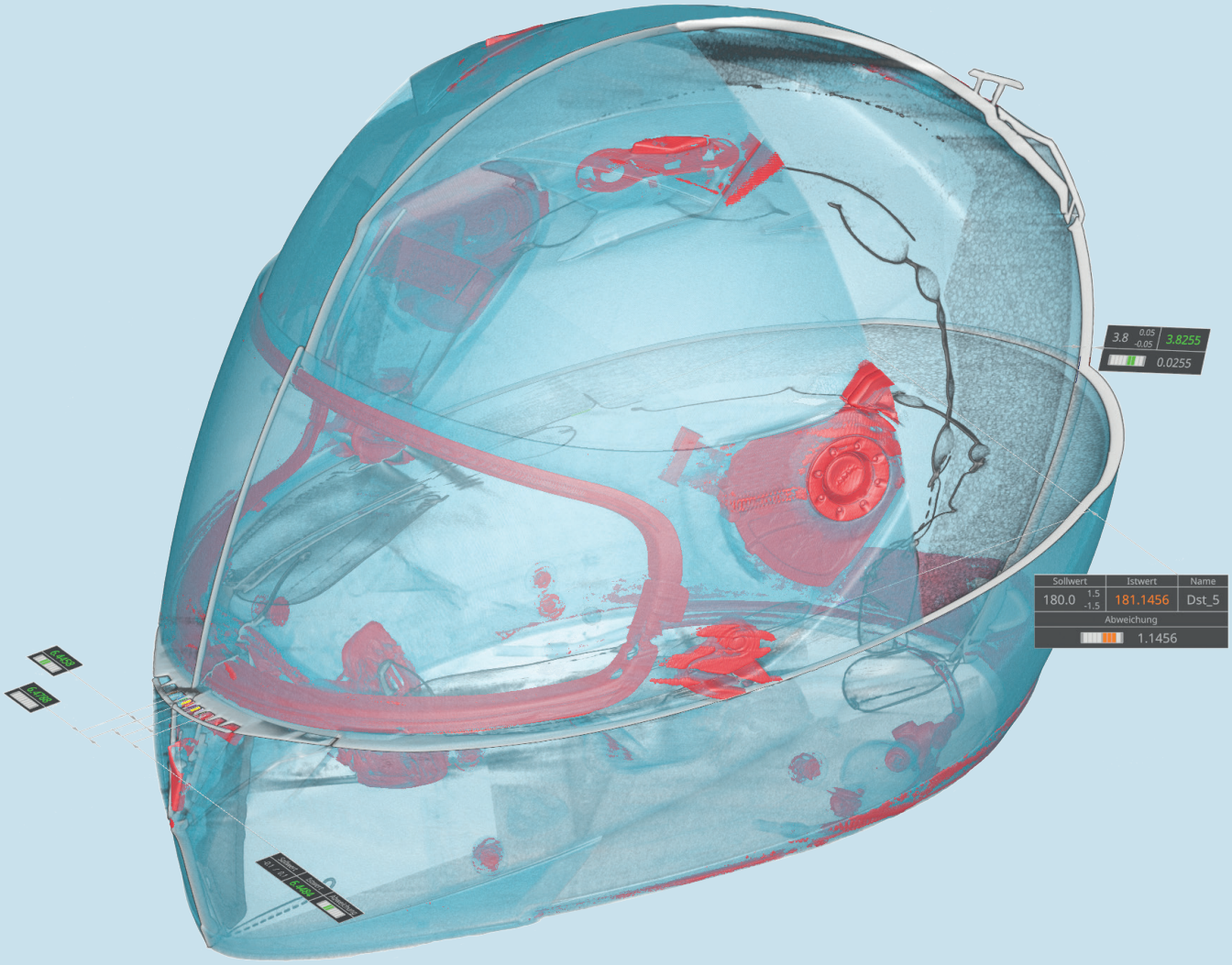


New Features

WinWerth® Version Information 9.45

The measurement software for all tasks on the shopfloor and in the laboratory

Werth Messtechnik GmbH **www.werth.de**

Foreword

WinWerth® Version 9.45

Dear customers,

We are pleased to present the new version of our 3D measuring software. It is available as WinWerth® 9.45 for Windows 10 with extensive new features and enhancements.

The revised design of the WinWerth® user interface provides you an improved ease of use, an extended range of functions and an interface with clear structures and lines. New dialogues and an improved arrangement of the sensor tools in the area of standard applications offer a clear and simple operation of WinWerth®.

With the growing demand for CT coordinate measuring machines, the focus of the software enhancements in this version is also in the field of computed tomography and its application fields. Thus WinWerth offers in addition to the extension of the option OnTheFly CT new tomography procedures, too. Via helical tomography, it is now possible to tomograph without the influence of artefacts due to the cone beam geometry of the measuring machine. Planar laminography is a second method for measuring flat workpieces without mandatory rotation. Especially for the measurement of workpieces with unfavourable aspect ratios, e.g. printed circuit boards, this function is a gain.

