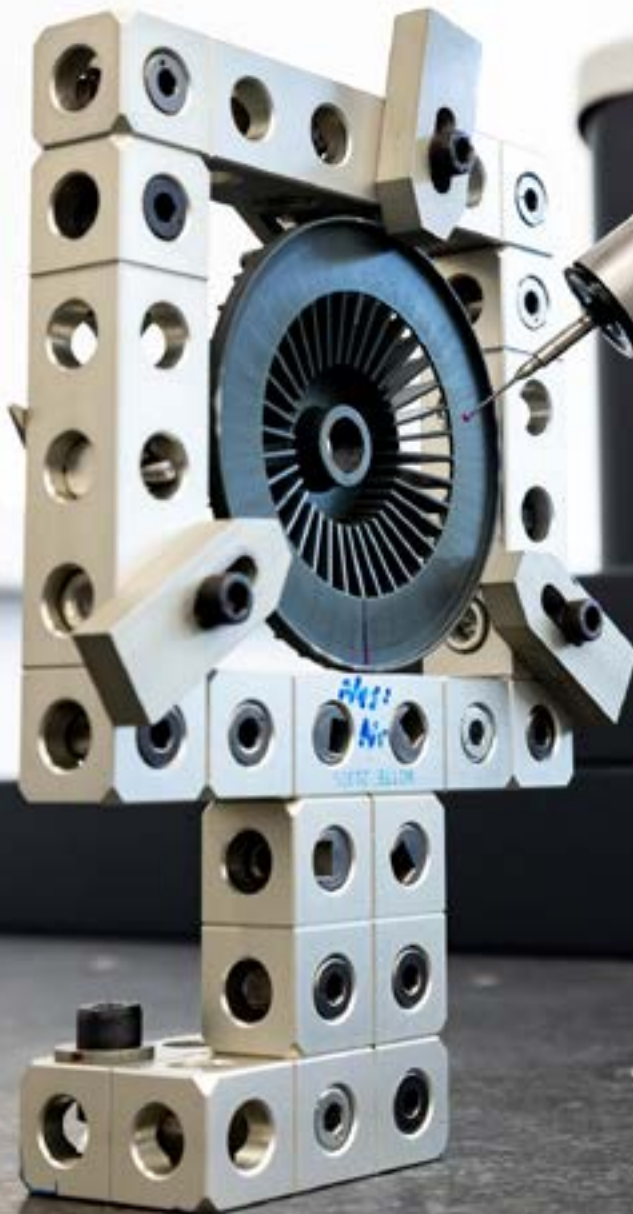


# Metrology World

2023



Precision | Productivity | Passion

# WELCOME

## Sustainable digitalization also changed measurement technology.

Welcome to the world of WENZEL - we appreciate your interest in our products and solutions. We develop them to solve specific measurement tasks for our customers. We are excited to share success stories from across the globe with you again this year.

Unfortunately, the world has not yet returned to normal, and many industries and products are suffering, whether due to supply bottlenecks or price increases. That is why we must all continue to work on economic solutions. Using existing machines for longer can be an answer. Good service could ensure that reliable results are achieved in the long run. However, the end of an existing machine is not the end of its individual components: This is where we contribute to sustainability with the WENZEL EcoLine. Why dispose of thousand-year-old granite that has only served for 30 years as a granite base plate which is still in mint condition? Why throw away functioning cladding or any other functioning parts? In the EcoLine, we reuse all the parts of an "old" machine that is still in perfect condition and equip it with the latest technology to work as good as new for another 20-30 years.

At the end of 2021, we offered gear measuring machines and design solutions with a variety of our styling units. We are proud of the newly developed product portfolio and delighted about the interest in the market. Especially with the universal application of our gear-measuring software on all WENZEL machines.

We continue to deal with trends in measurement technology: digitization and automation are playing an even greater role in our developments and customer projects. With our portfolio of optical sensors and the REVO, we have solutions to meet the cycle requirements in manufacturing. We have established innovative solutions with our software solutions for the automated generation of measuring programs and for the integration of our machines into automated manufacturing cells. We will continue to work in these areas and are pleased about your trust in our company.

Thank you very much for this and enjoy reading our Metrology World 2023

Heike & Heiko Wenzel

  
Dr. Heike Wenzel

  
Prof. Dr. Heiko Wenzel-Schinzer



# CONTENT

Interview - Process integrated measurement technology	3
WENZEL EcoLine - Sustainable coordinate measuring technology	5
WM   Quartis - Numerous innovations for special applications	7
Design - We are back	9
Modular process optimization in quality control	11
Measurement technology at the heart of the production process	15
Measurement of high-precision turbine blades	19
When metrology increases productivity	23
Effort reduced, quality improved	27
Measure as much as possible yourself	31
Computer tomography takes quality to a new level	37
More effective with a four-day week	41
AUKOM Form & Position - Come Together	43
Imprint	45

# Process-integrated metrology

Interview with Prof. Dr. Heiko Wenzel-Schinzer

**Metrology News recently spoke with Dr. Heiko Wenzel-Schinzer, CDO (Chief Data Officer) of the WENZEL Group, about his views on the future role of dimensional metrology in the new era of smart manufacturing and how process-integrated metrology is viewed by suppliers and users, as well as its challenges.**

## What trends do you currently see in quality assurance?

**HWS:** I see a clear change in many industries resulting from the major technology trends Industry 4.0, Internet of Things and the shift to e-mobility, but also from the now very rapidly growing problems with the shortage of skilled workers in many companies. The technical innovations lead to a significant change in the parts to be measured, the measurement tasks, but also the location of the measurement. The lack of human resources places further demands on the usability of the measurement solutions.

## Quality assurance is increasingly becoming a direct production function. How does this affect conventional dimensional inspection equipment?

**HWS:** In production, we have to deal with different environmental conditions in terms of temperature, air purity, vibrations, and so on. The measurement technology has to adapt here, it has to be more robust to external influences and analyze and compensate for them better. Of course, it is possible to work traditionally in production by using special enclosures and measuring rooms here, but space in production is even more precious than elsewhere in the company, so this is not an option in the long run. But the expectations for speed and quality of measurement results are getting higher and higher, so this is really an exciting challenge for all of us.

## How does the location of the measurement technology change the focus of an equipment supplier?

**HWS:** From the customer's point of view, the requirements for metrology suppliers are quite simple: exact as in the measuring room, small in space, robust in application and fast in measurement and evaluation. For us, this means: innovative mechanical engineering with resilient materials, equipping our machines with sensors and cyber-physical systems for direct feedback of the measurement to the current environment, fast measuring times through scanning, 5-axis measuring heads and optical sensors, and an extreme focus on simple usability of hardware and software.

## What are the most important changes you are bringing as a provider?

**HWS:** I see the following five major changes:

- The location of the measurement changes the focus  
When we use measurement technology in the measuring room, the primary focus is on checking the deviation of the actual values from the target values. Ultimately, this is a question of absolute accuracy: are we within tolerance or not? But if the measuring technology is installed directly in production, then we primarily want to ensure the process reliability of our production. So ultimately it's about the repeatability of our production, or do we have to readjust something on the processing machines because our results change unintentionally over time.
- The duration of the measurement is shorter  
if we move the location of the measurement to production, then we have to adapt to the cycle in production and therefore have less time for the individual measurement, especially as larger random samples or even a 100% inspection are often to be carried out. Faster measurement
- for this we need faster measuring systems such as optical sensors or the fast, tactile 5-axis measuring head such as the Renishaw Revo.

- The amount of measured data increases significantly  
Traditionally, we looked very closely at which features and elements really needed to be measured to ensure production quality before we even started a measurement. We touched on these points and evaluated them; the result was a manageable amount of measurement points and a clearly focused evaluation with a measurement report. High-speed scanning and optical measurements allow us to capture large amounts of data very quickly. This helps us keep up with the cycle time of production, but we also need to match this data with what is needed to control the process. Otherwise, the data is wasted. This is where working with the customer can lead to very innovative solutions for data processing.
- Data quality increases enormously  
The amount of data just described also opens up new possibilities for analysis. First of all, the way we capture data has advantages for the quality of the data. We don't just tackle individual points, but also capture surfaces, recognize features and edges, and thus have a much broader view of the measured object than before. In the case of anomalies, we can go into the neighborhood of the relevant measurement points and check other things; here, the point cloud offers enormous added value.
- Significant increase in data analysis techniques  
Among the technical innovations that also have a significant impact on measurement technology are data mining, machine learning, and numerous methods of so-called artificial intelligence. Whereas it used to be up to the user to identify relevant correlations and patterns, these methods can make us aware of new facts, visualize them and thus make them the subject of our analyses. I believe that these techniques can support us very strongly: no more, but also no less...

## In the past, device manufacturers have understandably focused more on functionality and less on usability. How do you think this will change in the future?

**HWS:** The new requirement for software usability is to make extensive and complex functions easy to use. We already talked about the shortage of skilled workers at the beginning. When measurement technology shifts to production, we find users there whose job is actually something other than measurement. These people are now given the additional task: „Put the part on the measuring machine and see what comes out.“ And that's exactly what the software needs to support.

