

FOR USE IN PRODUCTION

WENZEL SHOPFLOOR SOLUTIONS

Robust, fast, ready for automation



PRODUCT RANGE
SHOP FLOOR SOLUTIONS

WENZEL – INNOVATIVE SOLUTIONS FOR THE SHOP FLOOR



Industrial measurement technology is increasingly used directly in production. We supply innovative solutions for the shop floor, with which our customers can cover their very different requirements with our well-known highest quality.

Dr. Heike Wenzel and Prof. Dr. Heiko Wenzel-Schinzer
Management of the WENZEL Group

WENZEL FACTS

About WENZEL:

Founded in 1968 by Werner Wenzel
100 % family owned business in 2nd Generation

Subsidiaries

In nine countries: USA, China, Singapore, India, England, France, Italy, Switzerland and Poland

Sales and Service Partner

In more than 30 countries

Installed machine base worldwide:

> 10.000

Number of employees worldwide:

> 600

Unternehmenssitz:

Wiesthal, Deutschland

Production Plants:

Two in Wiesthal, one in Shanghai

Produktprogramm:

Five product lines, own software for all product lines

The WENZEL Group GmbH & Co. KG is a leading Manufacturer of innovative measuring technology solutions. The success of the largest family-run company in the industry is based on German quality, technology, flexibility and Founded in 1968, the name WENZEL stands today primarily for the highest precision, reliability and technological competence strong partnerships.

Founded in 1968, the name WENZEL today stands for the highest precision, reliability and technological competence.

WENZEL offers complete solutions in the following areas:

- High-precision metrology
- Shop floor metrology
- High-speed metrology
- Large volume metrology
- Non-destructive metrology

Technology from WENZEL is used in all branches of industry, including the automotive sector, Mechanical engineering, aviation and aerospace, mould and tool making production, plastics technology and medical engineering.

WENZEL SOLUTIONS

VERSATILE APPLICATIONS

OUR APPLICATIONS



OUR SCOPE OF SOLUTIONS

- High Precision** Metrology | LH
- Shop Floor** Metrology | SF
- Large Volume** Metrology | R; LHF
- High Speed** Metrology | CORE
- Non-Destructive** Metrology | exaCT

OUR PRODUCT LINES

OUR FOCUS INDUSTRIES

TYPICAL BUSINESS AREAS

- General Part Inspection
- Sheet Metal & Trim
- Powertrain & Engine
- Blade & Gear
- Reverse Engineering

Measurement technology has been our profession since 1968 and we have developed it to absolute perfection over the years. WENZEL stands for highest quality standards and reliability - without forgetting that only those who have their sights set on the future and their vision constantly in mind can survive.

WENZEL offers numerous innovative solutions for measurement solutions for production, which we present here in this segment brochure.

The shop floor measuring technology has two main tasks: on the one hand it serves to monitor the process stability in the production and on the other hand the dimensional accuracy of the components. For testing the stability, fast but not quite as accurate solutions are often sufficient: we at WENZEL offer you measuring arms with tactile and optical sensors and comparators such as the Equator from Renishaw. However, ensuring dimensional accuracy still requires highly accurate measuring equipment. We at WENZEL offer you our own range of SF solutions for this purpose. With the SF 55, 87 and 1210 we cover a wide range

TYPICAL APPLICATION AREAS

- Automotive manufacturers and suppliers
- Aerospace
- Mechanical Engineering
- Foundry Technology
- Metal and plastic processing industry
- Medical Technology
- Mould and tool making
- Electrical engineering / electronics
- Measurement service provider
- Research and science
- ...and many more

with which we can meet a great many requirements. These machines differ from our "classical" measuring machines mainly by a higher robustness regarding temperature variation and environmental conditions like dirt and vibrations. All solutions from WENZEL are available with different tactile and optical sensors and are optimally operated by our own software. Our high quality demands on the machines should also be demonstrated by our users: simple operation despite a deep functional diversity - WENZEL is your long-term partner for today and tomorrow. Enjoy reading and challenge our flexibility: we are ready to be there for you!

WENZEL SOLUTION FINDER

THE RIGHT SOLUTION FOR EVERY TASK

WENZEL offers you the appropriate solutions for your different requirements. But which one suits you? On this double page we want to give you a qualified overview. Of course, we would also be happy to advise you on a detailed analysis and examination.

1. Installation location: Here we differentiate whether the machine is fundamentally designed for the measuring room or for production, i.e. without any special precautions.

2. Component size: Here we roughly distinguish between small, medium and large components.

3. Accuracy: Here we differentiate roughly into very accurate, accurate or less accurate.

4. Application: Here we make a rough distinction between geometry, free-form surfaces, non-destructive testing and defect detection.

5. Mobility: The main issue here is the amount of work required for the measuring instrument to be able to work at a different location.

6. Speed: The higher the speed, the lower the achievable cycle times.

7. Financials: In addition to the acquisition costs, this also includes maintenance and service costs as well as operating costs (e.g. simple operation). Of course, all our solutions have a very good price/performance ratio, but require investments in different amounts. We differentiate between lower, medium and higher investment.



LOCATION	Measuring room	●	●							●	●	
	Production	●	●	●	●	●	●	●	●	●	●	
PART SIZE	Small			●	●					●	●	
	Medium	●	●			●	●			●	●	
	Large							●	●			
ACCURACY	Very high			●		●		●				
	High									●	●	
	Medium	●	●		●		●		●			
APPLICATION	Geometry			●	●	●	●	●	●	●	●	
	Surface	●	●	●	●	●	●	●	●	●	●	
	NDT + defect											
MOBILITY	High	●	●	●	●					●	●	
	Medium			●	●	●	●					
	Low							●	●			
SPEED	Very high		●		●		●		●			
	High	●								●	●	
	Medium			●		●		●				
FINANCES	Acquisition	+++	+++	+++	++	+++	++	+++	++	++	++	
	Maintenance	+++	+++	+++	+++	+++	+++	+++	+++	++	++	
	Ease	+++	+++	+++	++	+++	++	+++	++	++	++	
		TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	
		WM MMA		SF 55		SF 87		SF 1210		CORE D/M		

*depending on the material of the component

TABLE OF CONTENTS

OUR COMPANY PROFILE	02
WENZEL SHOP FLOOR SOLUTIONS	08
SF SERIES	10
SF 55.....	14
SF 87.....	16
SF 1210	18
Sensors & change racks	20
CORE SERIES	22
CORE D.....	26
CORE M.....	28
Sensors for the CORE series	30
AUTOMATION SYSTEMS	31
7-AXIS MEASURING ARMS WM MMA	32
WM MMA accessories	34
RENISHAW EQUATOR POWERED BY WENZEL	38
WM SOFTWARE SOLUTIONS	42
ACCESSORIES	44
WENZEL SENSOR PROGRAM	46



ROBUST, FAST AND PRECISE WENZEL SHOP FLOOR MACHINES

RANGE OF SERVICES AND FIELDS OF APPLICATION AN OVERVIEW

The market trend is towards measurement solutions that can be easily integrated into the customer's production process. The fields of application are complex and require flexible and robust measuring systems that function reliably under different environmental conditions. For these applications the shop floor solutions of WENZEL were developed. These guarantee that errors are detected early and thus downtime costs are minimized.

