

The Universal High-End Measuring Machine for Manufacturers of Threading Tools

## threadChecklcc



# We Stand for Smart **Progress**

**ECONOMICS** 

The »threadCheck | cc« universal high-end measuring machine from ZOLLER sets new standards for the fully automatic complete measurement of all types of cutting tools, specializing in threading and gear cutting tools.

Experience top class innovation from ZOLLER. The »threadCheck|cc« impresses with its fully automatic and  $\mu m$ -accurate measuring technology in transmitted and incident light – from measuring the outer contour of the tools to operator-independent complete inspection. The integrated tailstock allows tools to be clamped between centers. Automated loading is ensured by the CNC control of the tailstock. All measurement results are recorded clearly and in detail.



# Innovative Measuring and Inspection Technology

Intelligent multi-sensor technology and the functional full enclosure, in combination with the universal toolholding system including tailstock, make the ZOLLER »threadCheck | cc« unique worldwide for measuring and inspecting all types of precision tools, from taps/thread cutters through to gear cutting tools.

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 \*\*threadCheck|cc\*\* 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.





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



»threadCheck|cc«

## We Stand for Unmatched **Precision**

TECHNOLOGY

In every new development, factors such as ergonomics, operation and comfort at the workplace play a decisive and competitive role. The »threadCheck|cc« ensures ideal accessibility and allows a highly precise measuring process. Other highlights include the flexibility of the »cockpit« and accessory shelves as well as the innovative multi-sensor system – all aspects to ensure functionality and productivity at the highest level.

### Every »threadCheck|cc« is a promise to our customers.

The fully automatic measurement of cutting tools knows no limits. By connecting the "https://example.com/readCheckless" to the ZOLLER "roboSet 2" you step into the future of automation.

Everything about this measuring machine is just right for me. All the components are perfectly coordinated and optimally installed. In the assembly team, I am part of this high-end design – for maximum convenience through to ease of service work.

#### **GEORG BÄR**

Part of the ZOLLER assembly team



### Perfection in Detail



Transmitted light camera with multi-LED illumination – with high-quality, lowdistortion optics and telecentric transmitted light, enables the µm-precise measurement of cutting edge contours and step geometry in the silhouette with up to 5 megapixels. The camera has a high frame rate for fast focus and contour recording from the tool rotation. The multi-LED ring light ensures bright, highcontrast illumination of the cutting edge inspection in incident light.

Pneumatic tailstock – with high-precision moving center allows the holding of long and thin tools as a counter center as well as clamping between centers. 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. In addition, the integrated CNC drive enables automation for

High-precision spindle »ace« - guarantees µm-accurate holding and clamping of all types of tools and holders. Adaptation to many tool holder systems is guaranteed by the universal adapter tool post changing system. The CNC drive with autofocus and precise angle measuring system offers automatic focusing of the tool cutting

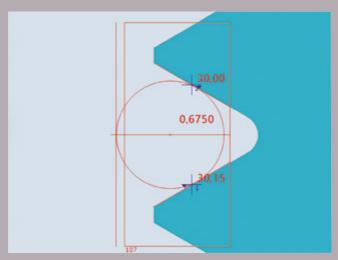
Software »pilot 4.0« – is self-explanatory, clearly laid out and enables the operator to take reliable measurements. It offers a uniform user interface on all ZOLLER systems – right up to ZOLLER TMS Tool Management Solutions. The individual structure of the software allows customer-specific adaptations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

Control unit »cockpit« - offers the operator ergonomics and comfort through individual adjustment options. The »cockpit« can be adjusted in height and position

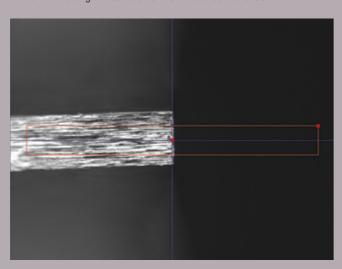
Storage options – for adapter tool posts and intermediate sleeves can be found in the integrated shelves. This means you always have your accessories to hand.

# High-Precision Sensors for Measuring Technology

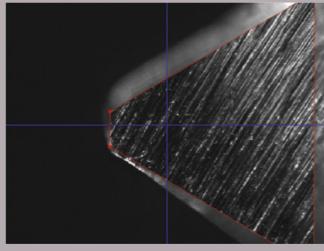
With the ZOLLER »threadCheck | cc« you measure without contact in transmitted light and incident light. Equipped with a CNC-controlled swiveling optics carrier and transmitted light and incident light image processing, you can precisely and automatically measure almost anything on cutting tools of any kind as well as on threading and gear cutting tools. The centered multi-LED ring lights ensure ideal illumination on every tool for inspections on the face, on the circumference and in the chip space. The optional electronic measuring probe offers additional measuring options on threading and gear cutting tools.



