PRODUCT RANGE

OUR SOLUTIONS FOR YOUR MEASUREMENT TASKS

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WENZEL
GENERAL CATALOG

TABLE OF CONTENTS

WENZEL – **INNOVATION MEETS TRADITION**

DR. HEIKE WENZEL AND PROF. DR. HEIKO WENZEL-SCHINZER

MANAGEMENT OF THE WENZEL GROUP

With our product range we are able to support all your measuring needs. As a family business, we strive to achieve long-term partnerships with our customers and for this we invest in the outstanding quality of our machines and offer you excellent service.

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 strong partnerships.

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

In recent years, measurement technology has changed a lot. The measuring tasks are performed in production as well as in the measuring room. In addition to high precision tactile measurement, optical sensors as well as new technologies such as computed tomography have found their place in metrology. We as WENZEL have brought numerous innovative solutions onto the market in recent years so as to offer our customers the right products. In addition to the product itself, we also supply you with turnkey solutions. This makes us flexible experts for innovative measurement solutions.

About WENZEL

Founded in 1968, WENZEL is today the largest family-run measurement technology manufacturer.

More than 10,000 machines installed worldwide

WENZEL Worldwide

More than 600 employees worldwide

Subsidiaries & representatives in more than 50 countries

Our Headquarters

Wiesthal, Germany

Total area:	54.000 m²
of which buildings:	15.500 m²
air-conditioned:	5.000 m²

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 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!

TYPICAL BUSINESS AREAS

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

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

INNOVATION MEETS TRADITION

THE MILESTONES OF OUR HISTORY

AWARDS

TOP 100

PRODUCTS

1968 | Manufacture of testing equipment and precision measuring instruments

1980 | Presentation of the first self-developed 3D coordinate measuring machine

1999 | Entry into the field of measurement software

WENZEL Metromec

2003 | Presentation of the first WENZEL gear measuring machine

CORPORATE DEVELOPMENT

1968 | Foundation WENZEL

WENZEL PRÄZISION

1973 | Production hall with machine equipment

1983 | Extension Work 1

1994 | Foundation America & UK

1997 | Foundation France

2002 | New construction Plant 2

1968

2003

2009 & 2012 | Award 'Bayerns Best 50' & Finalist Best Professional Supplier Award 2012

2004 | Development of WENZEL's own sensors

2008 | Presentation of the first WENZEL computer tomograph

2009 | Introduction of optical high-speed measuring and digitizing systems

2016 | WM I Software Solutions

2018 | WENZEL conquers the shop floor with the SF 87

2005 | Extension administration building plant 1

2019 | Opening of the Shopfloor World in Wiesthal

2005 | Foundation Shanghai

2007 & 2008 | Foundation South Asia (India) & Asia (Singaporr)

2010 | Foundation Italily

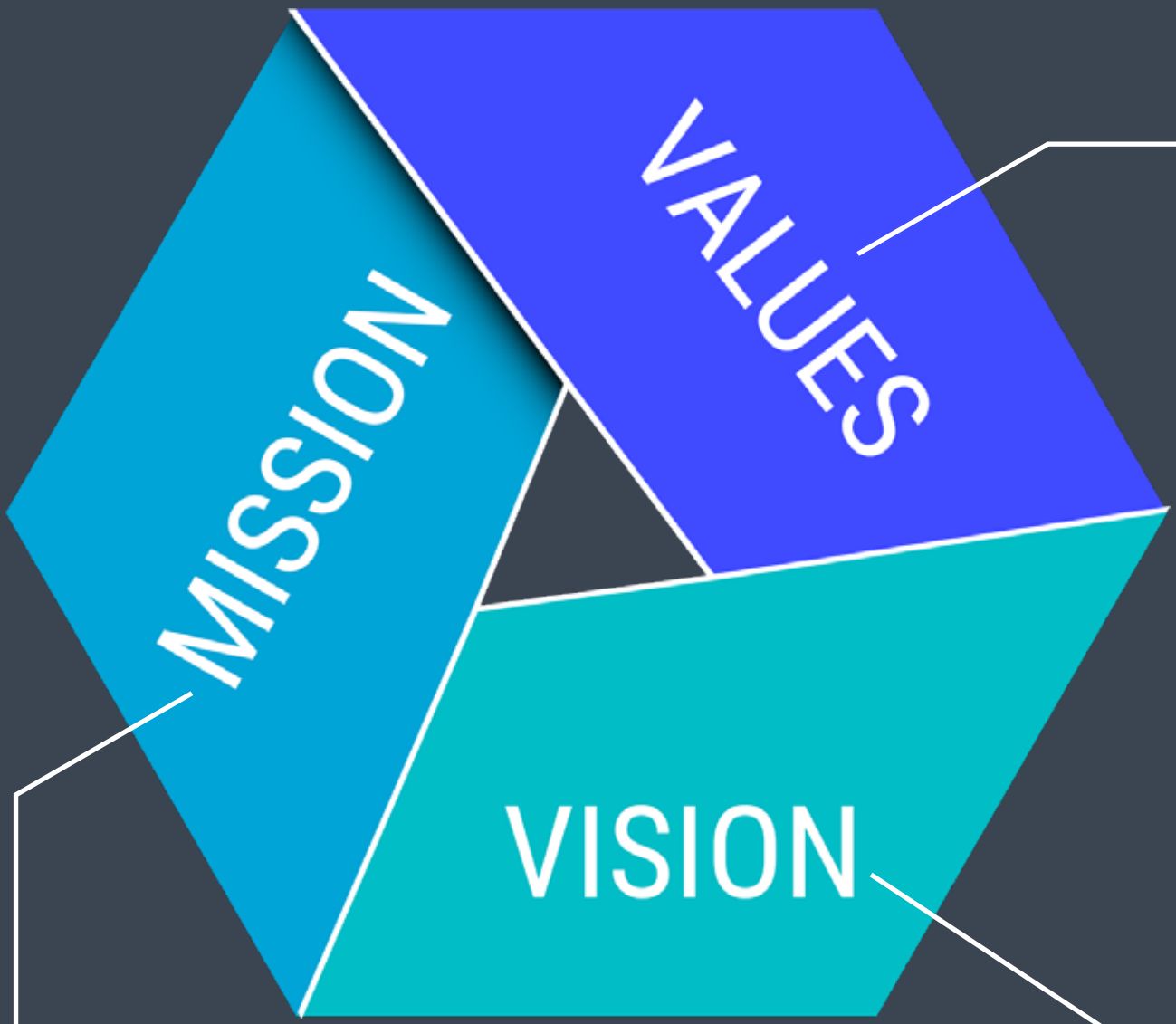
2019 | Foundation Poland

2004

2019

MISSION | VISION | VALUES

DISCOVER WHAT MOTIVATES US



OUR MISSION

We produce metrology solutions at the highest quality level, with which we exceed the industrial requirements of our customers.

OUR VALUES

INNOVATION

Innovative products and processes are the basis for our success - and our drive for the future.

INTEGRITY

Integrity is an indispensable value for us – that's what we stand for as a family with our name.

RELIABILITY

Reliable products and services are the basis for our actions - customers, partners and employees can rely on our sustainable corporate strategy.

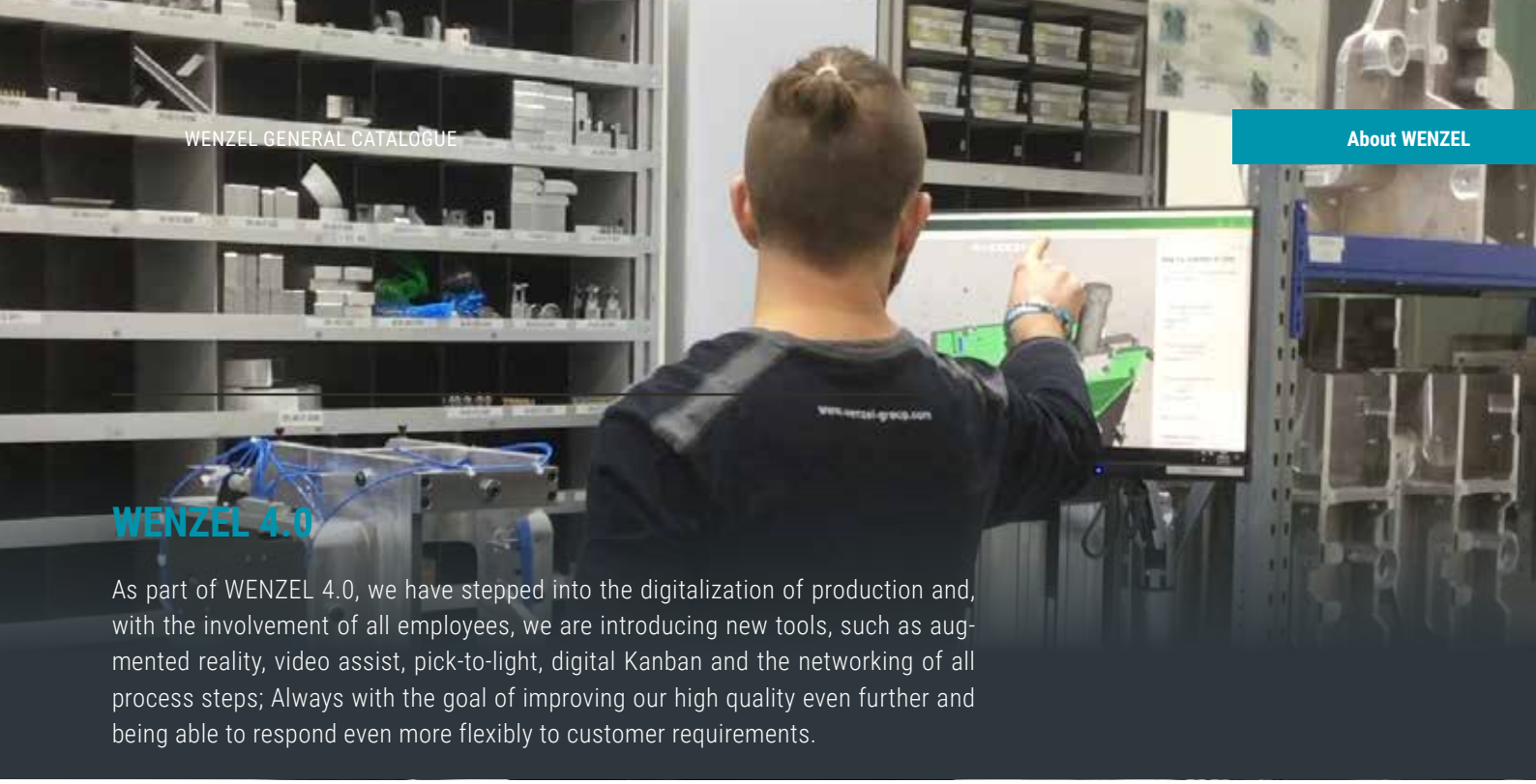
FLEXIBILITY

Individually tailored customer solutions enable the maximum success of our solutions – Our flexibility is based on our unique product portfolio and many years of experience.