WENZEL has invested a lot in the development of its Shopfloor measuring systems, in order to reduce the influence of temperature and dirt on the measuring results. The award winning SF 87 CMM requires little floor space and offers the best ratio of measuring volume to floor space in its class on the market. This makes the SF 87 ideal for a large part of the cutting and forming industry. Furthermore WENZEL offers with the robust SF 55 the smallest coordinate measuring machine for the shop floor area, which among other things is characterized by a high efficiency. The new SF 1210 offers a low footprint, good accessibility and short measuring times with an enormous measuring volume.

The highly dynamic optical high-speed scanning system CORE was specially developed for the non-contact measurement of turbine blades, medical products and many other parts with polished, reflective surfaces and sharp edges in the production environment. With the CORE, cycle times are tremendously reduced and a significantly higher measurement throughput is possible.

Often, a comparison with a master part or a quick scan is all that is needed for process control in production. At this point WENZEL has extended the product portfolio by partner solutions. Together with Renishaw their Equator was integrated into the WENZEL solutions. With KREON the WENZEL measuring arm WM | MMA was developed, which can also be operated directly with the WENZEL software.



OVERVIEW

SHOP FLOOR MACHINES

INLINE METROLOGY IN SYNC WITH PRODUCTION

The reduction of batch sizes and the strongly growing interest in 100% measurements require more and more automation solutions in the shop floor environment with the aim of achieving full process control. The trend is towards intelligent and integrated solutions. This means that measuring systems can be loaded automatically and measuring programs can be started directly. But it also means that data such as measuring programs and results can be exchanged and further processed via standardized interfaces.

Whether close to production or fully integrated, the production measuring devices from WENZEL as well as the exaCT U computer tomograph are designed in such a way that they can match the cycle time of production via automatic loading. WENZEL Shop Floor solutions offer clear competitive advantages to the customer, by making a failure-free production and a perfect material flow possible. Production costs are lowered and productivity, flexibility as well as the product quality are increased.



SF 87

DMU 60
DECKEL M

PZ00062831

WENZEL SF SERIES

ROBUST, FAST & PRECISE

WENZEL®



THE NEW WENZEL SHOPFLOOR SERIES CMMs FOR USE IN THE WORKSHOP

WENZEL's workshop-suited CMMs are universally applicable. The WENZEL SF 55, SF 87 and SF 1210 coordinate measuring machines can be used to measure both series and individual individual parts in the direct production environment, in incoming goods and in classical quality assurance. The intelligent and compact design is suitable for a wide range of applications in the production environment, especially in the cutting and forming industry.

WENZEL SF 55

The SF 55 is a CNC bridge measuring device for use in a production environment and can be equipped with both tactile and optical sensors. The corrosion-free guides of the machine are made of granite and hand lapped with high precision. The guide ways are completely covered and protected against contamination. The controller and PC are integrated into the machine for a minimum footprint. The space requirement is low with excellent price-performance ratio. The SF 55 has passive vibration damping and can optionally be equipped with active vibration isolation.



WENZEL SF 87

The new SF 87 coordinate measuring machine is the universal measuring machine for the production environment. The SF 87 requires little floor space and offers an optimized measuring volume of 800x700 x 00 mm. This makes it ideal for a large part of the metal cutting and forming industry. The machine concept offers a very good price-performance ratio with low space requirements. High traversing speeds and accelerations ensure high productivity. The combination of powerful probes and optical sensors leads to a considerable increase in efficiency in your measuring and testing process.





WENZEL SF 1210

The latest model in the SF series is the SF 1210, which offers a measuring volume of 1,200 x 1,000 x 1,500 mm, which is unique on the market for a coordinate measuring machine of this type. The Y-axis can be individually adapted. The CMM is accessible from four sides and is therefore ideally suited for automation. The SF 1210 is equipped with high-quality linear guides and is therefore ideally suited for the rough environmental conditions. The complete WENZEL portfolio of tactile and optical sensors is supported.



WENZEL SF 55

MEASURING IN THE PRODUCTION ENVIRONMENT

The SF 55 is a CNC bridge measuring device for use in a production environment and can be equipped with both tactile and optical sensors. The corrosion-free guides of the machine are made of granite and hand lapped with high precision. The guide ways are completely covered and protected against contamination. The controller and PC are integrated into the machine

for a minimum footprint. The space requirement is low with excellent price-performance ratio. The SF 55 has passive vibration damping and can optionally be equipped with active vibration isolation. For use in serial measurements, the machine achieves a multiple of the usual scanning speed in comparator mode with only slightly poorer repeatability values.

FEATURES

- **Cost-effective entry into coordinate measuring technology** due to excellent price-performance ratio
- **Flexible and universally** applicable in the workshop and in production
- **High measuring throughput** with scanning measuring heads
- **High accuracy** over a wide temperature range due to the use of granite in all axes
- **Compact design** with small footprint

FIELDS OF APPLICATION

The SF 55 can be used universally. Serial and individual prismatic and free-form workpieces can be measured with the coordinate measuring machine in a production environment, for incoming goods and for classic quality assurance.

Steel bushings

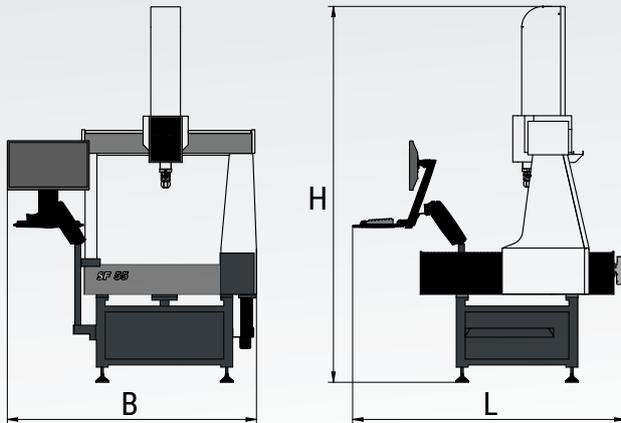


Machine components



Gearboxes





MACHINE PROFILE

Space Requirements (L x B x H)	1730 x 1440 x 2555 mm
Machine weight	980 kg
Max. Workpiece weight	200 kg
Measuring ranges	500 x 500 x 500 mm*

* with touch probe PH10M PLUS

YOUR ADVANTAGES AT A GLANCE

- **High flexibility**
 Bellows covers to protect against contamination |
 Data compatibility with other WENZEL systems |
 Height-adjustable operating arm
- **High mechanical precision**
 Granite base | Hand-lapped base plate (DIN 876/0) |
 Air bearing guide elements in all axes
- **Low operating costs**
 Low air consumption | Renishaw sensors |
 Reliable and inexpensive spare parts
- **Versatile sensor options**
 Swapable sensor systems | 3-axis scanning |
 Optical sensor technology
- **Suitable for automation and integration into the line**
 WENZEL-Automation-Interface (WAI) |
 Good accessibility | WM I SYS Analyzer

WENZEL SF 87

MEASURING IN THE PRODUCTION ENVIRONMENT

The new SF 87 coordinate measuring machine is the universal measuring machine for the production environment. The SF 87 requires little floor space and offers an optimized measuring volume of 800 x 700 x 700 mm. This makes it ideal for a large part of the metal cutting and forming industry.

The machine concept offers a very good price-performance ratio with low space requirements. High traversing speeds and accelerations ensure high productivity. The combination of powerful probes and optical sensors leads to a considerable increase in efficiency in your measuring and testing process.