2D transmitted light measurement on the circumference



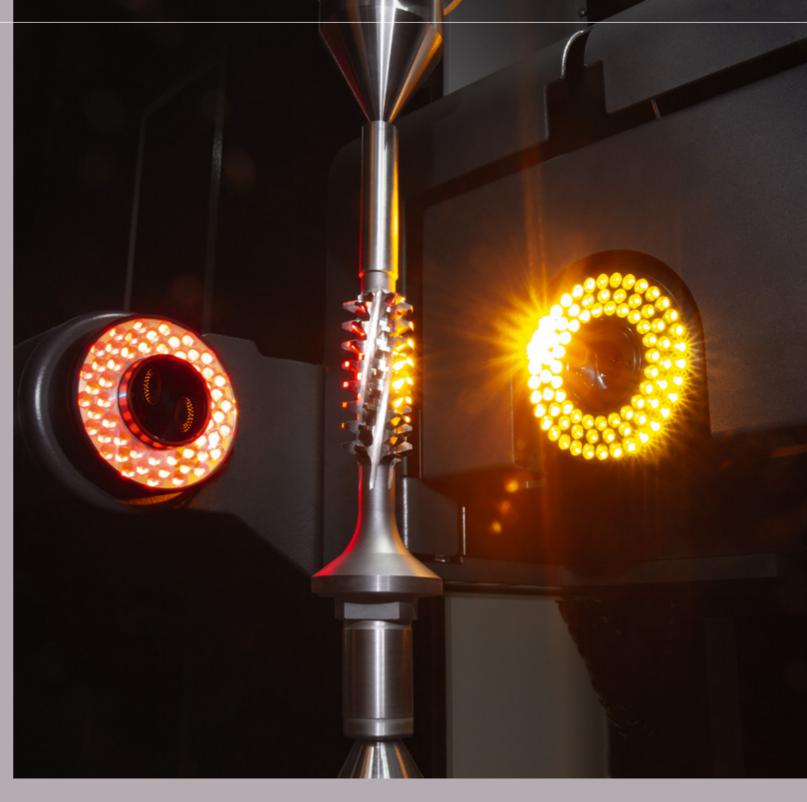
2D incident light measurement on the circumference



