The MultiSensor
The Internal Newsletter of Werth Messtechnik
January 2009

Tradition and High Tech in One Package

Maintaining our tradition of innovation and quality is an important basis for positive corporate growth. Customers profit from "High tech - Made in Germany".

By Dr. Ralf Christoph

Werth Messtechnik GmbH has several reasons to celebrate this year. It is the one hundredth birthday of the founder of the company. Dr. Werth laid the cornerstone over 50 years ago for corporate growth built on quality and innovation. Fifty years ago, he was responsible for moving the company from Düsseldorf to Giessen, its current location. The space needed for production of profile projectors, which were then state of the art, was still small.

Werth Messtechnik GmbH in the 1960s - The office and residence of the company's founder were still a single unit.

Another reason for Werth Messtechnik GmbH customers and employees to celebrate this year is the dedication of a newly constructed building wing. New offices and space for training sessions and demonstrations, with a total area of about 1500 m², provide optimal conditions for our customers and employees.

Dr. Ralf Christoph

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Dr.-Ing. Siegfried Werth Foundation

The power of innovation is the strength of Germany as a production location. This is why the Dr. Siegfried Werth Foundation, closely related to Werth Messtechnik GmbH, has supported basic research in the area of optical measurement technology for years. This year, a doctoral grant for a gifted budding scientist was awarded for this purpose. The official awarding of the grant took place on September 18, 2008, on the occasion of the dedication of the new training and demonstration center.

The new Werth training and demonstration center (left)

One of the new climate chambers can even accommodate machines with an overall height of up to 6 meters. One of the production floors has been expanded by about 2500 m² to support the considerable growth in sales volume. With an average annual growth rate of over 10% since 1992, this was urgently needed. In addition to these investments in infrastructure, Werth is setting new standards in the area of technical development as well. For the Control 2008 trade show in Stuttgart, a series of new products was presented. With the new TomoScope HV Compact tomography measuring machine, Werth again underscores its role as a pioneer of coordinate measuring technology with computer tomography. This event was a reminder that in 2005, Werth Messtechnik GmbH was the first manufacturer to show a coordinate measuring machine with computer tomography at a trade show. The highest precision is achieved with the use of proven technologies in coordinate measuring technology. The optional integration of multisensor technology raises the potential precision even further. This also allows more flexible application of the machines.

Through an exclusive cooperative agreement with Nanofocus AG, the technology of confocal microscopy was brought into coordinate measuring machines. Surface topography measurement of microfeatures is now possible, even on larger components. Complete integration in the user-friendly WinWerth® coordinate measuring software enables simple solutions for measurement tasks.

The 3D version of the most commonly used microprobe in the world, the "Werth Fiber Probe," expands the area of application to actual 3D measurement. Applications in mold construction for micro injection parts and similar tasks are thus made possible.

news

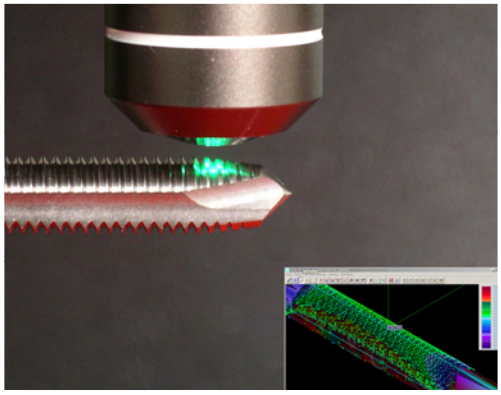
New sensor: NFP (NanoFocusProbe) integrated in WinWerth

With the NanoFocusProbe, Werth Messtechnik has, for the first time, integrated a confocal surface sensor in a multi-sensor coordinate measuring machines as part of an exclusive cooperation with Nanofocus AG.

With this 3D distance sensor, it is possible to measure surfaces with high precision. The measured point clouds can be compared with CAD data in WinWerth, as usual, so that a color-coded deviation plot can display measured deviations in geometry and form at a glance. All geometric dimensions, such as radii, angles, etc. can also be measured. This gives rise to applications such as the clearance angle, rake angle, cutting edge radii of cutting tools, and complete geometries of electrodes, among others.

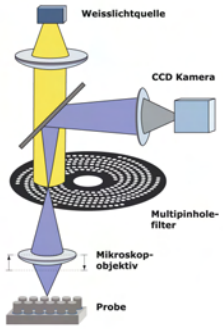
The sensor is completely integrated in the Werth Multisensor concept, so that reproducible measurements can be taken in workpiece coordinates at the same carefully selected position. The use of a high-precision VideoCheck machine further allows several measurements to be carried out at various positions and aligned with dimensions, such as a large distance of two microspheres, a height dimension of several millimeters, and the angle of two surfaces that are far away from each other.