OUR VISION

Our innovative products set the quality standard in coordinate metrology. With our flexible production, we create unique solutions and added value for our customers.

THE WENZEL PRODUCTION OUR SUCCESS FACTORS



WENZEL 4.0

As part of WENZEL 4.0, we have stepped into the digitalization of production and, with the involvement of all employees, we are introducing new tools, such as augmented reality, video assist, pick-to-light, digital Kanban and the networking of all process steps; Always with the goal of improving our high quality even further and being able to respond even more flexibly to customer requirements.

01

High vertical range of manufacture

For more than 50 years we have been pursuing the strategy of a high level of vertical integration with distinct advantages for our customers. We see ourselves as a provider of customized solutions as well as series products. At all times, the binding nature of our commitments comes first. With more than 100 employeesin production and a skilled worker made content of more than 98%, we are able to carry out production steps independently in-house.

02

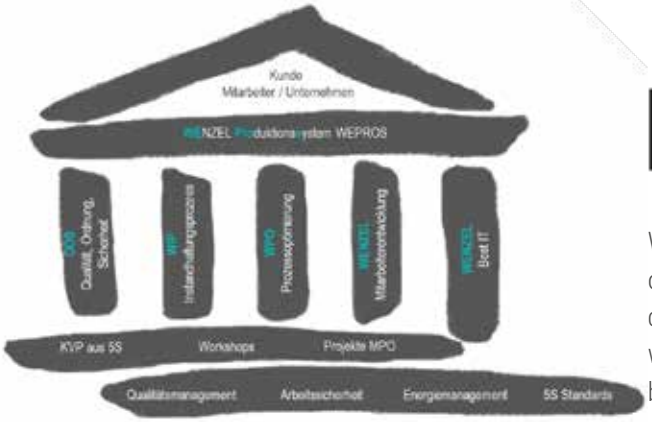
Production Know How

We have production know-how that represents a unique selling point for the industry. Starting with raw steel cutting and welding and casting machining on our CNC machining centers through to our own granite processing with fine adjustment. In addition, the wiring harness and control construction as well as the final assembly take place in our air-conditioned final assembly hall.

03

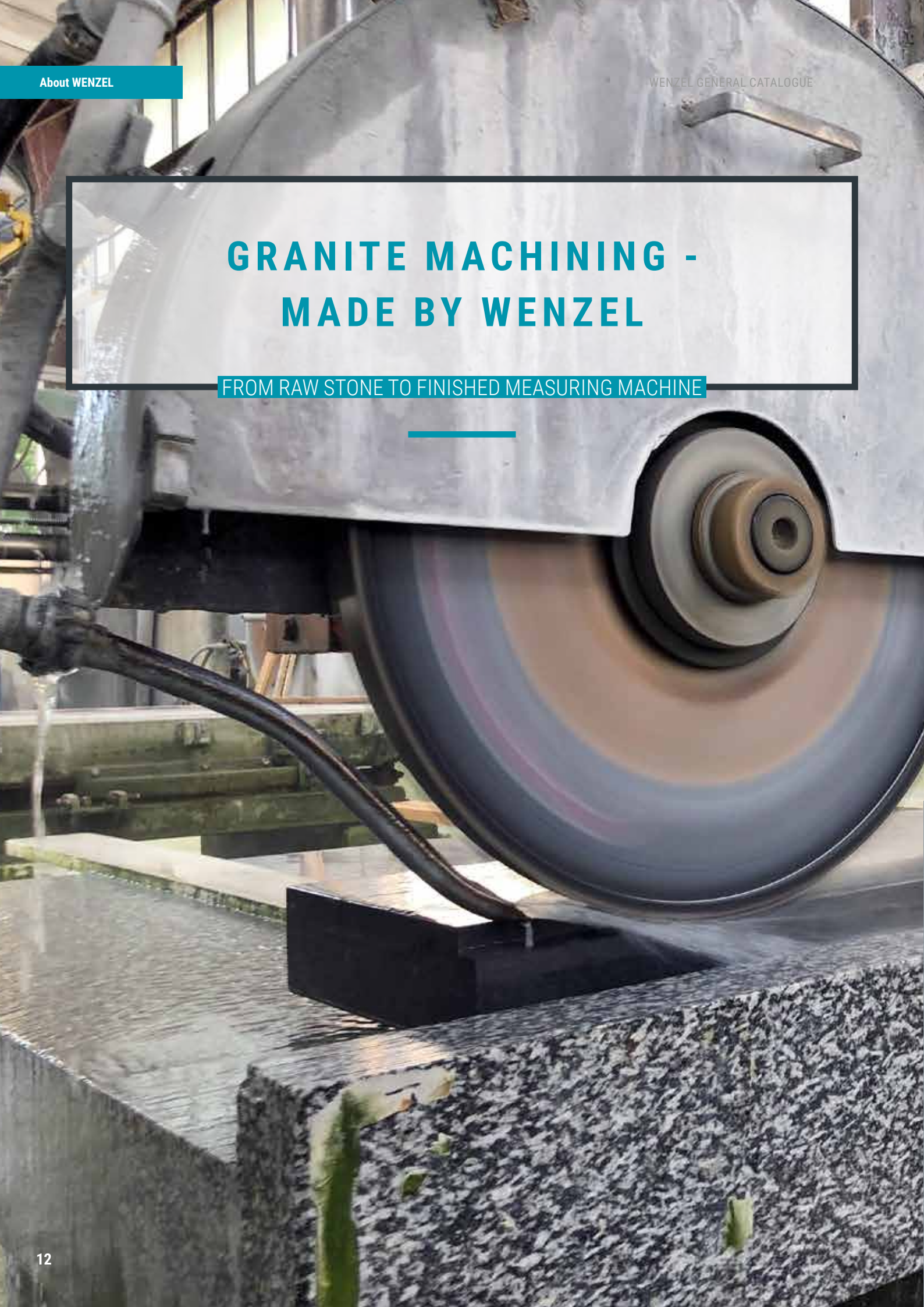
Produktionssteuerung

Quality and delivery dates as well as the planning of all production resources are permanently tracked as part of our production control. This allows the adjustment of delivery dates if necessary and enables a just-in-time production strategy that ensures all capacities are only used on an order-related basis in order to respond to short-term needs. As a result, customer-specific developments with almost standard delivery times can be achieved.



WENZEL PRODUKTIONSSYSTEM
WM | WEPROS

We are convinced that our know-how in production, which has grown over many years, is the key to our success. The knowledge of each core process is the basis for a continuous improvement process, which also in our WENZEL Production System WM | WEPROS is visible in the form of customer satisfaction.



GRANITE MACHINING - MADE BY WENZEL

FROM RAW STONE TO FINISHED MEASURING MACHINE

GRANITE MANUFACTURE

Since 2006, the granite manufactory Steinwerk Heina, which was founded in 1880, has belonged to the production network of the WENZEL Group.
WENZEL is the partner for customer-specific measurement solutions with the highest quality,
and this goes back to the beginning of the production chain.

Our granite is the basis for all WENZEL measuring machines and is thus fundamentally important for the high mechanical precision. As is typical of WENZEL, our production chain starts with the selection of the ingot in South Africa by our granite production manager. Only granite blocks that meet our high standards are sent on the long journey to our stone factory near Darmstadt.At WENZEL Steinwerk, our long-term employees are workingwith the help of state-of-the-art CNC processing machines, the single ingots weigh up to 40 tons, to send them on the way to Wiesthal.

In Wiesthal, the grinding and fine adjustment operations follow until the blocks arrive on schedule in final assembly. The mastery of this complex process chain ensures high quality and customer loyalty at all times and enables us to create special products to meet customer needs with shortest delivery times.

WENZEL PRODUCTION WORLDWIDE

ONE QUALITY STANDARD

SHANGHAI ASSEMBLY PLANT

We also produce measuring machines for the Asian market in our assembly plant in Shanghai with almost 100 employees, on a production area of almost 1,300 m². The accuracy-relevant core components "Made by WENZEL" are provided by our main plant in Wiesthal. Many Chinese employees become part of an international exchange program trained in the parent plant and pass on their knowledge to new employees in Shanghai.

We are particularly proud of the granite processing modeled on the Production at the Wiesthal plant, the fine machining of high-precision machine elements is one of WENZEL's core competences. The connection to our ERP and quality system secures the high product quality with shortest delivery times for our measuring machines "Made by WENZEL in China".

WENZEL LIFE CYCLE

PLANBARE WARTUNGS- UND BETRIEBSKOSTEN
IHR INDIVIDUELLES SERVICEPAKET

WENZEL measuring machines are durable capital goods and are characterized by a very high level of quality due to the design, construction and high in-house production content of WENZEL. This is also reflected in the usage behavior and especially in the service life of the machine. Many customers use their machines for years and decades and WENZEL offers with specially tailored **service products** each customer the best solution for their specific use case. The specially designed Business Unit **Service & Application Center (SAC)** offers all relevant service products with a broad product portfolio. The broad spectrum of the SAC covers all needs during the life cycle of a measuring machine in terms of field services, calibration, wear and spare parts, as well as software and service contracts.

With the **service contracts** offered by WENZEL, customers can choose between **different contract models, scopes and terms**. The most comprehensive package is provided by the **WENZEL Full Service**, which, in conjunction with a manufacturer's warranty of up to 5 years, including multi-shift operation, covers all service costs in connection with the operation of the machine. WENZEL ensures the maximum availability of the machine and carries out all related services including the required parts. For the customers this means, with **maximum operational safety and availability of the machine, a reduction of risk** during use at a **clearly defined cost**.

Through **financing and leasing terms** offered by WENZEL, in combination with full service, up-front investment costs can be avoided and machines can be used at precisely defined operating costs without risk. Other contract models are **maintenance contracts** for the machines, which in the case of new machines can also be supplemented by a corresponding **warranty extension program**. The software used can always be kept up-to-date through **software maintenance**. In doing so, they ensure access to new insights and features that are recorded with each new software release, as well as the implementation of legal requirements and standard changes. In addition, customers secure access to our **WOS (WENZEL Online Service)**, a hotline that provides technical support for the use of our software and machine. All service contracts have in common that they offer **significant financial savings** and are good tools, to **reduce operating costs significantly**

Due to the longevity of the machines already mentioned, it is a very interesting option for customers to divert their measuring instruments to the latest state of technology. Here, WENZEL offers to equip older machines with new PC and controller technology and, in conjunction with the latest software, to bring them up to the


Used Machines
Support
Tech Support / Fieldservice
WENZEL Online Service
Parts Supply
Training
Measurement Services
Software
Retrofit


WENZEL

level of new machines. In addition, **retrofits can be offered to increase performance**. These can be conversions from indexing to scanning or REVO 5-axis measuring systems. Likewise, retrofitting of optical sensors is possible which allow machines to be used as multi-sensor machines; highest accuracy by tactile measurement and speed increase by non-contact optical working. WENZEL Retrofits increase performance and ensure the use of the machine for another life cycle.

