Control Edition: 05/2017

WENZEL Journal

# WENZEL Metrology World

Successful companies know that Quality Control is a highly important element of the production process. As the key driver in metrology we constantly work on new solutions in order to offer our customers even more superb products. The basis of our success is our innovative strength. This year we have again developed new products and implemented numerous improvements in all areas of technology. This applies to coordinate and gear measuring systems, industrial computed tomography, optical high-speed scanning and our solutions for styling studios.

With the introduction of our new CT system, the exaCT U we are setting a new benchmark. The newest generation, state-of-the-art system is one of the most powerful, if not THE most powerful system on the market, reaching a scanning speed more than 40 times as fast as its predecessor.

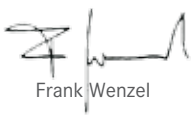
Our highly successful High Speed Scanning System, CORE D has been improved in terms of hardware, sensors and design and is now even more efficient than before. During the development process, we worked closely together with our customers, keeping their desires and needs in mind.
Furthermore we are expanding our product portfolio in response to Industry 4.0 and we demonstrate in concrete applications how production companies can utilize the shift to digital. We are introducing our new concept of the smart factory at the CONTROL in Stuttgart. The goal is to connect hardware, software, services and know how in an intelligent way and automate them as much as possible.

Our LH series coordinate measuring systems have been optimized in many details and can now achieve substantial accuracy improvements of up to 25%. The latest release of Metrosoft QUARTIS measuring software is now also available with many innovations and interesting features.

Last but not least we have bundled together a unique service package. With the formation of the Full Service contract, customers are ensured a 100% extended manufacturer‘s warranty. This ensures a fixed predictable investment as well as an optimal uptime, enabling customers to entirely concentrate on their core business.

You will learn more about the latest innovations and improvements in the current issue of the WENZEL Metrology World.

We wish you inspiring and informative reading.



Frank Wenzel

Dr. Heike Wenzel


Every day we work
for long lasting quality.
For your continued success.

Interview with Frank Wenzel

# Control 2017 - Strong Programme on an Enlarged Exhibition Area

**Mr. Wenzel, the Control Show is always an exciting time of year for the Quality industry, what makes the 2017 show special for WENZEL?**

To begin with we have the largest floor space at the show in our history. We needed more space to display our growing range of products and newest innovations. We are also launching three major new products which we believe will make a huge difference for our customers.

**Please describe the new product launches and why you think they will make a major impact?**

All of the new products are at the cutting edge of new technology and are all linked to the growing demands of Industry 4.0. Last year we talked about developing software to allow our customers to monitor their WENZEL machines remotely and this year we are showing the first version of the product we called WENZEL IMI – our Intelligent Machine Interface. Our staff on the stand will demonstrate the product live showing the performance and status of the machines on the stand. We really believe that this product will help our customers to be better connected to their machines, informed of their processes and protected as much as possible from unplanned downtime.

We are also launching our brand new CT product, the exaCT U. The U stands for “Universal” and we truly think we have come up with the most flexible and Universal CT on the market today. The machine has a huge measuring volume for its physical size, huge power potential, much faster measurement and reconstruction speeds and of course, is built to be integrated into a production line.

Our third big launch is for the next generation of our CORE high speed optical scanning systems. The machine has a new, automatic cover for shop floor protection and robot loading, a new sensor with higher power and a quick change joint and like all new generation WENZEL machines it has been styled to look great as well as offer excellent technical performance.

**What else will you show at Control?**

We will also show our full range of measuring machines including gear testers, vertical and horizontal CMM systems equipped with the latest sensors from WENZEL and Renishaw.

**Control is for WENZEL’s range of Metrology products but how is your Styling Studio product line going?**

The product line is very successful. We have great technology and solutions that our customers appreciate very much.

But something new is coming up. Something powerful and unique! We will launch this in the second half of this year and we are VERY excited!

**How would you sum up WENZEL and the Control show in 2017?**

We are showing that we are not only powerful in our ability to innovate, but also that we are agile and fast to respond to customer and market demands. This is what I believe differentiates WENZEL from its competitors and makes us a good partner for our customers.

# CONTENTS

Improvement of CMMs Accuracy by 20%

# Chasing Fractions of Microns

**When you have been building accurate measurement devices and CMM's (Coordinate Measuring Machines) as long as WENZEL (almost half a century), it gets harder and harder to find accuracy improvements. But not only are customers demanding lower specifications and uncertainties of measurement, but WENZEL also push themselves to stay in front of the competition.**

Earlier this year, WENZEL set themselves a target of a 20% improvement in accuracy, but also decided to report CMM specifications to the ISO10360-2:2010 standard. The latest generation of LH CMM's would therefore have to have improvements of greater than 20% as the latest 10360 standard requires that the stated accuracy takes account of and includes the uncertainty of equipment used to determine the CMM's uncertainty.

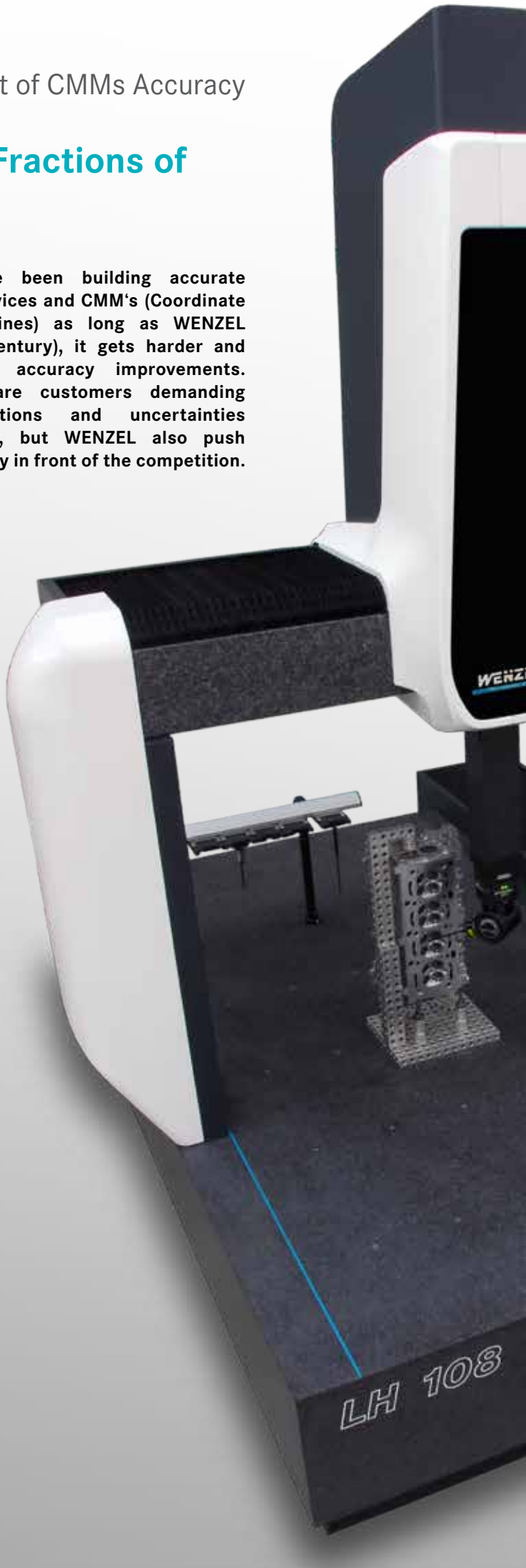
Let us imagine a CMM with an accuracy of 1.5 microns and a targeted new accuracy of 1.2 microns. How on earth would you go about making that large structure 0.3 microns more accurate? Make 10 improvements that each in themselves contribute a 0.03 micron improvement, that's how!

It's very easy to throw around these numbers but what do we really mean when we talk about microns and fractions of microns.

A micron is millionth of a metre or one thousandth of one millimetre. Here are some things considered to be 'small' and their approximate size in microns;

- The diameter of human hair – 40 to 80 microns
- The diameter of a water droplet in fog – 10 microns
- The diameter of a human red blood cell – 5 microns
- The diameter of a particle of wood smoke – 1 micron

So, the engineers at WENZEL are trying to find accuracy improvements 1/50th of the size of a particle of smoke!




The granite is meticulously lapped by hand to ensure highest level of accuracy.

Of course, WENZEL don't give all the details of the improvements made – that would be selling the family silver, but they include improvements and changes to components, materials, assembly processes and calibration methods.

Here's a few of the improvements to the LH CMM to whet your appetite;

- Larger air bearings to improve stiffness and reduce microscopic vibrations
- A slightly less porous granite for the X and Z axes
- Flatness and Parallelism manufacturing tolerances halved on some components
- Moving the X scale under a cover to reduce temperature effects
- Increasing the bend radius in the cable drag chains to reduce 'pull' on the axis

There are others too, and each improvement was rigorously tested to make sure there were repeatable gains in accuracy.

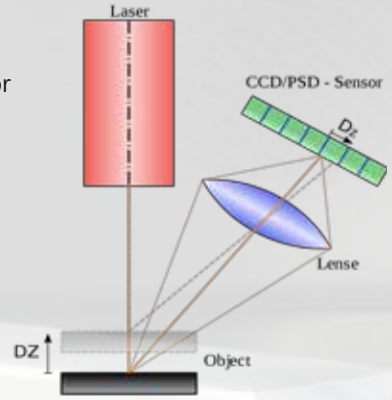
WENZEL has always been a company that made attention to detail their daily work, but nowadays these details are getting smaller and smaller. It's this kind of focus that makes a WENZEL CMM have the finest mechanical construction in the world. A bit of software compensation can be added to this structure to make it even a little more accurate, but doesn't it give you a large comfort feeling that underneath the covers the WENZEL mechanical design and construction is by far the best in its class?

Optical 3D Sensor Technologies

# Fast and Efficient

**The efficiency requirements of businesses are increasing day by day. Measurement results have to be available at increasingly shorter intervals. Optical sensors achieve high measurement speed and improve the measuring throughput. Therefore optical sensors are used more and more in the industrial environment and offer great potential. WENZEL is meeting this trend with recent developments and continuous improvements.**

Our optical sensors SHAPETRACER, PHOENIX, and the Double Eye Sensor are based on the triangulation principle. The distance of the sensor from the component for a point sensor is determined by a triangular approach, as outlined in the figure on the right. The sensor distance is determined by the light beam direction, the distance and angle of the light source from the camera as well as the measured angle of the reflected light. Line and area sensors can be regarded as a series or matrix of point sensors.