The quick operation for non-measurement experts who „only“ want to see an Ok / not Ok result at the end. But the „experts“ also expect more and are used to easy-to-use apps on their smartphones from private use.

## In your opinion, to what extent does the automation of plant programming simplify the integration of plants and their ongoing adaptation to changes in production parts?

**HWS:** I see the trend and understand why it makes sense. In many industries, we work with fewer people on rapidly changing parts. The days of producing the same part for many years are gone in many industries. That's where automated manufacturing cells need to adapt quickly, without a lot of reprogramming and setup time. But for me, this is a logical consequence of our Industry 4.0 transformation. More individuality and rapid change, and that too with fewer personnel because they simply don't exist. This is a challenge for all of us, but successful implementation will secure our industrial future and thus our companies.

## How and by whom will the generated data be used in the factories of the future?

**HWS:** I believe that we will see a new job description with the Metrology Data Scientist.

## In your opinion, what is the future roadmap for metrology?

**HWS:** Accuracy and speed are currently the main requirements of many customers for measurement technology. Reusability of the old programs is also a very often requested secondary requirement. From my point of view, speed today starts with the design, using PMI to quickly generate a test plan from the design model and then a suitable measurement program; at the state of the art with all available sensors and together with the know-how of trained users at a few central points. These programs are then transferred to measuring devices that can be operated by „non-measurement experts“ with very simple applications or even integrated fully automatically, the data is then managed by the Metrology Data Scientist to ensure efficient process control. Centralizing metrology expertise across the company ensures better comparability of results, regardless of the machine or sensor technology used, thus creating more independence from a specific supplier and room for innovative solutions.

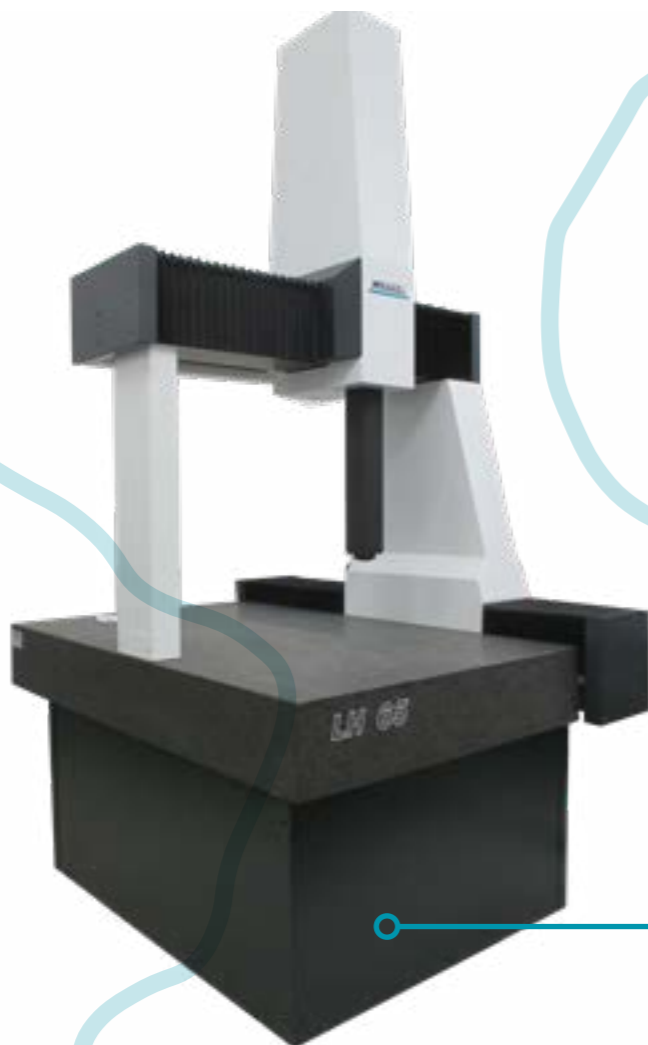


# WENZEL EcoLine

## Sustainable coordinate measuring technology

As a family-owned company for 55 years, WENZEL has always thought long-term and across generations. "We want to make things better through our actions and then pass them on to the next generation. This applies to the company and the environment," explains Managing Director Dr. Heike Wenzel .

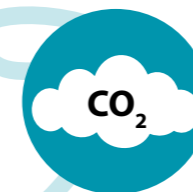
The idea behind this is simple and convincing. WENZEL takes back machines from customers at the end of the product's life cycle and continues to use everything that makes ecological and economic sense. "We recondition the granite parts (base plate, crosshead and quill) as well as the cladding parts and reassemble these indestructible parts using the latest measuring technology. The result is a completely new machine, with the same CMM performance and accuracy but with significantly reduced resources and CO2 consumption," says Heike Wenzel .



### Saving CO2 consumption

With the new EcoLine CMMs, WENZEL is making a remarkable contribution to environmental protection. Thanks to the stable basic structure of the old machines, they have the ideal basis to continue playing in the first league in terms of quality. By reusing the basic components, up to 50% of the CO2 consumption is saved. "We have therefore created a new regenerative business model and are making optimum use of natural resources," confirms Heike Wenzel.

With an EcoLine coordinate measuring machine from WENZEL, users invest in a fully-fledged new machine at the best price/performance ratio, including new sensor technology, new control, new electronics and new software as well as new machine warranty and CE marking. Thanks to a shortened production process, WENZEL can deliver the EcoLine measuring system up to 50% faster while protecting the environment and the buyer's investment - by up to 30%.



### Reduced CO<sub>2</sub>-Footprint



### Warranty



### Shorter delivery time



### Efficiency

# Quartis Update

The WM | Quartis R2023-1 brings numerous innovations for special applications and fields of use.



## Benefit from the following innovations, among others:

- WM | Quartis R2023-1 brings numerous innovations for various applications and fields of use.
- WM | Quartis R2023-1 includes additional functions for optical measurement and evaluation. They decorate the colored 3D comparisons between CAD model and CT data with deviation flags. Automatically created scan paths based on the CAD model save valuable measurement time when scanning point clouds.
- WM | Quartis R2023-1 includes the new "Rough Alignment" function. With this function, you can align point clouds, polygon meshes or workpieces with the CAD model in just a few clicks or by probing the actual values on the coordinate measuring machine.
- WM | Quartis R2023-1 measures planar curves (section with plane) and axial curves (section with cylinder) optionally as 3D curves. This provides the basis for measuring any curves in 3D space, such as offset curves, polyline curves or free CAD curves.
- WM | Quartis R2023-1 imports CAD models with PMI (Product Manufacturing Information). The PMI (dimensions) are visualized in the 3D graphics.
- WM | Quartis R2023-1 evaluates further geometric features according to standards. You evaluate distances of two parallel planes optionally with the specification operators (LP, GG, GC, GN, GX or E). The position tolerance of a pattern tolerance according to ISO GPS or ASME Y14.5 supports further applications.
- WM | Quartis R2023-1 provides easy access to probe system calibration data. Among other things, you can use it to monitor or document the stylus systems used.
- WM | Quartis R2023-1 includes an optimized interface to the WM | Gear gear measuring software and a direct operation of the motorized counter holders on WENZEL GT gear measuring devices.
- WM | Quartis R2023-1 offers updated CAD interfaces as well as other useful improvements and enhancements.





# DESIGN IS BACK

## WENZEL Design Solutions

For decades we have been supporting well-known companies in the creative design of their products and have been setting standards, especially in the automotive industry. With our WENZEL design solutions we create the ultimate space for your creativity to flow. Our styling package is intentionally tailored to the needs of the designer and ensures the perfect workflow from planning to the actualization of the clay model.

Create an expressive design model down to the last detail with our powerful milling machines. Speed up your design process with our sophisticated WM | DesignMaster software. If you already have design solutions in use, we could bring them up to date with our retrofit package.

***Our service is unbeatable! Rely on the wide range of services offered by our experienced team.***





Die casting foundry relies on CMMs and CT from WENZEL

## Modular process optimization in quality control

Fonderia Bassoli has been relying on measuring solutions from WENZEL for the quality assurance of its die-cast parts since 2011. In their quality control measuring room, eight LH Series WENZEL coordinate measuring machines (CMMs) ensure process optimization. Another coordinate measuring machine with 3D laser sensor is in the measuring lab as well as an industrial computer tomography, machine the exaCT M, to look inside the components.

### Preventive corrections in real time

The parts produced by Fonderia Bassoli are die-castings of numerous sizes, weighing from 50 grams to 9 kilograms, for mechanics, electromechanics, agriculture, electronics, and many other industries. The dimensional tolerances of the machined parts are about 13 microns.

By using the WENZEL CMMs, which are directly integrated into automatic lathes, the Italian company based in Luzzara, was able to significantly reduce the measuring times which resulted in an increase of cycle time and overall productivity. Furthermore, in the event of tolerance deviations, preventive and corrective intervention can be carried out in real time via the interface between the WENZEL CMM and the machine tool.

Before the introduction of WENZEL CMMs, manual measuring devices were used online, supported by a spot check on a three-dimensional measuring device in the technical office. The production batches were much smaller than today; nevertheless, waiting for the results of the measurements could lead to dimensional deviations and rejected parts.



