera and measuring probe enables the fully automatic and complete measurement of gear cutting tools and cutting tools of all kinds.

**Pneumatic tailstock** – allows long and thin tools to be held as counter centers and clamping between centers. It has a high-precision and moving center. The smooth-running quick adjustment allows sensitive entry into the tool center and the automatic pressure build-up ensures that the tools are held securely without distortion.

**Electronic measuring probe** – CNC-controlled, swiveling for fully automatic measurement of form and position deviation of the rake faces, pitch of the flutes, flute direction and other parameters.

**Software »pilot 4.0«** – is self-explanatory, clearly laid out and enables the operator to take reliable measurements. It offers a uniform user interface on all ZOLLER systems – right up to ZOLLER TMS Tool Management Solutions. The individual structure of the software allows customer-specific adaptations to be implemented quickly.

Separate »cockpit« control unit – offers space for keyboard and mouse as well as shelves for label and laser printers, scanners and tools. The height and angle of the 24" TFT color monitor can be adjusted to make using the software as comfortable as possible. This means that every operator can set up the workstation individually in just a few simple steps.

**High-precision spindle »ace«** – guarantees µm-precise holding and clamping of tools and fixtures of all kinds. Adaptation to many tool holder systems is guaranteed by the universal adapter tool post changing system. The optional CNC drive with autofocus and precise angle measuring system offers automatic focusing of the tool cutting edge and recording of the cutting contour.

**Stable table** – forms the base of the device. This is where the computer, electronics and pneumatic elements are stored in an industrial and service-friendly manner, all neatly laid out with sufficient space for good accessibility and optimum ventilation.

## High-Precision Sensors for Gear Cutting Tools

With the ZOLLER »hobCheck«, you can complete tactile measuring without contact in transmitted light and incident light. Equipped with a CNC-controlled swiveling optics carrier, electronic measuring probe and transmitted light and incident light image processing, parameters such as tooth profile, concentricity/wobble, pitch and many more can be measured automatically on hob cutters in accordance with DIN 3968. The ZOLLER »pilot 4.0« software takes care of all calculations, positioning processes and the assignment of sensors to the respective measuring task. The evaluation of the tooth profiles and measured values, the calculation of the quality classes and the graphic logging are fully automatic.



2D transmitted light measurement on the circumference



Tactile measurement in the chip space



Incident light focus/2D incident light measurement on circumference





Sensors configuration	
Optics transmitted light	
Transmitted light camera HR50, BF approx. 7.3 x 6.7 mm²	۲
Transmitted light camera HR70, BF approx. 4.0 x 3.6 mm²	•
Transmitted light camera 5 Mpx, BF approx. 4.4 x 4.0 mm²	۲
Transmitted light camera WF, BF approx. 15.5 x 14.1 mm²	۲

3D contour measurement (pinion cutter/hob cutter)





# Tooth By Tooth in the Focus of the Probe

The electronic measuring probe supplements the ZOLLER sensor system for measurements on undercut surfaces to determine form and position deviation of the rake faces, pitch of the flutes and flute direction. The optics carrier of the »hobCheck« offers unique possibilities for the complete measurement of straight-fluted and helical gear cutting tools thanks to its integrated CNC Y-axis. With the combination of image processing technology, the CNC drive and measuring probe, all important parameters can be measured fully automatically. The advantages are numerous and impressive: fast measurement results, contact-free measurement due to the transmitted and incident light camera, µm-accurate measurement of spiral tools, universal applicability, direct measurement of the tooth profile on the cutting edge and distortion-free recording of the cutting contour.

For large, reversible cutting plate tipped hobs and tooth form cutters, ZOLLER offers the »smartCheck 800« as the perfect solution, equipped with a special optics carrier with high-resolution incident light camera for automatic incident light focusing and measurement.





Shape and position deviation of the rake face



Display of results in »pilot 4.0«

## High-Precision Spindle »ace«



Moving center point

D 42 mm

Precision

design





D 42 mm Interchangeable system center inserts

D 52 mm Precision design





Center point

D 30 mm/60°

Drive rotary

heart holder



Center point D 60 mm/60°

High precision spindle »ace« - with power clamping and quick-change system

Power-operated tool clamping - constant, independent of the user High axial and radial run-out accuracy – better than 2  $\mu m$ Ergonomic spindle handwheel - for safe rotation of the spindle and precise focusing of the tool cutting edge Pneumatic spindle brake and indexing - for fixing the spindle in the desired position High changing accuracy of adapter tool posts – better than 1 µm Quick adapter tool post change - in less than 10 seconds Integrated calibration spheres on adapter tool posts - for simple, quick and precise determination of the spindle zero point Automatic zero point selection - automatic detection and calibration of the adapter tool post used