**Great Care and High Quality Components**

In order to perform high-precision measurements in the range of microns, WENZEL takes great care to employ high-precision optics, highly dynamic camera modules and state-of-the-art light sources. A reliable and precise measurement is feasible by interaction with evaluation algorithms adapted precisely to each sensor, even when facing varying surface finishes and colors.
The broad spectrum of optical sensors by WENZEL reflects the variety of applications and work piece materials. By adopting Renishaw's fully automatic tool change interface, the customer receives greatest possible flexibility.

**The Optimal Solution for Every Requirement**

Due to the integration into the highly dynamic CORE Series equipped with a rotary table, the Double Eye Sensor achieves maximum productivity, particularly when measuring long and shiny parts, such as turbine blades.

The line sensor SHAPETRACER II with a line width of 120mm offers maximum flexibility. Due to the variable process speed of the machine, large components can be digitalized quickly and small components with a higher resolution.

The PHOENIX enables a fast collection of characteristics in a single and fast measurement. Therefore the PHOENIX is particularly suitable for quick feature measurement in sheet metal parts.


Line sensor SHAPETRACER II


Double-Eye white-light point sensor

WENZEL 4.0

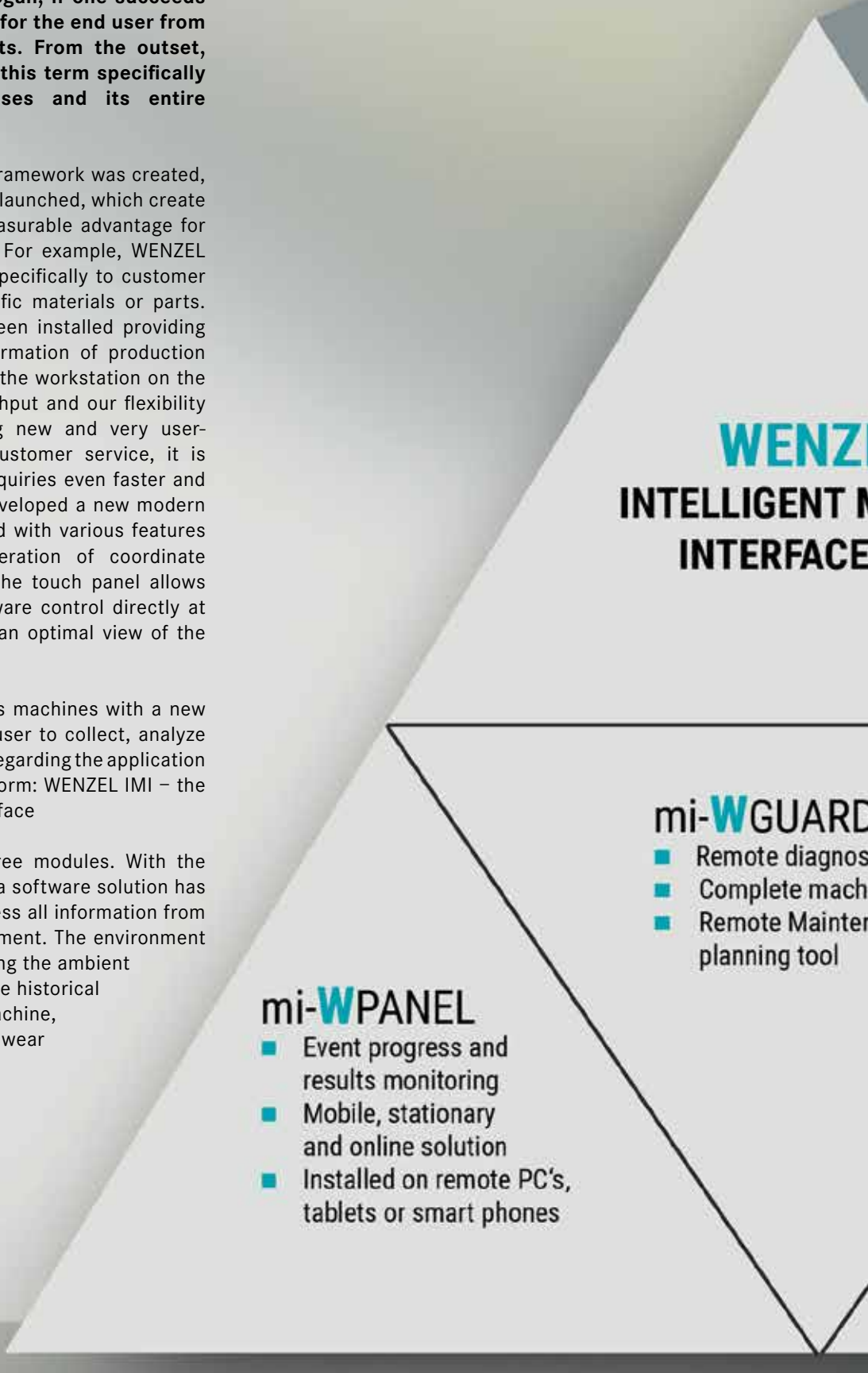
# WENZEL IMI – WENZEL Intelligent Machine Interface

**Automation, big data, artificial intelligence and additive manufacturing/3D printing are some of those modern terms many providers use in connection with the megatrend Industry 4.0. But Industry 4.0 is more than a slogan, if one succeeds in generating a specific benefit for the end user from our technological developments. From the outset, WENZEL has questioned, what this term specifically means for products, processes and its entire business model.**

By implementing WENZEL 4.0, a framework was created, from which various projects were launched, which create a highly specific and directly measurable advantage for customers and employees alike. For example, WENZEL uses 3D printing to react more specifically to customer requirements, when facing specific materials or parts. Digital workstations have also been installed providing employees with all relevant information of production orders, paperless and directly to the workstation on the shop floor. This increases throughput and our flexibility for customers. By implementing new and very user-friendly software solutions in customer service, it is possible to react to customer enquiries even faster and more efficiently. WENZEL also developed a new modern touch panel, which was optimized with various features to guarantee a convenient operation of coordinate and gear measuring machines. The touch panel allows machine and measurement software control directly at the machine, whilst maintaining an optimal view of the machine and part.

In addition, WENZEL will equip its machines with a new intelligence, which will help the user to collect, analyze and present relevant information regarding the application of the machines in an appealing form: WENZEL IMI – the WENZEL Intelligent Machine Interface

The WENZEL IMI consists of three modules. With the implementation of the mi-WLINK a software solution has been created to collect and process all information from the measuring machine's environment. The environment information includes data regarding the ambient temperature, the humidity and the historical performance of the measuring machine, but also any ongoing problems or wear to critical parts are recorded.




For this purpose, integrated sensors as well as information from the controller are used. In addition, warnings and status reports from the application software were integrated. Information about currently running measuring programs or more specific error messages can be processed in this way. This collected information is processed in a standardized manner for each individual measuring machine and can be evaluated in various scenarios.

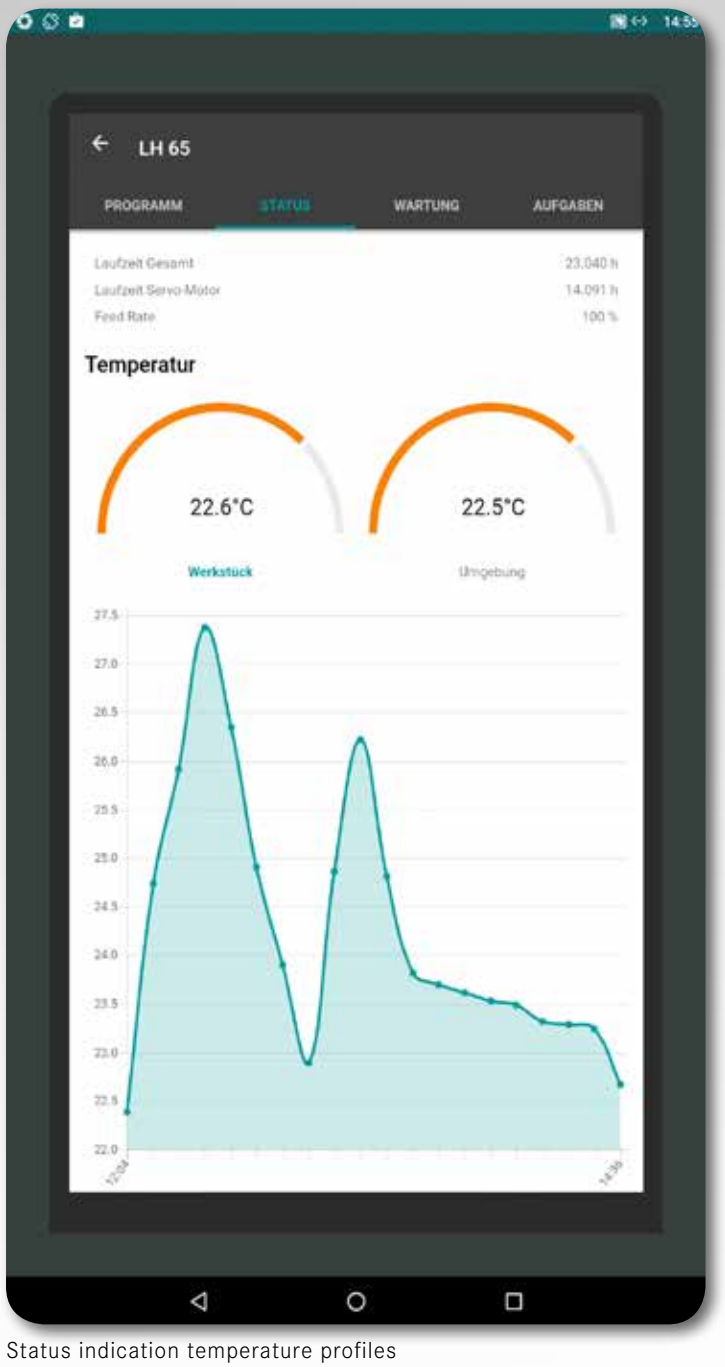
In the local mi-WGUARD scenario all machines set up in the same measuring room, are included into the solution. In the global mi-WGUARD solution all of the customers' machines can be included, wherever in the world they are being used. The data can also be transferred to a secure area at WENZEL with the consent of the customer. This enables a new quality of cooperation between WENZEL service technicians and the customer, including the possibility to conclude a maintenance contract with predictive maintenance.