### Versatile measuring and testing options

With the first project, it was essential to find the right measurement system. Different possibilities were explored: stylus masks, laser scans, optical cameras and many more. Fonderia Bassoli's main goal was versatility without compromising on the accuracy and repeatability of the measurement process. A traditional WENZEL coordinate measuring machine met all their requirements, especially because of its flexibility.

The WENZEL CMM was equipped with a motorized measuring head with a probe for the required tolerances. In addition, four pneumatic stabilizers were mounted as dampers under the granite plate to eliminate the vibrations coming from the production machines. To ensure reliable results the machine was placed in a metrology lab with consistent temperature control.





### Looking into the component with computed tomography

To be able to measure and inspect the internal features of the components non-destructively, the measuring lab was expanded with an industrial computer tomography machine. The exaCT M from WENZEL. The exaCT M is based on a workstation concept that combines high X-ray performance and high scanning speeds with a small footprint. WENZEL's exaCT M has an integrated evaluation unit in an ergonomic desk workstation that makes it ideal.

WENZEL has been favored over its competitors thanks to the high quality of the machine, the efficient measurement solution, and the confidence they have in the WENZEL Group. Above all the interface between the measuring system, machine tools and robots clinched the deal. In the event of a change in production or in the implementation of the measuring program, it is possible to intervene quickly and easily, which is a great advantage.

### About FONDERIA BASSOLI

FONDERIA BASSOLI M. S.R.L. is a mining and metals company based in Luzzara, Italy and was founded by Marsilio in 1957. In 1961, his sons Franco and Bruno joined the company, shortly after the first die-casting machine was purchased and technological development began.

In 1989 the company moved into a bigger facility in Luzzara. Thanks to continuous growth, the company needed more space. In 1998, they offered a wider range of services with the creation of a new department for the mechanical processing of the castings produced.

To date, Fonderia Bassoli has 22 automatic die-casting cells with variable tonnage from 200 to 1,000 tons, a tooling department with 5 machining centers with 3 to 5 axes, a technical office with 3D software for internal mold design and equipment, and a mechanical machining department with 10 robotic lathes and 3 vertical machining centers. Quality assurance takes place on 8 coordinate measuring machines in process automats. In the metrology lab, there is another coordinate measuring machine with a 3D laser sensor as well as an exaCT M industrial computer tomography machine to see inside the structure of the components.





Medical Technology & Packaging Industry

## Metrology at the heart of the production process



**F**ormtechnik, headquartered in Anderstorp, Sweden, is the world's leading supplier of system solutions, from design to turnkey injection molding solutions for high-volume production, in medical technology and packaging industries. With a proven track record in delivering world-class products and services, Formtechnik's unique approach focuses on metrology, which is at the heart of the production process.

Lars Andersson, Production Manager at Formtechnik, says: "Without the measuring machines, our production would come to a standstill. Our customers expect the highest quality, and there is simply no room for error." This unwavering commitment to quality is evident in every aspect of Formtechnik's operation, from its state-of-the-art facilities to its talented and dedicated employees.

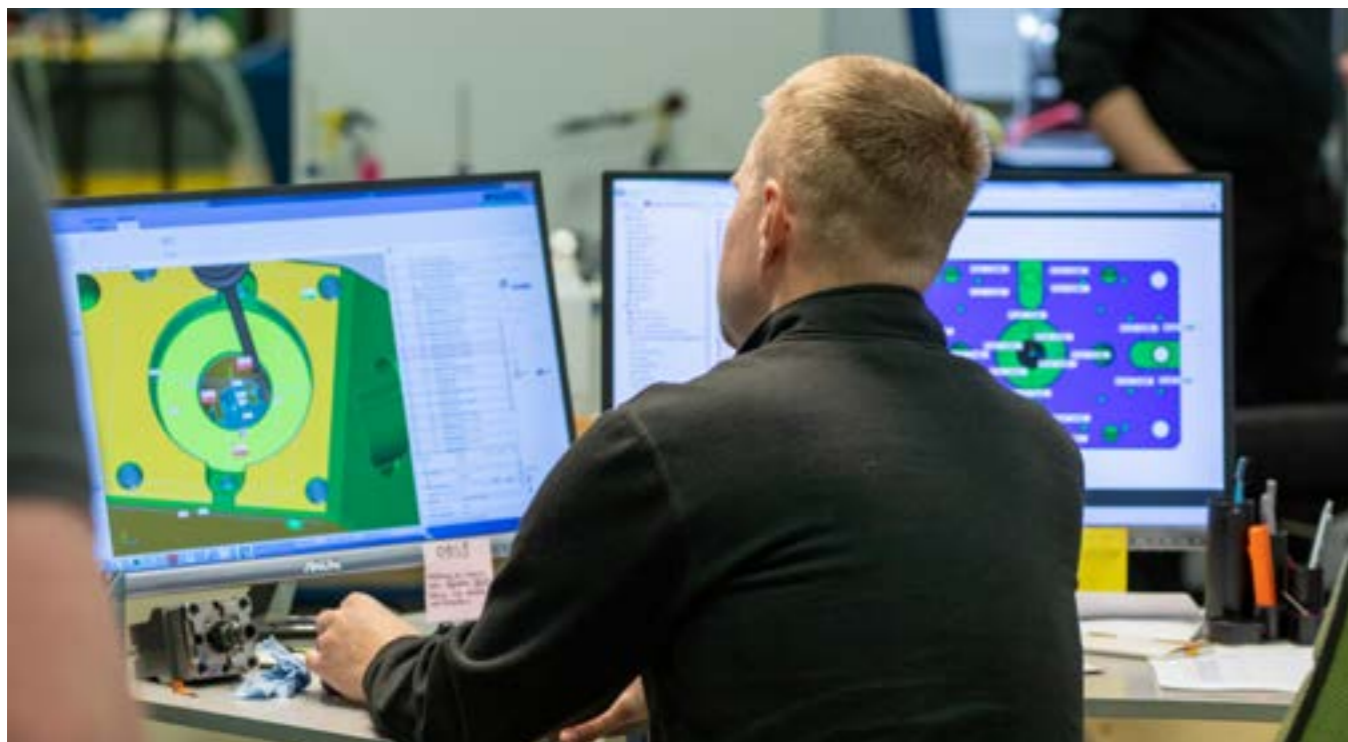
One of the ways Formtechnik attracts and retains top talent is by offering a unique and supportive work environment. "We don't just sit around and complain about the lack of technicians or workers in general," Lars explains. "Instead, we actively seek out talented and dedicated employees and then help them develop their skills and grow their careers within our company."

### Top talents & top measuring machines

Lina Persson is one of those success stories. The 25-year-old metrology technician, has worked for the company for three years and began her career at an industrial school, where she learned how to operate CNC machines. After gaining experience in metrology, she jumped at the opportunity to join Formtechnik, citing the company's potential for growth and development as the main reason for her decision. "Formtechnik cares about its employees and is always looking for ways to improve and innovate," Lina said. "Working with the WENZEL machine and Quartis measurement software has been an incredible opportunity to improve my skills and contribute to a dynamic and exciting field."

Lina wants to encourage more young people to explore the world of metrology. "If you like to take on challenges and solve complex problems, then metrology is for you," she says. "There are endless opportunities to develop and grow in this field, and I can see myself working in metrology for many years to come."

Alongside Lina, Markus Norrman, who has been with the company for almost 20 years, also works in Formtechnik's metrology team. He started in production but gradually got increasingly involved with metrology, and became fascinated with the intricacies of the field. "I love experimenting with software and learning new things every day," Markus explains. "It's incredibly satisfying to tackle a big challenge with my team and find innovative solutions using cutting-edge technology."



### Strong partners & strong measurement software

Strong partners & strong measurement software Both Lina and Markus agree that working with WENZEL and Quartis has made their work much easier, thanks to the user-friendly interface of the software. Markus also praised the responsiveness of the WENZEL Group, which has always been extremely helpful and quick to address any concerns or improvement suggestions.

Formtechnik is looking to the future and striving to remain at the forefront of measurement technology. Markus cites automated measurement and more efficient measurement of round details as two of the key challenges the company is currently working to overcome. In the meantime, Lars emphasizes the importance of establishing a strong presence throughout Europe, with a focus on leveraging the expertise of partners like Ravema to streamline the production process and ensure continued success for years to come, "Ravema is truly a unique partner. Ravema's expertise and the fact that they can also support their partners with advanced training and tasks in production and metrology is something very special. I would say no other supplier can match that," says Lars.

### Did you know

Formtechnik has seven WENZEL machines.