### Software »hobCheck« – Clever, Fast, Perfect

Based on the ZOLLER »pilot 4.0« software, the »hobCheck« software makes the fast and µm-accurate measurement of gear cutting tools child's play. Cylindrical hobs are measured fully automatically and evaluated in accordance with DIN 3968. By specifying the quality class, the tolerances of the measurement parameters are classified accordingly after measurement. For example, the radial/axial run-out of the inspection collars, form and position deviation of the rake face, form deviation of the cutting edge, tooth thickness, flute direction and much more are determined. The measuring process is fully automatic. Depending on the evaluation options, teeth are focused, measurements are carried out optimally for the measuring task using image processing or measuring probes and the optics carrier is swiveled for certain measurements.

Photo-realistic input dialog »fored« of measuring program 312 for simple data creation 0

Fully automatic and time-saving measurement with transmitted and incident light image processing and measuring probe



### Measurable parameters according to DIN 3968:

- Concentricity deviation on inspection collars
- Axial deviation on the clamping surfaces
- Concentricity deviation at the tooth tip
- Form and position deviation of the rake faces
- Individual pitch of the flutes
- Pitch jump of the flutes
- Total pitch of the flutes
- Flute direction over 100 mm cutter length
- Form deviation of the cutting edge
- Tooth thickness on the reference cylinder
- Milling pitch height in pitch direction between any cutting edges of a thread
- Milling pitch height between cutting edges of a thread
- Engagement pitch
- Pressure pitch
- Axial pitch





### All highlights at a glance:

- Intuitive graphical user interface
- Automatic assignment of the quality class
- Re-measurement function
- Short measuring times
- Combination of image processing and measuring probe
- Representative documentation

Results display with extensive detailed information for each parameter and remeasurement function

Graphic evaluation of the form deviation of the cutting edge

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# Solutions for Reversible Cutting Plate Tipped Hobs

### Measuring program 313

for measuring reversible cutting plate tipped cylindrical hobs with comprehensive evaluation based on DIN 3968. Among other things, concentricity deviation at the tooth head, individual and cumulative pitch and pitch jump of the flutes, flute direction, tooth thickness and cutter pitch height are determined.



**Measuring program 313** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 313** – Results display with detailed information for each parameter and re-measurement function.





**Representative inspection report** – including parameter selection for internal and external use.





**Representative inspection report** – including parameter selection for internal and external use.

### Measuring program 314

for measuring tooth form cutters with comprehensive evaluation based on DIN 3968. Among other things, concentricity deviation at the tooth tip, individual and cumulative pitch and pitch jump of the flutes, flute direction, tooth thickness and pressure angle 1 and 2 are determined.



**Measuring program 314** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 314** – Results display with detailed information for each parameter and re-measurement function.

# Inspection of Protuberance and Tooth Flanks

### Measuring program 315

for measuring the protuberance on cylindrical hobs. The amount, height and angle of the protuberance and the edge breakage height on the left and right tooth flank are determined.



**Measuring program 315** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 315** – Results display with detailed information for each parameter and re-measurement function.







**Representative inspection report** – including parameter selection for internal and external use.





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**Report printout** – of all measured axial relief grindings as a graphical progression and angle specification.

### Measuring program 720

for measuring the axial relief on the tooth flanks of hob cutters. The exact contour of the relief is recorded and analyzed with the scanning measuring probe.



**Measuring program 720** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 720** – Result display of all measured undercuts as measured values and graphics including zoom function for a detailed analysis.

## Inspection of Pinion and Hob Cutting Wheels

### Measuring program 412

for tactile measurement of cutting wheels with measuring probe and evaluation according to DIN 1829. Straight and helical cutting wheels can be measured. The axial run-out, rake angle at the tooth tip and the rake face pitch angle (for helical cutting wheels) are determined.



**Measuring program 412** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 412** – Results display with detailed information for each parameter and re-measurement function.





**Representative inspection report** – including parameter selection for internal and external use.





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**Representative inspection report** – including parameter selection for internal and external use.

### Measuring program 512

for the measurement of hob cutting wheels in transmitted and incident light with evaluation according to DIN 1829. Concentricity deviation on the pitch and tip circle, individual pitch deviation left/ right, pitch step left/right, total pitch deviation left/right, tooth thickness variation, rake angle on tooth tip and rake face pitch angle are determined.