3D contour measurement in the chip space



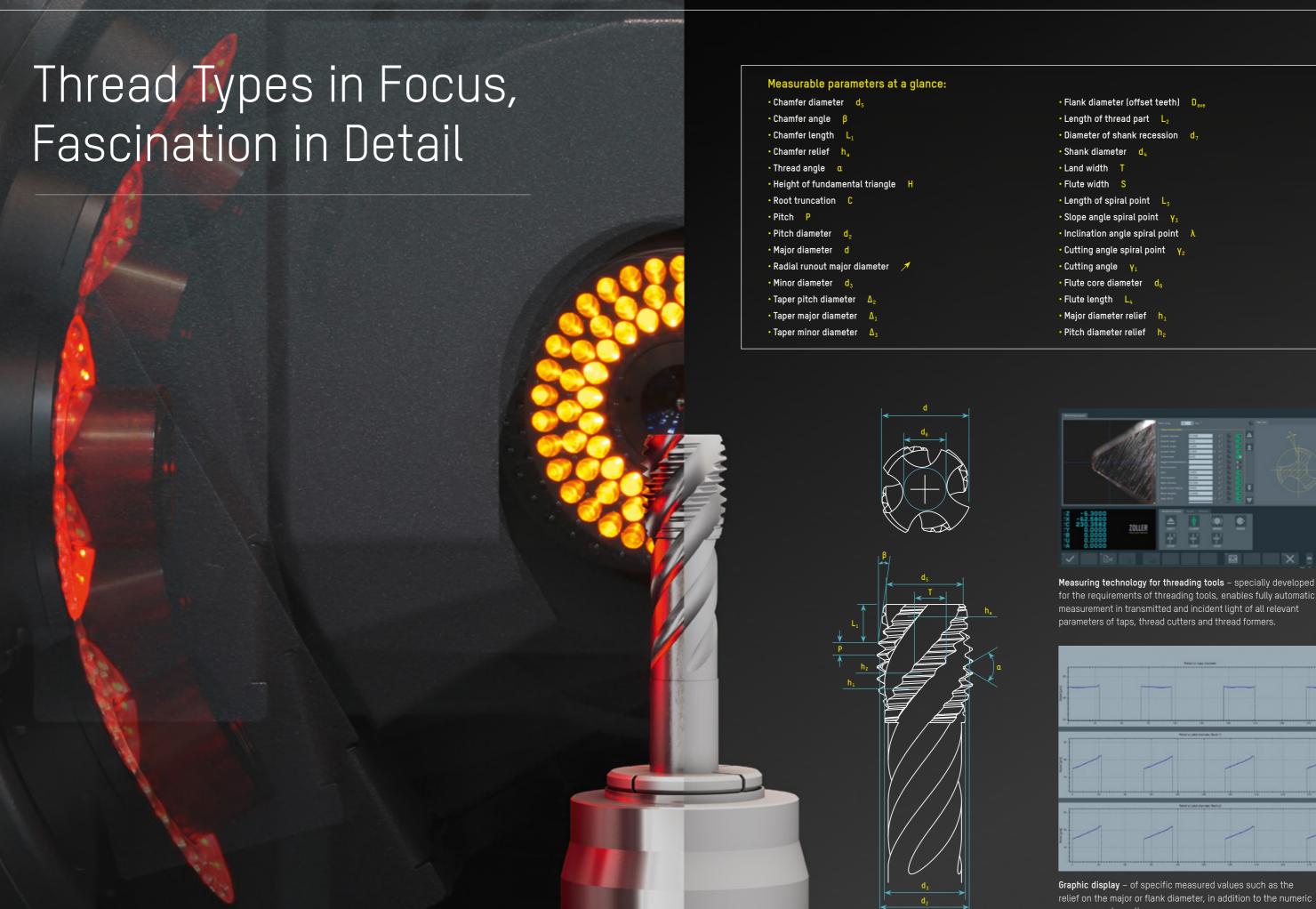
Electronic measuring probe



Sensors configuration	
Optics transmitted light	
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	•
Transmitted light camera WF, BF approx. 15.5 x 14.1 mm²	•

Sensors configuration	
Optics incident light	
Incident light camera HR50 Standard, BF approx. 1.1 x 1.0 mm²	•
Incident light camera HR50 Micro, BF approx. 0.4 x 0.4 mm²	•
Tactile	
Scanning measuring probe	•
Switching measuring probe	•

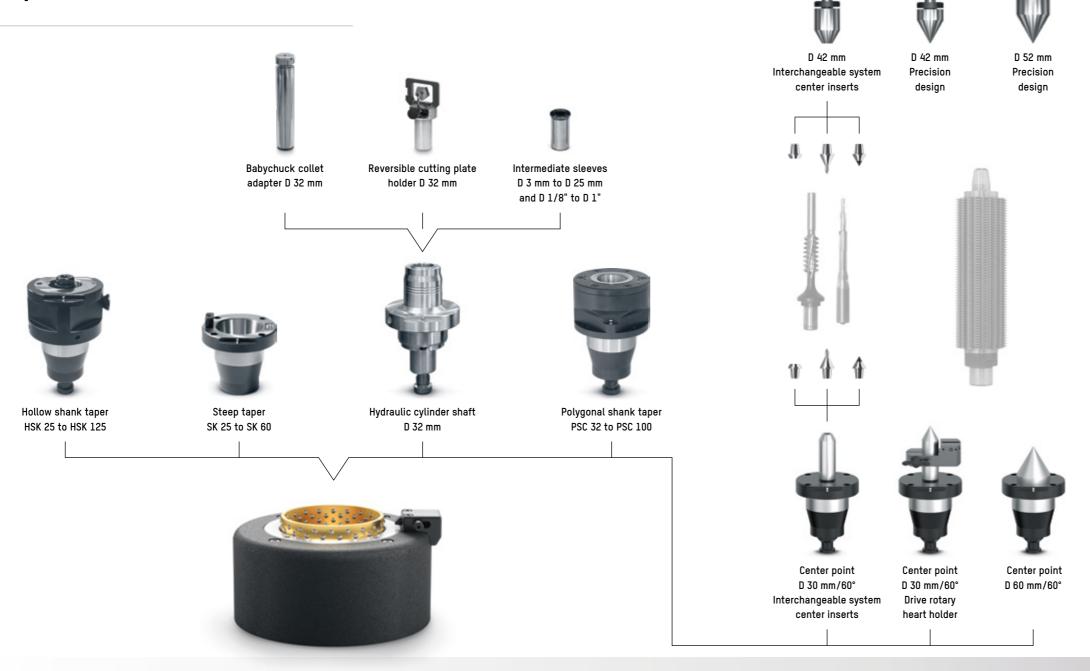
● Base model ⊙ Optional



Images show exemplary application options

relief on the major or flank diameter, in addition to the numeric

# High-Precision Spindle »ace«





### 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

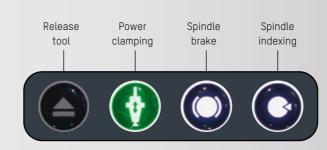
Pneumatic spindle brake and indexing – for fixing the spindle in the desired position