FEATURES

- **Maximum driving dynamics** for maximum productivity
- **High measuring volume**, matched to production machines
- **Compact design** with small footprint
- **Flexible and mobile** for use in the workshop
- **Maximum stiffness with minimum dead weight** due to bionic design

FIELDS OF APPLICATION

The SF 87 is a workshop-ready 3D coordinate measuring machine for measuring small to medium-sized production parts. The intelligent and compact design is suitable for a wide range of applications in the production environment, especially in the cutting and forming industry.

Steel bushings

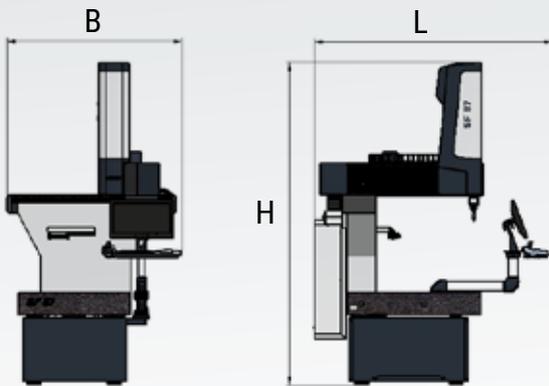


3-cylinder engine block



Gearboxes





MACHINE PROFILE

Space Requirements (L x B x H)	2130 x 1560 x 2890 mm
Machine weight	1850 kg
Max. Workpiece weight	300 kg
Measuring ranges	800 x 700 x 700 mm*

* with touch probe PH10M PLUS

YOUR ADVANTAGES AT A GLANCE

- **Suitable for workshop and production use**
 Temperature compensation | Active damping as an option
- **Excellent price-performance ratio**
 Large measuring volume with small footprint |
 Low operating costs | No compressed air required
- **Modern machine design**
 Ergonomic and user-friendly | Bionic structures and
 massless weight compensation | Turntable option
- **Flexible and universal use**
 Multisensor capable (optical and tactile) | 5-axis
 measuring technology | Available with matching
 probe changing units
- **Integration into the line and into automation processes**
 WENZEL-Automation-Interface (WAI) |
 Can be equipped from three sides |
 WM I SYS Analyzer

WENZEL SF 1210

MEASURING IN THE PRODUCTION ENVIRONMENT

The new coordinate measuring machine SF 1210 is WENZEL's answer to the trend to bring metrology closer to production. The SF 1210 offers a large measuring volume of 1200 x 1500 x 1000 mm. This makes it ideal for a major part of the cutting and forming industry. The extended temperature range makes it the ideal system solution for manufacturers of e.g. castings, chassis parts, subframes, engines, etc. The machine concept offers a very good

price-performance ratio with a small footprint. The double drive in the Y-axis provides for highest accelerations and speeds and thus for high productivity, e.g. also in connection with an automation. The SF1210 is compatible with the complete sensor program from WENZEL. This flexibility ensures efficiency increases in your measuring and testing process.

FEATURES

- **Maximum travel speed** through double drive
- **High measuring volume**, adapted to production machines
- **Ideal for automation solutions** due to barrier-free access from 4 sides
- **Developed for workshop use** (robust linear guides, bellows, etc.)
- **Maximum stiffness with minimum own weight** due to bionic construction

APPLICATIONS

The SF 1210 is a 3D coordinate measuring machine for measuring medium to large production parts in the shop floor environment. The intelligent and compact design is suitable for a wide range of applications in the production environment, especially in the cutting and forming industry. Examples are:

Suspension parts

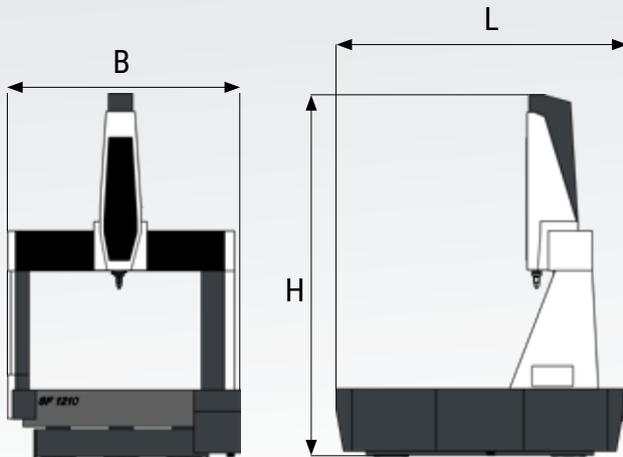


Electric motors



Cast housings





MACHINE PROFILE

Space Requirements (L x B x H)	2976 x 2302 x 3928 mm
Machine weight	6655 kg
Max. Workpiece weight	1000 kg
Measuring range	1200 x 1500 x 1000 mm*

* with touch probe PH10M PLUS

THEIR ADVANTAGES AT A GLANCE

- **Suitable for workshop and production use**
 Temperature compensation | Active damping as an option | Robust linear bearings | Broad temperature range
- **Excellent price-performance ratio**
 Large measuring volume with small footprint | Low operating costs
- **Modern machine design**
 Ergonomic and user-friendly | Bionic structures and massless weight compensation | Barrier-free accessibility from 4 sides
- **Flexible and universal use**
 Multisensor capable (optical and tactile) | 5-axis measuring technology | Available with matching probe changing units
- **Integration in the line and in automation processes**
 WENZEL-Automation-Interface (WAI) | Can be equipped from four sides | WM | SYS Analyzer

SENSORS AND CHANGE RACKS

MOUNTING HEADS, PROBES AND SCANNERS

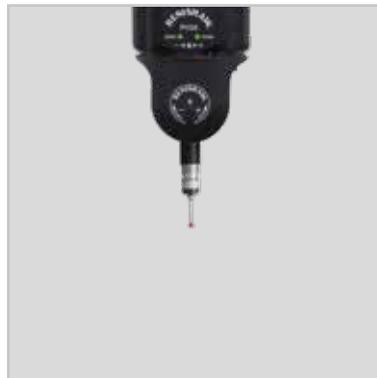
Combined with a variety of innovative sensors, the WENZEL SF series machines are applicable flexibly even for the most different of applications. From smallest injection moulded parts up to large sheet metal punching tools - our product series meet your requirements! They can be equipped with manual, motorized, infinitely variable

or indexable mounting heads. With the corresponding touch-trigger, scanning and optical measuring systems, our product series achieve meaningful results for a wide variety of applications. The compatible automatic changing racks turn the measuring machines into homogeneous and versatile measuring systems.



PH10T PLUS / PH10M PLUS / PH10M iQ PLUS

Automatically, indexable probe head, Fast probe replacement (auto joint) with the corresponding change systems.



PH20

The 5-axis PH20 and LH are an efficient solution for measuring 3D and prismatic components. The 'Head Touch' function takes measurement points very quickly and reduces cycle times.



REVO-2

The revolutionary 5-axis probe system REVO™ coupled with WM | Quartis provides an extremely fast high scanning speed solution with a high degree of measurement flexibility, and thus an extremely high throughput.



TP20

Touch trigger probe. Extremely robust and flexible touch trigger probe with stylus module.