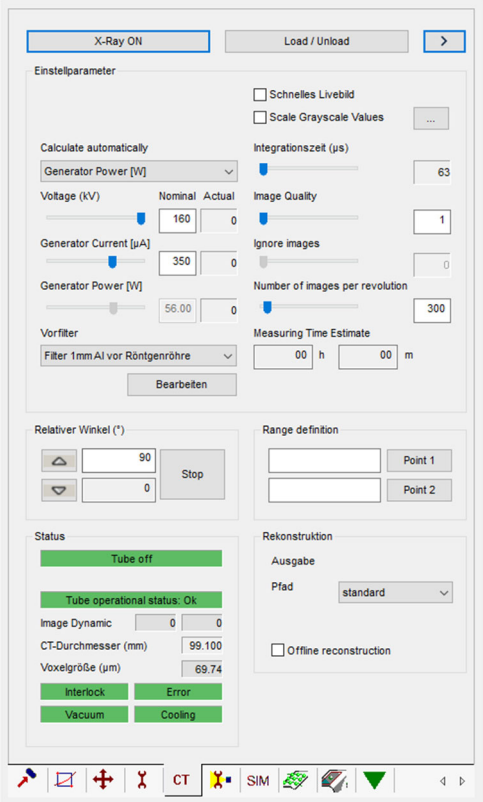
Have we aroused your interest? You will find detailed descriptions and further innovations in this information brochure. If you have any questions and/or you are interested in one of our products, our worldwide service centres as well as our head office in Germany are available by phone at +49 641 7938-519 or at vertriebsinnendienst@werth.de .

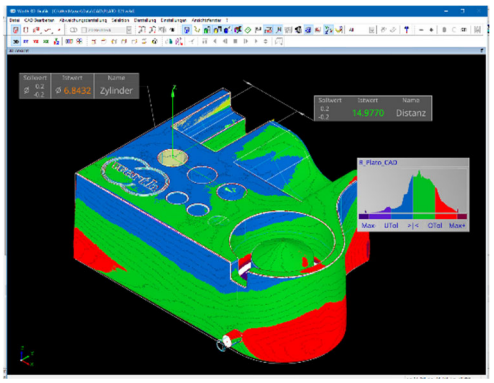
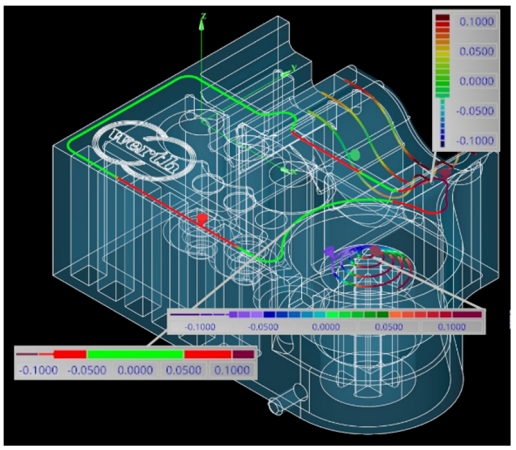
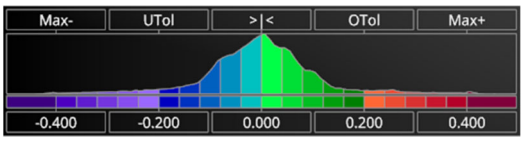
We hope you enjoy discovering our innovations in the WinWerth® measurement software.

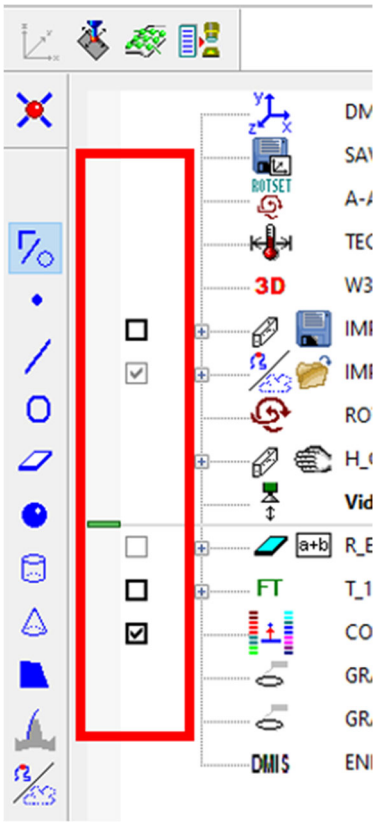
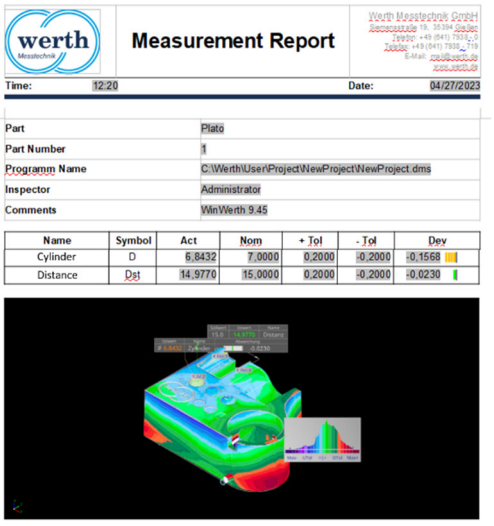
With kind regards