High changing accuracy of adapter tool posts – better than 1  $\mu m$ 

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



Moving center point

# »threadCheck|cc« Becomes the Hob Specialist

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



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



#### Measurable parameters according to DIN 3968:

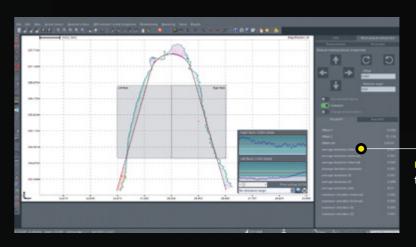
- · Concentricity deviation on inspection collars
- Concentricity deviation on the clamping surfaces
- · Concentricity deviation at the tooth head
- Form and position deviation of the rake faces\*
- Individual pitch of the flutes\*
- Pitch jump of the flutes\*
- Total pitch of the flutes\*
- Flute direction 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 helix
- Milling pitch height between cutting edges of a thread
- Engagement pitch
- Pressure pitch
- Axial pitch
- $^{\ast}$  Precondition electronic measuring probe

#### 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

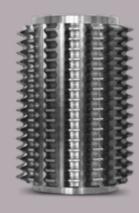


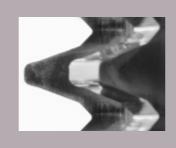
Graphic evaluation of the form deviation of the cutting edge

## 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.



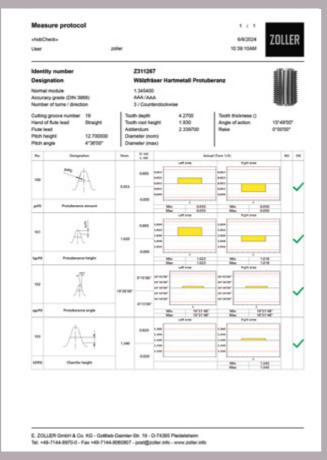




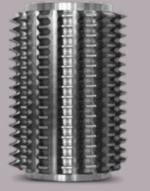
**Measuring program 315** – Data creation in the photo-realistic input dialog »fored«.

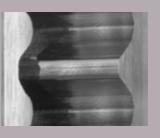


**Measuring program 315** – Results display with detailed information for each parameter and re-measurement function.



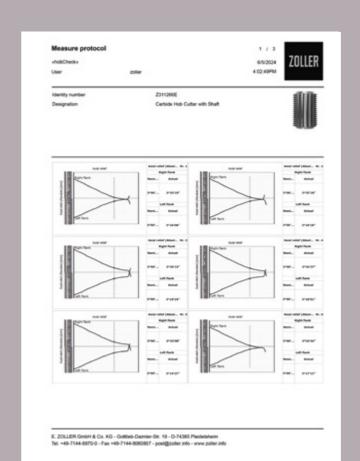
Representative inspection report – including parameter selection for internal and external use.



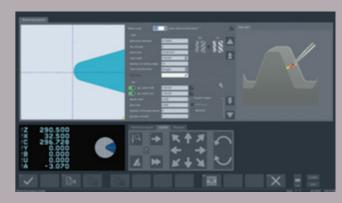


### Measuring program 720

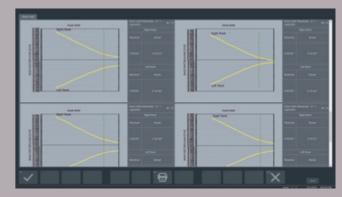
for measuring the axial relief on the tooth flanks of hob cutters. The exact contour of the relief is recorded and analyzed with the scanning measuring probe.



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



**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.





**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«.

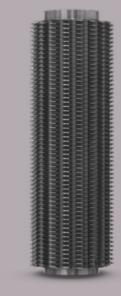


**Measuring program 512** -Results display with detailed information for each parameter and re-measurement function.

## 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.

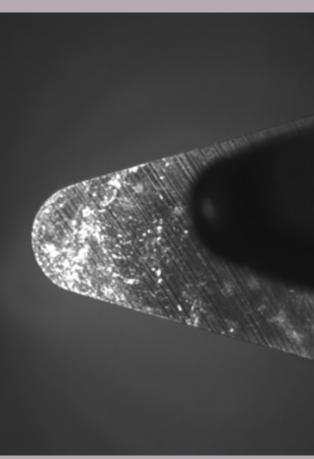




**Measuring program 482** – Data creation in the photo-realistic input dialog »fored«.

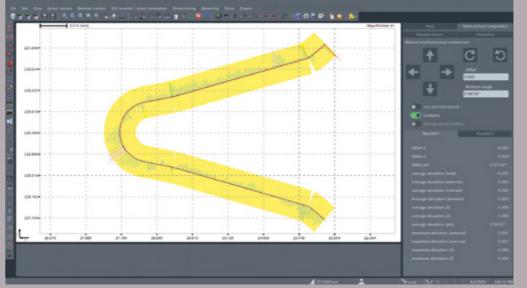


Measuring program 482 – Overview of the recorded cutting edge images including measuring function for determining wear.