Customers with technical questions can contact the WENZEL Contact Support, where there are central contact points for questions concerning software topics or machine operation. Experienced technicians support you by phone or switch directly to the customer's machine via WOS (WENZEL Online Service). This customer service directly supports the processing from open topics or prepares if necessary purposeful further measures. If necessary then there is a service network available to plan and implement putting a service technician on site. The central operational planning in Wiesthal has all customer requirements in mind, determining the necessary measures and controlling the operations of the service technicians.

The **WENZEL Academy** offers both seminars as well as individual training. The basics for successful measuring and working with the WENZEL Software WM | Quartis and all other WENZEL software solutions are covered in the seminars. For individual training, the group consists of employees of a single company. The contents of the training can be designed according to your requirements and your own workpieces can be measured. The training can be done at WENZEL or take place at your facility. Our Solution Center is equipped with the Laboratory World for classical measuring room applications and the Shopfloor World for production-related applications, the appropriate premises, machines and equipment is available in order to achieve the most efficient and practical training.

WENZEL is a **member of the Global Training Standard for Production Measurement Technology (AUKOM E.V)** and offers all relevant AUKOM training courses using specially trained coaches. AUKOM seminars provide metrological basics and thus complement the WM | Quartis product training in an ideal way. The AUKOM Seminars take place in three stages (operators, users, expert).
To set a worldwide standard for implementation, **WENZEL** has set up a global **W**ENZEL **Q**ualification **P**rogram with **WQP** to ensure service delivery. In it are technical requirements, as well defined training and qualification requirements that are met by all subsidiaries and partners. This is documented by the **WQP certification** and guarantees customers qualified support.

First choice second-hand! WENZEL offers low cost used coordinate measuring machines.
The machines are overhauled in the factory and their hearts and kidneys checked. Properly prepared in this way, you have the opportunity to secure the use of a proven measuring machine at an attractive price. On our homepage you will find an overview of our current range of **used machines**:
https://www.wenzel-group.com/de/used-machines/

OUR PRODUCT LINES

THE RIGHT SOLUTION FOR EVERY TASK

So as different, complex and challenging, as the products made by industry are, so too are the associated measurement and control tasks. These are necessary to ensure and document the quality of the production process and optimize, thereby minimizing the scrap rate, improving products and reducing costs. WENZEL offers a wide range of measuring solutions for these various measuring tasks. The product portfolio offers ideal, customer-specific solutions with the appropriate equipment, whether for watch manufacture, the manufacture of components for coffee machines or manufacturing in the automotive or wind power industry. For harsh environmental conditions in production and on the production line, WENZEL offers the SF 1210, SF 87 and SF 55 special shop floor machines, which are also ideally suited for operator use and automation.

LH SERIES

In all imaginable branches of industry, the air-bearing portal measuring machines of the LH series from WENZEL with their high precision, long-term stability, reliability and flexibility to have the ability improve products. From small to medium measuring volumes, as bridge machines and typically gantry machines for larger measuring ranges up to very large machines with guide beams on concrete foundations, the machines are produced to the highest quality standards in many sizes and also customer-specific oversize lengths, designs and equipment.

SF SERIES

Measurement results should be delivered faster and closer to the production line. Accordingly, WENZEL offers the SF 1210, SF 87 and SF 55 special shop floor machines that are built for the rough environmental conditions in production and at the production line and are also ideally suited for both operator use and automation.

R SERIES

The proven upright machines of the R series from WENZEL not only appear in automotive industry and transport engineering, but also in model and mold making, in the aerospace industry as well as in heavy and special machine construction. The systems with and without base plate, integrated into a foundation on the ground level or mounted on an existing floor, are configured not only in customer-specific axis lengths but also as multiple and multi-stand systems or with underfloor measuring equipment.

CORE SERIES

The CORE measuring machine with turntable and the optical double-eye sensor is unmatched for fast measurement of shiny components such as turbine blades, artificial knee and hip joints and when scanning other rotationally symmetric, measurable from the outside parts in conjunction with the optional, additional tactile sensor for other geometries.

GT SERIES

Our new GT series is based on our successful tradition in the development and production of specialized gear measuring machines. We have improved many, decisive details in the new development. The new GT series works with our standard controller WPC and is used with a completely new software from WENZEL. With the GT series we set standards: gear measuring technology grows together with universal measuring technology: tactile and optical!

exaCT series

Additive manufacturing processes with their possibilities to produce internal complex structures unreachable by conventional measuring tools are to be found more and more in production applications. WENZEL's CT range is the ideal tool for measuring and testing these internal and external structures of objects without contact and in non-destructive testing. Defect and structural analyses as well as assembly and dimension checks to the highest precision of non-visible and accessible component areas in a short time paired with a high information density of the volume data characterize this series of machines.

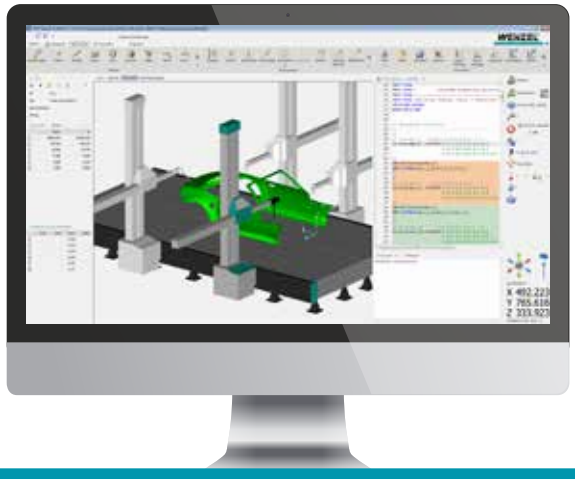
Already before the start of the project WENZEL advises not only on the design of the measuring technology itself, but also on the planning of premises, possibly necessary foundations, automation and networking of the measuring machine as well as subsequently on the creation of the measuring program. Thus WENZEL is the right partner for the solution of your measuring task from the beginning.

SENSORS

Depending on the type and equipment, WENZEL offers the appropriate sensor technology for the machines: touch-trigger and measuring probes, the decades proven, undisputed world bestseller PH10, the stepless PHS, the revolutionary high performance head REVO as well as optical scanners from WENZEL or our technology partner NIKON.

SOFTWARE

The systems are completed with the corresponding user-friendly software - "Made by WENZEL" - for measuring, evaluation, reverse engineering and machine monitoring. Of course, all machines can be equipped with interfaces for automation as well as data input and output and can thus be integrated into a fully automated process.



TRAINING

All WENZEL systems are characterized by highest mechanical precision, reliability and future-proofing through long-term stability and upgradeability. In addition to the in-house service for installation and maintenance, WENZEL offers a comprehensive program for the education and training of machine operators in the training center incl. AUKOM training center.

WENZEL SOLUTION FINDER
THE RIGHT SOLUTION FOR EVERY TASK

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.

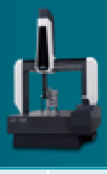
7. Financials: In addition to the acquisition costs, this also includes maintenance and service costs as well as operating costs (e.g. simple operation). Of course, all our solutions have a very good price/performance ratio, but require investments in different amounts. We differentiate between lower,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

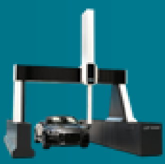
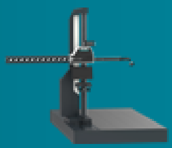
		WM | MMA		XO 5-5/8-7		LH 6-5/8-7		SF 5-5/8-7		XO 10-7/12-10		
		TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	
LOCATION	Measuring room	●	●	●	●	●	●			●	●	
	Production	●	●					●	●			
PART SIZE	Small			●	●	●	●	55 ●	●			
	Medium	●	●					87 1210 ●	●	●	●	
	Large											
ACCURACY	Very high			●		●		●		●		
	High											
	Medium	●	●		●		●		●		●	
APPLICATION	Geometry			●	●	●	●	●	●	●	●	
	Surface	●	●	●	●	●	●	●	●	●	●	
	NDT + defect											
MOBILITY	High	●	●					55 ●	●			
	Medium			●	●	●	●	87 1210 ●	●	●	●	
	Low											
SPEED	Very high		●		●		●		●		●	
	High	●										R
	Medium			●		●		●		●		
FINANCES	Acquisition	+++	+++	+++	++	+++	++	+++	++	+++	++	
	Maintenance	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	
	Ease	+++	+++	+++	++	+++	++	+++	++	+++	++	

*depending on the material of the component

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.