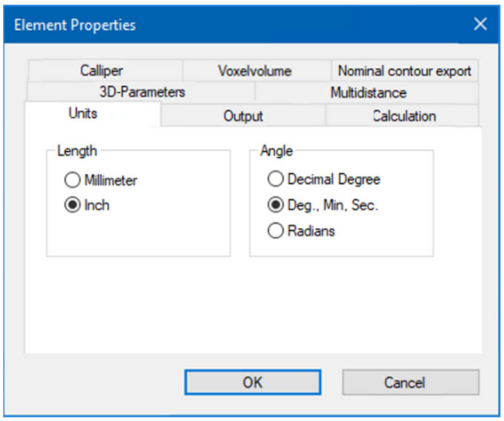
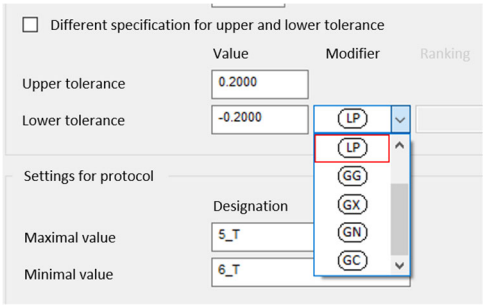
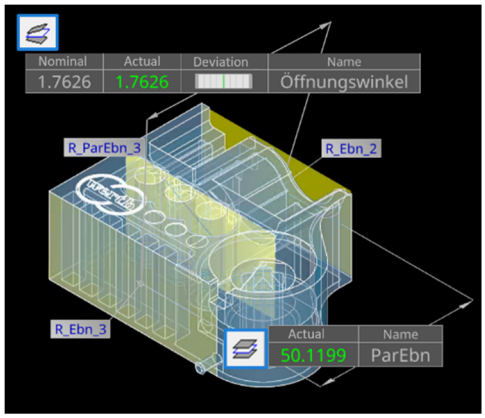
Your team at Werth Messtechnik GmbH

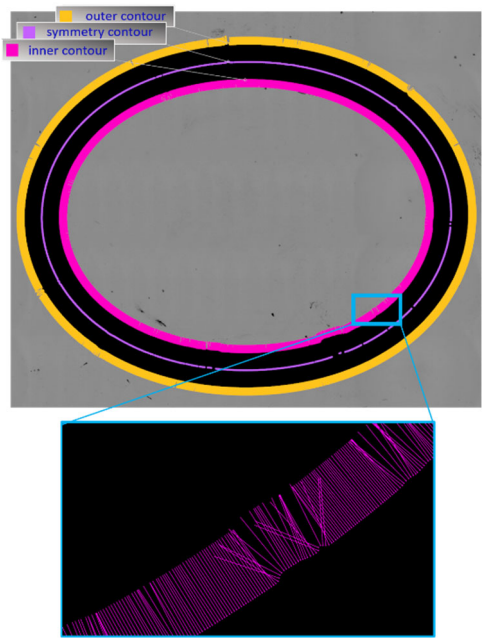
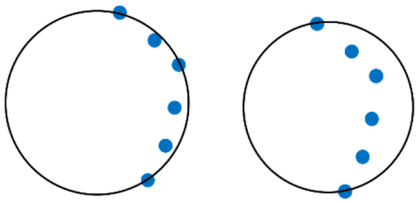
Table of contents

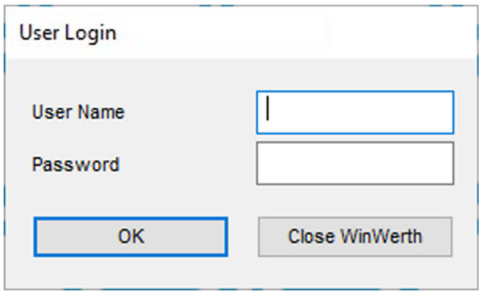
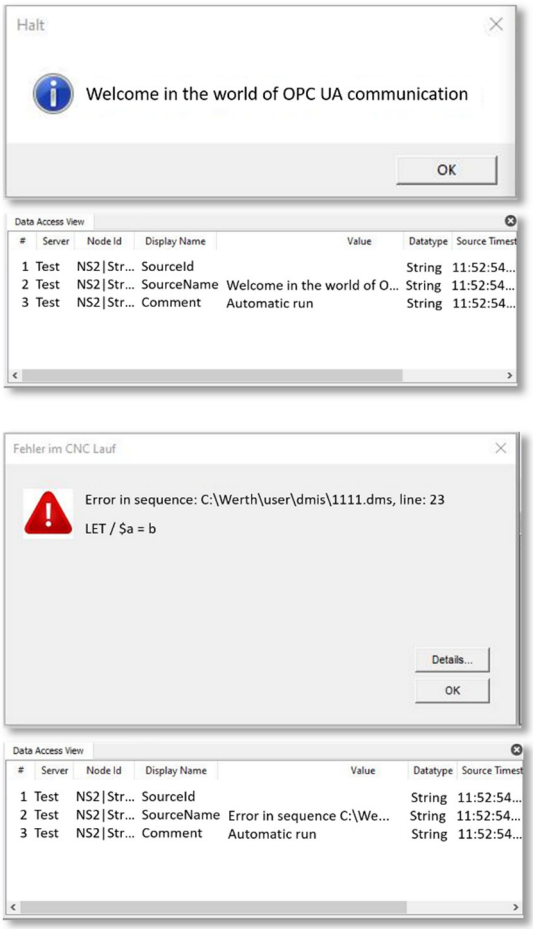
WinWerth ® Viewer	**WinWerth® Viewer** With the WinWerth® Viewer there is now a new (free) tool for visualisation and editing of WinWerth® data . With a reduced WinWerth® user interface, it is possible to check data generated offline or complete evaluations. The new WinWerth® Viewer replaces the previous W3D Viewer. • Display of measurement results and colour-coded deviations • Output of measurement protocols with the functional scope of WinWerth ® • Changing views • Available feature tree enables additional measurement on the loaded data • Saving (measurement) sequences and controlling machines is reserved for the full version.	
WinWerth® General functions (Standard)	**Facelift user interface** The release 9.45 offers a newly modernised interface with clean lines. • New, increased ease of use through simplified dialogues and a clear arrangement of functions • Unified layout for a better overview • Easy changeover for experienced users due to proven structures.	 *Figure: GUI-Facelift: Example toolbar. The toolbar can now be found below the MMB. In the CT tool, all necessary settings can now be found in the standard view.*