Depending on the measurement task, various objectives can be used which have different magnifications (10x to 100x), field of view (1.60 mm to 0.16 mm), measuring accuracy (50 nm to 1000 nm), aperture angle (17° to 72°), and working distance (0.3 mm to 12 mm). Using the 100 x objective and the integrated sensor axis, a probing deviation of 50 nm can be achieved regardless of the base machine. If several measurements are needed next to each other due to a larger measurement area (larger than the field of view of the objective used), and their relationship to each other, in turn, has very low tolerances, then a high-precision CMM is required, such as the Werth Video Check UA.



How does a confocal sensor actually work?

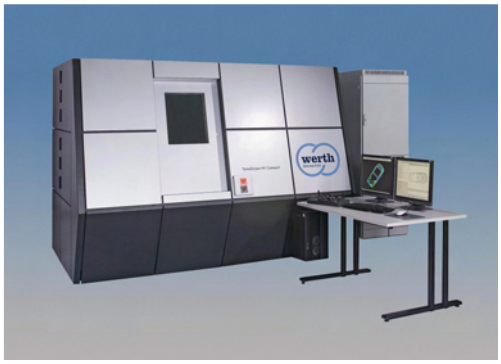
In a light microscope, the object image is a composite of both a sharp image of the points in the focal plane, and a blurry image of the points outside of this plane as well as adjacent points. In a confocal microscope, the light source is focused onto the measurement object. The reflected light from this focus is made into an image by a pinhole, and from there it impinges on the detector. The blurry areas of adjacent image points are thus masked.



The sensor is moved along the Z axis, thereby changing the focal distance. Maximum brightness is reflected by the measured object exactly in the focal plane. As soon as the object moves out of the focal plane just a little bit, the image becomes significantly darker. This results in brightness curves relative to the Z-axis. In order to perform a measurement of the entire visible field, which is not possible with a fixed aperature plate, we use a Nipkow disk, named after its inventor, Paul Nipkow. It has aperature plates mounted along concentric circles which cover the entire visible field with a synchronized CCD camera when the Nipkow disk spins rapidly. In contrast to the Werth 3D patch, sharpness is determined not by the contrast of the object surface, but by the light intensity of the image.

The TomoScope® HV Compact

Promptly in time for Control 2008, Werth Messtechnik GmbH was able to present the fourth model in the computer tomography series. The TomoScope® HV Compact has now achieved a combination of high X-ray energy in a small machine package.



TomoScope® HV Compact

The new machine is based directly on the design of the TomoScope® HV 500. The solid granite base is used to mount the detector and X-ray tubes and guides the air-bearing rotary axis in the measurement envelope. Proven components, such as guideways and scales on the axes, provide a high degree of long-term stability for calibrated magnifications. Drift effects are avoided during the tomography process.

At 200 mm x 200 mm, the detector works with a wide range of parts. The raster tomography that is now familiar at Werth expands the measurement area to L = 350 mm and D = 350 mm. The design of the TomoScope® HV Compact is also new. Besides the modified cover, a pneumatic door has been included. This not only makes it easier for the operator to change out parts, but also provides another opportunity for integrating robots for automatic part loading. This makes fully automated CNC processing possible.

Integration of multi-sensors is also an option with the HV Compact. Together with Werth Auto-Correction, this ensures traceability of measured values obtained through computer tomography to actual parts. All this makes the TomoScope® HV Compact the most precise X-ray coordinate measuring machine in the world.

New Standards and Guidelines for Coordinate Measuring Technology

Important progress has been made due to years of effort of Werth Messtechnik GmbH. A standard has now been developed at the ISO level for acceptance testing of optical coordinate measuring machines. The sheet designated ISO 10 360 - 7 is circulating as a draft, and will soon be made available to the public. New VDI guidelines on the subjects of "Computer Tomography using Coordinate Measuring Machines" and "Contour Measurement" are also close to completion. Employees of Werth Messtechnik GmbH have also made significant contributions to ensure that the guidelines are thorough. This also makes it possible for Werth to use the new guidelines right from the beginning to benefit its customers when inspecting Werth measuring machines.

Vive la France

Record year

Werth France SARL was also able to grow in the past fiscal year, and achieved its highest sales numbers since it was founded in 1995. In order to remain on a growth course, and to provide customers in France and francophone Switzerland the best possible service, additional employees were hired in the areas of service and sales.