WENZEL®





	LH 10-8/12-10 ACTILE	LH 10-8/12-10 OPTICAL	LH 15-12/20-15 TACTILE	LH 15-12/20-15 OPTICAL	LHF TACTILE	LHF OPTICAL	R-Series TACTILE	R-Series OPTICAL	CORE D/M TACTILE	CORE D/M OPTICAL	GT-Series	exaCT S/M	exaCT L/U
	●	●	●	●	●	●	●	●	●	●	●	●	●
							●	●	●	●	●		●
									●	●	300 ●	●	●
	●	●	●	●					●	●	450 ● 600		●
			●	●	●	●	●	●			900 ● 1200		●
	●										●	●	
			●		●		●		●	●		●	●
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					●	●	●	●			600 ● 900 1200		●
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	EVO ●		REVO ●		REVO ●				●	●		● *	● *
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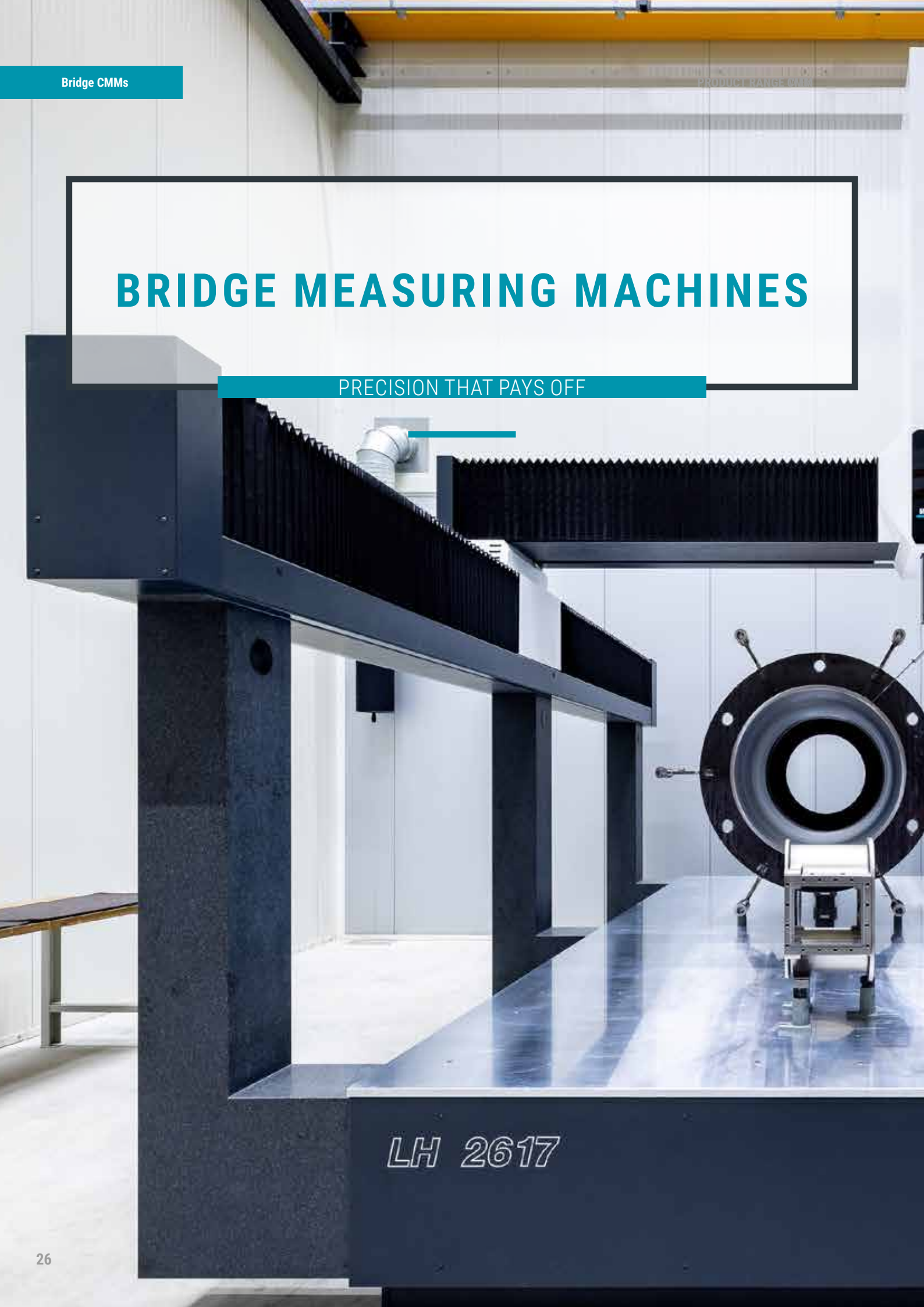
BRIDGE MEASURING MACHINES

PRECISION THAT PAYS OFF



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WENZEL BRIDGE CMMS

RANGE OF SERVICES AND FIELDS OF APPLICATION

With the help of coordinate measuring technology, dimensional measured variables of standard geometric elements or free-form surfaces of individual parts, moulds, models and tools can be recorded. The elements are picked up at the workpieces and their measuring points are then processed further on computer. The development of coordinate measuring machines has made it possible to perform measuring tasks faster and with very high accuracy. Coordinate measuring technology is therefore indispensable in today's industrial production process.

Measurement technology has been WENZEL's profession since 1968 and in 1980 the first coordinate measuring machine developed by WENZEL was introduced. Since then, WENZEL has been one of the world's leading suppliers of coordinate measuring machines and the largest family-run company in the industry. Today, the name WENZEL is synonymous with highest precision and innovation in the fields of coordinate measuring technology, computer tomography and high-speed scanning.

With coordinate measuring machines from WENZEL almost all measuring tasks can be mastered. The success of WENZEL's customers depends on the performance of its products and services. Their demands for quality and precision are constantly increasing. WENZEL takes up this challenge every day with the aim to convert the needs of the different industries into efficient products.

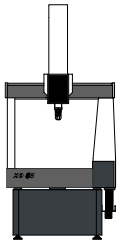
The offer extends far beyond the machine configuration: For special requirements WENZEL has tailor-made solutions ready: From conception and planning to the turnkey handover. In addition to the production and installation of the measuring instruments, this includes, for example, the necessary static calculations as well as the complete installation of the measuring room, including the control and safety technology. Starting with the floor construction up to the software configuration - WENZEL makes almost everything possible.

COORDINATE MEASURING METROLOGY

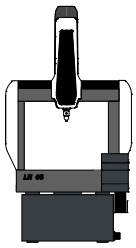
„MADE BY WENZEL“

WENZEL offers well-engineered coordinate measuring machines (CMMs), which have proven themselves many times in the market. In this brochure we first present the XO and LH series of CMMs. The LH series bridge CMMs have air bearing guide elements in all axes which ensure wear-free and smooth operation. The LH base plates as well as traverses and quills are made of granite. Granite's physical properties make it the perfect material for measuring instruments. The LH series distinguishes itself by its high accuracy and high measuring speeds.

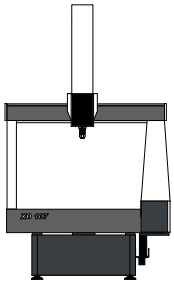
OUR SIZES



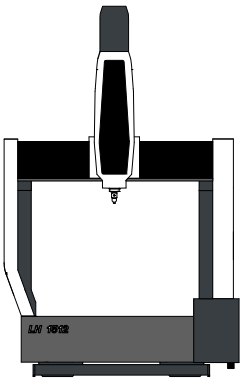
XO 55...



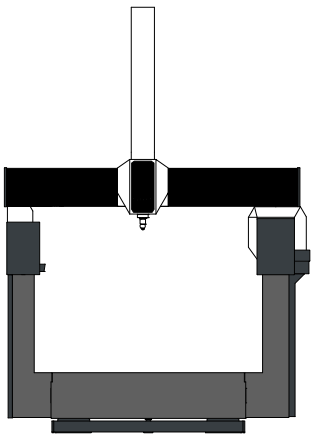
LH 65...



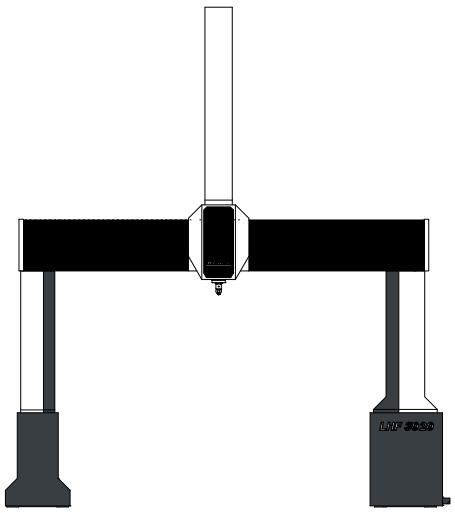
XO 107...



LH 2015P...



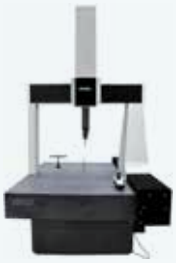
LH 2617...



LH 3020...

ACCURACY | GENAUIGKEIT [µm]

	XO 55	LH 65	XO 87	LH 87
<1		PS 0,8 + L/ 450		PS 0,8 + L/ 450
1	P 1,5 + L/ 350	P 1,0 + L/ 400 S 1,2 + L/ 350	P 1,6 + L/ 350	P 1,0 + L/ 400 S 1,2 + L/ 350
2	S 2,0 + L/ 300		S 2,2 + L/ 300	
3				



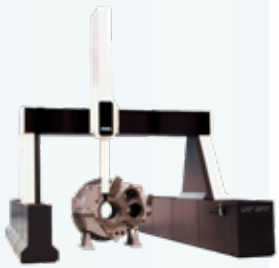
MEASURING VOLUM

XO 107	LH 108	LH 1210	LH 1512	LH 2015
	PS 1,0 + L/ 450			
	P 1,2 + L/ 400			
	S 1,4 + L/ 350			
		PS 1,6 + L/ 450		
P 1,8 + L/ 350		P 1,8 + L/ 400		
			PS 1,9 + L/ 450	
		S 2,0 + L/ 350		
			P 2,1 + L/ 400	
			S 2,3 + L/ 350	
S 2,6 + L/ 300				
				PS 2,9 + L/ 450
				P 3,2 + L/ 400
				S 3,5 + L/ 350
				

E | MESSVOLUMEN

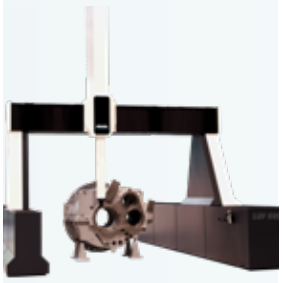
ACCURACY | GENAUIGKEIT [µm]

	LH 2015 G	LH 2317	LH 2617	LHF 2517
2	PS: 2,6 + L/ 450 P: 2,8 + L/ 350			
4-3	S: 3,1 + L/ 300	PS: 3,3 + L/ 450 P: 3,5 + L/ 350 S: 3,8 + L/ 300	PS: 3,6 + L/ 450	PS: 3,5 + L/ 450 P: 4,1 + L/ 350 S: 4,7 + L/ 300
6-5				
8-7				



MEASURING VOLUM

LHF 3020	LHF 3025	LHF 4025	LHF 4027	LHF 5025
PS 4,6 + L/ 450	PS 5,6 + L/ 450	PS 6,6 + L/ 450	PS 7,1 + L/ 450	PS 7,6 + L/ 450
P 5,2 + L/ 400	P 6,1 + L/ 400	P 7,1 + L/ 400	PS 7,8 + L/ 450	PS 8,1 + L/ 450
S 5,8 + L/ 300	S 6,7 + L/ 300	S 7,7 + L/ 300	S 8,3 + L/ 300	S 8,6 + L/ 300


E | MESSVOLUMEN

BRIDGE MEASURING MACHINES

PRECISION THAT PAYS OFF

WENZEL LH coordinate measuring machines are available for different accuracy requirements in three accuracy classes:

Standard | Premium | Premium Select

The already high-precision standard version coordinate measuring machines are surpassed by the Premium and Premium Select models due to even more precisely machined mechanical components, selected materials, optimized acceptance procedures and additional options.