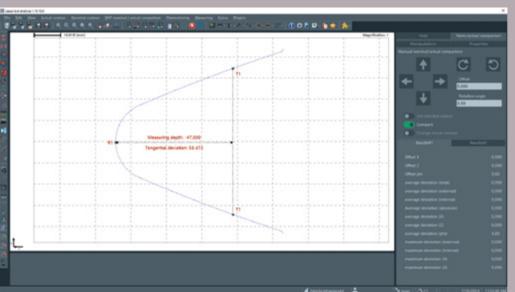


Cutting edge view chip space

#### 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.

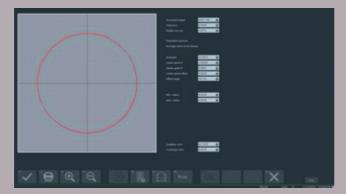
### Solutions for Standard Tools

#### Further measuring programs at a glance:

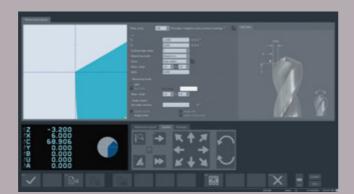
- · »metis«-Interpreter
- PCD face and corner milling cutters
- Thread cutter (incident light)
- Thread cutter (transmitted light)
- PSC contour measurement
- · Variable helix pitch
- Axial run-out
- Christmas tree cutter
- Concentricity thread
- · Flank difference face
- HM deep hole drilling heads
- 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:

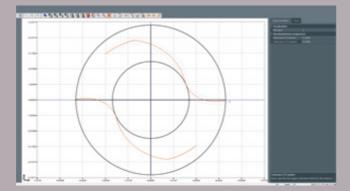
- Collective report
- Customer-specific test report
- Concentricity and wobble compensation
- Cutter template package
- Drill template package
- Expert template KenTIP
- Cutting edge preparation »skp«
- Cutting edge symmetry and angle
- Symmetry drill head
- · Reference tooth via helix angle
- · Chisel 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



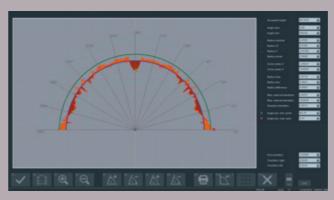
Concentricity check 360° – to automatically determine the radial run-out on circular surfaces (e.g. tool shank) and graphically evaluate the entire contour.



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.



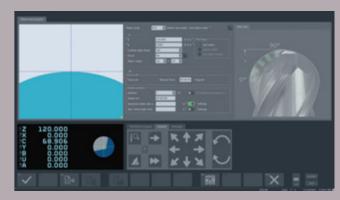
Radius contour »contur« with graphics – for automatic determination of concave and convex radii on the outer contour of tools including adjustable angle sectors with graphic evaluation.



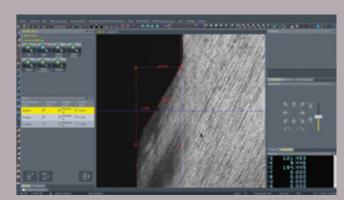
Contour measurement »lasso« - to scan any tool and workpiece contours and perform a nominal/actual comparison or dimensioning of the contour.



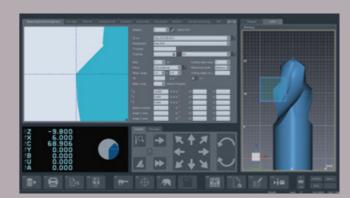
Editable inspection report »apus« – to display all measurement results including designations, nominal values, tolerances and much more in tabular form and flexibly in the layout.