The Werth France sales team

The World Comes Together in Giessen

Sales Training

In April 2008 sales partners from over 35 countries accepted an invitation to come to Giessen for a presentation of the new products from 2008.

This year's winner of the "Best Agent Award" was, as in the previous year, HB Prima from the Czech Republic. The award is given annually for exceptional performance in sales and service.

Dr. R. Christoph, CEO of Werth Messtechnik GmbH, and P. Bilavcik, CEO of HB Prima (right) at the award presentation

Background

WinWerth 7.31

Werth Messtechnik GmbH presented the new functionality of its WinWerth® measurement software at Control 2008.

Many new capabilities have been implemented in the latest ***Version 7.31 of WinWerth®*** *3D measurement software.*

Existing functions have been optimized in the areas of increased performance, ease of operation, flexibility, and speed. Measuring with the image processing sensor is now more secure and easier than ever, with new search window shapes and intelligent mathematical algorithms.

Newly integrated lighting units and sensors are easy to control. "Editing" and "Learning" part programs have been further refined, providing exceptional user-friendliness.

Work is made easier by many improvements in detail, including 3D CAD support.

Excellent

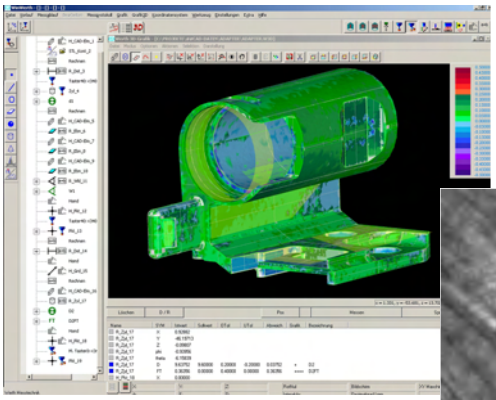
ScopeCheck MB

At the industrial trade show in Nitra, Slovakia, the ScopeCheck MB was awarded the "Grand Prix Industry" for exceptional product flexibility.

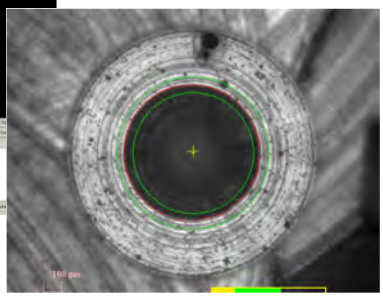
Werth customer seminars in Bremen, Munich, and Leipzig

Close to the Customer

In order to provide our customers with a convenient, local way to get extensive information about new developments, Werth Messtechnik GmbH held two-day seminars with technical presentations and machine demonstrations at remote locations. The offer was very well received and attended. Additional events are already planned.



Display of 3D CAD data in Version 7.31 of WinWerth® 3D measurement software



Optical roundness measurement with circular measuring windows

On the Advance

New Sales Partners

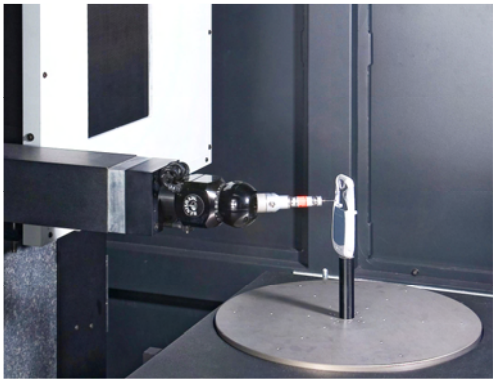
The worldwide advance of Werth Messtechnik cannot be stopped. Even in Turkey, Romania, and South Africa, we now have exclusive sales partners.

In China, we have been able to find a second partner to handle the Northern provinces. An on-site Werth Messtechnik GmbH representative office is being prepared.

Traceability in Computer Tomography

The great advantage of computer tomography is the ability to capture components completely, regardless of their complexity. Exterior as well as interior geometries are captured. Industrial use of computer tomography was previously limited to material inspection, due to insufficient precision.

There is a way to guarantee specifications through traceability to standards. Probing deviations of a sphere, and sphere distance deviations, are determined using a ball bar. The length measurement deviations derived in this way, however, cannot provide any conclusion about measurement uncertainty on real parts, since the influence of the measurement process, especially the geometry and material of the inspected object, cannot be taken into consideration. The reason for this is physically determined artifacts caused by X-ray penetration. The necessary traceability must be carried out on real parts.



Tactile counter measurement for determining Werth AutoCorrection in a TomoScope® HV Compact

With the use of multisensors and tactile or optical counter measurement, it is possible to correct the results of computer tomography measurements. This Werth AutoCorrection is carried out only once, on the first article in a series of parts. The correction data set thus obtained can then be used for all further identical parts, which provides equally high precision for computer tomography measurements.