Visual presentation is provided by a modern software solution, the mi-WPANEL, which allows customers to be interactively informed about the condition of all connected measuring machines. Depending on the chosen scenario, the current condition of all measuring machines can be viewed at a glance. Detailed information can be retrieved with the help an easy double-click at any time. This is possible in the workplace as well as externally with the use of mobile devices such smartphones or tablets. In the first instance, mi-WPANEL will be delivered to our customers as a Freemium product. In the free of charge version all basic information concerning the measuring machine are provided. The monitoring of an entire measuring room (local scenario) or of all machines of a customer worldwide (global customer scenario) is provided by the premium version.

With the development of this solution WENZEL sets specific standards for the implementation of Industry 4.0. Collecting data and processing it in an expedient manner is an important step to further improve efficient use of WENZEL measuring machines. WENZEL 4.0 provides solutions to support the customer with digital transformation projects.

# WENZEL IMI – WENZEL Intelligent Machine Interface


Status indication machine




Status indication temperature profiles


Status indication measuring programs


Status indication service & maintenance

Automated Measurement Solutions

# Intelligent and Integrated Connectivity

**The innovation processes associated with the term "Industry 4.0" are key drivers for WENZEL. This is because the foundations for intelligent and integrated connectivity are implemented with metrology and the respective software. Measuring systems can now be loaded automatically and measurement programs can be started directly, but also that data, such as measuring programs and results, can be shared and processed via standardized interfaces.**

The number of inquiries we receive for automated is increasing constantly. Therefore WENZEL has extended and expanded the interfaces in their Metrosoft QUARTIS measurement software in order to enable connections with external systems and thus allowing the complete integration into the customers' process. The loading process for integrated coordinate measuring machines is performed, for example, by an industrial robot, and therefore the system runs fully automatically.

Line integrated coordinate measuring machine with automated loading by an industrial robot.

Ready for Industry 4.0

# Shop-Hardened, Touch Panel for Coordinate Measuring Machines

**WENZEL has developed a modern touch panel for convenient operation of coordinate and gear measuring machines. The WENZEL Touchpad offers a perfect combination of ergonomics and functionality in a shop-hardened design. The WENZEL Touchpad enables the operation of measuring machines and software directly on the touch screen, while maintaining an optimal view on the machine and component.**

The positioning and probing of the machine can be easily controlled with the touchpad. Furthermore the screen content of the machine computer can be mirrored directly to the panel, such that the entire measuring procedure can be controlled and programmed. The new development offers an interactive interface for remote service, application support and online training. A 5-megapixel camera, speakers and a microphone are directly integrated into the WENZEL Touchpad, allowing optimal conditions for remote maintenance by service and application engineers. Live video and photos help to find solutions to any operator issue.


During the development, particular emphasis was placed on comfortable ergonomics, combined with robustness. The 10.1" IPS Touchscreen consists of an extremely durable anti-glare Gorilla® glass screen, making the display extremely crack and scratch resistant. The high quality and illuminated membrane keypad also operates under the most challenging conditions. The function keys are programmable by the WENZEL Metrology Controller (WMC). The axial directions are displayed via LEDs directly above the joysticks.

The display and the membrane keypad are embedded ergonomically into the housing in order to prevent any ingress of dirt.

The premium aluminum housing guarantees optimal temperature behavior and excellent EMC shielding. The housing, including the frame of the display is designed in typical WENZEL style and therefore harmoniously blends in into the overall visual impact of the system. In addition, the housing has rubberized, magnetic feet, which enables easy fixing to the control panel.

The 2-axis thumb joysticks with wear-free, Hall Sensor technology are exceptionally robust. In case of unintentional movement, for example, a strong tilting of the WENZEL Touchpad, an electromagnetic safety sensor ensures deactivates the joysticks. The speed of the measuring machine can be adjusted via a potentiometer. The two channel emergency stop switch ensures maximum safety to category four.

An embedded, Android operating system with a self-developed, secure launcher and expandable functionality makes the WENZEL touchpad a future-proof investment. The WENZEL Touchpad is supported by the WENZEL Metrology Controller (WMC). Updates can be implemented any time with the support of the WMC.

You Decide the Program

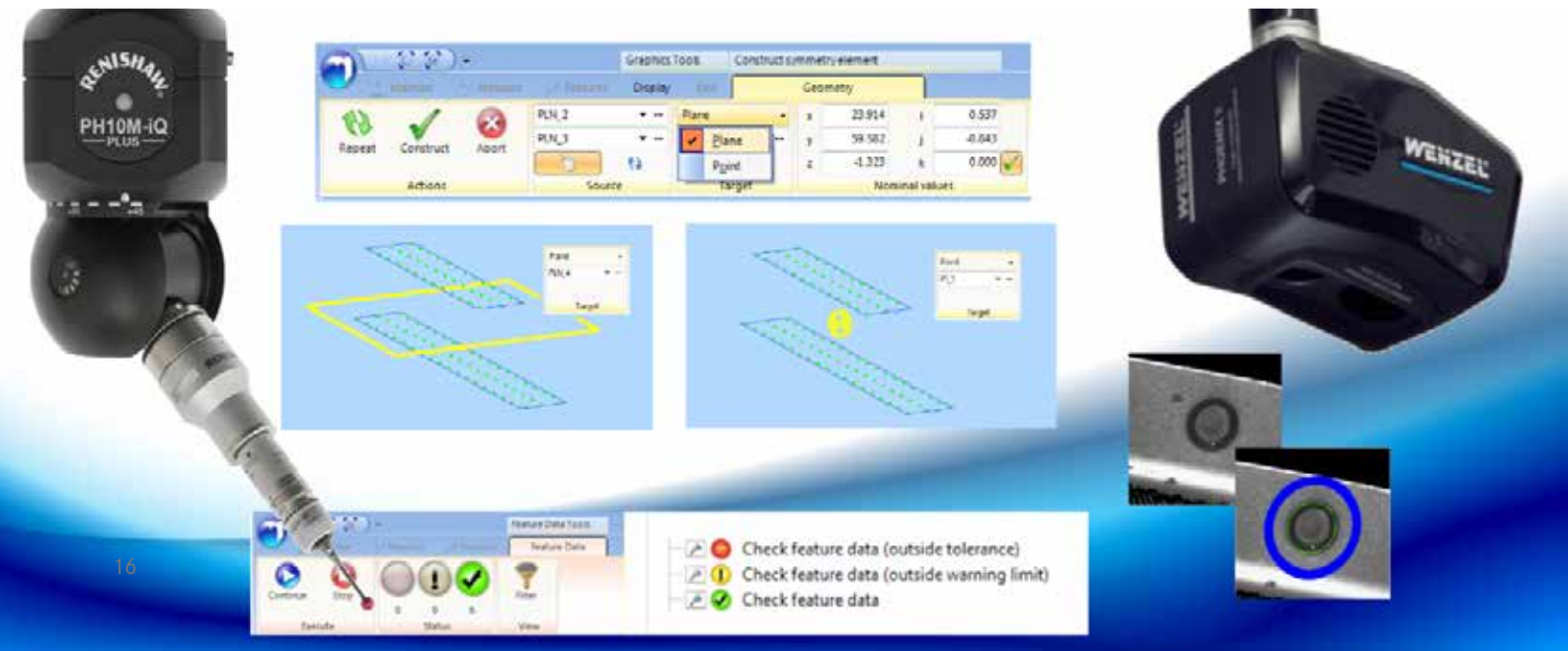
# Metrosoft QUARTIS R15 is Now Available

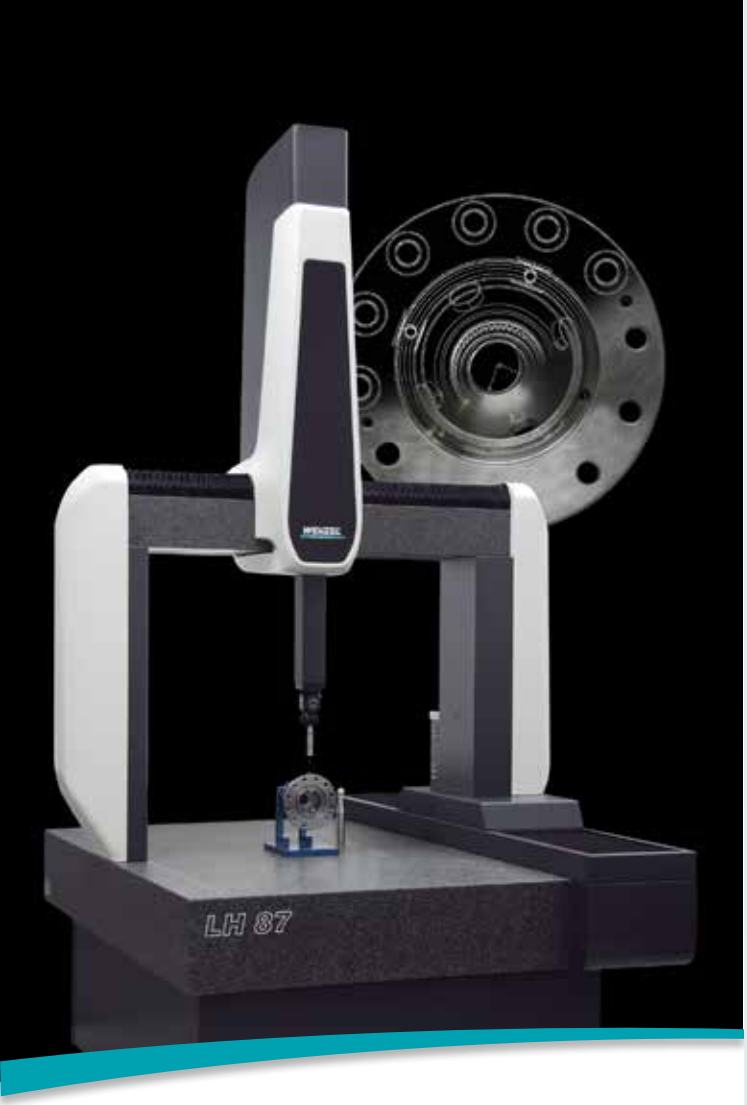
**With Metrosoft QUARTIS, WENZEL Metromec introduces a measuring software with an uncluttered, flexible and result orientated workspace that reduces distraction for users so they can spend more time and energy focused on their work. Measurement results can be generated even faster and easier. Metrosoft QUARTIS R15 offers a wide range of improvements for all users and significantly contributes to optimize daily metrology work. Extensive improvements were added particularly in the following topics in Metrosoft QUARTIS R15:**

- Constructing elements using the ribbon with live preview
- Constructing surfaces out of curves
- Check feature data: new with signal light, filter and program control function
- Optical sensor WENZEL PHOENIX II measures positions of welding points
- CNC rotary tables supported
- Renishaw PH10-iQ increases the machine availability
- FARO measuring arms via USB interface supported
- Updated CAD interfaces
- Insert auxiliary elements into CAD model
- 64-Bit version for large CAD models

Metrosoft QUARTIS R15 offers many additional improvements and extensions.

