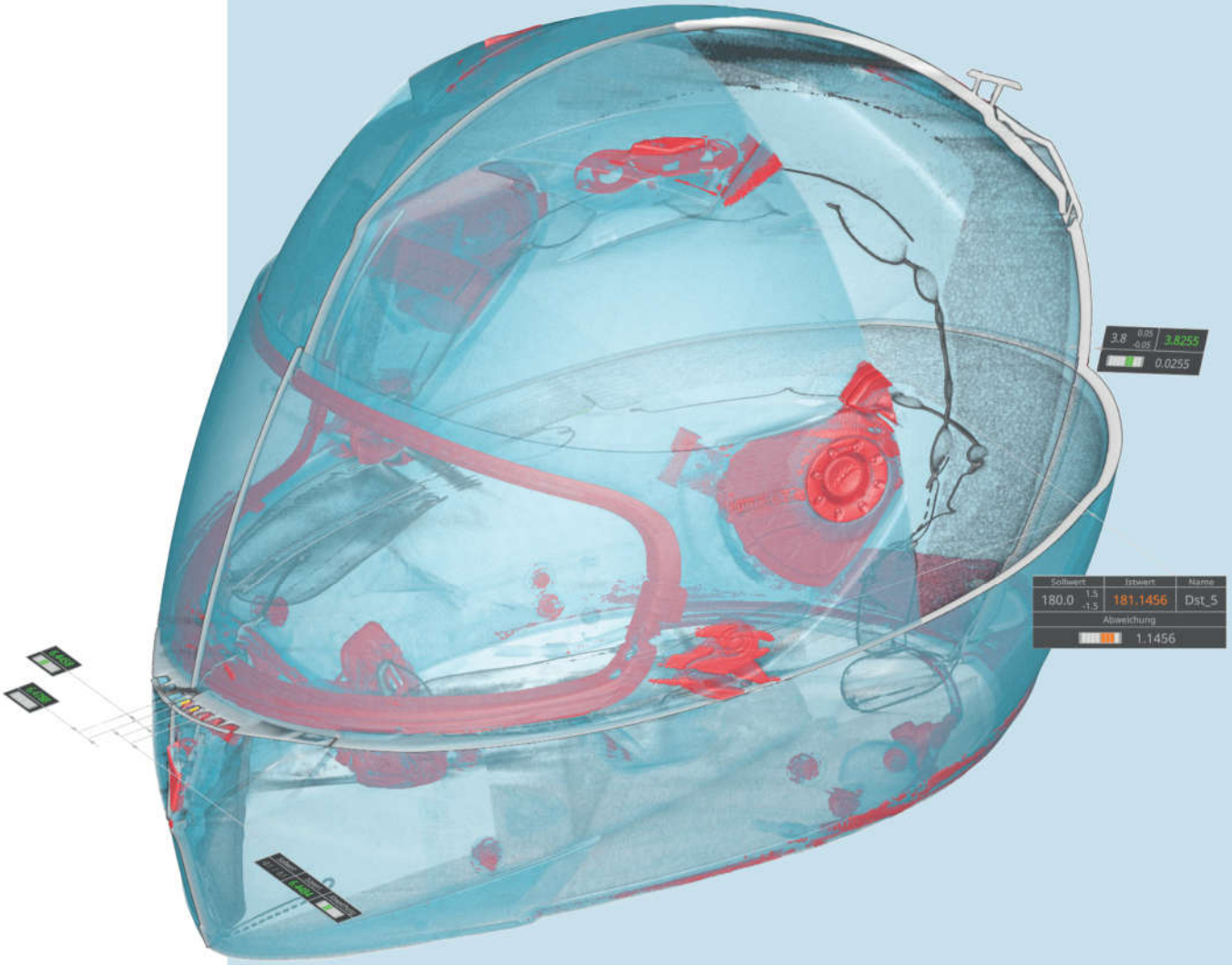
Multisensor

Innovative Metrology for your Quality Products



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Cover picture: With the new TomoScope® S Plus and WinWerth® version 9.45, even large multi-material workpieces can be measured with the highest accuracy in this machine class

The unique concept with three independent sensor axes enables fast multisensor measurements without restriction now also on the VideoCheck® S

We set standards for quality

The trend towards measuring many points with optical sensors, computed tomography and multisensor technology continues. With the continually broadening range of applications, demand for computed tomography is significantly increasing. The machines of the TomoScope® XS series are suitable for workpieces made of plastic and metal. Low maintenance and short measuring times at high resolution ensure an excellent price-performance ratio. The optimization of components and software for easy operation, even higher measuring speed and accuracy, and the expansion of the application range are the goal of further developments. The same applies to optical measurement.

In the field of X-ray computed tomography, the new TomoScope® S Plus offers twice the measuring volume with almost the same footprint and improved accuracy compared to the previous model. Functions such as Laminography and Eccentric Tomography at increased measuring speed by OnTheFly CT are now also available for the third generation of the first TomoScope® since its launch in 2005. Probably the world's first sub-microfocus source in a monoblock design can be used for all Werth CT machines. Longlife components enable high-resolution measurements with high availability and low maintenance costs.

The compact VideoCheck® S now provides even more flexibility for multisensor measurements with up to three independent sensor axes. The new generation of the VideoCheck® UA, probably the world's most accurate multisensor coordinate measuring machine, approaches length measurement errors in the double-digit nanometer range.

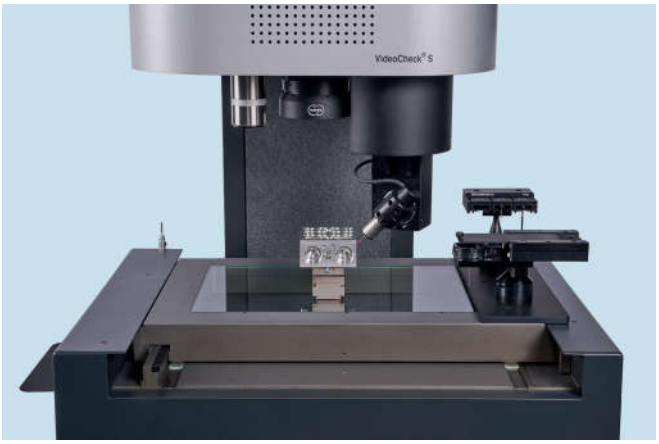
In WinWerth® version 9.45, the ease of use has again been increased, among other things, with uniform user interface dialogs as well as increased flexibility in the graphical display of the measurement results. There are new "intelligent" filter options for multi-point measurement with optical sensors. In the field of computed tomography, new functions such as multi-material segmentation, the Spiral CT and new automatic procedures for artifact correction to achieve low measurement errors are available.

In this year's issue of "Multisensor", our Chinese subsidiary presents itself. Employees from the headquarters in Giessen, Germany, provide insights into the DAkkS calibration of our CT coordinate measuring systems along with the fiber production process for the patented micro-probe Werth Fiber Probe®. The regular dialogue with our customers is of outstanding importance for ongoing product enhancement and innovation. We are looking forward to many interesting discussions again this year.