Background:

How Contour Image Processing Works

In contour image processing, the image is viewed within an evaluation window as a complete two dimensional map. The contours extracted from the image consist of a chain of connected points associated with information about their neighboring points.

This makes it possible to recognize two-dimensional structures and disturbances when measuring, and to filter them out, without changing the shape of the contours.

Advantage over "Edge Finders"

With an edge finder, the intersections of predefined lines in the image and the visible contours of the object are determined.

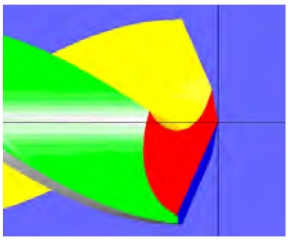
The repeated procedure in a determined evaluation range generates the measurements points that form the contour, but they are evaluated separately in a single dimension, and do not contain any two-dimensional information.

This makes it harder to reliably find edges and suppress shape and dust errors, especially when measuring under incident light.

Tool Measurement

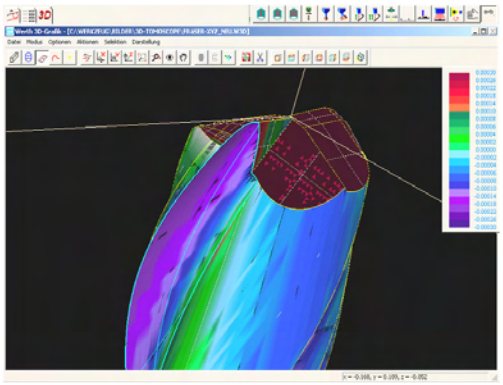
Tool Measurement with 3D Data

In the tool industry, as well, working with 3D data offers huge advantages over typical 2D evaluation methods. The increasingly complex demands on free-form geometries in flute space and varying twist angles for different cutters, require new paths in grinding and measuring technology.



Programming of these complex tools is already being carried out and simulated in 3D grinding software. The 3D comparison of measurement results against the IGES or STEP model is, as with small transional radii in 2D, considerably more indicative than the output of pure numerical values.

The additional information gained by comparison to a tolerance band justifies a new way of thinking in the industry. The 3D module of WinWerth software can be used to control the measuring machine (3D CAD Online) and for variance analysis (3D BestFit). Using multisensor technology, combined measurements with different sensors on the same tool are possible as well.



Greater Dynamics

Twice the Measuring Speed

The VideoCheck 250 and 400 series and the ScopeCheck 200, 300, and 400 series now have stable granite bases. Due to their solid sub-structure, the machines can now be run at much higher speeds (with identical maximum permissible error MPE). The VideoCheck machines also now have a Z-stroke of 250 mm. The thermally isolated controllers are integrated in the base frame for easier serviceability. These improvements, of course, are available at unchanged prices.

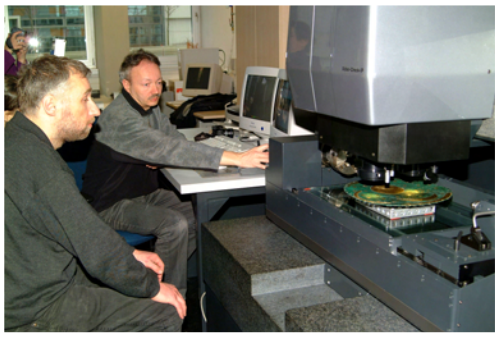
VideoCheck 400

ScopeCheck 300

Heavenly Machines

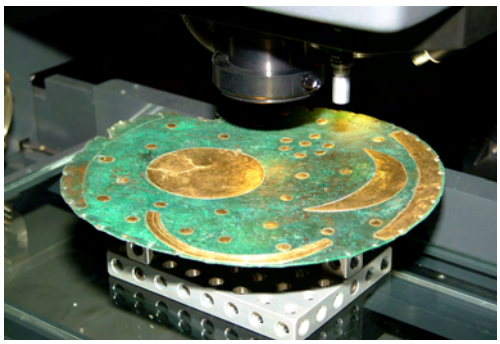
Nebra Sky Disk on a Werth Measuring Machine

Scientists at the Institute for Manufacturing Technology and Quality Assurance at the Otto-von-Guericke University of Magdeburg, working together with scientists from the Saxony-Anhalt Museum of Prehistory in Halle have investigated and taken measurements from the Nebra Sky Disk using non-contact measuring methods, such as image processing and laser probing, from Werth Messtechnik GmbH.