Detailed information can be found here.
http://www.metromec.ch/en/metrosoft-quartis/improvements.html






**Accurate Measurement Results**
**Quick and Easy**
**with WENZEL CMMs**

Efficient measuring solutions ensure
the quality of your components

Intelligent software measures and analyzes
regular geometries and free-form surfaces

Reliable, user-friendly and
a safe investment

Made in Germany

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# Feedback form

## Please send via Fax to +49 6020 201-1999

Please send me the marketing materials about the following products:

**Coordinate Metrology**
- ☐ The LH Generation
- ☐ LH Gantry and LHF Series
- ☐ R-Series

**Gear Metrology**
- ☐ WGT Series
- ☐ LH Gear-Series
- ☐ LH Hybrid

**Styling Solutions**
- ☐ Design-Flyer
- ☐ Excalibur

**Computed Tomography**
- ☐ exaCT® XS
- ☐ exaCT® S
- ☐ exaCT® U

**High Speed Measuring Systems**
- ☐ CORE

**Software**
- ☐ Metrosoft QUARTIS®
- ☐ PointMaster
- ☐ DesCAD3D

☐ Please contact me for a product demonstration.

**Sender:**

First Name, Last Name

Company

Address

Postal Code, City

Country

Phone

E-Mail


Foundation of
WENZEL Software Solutions GmbH

## WENZEL Bundles its Software Expertise

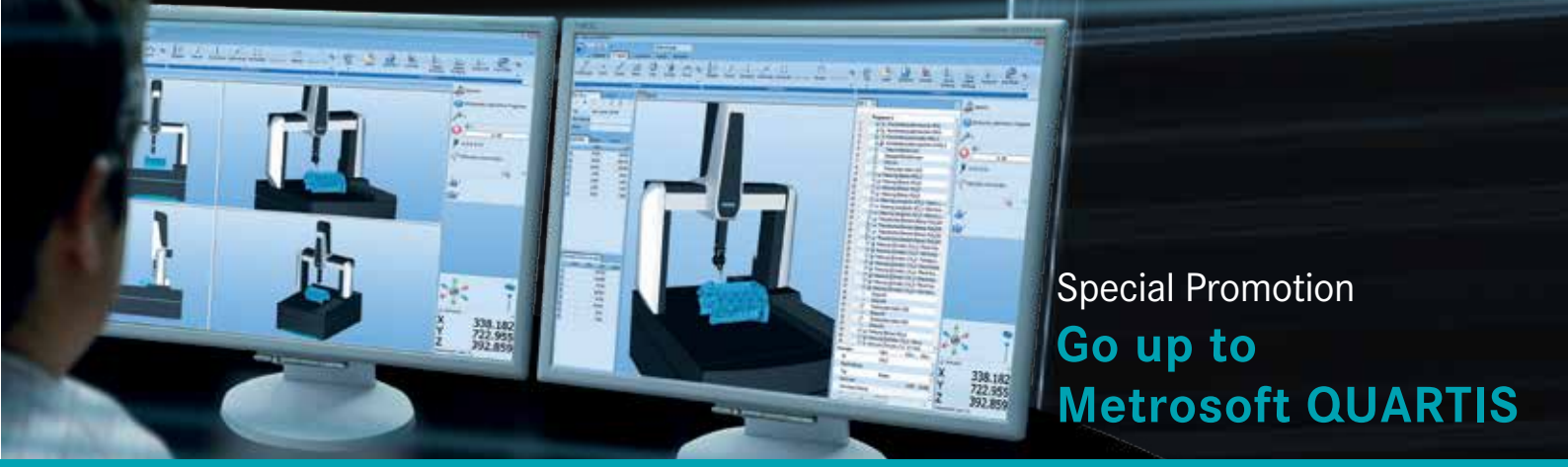
**On the 5th December 2016 WENZEL Software Solutions GmbH was founded by WENZEL Group GmbH & Co. KG, a leading manufacturer of measuring and styling technology from Wiesthal, Germany. The new company will coordinate all of the WENZEL Groups' software activities. With this strategic decision, WENZEL will synchronize existing expertise and create synergy gains.**

The foundation of the new company reflects the increasing importance of software solutions in future projects in the fields of 3D and Gear Metrology, Computed Tomography, Optical High Speed Scanning and Styling Solutions. WENZEL's aim is to advance the digital transformation and to expand the role of its measurement solutions in networked production in order to make the smart factory in the age of industry 4.0 a reality.

Working with Two-Handed Power

## 3D Mice – New Models Available

As a distribution partner of 3D Mice and input devices from 3Dconnexion the WENZEL Metromec AG introduced new models in their range of products. Metrosoft QUARTIS and 3Dconnexion-Mice increase your productivity significantly. 3Dconnexion is the leading supplier of 3D Mice for construction, design, visualization and inspection. A perfect combination of high-performance and ergonomic hardware with a well thought out and intuitive software. It ideally supports relaxed and productive working with CAD-models. Metrosoft QUARTIS has been certified as one of the first coordinate measuring software products by 3Dconnexion. The latest models of the 3Dconnexion product family enable a comfortable and native interaction with digital content containing 3D applications, so that you can fully focus on your main tasks. Additional office products and web browsers are also supported for smart and ergonomic navigation.



Special Promotion

# Go up to Metrosoft QUARTIS

**Upgrade from Metrosoft CM to Metrosoft QUARTIS!**
**Faster and Easier to Significant Measuring Results!**

Benefit from our special promotion Go up to Metrosoft QUARTIS until June 30th 2017 and get the latest version of our measuring software Metrosoft QUARTIS. Your Metrosoft CM installation will also be updated, so that you can work parallel with both versions. Please note that Metrosoft CM support ends June 30th 2017

We will be pleased to advise you in all aspect and to send you our price information!
Just send an e-mail to retrofit@wenzel-cmm.com

**Your Benefi ts through Metrosoft QUARTIS at One Glance:**

- The Multi-Function Tool Bar: Clearly designed working area for more effective work
- The Contextual Tabs: The right functions just in time
- The Live Preview: Anticipate the Result
- CAD Functionality: The basis for effi cient measurement
- Virtual Programming & Measuring: Measure where mechanical probing is not possible
- User Interface: Suitable for each task
- DMIS: Seamless integration into the QUARTIS programming environment
- Measure and Evaluate Curves: Your profiles and contours under control
- Measuring against Nominal CAD Data: Seamless integration of free-form
- Data Management: Clearly structured due to database
- Statistics: Your processes under control
- Revolutionary Measurement Reports: Present your results optimally
- External Databases: Flexible through multi-user ability, saving large datasets effectively
- Duplex- and More-Column Measuring Machines: Simultaneous, synchronous, collision-free
- Roughness Measurement: Economical with multi-sensor measuring machine
- Multilanguage: Measure in 16 languages global and transnational
- CNC roundtable: Calibration and positioning
- Portable measurement arm: Operation of FARO measurement arm by USB interface


Do you already have a Software Maintenance Contract or do you want to sign into one? Then you will get an additional discount and you will profit with every release immediately from useful functions and improvements. Be always on the state-of-the-art.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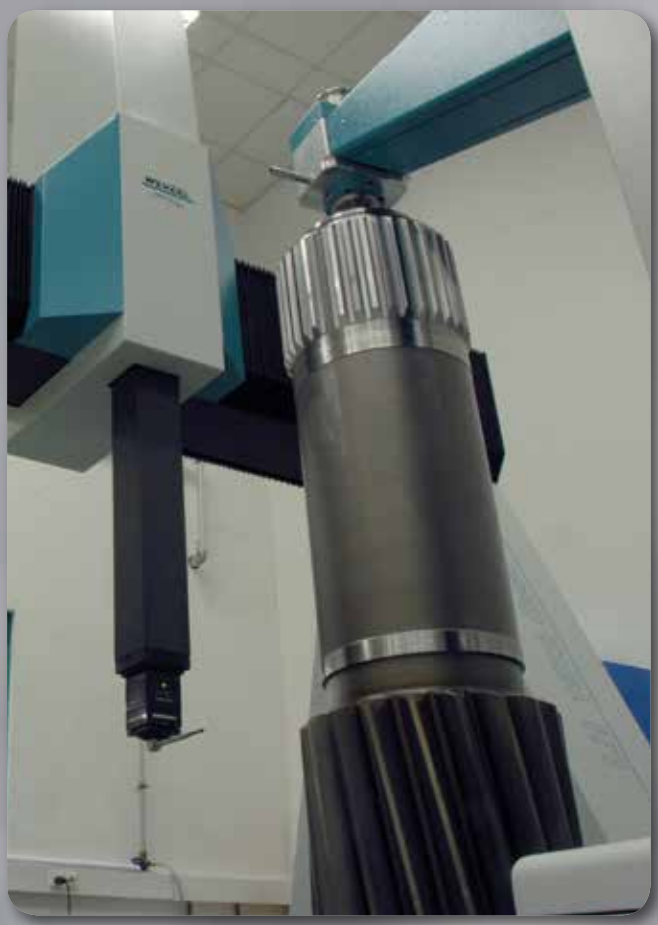
Gear and 3D Coordinate Metrology –
Combined Methods in Use

# More Flexibility in Metrology

**The requirements for metrology regarding throughput and flexibility are steadily increasing. Therefore the individual measuring methods not only have to become faster, but the measuring systems must also become universally deployable. Ideally, different kinds of measurement tasks should therefore be able to be performed by one single system and in one process.**

The combination of Gear and 3D coordinate metrology not only allows the complete measurement of various gear, prismatic and free form components but also the entire metrological analysis with regard to form and location. This means that complex components can be analyzed in a fully function-orientated manner. This is particularly evident in the case of components where gearing and geometrical elements are combined, such as, for example, planetary gear carrier sets.