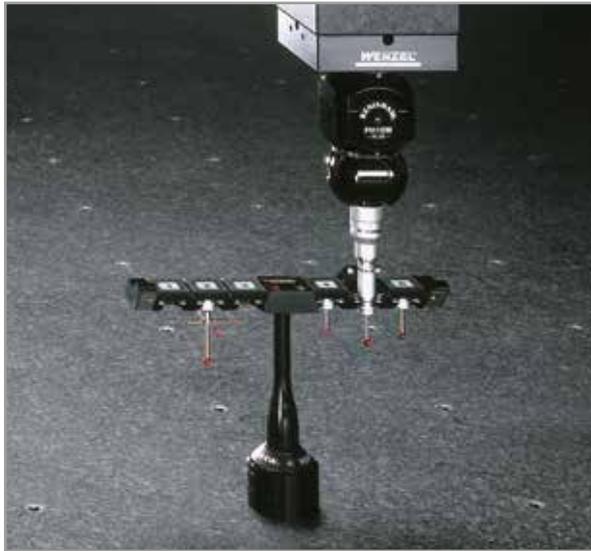
TP200

Compact, modulechanging touch trigger probe particularly suitable for measuring tasks with tight dimensional tolerances for 3D free-form surfaces with longer styli.



SP25M

The most compact and versatile probe system for scanning on a global scale.



Change Rack SCR200

The SCR200 provides automatic, high speed changing between up to six TP200 stylus modules. The SCR200 is powered by the separate probe interface, PI 200, and provides features to facilitate safe stylus changing.



Change Rack ACR3

The changer rack ACR3 provides a passive means to automatically exchange probes without the need for requalification. Although the ACR3 is a four port unit, systems can be linked together so that more different probes or extensions can be stored in the rack - sufficient for any measurement task.



Change Rack FCR25

Flexible change racks for automated changing of SP25M scanning and touch-trigger 3 Station (6, 9, 12 and 15 Stations available).



MRS2 Stylus Module Rack

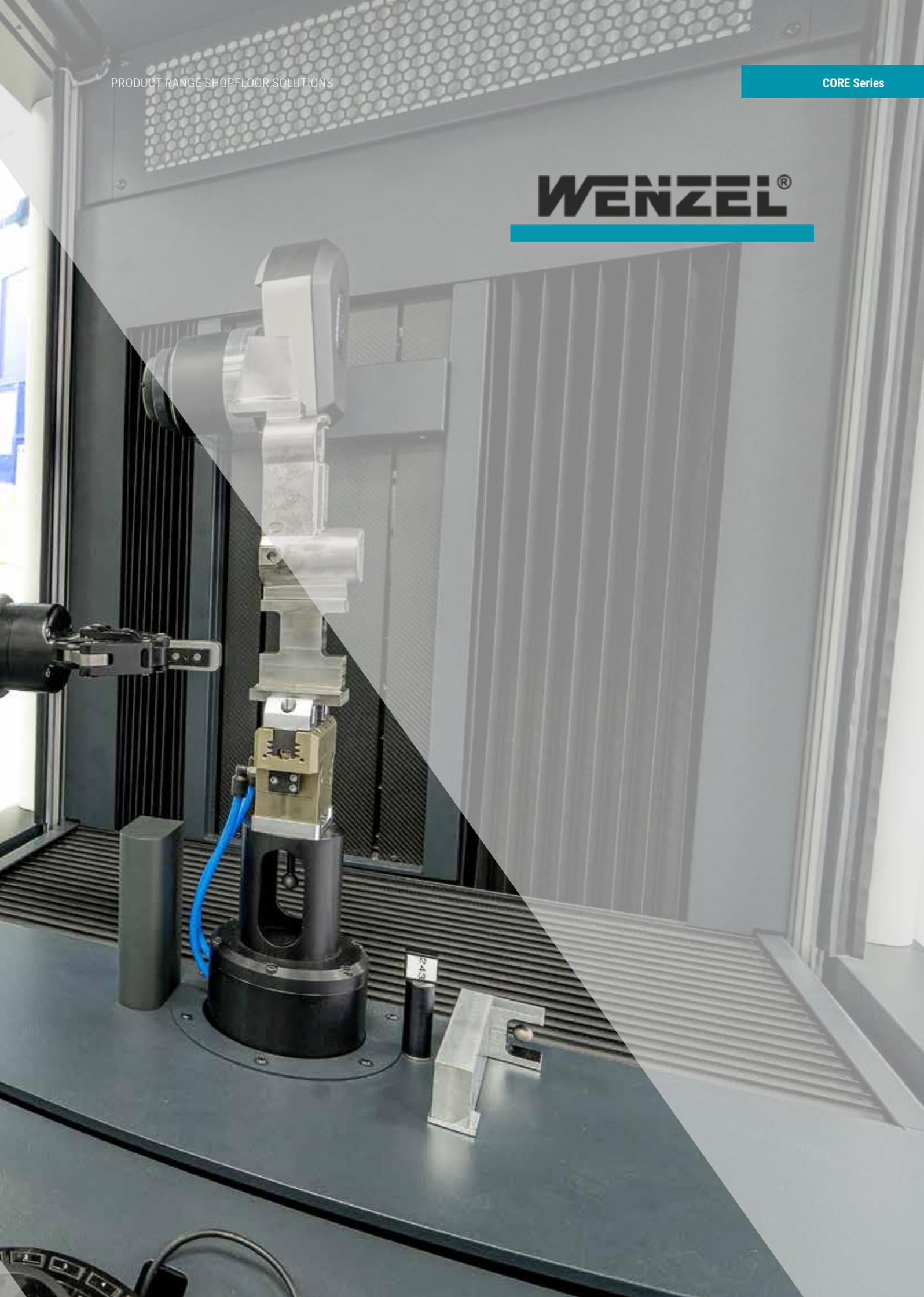
MRS2 is available with different column and rail lengths to allow configurations for a variety of applications. When the CMM workspace is tight, or when a large number of probes and styli are needed, additional rails can be attached to the MRS2 to configure a multi-stage magazine. The rail is compatible with the following interchangeable systems: ACR3, FCR25, memory module and roughness probe SFA for REVO probes.

WENZEL CORE SERIES

BLADES, BLISKS & MORE



WENZEL®



OVERVIEW

WENZEL CORE

OPTICAL HIGH SPEED SCANNING MEASUREMENT OF BLADES, BLISKS AND IMPLANTS

Hollywood, for example, used it for the film “The Core”. In sports, “core training” means the training of the central body part, in physics “core” is the most important part of a nuclear reactor in which the chain reaction takes place. No matter what we have looked at so far, they all have one thing in common: it is about the innermost, the central part.

In addition to measurements in the measuring room, it is now important to move metrology into the production area close to the processing machines in order to be able to react quickly to deviations. With this in mind, WENZEL's CORE product range was developed for the central part of a production plant - the quality of the products. No matter whether the measurement is carried out directly after production or during post-processing within the maintenance cycle at a later point in time, the CORE is the appropriate coordinate measuring machine for this. The measuring machine can be used directly in the production area and measure the relevant characteristics. It is possible to measure on almost all

surfaces, whether shot peened, lacquered, polished or matt. Due to the unique optical sensors of the CORE product line it is possible to measure all these surfaces. Some may now think that optical sensors cannot measure everything. That's right, every technology has its limits. For this reason, WENZEL has developed a hybrid sensor that combines the characteristics of optics and tactile sensors and is outstanding in this regard, but not only are the sensors to be emphasized here, also the machine itself impresses with its small space requirement in comparison to similar measuring machines. The CORE product range is also characterized by its incredible flexibility. Depending on the model, the CORE can be equipped with 6 axes and a measuring turntable. This combination allows almost unrestricted access to the components in order to measure as many features as possible in a single operation without re-clamping. This measurement is not done in hours, days or weeks, no, the development of the CORE product line has been designed to measure within the cycle time of production. Fast measurements can be achieved as a result of





high acceleration of the individual axes. yet the accuracy is not overlooked, resulting in the best possible relationship between measurement time and accuracy. In addition, the CORE product range can also be integrated into a fully automated production line. Whether using a robot or an automatic feeding system - with the CORE, WENZEL can make real almost any automation. What would a measuring machine be today without the right software? It would probably only function in a limited way. For this reason the CORE is now available with the well-known WM | Quartis software from WENZEL. The areas of application for CORE are wide. For example,

turbine blades from the aerospace industry or industrial gas turbines can be inspected. In medical technology, joints and prostheses can also be measured, as can components from other diverse markets. Small, medium and large components with a length of more than 2m can be measured with the CORE product range. No matter whether you want to check the quality of your products directly after manufacture or at a later point in time, CORE will not let you down. Do not leave the quality of your products to chance, but entrust this important central part of the CORE to WENZEL.