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

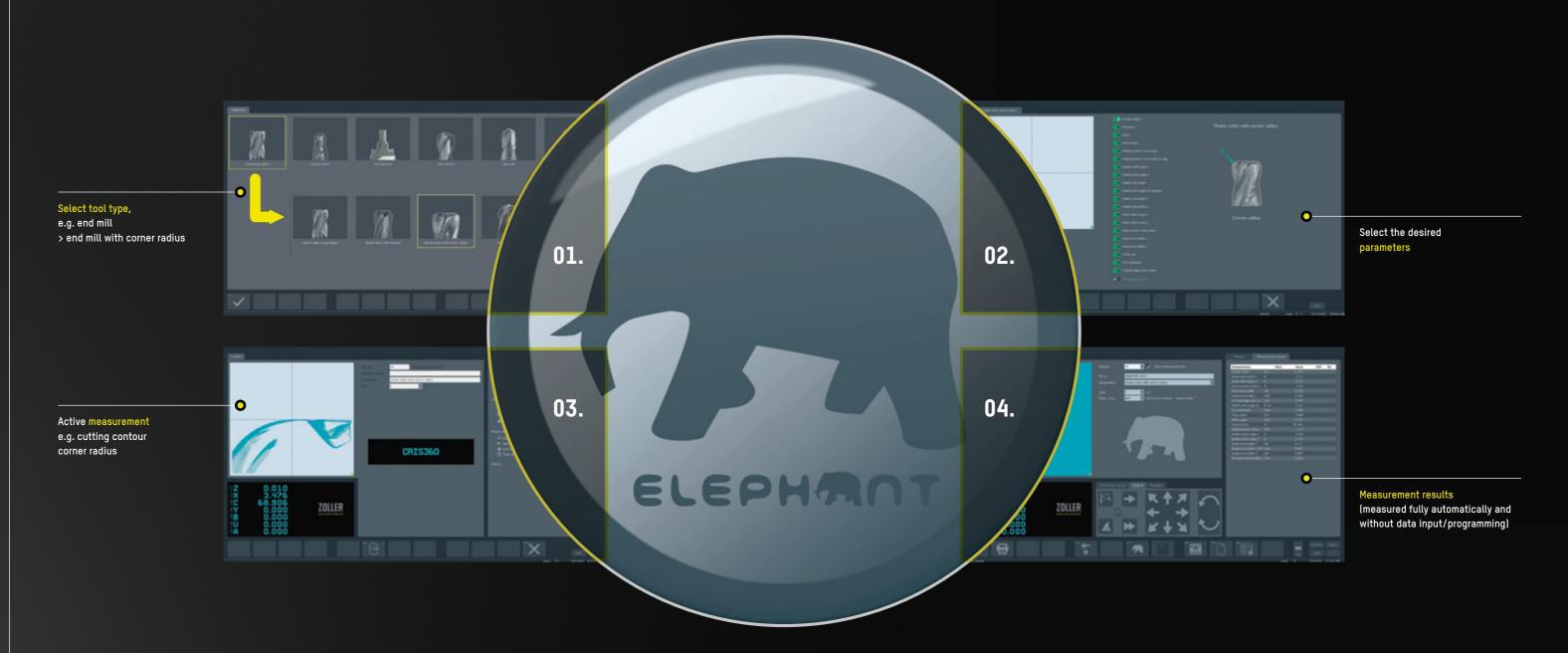
The »elephant 2.0« measuring program wizard enables simple, user-independent measurement and parameterization of standard tools without entering the target data. Using the graphical selection dialog, the desired tool category can be selected and a specific measurement task can be activated. Typical parameters 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

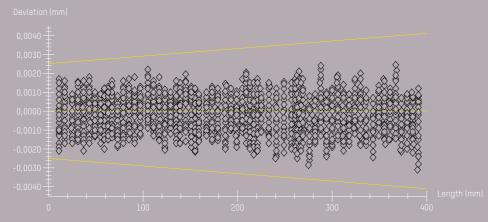


Intelligent searches automatically determine the tool dimensions, including the number of cutting edges. The operator is graphically supported in positioning the cutting edge and measuring window. The tool measurement is then carried out fully automatically and the generated sequence can be saved for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