Due to the position of the tailstock outside of the measuring volume, gear shafts can easily be supported and measured.

In conjunction with a change rack, it is possible to automatically switch between different probe configurations during the course of a measurement program. An intervention by the operator is not required and so reproducible, user independent measurement results can be achieved.

Gear and 3D measuring systems normally differ in their construction. Gear measuring systems are conceived for measuring rotationally symmetrical workpieces with three linear and one rotary axis. Gear measurements can be performed according to gearing principles with the aid of the integrated rotary table, thus enabling optimum tactile contact conditions. 3D coordinate measuring systems are more universally applicable due to their rectangular measuring volume, with prismatic and free-form components being typical.

The high-precision rotary table enables the flexible and precise measurement of gears and rotationally symmetrical components.

## Optimal Utilization of the Coordinate Measuring Machine

The accuracy and acceptance procedures are also based on the respective application fields. Gear measuring machines are accepted according to the VDI/VDE-Directives 2612/13 and 3D measuring machines according to the ISO 10360 series of standards. The data from the 3D coordinate systems describe the precision of single-point probing and linear measurements. These are performed on reference standards such as spherical reference standards, step gauges or ball bars. In order to combine both metrology principles, both acceptance procedures are used on a combination machine. In favor of achieving an optimal precision, the smallest residual, structural errors are captured and compensated by CAA laser compensation. At WENZEL, those errors are reduced to an absolute minimum with structures made to the highest possible mechanical precision and the application of hand lapped granite guide ways.

If a 3D coordinate measuring machine is equipped with an integrated rotary table, the basics of Gear metrology can be combined with the flexibility of 3D coordinate measuring machines. This procedure provides the possibility to use Gear measuring software as well as 3D measuring software on one measuring machine. In this way prismatic components, for example cases can be programmed and measured against the CAD data, with extensive shape and position analysis also being feasible. In particular, position tolerances can be evaluated this way both in terms of production as well as function.

On request, certain machine sizes can be equipped with tailstocks for the measurement of shafts (e.g. LH Hybrid). The optimal utilization of the coordinate measuring machine is guaranteed due to the application of the 3D and Gear measuring software. With a broad product portfolio of gear measuring machines WENZEL offers solutions for a fast and effective analysis of minute gears up to large ring gears and bearings with a diameter of up to 6,000mm.

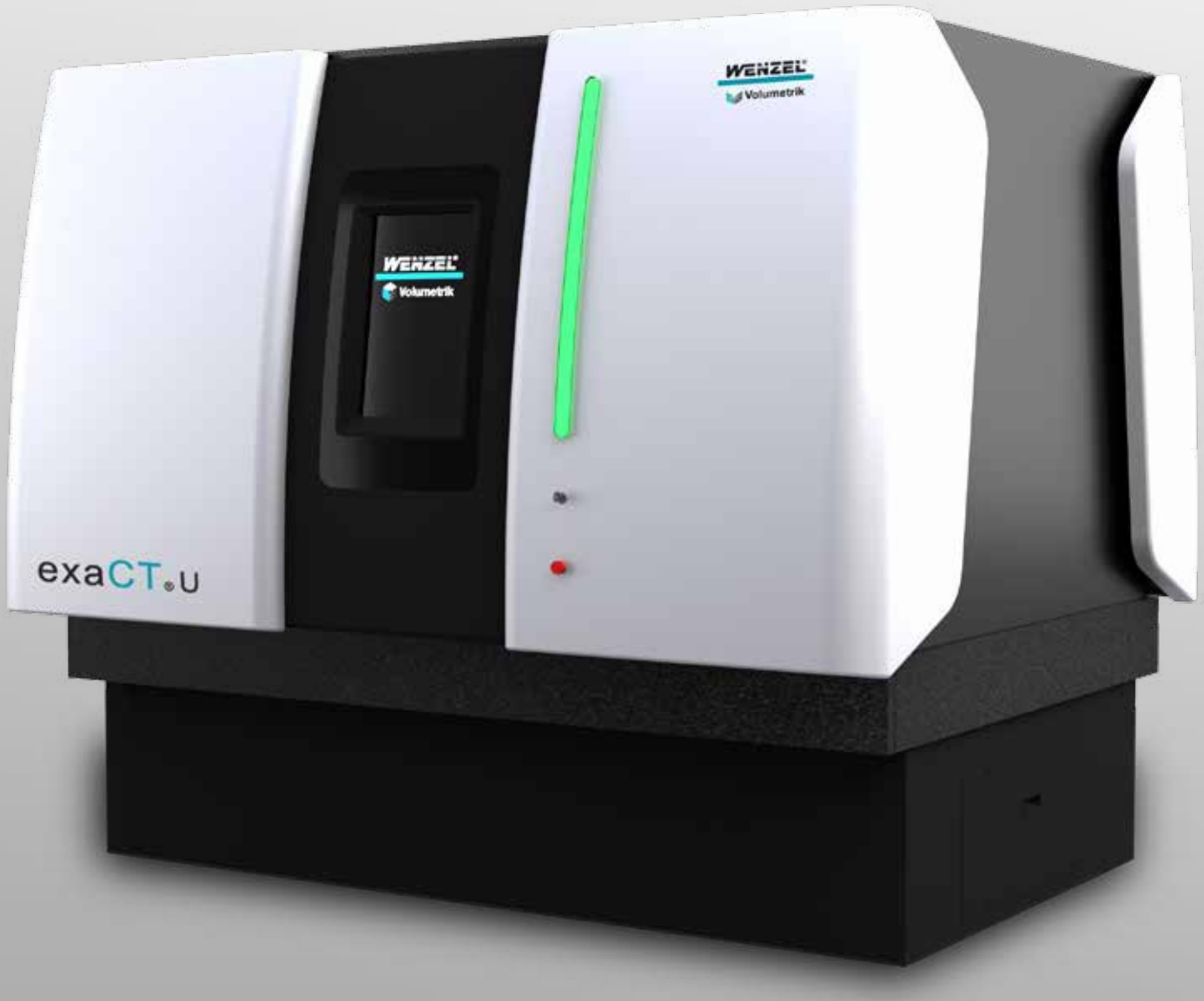
The LH Hybrid is the ideal solution for the measurement of gears and prismatic components with one machine.

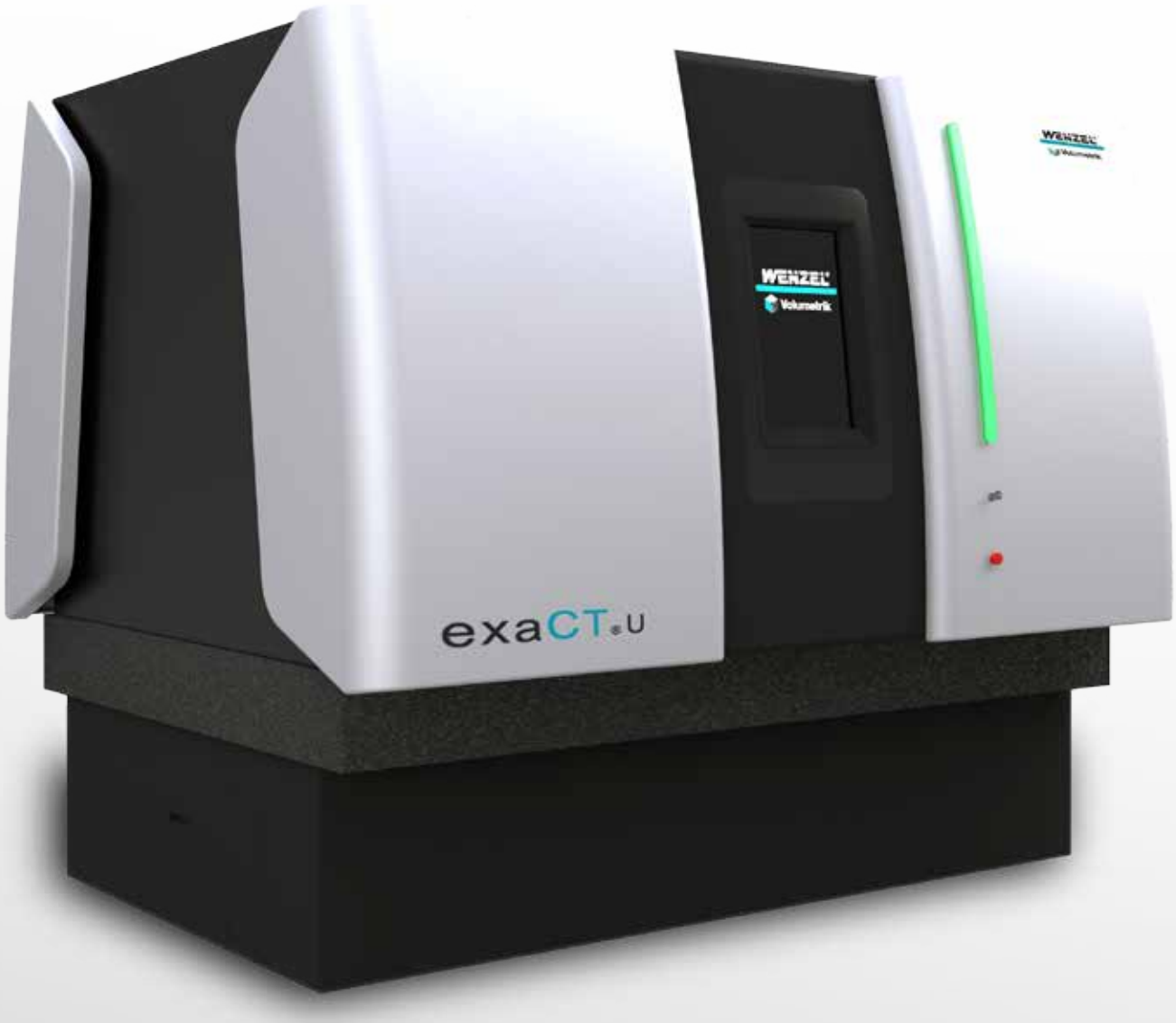
WENZEL Presents the Universal CT System exaCT U