The nearly circular bronze disk, dated at around 1600 to 1900 BC and having a diameter of about 32 cm and weighing about 2 kilograms, is presumably the oldest representation of the sky in the world. The Sky Disk took an adventurous path to the Saxony-Anhalt Museum for Prehistory in Halle.

Dr. Steffen Wengler of the Otto-von-Guericke University in Magdeburg captured geometric data from the shapes and relative locations of individual elements on the disk, such as stars, the sun, moon, a ship, and horizontal arcs, using a Werth coordinate measuring machine. Height profiles of selected stars and working marks were of special interest.



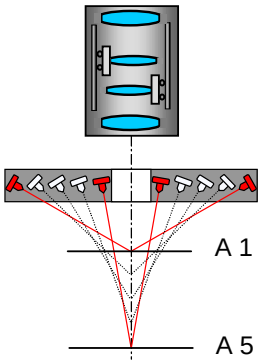
The investigations confirmed once again the conclusion that the Sky Disk has been reworked several times. In a second measurement process, Dr. Steffen Wengler analyzed the surface condition of the gold plating on the disk. Changes in the surface, especially due to improper treatment by one of the intermediaries, were of interest.

How Exactly Does

Werth Zoom with Multiring work?

In the Werth Zoom, lens packages are driven along linear guides by motors to provide different magnifications and working distances. This allows magnifications of about one to ten times, at distances of 30 mm to 250 mm.

Measurements at even large depths are possible without collision with the work piece.



The MultiRing® is used for optimal lighting at the correct angle. Illumination angles of nearly 90° to the optical axis are achieved without mechanical interference.

Lighting is selected to match the working distance currently being used.

The software automatically activates the correct diode ring depending on the selected working distance.

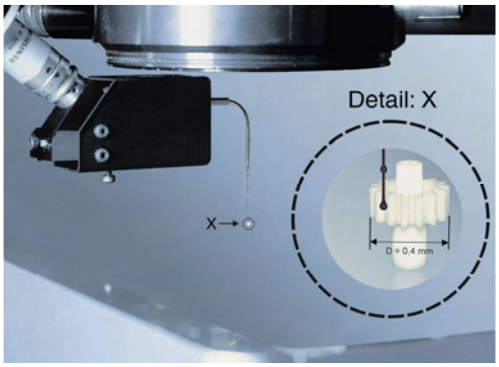
Werth Fiber Probe 3D

Using new technologies, the Werth Fiber Probe (WFP) has been expanded to complete 3D functionality. As before, a small sphere is brought into the focus plane of the optics in order to measure the contact sphere optically. For the WFP 2D, the position of the contact sphere in the image plane is measured in two dimensions only.

For the WFP 3D, in contrast, laser light is transmitted through the glass fiber into the contact sphere, which generates a speckle pattern that is strongly dependent on the displacement of the contact sphere, not in the X and Y directions, but in the Z direction.

Using this method, it is possible to measure highly precise points, and accurately scan contours as well. Like the 2D WFP, the 3D WFP also has the advantages of very low contact forces and the ability to use very small contact spheres (down to 10 µm radius.)

This has greatly expanded the areas of application for the WFP. Tiny geometries, such as electrodes, 3D die punches, and others can now be measured completely in three dimensions.



3D WFP Werth Fiber Probe for three-dimensional measurements

Light Control Simplifies Optical Measurements

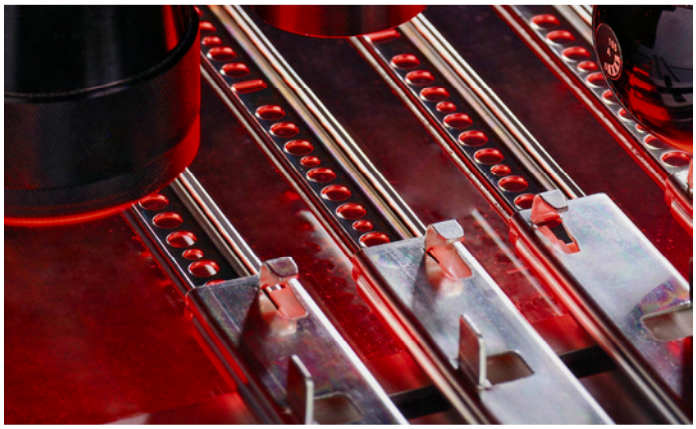
With the Light Control option, identical plastic parts with different colors and reflection properties can be measured using the same measurement program without editing. The operator simply needs to activate the Light Control option. During an automatic process, a check is made as to whether the brightness received by the camera corresponds to the saved light intensity. If it deviates by more than 10%, for example, then the light intensity of the light source (transmitted-light, brightfield incident light, sector light) is automatically adjusted to deliver the same intensity to the camera as before.

