The MultiSensor
The Newsletter of Werth Messtechnik
Issue 3, January 2015

Werth Fiber Probe/Scanning

The most successful microprobe in the world – now with free form Scanning mode

The Werth Fiber Probe, with multiple patents, has been used exclusively with Werth coordinate measuring machines for many years. Due to its outstanding properties, such as maximum precision paired with very small probe sphere diameters, it has been proven many times over in the marketplace. With several hundred installations, it is by far the most successful microprobe in the world. With modern signal processing and 64-bit control technology, a free form scanning mode is now possible without the use of prescribed contours. The user simply selects the start and end points for the scan path and the sensor follows the unknown contour automatically.

Software integration is completely analogous to the functions of conventional measuring probes. This makes it easier for the user to operate. With negligible contact force in the µN range, the Fiber Probe ensures that work pieces will not be damaged, even when scanning "unknown" contours. The probe pin length, probe electronics, sensor offset, and sensor drift have negligible effects on the measurement results. Another advantage is simple operation while observing the probe sphere with the optics.

The versatile WFP/S can be used in medical technology (implants), the clock industry (miniature gears), and automotive technology (fuel injection systems).

Werth Fiber Probe WFP/S

"Multisensor"

A True "Multisensor"

Werth Messtechnik GmbH has once again blazed the trail and developed a true "multisensor." An image processing sensor and a laser distance sensor are integrated in a single measurement head. It utilizes the standard Werth magnetic interface and can also be used with the 3D fiber probe or the Werth Contour Probe, for example. The classical TP200 and SP25 mechanical probes and the WFP/S fiber probe have been newly integrated into the interface concept. The Werth Zoom can also be combined with all of these additional sensors.

Measurements using various sensor principles in the same measuring program can now be performed not just on the same machine, but at the same sensor position. This means that the entire measurement range of the machine is available for combined measurements using all sensors, so that smaller measuring machines can be used. The risk of collision is reduced because no other measurement heads are involved. Even large objects can be measured without any collision issues. The various sensors can be changed out precisely and fully automatically using parking stations.

Autocorrection

Virtual, or Multisensor-Based?

The term autocorrection was coined by Werth with the introduction of the first coordinate measuring machines with computed tomography in 2005. With corrections based on multisensor measurements, it became possible to guarantee traceable measurement results at the precision level of a coordinate measuring machine. Thanks to the greatly improved basic precision of CT, the autocorrection method (patent pending) is now used only for submicron precision measurements, such as fuel injection systems. Some workpieces are difficult to capture tomographically, such as those made of metal. Artifacts from beam hardening, cone beam effects, or scatter effect often have a great influence on the measurement uncertainty. For practical reasons, a somewhat greater measurement uncertainty is often accepted, or conventional measurement is used.

With virtual autocorrection, Werth Messtechnik now offers a solution for this problem. Comparative measurements using multisensors is replaced, for this method, with theoretical simulations under ideal (without artifacts) and actual (with artifacts) conditions. The difference between the two simulations provides the artifact-induced systematic measurement deviations used for correcting the measurement results. This method also leads to good results even if alternative methods (characteristic curve-based correction methods, multisensor Werth autocorrection) cannot be used due to insufficient data. Both for fast first article inspection and for production inspection, computed tomography (CT) is the ideal tool using this new correction method to expand the scope of applications.