**Measuring program 512** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 512** –Results display with detailed information for each parameter and re-measurement function.

### Precise Wear Control on Hob Cutters

### Measuring program 482

for automatic image acquisition of the teeth on circumference and in chip space of cylindrical hobs. Display of the cutting edge images including measuring function for simple, fast determination of the greatest wear. This enables the resharpening process to be optimized and ensures that neither too much nor too little resharpening is carried out.



**Measuring program 482** – Data creation in the photo-realistic input dialog »fored«.



**Measuring program 482** – Overview of the recorded cutting edge images including measuring function for determining wear.



Cutting edge view chip space

Further Software Functions for Hob Cutters:







Measuring program 80 – the contour measurement »lasso« enables the automatic nominal/ actual comparison of the tooth contours using a DXF nominal contour.

»lasso« tooth form cutter plugin – for automatic determination of the tooth width with freely definable measuring depths starting from the tooth tip.

Measuring program 318 – for automatic measurement of the width and center offset of the wrench flat on hobs using the measuring probe.

### Solutions for Standard Tools

### Further measuring programs at a glance:

- »metis«-Interpreter
- PCD face and corner milling cutters
- Thread cutter (incident light)
- Thread cutter (transmitted light)
- PSC contour measurement
- Variable helix pitch
- Axial run-out
- Christmas tree cutter
- Concentricity thread
- Flank difference face
- HM deep hole drilling heads
- Skiving cutter
- Grinding wheels/packages
- Saw blades
- Cylindricity/taper
- Radius contour »contur« (sector)
- Radius contour end mills (sector)
- »apus«-Calculator
- Radius concentricity
- Roundness measurement

### Further software functions at a glance:

- Collective report
- Customer-specific test report
- File logging
- Concentricity and wobble compensation
- Cutter template package
- Drill template package
- Expert template KenTIP
- Cutting edge preparation »skp«
- Cutting edge symmetry and angle
- Symmetry drill head
- Reference tooth via helix angle
- Chisel edge length-face-1MF
- Cut-out length-face
- Corner radius step tools
- Contour correction »coCon«
- Macro editor »lasso«
- »metis«-Generator
- Microsoft SQL server database interface



**Concentricity check 360°** – to automatically determine the radial run-out on circular surfaces (e.g. tool shank) and graphically evaluate the entire contour.



**Point angle with hollow grinding** – is determined on drilling tools and hollow-ground tool cutting edges from the starting point (outside diameter) to the tool tip or the defined end point by contour tracking.



Flute/chip space scan- automatically scans the flute/chip space contour without contact and displays it graphically.



**Radius contour »contur« with graphics** – for automatic determination of concave and convex radii on the outer contour of tools including adjustable angle sectors with graphic evaluation.



**Contour measurement »lasso«** – to scan any tool and workpiece contours and perform a nominal/actual comparison or dimensioning of the contour.



Editable inspection report »apus« – to display all measurement results including designations, nominal values, tolerances and much more in tabular form and flexibly in the layout.



**Rake angle on radius cutters** – determines the rake angle in the radius segment at the specified angles. Suitable for die, corner and full radius cutters.



Tool analysis »metis« – measures and documents any contours, radii, angles, distances and defects (wear) in incident light.



**ZOLLER »caz«** – the virtual measuring device for PC workstations for external creation of the inspection and measuring process including measuring programs, nominal values and tolerances using the 3D model of the tool before it is manufactured.

### »elephant 2.0« – Extremely Easy to Operate

The »elephant 2.0« measuring program wizard enables simple, userindependent measurement and parameterization of standard tools without entering the target data. Using the graphical selection dialog, the desired tool category can be selected and a specific measurement task can be activated. Typical parameters are available depending on the selected tool type. The »elephant 2.0« software is based on innovative AI technology.

### Advantages of ZOLLER »elephant 2.0«

- Execution of measurement sequences without special prior knowledge

- Simple selection dialog for defining standard tools

- Storage of measurement sequences in the database

Intelligent searches automatically determine the tool dimensions, including the number of cutting edges. The operator is graphically supported in positioning the cutting edge and measuring window. The tool measurement is then carried out fully automatically and the generated sequence can be saved for repeat measurements and supplemented as required, for example with tolerances.