Optical measurements using this "adjustment process" require only a little more time than without it. Further applications include metal parts with different surfaces. Different gloss levels can be captured using this function, such as for parts whose surface changes due to wear of the tool in use.

application

Hettich in Kirchlengern: Measurement Stations Integrated in Production for Shop Floor Inspection

J. Gruber (freelance journalist)



Measurement costs cut in half, throughput increased

Safeguarding high-quality products is inconceivable without the appropriate measurement systems. Measurement at the workstation, for many companies, primarily means manual measurement with a caliper, micrometer, or indicator. A qualified worker knows how to use these, and the measurement results are usually satisfactory - but the results depend on the worker, so they allow undesirable leeway in interpretation, which cannot be documented. The results are also seldom integrated in a CAQ system; rather, they are written down and then disappear, as a valuable piece of data into a file cabinet.

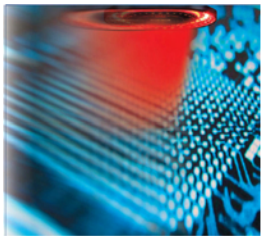
This can all be done more precisely, faster, and above all, in a way that supports evaluation, as proven by furniture hardware manufacturer Hettich, headquartered in Kirchlengern. There, the manual measurement tools that used to be standard for worker self-inspection have long since been replaced with 3D coordinate measuring machines with multi-sensor technology.

Hettich International, with around 5,550 employees worldwide, is one of the biggest global players in the furniture hardware industry. The product spectrum extends far beyond what is typically thought of as hardware. The company's slogan, "At home in all good furniture," comes closer to capturing the portfolio, which ranges from functional components to design accessories. The company is represented all over the world, with 36 branches, including production locations in Europe, American, and Asia. The furniture industry, retail, handicraft, and the do-it-yourself industry - these are Hettich's customers around the world. "Made by Hettich" has long been considered the standard for quality in these industries, and the family-owned company has done its part to not only maintain this standard, but also to improve it. Quality wants to be designed and produced.

Background:

How does "on the fly" work?

At Control 2007, Werth Messtechnik GmbH presented the patented "OnTheFly" technique for rapid measurement using image processing.

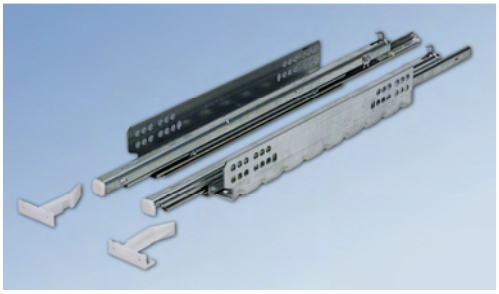


Measurement results on the fly - during motion

Measurement is done while the camera sensor is moving. Typical start-stop operation is no longer needed, and measurement time is drastically reduced (up to a factor of 10), due to the lack of acceleration cycles.

Flashing the LED light sources prevents blurriness due to motion, since the path travelled by the measuring machine during the light flash is negligible, but is just enough that no additional measurement error is introduced. Intelligent machine controls synchronize the motions of the machine axes with the corresponding captured image sequences, and thus provides measurement points "on the fly."

Several Inspector FQ 3D CNC coordinate measuring machines from Werth Messtechnik have completely replaced the typical workstation measurements in pre-fabrication. In parallel, a measurement technology discipline has been in installed in the Quality Assurance department, which has implemented a program structure for 3D coordinate measuring machines that may well be the only one of its kind in the world, and that allows worker self-inspection. The software control for the measuring machines and the master programs are specified by this area. The QA in the product preparation process trains the workers, and converts the master programs into variants. Currently there are about 1,600 programs on each measuring machine. In order to increase uptime, these programs are mirrored on several measuring machines in the pre-fabrication area, which safeguards the high quality standard at Hettich.



Runner System

Several profiling systems are in use in Kirchlengern, on which components are made for runner systems for kitchen, bath, office furniture, and white goods. These components are then assembled on assembly lines. Everyone who has ever thought about this subject (maybe when buying kitchen cabinetry) knows that precision is needed in this process chain. When a drawer opens and closes gently, almost weightlessly, then the secret is not least the production quality. The specification must therefore be kept in mind during the production process. Faster measurement was in the foreground, and the decision to invest in Werth Inspector FQ machines was practically a foregone conclusion.

The systems used at Hettich provide a combination of image processing sensors and probes, and now represent flexible coordinate and multi-sensor measuring machine technology - and thus quality assurance par excellence.