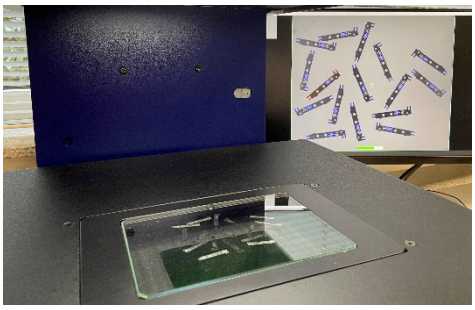
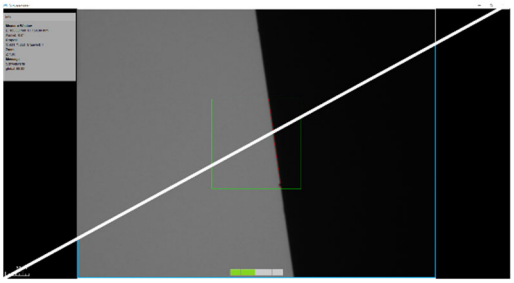
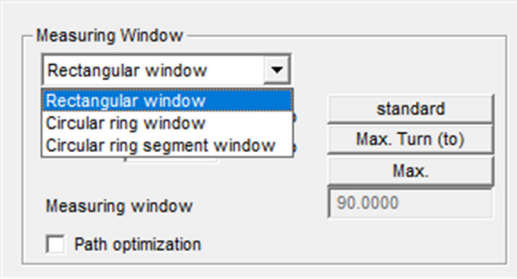
WinWerth® General functions (Standard)	**Acceleration of the autosave function** In order to optimise the Autosave function, large data sets such as point clouds or CAD data are not saved. The main goal of the autosave function is to save the measurement process and the associated actions and measurements. The new handling is intended to prevent a large part of the hard disk from being occupied with autosave data.	
WinWerth® General functions (Standard)	**Functional enhancements of the Werth 3D-graphics** With WinWerth® Version 9.45, the last special functions from the 2D graphics are now available in the 3D graphics. It is now no longer necessary to switch between the graphics windows in order to make evaluations and its displayed results as effective and clear as possible. Also 2D-CAD-Offline® is completely implemented in W3D - graphics.	
WinWerth® General functions (Standard)	**Individual colour scales for deviation display** Until now, a colour coded deviation display of, for example, a measured contour or point cloud described all contours via the W3D graphics. With the extension of the function it is now possible to set up different colour codes and displays for each deviation. In one display, for example, short and vertical colour bars for a relative deviation display and small dots for an absolute deviation can be displayed simultaneously. • For each deviation, the corresponding colour scale is displayed below the dimensioning flag. • A frequency distribution gives an overview of the distribution of deviations. • Relative as well as absolute deviations can be displayed in parallel. • For the colour display on the workpiece, contour lines are also available for a better view.	 

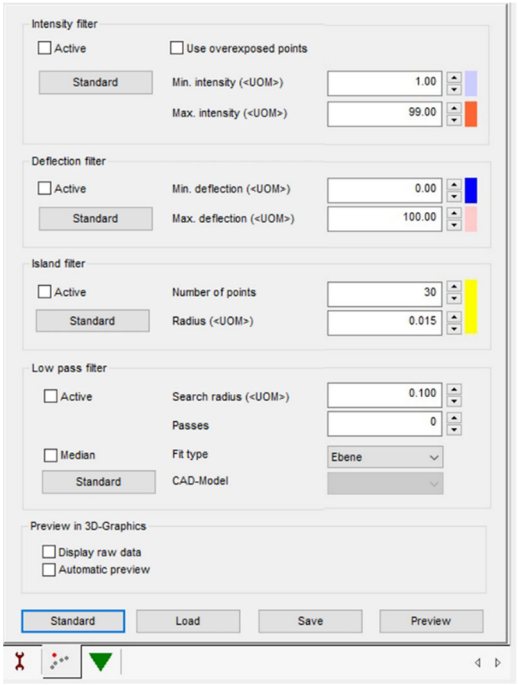
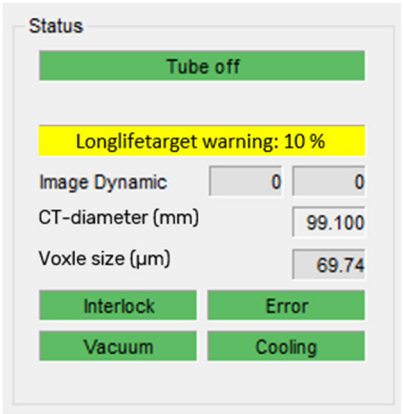
WinWerth® General functions (Standard)	**Element view in the W3D graphic** The new feature provides improved clarity within the graphic during the "step-by-step processing" of individual or several elements in the feature tree. The visibility of individual elements or element groups is specified by the operator by simply setting a tick in the feature tree. The following display options are available: • Objects in 3D–graphic are displayed permanently • Objects in 3D -graphic are hidden permanently • Show and hide objects in 3D graphics via the standard (group) selection.	
WinWerth® General functions (Standard)	**Graphic in Office Report** Up to now, the display of the W3D graphics was integrated via the graphics export step followed by loading into the Office report, the new function "Insert W3D view" makes it easier to use. With the new ease of use the view of the measurement results in the W3D window is inserted directly from the measurement process into the Office report.	