Dr. Ralf Christoph
President and owner of
Werth Messtechnik GmbH Giessen

Content

News about Multisensor Systems



Werth Featured Article

News about X-ray Computed Tomography

Werth Featured Article

News about the Werth Group

Multisensor technology perfectly integrated on the VideoCheck® S

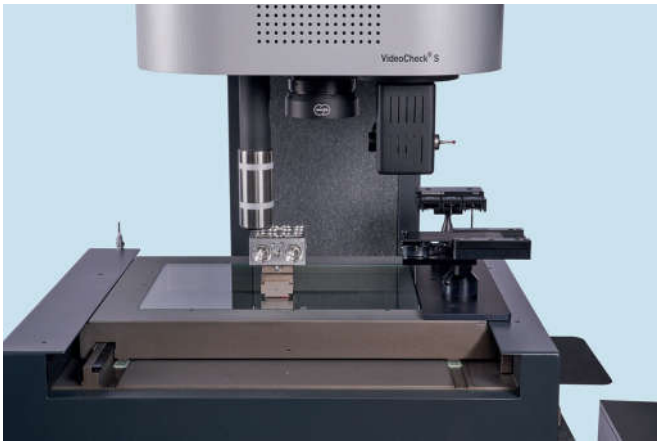
Optimal accessibility of workpiece geometries
and minimal risk of collision now also on the VideoCheck® S

With the high-precision machines of the VideoCheck® series, the potential of even the most accurate sensors can be fully exploited. The multisensor technology with large sensor selection allows the economical solution of many measurement tasks with one machine. Werth offers unique high-precision sensors, e.g., the patented Werth Fiber Probe® 3D or the Werth Interferometer Probe.

The proven multi-ram design for maximum flexibility when using multisensor technology is now also available for the smallest machine in the series, the VideoCheck® S. The new machine concept also makes it easy to retrofit purely optical or purely tactile machines to multisensor coordinate measuring machines. This means that the accessibility of workpiece geometries is no longer restricted by other sensors or accessories. The independent sensor axes enable fast measurements without time-consuming sensor changes. Since the axes with the non-active sensors are outside the measuring range, the risk of collision is minimal. Sensor changing stations are no longer necessary, so that the measuring range can be used without restriction. It is possible to remove the changing stations from the measuring volume after the sensor change using the machine axes, but now the time required for this is also eliminated.

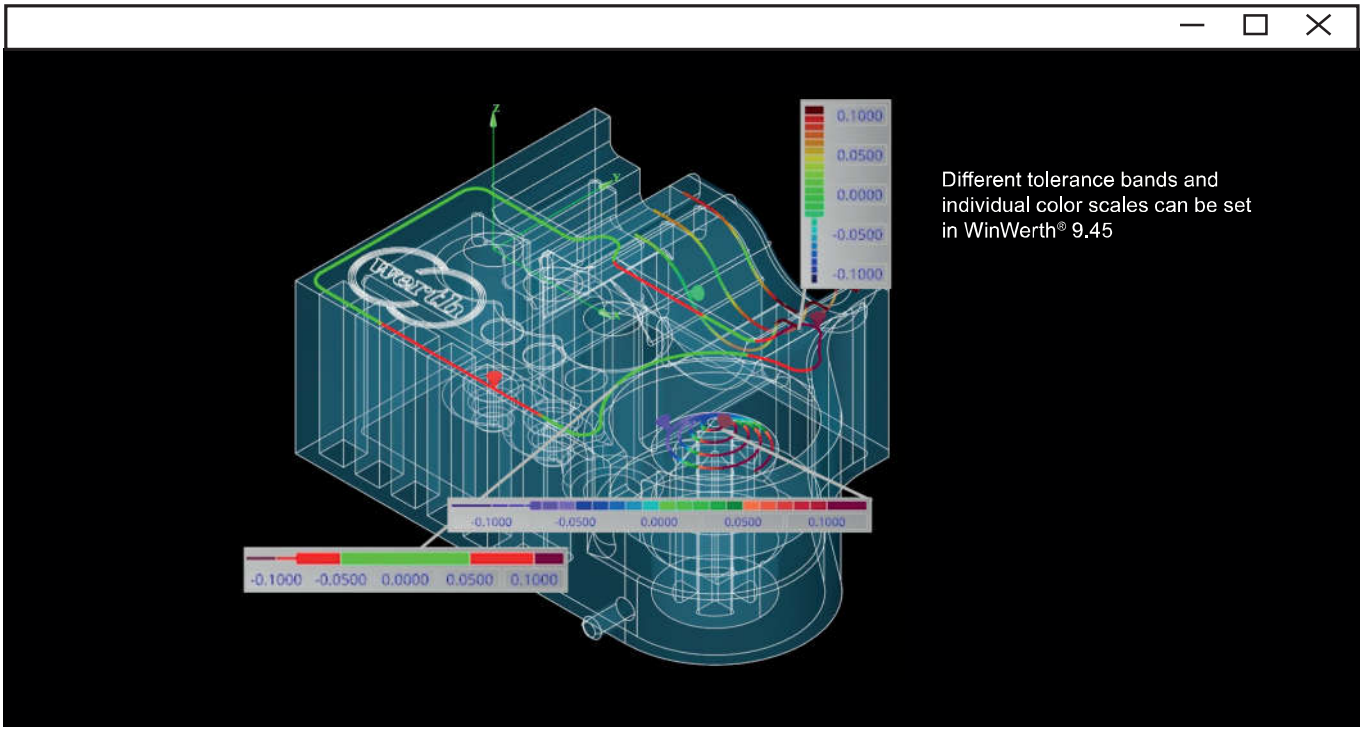
Werth coordinate measuring machines offer high flexibility with various options. With the Werth Multisensor System, different sensors can be swapped in at the same position in front of the image processing beam path. This means that the combined multisensor measuring range can be used without restriction, even with additional sensors, and the risk of collision is minimal. The new, multisensor-capable Werth Rotary Tilt head (see page 10–11) enables fast, stepless positioning of sensors. Workpiece rotary or workpiece rotary/tilt axes can be mounted in any direction. The multi-ram concept optimizes accessibility and minimizes the risk of collision.

The new machine is suitable for medium-sized workpieces with tight tolerances and different geometric properties that require the use of multisensor technology. Examples include large plastic housings of automotive electronics, cutting inserts, micro hobs, shaft tools, optical lenses or dental implants.



Fast multi-sensor measurements without limitations with the multi-ram concept

New WinWerth® Version 9.45



Different tolerance bands and individual color scales can be set in WinWerth® 9.45

Version 9.45 of the WinWerth® measurement software offers many new and improved functions, for example Spiral (Helical) Tomography to increase accuracy with the smallest measurement errors in the range of 0.5 µm (see page 16). With Multi-Spectra Tomography, high-resolution, low-artifact measurements of difficult-to-penetrate workpieces and assemblies are possible with better quality (see page 17). The new WinWerth® Viewer allows automatic processing of existing projects and additional manual evaluation as well as the output of measurement reports with the range of functions familiar from WinWerth®.