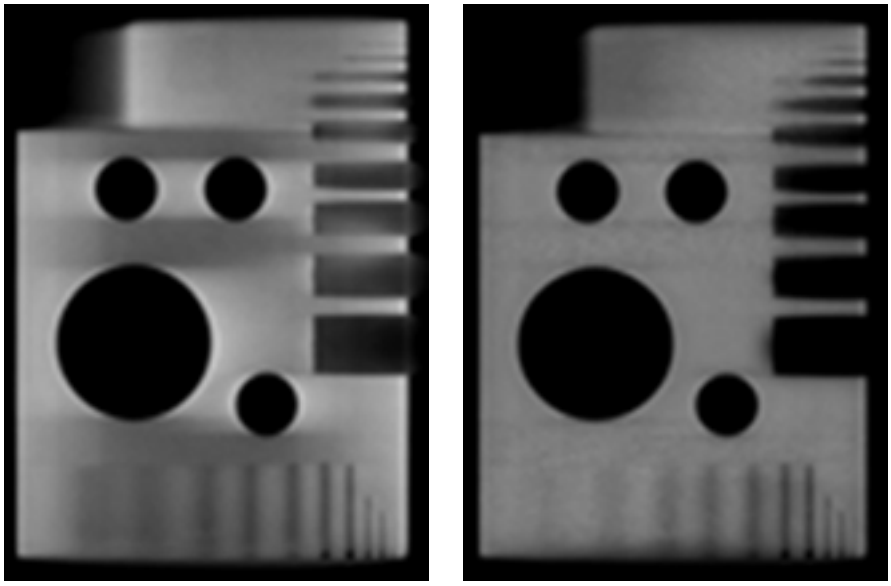


Fig. 1: Volume cross section through a 200 mm aluminum block – at left without virtual autocorrection, at right with virtual autocorrection

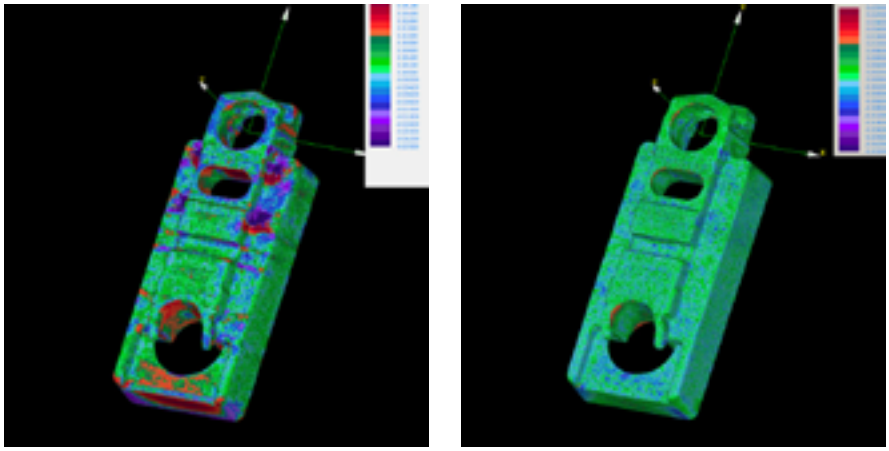


Fig. 2: Comparison of two measurements of a zinc die cast part in various positions – at left without virtual autocorrection, at right with virtual autocorrection

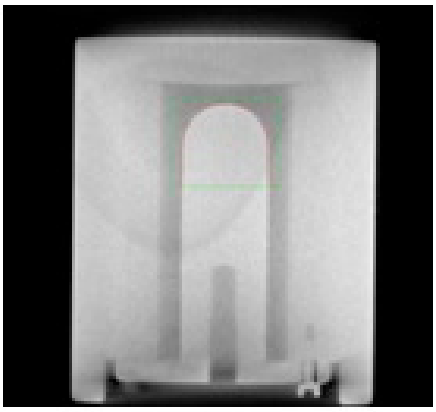
Werth Volume Cross Section

Measuring a Steel Workpiece with Tomography

Due to the large radiographic length of the cylinder (approx. 50 mm), the volume is full of artifacts and the contrast between the dome cap and the air in the interior of the components is very low. For typical computation of the surfaces, the dome is therefore not easy to detect and is hardly measurable.

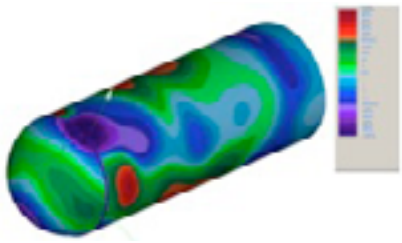
Disassembled workpiece

The volume section function makes it possible to capture measurement points and contours in the voxel volume with the powerful Werth contour image processing.



Section in the low-contrast voxel volume

These points are consolidated into a point cloud in STL format using the triangulation function in the WinWerth® software. Now the analysis can continue as usual to measure the workpiece in three dimensions.