WENZEL CORE D

OPTICAL MEASUREMENT AT PRODUCTION CYCLE SPEED

Designed to increase the speed of the production process, the CORE Optical High Speed Scanning System offers a highly flexible 3D inspection solution for demanding measurement requirements in global manufacturing. The CORE is based on a proven mechanical structure, developed and manufactured in WENZEL's

renowned production facility in Germany. This forms the cornerstone for its accuracy, reliability and quality. With a scanning speed of up to 400 mm/s, the CORE provides time savings by a factor of about 4 compared to tactile coordinate measuring machines.

FEATURES

- The CORE is the optimal solution **for automated measurement** of components in-line or at-line
- **Robust construction** ensures its use in production environment
- **Fully integrated optical sensors** measure complex workpiece geometries in a reasonable time
- **Possibility of tactile measurement** when optical methods reach their physical limits
- **Automatic change between tactile and optical measurement** by the WM | HS hybrid sensor

FIELDS OF APPLICATION

Typical applications of CORE can be found in a wide variety of industries, for example in tool and mold making, prototype construction, the automotive industry, reverse engineering and above all in medical technology and aviation. CORE is used to measure turbine blades, joints, implants and vehicle parts.

Knee and hip prostheses

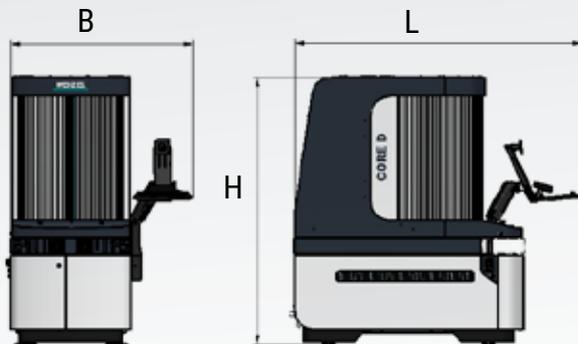


Turbine blades



Pump





MACHINE PROFILE

Space Requirements (L x B x H)	2255 x 1500 x 2100 mm
Machine weight	1500 kg
Acceleration	> 3000 mm/s ²
Measurement system resolution	0,1 µm

YOUR ADVANTAGES AT A GLANCE

- **Fast and efficient**
 Fast point detection | Minimization of machine movement | Repositioning during measurement
- **Easy integration**
 Compact design with a small footprint | Controller and computer integrated in the unit | Accessible work area | No compressed air required | Portable machine type
- **Unique sensors**
 Simple measurement of critical areas | Direct measurement of polished and highly reflective surfaces | Large working distance and measuring range
- **Latest technology**
 Can be automated | Connection of robots for assembly | Temperature stability from 18°C - 30°C | Dirt-resistant due to protected guides | Vibration-resistant | Use of precision scales | 6-axis measuring system | 5-axis angle acceptance of the sensors of 90° ±85°

WENZEL CORE M

OPTICAL MEASUREMENT AT PRODUCTION CYCLE SPEED

The CORE M High Speed Optical Scanning System is a device that was developed to meet the increasing demand for 100 % inspections. It works quickly and efficiently directly in production. Designed to increase the speed of the production process, the CORE M offers a highly flexible 3D optical inspection solution for large components

and demanding measurement requirements in global manufacturing. The CORE is based on a proven mechanical structure, developed and manufactured in WENZEL's renowned production facility in Germany. This forms the cornerstone for its accuracy, reliability and quality.

FEATURES

- **High-speed measuring operation** using dynamic linear motors in a 6-axis measuring system
- **Fully integrated optical sensors** measure complex workpiece geometries in a reasonable time
- The CORE M offers the optimal solution for **the measurement of components in-line or at-line with** its sensors
- **Large measuring volume** (up to 500 mm x 500 mm x 2500 mm) for measuring large components
- **Small footprint** and compact design in relation to measuring volume

FIELDS OF APPLICATION

The CORE M is the optimal solution for the measurement of turbine blades, shafts, various vehicle parts and much more. The optical high-speed measuring system is used in a wide variety of industries, such as tool and mold making, prototype construction, the automotive industry, reverse engineering and aviation.

Vane blade segment

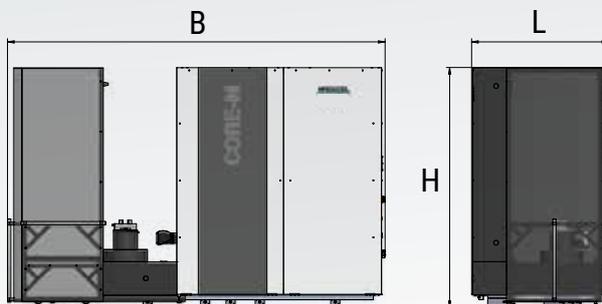


Turbine blade



Common Rail





MACHINE PROFILE

Space Requirements (L x B x H)	1440 x 3970 x 2530 mm
Machine weight	6300 kg
Acceleration	10.000 mm/s
Measurement system resolution	0,1 µm

YOUR ADVANTAGES AT A GLANCE

- **Dynamic and effective**
 Acceleration up to 10,000 mm/s | Travel speed of 800 mm/s | Minimization of machine movement | Repositioning during measurement
- **Compact design**
 Small footprint with large measuring volume | Working range accessible from 3 sides | Integration of controller and PC in the device | Protective hood for unfavorable lighting conditions | No compressed air required
- **Unique sensors**
 Simple measurement of critical areas | Direct measurement of polished and highly reflective surfaces | Large working distance and measuring range
- **State-of-the-art technology**
 Can be automated | Robotic integration capability | Temperature stable in a range from 18°C - 30°C | Dirt resistant due to protected guides | Earthquake proof up to 6.5 on the Richter scale | Use of precision scales | 6-axis measuring system | Angle acceptance of the sensors of 90° ±85°

WM | HS, WM | DS & WM | RS-C

FOR CORE SERIES

The WM | HS and WM | DS have been specially developed for the CORE product range. The WM | DS is based on a double-eye principle which enables the precise measurement of particularly small radii. The WM | HS is a hybrid sensor, which fulfills your measuring task at top speed by the combination of optical and tactile at a CORE with a 5-axis scanning. Both sensors are designed for use in the

production environment. The latest addition is the optical sensor WM | RS-C, which allows the CORE to optically measure roughness parameters and evaluate them with the corresponding software. All sensors of CORE are designed in such a way that they can also be used in the shop floor area.