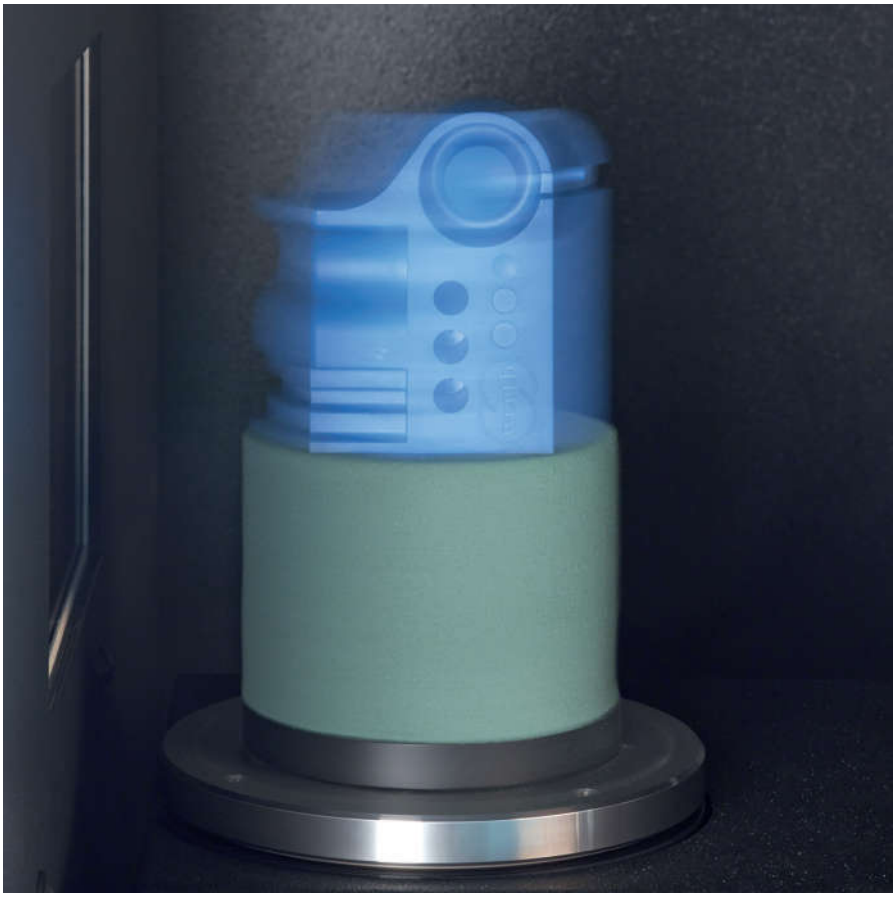
The measurement software has been extended by various smart functions. For measurements with the image processing sensor, the contours of several workpieces measured in one image can now be separated automatically as well. Another new feature is the subsequent filtering of recorded 3D measured data, taking into account the process parameters of the sensors, which allows probing errors to be significantly reduced when using multi-point sensors, for example. With the WinWerth® user management, the user rights can be limited to the selection of a workpiece also for the automatic start of the measuring program. Upon completion of the measurement the machine is secured again by an automatic logout of the active user. Individual users can be managed directly via Windows ActiveDirectory by linking them to Windows user accounts. For an improved overview, only features above the insertion tag are displayed in the 3D graphic. The graphic can now be saved directly in the Office report.

The modernized WinWerth® 9.45 user interface with clear lines and uniform, simplified dialogs increases ease of use. For form errors with different tolerances, the type of deviation display can now be adjusted by the user within wide limits. With the aid of the color distribution diagram, the size of systematic and random deviations can be easily assessed.

The scope of functions has also been extended in the area of computed tomography. OnTheFly CT (patent pending) for increasing the measuring speed is now available for all special measuring methods, for example the patented Multi-ROI CT. When programmed offline with TomoSim, the quality of the simulated volume corresponds to the subsequent measurement in terms of resolution, artifacts and many other properties. With the help of the simulated intensity image, tube power and position of the workpiece on the detector can be optimized.

In the new WinWerth® version, various calculation elements have been added. A standard-compliant evaluation of geometrical characteristics such as size is performed fully automatically after selection in the measurement software. The distance between parallel planes and the opening angle of planes at an angle to each other can also be determined in conformity with the new standards. Another new function enables the determination of the symmetry contour between two contours. Enclosing spheres with the smallest possible diameter can be calculated from any point clouds.

Several status displays provide information for the user. For example, the machine status can be transmitted to the production control station via OPC UA protocol. It is possible to read the absolute radiation time of the X-Ray tube and the wear condition of the target in the user interface, thus preventing downtimes.



OnTheFly CT (patent pending) enables an increase in measuring speed now also for special measuring methods like the patented Multi-ROI Tomography

News about Multisensor Systems

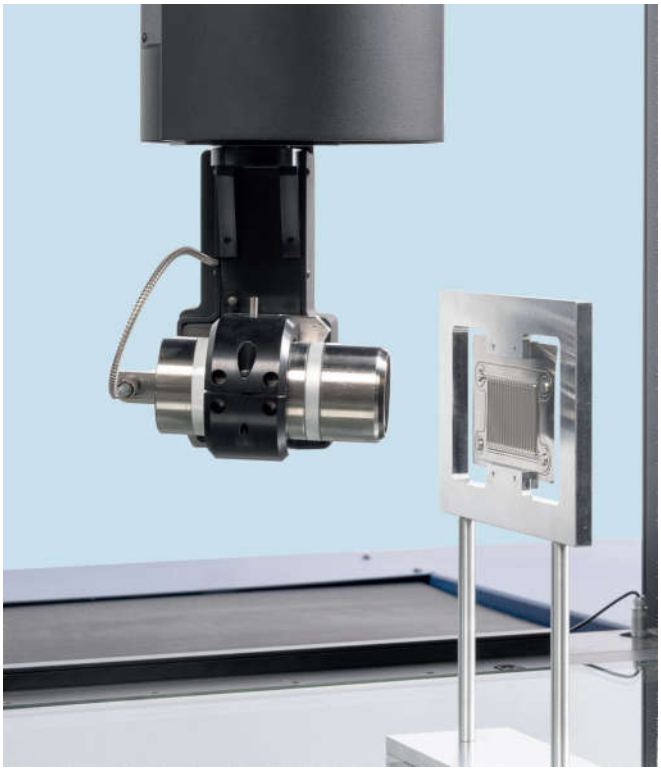
Stepless rotary/tilt head for optical distance sensors and tactile sensors

Stepless positioning with small tilt path due to small distance between tilt axis and stylus tip

The new WRT rotary/tilt head enables fast, stepless positioning of sensors. The eccentric probe mounting allows the use of rotary/tilt heads on small machines.

Some workpieces, such as thin sheet metal, must not be contacted or moved, but are also too large and heavy for rotary axes. In such cases, a multisensor capable rotary/tilt head is needed for measurement on both sides. The new WRT can handle higher loads than conventional rotary/tilt heads and is therefore suitable for a wide range of sensors. For example, it can be used on coordinate measuring machines with a fixed bridge or on the new VideoCheck® S 6–7) with up to three independent sensor axes.

The WRT enables measurements in any probing direction both with conventional scanning probes and, for example, with the Chromatic Focus Point optical distance sensor. The limiting angles for capturing the light reflected from the workpiece surface, which are specified by the numerical aperture of the lens, and the resulting limitations for the surface angularity are eliminated. Combined measurements in several tilt positions allow, for example, very steep flanks to be measured.



With the rotary/tilt head Werth Rotary Tilt (WRT), optical distance sensors can be optimally positioned relative to the workpiece surface

Higher accuracy and better accessibility

For the scanning probe, e.g., the eccentric probe mounting results in a smaller distance between the tilt axis and the stylus tip, and thus a smaller tilt path when measuring a complex workpiece. This improves the accuracy, since the length measurement error of the machines increases with the measuring length, mainly due to temperature.

Another benefit over conventional rotary/tilt heads is the infinitely variable adjustment range for rotation and tilting, which offers better measuring object and element accessibility. The eccentric arrangement of the tilt axis also results in a larger usable measuring range.

Fuel cells are one application example: A vertical set-up of the bipolar plate enables the measurement of wall thickness, mold center offset and weld center offset. The geometry of the flow field can be captured at the half plates. Other areas of application include the measurement of cylinder-head gaskets, turbine blades or protective glass for dashboards.