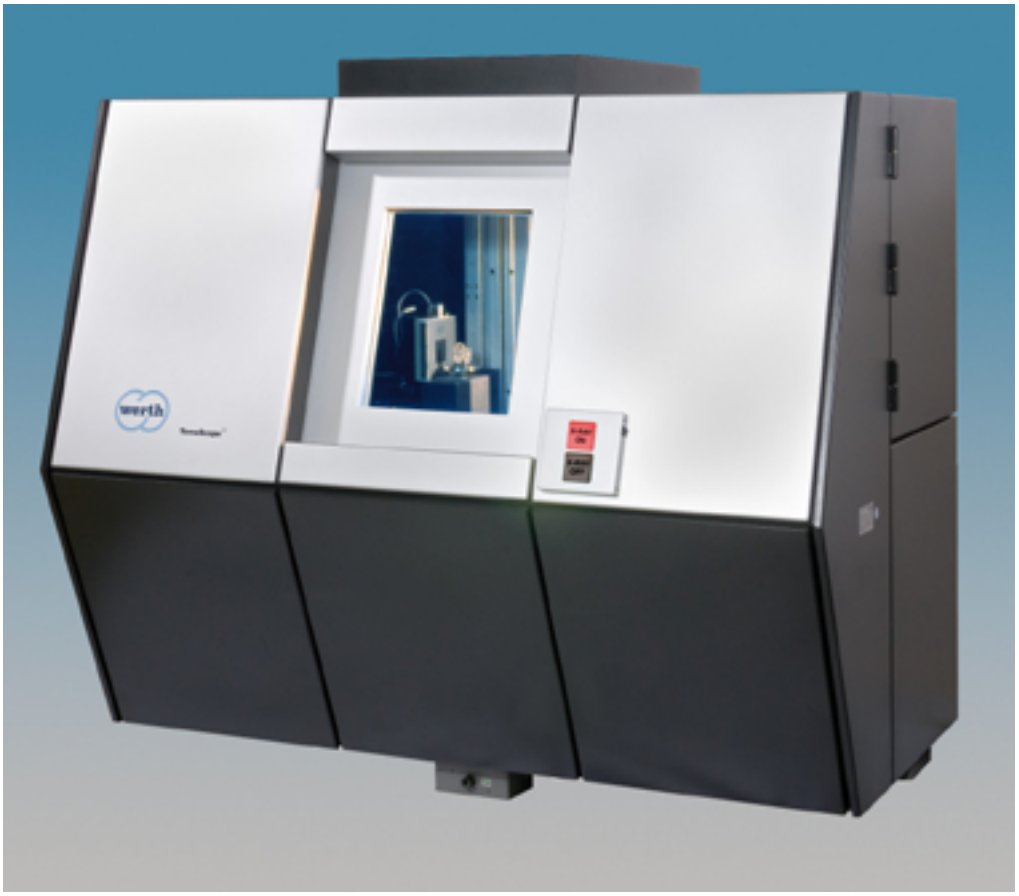
Measured contours from the volume section and from the triangulated point cloud

Compact and Precise

TomoScope® 200 Now with 225 kV

The new TomoScope® 200 / 225 kV coordinate measuring machine with X-ray tomography combines a compact footprint with a new high-resolution X-ray detector. It is excellent for performing dimensional measurements and for material inspection of small and medium sized work pieces. Due to its high pixel density and large detector surface area, measurement times can be greatly reduced. Depending on the application, a significantly higher resolution can also be obtained. The powerful machines, with 190 or 225 kV, are distinguished by very small focal point sizes even at very high power.

The machines in the TomoScope® 200 series can be equipped with transmission and reflection beam sources ranging in power from 130 kV to 225 kV, depending on customer requirements. They can be used for a broad spectrum of measurement tasks. The arrangement of the x-ray source, measured object, and detector, which can be positioned relative to each other fully automatically, allows the user to optimize the measurement for resolution and cone beam angle. With highly developed machine technology and the patented process of "local sub-voxeling", very low measurement uncertainty can be achieved.