- LH 87 - 1998
- LH 54 - 2001
- LH 54 - 2001
- LH 54 - 2004
- LH 87 - 2007
- LH 87 - 2012
- LH 87 - 2019







Hyatech increases its product quality with measuring solutions from WENZEL

## Measurement of high-precision turbine blades

**Hyatech relies on measurement solutions from WENZEL for the quality assurance of its high-precision turbine blades. The up-and-coming high-tech company specializes in research and development, production and sales of important components for aircraft engines. These include high-performance components such as compressor blades, rotating components and parts such as blisks, casings, turbine and compressor disks, rectifiers and rotor components.**

### Maximum ease of use for hardware and software

Maximum ease of use for hardware and software For Leiyu Zhang, engineer at Hyatech, the engine is the “heart” of an aircraft, so the rotating parts and structural elements such as the engine blade, blisk, turbine disk and casing are the “muscles and meridians”\*. As one of the most important parts of the engine, the blade’s geometry directly affects the aerodynamic performance during operation. The characteristic parameters of the engine, the compressor charge ratio, turbine speed, etc. are closely related to the shape and position of the blade. The geometry measurement of the engine blade is therefore particularly important.

Hyatech has grown rapidly in recent years. With soaring production capacity and increasingly complex product structure, the need for measuring equipment has escalated to keep up with the development. Hyatech chose WENZEL among many suppliers for measuring solutions, as Leiyu Zhang explains, “WENZEL has a long manufacturing history and the coordinate measuring machines are made of granite structures, which has many advantages. The measuring software is modular and can be updated to the latest version very easily. We already have two measuring machines from WENZEL that have impressed us with its simple and ergonomic operability. Deciding on another WENZEL coordinate measuring machine (CMM) LH 2015 was easy thanks to our positive experience this far.”



**What challenges has the CMM overcome?**

- » **Measurement of the complex product structure**
- » **Measurement of the blade profile of the blisks, including the tothing and the surface roughness of the turbine blade profile**

Measuring and determining the machining accuracy is particularly important and challenging due to the higher requirements for blade profile size and positional accuracy of the blisks, the uniform arrangement of the blades in the circumferential direction on the blisks, and the very small airflow channel between the blades. The five-axis measuring machine solves the above challenges perfectly.

\* In traditional Chinese medicine, a meridian refers to a pathway that runs through the entire body.





### Measuring module for gear teeth and roughness

The LH 2015 is a high-speed, high-precision gantry CMM that supports tactile, scanning and optical sensors. The measuring range in X, Y and Z is 2000 mm, 4000 mm and 1500 mm, respectively. The load capacity is 6,000 kg, which can easily accommodate the entire blisk as well as large and complex structural elements.

Compared to previous measuring machines, WENZEL's solution offers some exceptional advantages, explains Leiyu Zhang: "WENZEL has a lot of experience in measuring blisks and turbine blades. This is necessary because the structure of blisks is complex and the surface is also difficult to measure. WENZEL offers a measuring module for gears, which is composed for some special components of parts and is very convenient to use.

In addition, WENZEL offers roughness measurement for blade profiles, which has been improved in terms of time and efficiency; and the form of measurement protocol tends to be standardized. This has opened up a new world for Hyatech that can meet future challenges and opportunities." Leiyu Zhang is also positive about WENZEL's service:

“

*We have been working with WENZEL for many years. If we have any questions about the software or hardware, WENZEL is always quick to respond. For example, the service technician always arrives on site the next morning if a problem was reported the previous afternoon and solves it efficiently. We would like to continue this kind of cooperation in the long term.*

”







Fully automated measurement in the production line

## When measurement technology increases productivity



**O**n the fully automated production line of Pamatool AG, components of the Gremotool workpiece clamps are measured reliably with a measuring system from WENZEL during ongoing production. The company from Jonschwil in Switzerland already relied on the WENZEL gantry measuring machine LH 108 in combination with the proven measuring software WM | Quartis during the planning phase.

The measuring solution is fully automatically integrated into the FASTEM CNC automation solutions. "With the overall solution, we now unleashed the full production potential of our flexible series," explains René Baumann, Managing Director of Pamatool AG. "Thanks to the high degree of automation of the individual system components, we can meet customer requirements very quickly and individually and log them according to quality requirements."

### Factor measurement uncertainty reduced to a minimum

The connection to the production planning system (PPS) as well as the pallet, work piece and machining tool handling system was made via the WENZEL Automation Interface (WAI). The interfaces were standardized and unified in themselves via the OPC Unified Architecture (see box) and the palletizing system to the production cell with high rack and 5-axis machine tools. This arrangement allowed the measurement uncertainty factor to be reduced to a minimum.

"Machine tool downtime due to manual first-piece and serial inspections was a significant time factor. The logistical effort for measuring equipment management and logging of work piece measurement was also enormous," says René Baumann, describing the initial situation before the automation system was introduced.

### High precision Made in Switzerland

Since the Gremotool customer requirements in automation and single work piece production in the machining industry are extremely high in terms of accuracy, stability and reliability, the requirements for workpiece clamping are about 5 times higher than for the manufactured work pieces.

The Gremotool work piece clamp - consisting of base body, jaw holder, bearing block and clamping jaws - measures complex geometries. This includes parallelism, angular accuracy and flatness of various surfaces. These have a repeatability of 0.005 mm. This is measured and recorded in a process-safe manner with the WENZEL measuring solution, the Gantry measuring device and the intuitive measuring software WM | Quartis.



### Solution-oriented partnership

“The flexibility of WENZEL regarding our requirements as well as the connection to our system and the proximity of WENZEL Metromec, located in Chur, played an important role in our decision,” René Baumann elaborates. At Pamatool AG, great value is attached to Switzerland as a production and development location.

“The open communication and solution-oriented approach of WENZEL from the very beginning is the basis for the successful cooperation and the successful operation of the complete manufacturing plant. Furthermore, WENZEL met all planned deadlines and costs,” emphasizes René Baumann.

### OPC Unified Architecture (OPC UA)

As an open interface standard, OPC UA is a key prerequisite for the successful introduction of Industrie 4.0 into production. OPC UA ensures the interoperability of machines and systems, which can be linked and reconfigured as required via Plug & Work - platform-independent and cross-vendor.

To make this vision a reality, VDMA is working with its member companies [including WENZEL] to develop industry-specific OPC UA Companion Specifications, creating a world language of production.

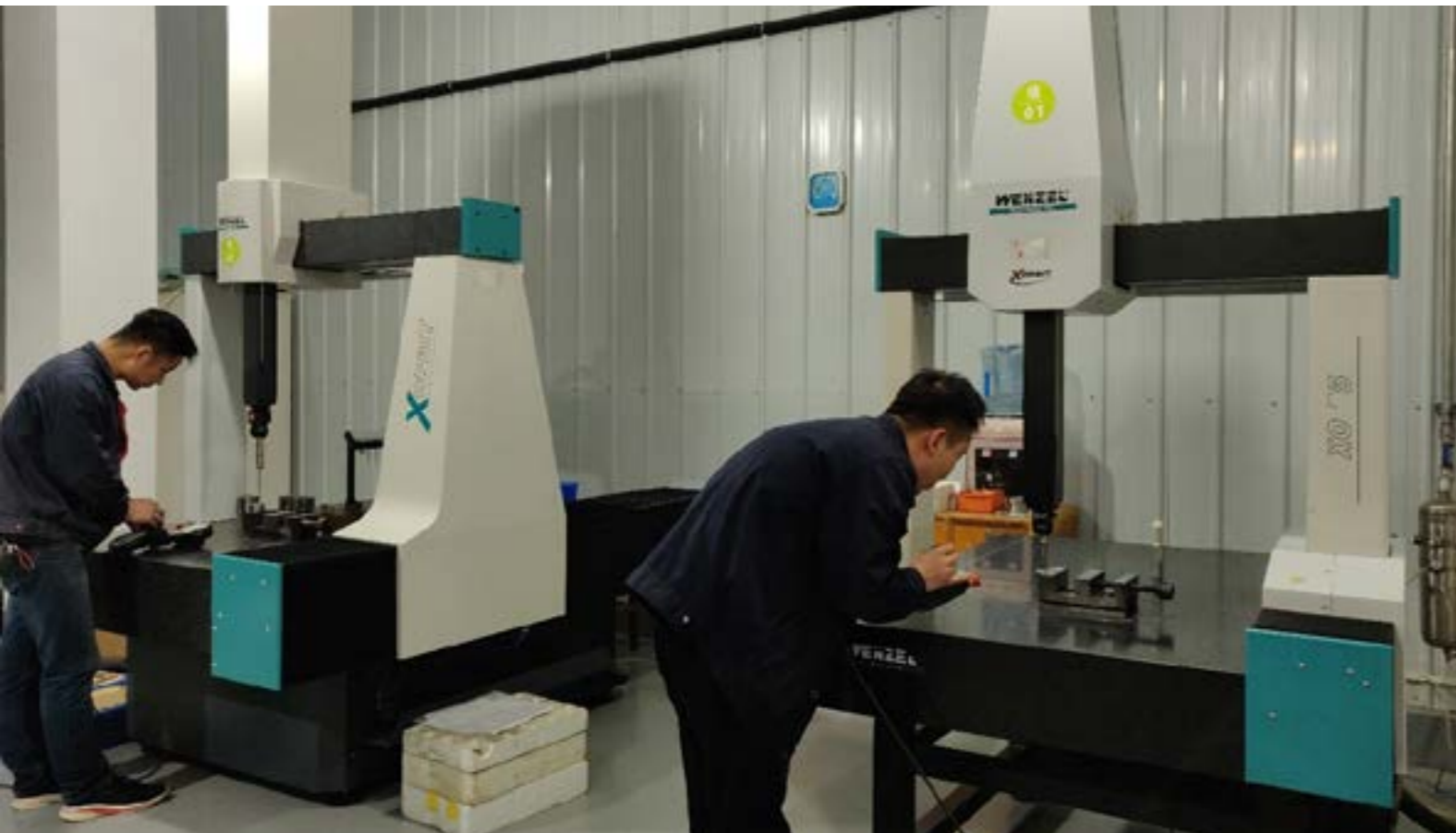
### About Pamatool AG

“ We manufacture high-precision parts from a wide variety of materials such as steel, cast iron, chrome steel, aluminum, plastic, brass, copper and titanium for well-known companies from all over the world. Modern manufacturing technologies and experienced, well-trained employees ensure that our Swiss quality products meet the highest standards. Our jigs, fixtures and customized workpiece clamping systems manufactured specifically to customer requirements are in great demand.