# The New Generation of Industrial Computed Tomography

**World premiere at the CONTROL show in Stuttgart: From May 9th to 12th, 2017, WENZEL will present the industrial CT system exaCT U for the first time in Hall 5, Stand 5102. The exaCT U is used for the measurement and testing of components where 3D data of complex internal and external structures are required. With the new development, WENZEL is expanding its successful exaCT Series with a system that sets new standards in performance and measuring volume.**

The exaCT U can be used universally and is designed in such a way that each customer can tailor his individual system with the appropriate X-ray source and detector. Sources of 135 - 450 kV and services for all requirements are configurable in the mobile variant of the machine. Radiation sources whose performance would not make sense in a transportable CT system are offered as stationary systems based on the basic device and they achieve unprecedented power and flexibility. Due to its very large measuring volume of 700 mm in height and 300 mm in diameter, the exaCT U allows the measurement and testing of large components with higher densities.






## Intuitive User Interface Provides Fast Results

The innovative system design offers a new operating concept and an integrated workspace. Due to the intuitive user interface, precise measurement results can be generated after a short training period. The exaCT U is also smart as the system automatically optimizes the measurement parameters.

The CT control and reconstruction software is specially developed by WENZEL Volumetrik for industrial applications to ensure high precision and fast scanning times. The individual components are optimized and fine-tuned to each other, thus achieving the highest quality standard. The data acquisition software ensures the optimized control of the CT system with the reconstruction software guaranteeing the exact calculation of the volume data.

## Automated Measurement in the Production Line

The evaluation software of the exaCT U has a direct link to the proven WENZEL software products, Metrosoft QUARTIS and exaCT Analysis. The system offers numerous evaluation possibilities. On the basis of a single measurement, materials testing, nominal-actual comparisons against a master component or CAD data, reverse engineering and compensation of shrinkage and warping are possible within a very short time.

In its performance class, the exaCT U is one of the most compact CT systems on the market. With four independent traversing axes, it offers an impressive resolution (4000 x 4000 pixels). Hardware and software offer the possibility of automated measurement integrated into the production line and provides the answers to questions posed by the Industry 4.0 concepts.

CT Innovation Days at WENZEL

# Insights into the Possibilities and Advantages of Industrial Computed Tomography

**On the 9th and 10th November 2016, WENZEL welcomed numerous visitors and experts to its CT Innovation Days at its headquarters in Wiesthal. The event was entirely dedicated to industrial computed tomography and offered newly interested as well as experienced CT users the possibility to learn about industrial computed tomography or to deepen existing knowledge in a targeted manner. The two day program guaranteed a varied mix of specialist lectures, live demonstrations and discussion rounds. The participants especially enjoyed the successful combination of practical application examples directly on the machines, as well as the communication of theoretical basics and specific expert knowledge. In addition, there were always chances to answer individual questions and to exchange experiences on the subject of CT at WENZEL.**

The station “virtual measurement of CT data” demonstrated the interaction of CT data and WENZEL Metrosoft QUARTIS measurement software.

**The aim of the event was to demonstrate the impressive possibilities of computed tomography with all its testing and evaluation methods. Industrial computed tomography can capture complex surface shapes, as well as complex internal structures of components in three dimensions and provides a maximum of information on dimensional accuracy and processing quality in the shortest time possible.**

## Computed Tomography in Action

During the first of the Innovation Days, visitors had the opportunity to experience CT systems with live demonstrations. Different tasks were introduced, with which the participants could get an idea of possibilities of industrial computer tomography. The complete exaCT product range from WENZEL was available for this purpose. The product range extends from the highly compact desk CT system exaCT XS, the entry-level model, over the exaCT S for high precision detail tomography, with which even fiber structures of composite parts were visible, up to the high performance exaCT M Workstation for measurement and inspection of medium sized metal components.

At the exaCT S station the visitors were informed about the analysis and evaluation possibilities of multi-material components, as well as the topic of non-destructive testing. With the support of the exaCT M150 workstation, various advantages of CT batch scanning were demonstrated. In a CT batch scan, multiple individual objects are measured simultaneously in a single CT scan, with scan results automatically evaluated. The station “virtual measurement of CT data” demonstrated the interaction of CT data and WENZEL Metrosoft QUARTIS measurement software. The significant speed advantages and the easy operation of CT and measuring software was impressively demonstrated. The participants hopefully convinced themselves that the exaCT XS could be an affordable and easy entry into the world of industrial computed tomography. Each system version can realize different demands and customer requests.

## Exposing Product Pirates – Research and Production at the Highest Level

In addition to the CT specialists of WENZEL, on the second day of the CT Innovation Days, guest speakers from industry and research also gave delegates interesting insights into different areas of application of CT. Miriam Rauer of the Hochschule Aschaffenburg lectured on the three-dimensional analysis of pores and cracks in solder joints in high power LEDs. Sebastion Horlemann of the SKZ Würzburg impressively illustrated the value of CT technology for non-destructive testing and analysis of synthetic materials. At the Hochschule Aschaffenburg, as well as at the SKZ, an exaCT S CT system is the basis for extensive and highly interesting analyses. Christian Klostermann of the Klostermann Ingenieurbüro und Vertriebsgesellschaft GmbH showed on the basis of real examples of original and plagiarism, how counterfeits can be unmasked within seconds with the support of computed tomography and how the advantages of the original can be extracted.

Alexander Munk of Renishaw GmbH from Pliezhausen finally provided a profound insight into additive manufacturing. Renishaw is the global leader in generative manufacturing, also referred to as 3D metal printing. Renishaw provided the event with the generative manufacturing system AM400, as well as with numerous components, that were produced with the help of laser melting technology. A particularly impressive exhibit was a bicycle frame printed from metal powder.

The exciting day was crowned by a dinner at the 4 star conference and experience hotel Villa Marburg, located in Heigenbrücken. The participants ended the day in a relaxed atmosphere.

Guest speakers from industry and research also gave delegates interesting insights into different areas of application of computed tomography.

WENZEL Presents the New Generation of the Optical High Speed Scanning System, CORE D

# Fast and Accurate Inspection on the Shop Floor

**The next chapter in the eight year sucess story of the WENZEL Optical High Speed Scanning System CORE D has begun. The CORE D was developed to improve measurement speed in the production process and is today an established, global solution for complex measurement tasks in production processes of various manufacturing industries. The hardware, sensor and the design of the CORE D have been extensively reworked and improved.**

The accuracy of the machine with the optical Double-Eye white-light point sensor for the probing test MPEP has been improved by 100% since the introduction of the machine. The stability of the measurement process is enhanced by the new generation of the Double-Eye white-light point sensor, which is also introduced at the same time. The design and inside of the sensor have been optimised by continual improvement processes. The sensor is capable to measure the increasingly complex parts in shortest time.

## New Generation of the White-Light Point Sensor and Light Protection Cover

The camera in the new sensor has an increased resolution and better sensitivity and therefore improves the measurement process due to larger light yield. The active cooling system is replaced by a passive one which is more robust even within a dusty production environment. The sensor is mounted on a magnetic crash protection joint which can trigger if the sensor touches the part. The new sensor generation maintains the large working distance of 80mm, the measurement range of +/- 3mm as well as the large angular acceptance of up to 85 degrees.


Double-Eye white-light point sensor


CORE D with the new automatic and integrated light and environment protection cover

The new automatic and integrated light and environment protection cover of the new CORE D ensures the accurate optical measurement even on highly polished parts within suboptimal lighting conditions as often found in production environments. Furthermore, the protection cover improves the safety of the operator and provides additional protection of the measurement system.

The design of the new CORE generation takes its design cues from the coordinate measuring machines, gear testers, the computed tomography systems and styling solution machines from WENZEL. The angular edges are replaced by softer and rounder forms and the previously grey underframe is now a modern black and white. The protection cover is perfectly integrated into the new CORE design. The large opening still offers very good accessibility from 3 sides and the CORE D is well suited for projects where robot loading is a requirement. Of course, the numerous, traditional advantages of the system are kept and continue in the new machine generation: the ability to measure sharp edges and small features without tip compensation errors, the simultaneous control of the 3 linear and 2 rotary axes, the compact footprint, the large temperature range, the great accessibility and integrated work station. And the CORE D still does not need an air supply.

Interview with Stefan Mahr, Sales Manager
WENZEL ScanTec Division

# Fast and Automated Measurement of Turbine Blades

Stefan Mahr,
Sales Manager WENZEL ScanTec

**We see the CORE measuring turbine blades really often. Would you please tell us the advantages of the Optical High Speed Scanning System CORE D regarding the measurement of turbine blades?**

Clamp the turbine blade on to the machine push a button and the measurement starts! Our CORE is a compact and robust measurement system with fast dynamics developed for the measurement of turbine blades directly in the production environment. The system provides an optical sensor which ensures a high-quality measurement even on shiny and highly reflective surfaces.

**What are typical applications for your CORE machine?**

Besides the measurement of turbine blades there are a lot of different applications. We have an increasing amount of requests from the field of medical engineering, e.g. we can measure the shiny surfaces of artificial knee joints. Especially these highly reflective surfaces are difficult for other systems.