TomoScope® 200 / 225 kV

Pallet changer in the TomoScope®

Automatic Loading to Closed CT

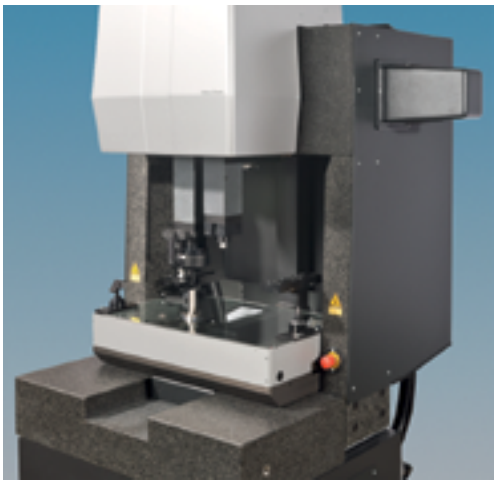
As with many manufacturing processes, integrated automated solutions ensure more efficient work in metrology, as well. To automate the process of production measurements with the Werth TomoScope®, it is now possible to use a pallet system to automatically feed in several identical or different parts. The unique Werth multisensor concept is used. In place of a tactile or optical sensor, a gripper is mounted on the rotary tilting head. This utilizes the machine axes to populate the rotary table with parts from a pallet located within the machine. The measuring machine thus remains closed during the entire series of measurements. This also eliminates additional safety concerns required when integrating external robots and a loading door. The TomoScope® can perform measurements without operator intervention during an "unmanned" shift. This option is currently available for the TomoScope® HV 500 and TomoScope® HV compact units.

VideoCheck® Bridge Type Machines

Multisensors Converge

For many years now the VideoCheck® coordinate measuring machines have proven the value of measuring with sensors mounted on two independent sensor axes. This design significantly reduces the risk of a collision between the sensors and the workpiece, because the sensors that are not in use are retracted out of the way. This is especially practical for large workpieces, or when mounting fixtures or rotary and rotating / tilting axes are used. For example, a probe can be mounted on one axis and an optical sensor on the other, or two different optical sensors can be mounted on both axes. Additional sensors can also be installed.

With the latest generation of the VideoCheck® bridge type machine with two Z axes, the specified measurement range is provided for both axes in multisensor mode. The offset of each of the two Z axes is now equal to two optical sensors mounted with a fixed offset on a single Z axis. This compact design offers more measuring range without a larger footprint than the previous VideoCheck® bridge type machine. The new VideoCheck® machine can also be equipped with just one Z axis and optional preparation for a second axis. The second axis can then be retrofitted later on site. The maximum permissible error MPE E for these VideoCheck® machines is specified as (0.9 + L / 400) µm and (0.5 + L / 600) µm (for VideoCheck® HA).



Werth VideoCheck® with two Z axes

Werth Inc. Announces New West Coast Regional Sales Manager

Werth Inc. continues to grow and is pleased to announce Ken Kino as Regional Sales Manager of the West Coast territory. Ken will be responsible for driving revenue through sales and marketing activities of Werth Optical & Multi-Sensor CMMs. Ken comes to Werth from JDSU as an Account Manager and has more than 20 years of experience in the optics industry which included selling laser systems and optical systems to the biomedical, semiconductor, and aerospace markets. A graduate of San Jose State University with a Bachelor of Science in Mechanical Engineering, Ken has worked across a broad range of markets. We welcome Ken who will be joining Florian Herzog and Tina Silva at our Morgan Hill, California demonstration facility.

Ken Kino, West Coast Regional Sales Manager

Werth Coming to a City Near You

Werth is on the road and at the shows from Coast to Coast. Come visit us at these trade shows throughout 2015. Contact us for complimentary admission.

Pacific Design & Manufacturing – Anaheim, California
February 10-12, 2015 – **Booth 3191**

National Plastics Expo – Orlando, Florida
March 23-27, 2015 – **Booth S19086**

EASTEC – Springfield, Massachusetts
May 12-14, 2015 – **Booth 3213**

Medical Design & Manufacturing – Minneapolis, Minnesota
November 4-5, 2015 – **Booth 449**

BIOMEDevice – San Jose, California
December 2-3, 2015 – **Booth 426**

Werth, Inc.

8 Custom Dr. • Old Saybrook, CT • 06475 USA
Tel: (860) 399-2445 • Fax: (860) 399-6784

16060 Caputo Drive – Suite 120
Morgan Hill, CA 95037
Tel: (408) 549-1747 • Fax: (408) 512-1749

info@werthinc.com