## Two-Dimensional Guaranteed Quality

The demands in quality management are constantly increasing. That means you must be able to rely on the constant measuring deviations of your machines. In ZOLLER measuring machines, high-precision calibration standards made of Borofloatglas® are used to determine the length measurement deviations based on the DIN EN ISO 10360 standard. In accordance with this standard, at least three measuring sequences (25,326 relationships) are carried out. With this procedure, the accuracy of the ZOLLER measuring machines is documented in two dimensions and can be traced at any time.



Two-dimensional – based on DIN EN ISO 10360,  $E_{xy}$  = 3.0  $\mu$ m + (L/250 mm)  $\mu$ m



**One-dimensional** – according to VDI/VDE 2617,  $E_x = 1.5 \ \mu\text{m} + (L/300 \ \text{mm}) \ \mu\text{m}$ 



### Interfaces -Precisely Networked

ZOLLER ensures the fast, complete and automatic provision of your hob data. The interface available for this purpose ensures direct communication between your »hobCheck« measuring machine from ZOLLER and the esco PTM software for tool design and production automation. The esco interface impresses first and foremost with its user-friendly design - complete tool data records can be imported quickly and error-free at the touch of a button. Both today and into the future, automated data creation is an important and decisive component for efficient production.

ZOLLER interfaces are the basis for smooth processes and open up new avenues for savings and increased productivity.

The ZOLLER »hobCheck« measuring machine communicates with esco for reliable networking of your production processes.





# Installation Dimensions and Technical Data

Technical data »hobCheck«						
Maximum tool length Z	Maximum tool diameter D	Maximum snap gauge diameter d	Travel range Y-axis	Weight	Height H1 max/H2	
600 mm	420 mm	100 mm	± 40 mm	~ 542 kg	~ 2106/~ 1970 mm	
800 mm	420 mm	100 mm	± 40 mm	~ 557 kg	~ 2306/~ 2170 mm	
1000 mm	420 mm	100 mm	± 40 mm	~ 572 kg	~ 2506/~ 2370 mm	



Technical data	
Axes	
One-hand control handle »eQ«	٠
CNC drive (Z, X)	٠
C-axis angle measuring system	•
CNC/autofocus	٠
CNC/Y-axis	٠
CNC/swiveling optics carrier (A)	٠
Electronics	
24" TFT color monitor with software »pilot 4.0«	٠
Separate control unit »cockpit«	٠
Spindle	
High-precision spindle »ace« size 1	•
High-precision spindle »ace« size 2	۲
Tailstock	
Pneumatic counter center	۲
Pneumatic counter center –	۲

Technical data	
Camera/sensos configuration	
Transmitted light camera HR50, BF approx. 7.3 x 6.7 mm²	٥
Transmitted light camera HR70, BF approx. 4.0 x 3.6 mm²	•
Transmitted light camera 5 Mpx, BF approx. 4.4 x 4.0 mm²	٥
Transmitted light camera WF, BF approx. 15.5 x 14.1 mm²	۲
Incident light camera HR50 Standard, BF approx. 1.1 x 1.0 mm²	٠
Incident light camera HR50 Micro, BF approx. 0.4 x 0.4 mm²	٥
Cutting edge inspection LED incident light	٠
Scanning measuring probe	٠
Switching measuring probe	۲
Machine table	
Integrated	•
Tool identification	
RFID Manual »mslz«	۲
RFID Automatic/drive slot	٥
Code scanner Automatic/drive slot	٥

# Pioneering Efficiency for your Grinding Shop

The highest potential for greater efficiency lies outside the grinding machine: ZOLLER Solutions stand for your future – we make you more successful. If you can manufacture your parts faster and more efficiently, you can work more economically and invest in the future. If economic progress is your goal, then ZOLLER is your partner.

**CONCRETE** 



### Made in Germany – Available Wherever You Are

Your Advantage **ZOLLER** presence

Global. Close. Personal.

ZOLLER quality is "made in Germany" and there for you, anywhere in the world.

Our company has its own locations and branches at 85 sites in 62 countries, guaranteeing we are close to customers and can provide first-class, personal customer service in local markets.

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# zoller Solutions

More speed, higher quality, safe processes – with ZOLLER, you increase the efficiency of your production. ZOLLER offers you outstandingly precise devices for adjusting, measuring and testing cutting tools, software, interfaces, cloud services and solutions for the automation of tool processes. You can combine all of this to create your individual system solution – on your way to the smart factory.

Presetting & Measuring Tool Management Inspection & Measuring Automation Everything from a Single Source. Everything for your Success. Everything with ZOLLER Solutions.



Headquarters in Pleidelsheim E. ZOLLER GmbH & Co. KG

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