Werth Featured Article

The next generation of the world's most accurate multisensor coordinate measuring machine

The VideoCheck® UA of RhySearch in the measuring lab of the Competence Center Production Metrology at the Eastern Switzerland University of Applied Sciences OST in Buchs/Switzerland features a Chromatic Focus Point Sensor with high accuracy and one with a large measuring range, an image processing sensor with Werth Multi-sensor System for adaptation of a conventional probe, the patented micro probe Werth Fiber Probe® 3D and the also patented rotatable Werth Interferometer Probe (from left)

Many standards are not accurate enough for the minimum length measurement and probing errors of the VideoCheck® UA

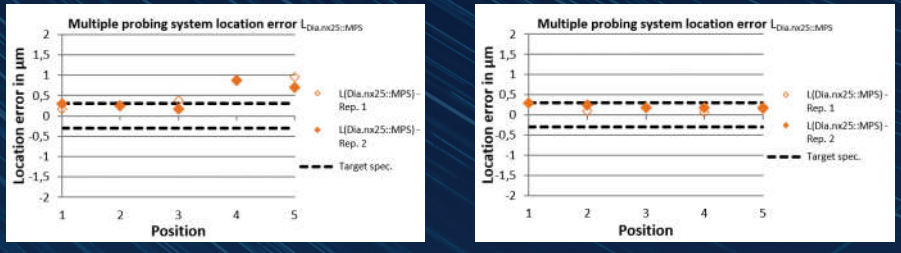
Dr. Thomas Liebrich, responsible for the High- and Ultra-precision Manufacturing Lab at RhySearch, the Rhine Valley Research and Innovation Center: “To evaluate the high- and ultra-precision workpieces we manufacture with form, size and position tolerances down to the sub-micrometer range, we rely on extremely accurate but also very flexible measurement technology. For example, we measure workpieces made of a wide variety of materials – from brittle-hard to very sensitive – but also different surfaces from mirror-like to matte.”

With the VideoCheck® UA, the potential of high-precision sensors can be fully exploited. Werth Messtechnik has probably the largest selection of such sensors, such as the patented Werth Fiber Probe® 3D, the Chromatic Focus Point Sensor or the Werth Interferometer Probe. Prof. Dr.-Ing. Michael Marxer, Head of the Competence Center Production Metrology at the Eastern Switzerland University of Applied Sciences OST in Buchs: “With the Werth VideoCheck® UA, we have a large number of tactile and optical sensors available on one measuring machine, which we can use optimally for a very wide range of ultra-precise measuring tasks. We achieve the smallest measurement uncertainties and high measurement speeds at the same time.”

In the new accuracy-optimized design, the MPE for Euni has been reduced to (0.15 + L/2000) µm (option). The new machines feature improved decoupling of ambient vibrations, improved long-term temperature stability and thus the smallest sensor offsets for improved measurement uncertainty in multisensor measurements. Thus, especially for time-consuming multi-point measurements with several sensors in the same reference system, the accuracy has been increased once again. Marxer: “The VideoCheck® UA enables us to measure workpieces economically and to calibrate standards with high precision in new application areas with the highest requirements. In combination with the user-friendly software, the machine is a universal tool for us that exceeds our high requirements."

The revised machine concept is characterized by temperature-stable components, optimized heat circulation, active cooling of components and extended software temperature compensation. Liebrich: “In Werth Messtechnik, we have found a partner that meets our high requirements with a wide range of sensor technology and also continuously improves its multisensor coordinate measuring machines through various optimizations. We very much appreciate the open and constructive exchange with the Werth Messtechnik team.”

Other prerequisites for the improved specification of the VideoCheck® UA are new procedures and the utmost care in qualifying the software corrections, for example exact guidelines to achieve thermal equilibrium. Many standards are not accurate enough to demonstrate the small probing errors (size and form) of the highly accurate sensors on the VideoCheck® UA. For example, a special ultra-precision sphere had to be created for the Werth Fiber Probe® 3D.



Multiple probing system location error for five different positions of the test sphere in the measurement volume. The deviation of the center points measured with different sensors on the identical test sphere is determined in accordance with DIN EN ISO 10360 for a VideoCheck® UA in standard (left) and accuracy-optimized design (right)

TomoScope® S Plus – the evolution of measuring volume and accuracy

With the large measuring range and X-ray voltages up to 240 kV, even large objects can be measured

Werth TomoScope® coordinate measuring systems with computed tomography offer high measuring speed at high resolution. Transmission tubes with 80 W tube power allow measurements up to five times faster than conventional reflection tubes at the same structural resolution. OnTheFly CT for continuous acquisition of intensity images during rotation and real-time reconstruction of the digital workpiece volume simultaneously with image acquisition also contribute to the very high measurement speed. TomoScope® machines feature high availability due to low maintenance requirements. Proven long-life components allow maintenance-free operation for up to 12 months; maintenance work by the operator is completely eliminated. Standard-compliant calibration is optionally available from the Werth-DAkkS laboratory, the first in the world for CT coordinate measuring systems.

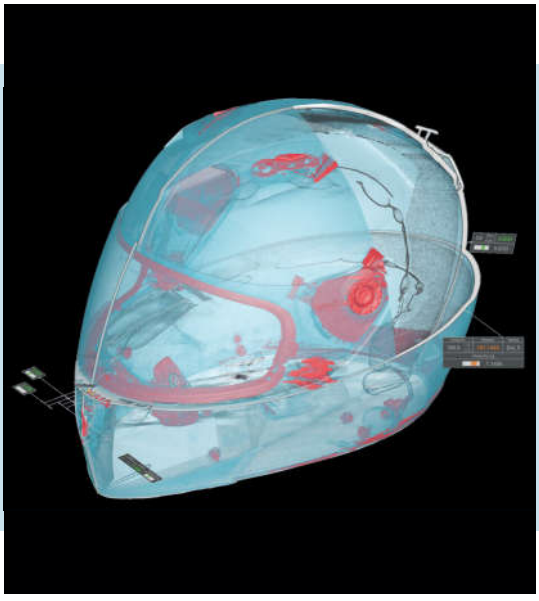
In 2005, Werth developed the TomoScope® 200, the first CT machine for coordinate metrology. With a permissible length measurement error MPE for E up to (4.5 µm + L/75) µm, it was already possible to measure completely and accurately at that time. In 2011, the modern successor with high tube voltage and high-resolution detector with compact external dimensions was introduced. In the years that followed, initially larger CT machines for the measurement of difficult-to-penetrate workpieces with high resolution followed. From 2017, more compact CT coordinate measuring systems for fast measurements with high resolution were introduced with the TomoScope® XS machine family.

Maximum performance with optimum components

The new TomoScope® S Plus measuring systems have more than twice the measuring volume of their prede cessor with almost the same size. With the unique specifications for the length measurement deviation MPE for E of (4 + L/75) µm and the distance deviation MPE for SD of (2.5 + L/100) µm, the series also offers what is surely the highest accuracy in its machine class.

The modular equipment system has been expanded. X-ray tubes from 130 kV to 240 kV tube voltage, with transmission or reflection target as well as with and without focusing can be integrated. With tube voltages of up to 240 kV, the new TomoScope® S can be used to measure large workpieces that are difficult to penetrate. The detectors feature 2 megapixels to 28 megapixels with pixel sizes from 50 µm to 200 µm. The combination of large detectors and special tomography techniques such as Raster or Half-Sided Tomography enable a large measuring range of up to 650 mm. In addition, new operating modes such as laminography and Eccentric Tomography “OnTheFly” are available for the TomoScope® S series.

The new machines achieve an even higher measuring speed. With the help of the new cone beam artifact correction, fast, accurate measurement is possible with a small distance between the X-ray source and detector. By using large and fast detectors, a larger part of the radiation energy is used. This enables higher measurement speed or, by improving the signal-to-noise ratio for the same measurement time, higher accuracy. As with all Werth TomoScope® machines, the measuring time can be further reduced by measuring many workpieces simultaneously.