WENZEL ACCURACY CLASSES

AT A GLANCE

- **Perfect interaction** of the machine components
- **Identical thermal behavior** of the granite in all axes
- **Manual** temperature compensation
- **High-resolution** scales
- **State-of-the-art Sensors** (tactile, scanning, optical)
- **Innovative** drive, bearing and guidance technologies
- **Modular design** for retrofitting

- **Online** temperature compensation
- More elaborate **premium acceptance procedure** with tighter tolerances for better CAA Compensation **(Computer Aided Accuracy)**

- Use of the **highest quality granite** for the base plate, cross-beam and sleeve
- **WENZEL-specific** air bearing technology
- Grinding and lapping processing up to the **mechanically feasible limit**
- **Higher resolution** length measuring systems
- Premium Select Acceptance Procedure for **optimal CAA Compensation** (Computer Aided Accuracy)
- Inherent mechanical **accuracy**

WENZEL XORBIT SERIES

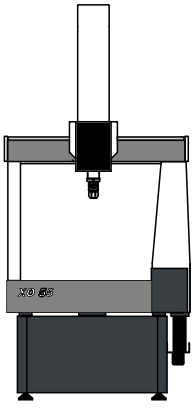
YOUR ENTRY INTO COORDINATE METROLOGY

The WENZEL XOrbit is the ideal coordinate measuring machine for when the essential elements of measurement are important and when speed and ease of operation are required. The XOrbit coordinate measuring machine offers an excellent price-performance ratio and can be equipped with multiple changeable measuring sensors. Its flexibility and suitability for a wide range of applications make the XOrbit an effective all-rounder.

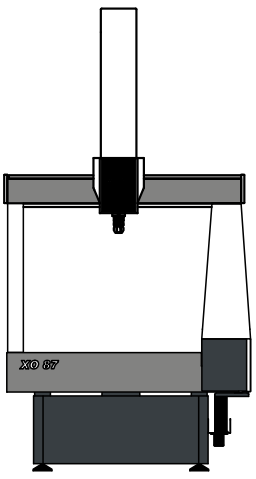
The consistent approach and intelligent machine concept makes it an economical entry into coordinate measuring technology. Simple measurement - simply good. CMMs of the XOrbit series are available in the accuracy classes Standard and Premium.

FIELDS OF APPLICATION

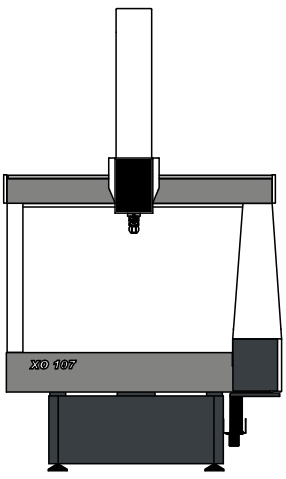
The XOrbit is the all-rounder for every field of application when it comes to measuring standard geometries and free-form surfaces. The XOrbit fulfills all important roles from use in incoming goods through to final inspection. For single or serial parts - the XOrbit is universally applicable.



XO 55



XO 87



XO 107

FEATURES

- **Cost-effective introduction to coordinate measuring technology**
  Excellent price-performance ratio | WENZEL High quality
- **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
- **High flexibility**
  Bellows covers for protection against contamination | Data compatibility with other WENZEL systems | Automation solutions
- **Versatile sensor options**
  Changeable sensor systems | 3-axis scanning | Optical sensors

MEASURING ACCURACY

Type	Measuring ranges X x Y x Z (mm)	Volumetric length measuring uncertainty $E_{L, MPE}$ (µm) Premium
XO 55	500 x 500/700/1000 x 500	1,5 + L / 350
XO 87	800 x 1000/1500 x 700	1,6 + L / 350
XO 107	1000 x 1500/2000 x 700	1,8 + L / 350

Value $E_{L, MPE}$ is only valid with the respective touch probe. Further information can be found in the technical data sheets.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

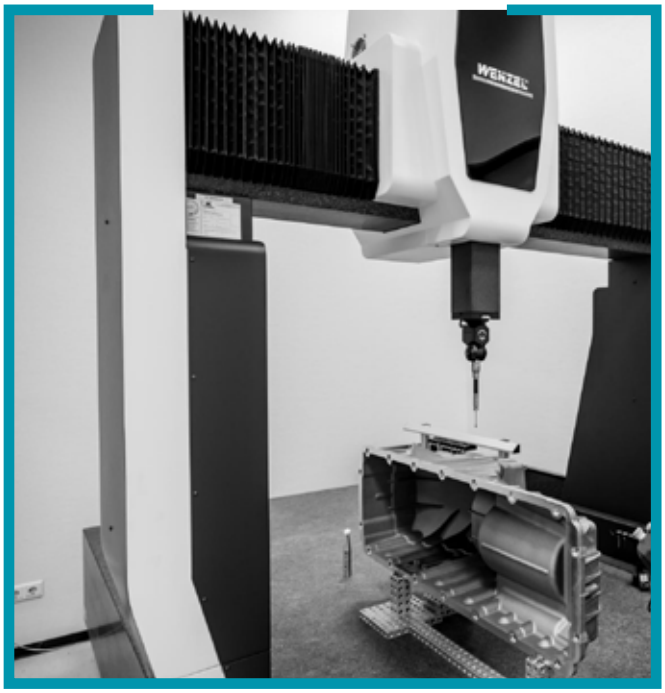
WENZEL LH SERIES

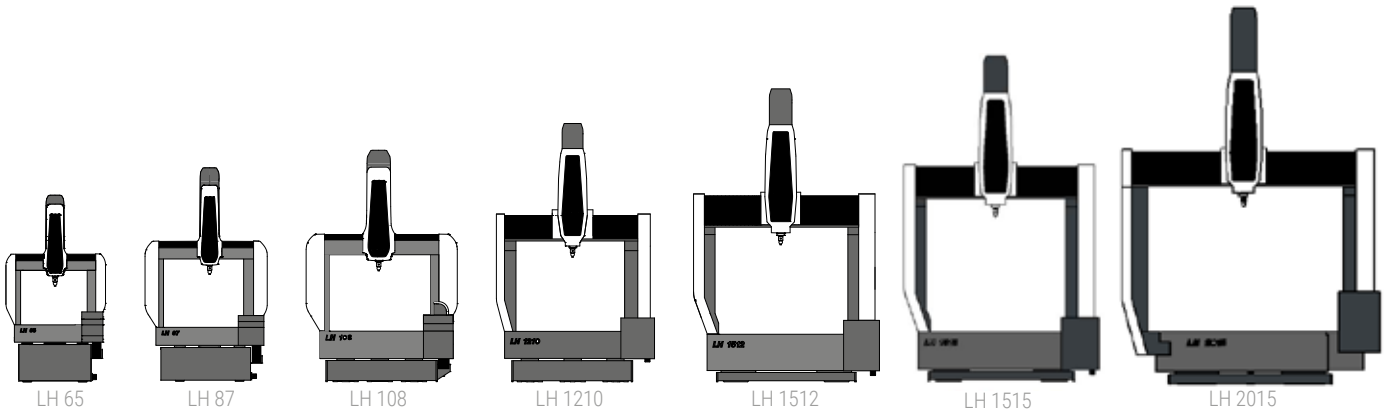
THE FAST AND EASY WAY TO EXACT MEASUREMENT RESULTS

With the LH you benefit from an extremely functional, effective and flexible measuring machine that is reliable and easy to operate.The success of our coordinate measuring machines is based on a proven holistic concept consisting of first-class mechanical engineering, intelligent software and accessory options and a comprehensive service package. Stable, reliable and fully dynamic, the LH is a universal and flexible measuring instrument for a wide range of applications. With the current generation of air-bearing bridge machines, WENZEL continues the progress in precision, efficiency and longevity. With its proven design, the LH impresses with high mechanical accuracy, perfect ergonomics and increased dynamics. CMMs of the LH series are available in the accuracy classes Standard, Premium and Premium-Select.

FIELDS OF APPLICATION

The LH is ideal for all applications requiring high accuracy and high throughput. The LH series is used in almost all areas of industry and measures components in detail from watch manufacture through to the production of large engines. The Y-axis can be customized in length for special sizes.





LH 65 LH 87 LH 108 LH 1210 LH 1512 LH 1515 LH 2015

FEATURES

- **Highest mechanical precision**
  Granite in all axes | Handcrafted | Unique mechanical precision
- **Versatile sensor options**
  Changeable sensor options | 3- or 5-axis scanning | Optical sensors
- **Low operating costs**
  Low air consumption | Fast availability of reliable spare parts
- **Ergonomic design**
  Easy to operate | Ease of maintenance | Aesthetic design
- **High flexibility**
  Customer-specific measuring volume | Data compatibility | Suitable for automation

MEASURING ACCURACY

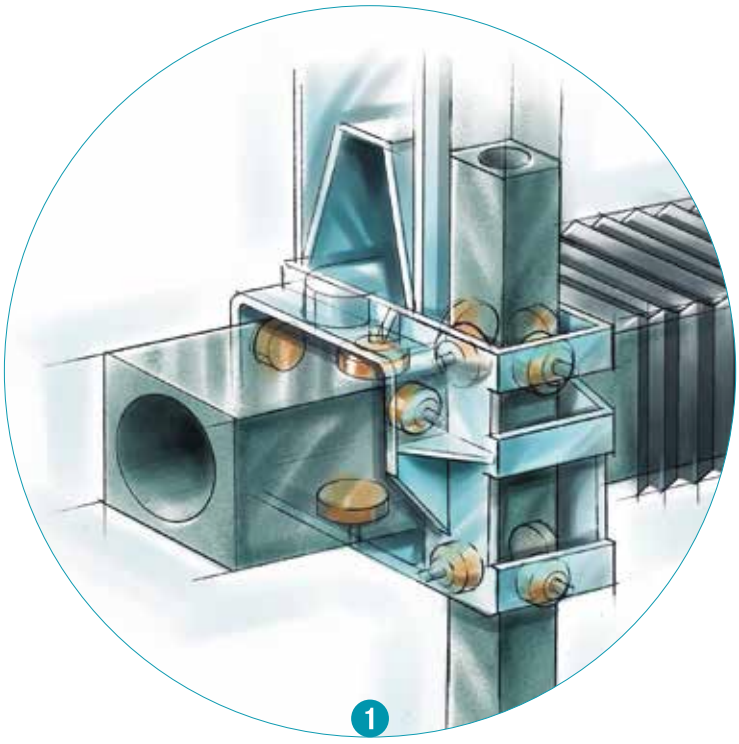
Type	Measuring ranges X x Y x Z (mm)	Volumetric length measuring uncertainty $E_{L,\ MPE}$ (µm) Premium Select
LH 65	650 x 750/1200 x 500	0,8 + L / 450
LH 87	800 x 1000/1500/2000 x 700	0,8 + L / 450
LH 108	1000 x 1200/1600/2000/3000 x 800	1,0 + L / 450
LH 1210	1200 x 1600/2000/2500/3000 x 1000	1,6 + L / 450
LH 1512	1500 x 2000/2500/3000 x 1200	1,9 + L / 450
LH 1515*	1500 x 2000/3000/4000 x 1500	2,3 + L / 450
LH 2015*	2000 x 3000/4000/5000 x 1500	2,9 + L / 450