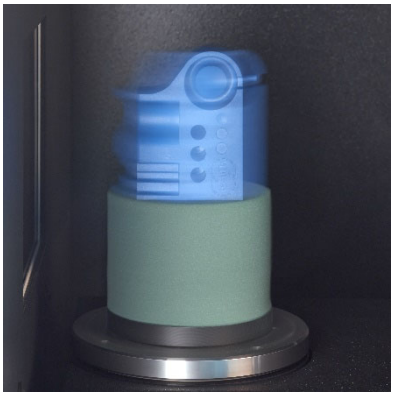
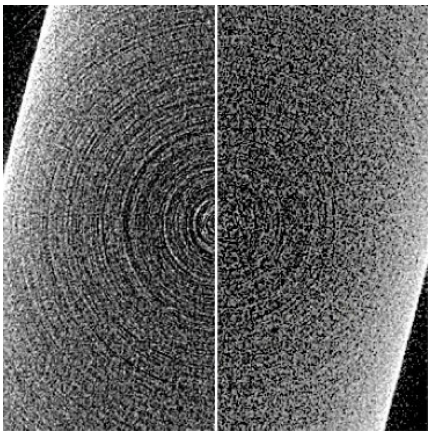
WinWerth® General functions **Units** (standard)	**Units of measurement** The operation for the already supported units in WinWerth ® has been revised and supplemented. First, the parameter queries in the dialogues have been adapted. and second, when changing units, all measurements and sizes already entered are now automatically converted to the new measurement system, even during teach-in. This ensures a uniform representation of measurements. The following are available: for length measurements • Metric • Inch for angle measurements • Decimal degree • Degrees, Min, Sec. • Radiant	
WinWerth® General functions (Standard)	**Size measurements** The new function "Size" offers a comfortable, dialogue-guided, standard-compliant check of drawing entries according to ISO 14405. In the created dialogue the corresponding modifier is selected according to the drawing. The calculation of the two-point dimension is also available for planes, now.	
WinWerth® General functions (Standard)	**Parallel / angular plane pair** Using the new elements parallel and angular plane pair, a distance between parallel planes or the opening angle of planes can be determined with little effort and in conformity with the standard.	

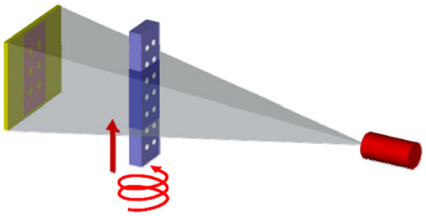
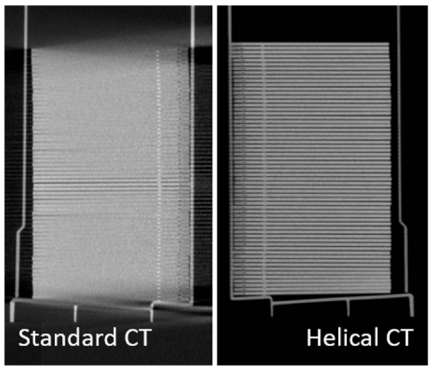
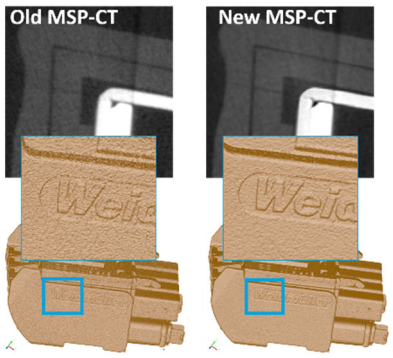
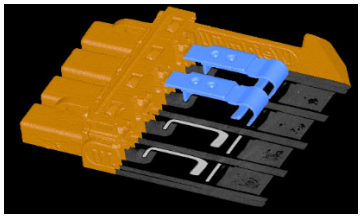
WinWerth® General functions (Standard)	**Symmetry contour** The new function Symmetry contour provides a symmetry contour e.g. of two measured contours. At the same time, it is now possible to capture directional contours with the BV. Possible applications of the function are: • The determination of the theoretical contour position on curved workpieces with outer (long) and inner (shortened) contour (Fig.) • The determination of theoretical material transitions (e.g. for weld seams) for comparison with CAD model transitions. • BestFit.	 *Figure: Symmetry contour of an O-ring (purple); outer contour (yellow) with directional information and inner contour (pink) with directional information; bottom: Detailed illustration of the normal vectors of optically detected contours with direction information.*
WinWerth® General functions (Standard)	**Enclosing sphere** Based on the (standard) enveloping sphere, an enclosing sphere comprises any point cloud with the smallest possible diameter. This strategy is used, among other applications, in blowhole analysis for the classification of individual air inclusions.	 *Figure: The difference between the enveloping sphere (left) and the enclosing sphere (right) is illustrated in a 2-dimensional schematic representation.*
WinWerth® Module **User management** (option)	**Authentication of the user via Windows functions (AD)** With the new function, the support effort for IT regarding user administration is simplified. Thus, Windows user accounts can now be linked with the WinWerth® user administration and all users can be administered via the Windows ActiveDirectory.	