WM | RS-C



WM | DS



WM | HS

AUTOMATION SYSTEMS

FOR MEASURING SYSTEMS FROM WENZEL

It's hard to imagine today's production environment without automation. WENZEL offers various solutions to combine production and measurement technology on the shop floor. No matter for which machine type, for which kind of integration whether Atline or Inline WENZEL has a solution for almost every requirement. Thus it is possible to integrate the measuring technology in form of a coordinate measuring machine into the production and to measure geometrically the manufactured parts faster. Due to this in-/atline measuring, deviations can be quickly detected and corrected. This results in a lower waste rate and therefore lowers costs for your company. Whether you decide for a classical coordinate measuring

machine, a CORE or a computer tomograph, at WENZEL you will find the suitable product and the suitable solution for your specific measuring task including the appropriate automation for your production. Be ready for the next step and take it together with WENZEL.

WENZEL - Automation ready

Z&K Chameleon Mono

The integrated, fully automatic loading system can be equipped with up to 126 workpieces, e.g. electrodes, and thus guarantees a higher utilization of your machine and lower personnel costs, e.g. due to unmanned shifts.

High economic efficiency in a very small space. The ideal introduction to the automation of your stand-alone machine.

You can find more information about Chameleon Mono at:
www.zk-system.com/produkt/chameleon-mono/



Easy Robotics ProFeeder

The ProFeeder in combination with a Universal Robot represents a compact, modular automation cell that in most cases does not require any additional safety technology. The ProFeeder can be quickly adapted and converted to various tasks and machines and can be expanded in several steps from support for small series to the set-up for monitoring series production on your Stand-alone machine.

You can find more information about the ProFeeder at
www.easyrobotics.biz/products/robot-arms/profeeder/



WM | MMA

7 AXIS MEASUREMENTS ARMS

WENZEL®

A close-up photograph of a white Wenzel MMA Series floor buffer head. The head is cylindrical and features a black handle on the left side and a grey control knob on the right. The Wenzel logo is prominently displayed on the top surface. The background is a blurred industrial or warehouse setting.

WM | MMA SERIES

MOBILE MEASUREMENT IN THE PRODUCTION ENVIRONMENT

Mobile measuring arms from WENZEL are characterized by great flexibility, enabling use in both production and quality assurance processes. By combining a portable 7-axis measuring arm with a high-resolution line scanner, which captures every detail contact-free, the measuring arms represent a useful complement to your established classical coordinate measuring systems. The use of the latest materials makes the measuring arm a lightweight unit that delivers highly accurate

and reproducible measurement results in mobile applications. The measuring arm can be used directly on the component - both with optical and tactile sensors - without any warm-up time and without sticking markers to the component. The measurement results obtained can then be transmitted via a WiFi interface for further use. The capacity and low consumption of the integrated battery ensure reliable operation of the measuring arm over a long period of time.

FEATURES

- Freedom of movement due to 7 axes with axis limit detection
- Automatic button recognition
- WiFi
- Battery operation
- Temperature compensated
- Stable resting position
- Internal weight compensation with damping element

MEASURING ARM PROFILES

The measuring arm is available in different accuracy classes (Standard & Premium) as well as in different versions - suitable for individual measuring requirements and tasks.

Type	Arm length	EUNI	Tactile (at the scanner)	
			PSIZE	PFORM
WM MMA 2.0	2,0 m	0,037 mm	0,012 mm	0,020 mm
WM MMA 2.5	2,5 m	0,041 mm	0,015 mm	0,024 mm
WM MMA 2.5 P	2,5 m	0,033 mm	0,012 mm	0,022 mm
WM MMA 3.0	3,0 m	0,069 mm	0,020 mm	0,035 mm
WM MMA 3.0 P	3,0 m	0,057 mm	0,017 mm	0,030 mm
WM MMA 3.5	3,5 m	0,079 mm	0,024 mm	0,041 mm
WM MMA 3.5 P	3,5 m	0,067 mm	0,021 mm	0,037 mm
WM MMA 4.0	4,0 m	0,094 mm	0,029 mm	0,048 mm
WM MMA 4.0 P	4,0 m	0,084 mm	0,026 mm	0,042 mm
WM MMA 4.5	4,5 m	0,114 mm	0,045 mm	0,060 mm
WM MMA 4.5 P	4,5 m	0,105 mm	0,040 mm	0,051 mm



YOUR ADVANTAGES AT A GLANCE

- **High flexibility**
 7 axes for freedom of movement | Can be used with tactile and optical sensors | Axis limit detection
- **Mobile use**
 Suitable for industrial use | Portable light weight | Integrated battery & WiFi
- **High process efficiency**
 No marker sticking | No warm-up time | Automatic button recognition
- **Accurate and reproducible measurement results**
 Temperature compensation | Stable rest position | Internal weight compensation with damping element
- **Data evaluation and security**
 Integrated WiFi interface | Evaluation with QM | Quartis Mobile

LDIA	SPAT	Optical		
		WM MLS 100P LDIA scanning	WM MLS 200 LDIA scanning	WM MLS 100 LDIA scanning
0,044 mm	0,022 mm	0,043 mm	0,047 mm	0,049 mm
0,055 mm	0,027 mm	0,049 mm	0,053 mm	0,055 mm
0,047 mm	0,025 mm	0,045 mm	0,049 mm	0,052 mm
0,081 mm	0,042 mm	0,064 mm	0,066 mm	0,068 mm
0,074 mm	0,039 mm	0,055 mm	0,059 mm	0,062 mm
0,095 mm	0,054 mm	0,079 mm	0,082 mm	0,084 mm
0,089 mm	0,045 mm	0,069 mm	0,074 mm	0,076 mm
0,115 mm	0,066 mm	0,091 mm	0,102 mm	0,105 mm
0,105 mm	0,054 mm	0,080 mm	0,084 mm	0,087 mm
0,125 mm	0,078 mm	0,120 mm	0,130 mm	0,132 mm
0,114 mm	0,067 mm	0,095 mm	0,104 mm	0,110 mm

Magnetic MOUNTS 6" and 8"

An excellent way to attach a measuring arm to an ferrous surface such as a steel plate or table is to use a magnetic holder. Some customers use it as a flexible mounting solution on a large steel table or even mount it directly on the bed of a machine tool. They can be easily turned on and off so that the user can quickly change position while measuring a large part on a table. The magnets are switched on and off with an Allen key. In some cases, customers even use a magnetic holder to attach the measuring arm directly to the part being measured. This creates a desirable situation where the part does not move relative to your gauge. Our magnet attachments include a universal 3-1 / 2"-8 stainless steel mounting ring. The magnetic holders are supplied in a hard foam case to ensure easy transport to the workplace.



TRIPOD-HDP

Portable tripod for measuring arms with a universal 3-1 / 2" -8 threaded ring. The measuring stand is suitable for Measuring arms up to a length of 3 m. The portable aluminum measuring stand is lightweight and can be folded and stored in our optionally available plastic case.



TRIPOD-HDP-PRO

The measuring stand is suitable for measuring arms up to 5 m long. The portable aluminum measuring stand is lightweight and can be folded and stored in our optionally available plastic case.



Workshop trolley with granite plate 600 x 920 mm

This workshop trolley has dimensions of approx. 600 x 920 mm and is equipped with a granite plate. The trolley is narrow enough to pass through a standard size door opening and contains two 3-1 / 2" -8 mounting rings. It has lockable cabinet doors and handles at both ends to ensure easy maneuverability of the trolley. The interior of the case remains open to accommodate all equipment, power supplies, printers or computers.



Workshop trolley with granite plate 720 x 1220 mm

This workshop trolley has dimensions of approx. 720 x 1220 mm and is equipped with a granite plate. The trolley is still narrow enough to fit through a standard size doorway and contains three 3-1 / 2" -8 mounting rings. It has lockable cabinet doors and handles at both ends to ensure easy maneuverability of the trolley. The interior of the enclosure remains open to accommodate all equipment, power supplies, printers or computers.