Our own products Gremotool has been a well-known brand for high-precision workholding fixtures for the machining industry since 1986, with development and production facilities in Jonschwil, Switzerland. Gremotool develops and manufactures process-safe workpiece clamping in heavy-duty design, without pre-stamping with claw jaws thanks to pull-down, with minimal material requirements and a high centering and repeat accuracy at an incomparable cost-benefit ratio. The rapid increase in customer requirements regarding automation and digitalization in the machining industry, requires a higher flexibility in the development and production of workpiece clamping at our customers. Thanks to the Gremotool products standardization, parameterization, individual customer solutions can be implemented very quickly, from design to production to process-safe use at the customer. Gremotool offers complete solutions of workpiece clamping through its specialized sales representatives at home and abroad.







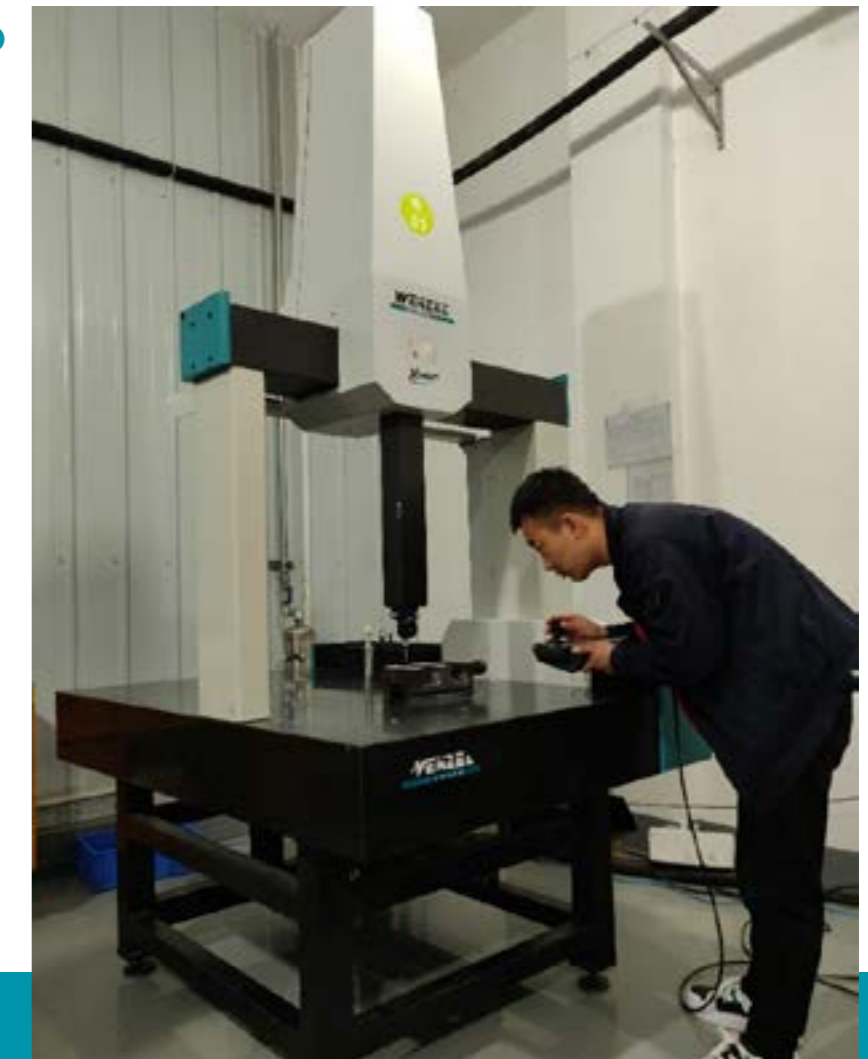
Aerospace industry

## Effort reduced, quality improved

**Shaanxi Hangyu Non-ferrous Metal Processing Co., Ltd. is a supplier of precision parts for the aerospace and chemical industries. The precision products are mainly made of titanium and titanium alloys. WENZEL XO series measurement solutions support Shaanxi Hangyu's product quality by improving performance, quality and reliability.**

Hangyu manufactures hydraulic valve bodies. The requirements for accuracy of size, shape, and position tolerances are extremely high. Before using WENZEL's coordinate measuring machines (CMMs), measurements were performed by an external service provider. However, the quality managers were dissatisfied with the time efficiency and process management.

What followed was buying about 70 different measuring instruments, but this resulted in large deviations. There were just too many different specifications for three-point internal micrometers and the measurement accuracies could not be readily guaranteed.



### Measurement of highly complex valve bodies

The products manufactured in different industries vary in complexity and sophistication, as do the measurement and control tasks. Documenting and perfecting the quality of the manufacturing process to minimize waste, improve product quality and reduce costs are therefore necessary.

Ultimately, it was WENZEL's CMM solutions that provided Hangyu with the measurement solutions they were looking for. Aimin Dong, Executive General Manager at Hangyu, explains, "We mainly use WENZEL's CMMs to solve the measurement problems of geometric tolerance and high-precision dimensional tolerance. These technical requirements are important to us. For example, there are extremely high requirements for roundness, dimensional tolerance, shape and position of the main function hole in various complex valve bodies. At the same time, the positioning accuracy must be guaranteed within 0.008 mm. The CMM solution from WENZEL performs well in all these aspects and supports us in quality assurance."



### Quality improvement and cost saving

As a supplier to the aerospace industry, Hangyu has very strict requirements for product quality and is extremely careful when selecting measuring equipment. When asked why Hangyu chose WENZEL, Aimin Dong says, "Before purchasing the coordinate measuring machines, we compared four companies based on the following criteria: First, the vendor's service; second, the quick response to our detailed inquiries; and third, we visited users and gathered application information about the CMMs."

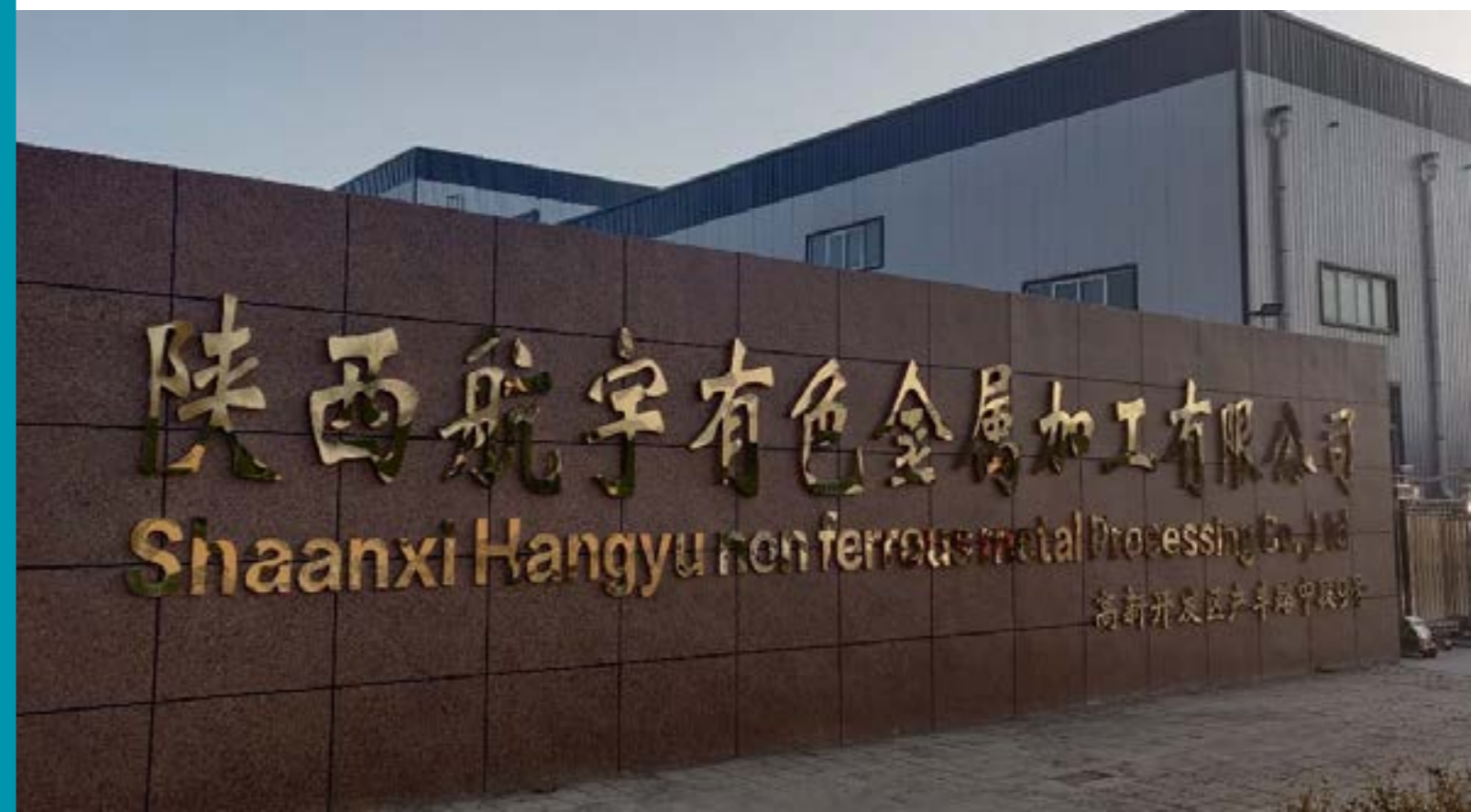
"We chose WENZEL based on two considerations: First, WENZEL has a number of use cases in the Baoji area and enjoys a good reputation; second, the active cooperation of team members and the performance of WENZEL's equipment encouraged us to make the right decision. Hangyu has grown from a small company with only 5 devices to a large enterprise with nearly 200 devices and a production area of 48 hectares after more than ten years. WENZEL's CMM solutions have helped us a lot to improve the quality of our products and save us the cost of buying other measuring equipment."