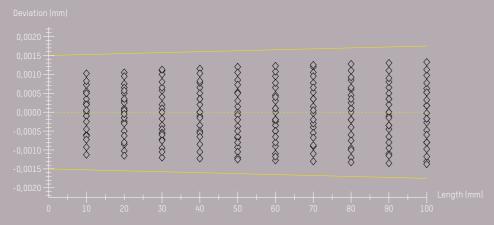


# Two-Dimensional Guaranteed Quality

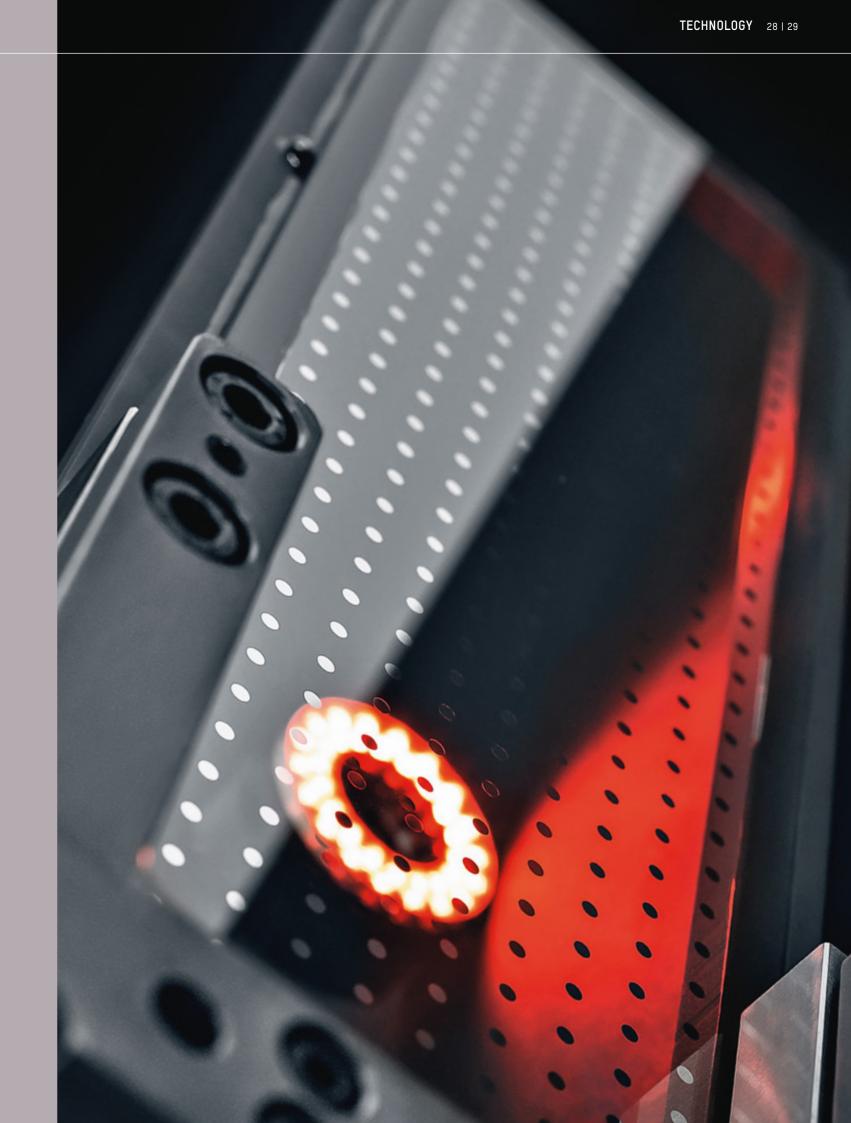
The demands in quality management are constantly increasing. That means you must be able to rely on the constant measuring deviations of your machines. In ZOLLER measuring machines, high-precision calibration standards made of Borofloatglas® are used to determine the length measurement deviations based 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,  $E_{xx}$  = 2.5  $\mu$ m + (L/250 mm)  $\mu$ m



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

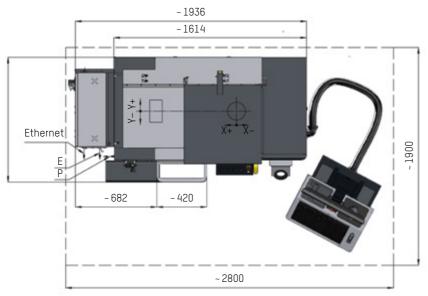


### Installation Dimensions and Technical Data

Technical data »thre	Technical data »threadCheck cc«						
Maximum tool length Z	Maximum tool diameter D	Maximum snap gauge diameter d	Travel range Y-axis	Number of axes	Weight		
600 mm	420 mm	100 mm	± 50 mm	6-7	~ 1260 kg		







Application	
2D parameters incident light	
Diameter standard 2-100 mm	•
Micro tools 0.1-10 mm	•
3D parameters incident light	
Partial	•
Surface-related	•
Measuring tasks	
Threading tools	•
Gear cutting tools	•
Sensors configuration	
Optics transmitted light	
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	•
Transmitted light camera WF, BF approx. 15.5 x 14.1 mm²	•
Optics incident light	
Incident light camera HR50 Standard, BF approx. 1.1 x 1,0 mm²	•
Incident light camera HR50 Micro, BF approx. 0.4 x 0.4 mm²	•
Tactile	
Scanning measuring probe	•
Switching measuring probe	•
Tool identification	
RFID Manual »mslz«	•

Measuring machine configuration	
Spindle	
High-precision spindle »ace«	•
Hollow encoder	•
Linear drive	
ZOLLER power transmission	•
X-, Y-, Z-axis in column design	•
Optics drive	
Swivel axis incident light	•
Swivel axis incident light & transmitted light	•
Vibration damping	
Leveling element on machine feet	•
Active integrated vibration decoupling	0
Accuracy	
E <sub>xy</sub> = 2.5 μm + (L/250 mm) μm	•
E <sub>x</sub> = 1.5 μm + (L/300 mm) μm	•



Parent company Headquarters

Branch office Representative

### 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.

#### **HEADQUARTERS**

E. ZOLLER GmbH & Co. KG Einstell- und Messgeräte Gottlieb-Daimler-Straße 19 D-74385 Pleidelsheim Tel: +49 7144 8970-0 Fax: +49 7144 8970-70191 post@zoller.info | www.zoller.info