WM | Quartis Mobile

THE UNIVERSAL STANDARD MEASUREMENT SOFTWARE

WM | Quartis Mobile is the product for applications using mobile measuring instruments. The following measuring arm can be operated with the product without an additional module: WENZEL WM | MMA. The additional DME-MAN module also supports the Hexagon RDS, FARO USB FaroArm and Kreon ACE measuring arms. The use of other measuring instruments is not possible with this product.

User interface

Suitable for every task

The easy-to-use, task-oriented and individually configurable graphical user interface is suitable for every measuring task. The measuring programs can be started quickly and easily with just one click via the quick selection panel or by means of a barcode scanner. The relational database also ensures traceable measurement results. The integrated statistics package guarantees a quick assessment of the manufacturing processes. The CAD functionality of WM | Quartis Mobile is the basis for efficient measurement. The integrated live preview ensures a correct application of the standard-compliant evaluation according to ISO GPS and ASME.

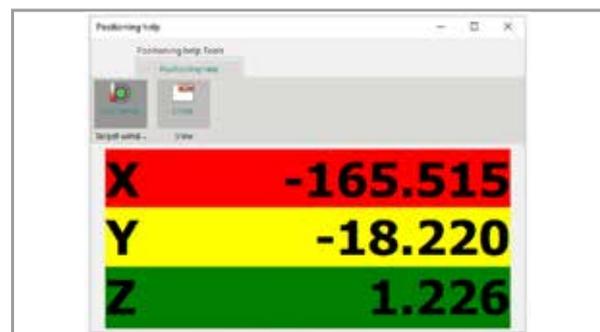
Clear measurement reports

Everything at a glance

The integrated report generator allows free design of measurement reports (table and graphic views with freely configurable data and statistics boxes). Deviations can be displayed color-coded. WM | Quartis Mobile also offers various export options (PDF, ASCII, Excel).

Positioning help

The new working window "Positioning help" is used to approach the touch points of the elements as accurately as possible with manual measuring devices during the execution of measuring programs. The target window of the positioning help is defined over the measuring distance and moved in the normal direction of the point to be probed, taking into account the currently used probe radius. The target point is therefore identical to the contact point of the probe on the material (at actual = nominal). The "Positioning help" working window can be displayed via "Quartis button / Working window / Display and edit positioning help". If the "Positioning help" working window is switched on and manual measurement of an element is active during execution of a measuring program, the X, Y and Z values are displayed numerically in the working window.



EXTERNAL SOFTWARE

	WM Quartis	Metrolog	Polyworks
Tactile measurement	WM Quartis Mobile Tactile	WM EVO touch	Polyworks Inspector Probing
Optical measurement surfaces	WM Quartis Mobile	WM EVO touch & scan	Polyworks Inspector Standard
Optical measurement features	WM Quartis Mobile R2020-2	WM EVO touch & scan	Polyworks Inspector Standard

FOR MEASURING ARMS

The optical sensors of the WM | MLS product series were specially developed for use on the measuring arm. Depending on the sensor, these enable you to digitize a component in record time with a correspondingly high resolution. They can measure with a line width of 100 mm to 200 mm (depending on the sensor) and digitize the component with an accuracy of up to 9 μm at a data rate of 600,000 points per second. Depending on the version, the sensor also has temperature compensation and an LED display.



WM | MLS 100

The WM | MLS 100 is distinguished by a max. laser line of 100 mm at a line resolution of 50 μm and a maximum data rate of 200,000 points per second.



WM | MLS 100P

The high-resolution scanner WM | MLS 100P has a max. laser line of 100 mm at a line resolution of 25 μm and a max. data rate of 600,000 points per second, which enables accurate digitization.



WM | MLS 200

The optimized scanner WM | MLS 200 has a max. laser line of 200 mm at a line resolution of 50 μm and a max. data rate of 600,000 points per second, which enables fast digitization.



Renishaw Equator

POWERED BY WENZEL

In the past, various measuring instruments were used to control manufacturing processes, e.g. Calipers, go/no-go gauges or bore gauges were used. The Equator Gauge combines these measurements in one device. This independent inspection system offers a good repeatable accuracy at an appropriate speed, with light weight and a high operability for manual and automated applications in production. For direct quality assurance in the process, the Equator enables timely

corrections to the process for specific manufacturing processes. By checking at more frequent intervals, the following occurs; A fast reaction to possible process fluctuations. Almost independent of the production environment, constant accuracy can be guaranteed in a temperature range from 5°C to 50°C at a humidity of 80%. The system is designed for ease of use, cost reduction and improved process control through an appropriate test system concept.

FEATURES

- **100 % testing** at low cost
- **Increase measurement throughput & reduce labor costs** through automation solution with Equator tester
- **Reduce scrap** with real-time process monitoring functionality
- **Short cycle times** due to versatility & high operating speed
- **Versatile** due to high temperature range & many configuration options

APPLICATION AREAS

The Renishaw Equator powered by WENZEL is used wherever gauges, measuring rings, etc. have been used until now. By previous production of a master part on a CMM, in connection with the Equator, almost 100 % inspection of the manufactured components can be realized in time with the production cycle. Therefore you don't even have to change the software, both the CMM and the Equator work with WM | Quartis from WENZEL. By loading measurement programs on the PC of the Equator, it is possible to select the corresponding program previously created on the CMM.