### Impressive service solution

WENZEL's all-round service offering finalized the decision, which Mr. Dong confirms with satisfaction:



*"WENZEL's after-sales staff are very dedicated. They address any question by phone, WeChat, video or on site. Our CMMs are used a lot because we inspect all our parts hundred percent, and many precision machined parts need to be measured too. I have been very satisfied with the accuracy of WENZEL's CMMs for many years. We have confidence in the WENZEL brand."*



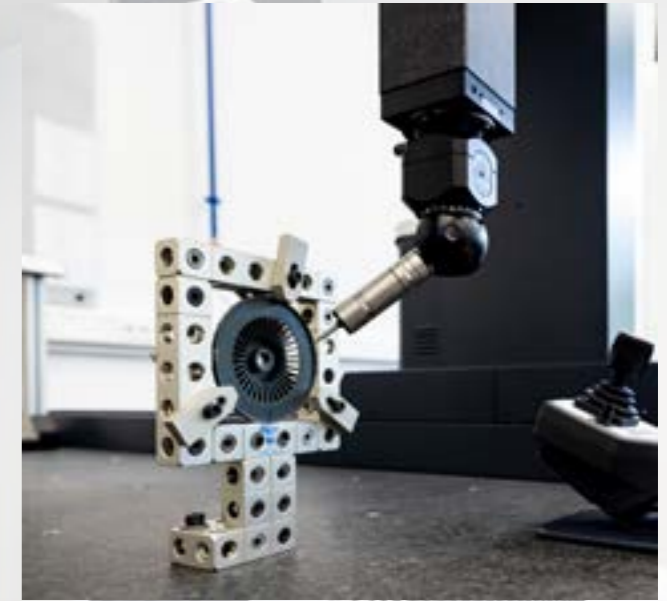


# Vorwerk: “We want to measure as much as possible ourselves”

**Measuring internally makes us more flexible and gives us advantages when developing new products,” says Martin Przibilla, Head of Quality at Vorwerk’s Wuppertal plant. The family-owned company, has always relied on direct sales of its products. They are best known for their Kobold brand vacuum cleaners and attachments as well as their Thermomix kitchen machines. The company has a global network of plants in Wuppertal, Cloyes-les-Trois-Rivières/France and Shanghai/China, production is carried out according to uniform specifications and strict quality standards. “All plants are independent, but there is a close exchange - especially in quality assurance,” explains Przibilla. For example, the quality assurance department in Wuppertal also performs measuring tasks for the Thermomix plant in France as an internal service provider.**

The quality assurance department at the Wuppertal plant consists of three teams: quality planning, which starts early in development projects; quality assurance for series production; and the measuring room with five employees. Przibilla has headed the department since 2016, and then in 2019 the measuring room was added to the department too. “It struck me at the time that we had a lot of unused potential in the measuring room,” he recalls. “We have tremendous expertise within our measurement technology staff. At the time, the measuring room supported the development area to some extent, and it also performed some measurements during series production. But the bottom line was that the coordinate measuring machines had too much idle time, which was also partly because they were not optimized. Creating the measurement programs ran in software that was no longer updated and took an awfully long time because every single movement of the coordinate measuring machine had to be written in source code.”

“This was the hook for us to reorganize ourselves in quality assurance and to raise the measuring room to a new level, so that we can measure much more internally than in the past.,” says Przibilla.



## More measurement tasks due to new wireless cleaning system

During the development of the new VK7 wireless cleaning system metrology requirements played a huge part in the company’s end goal: to increase the number of plastic parts produced with injection molding in Wuppertal by 10. “This was the motivation to raise the bar of the measuring room, so that we can measure much more internally than in the past. Most importantly we wanted to increase internal ability and vertical integration,” says Przibilla.

Klostermann GmbH has been their measuring service provider for around 15 years and was the perfect partner to help them put their plan to work. Klostermann has also created measuring programs for Vorwerk; including clamping systems from Witte.

Klostermann recommended that Vorwerk replace the existing coordinate measuring machines with an LH 87 gantry measuring machine from WENZEL. Klostermann: “In the high-end sector, the hardware of coordinate measuring machines does not differ significantly from one another. What makes the difference today is the measuring software - and with WM|Quartis, the measuring software from WENZEL, this is very easy to use,” explains Christian Klostermann, Managing Director of the family-owned company based in Remscheid. When it comes to Przibilla, he was preaching to the choir: “We had an ultra-high-precision coordinate measuring machine. We could use it to measure gauges, but we don’t need that. It doesn’t depend on the micrometer for our measuring tasks; we mainly measure in the hundredths of a millimeter range.”





### Today, measurement programs are created with a few clicks

The difference to the measuring software of the existing coordinate measuring machines became apparent right after Vorwerk put the first LH 87 from WENZEL into operation. "Thanks to the WM Quartis software, WENZEL's coordinate measuring machines can be operated very easily and intuitively, which has really proven its worth. Today we don't have to type in source code, we just click buttons. We can probe points directly on the CAD model. We benefit from this not only when creating measuring programs, but also in our daily work," says Przibilla.

For example, Vorwerk now uses the new coordinate measuring machines to measure components for Kobold and Thermomix against the CAD model. This also enables the company to evaluate free-form surfaces. Fast and easy alignment against CAD data is made possible by the Reference Point System (RPS), which WM Quartis supports. "Data set-based probing of elements is also much faster today, of course," says Przibilla.

He can precisely quantify the benefits: "Under WM Quartis, my employees can now create measurement programs much faster - in 20 percent of the time it used to take them. As a result, we were able to program all the measuring programs for the components of the new VK7 ourselves. This saves time in the creation of measuring programs, but also costs - around 40 percent. The bottom line is that it has made us much more flexible."

Przibilla also received this positive feedback back from internal customers during the development of the new Kobold VK7 vacuum cleaner, which was launched on the German market in October 2022: "Those responsible for the project praised us for providing the measurement data more quickly and also for the fact that it is more meaningful than before because we can display the measurement reports more clearly with WM Quartis - in direct comparison with the CAD data. This means that project staff can see at a glance where there are dimensional deviations in form and position tolerances, for example, on the basis of the colored display."

### Coordinate measuring machines with probe system from Renishaw

Vorwerk now has three WENZEL coordinate measuring machines in operation in the measuring room.

Thanks to Vorwerk Groups successful sales, demand has increased, and the measuring room has obtained these machines in less than 2 years. All machines are equipped with Renishaw's PH10M/SP25M probe system for 2D and 3D scanning. Compared to the previous solution, this probe head can tilt and enables probing from the side. The SP25 is known for high scanning speeds and high point rates.

"Of course, we could also use optical sensors and multisensory technology on the Wenzel measuring machines, but for us, tactile and optical measuring technology continue to be two different worlds with their own strengths and weaknesses," says Przibilla.



He sees further advantages in Vorwerk now more easily exchange measuring programs with Klostermann, especially outsourcing measuring tasks to them during peak times. Klostermann also measures the components on an LH 87, allowing both companies to access a database and even exchange fixtures. "In the end, it was this overall package from Klostermann that convinced our management to make the new investment. The new coordinate measuring machines make us much more flexible - and Klostermann can cushion order peaks for us even better."