Quick note

Measurement result motorcycle helmet

With WinWerth®, radiographic images, reconstructed workpiece volumes and measurement point clouds can be conveniently evaluated for geometric properties, defects such as burrs and cracks, or material properties such as fiber orientation

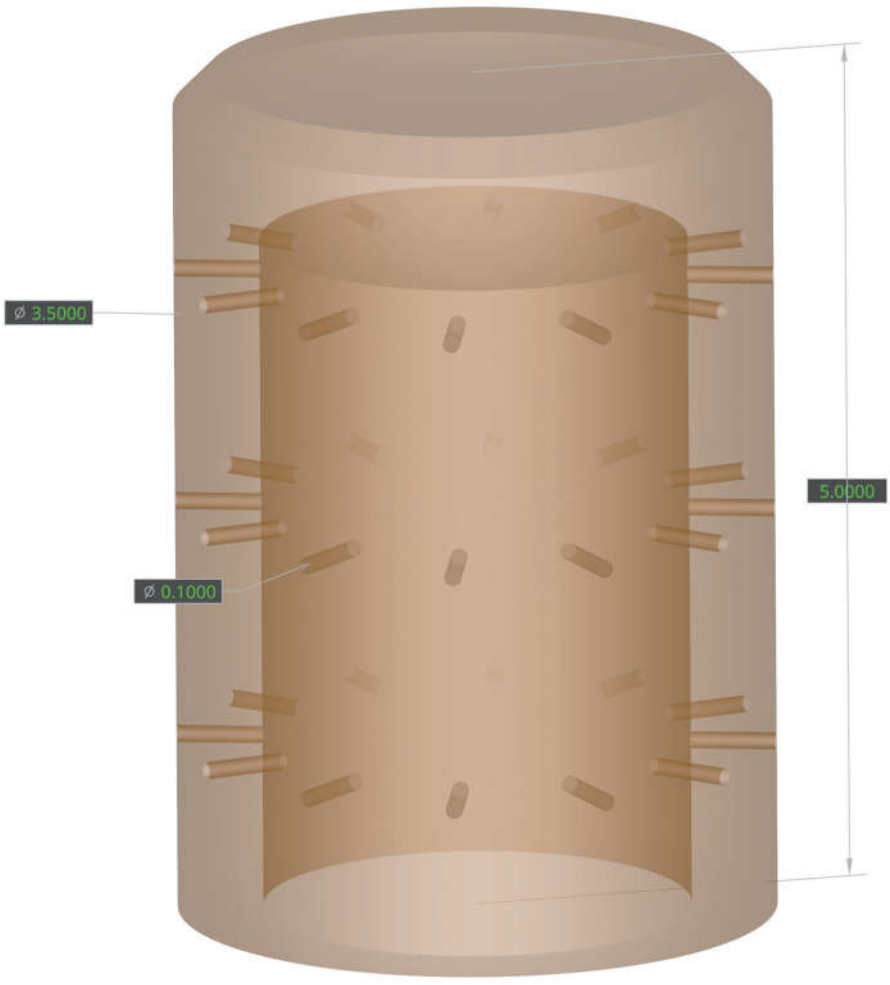
Optimized accuracy

With Spiral (Helical) Tomography, the measuring object is moved screw-like along the rotary axis as it rotates. This has the benefit that all parts of the measuring object are irradiated horizontally from the source to the detector at least once. Due to the principle, no cone beam or ring artifacts occur, and the systematic measurement errors are correspondingly lower.

The fast image acquisition by OnTheFly CT (patent pending) and the use of large detectors with small distances between X-ray source and detector shorten the measurement time. For a large aspect ratio of length to diameter, e.g., for long workpieces or fixtures with multiple stacked workpieces, measurement time is less than with Raster Tomography. An additional Cone Beam Artifact Correction (patent) is not necessary and this often reduces the evaluation time.

With conventional Cone Beam CT, systematic measurement errors occur as the cone angle increases. With the Werth software correction methods, these measurement errors are reduced to a few micrometers. By penetrating all parts of the measuring object horizontally, exact reconstruction is possible with Helical CT, so that cone beam artifacts and the need for corresponding correction methods are eliminated by this operating principle.

One application example for Helical Tomography are endoscope nozzles. These are millimeter-sized metal workpieces with several dozen spray holes. Spray hole diameters in the two-digit micrometer range require high resolution and therefore the use of transmission sources. With tolerances in the range of 10 µm, measurement errors should not exceed 1 µm to 2 µm. In addition, the

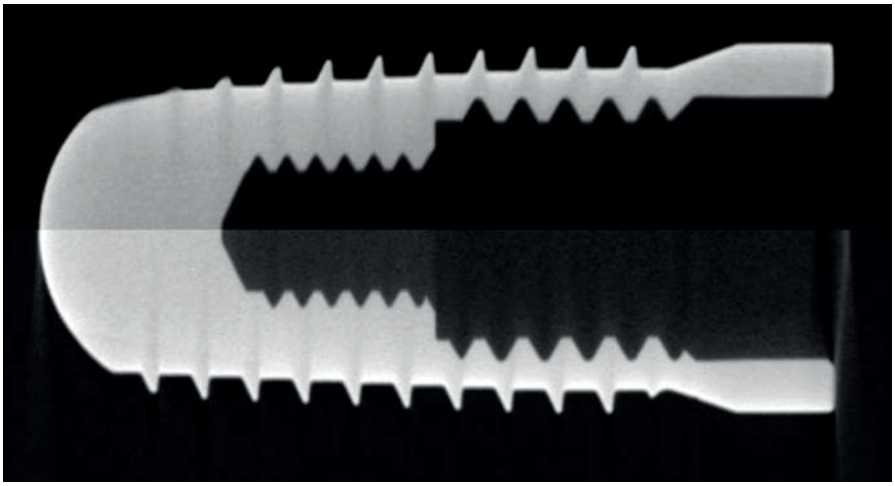


Millimeter-sized endoscope nozzles with injection hole diameters of around 100 µm can be measured in the production cycle using the new computed tomography coordinate measuring systems and measurement methods

use of a transmission source enables high-resolution measurements at high measuring speed, since much smaller focal spots are usually available for the same power compared to reflection tubes. Due to a small distance between the X-ray source and a large detector, a large part of the radiation energy is used at the same time. Multi-object measurements with up to fifteen workpieces in one measurement process are possible. Thus, cycle times of about 10 minutes can be achieved. The user's tasks in close-to-production worker self-inspection are limited to loading the machine and selecting the measuring program.

Fountain pens are another application example for Helical Tomography. Thin-walled lamellae under the nib suck in the ink by capillary action. Due to artifacts that occur, the lamellae cannot be easily measured with conventional Cone Beam CT. With Helical CT, they can now be made visible and measurable.

Helical Tomography is also used in the area of dental implants. Here, gaps between the components of the assembly would favor the intrusion of bacteria. Helical CT allows the measurement of internal geometries with correspondingly tight tolerances and also, for example, the measurement of the width across flats in the implant.



Volume section of a dental implant from measurement with Spiral Tomography (top) and conventional Cone Beam Tomography (bottom)

TomoScope® XS Plus with sub-microfocus X-ray tube

Since its foundation in 1817, the Senckenberg Society for Nature Research has been researching the development of the earth and the importance of biodiversity. The Senckenberg Natural History Museum at the main site in Frankfurt am Main is one of the largest natural history museums in Europe. Senckenberg's scientific collections – with around 41 million objects the most extensive in Germany – are as "archives of life" an indispensable basis for the study of our biotic and abiotic environment.