**You mentioned that the CORE is highly suitable in shop floor environments. What are the reasons?**

The CORE has a very stable structure. Large and stable linear bearings ensure long durability and stable operation even in production environment. Furthermore, the CORE D has a small footprint and does not need air supply and is therefore relatively mobile.

**A current and relevant topic also regarding measurement machines in general is the fully automated loading/unloading and automated measurement. Do requests for integration of measurement machines into automated production cells generally increase?**

The project requests regarding automation continually increase, also for all other WENZEL products, especially regarding coordinate measurement machines. The measurement technologies and corresponding software become more and more important for integration processes. The automated loading and unloading of parts and automated measurement are already quite common. Now also data extracted from the measurement is being exchanged and processed on other machines.


Production cell at Starrag AG

**Could you please elaborate some details of one of your automation projects? ?**

We integrated two CORE D machines into an FMS (Flexible Manufacturing System) at Starrag AG, located at Rorschacherberg, Switzerland. This system consists of four milling machines with a special clamping concept, which machine the blades, as well as two washing systems and two CORE measuring machines. The individual stations are loaded by robot. The CORE measuring machines are controlled via the cell controller. The Decision for our Core was based on a strict selection process. An important reason that favored our measuring solution was that we could meet the demanding cycle times.

**The new CORE D generation has an integrated light protection cover. Are there any changes regarding automation projects?**

The integrated light protection cover provides a major advantage for measurements of very shiny parts. It ensures precise measurement even when facing suboptimal lighting conditions that are typical for a production environment. The new protection cover features a large opening and inherent great accessibility from three directions. Therefore the new CORE is perfectly suited for automated loading and unloading.

**What further advantages does the new CORE D generation have?**

The hardware and sensor technology have been continuously improved. The new camera of the Double-Eye White-Light Sensor has a better resolution, larger light yield and is more robust. The machine has a new design that matches with the design of other WENZEL machines like tactile CMMs or Gear Measuring Machines.

**Is it possible to use other optical sensors besides the Double-Eye White-Light point Sensor on a CORE D?**

Yes, you can also use the WENZEL PHOENIX sensor which uses the phase shift method and structured light projection. Focus of this solution is the capturing of surfaces and a quick comparison to CAD data for quality control. This can be done via comparison of individual features or pseudo color representation of deviations from the nominal data. The combination of CORE and PHOENIX is also deployable into production lines. Furthermore, the combination CORE and PHOENIX is perfectly suited for reverse engineering. It enables users to capture STL data which can be further processed in the usual CAD programs.

Measurement of a turbine blade

All-Embracing, Care-Free Service Package for Coordinate Measuring Machines

# WENZEL Full Service 4.0

Karl Nagel,
Head of After Sales Service
WENZEL Group

**As a manufacturer of measuring machines, WENZEL Group GmbH & Co. KG now offers a unique all-embracing care-free service package. By signing a Full Service contract, customers are ensured a continued, 100% manufacturer's warranty. Based on a fixed quarterly rate, all necessary services and components are covered to ensure the complete operational readiness of the measuring machine.**

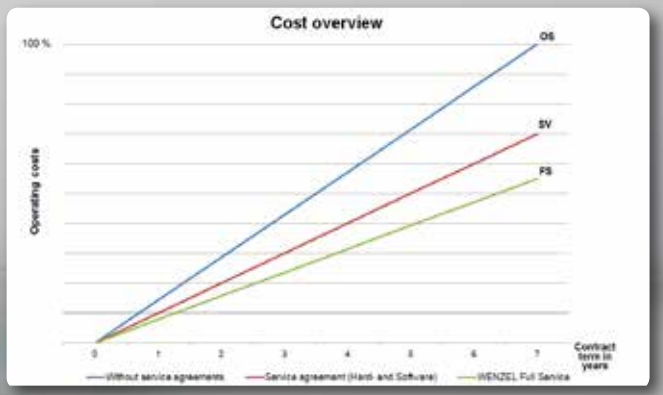
The outstanding performance promise includes all services, such as preventive maintenance, calibration and repairs. The Full Service manufacturer‘s warranty includes original spare and wear parts, the controller, the computer, the control panel as well as the machine frame itself. Only the probe system is excluded. In addition, the installation of the most recent release of the Metrosoft QUARTIS metrology software as well as one training day per release is also included. The Full Service package has duration from 3 to 7 years and offers an extended scope of service with guaranteed response times, extended on-call availability and WENZEL Online Service.

## Maximum Availability at an Attractive Price

„With individual, customized Full Service, WENZEL assumes the risk of costs and maintenance planning," states Karl Nagel, Head of the After Sales Service at WENZEL. This way, in addition to absolute cost transparency and simple budgeting, the maximum availability of the machine is ensured over its entire lifetime and a well-planned execution of preventive maintenance is guaranteed. “Our customers can concentrate entirely on their core business and transfer the responsibility for the operational readiness of their measuring machine to WENZEL, “adds Nagel.

WENZEL also offers flexible leasing models for machines with a Full Service contract representing a whole bundle of complementary services offering significant added value for the customer. Leasing the machine with extended warranty and full service not only helps with customer liquidity, but it also allows the customer to acquire a machine with an ‘off balance sheet’ transaction. This creates planning security and competitive advantages. The customer has full investment certainty and long-term, manageable, fixed costs. „Our new proposal is calculated in such a way that it offers the customer significantly favorable pricing when compared to individual orders for each individual service. Even in comparison to our service agreement models, Full Service offer can save a lot", assures Karl Nagel.

The WENZEL Full Service 4.0 has started in Germany with touch trigger and scanning WENZEL XO and LH bridge machines up to the 1210 range (X=1200 mm, Y=1000mm). “Expansion to further countries, models and product groups is planned“, says Nagel and furthermore explains an additional positive side effect: „The close cooperation with customers within the scope of the WENZEL Full Service offer will also enhance our own technical development."



Overview Operational Costs

Service at the Highest Level

# PQP – WENZEL Partner Qualification Program

**With the WENZEL Partner Qualification Program (PQP), WENZEL has implemented a global qualification program in order to meet the growing customer expectations for the After Sales Service. With the PQP, WENZEL ensures a globally coherent service at the highest level. The program ensures customers that the work and corrections on their measuring machines are performed by well trained and qualified personnel.**

The stringent audit process certifies WENZEL service partners for the PQP for a period of 36 months. An independent certificate has to be acquired for every WENZEL product line. This applies to Bridge, Horizontal and Gear CMMs, Styling Solutions as well as Optical High Speed Scanning Systems. The assessment includes 10 criteria including the qualification of the technicians, the application of tools and information technologies, and business processes. For each criterion, 5 to 20 sub-items are evaluated.

„The PQP focusses on qualified employees“, explains Karl Nagel, Head of the After Sales Service at WENZEL. „The acquisition of the certification is an investment into superbly trained professionals and thus an investment for the future.” The participants of the qualification program also have the necessary hardware and software tools to perform the required settings and error compensation.

„The variety and complexity of WENZEL products is becoming more and more challenging,” states Karl Nagel. „Additionally, there is a growing installed base. Therefore the PQP is not merely a one-time thing, but rather a continuous process which is constantly being refined.” In connection with new developments, such as the WENZEL Intelligent Machine Interface, the WENZEL Partner Qualification Program is an important component in the Industry 4.0 environment and a further development of WENZEL Full Service 4.0 towards to Predictive Maintenance.

**At a Glance:**

- Qualification After Sales Service Partners
- Certification of all product lines
- 36 months Certificate validity
- Extensive auditing
- Auditing Points, such as Qualification, measuring devices, tools, support, technical requirements

Germany's Innovative Elite

# WENZEL Group is one of the TOP 100


**For the 23rd time the TOP 100 most innovative mid-market companies in Germany, have been honoured. The WENZEL Group GmbH & Co. KG based in Wiesthal is proud to be one of these companies. To achieve this great honour WENZEL participated in a challenging, scientific selection process. The innovative management structure and innovation success was closely examined. As mentor of the innovation competition, Ranga Yogeshwar honoured the top innovators within the German SME Summit on 24 June 2016 in Essen.**

With a wide range of measurement technologies - from Coordinate Metrology and High Speed Scanning to Computed Tomography – WENZEL has managed this remarkable innovation success and was awarded with the TOP 100 seal. The measuring machine manufacturer from Wiesthal invests eleven percent of its revenues in research and development. This is above the industry average. „As family company we have to be innovative in this market environment," says Chief Executive Officer Dr. Heike Wenzel. This motivates her and her 650 employees. The company founded in 1968, has already passed a number of challenges and has continued to develop steadily. Next goal: to cope with the requirements of the „Industry 4.0" initiative.

## Structured Innovation Processes and Bundled Expertise

Therefore, the top innovator started early in 2015 to tune its innovation processes and re-structured the process chain. WENZEL builds on its own development department skills and bundles the expertise of various technology segments, as well as in international locations. The TOP 100 Company has subsidiaries in the USA, China, India, Singapore, United Kingdom, France, Italy and Switzerland.

Crucial for the development of innovation is the internal network of this group. „We bundle the knowledge from different departments in think tanks and let them develop ideas," explains the Director of Business Development, Prof. Dr. Heiko Wenzel Schinzer. If an employee likes to work alone meticulously on an idea, WENZEL will provide money. Moreover WENZEL runs a sophisticated monitoring of the market and of competitors, tracking new trends and technologies in order to keep the company at the forefront of the highly competitive metrology segment.

This year, more than 4,000 companies were interested in participating in TOP 100 competition. 366 of them applied to take part in the qualification round, with 284 of them reaching the final round. In the end, 238 were able to claim a place among the TOP 100 (a maximum of 100 in each of the three size categories). Once again, the competitors were assessed by Prof. Dr. Nikolaus Franke of the Institute for Entrepreneurship and Innovation of Vienna University of Economics and Business (WU) and his team, who posed questions relating to 100 parameters in five different evaluation categories. The three best entrants in each category were then selected to take part in the elimination round to find the overall winner in their respective TOP 100 size category. The decision by which the companies were crowned „Innovator of the Year" was made by the TOP 100 jury – comprising experts from the worlds of economics, science, and politics – on the basis of all the information gathered.