The Werth Inspector FQ is the fastest multi-sensor coordinate measuring machine in the world, and is naturally used wherever high-speed measurement is needed; that is, where large numbers are produced. The fact that wear-free linear direct drives stand ready with the highest positioning speeds may be insignificant for individual measurements - but for large quantities of parts, the potential savings rise enormously just because of this: the ability to measure faster means (for Hettich, too) the ability to greatly increase throughput.

Werth Inspector FQ

This isn't the only thing, though, as can be seen with a striking comparison on a real part, known as the positioning hook. This is a stamped sheet metal part with several cutouts and holes.

The hook heights have always been inspected with a check gage, and other relevant features, such as the hook position, were measured with an indicator or caliper. Only manual measuring machines had been previously available for capturing the relevant dimensions.

With conventional tactile measurement technology, a good 17 minutes were required for each part, while experiments with conventional multi-sensor technology resulted in 10 minutes for one measurement cycle. The Werth Inspector FQ, however, broke even this record impressively. With the multi-sensor coordinate measuring system that is now in place at Hettich, with fast FQ technology, this time frame was reduced by half.

With optical and tactile sensors, the measurement sequence can be reproduced in one setup, and independently of the worker. Lengths and widths, hole positions, cutout patterns, twisting, bending, and so forth are measured. The largest share is handled by the image processing sensor: 60 percent of features are measured optically. The camera electronics in the image processing sensor converts optical signals that enter through the objective into a digital image, which is visible to the worker on a screen. Appropriate software ensures that dimensions and tolerances (for the tactile sensor, as well) can be displayed and documented.

Although the charm of non-contact measurement with optical sensors cannot be denied, tactile sensors cannot be completely dispensed with. There are geometries for which optics don't have a chance, such as undercuts. Using a probe, features can be measured that are not visible to the image processing sensor.

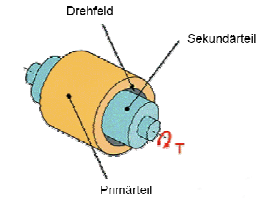
Background:

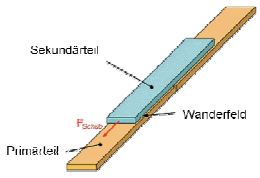
How does a Linear Drive work?

Linear motors use the same functional principle as AC motors.

In the linear motor, however, the arrangement of electrical exciter coils (stator) that is circular in an AC motor are stretched out flat.

The "rotor", which rotates in an AC motor, is pulled along the magnetic field moving longitudinally in the linear motor.



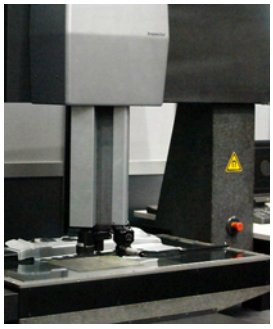


Linear motors have the advantage of high accelerations, up to six times the acceleration of gravity.

The Transrapid (Magnetic Levitation Train) is probably the best-known application for this type of drive. The modern train achieves speeds of up to 550 km/h.

The Werth Inspector FQ can accelerate its axes at 10 m/s², achieving a speed of 1000 mm/s.

This makes it the fastest coordinate measuring machine in the world!



Using a contact measurement system, three-dimensional contours and surfaces can also be scanned. This also applies to level sections and to prescribed paths, with as many measurement points as desired. In this concrete example, the remaining 40 percent of the measurement tasks require the probe. The ratio is approximately inverted when it comes to the time needed for the entire measurement cycle. The probe needs about 70 percent of the total cycle time for its 40% share.

In this regard, optics has the advantage, but in the end, it is the combination of optics and probe, as well as the high machine dynamics, that make the Inspector measuring machines unbeatable - even from a business point of view. At the bottom line, measurement costs per part are reduced dramatically by more than half. The investment is amortized within a few months.

The automated and, above all, fast measurement in Kirchlengern has one goal, namely to improve the quality of the final products even further. The worker simply places the part on the holding fixture of the coordinate measuring machine, and starts the measurement program. The rest is automatic. The worker can tell immediately from the inspection report that is issued whether the production machine needs to be adjusted in one place or another.

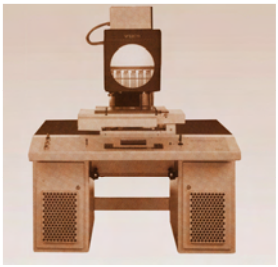
Multi-sensor coordinate measuring machines allow even complex parts to be measured in one step, since all the sensors work in the same coordinate system. Existing measurement programs can be easily adjusted for new revision states. Setup times and inspection costs per part are greatly reduced, because, in principle, all the parts can be inspected on the same machine, so each part does not need special measuring fixtures or gages. Calibration and master parts no longer need to be manufactured. The costs associated with calibration and maintenance (inspection equipment administration) also do not exist. The traceability of the measurement results to government standards is implicitly provided.