Value $E_{L,\ MPE}$ is only valid with the respective touch probe. Further information can be found in the technical data sheets.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.
* Estimated value | Machine currently under redesign

THE LH-FEATURES

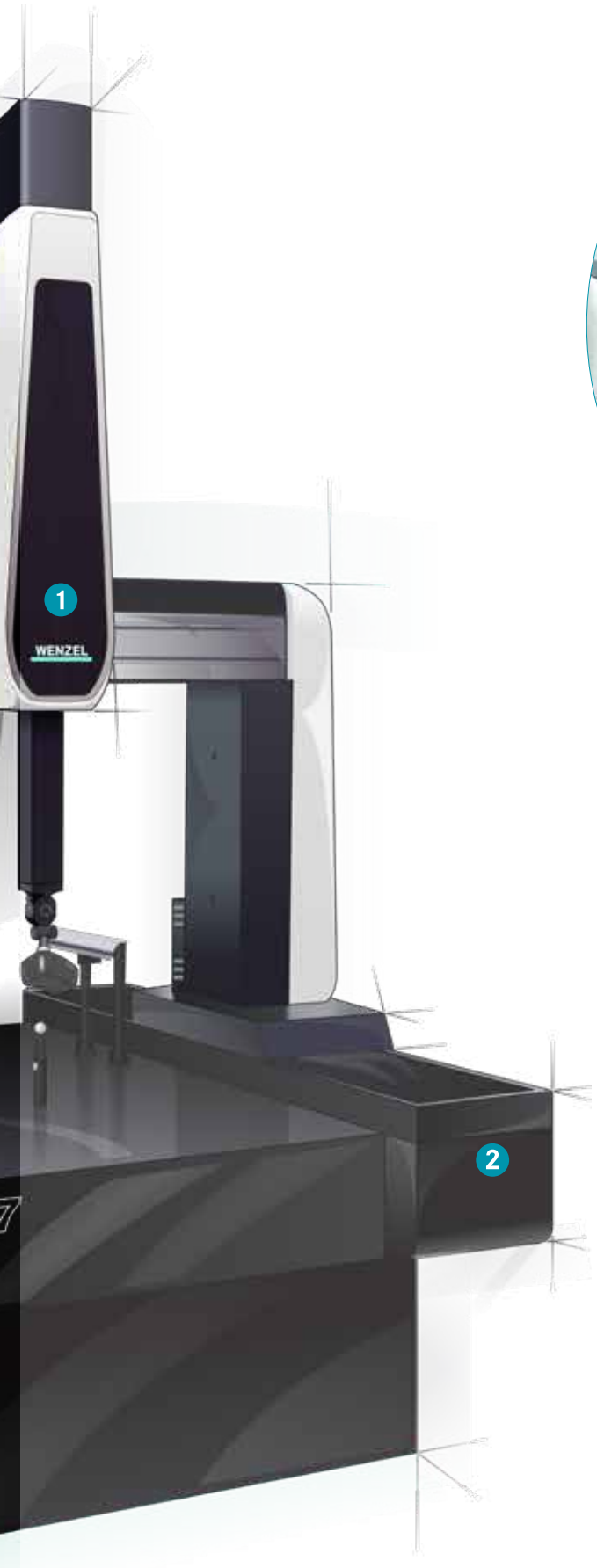
PRECISE IN DETAIL

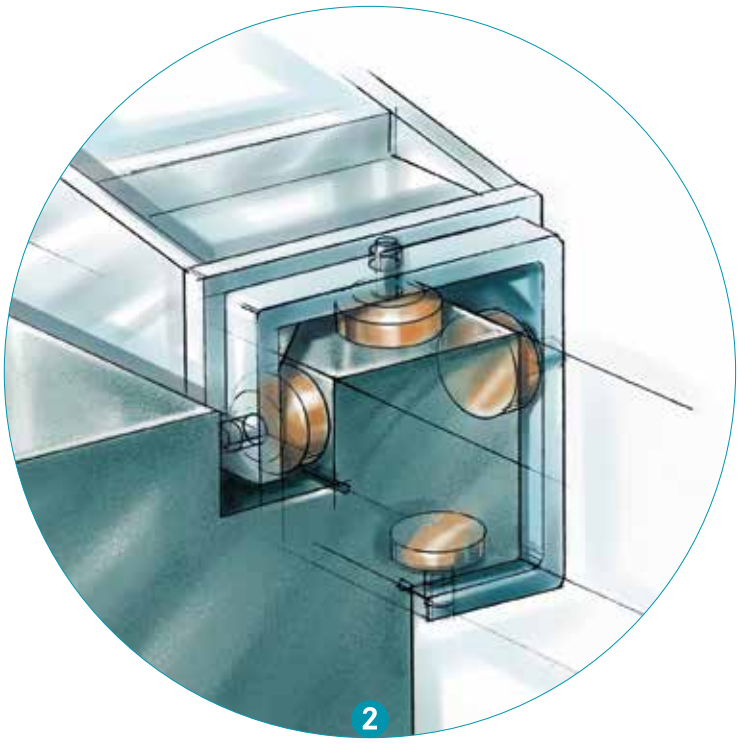
- Base plate, traverse and quill made of dark natural hard stone, ensuring identical thermal behaviour on all axes
- Y-axis guide system integrated directly into the base plate
- Weight compensation of the Z quill by means of a controlled pneumatic cylinder
- Available with active vibration damping
- Air bearing guide elements in all axes for wear-free, smooth-running operation
- Usable surface of the base plate machined according to DIN 876/0
- X- and Y-axis guidance with bellows cover
- CNC control of all axes
- Compact size
- Good accessibility for maintenance work



Components optimized by FEM/CAD guarantee maximum rigidity with reduced moving masses.

Symmetrical guide profiles with reduced wall thicknesses: optimum for predictable expansion behaviour at changing operating temperatures. Bellows protect the traverse as well as the Y-guide against environmental influences.





Preloaded air bearing guides in the Y-axis with high-precision lapped guide surfaces incorporated into the granite base plate: a guarantee for excellent long-term stability.

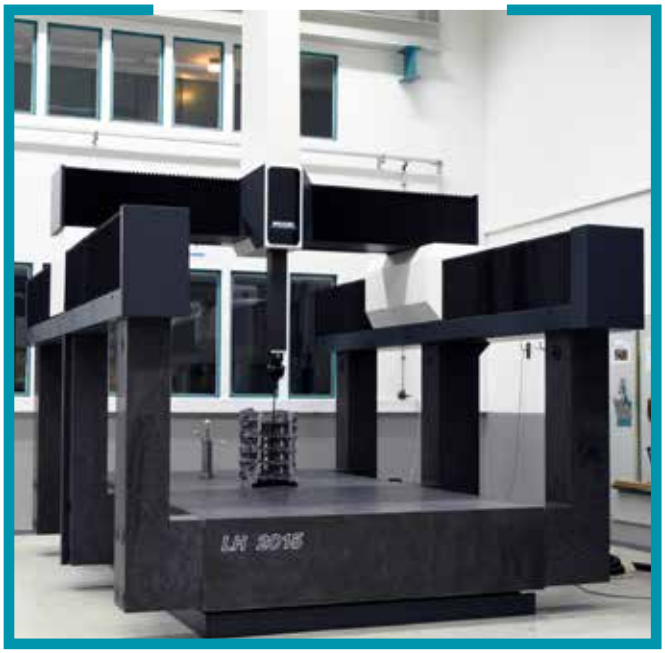
WENZEL LH GANTRY SERIES

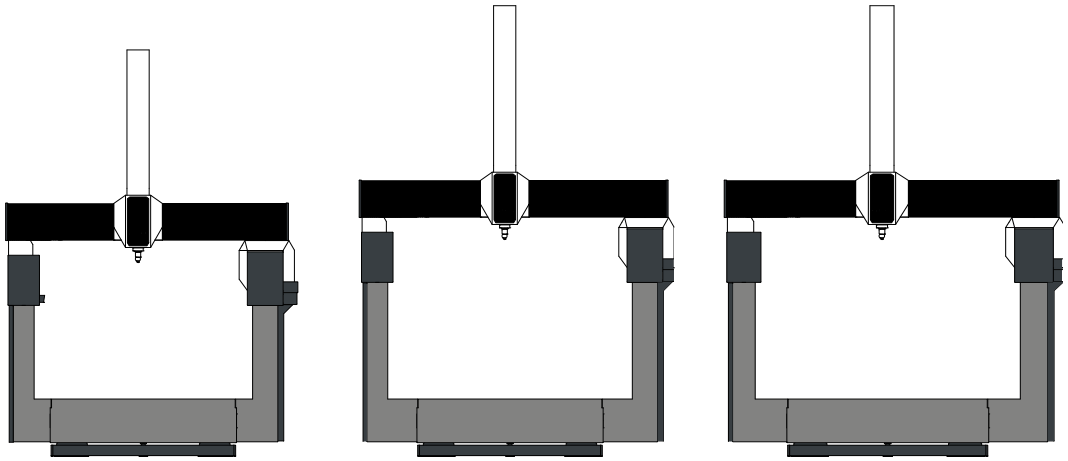
PRECISE RESULTS WHEN MEASURING LARGE COMPONENTS

The LH Gantry is a CNC coordinate measuring machine with air bearings in all axes. It offers all the advantages and application possibilities of the LH Series and has also been specially designed for the inspection of large-volume and heavy workpieces. The raised guides in the Y-axis also ensure maximum stability and rigidity, even with dynamic movements. Overall, the machine body forms an inherently stable, homogeneous unit with optional integrated active vibration damping, which does not require a separate foundation. Thermal environmental influences affecting the workpiece and the CMM can be corrected by means of automatic temperature compensation (optional). The optional use of a rotary table means that even large rotationally symmetrical components can be measured flexibly and accurately. LH Gantry series measuring machines are available in Standard, Premium and Premium Select accuracy classes.

FIELDS OF APPLICATION

Stable, reliable and fully dynamic, LH Gantry machines are flexible, making them universally applicable for a wide range of applications. Typical areas of application are, for example; the measurement of large engines, large gears or heavy machine components. The LH GANTRY Series also meets the growing demand for e-mobility and the associated new challenges for quality assurance. Examples of applications are the measurement of battery boxes for e-cars or e-commercial vehicles. WENZEL is committed to this market and supporting the development of emission-reducing technology.