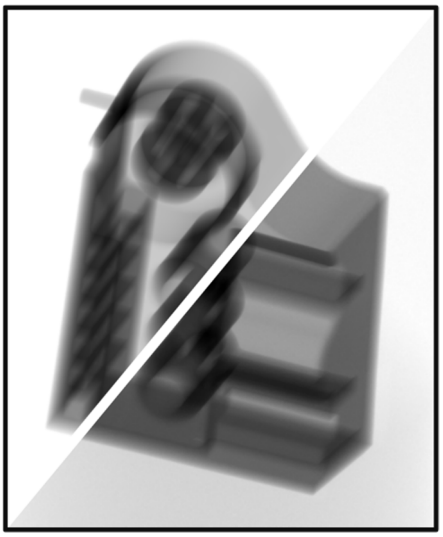
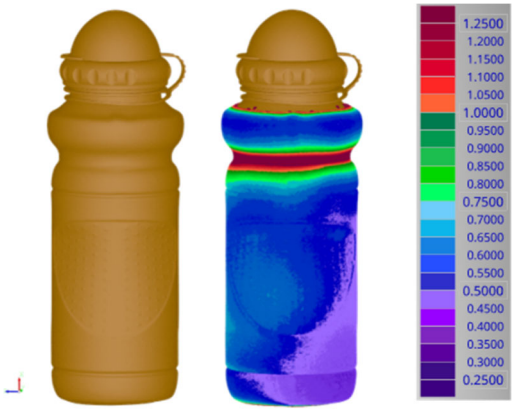
WinWerth® Module **User management** (option)	**Extension of the range of functions for user management** It was already possible to assign different rights of use to individual users via the WinWerth® user administration to assign different user rights to individual users. The function extension Autorun increases the ease of use and at the same time the security aspect for the untrained user. With one click after the person-specific registration, prepared measuring programmes for the respective workpiece can be started. After the measurement is completed, the machine is secured again by an automatic logout of the logged-in user.	
WinWerth® Module **OPC UA** (option)	**Process monitoring via OPC UA protocol** This option makes it possible to transmit information on the machine status via the OPC UA interface. The communication between the machine and, for example, the production control centre can be used for process monitoring. It is displayed whether a robot-controlled (measuring) process on the coordinate measuring machine is running smoothly. In case of an error message and the related machine shutdown, there is a real-time feedback on the problem that has occurred. The information transmitted thus enables quick intervention so that the machine can be restored to an operational state. The figure on the right shows two examples one of a programmed stop and one in case of an error message.	

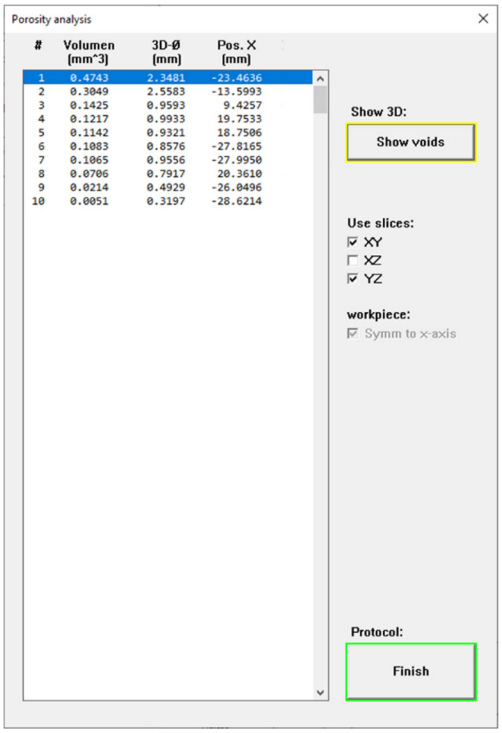
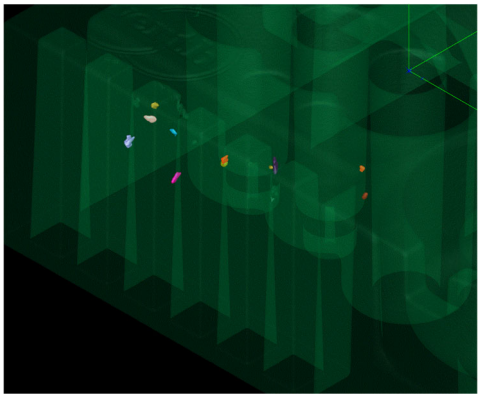
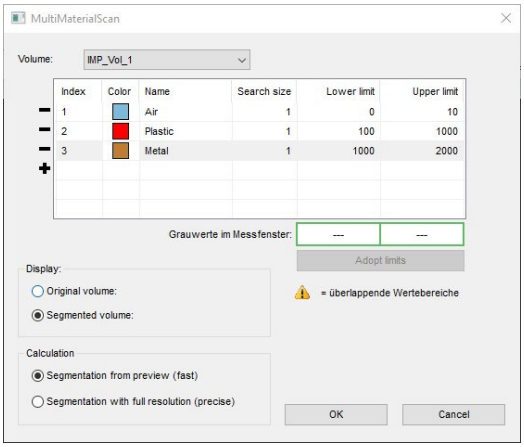
Multisensory Module **2D workpiece separation** (option)	**2D workpiece separation** With the extension of the existing option workpiece separation to 2D contours, it is now also possible to automatically separate contours in the image of several workpieces captured with the image processor. • Simple throwing up parts onto the CMM (if possible without overlaps) • The recorded overall contour is broken down into individual workpiece contours and can be aligned according to requirements and then evaluated workpiece by workpiece.	
Multisensory General function	**Visualisation for inverted operation of the machine axes via the image processor (IP)** A blue frame around the IP image signals to the user at first glance that the direction of movement of at least one of the machine axes is inverted in joystick operation and does not correspond to the standard Werth setup (white frame).	
WinWerth General functions **Measuring Window** (Standard)	**Extension of the measuring window selection in the image processor (IP)** Circle and circle segment windows are two new functions of the IP measurement window. It is now possible to record an autofocus around a borehole using ring windows.	