"Of course, the development at Vorwerk is bittersweet for us," says Klostermann. "On the one hand, we are now no longer commissioned by Vorwerk with as many contract measurement services as in the past. But on the other hand, with Wenzel's coordinate measuring machines, we have helped Vorwerk to deepen their value chain and become more flexible. And these strategic advantages for the customer outweigh the disadvantages at the end of the day." Przibilla adds, "Today, we process ten times more components in the measuring room. The use of the machines has definitely increased significantly. We have thus achieved the strategic goal of measuring as much as possible ourselves." Measurements during series production to safeguard manufacturing processes are also easier today with the coordinate measuring machines, since the measurement data can be compared with the CAD data records.

Something else that shows that the partnership with Klostermann works well: Is that Vorwerk created 35 of the 40 new measuring programs for the Wenzel machines itself, while Klostermann took over the rest. "The exchange of measuring programs and resources from employees with Klostermann works extremely well," Przibilla emphasizes.

Service and support for the coordinate measuring machines have also improved significantly for Vorwerk: this concerns the further development of the measuring software, but also the service provided by Klostermann. "The machine projects also include so-called consulting days at Vorwerk, which make it easy for the customer to access our support and knowledge within a short response time," says Klostermann.





### Klostermann gave the tip for the clamping systems from Witte

“Overall, the advice from Klostermann is very valuable to us,” says Przibilla. They worked together to develop and replace the clamping fixtures that had been done in the past with Witte’s modular clamping systems. “Although the investment was costly, it paid off quickly thanks to the retooling options, i.e., the reuse of system components from fixtures that are no longer needed, starting with the second project,” Przibilla is pleased to report. Klostermann has also trained employees from Przibilla’s department on the new Wenzel machines.

“In the future, we want to make the work within the department even more flexible, so that the boundaries between measurements during development and during mass production are even further integrated. This will further increase efficiency in quality assurance,” says Przibilla. Further tasks are already in sight for his team: Vorwerk will invest in the construction of an additional Thermomix production facility in France to meet the rapidly growing demand for Thermomix.



### About Vorwerk

Vorwerk is a family-owned company founded in 1883. In addition to Thermomix kitchen machines and Kobold vacuum cleaners, the company includes Neato Robotics and AKF Bank. Vorwerk operates in more than 60 countries and generated consolidated sales of 3.3 billion euros in 2021. The Thermomix Division’s sales amounted to 1.7 billion euros in 2021, the year of its 50th anniversary. The Group’s largest production site is Wuppertal, Germany, with more than 1,000 employees.



Visiting Wieland Electric in Bamberg

## Taking quality to new heights with computer tomography

“Tradition meets innovation” twice over

We visited Wieland Electric in Bamberg to share how the traditional company has raised its quality processes to new heights with the WENZEL exACT L computer tomography machine. Get exclusive insights into Wieland’s new showroom and learn about the many advantages of our CT in the quality lab.

Wieland and WENZEL stand for quality Made in Germany and both have the guiding principle “Tradition meets Innovation”. With its foundation in 1910, Fritz Wieland laid the foundation for the company with his slotted terminal, the so-called Wieland terminal, today it is primarily used in the Building Solutions and Industry Solutions business units. Wieland Electric guides customers from project planning to project completion.

In over hundred years of Wieland’s existence, there have been several changes. From component supplier to solution provider, Wieland has always evolved but the focus has always been on quality and its assurance. And this is where WENZEL comes into play.

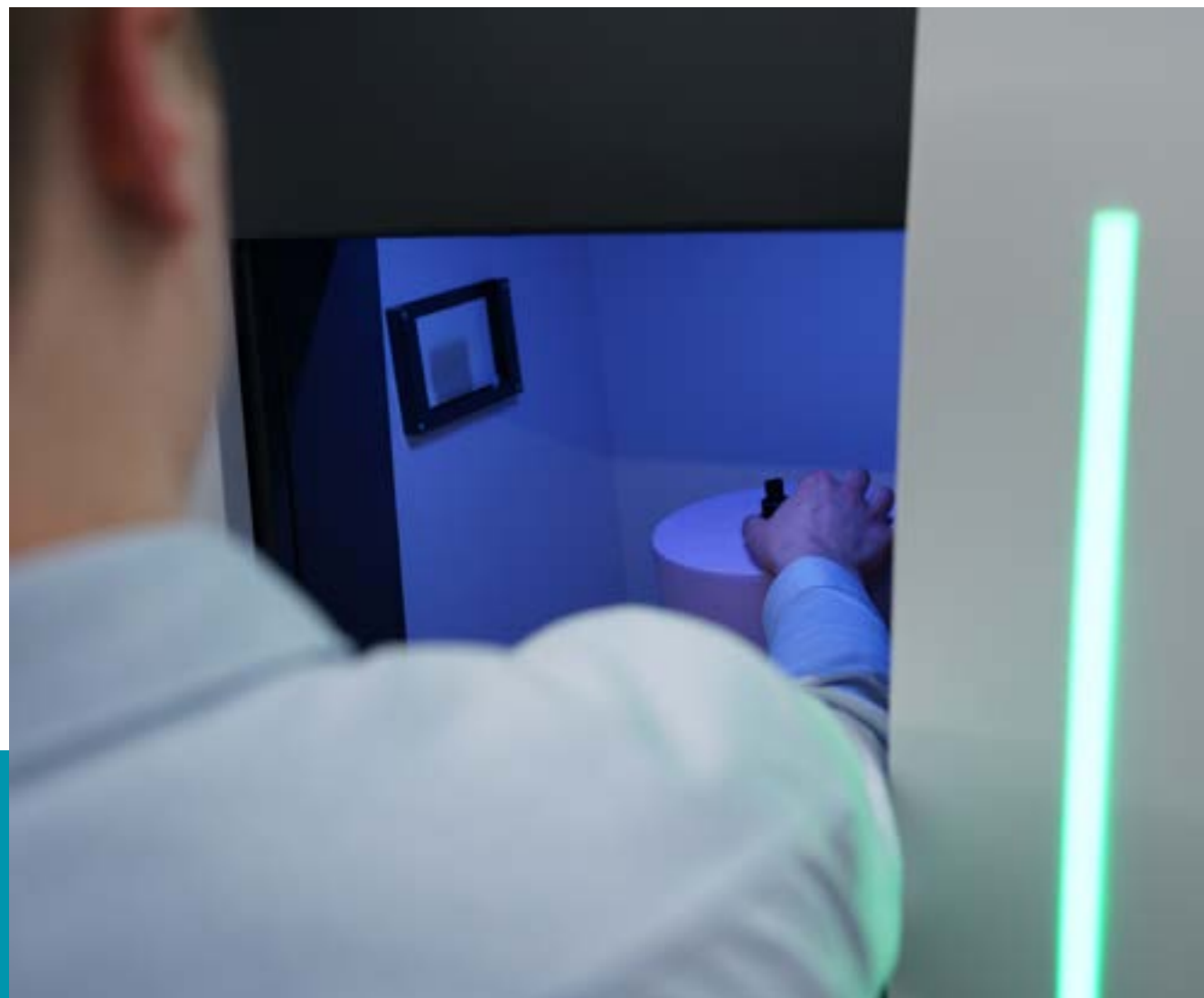


### With the exaCT L to a new level

Before the exaCT L 250 from WENZEL moved in at Wieland, the innovative, watertight connectors had to be embedded, sawed, ground, polished and then checked for quality using 2D measuring microscopes. With the exaCT L 250 from WENZEL, quality assurance could be raised to a new level. Typical defects in plastic components such as blowholes, material distortion or even material accumulation in undesirable places are not uncommon and must be eliminated before further processing.

With the CT from WENZEL, these defects can be detected immediately by non-destructive testing of the plastic parts. This enables Wieland to check the quality of their products in simple and, most importantly, fast way. By target/actual comparison, the parts are analyzed by the CT, and their quality is evaluated.





### Precise measurement results at the push of a button

The WENZEL CT is characterized by its intuitive user guidance. As demonstrated in the case of Wieland. Testing processes can be carried out non-destructively and, above all, in a fraction of the time previously needed for testing. In its performance class, the exaCT L 250 is one of the most compact on the market. It has three independent axes and offers splendid X-ray performance. With its hardware and software, the exaCT L 250 can be easily integrated into the production line and thus provides market-driven answers to questions relating to Industry 4.0.

### The WENZEL-Team on an exiting day of filming at Wieland Electric in Bamberg



### About Wieland Electric

We are a solution provider and world market leader for pluggable electrical installation in building technology and a supplier of safety and automation technology. In over 70 countries worldwide, we serve customers in the fields of mechanical engineering, wind energy and building and lighting technology.

For more than 100 years, we have been developing solutions and manufacturing components that are precisely tailored to your application and requirements.





# MORE EFFEKTIVE WITH 4-DAY WEEK



Starting 2022, WENZEL was the first to adopt the 4-day work week in Lower Franconia. Most employees in production have reduced their weekly working hours from 37.5 to 36 hours, although their wages have remained the same. We interviewed Dr. Heike Wenzel about her experiences with the new work week model.