Many of these collections are already accessible online and thus used all over the world. Digital technologies are crucial for this, as the way in which collection material is utilized has constantly evolved. Technical progress and new examination methods make it possible to elicit more and more information from the objects. For the highly accurate digitization of the unique research objects, a TomoScope® XS Plus with a new sub-microfocus tube is used, which was jointly financed with funds from the Hessian Ministry of Higher Education, Research, Science and Arts (as part of EFRE) and from the Senckenberg Society's own funds (including SOSA).

In 2017, Werth Messtechnik presented the TomoScope® XS, the first compact machine with X-ray computed tomography for fast measurements with high structural resolution. The novel tube design allows the maintenance interval for such machines to be increased to 12 months for the first time. With the first TomoScope® XS Plus – at that time still with 130 kV or 160 kV maximum voltage – the measurement volume was quadrupled. Today, the compact machine is available with up to 200 kV tube voltage. The higher voltage makes it

The Senckenberg Research Institute in Frankfurt am Main (here a *Diplodocus* (center) and an *Iguanodon* (left) in the Senckenberg Natural History Museum) is one of the first users of the novel sub-microfocus X-ray tube

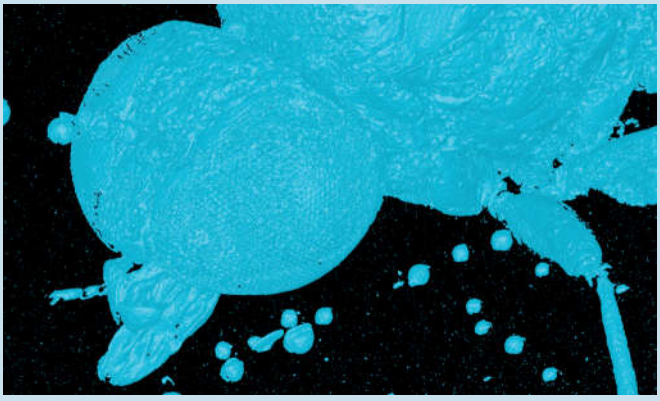
possible to use it even for workpieces made of dense materials with long radiographic lengths that are difficult to penetrate.

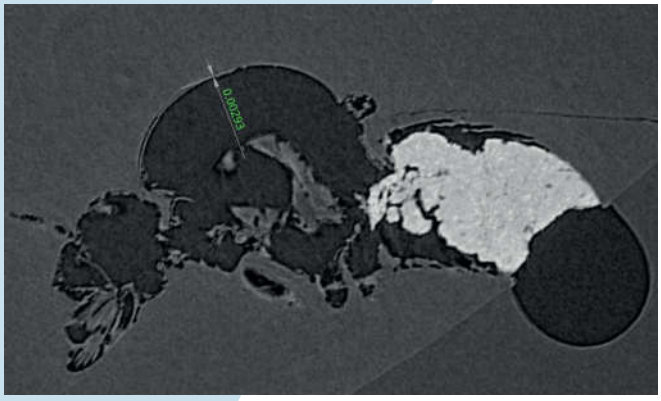
Now Werth is introducing this type of machine with the first sub-microfocus tube in a monoblock design and long-life components. Sub-microfocus tubes used to be particularly maintenance-intensive, resulting in long downtimes and high costs. The new tubes with up to 160 kV voltage allow high availability and significantly lower maintenance costs compared to conventional sub-microfocus tubes with a separate generator.

This is the first time that a sub-microfocus tube is also available in this machine class. The maximum structural resolution in the 2D transmission image is often specified as a parameter. Practically only the focal spot size of the X-ray source is relevant here, other influencing variables are largely neglected. This allows very small numerical values of a few hundred nanometers to be specified. For a TomoScope® XS Plus with the new sub-microfocus tube, this value is about 0.8 µm. However, the correct coordination with the other machine components such as the rotary axis and detector is also crucial for a high structural resolution in the 3D volume. Temperature also has a major influence on resolutions in the limit range. For this reason, active temperature control to 20 °C ± 1 K is used inside the machine. In addition, there is an automatic correction of temperature-related drift. All these measures make it possible to achieve a 3D volume structural resolution of about 1 µm, which is hardly surpassed even by conventional, so-called “nanofocus systems.”

In sub-microfocus mode, the X-ray tube allows the measurement of structures of a few micrometers in size with very high volume structural resolution. A high-power mode is also available and enables fast, high-resolution measurements of objects with structures only a few tens of micrometers in size with the usual short measurement times of Werth TomoScope® machines.

With the help of the Werth TomoScope® XS Plus, million-year-old collection items such as this fly in amber can be digitized as an archive of life. The compound eyes are clearly visible and the thickness of the chitinous shell of 3 µm is measurable



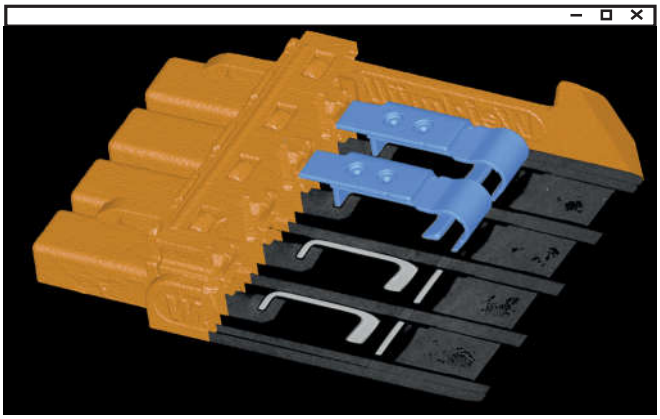


New Multi-Spectra Computed Tomography

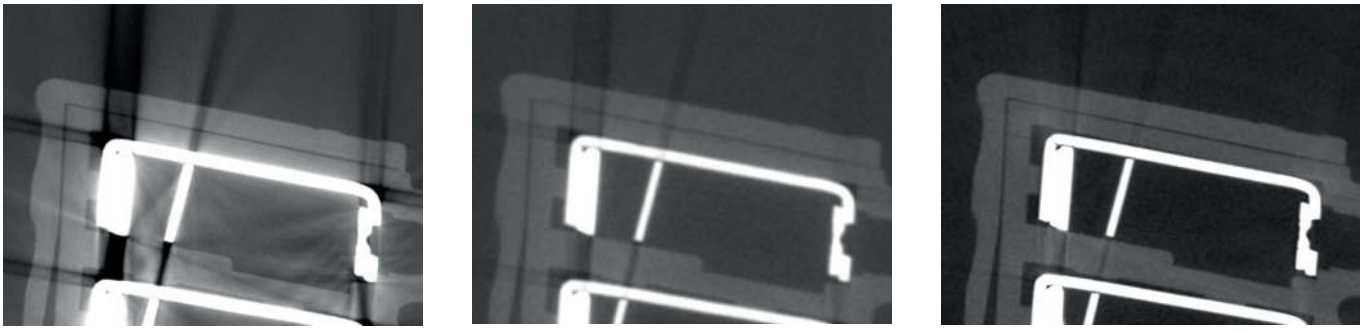
The new Multi-Spectra Tomography (MSP CT) enables high-resolution, low-artifact measurements of difficult-to-penetrate workpieces and assemblies. Previously, measurement accuracy was low, for example, when measuring larger cast aluminum workpieces due to severe artifacts. Measurements with low power and a small focal spot were time-consuming and resulted in high structural resolution but strong artifacts. High power with a correspondingly larger focal spot increased measuring speed but decreased structural resolution.