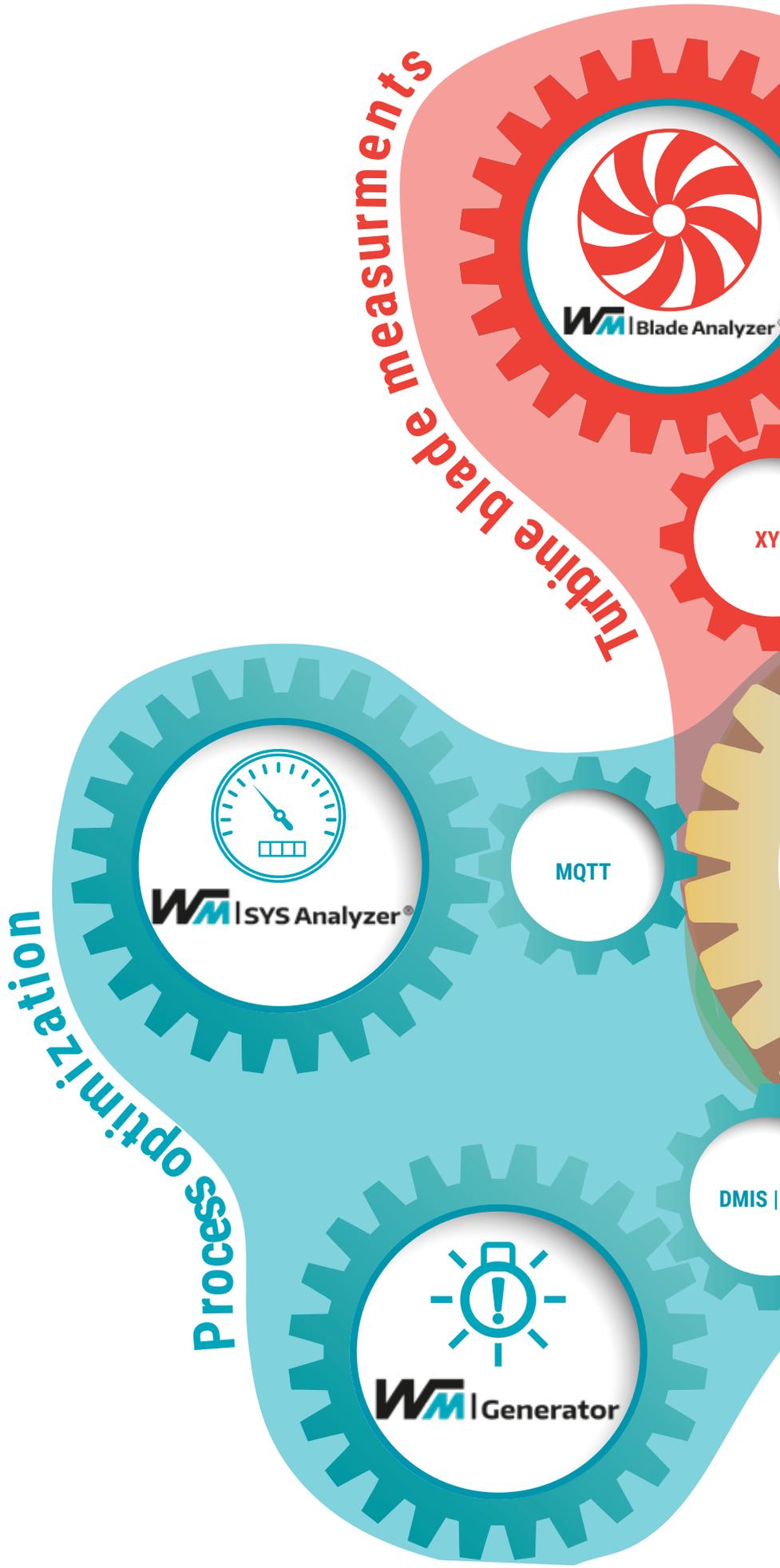




YOUR ADVANTAGES AT A GLANCE

- **Suitable for workshop and production use**
 Temperature range 5°C - 50° | Reliable measurement in Production environments | Temperature fluctuations compensation by reference point definition
- **Excellent price-performance ratio**
 One-system complete solution | One system for different Workpieces | No ongoing calibration costs
- **Flexible and universal use**
 Exchangeable clamping device | Simple Configuration | Operating system WM | Quartis Equator
- **Integration into the line and into the automation processes**
 Automation kit EZ-10 available | Automatic workpiece loading possible | Barcode reader for automatic program selection
- **Improved process control**
 Automatic updating of machine tools | Integrated data display

WM | Software Solutions®



Gear measurement

WM | Gear

GDE

WM | Gear Analyzer

I++

WM | Quartis



STL

Reverse Engineering



WM | Design



WM | PointMaster



WM | PointMaster for CT

PMI

EVALUATION SYSTEMS AND ACCESSORIES

PRECISION IN DETAIL



WENZEL Evaluation Station

- Compact workstation with integrated media supply
- Mounting the WENZEL CNC-Controller
- Housing of the evaluation PC system in desk form (120 cm x 90 cm) 19" technology

WENZEL evaluation system CNC

- Optimized machine performance
- Optimized for WENZEL & Renishaw sensors
- Scanning button possible via option cards

Interfaces WPC2040

- Ethernet
- RS232
- Readerhead input (5V TTL)
- Push-button input (5V TTL)
- Motor connections



Standard control panel HT400, wired

- Ergonomic shape for one-handed operation
- 1 joystick for all axes
- Multifunction pad
- Stepless adjustment of the CNC travel speed
- Emergency stop function according to EN 60204 and EN ISO 13850

Wireless control panel HT400RC

- Wireless control panel HT400RC incl. receiver
- 1 charging cable each 0.5 and 6.0 m
- Charging station and spare battery
- Power supply



Styli

Comprehensive range of styli for every application

The accessories shown here are only a small selection from our extensive product range.

For further information please contact your local WENZEL representative.

TECHNOLOGY AND SUPPORT

WENZEL SHOPFLOOR SOLUTIONS IN DETAIL



Reliable results on the shop floor

Active damping

The SF Series can optionally be equipped with a pneumatic active damping system, which protects the CMM from external vibrations and kinematic influences.

Thermal compensation

The SF Series can be equipped with automatic temperature compensation. Thus, the measuring device and work piece are protected against the thermal influences of the environment.



Robust and efficient

The measuring systems from WENZEL for the shop floor area are not only robust and insensitive, but are also characterised by high dynamics and productivity as well as low space requirements and good accessibility, making them ideally suited for the rough, often cramped conditions in the workshop, series monitoring or automation.



Service and application support - We are there for you

Professional user training

Training can be offered as individual training, group training and seminars. The Training can be performed at your facility or at your WENZEL technical center.

Qualified service team

Our service team is there to assist you: For repairs, maintenance, retrofitting and telephone support or with WENZEL Online Service (WOS) - the Internet-based remote diagnostics and remote maintenance service.



High resolution scales

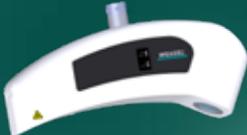
Accurate positioning thanks to the optimal position measuring system technology

The SF CMMs are equipped with an incremental measuring system, which has very fine scale pitch, and excellent dirt immunity.

Thus, the best position resolution and stability at high speed in all linear axes is possible. The highly precise and robust scale tapes compensate inherent hysteresis.

WENZEL Sensor Program

THE RIGHT SOLUTION FOR EVERY TASK

	WM Shapetracer	WM LS 70	WM LS 150	WM LS 600	WM DS & WM HS
					
Technical Basic principle Line length	 120 mm	 70 mm	 150 mm	 600 mm	 40 µm measuring point
Resolution					
Accuracy*					
Part size***	 	 	 		
Typical measuring tasks	 	 	 		
Supported Software					
Supported machines		 ****		 *****	

* based on MPEn-2 according to manufacturer

** available from 10/20

*** depending on cycle time & measuring speed

**** WM | MMA with accessories

***** from LH 2010

***** under development

Basic technical principle



Laser
Triangulation



Striped light
projection



White light
interferometer

Resolution



Medium



Accurate



Precise

Accuracy



Medium
> 100 µ



Accurate
> 50 µ <



Precise
< 10 µ

<p>WM MLS 100 WM MSL 100 P WM MLS 200</p> 	<p>WM AS 3036**</p> 	<p>Nikon LC 15 Dx</p> 	<p>Nikon XC65 Dx</p> 	<p>WM RS-C</p> 
 <p>100-200 mm</p>	 <p>300x360 mm</p>	 <p>18 mm</p>	 <p>3 lines offset by 120°</p>	
				
				
 			 	
 	 	 	 	
				
				<p>*****</p> 

Part size



Small



Medium



Large

Typical measuring tasks



Surfaces



Features



Gap and flush

Supported Software



WM | Quartis



Metrolog



WM | PointMaster



Polyworks

INNOVATION MEETS TRADITION

The WENZEL Group is a market leader in innovative Metrology. WENZEL offers a comprehensive product portfolio in the fields of Coordinate Metrology, Computed Tomography and Optical High Speed Scanning. The technology of WENZEL is used in all industries, including the automotive sector, aeronautics, power generation and

medicine. WENZEL looks at today on an installed base of more than 10,000 machines worldwide. Subsidiaries and agencies in more than 50 countries support sales and provide after-sales service for our customers. The WENZEL Group today employs more than 600 people.



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