#### **ZOLLER NORTH**

E. ZOLLER GmbH & Co. KG Service- und Vertriebszentrum D-30179 Hannover

#### **ZOLLER EAST**

E. ZOLLER GmbH & Co. KG Service- und Vertriebszentrum D-04158 Leipzig

#### **ZOLLER WEST**

E. ZOLLER GmbH & Co. KG Service- und Vertriebszentrum D-40764 Langenfeld

#### AUSTRIA

ZOLLER Austria GmbH A-4910 Ried im Innkreis office@zoller-a.at | www.zoller-a.at

#### SWITZERLAND

ZOLLER Schweiz GmbH CH-9016 St. Gallen info@zoller-ch.com | www.zoller-ch.com

#### FRANCE

ZOLLER France F-67380 Lingolsheim info@zoller.fr | www.zoller.fr

#### SPAIN + PORTUGAL

ZOLLER Ibérica S.L. E-08005 Barcelona correo@zoller.info | www.zoller.info

#### SWEDEN

ZOLLER Sweden AB SE-63221 Eskilstuna info@zoller-se.com I www.zoller.info

ZOLLER Ölçüm Teknolojileri San.ve Tic. Ltd. Sti. TR-16120 Nilüfer / Bursa

info@zoller-tr.com I www.zoller-tr.com

#### RUSSIA

LLC ZOLLER Russia RU-111123 Moscow, Russia info@zoller-ru.com | www.zoller-ru.com

#### **ISRAEL**

ZOLLER Israel GmbH Ramat Yishay 3009500 info@zoller-il.com | www.zoller.info

#### POLAND

ZOLLER Polska Sp. z o.o. 63-100 Śrem biuro@zoller-a.at I www.zoller.net.pl

#### CZECH REPUBLIC + SLOVAKIA

ZOLLER Czech s.r.o. 602 02 Brno info@zoller.cz I www.zoller.cz

#### USA 70LLER Inc.

North American Headquarters USA-48108 Ann Arbor, MI sales@zoller-usa.com | www.zoller.info/us

ZOLLER Inc. Pacific USA-90503 Torrance, CA sales@zoller-usa.com | www.zoller.info/us

#### CANADA

ZOLLER Canada Inc. CAN-L5N 8G4 Mississauga, ON sales@zoller-canada.com | www.zoller.info/ca

ZOLLER Tecnologías S de R.L. de C.V. MEX-C.P. 76030 San Angel Querétaro sales@zoller-mexico.com | www.zoller.info/mx

ZOLLER do Brasil BRA-CEP 13284-198 Nova Vinhedo, Vinhedo - São Paulo comercial@zoller-br.com | www.zoller-br.com

### INDIA

#### ZOLLER India Private Ltd. IN-Pune 411019 Maharashtra, India info@zoller-in.com | www.zoller-in.com

#### CHINA

ZOLLER Shanghai, Ltd. Asia Pacific Regional Headquarter RC-201108 Shanghai info@zoller-cn.com | www.zoller-cn.com

ZOLLER Asia Pacific, Ltd. RC-Kowloon, Hongkong info@zoller-cn.com | www.zoller-cn.com

#### JAPAN

ZOLLER Japan K. K. JP-564-0037 Osaka, Japan info@zoller-jp.com | www.zoller-jp.com

#### THAILAND

ZOLLER (Thailand) Co. Ltd. Amphur Muang Chonburi, TH-20000 Thailand info@zoller-in.com | www.zoller-th.com

#### **INDONESIA**

ZOLLER Singapore Pte. Ltd Indonesia Representative Office Tambun-17510, Bekasi, Jawa Barat info@zoller-in.com | www.zoller-in.com

#### SINGAPORE

ZOLLER Singapore Pte. Ltd SG-199589 Singapore info@zoller-in.com | www.zoller.info

#### MALAYSIA

ZOLLER MALAYSIA SDN. BHD. Malaysia Representative Office MY-Petaling Jaya | Selangor Darul Ehsan, Malaysia lau@zoller-my.com | www.zoller-in.com

#### VIETNAM

ZOLLER Vietnam VNM-Ho Chi Minh City, Vietnam info@zoller-in.com | www.zoller-in.com

ZOLLER Korea Co., Ltd. KOR-15119 - Siheung-Si, Gyeonggi-Do, Südkorea info@zoller-kr.com | www.zoller-kr.com

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Tool presetter and measuring machines
Gottlieb-Daimler-Straße 19 | D-74385 Pleidelsheim
Phone: +49 7144 8970-0 | Fax: +49 7144 8970-70191
post@zoller.info | www.zoller.info