(from left to right): Frank Wenzel (Chief Executive Officer), Dr. Heike Wenzel (Chief Executive Officer) and Prof. Dr. Heiko Wenzel-Schinzer (Innovation Manager)

## Culture of Innovation

Those companies who qualify for the TOP 100 competition belong to the absolute pacesetters in their respective industry sector. This is substantiated by the data gleaned during the evaluation process: Among the TOP 100 businesses are 97 national market leaders and 32 global market leaders. On average, each of them accrued 40 percent of their sales from new products and services and from product improvements they brought to market before their competitors did. Their sales growth was 28 percentage points higher than the respective industry sector average. Together, the SMEs in the TOP 100 have registered 2,292 national and international patents over the past three years. This innovative capacity is also having a hugely positive effect on jobs at these companies. The TOP 100 are planning to take on some 9,500 new staff during the coming three years.

TOP 100 mentor, science journalist and TV presenter, Ranga Yogeshwar, is highly impressed by the quality of the enterprises and hopes that their efforts and achievements send out an important message to others: „The way in which the TOP 100 generate new ideas and develop pioneering products and services from these ideas is truly remarkable. And I'm happy that this award honors and highlights these very qualities. Let's hope that the success of these companies encourages others to follow them. This culture of innovation will in the future be of greater and greater importance to all businesses."


Heinrich Brüderle, Sales Manager Europe and America of the WENZEL Group (right) receives the award from Mentor Ranga Yogeshwar (Source: KD Busch/compamedia)

## WENZEL Ideas Competition

Numerous WENZEL employees actively participated in the WENZEL ideas competition titled „Think outside the box, be a part of the discussion, be creative!" in the last year. More than 110 ideas were submitted, discussed and assessed. From this multitude of creative ideas WENZEL employees together with an employee jury and the management determined the winning ideas of the competition. The Winners were then finally awarded a price at the annual summer party in July 2016.

The concept and implementation period of the chosen ideas started in the 2nd half of 2016. The implementation phase of all chosen ideas should be finalized by the end of 2018.

International After Sales Service Conference 2017

Award Winner After Sales Service Meeting


Dr. Heike Wenzel in the radio station with Thomas Ohrner


Cooperation with the Nanyang Polytechnic Institute in Singapore

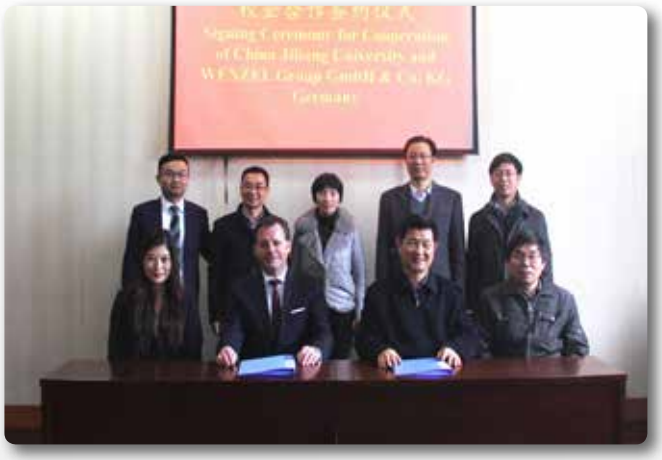
Open day at WENZEL


10th Anniversary of WENZEL Shanghai

Honoring longtime employee

Press visit on the occasion of the 20th Anniversary of WENZEL France


WENZEL Group International Sales Conference



Cooperation with the China Jiliang University in Hangzhou

Florian Vormwald was awarded for his examinations

WENZEL user meeting in Wiesthal


Donation of 1,300 Euros to „Das kunderbunte Kinderzelt e.V.“


WENZEL is setting up a new rescue vehicle location

Childcare at Prayer and Repentance Day

Federal deputy Bernd Rützel visited WENZEL


WENZEL user meeting in Poland

## Exhibitions 2017

**Visit us!!**

| | | | |
|---|---|---|---|
| 15.05. - 19.05.2017 | Metalloobrabotka | Moscow | Russia |
| 15.05. - 18.05.2017 | CMEF | Shanghai | China |
| 16.05. - 18.05.2017 | Eastec | Springfield, MA | USA |
| 23.05. - 26.05.2017 | International Engineering Fair | Nitra | Slowakia |
| 24.05. - 27.05.2017 | Metaltech | Kuala Lumpur | Malaysia |
| 06.06. - 09.06.2017 | Mach Tool | Poznan | Poland |
| 13.06. - 16.06.2017 | Die & Mould | Shanghai | China |
| 04.07. - 07.07.2017 | MTA Vietnam | Ho Chi Minh City | Vietnam |
| 23.08. - 26.08.2017 | PDMEX | Manila | Philippines |
| 24.08. - 26.08.2017 | AMTS | Shanghai | China |
| 01.09. - 05.09.2017 | Equipment Manufacturing | Shenyang | China |
| 18.09. - 23.09.2017 | EMO | Hannover | Germany |
| 20.09. - 23.09.2017 | Machinery & Electronic | Wuhan | China |
| 03.10. - 05.10.2017 | Toolex | Sosnowiec | Poland |
| 06.10. - 09.10.2017 | International Industry Exhibition | Tehran | Iran |
| 09.10. - 13.10.2017 | MSV Brno | Brno | Czech Republic |
| 11.10. - 13.10.2017 | MTA Hanoi | Hanoi | Vietnam |
| 12.10. - 14.10.2017 | KALITE | Istanbul | Turkey |
| 24.10. - 26.10.2017 | SIANE | Toulouse | France |
| 24.10. - 27.10.2017 | The Quality Show | Chicago, IL | USA |
| 24.10. - 26.10.2017 | Gear Expo | Ohio | USA |
| 24.10. - 27.10.2017 | Korea Metal Week | Seoul | Korea |
| 14.11. - 17.11.2017 | Formnext | Frankfurt | Germany |
| 15.11. - 18.11.2017 | Autoparts International Fair | Tehran | Iran |
| 22.11. - 25.11.2017 | METALEX | Bangkok | Thailand |
| 29.11. - 02.12.2017 | DMP | Dongguan Guangdong | China |
| 29.11. - 02.12.2017 | Manufacturing Indonesia | Jakarta | Indonesia |


**IMPRINT**

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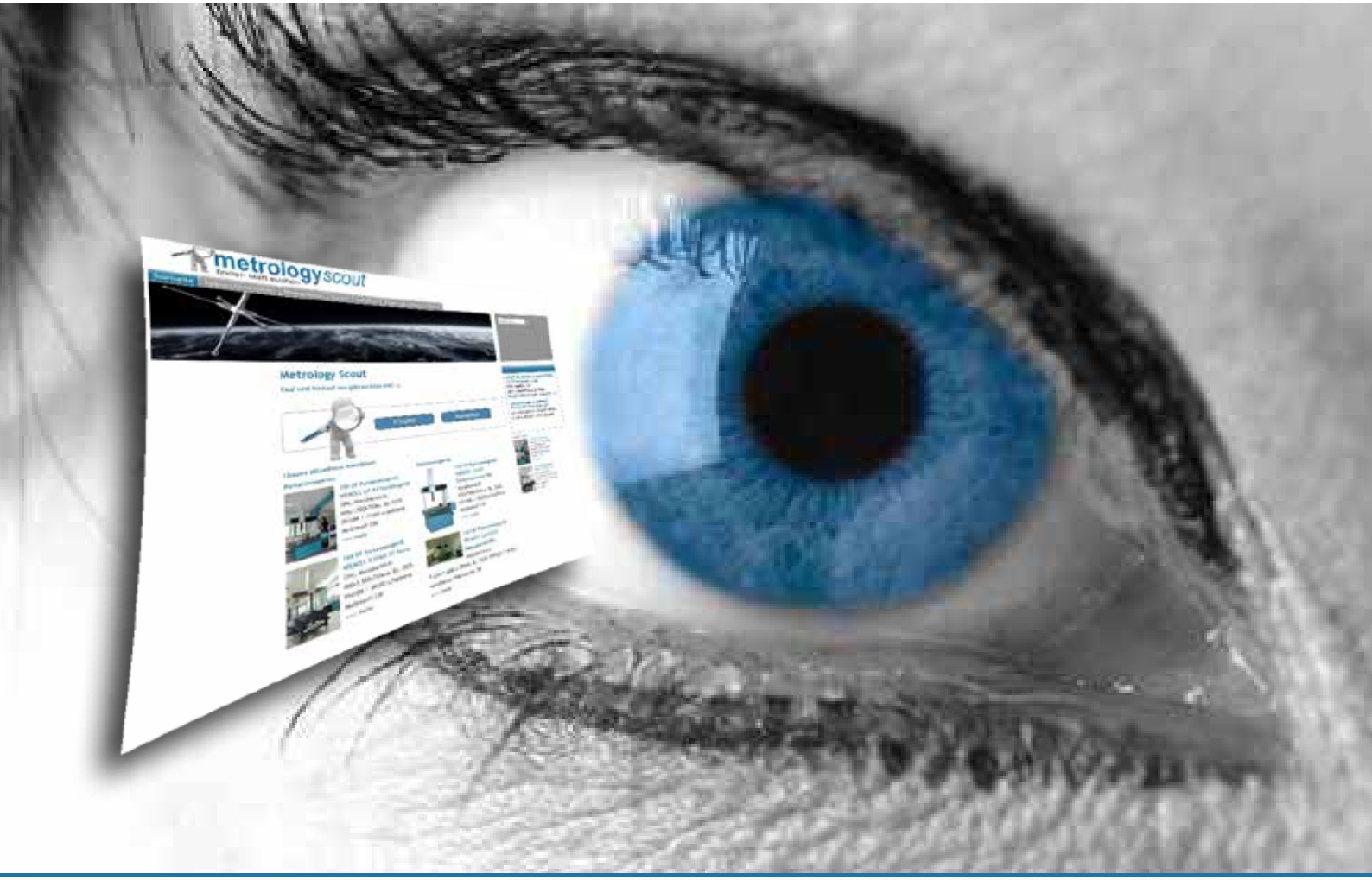


# Purchase and Sale of Used CMMs

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