LH 2015 LH 2317 LH 2617

FEATURES

- **Air bearing guide elements in all axes**
  High mechanical precision | Granite base | Handcrafted
- **Low operating costs**
  Low air consumption | Reliable and inexpensive spare parts
- **High flexibility**
  Customer-specific measurement volume | Data compatibility with other WENZEL systems | Automation solutions
- **Versatile sensor options**
  Switchable sensor systems | 3- or 5-axis scanning | Optical sensors
- **Ergonomic design**
  Simple operation | Simple maintenance | No foundation necessary

MEASURING ACCURACY

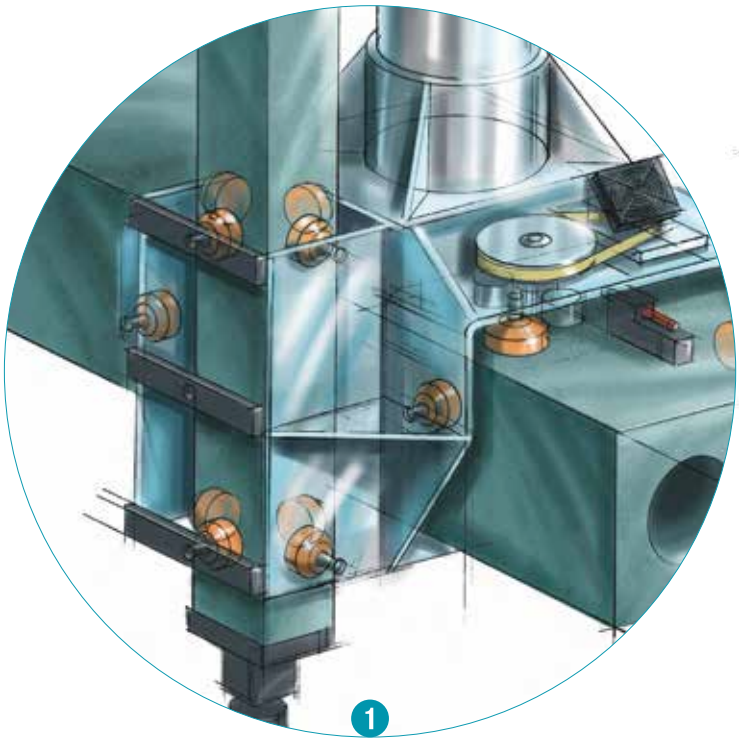
Type	Measuring ranges X x Y x Z (mm)	Volumetric length measuring uncertainty $E_{L, MPE}$ (µm) Premium Select
LH 2015	2000 x 3000/4000/5000 x 1500	2,6 + L / 450
LH 2315	2300 x 4000/5000/6000 x 1500	2,9 + L / 450
LH 2317	2300 x 4000/5000/6000 x 1750	3,3 + L / 450
LH 2615	2600 x 4000/5000/6000 x 1500	3,2 + L / 450
LH 2617	2600 x 4000/5000/6000 x 1750	3,6 + L / 450

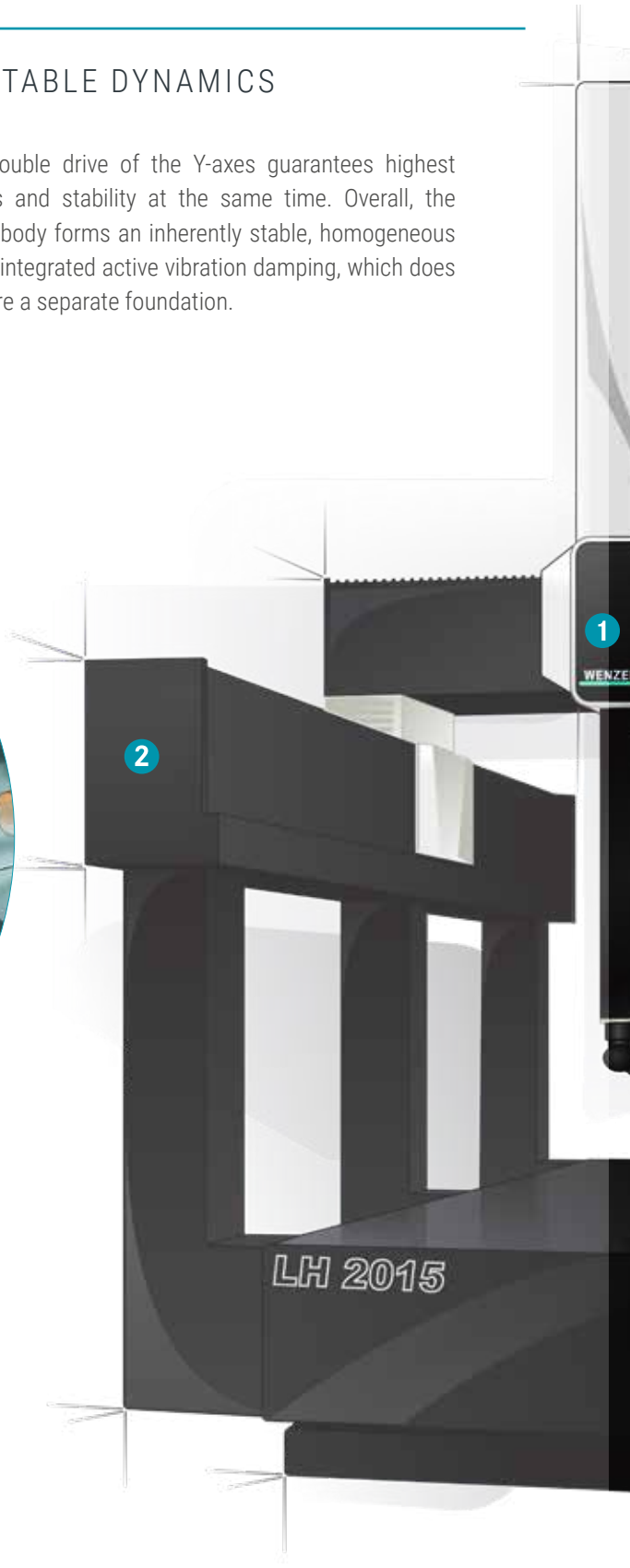
Value $E_{L, MPE}$ is only valid with the respective touch probe. Further information can be found in the technical data sheets.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

THE LH GANTRY-FEATURES

GUIDANCE FROM ABOVE FOR STABLE DYNAMICS

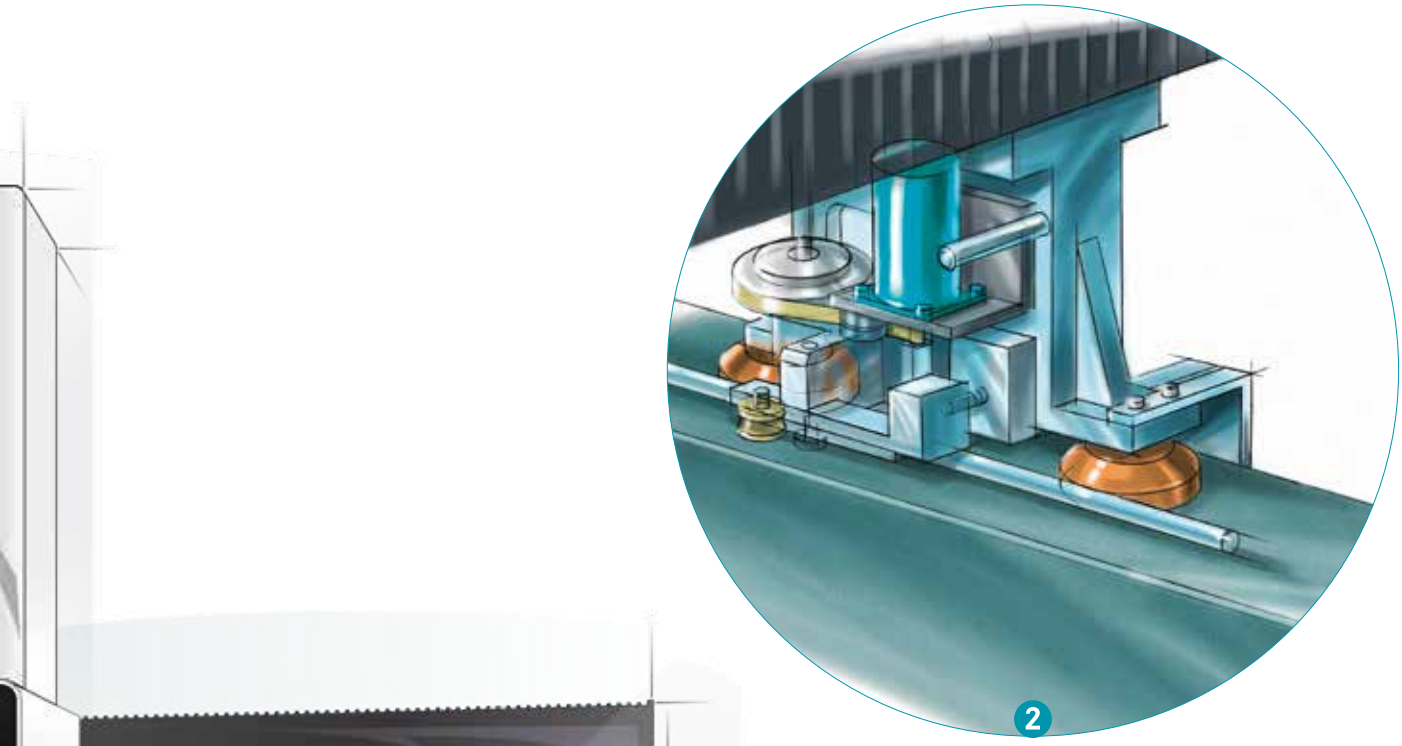
Air bearing guide elements in all axes of the LH Gantry ensure wear-free operation and optimum guidance characteristics. The same thermal behaviour of all axes is guaranteed by a base plate, traverse and quill made of dark natural hard stone. The stiff construction in combination with a double drive of the Y-axes guarantees highest dynamics and stability at the same time. Overall, the machine body forms an inherently stable, homogeneous unit with integrated active vibration damping, which does not require a separate foundation.