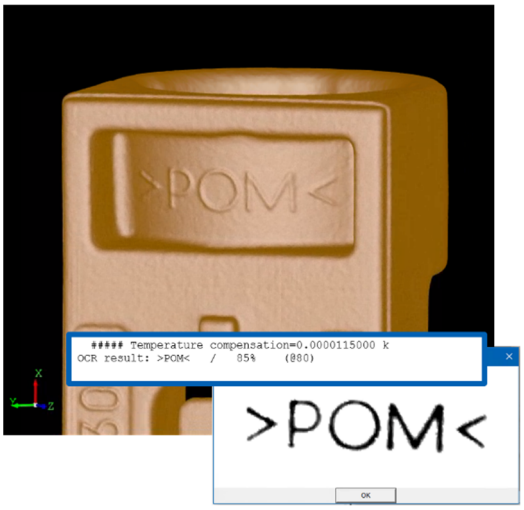
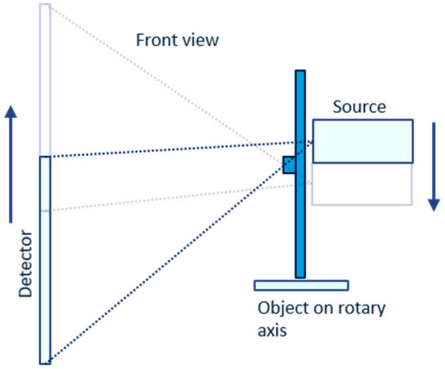
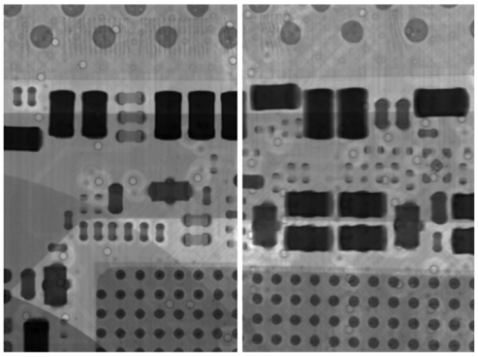
Multisensory Module **CFL filter chain** (option)	**Filtering CFL point clouds** The new CFL filter chain offers a wide range of filtering options for the elimination of defective points, taking into account the process parameters of the sensor system. • Significant reduction of the probing deviation to a few µm • Subsequent filtering of the recorded 3D measurement data possible • HDR method: Several measurements with different light intensities are carried out in order to obtain the best possible measurement results, e.g. on strongly inclined surfaces.	
X-ray tomography General functions **Blasting time** (Standard)	**Display total beam time of the X-ray tube** The absolute beam time of the X-ray tube can now be read via the WinWerth® surface.	
X-ray tomography Module **Longlife target** (option)	**Automated feedback on target status** Via the WinWerth® interface, the user receives a direct status report on the target status. A direct feedback on target wear and an advance warning before the target is completely worn out is displayed. This ensures a seamless transition between maintenance work (target replacement) and regular operation and thus prevents the CT machine from failing. In addition, the maintenance data of the target is stored. The color code stands for: Green: Target OK Yellow: Target soon worn Red: Target worn	

X-ray tomography Module **OnTheFly®** (option)	**OnTheFly® CT mode for all tomography applications** The option OnTheFly®-CT (patent application) offers up to 10 times faster measurement through continuous rotation of the workpiece compared to start-stop operation. With short exposure times and an increased number of rotation steps, measurement uncertainties as in start-stop operation are also achieved here. With the extension of the OnTheFly®-CT option, these advantages are now available for all tomography methods. In particular it is now available for eccentric tomography and eccentric ROI tomography modes, X- / Y-grid tomography, helical tomography and the ring artefact correction and laminography options, and more.	
X-ray tomography Module **Ring artefact correction** (option)	Ring artefacts are created by the rotation which is typical for computed tomography but result from (systematically) different grey values of the detector pixels. Measurements with the computer tomograph in start-stop mode are already corrected during tomography. To correct measurements without start-stop operation, there are two innovations: **Ring artefacts of an OnTheFly® tomography** With the introduced WinWerth® version, ring artefacts can now also be corrected during an OnTheFly® tomography, but a moveable rotary axis is required. **Correcting ring artefacts retrospectively** Ring artefacts occurring after a CT measurement can now be subsequently corrected with the software option Ring artefact correction on the voxel volume. With the help of the presented corrections, surfaces affected by artefacts can be mapped almost error-free.	 *Figure: Ring artefact correction: volume without (left) and with correction (right)*