These investment amounts quickly justify the use of an appropriate multi-sensor machine technology for a large variety of parts. All in all, the cost advantages that can be obtained speak an unequivocal language. With the patented "OnTheFly" process for rapid measurement with image processing, the time needed for optical measurement can be drastically reduced.

50 Years of Innovation in Giessen

Record E

Production in Giessen began with the first profile projector, developed in 1954, for non-contacting dimensional measurement of two-dimensional parts using transmitted light. Its console construction and fully encapsulated beam path allowed readings "without a head in the image" for the first time, since other machines had almost always an open beam path. In the 1970s, the first digital caliper and the Werth "Tastauge" were developed.



Optimus CC

In order to further simplify the measurement sequence, and especially to automate it, the first CNC projector in the world with micrometer precision was presented in 1980, the Optimus CC. The transition to multisensors took place in 1987. The Inspector set a new standard as the first multisensor coordinate measuring machine with image processing and a laser in one beam path, as well as an electronic telecentric two-step zoom. By 1990, the first software for automatic contour comparison was presented under the name Bestfit. The use of PC-based image processing with integration in the Windows operating system helped to launch the VideoCheck series in 1992, which greatly reduced the cost of 3D measurement, especially in incident light. The high-precision benchtop coordinate measuring machines provided non-contact measurements for use in a the QC lab and on the shop floor

Inspector

VideoCheck benchtop machine

COMMENT

Multisensor says …

The management of the Werth company decided to build a new house because business is bursting at the seams. Blueprints were made, building permits obtained. Medium-sized businesses always get support … so they thought.

But it took five months longer than usual to get the building permit, and fire protection system charges were a chapter in themselves. The waiting was annoying, especially since the need was extremely urgent.

But now the new space is finally done. Employees no longer need to run from one building to another, with half-frozen hands, because we used to be housed in several buildings. The danger of being run over while crossing dangerous traffic is also greatly reduced. Swallows no longer interrupt the homemade laser computer link, and internal processes function much more smoothly in a logically adapted structure without "walk-time losses".

All in all: The building is not only beautiful, is also fits the company very well with its steel and granite aesthetic appeal. With an additional 2500 m² of production area, and 1500 m² of office and measurement rooms, Werth Messtechnik has expanded considerably. Equipped for even large measuring machines, one climate chamber has a stately height of six meters.

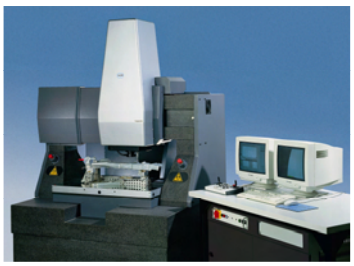
The new bistro will impress training participants, and taxpayers who smoke will appreciate the covered patio.

The difficulties are soon forgotten. A new fighting spirit has arisen - new customers and new orders will fill the new space with robust, animated life. After all, it does have to pay for itself!

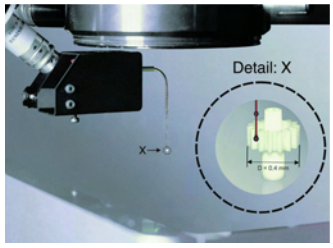
Best wishes,

The Multisensor

The next development steps increased measuring speed, among other advances. The use of highly dynamic linear drives, together with stable granite bases, led to the presentation of the Inspector FQ in 1996. This is the fastest multisensor coordinate measuring machine in the world, and was revised in a second generation in 2003. The measurement of ever smaller features took the leading role. The 2D fiber probe, developed for this purpose, had already been presented in 1998 as the smallest, most precise probe in the world (patented). At Control 2008, the 3D fiber probe was presented to the public for three-dimensional measurement. A multisensor coordinate measuring machine with computer tomography sensors was also shown as a world premiere in 2005. It allows complete object capture and three-dimensional measurement using the principle of computer tomography in combination with additional sensors. Equipped with a 130 kV X-ray tube, the TomoScope 200 is suitable for easily measuring parts made, for example, of plastic, aluminum, or titanium. For parts that are harder to penetrate, the machines of the TomoScope HV and TomoScope HV Compact series, with powerful 225 kV X-ray tubes, were developed in 2007 and 2008.



Inspector FQ



3D Fiber Probe

TomoScope®200

Credits

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