With the new MSP CT, a high-resolution measurement with low voltage and a fast measurement with high voltage can now be combined into a high-resolution, low-artifact measurement. For this purpose, the parameters of the X-ray source can be varied, for example for a high-resolution measurement with low power and low voltage and a fast measurement with high power and high voltage. It is also possible to use two different X-ray sources, such as a microfocus transmission tube for high resolution and a macrofocus reflection tube for fast measurements.

In this way, even small structures on workpieces made of several materials that are difficult to penetrate can be measured, e.g., gap dimensions of the mounting position between the printed circuit board and the corresponding plastic enclosure.

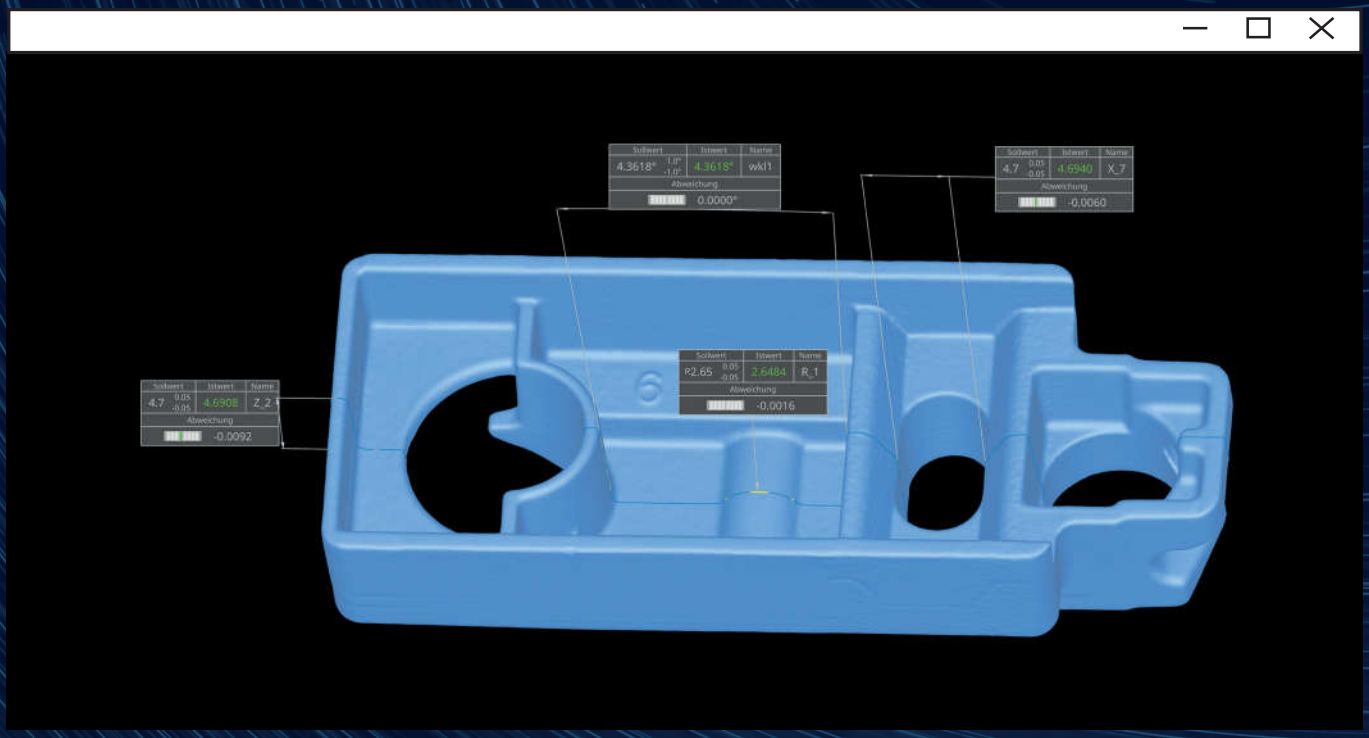


Cross section through high-artifact and high-resolution volume, low-artifact and low-resolution volume, and volume from Multi-Spectra Tomography



Cross section through high-artifact and high-resolution volume, low-artifact and low-resolution volume, and volume from Multi-Spectra Tomography

Measurement of metal workpieces with compact computed tomography machines



Measuring point cloud with inner and outer geometry of a die-cast zinc workpiece and measured geometrical characteristics

The Werth TomoScope® XS FOV provides high-performance computed tomography at the price of tactile or multisensor coordinate measuring machines. Special software tools also make the machine suitable for worker self-inspection: The workpiece is simply placed on the rotary table and the associated measuring program is started by pressing a button, barcode or RFID code. The measurement result consists in, for example, exact measured values for each geometrical characteristic or, in the simplest case, a color-coded deviation plot from a nominal-actual comparison.

Complete automation for inline applications is also possible, e.g., with robot loading. The machines in the TomoScope® XS family have the smallest footprint on the market for machines in this performance class, making them ideal for direct in-line use. The TomoScope® XS FOV is suitable for small plastic and metal workpieces in the medium accuracy range.

With the aid of the high-power X-ray source and tube voltages of up to 160 kV, even uncooperative materials can be irradiated from different orientations in a short time and thus captured completely and three-dimensionally – including internal geometries. With multi-object measurements and automatic workpiece separation, measurement times of some tens of seconds per workpiece can be achieved. The measuring range can be optionally extended with additional axes and Raster Tomography.

Werth in China: Suzhou Werth Metrology and Dantsin Technology

In China, Werth coordinate measuring machines had already been sold since the end of the 1990s through a trading organization based in Hong Kong, which also provided service. Due to increasing demand, a Werth representative office was opened in Shanghai in 2010 with Dr. Zhichao Li as Managing Director, thus opening a new chapter for Werth in China. From the very beginning, the Chinese market has been served jointly with Dantsin Technology Co. Ltd., which specializes exclusively in the sales and service of European metrology products in China. The team around Managing Director Henry Zhao consists of 150 employees, of which around 30 are service technicians and engineers and 65 are field sales staff. Werth coordinate measuring machines are the high-end products in Dantsin's portfolio.

Due to the rapid growth of the demand for Werth products, the representative office was transferred to Werth Metrology (Shanghai) Co. Ltd. in 2013. In November 2015, the company moved its headquarter to Suzhou and opened a demo center in the Nanopolis high-tech park together with its sales and service partner Dantsin.

Suzhou Industrial Park is located only 50 kilometers from Shanghai, and numerous German companies are based in the neighboring cities of Kunshan and Taicang. It is located in the heart of the Yangtze River Delta, one of the most industrially developed regions in China, with good transport links to the whole country. The demo center in Suzhou, which covers an area of almost 200 m², is equipped with a representative selection

Mr. Eric Zhou, Ms. Amy Tang, Mr. Yi Feng, Ms. Jana Si and Dr. Zhichao Li, Managing Director of Suzhou Werth Metrology, with Werth export manager Andreas Dirk at the CIMT fair (from left)

of Werth coordinate measuring machines such as TomoScope® L, TomoScope® XS, VideoCheck® S, ScopeCheck® S, FlatScope, StentCheck and Inspector® FQ.

Dr. Zhichao Li holds a PhD from RWTH Aachen University and has extensive experience in industrial metrology and quality management. He joined Werth in 2006 as Sales Manager for China and has been permanently based in China since 2008. There, he built a sales network for Werth and established a professional pre-sales and after-sales team to provide the best possible technical and sales support to Chinese customers. Mr. Yi Feng joined Werth in 2012 after completing his engineering studies in Germany, and was appointed Vice President Engineering in 2018. As an expert in 3D coordinate metrology and multisensor technology, he specializes in solving complex measurement tasks and actively works with customers in China to develop customized measurement solutions. Ms. Jana Si, Mr. Eric Zhou and Ms. Amy Tang have also been part of the team for many years.