X-ray tomography Module **Helix CT** (option)	**Helix-Tomography** With the new tomography method, helical tomography, the measurement object is moved helically along the rotary axis during its rotation. This has the advantage that all parts of the workpiece are penetrated horizontally at least once from the source to the detector. In contrast to cone-beam tomography, cone-beam or ring-beam artefacts do not occur here due to the principle. Ring artefacts occur, and the systematic measurement deviations are correspondingly smaller. An additional cone beam artefact correction (patent) is therefore not necessary, this often also reduces the evaluation time. The fast image acquisition through OnTheFly®-CT (patent application) and the use of large detectors with small distances between X-ray source and detector shorten the measurement time.	 *Figure a): Schematic mode of operation of the Helix CT. The workpiece shown in blue spirals through the recording area.*  *Figure b): Comparison of the tomography of a CD stack. Left: Tomography without helix trajectories, strong artefact formation in the form of grey veils can be seen, the individual CDs cannot be separated. Right: Tomography with the helix CT option. Strongly suppressed artefacts, the CDs are clearly separable.*
X-ray tomography Module **MSP-CT** (option)	**New Multi-Spectrum Computed Tomography** The new Multi-Spectral Computed Tomography (MSP-CT) enables high-resolution, low-artefact measurements of workpieces and assemblies that are difficult to penetrate. A high-resolution measurement with low voltage and a fast measurement with high voltage and low resolution can now be combined into a high-resolution, low artefact measurement. For two-tube systems consisting of macrofocus reflection tube and microfocus transmission tube, the option offers the possibility to perform the mentioned measurement with different tubes to create a low artefact, high resolution volume.	 *Figures: Left: Old MSP-CT with good resolution; Right: New MSP-CT producing high-resolution, low artefact measurements;* *Bottom: Multimaterial workpiece with Metallic inlay (blue) and plastic housing (yellow) and added high-resolution Volume section* 

X-ray tomography Module **Optimisation TomoSim** (option)	**Optimisation of the TomoSim function** With the TomoSim function, the possibility of realistic offline programming of CT measurements has already been introduced. The simulated volume corresponds to the later measurement in terms of resolution, artefacts and many other properties.. By optimising the TomoSim function, the simululated intensity images now also provide conclusions about possible over-radiation due to too high X-ray tube power and the positioning of the workpiece. Not optimally selected tube parameters as well as the position of the workpiece on the detector can thus be corrected offline before the real tomography.	 *Figure : Left: Simulated transmission image compared with the measured transmission image (right). Here, simulated and set values of both machines are identical.*
X-ray tomography Module **3D wall thickness** (option)	**3D wall thickness measurement** The extension of the option 3D wall thickness allows the evaluation of wall thicknesses of any point clouds in STL format. The minimum and maximum thickness is given. Colour-coded deviations are calculated and displayed from the nominal wall thickness over the selected range	
X-ray tomography Module **Volume export in WKS** (option)	**Volume export in workpiece coordinates** With the volume export in workpiece coordinates it is possible to export the recorded volume in a defined coordinate system. This provides a convenient, simple solution for the prealignment of separated workpieces, for example in the course of exporting and importing separated point clouds from nests. Each volume is exported and saved with its own workpiece coordinate system and can be loaded with its own coordinate system for evaluation in WinWerth®.	

X-ray tomography Module **Porosity analysis** (option)	**Porosity analysis** The porosity Analysis option is a function for quantitatively determining the porosity of the measured workpiece based on section planes. The interactive evaluation is based on the calculated voids of the workpiece. The user decides which voids are to be considered and reported. The result of the evaluation is saved in the familiar Office protocol.	 
X-ray tomography Module **MultiMaterial-Scan** (option)	**MultiMaterialScan** The WinWerth® option MultiMaterialScan enables the automatic, sub-voxel accurate calculation of separate STL point clouds per material. It is now possible, with the help of MultiMaterialScan, to calculate the material transitions of the measured multi-material workpiece and to generate material-separated point clouds with sub-voxel accuracy. The option allows the inspection and measurement of critical geometries in the assembled state. For example, assemblies can be tested for their functionality. Materials can be defined by setting measurement windows in VolumeCheck for the calculation of material transitions.	

X-ray tomography Module **Text recognition** (option)	**Text recognition on curved surfaces** With the OCR option (Optical Character Recognition), texts and character strings or blocks can be recognised and output by software. Whereas it was previously possible for flat surfaces, only, cylindrical and certain free-form surfaces are now also permitted. For CT data, a voxel volume was additionally required in order to be able to perform text recognition. With this extension, texts and character strings can now also be recognised on planes, on cylinders and, under certain conditions, on free-form surfaces on the basis of an STL. For measurements with several workpieces the extension offers the possibility of an automated assignment of the measurement results to the corresponding workpiece and thus a quick identification of possible poor parts via its part number.	
X-ray tomography Module **Laminography** (option)	**Planar laminography** With the introduction of laminography for 2D applications in the latest WinWerth® version, a possibility was presented for the first time that allows workpieces with a large aspect ratio, such as typically printed circuit boards or electronic assemblies, to be tomographed with a high lateral resolution. In addition to swing laminography (here the workpiece is swivelled at a small angle in front of the source), planar laminography of flat workpieces such as printed circuit boards is now also possible. Advantages to swing laminography: • Improved resolution as there is no rotation. This allows the workpiece to be positioned closer to the tube. • For workpieces with a large aspect ratio, the complete workpiece is accessible, as it is not necessary to measure on the position of the rotary axis.	 *Figure a): Schematic representation of planar laminography. Here the detector and source are moved in opposite directions during the measurement. The workpiece remains unchanged in position.*  *Figure b): Comparison of the planar (left) and swing (right) laminography modes. An improvement in resolution can be seen for planar laminography.*

Notes

New Features

WinWerth® Version Information 9.45

The measurement software for all tasks on the shopfloor and in the laboratory

05/2023

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