## Dr. Wenzel, how did the idea of introducing a 4-day week come about?

**Dr. Heike Wenzel (HW):** In view of developments in the labor market, we as a company want to offer attractive conditions to attract and retain the best people. The idea of a 4-day week had been around for some time and became concrete during the pandemic. During the lockdown, I often heard from employees that they found the extra free time a benefit and worked harder during the time they work. We then developed a working week model that would not harm the company and that our employees could live with better.

We then discussed in detail and quite controversially in the management circle the extent to which we could imagine introducing the 4-day week. We also sought talks with our works council and other employees. Once the decision had been made, we quickly put our plan into action.

## What happened right after the implementation?

**HW:** Some things had to settle in first. Who is available in which department on Fridays? Who works home office and when? And who can I contact as a substitute if the contact person is already away for the long weekend? In the meantime, things are running smoothly. All departments are adequately staffed on all days and responsibilities have been clarified.

During the changeover, the main criticism was that the 4-day week was not open to all departments but we have to keep our customers' schedules in mind too. We must be available. Especially in the service department, because of the different time zones. Not forgetting that the administration must also function on all working days.

## How does the new work week model affect productivity and energy requirements?

**HW:** In fact, our productivity is still high. Our employees are more motivated and rested and easily makes up the missing 1.5 hours. I am much more concerned with the results than with how long a single person works. And With more motivation and joy, the results are usually better. At the same time, stress and the risk of burnout are reduced.

To be honest, we had hoped for more in terms of energy consumption. We have savings because the production technology is running one day less but our biggest consumer is air conditioning. The production of ultra-precise measurement technology requires constant climatic conditions. We are therefore investing in retrofitting our air-conditioning technology so that it can be controlled flexibly and in line with demand. With this measure in place, we expect energy savings of 10 to 15 percent.

## Does the 4-day week have a positive effect on your attractiveness as an employer?

**HW:** Definitely! We were the first company in the region and the first mechanical engineering company to switch to this model, which has attracted an enormous amount of attention: We're receiving significantly more applications, and some applicants are calling us looking for exactly this kind of position. The positive effect is undeniable.



# AUKOM Form & Position Come Together

The communicative and cross-divisional AUKOM format for corporate teams

Come Together is the communicative, cross-departmental AUKOM seminar for teams from companies interested in taking AUKOM Form & Position. The new training format has a bonding effect and is aimed at teams from design, manufacturing and metrology. The goal is to develop a common understanding in order to use GPS tools profitably in the company. Because more than ever, well-functioning, cross-departmental collaboration is important.



## AUKOM, the international qualification standard

If the design department implements standard specifications in its drawings without considering metrology and manufacturing, the tools of the GPS standards cannot be applied profitably. The benefits are lost due to loss of time and costs if they are not understood. - Come Together from AUKOM puts the knowledge of form & position within the company on a shared, stable and technically competent level. The communication and process flow are decisively improved, saving time and costs.

Visit our WENZEL Academy as a team and learn together with teams from other companies. We offer the space for you to exchange ideas and build strong networks while taking your team to the next level. Our AUKOM Form & Position trainers are also happy to come to your company.



Our seminar hotel Villa Marburg is the ideal place to learn, exchange experiences and find new ideas.

If you have any questions or are interested in our AUKOM training courses, please contact our AUKOM representative:

**Ekkehart Jesser**

Phone: +49 6020 201-8410

E-Mail: [academy@wenzel-metrology.de](mailto:academy@wenzel-metrology.de)



## IMPRINT

### Publisher

#### WENZEL Group GmbH & Co. KG

Werner-Wenzel-Straße  
D-97859 Wiesthal

### Contact

Phone: +49 6020 201-0  
Fax: +49 6020 201-1999  
info@wenzel-group.com  
[www.wenzel-group.com](http://www.wenzel-group.com)

### Image credits

Adobe Stock  
Pixabay  
© MIKE KÖNIG PHOTOGRAPHY  
Klostermann Ingenieurbüro & Vertriebsgesellschaft mbH  
Videoboost  
Fonderia Bassoli M.S.R.L.  
Hyatech  
Pamatool AG  
Shaanxi Hangyu  
Vorwerk  
Wieland Electric  
AUKOM e.V.  
WENZEL Group GmbH & Co. KG

The copyright belongs to the respective photographers.

Reproduction, even of extracts, only with the permission of the publisher

#### WENZEL Metrology GmbH

Werner-Wenzel-Straße  
97859 Wiesthal, DE  
Website: [www.wenzel-group.com](http://www.wenzel-group.com)  
Phone: +49 6020 201-6006  
E-Mail: [sales@wenzel-group.com](mailto:sales@wenzel-group.com)

#### WENZEL UK Ltd.

Unit 9 Apollo Court,  
Vulcan Way Coalville. LE67 3FD. GB  
Website: [www.wenzel-group.com/uk](http://www.wenzel-group.com/uk)  
Phone: +44 (0) 1159 398550  
E-Mail: [sales.gb@wenzel-group.com](mailto:sales.gb@wenzel-group.com)

#### WENZEL South Asia Private Ltd.

Plot no 20, DLF Industrial Area, Phase 2  
IN-121 003 Faridabad  
Website: [www.wenzel-group.com/en/in](http://www.wenzel-group.com/en/in)  
Phone: +91 9212 567 001  
E-Mail: [sales.in@wenzel-group.com](mailto:sales.in@wenzel-group.com)

#### WENZEL Asia Pte. Ltd.

26, Boon Lay Way, #01-84 TRADEHUB 21  
SG-609970 Singapore  
Website: [www.wenzel-group.com](http://www.wenzel-group.com)  
Phone: + 65 6795 2327  
E-Mail: [sales.sg@wenzel-group.com](mailto:sales.sg@wenzel-group.com)

#### WENZEL Metromec AG

Rheinfelsstrasse 1  
CH-7000 Chur  
Website: [www.wenzel-metromec.ch](http://www.wenzel-metromec.ch)  
Phone: +41 81 257 07 00  
E-Mail: [sales.ch@wenzel-group.com](mailto:sales.ch@wenzel-group.com)

#### WENZEL America Ltd.

28700 Beck Rd  
Wixom, MI 48393, USA  
Website: [www.wenzelamerica.com](http://www.wenzelamerica.com)  
Phone: +1 24 8 295 4300  
E-Mail: [sales.us@wenzel-group.com](mailto:sales.us@wenzel-group.com)

#### WENZEL France SAS

2 rue Jacquard ZA du fresnes  
FR-91280 Saint Pierre Du Perray  
Website: [www.wenzel-group.com/fr](http://www.wenzel-group.com/fr)  
Phone: +33 1/60 87 16 60  
E-Mail: [sales.frs@wenzel-group.com](mailto:sales.frs@wenzel-group.com)

#### WENZEL Polska SP Z O.O.

Ul. Herbowa 13,  
62-070 Dąbrówka, PL  
Website: [www.wenzel-group.com/pl/](http://www.wenzel-group.com/pl/)  
Phone: +48 604 976-300  
E-Mail: [sales.pl@wenzel-group.com](mailto:sales.pl@wenzel-group.com)

#### WENZEL Measuring Machines (Shanghai) Co. Ltd.

No. 219, SongXiu Road QingPu District  
CN-(201703) Shanghai  
Website: [www.wenzel-cmm.cn](http://www.wenzel-cmm.cn)  
Phone: +86 21 - 5970 3088  
E-Mail: [sales.cn@wenzel-group.com](mailto:sales.cn@wenzel-group.com)

#### WENZEL Italia S.r.L.

Località Campi dell'oro n° 11  
IT-13017 Quarona (Vc)  
Website: [www.wenzel-italia.it](http://www.wenzel-italia.it)  
Phone: +39 0 163 430 144  
E-Mail: [sales.it@wenzel-group.com](mailto:sales.it@wenzel-group.com)



## INNOVATION MEETS TRADITION

The WENZEL Group is one of the leading suppliers in the field of industrial metrology and styling solutions. WENZEL's product portfolio includes coordinate and gear measuring machines with tactile and optical sensors, multi-sensor systems, optical high speed scanning and 3D X-ray measuring technology based on computer tomography. In addition to these systems WENZEL also offers comprehensive metrology software, which is used by many thousands of users for the measurement and analysis of parts. WENZEL's measuring solutions

are used in various industries, including the automotive sector, aerospace, power generation and medical devices. Our solutions also support reverse engineering, inspection, and analysis for a variety of fields including power generation, vehicle electrification, and additive manufacturing. Over the years WENZEL has installed more than 12,000 machines worldwide. Subsidiaries and agencies in more than 50 countries support the sales and ensure the after sales service for our customers. The WENZEL Group employs more than 500 people worldwide.



## YOUR LOCAL CONTACT PERSON

### WENZEL GROUP GMBH & CO. KG

Werner-Wenzel-Straße

97859 Wiesthal

Phone: +49 6020 201-6006

E-Mail: [sales@wenzel-group.com](mailto:sales@wenzel-group.com)

We are there for you worldwide. You can find our subsidiaries, sales and service partners at **[www.wenzel-group.com](http://www.wenzel-group.com)**.

Follow us & stay up to date!