Currently, several hundred Werth coordinate measuring machines from the entire range of Werth machine families and sensors are in use on the Chinese mainland in a wide variety of industries.

Dr. Zhichao Li, General Manager of Suzhou Werth Metrology, presenting the VideoCheck® FB

Mr. Henry Zhao, Managing Director of Dantsin Technology, during his speech at the opening of the joint demo center, which covers an area of almost 200 m²

CT calibration in field service

What are you doing right now, Mr. Bloh?
During the calibration of 3D coordinate measuring systems according to VDI 2617, the length measurement error and probing error is determined. To determine the length measurement error, I first measure the sphere center distances and two-point diameters of a calibrated multi-sphere standard. The measurement points for determining the sphere centers are sampled from nearly all spatial directions. The averaging effect reduces systematic measurement errors. To ensure comparability, a short length is measured bidirectionally in the corresponding orientation and the resulting probing error is added with the correct sign. I then determine the probing error for the diameter and shape of the sphere on another sphere standard. Incidentally, the DAkkS laboratory at Werth was the first laboratory to be accredited for coordinate measuring systems with computed tomography.

What is your background?

In 2010, I was looking for a training position in the technical field, as a mechanic or mechatronics technician. Since I come from Central Hesse, I found Werth while searching the Internet. It then became clear to me quite quickly that I would like to do my training there. I found the coordinate measuring machines and the associated technology very exciting. In addition, there is the range of applications; measuring technology is indispensable in almost all branches of industry. After completing their training at Werth, mechatronics technicians have many fields of activity, for example in machine commissioning or in service. That's how it was for me, too.

What do you enjoy most about your work?

My work is varied and interesting, you never stop learning. I let the day unfold, it's full of surprises. I get to see technical progress first-hand, not only with our machines, but also with our customers' products. At our customers' sites, I have access to areas that you don't normally get to see, such as the production lines in the automotive industry. In their development departments I encounter new products before they hit the market.

Jannik Bloh during DAkkS calibration of a Werth TomoScope® L coordinate measuring machine

Fiber probe production

What are you busy with, Mr. Mandler?

I manufacture the fibers for our patented Werth Fiber Probe® micro-probe. To do this, I enter the desired parameters such as probe diameter, shaft length and shaft diameter in the software. Then I roughly cut the glass fibers to the right length and clamp them in the specially developed fiber drawing system. There, electrodes are used to generate a plasma in which the fiber is heated and drawn into the preset geometry.

What is your background?

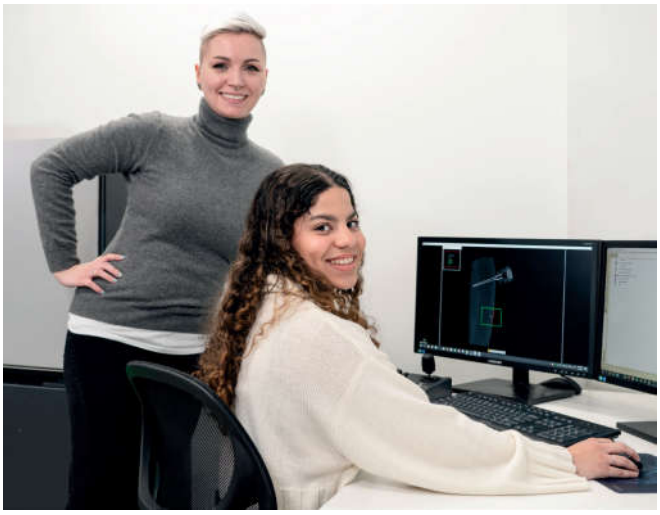
My father drew my attention to Werth Messtechnik. I first completed a one-year internship in assembly for my high school diploma. In 2014, I then started an apprenticeship as an industrial mechanic. After my training, I was taken on and hired in the assembly of bridge-type coordinate measuring machines. When my predecessor in fiber production retired, I was given the opportunity to take over his job.

What do you enjoy most about your work?

The fibers have different geometries, even dual-sphere styli are possible. With prototypes, I have to experiment for a while to find out the right parameters. It is always interesting to see how the fiber drawing system reacts when I adjust the length specification and heating values in the software. For the length specification, I also have to consider the material for the stylus tip. With prototypes, it can happen that, for example, the geometry corresponds to the specifications, but the fiber becomes 300 µm too short. For us, it's always about the micrometers!

Frederik Mandler manufactures the fibers for the patented Werth Fiber Probe® microprobe

News in Brief



Werth Inc. strengthens application engineering

After studying at the Technical University of Central Hesse, Germany, Jana Groh started 2018 as an application engineer at the headquarters in Giessen. There she acquired expert knowledge first in the area of multisensor technology, then also in the field of coordinate metrology with computed tomography. From 2020, she supported the Werth team in the USA on various projects and took over as head of applications engineering there in 2022. Paula Veras De La Rocha joined Werth Inc. in the summer of 2022 as an application engineer after graduating from Nova Southeastern University in Florida. She, too, is familiar both with computed tomography and multisensor coordinate measuring systems.

Werth Italia expands service

Werth Italia strengthens its team with Mr. Daniele Pasciucco, who brings his experience as a technician in various American and Italian companies now to Werth application engineering and service. Mr. Pasciucco is looking forward to supporting our Italian customers in the future so that they can benefit even more efficiently from the advantages of Werth coordinate metrology.

DAkkS calibration of distance sensors

In 2003, Werth pioneered the development of accreditation procedures for laboratories with multisensor coordinate measuring machines together with the German National Metrology Institute (PTB – Physikalisch-Technische Bundesanstalt). In July 2013, the DAkkS laboratory (Deutsche Akkreditierungstelle – German Accreditation Body) of Werth Messtechnik GmbH was also the first facility of its kind to be accredited for the calibration of coordinate measuring machines with X-ray tomography sensors. This was now followed by accreditation for the calibration of coordinate measuring machines with optical distance sensors, also in scanning mode.

State-of-the-art technology

Werth Magyarország, based in Monor, Hungary, expanded its demonstration center last year. In order to meet the increased demand for CT machines, a Tomo Scope® XS machine was installed so that the relevant technology can be presented to customers from Central and Eastern Europe during demonstrations and workshops as well as at trade fairs. In addition, a new ScopeCheck® FB was installed in order to be able to solve measuring tasks on larger workpieces with multisensor systems. The new ScopeCheck® FB fully exploits the possibilities of multisensor systems. The team around Tamás Csontos also offers contract measurements and training.

Dr.-Ing. Siegfried Werth Prize

In 2022, the Dr.-Ing. Siegfried Werth Foundation again awarded prizes to three scientific works in the field of non-contact dimensional metrology. Already in January, Dr. Hannes Radner from the TU Dresden was honored for his doctoral thesis, followed in July by Dr. Andreas Stark from the Friedrich Schiller University Jena. Prof. Dr.-Ing. Robert Schmitt (on the left in the image), Head of Production Quality and Metrology at the Fraunhofer IPT, attended the award ceremony held by Dr.-Ing. Bernd-Jochen Schniewind, Chairman of the Dr.-Ing. Siegfried Werth Foundation, in November 2022 together with the prize winner Jan-Henrik Woltersmann from RWTH Aachen University.

Coordinate Measuring Machines with Optics, Computed Tomography and Multisensor Systems

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