Symmetry everywhere

- Optimized air bearing with “broad base”
- Perfection in detail
- Service friendliness
- Thermal stability



Double drive in the Y-axis for LH 2015

- High dynamic

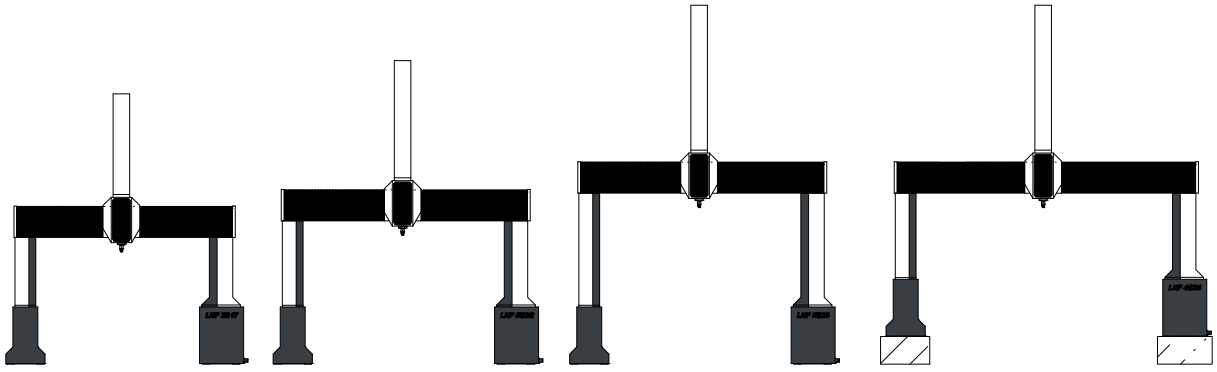
WENZEL LHF SERIES

LARGE MEASURING RANGE AND EXCELLENT ACCESSIBILITY

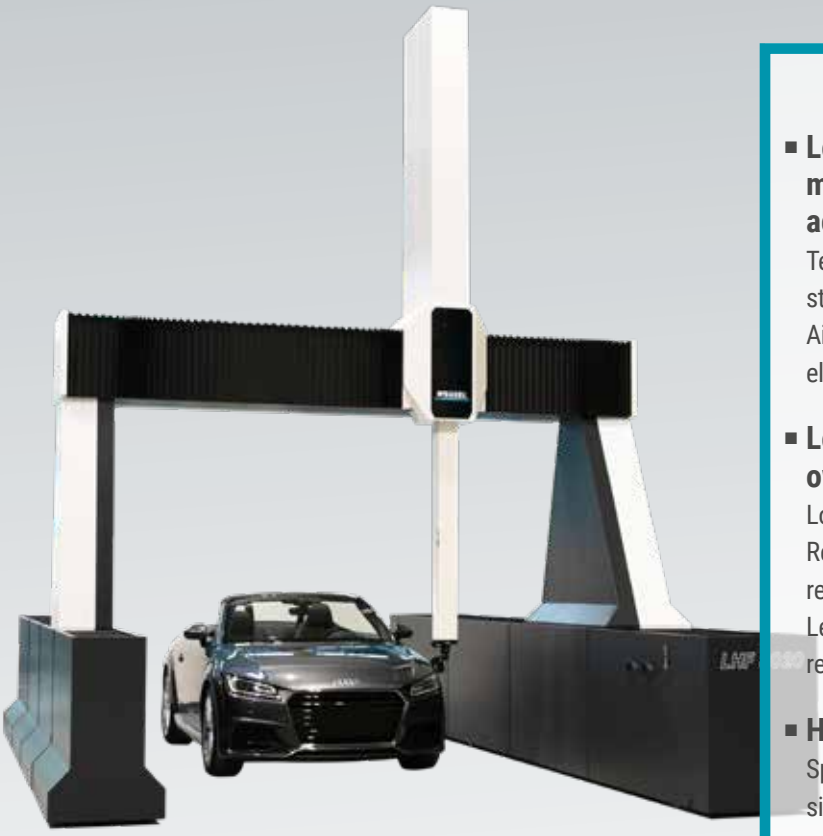
Wide measuring range and excellent accessibility. The LHF is a CNC coordinate measuring machine with air bearings on guide beams, which has been designed for high-precision measurement of large-volume and complex workpieces. Its ground-level design allows excellent access to a large measuring range with maximum freedom of movement. The measuring range in the Y-axis is available in the standard version up to a length of 12 meters. A double drive in the Y-axis of the LHF makes it unbeatable in terms of dynamics. The thermal influences of the environment on the machine and workpiece can optionally be corrected by means of automatic temperature compensation. LHF series measuring machines are available in the accuracy classes Standard, Premium and Premium Select.

FIELDS OF APPLICATION

The WENZEL LHF is designed for high-precision measurement of large-volume and complex workpieces. It is used by innovative medium-sized companies as well as world-famous large corporations - or simply everywhere where high measuring requirements define the requirement.



LHF 2517 LHF 3020 LHF 3025 LHF 4025



FEATURES

- **Long term, mechanical accuracy**
  Temperature stable structure | Hand finished | Air bearing guide elements in all axes
- **Low cost of ownership**
  Low air consumption | Reliable and cheap replacement parts | Less effort in recalibration
- **High flexibility**
  Special measuring sizes on request | Data compatibility with other WENZEL systems | Loading systems | Automation solutions
- **Various sensor options**
  Touch trigger probes | 3- or 5-axis scanning | Optical sensors
- **Ergonomic design**
  Easy to use | Easy to service | Easy to load

MEASURING ACCURACY

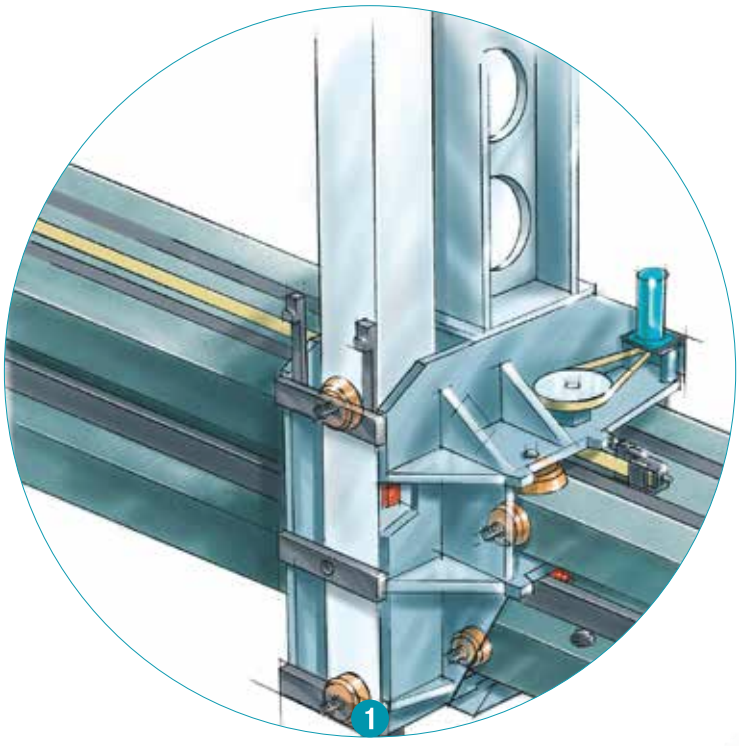
Type	Measuring ranges X x Y x Z (mm)	Volumetric length measuring uncertainty $E_{L, MPE}$ (µm) Premium Select
LHF 2517	2500 x 4000/5000/6000 x 1700	3,5 + L / 450
LHF 3020	3000 x 4000/5000/6000 x 2000	4,6 + L / 450
LHF 3025	3000 x 5000/6000 x 2500	5,6 + L / 450
LHF 4025	4000 x 5000/6000 x 2500	6,6 + L / 450
LHF 4027	4000 x 5000/6000 x 2700	7,1 + L / 450
LHF 5025	5000 x 5000/6000 x 2500	7,6 + L / 450

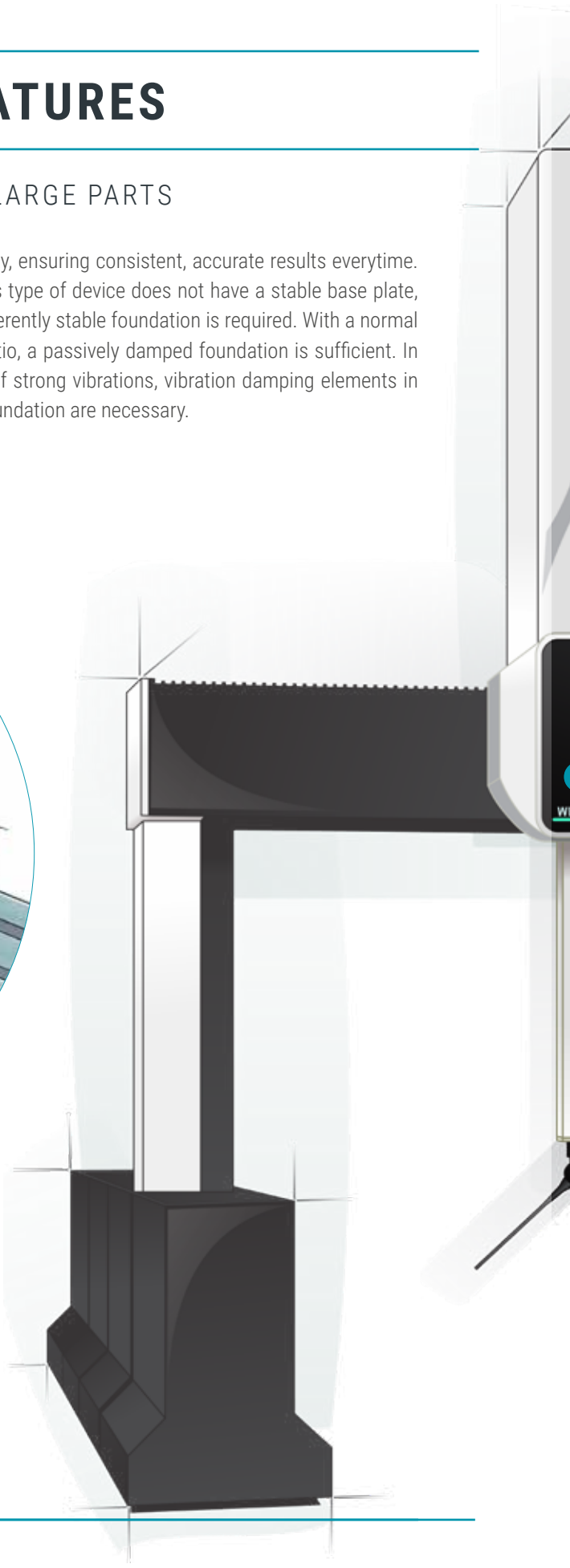
Value $E_{L, MPE}$ is only valid with the respective touch probe. Further information can be found in the technical data sheets.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

THE LHF-FEATURES

EASY HANDLING FOR LARGE PARTS

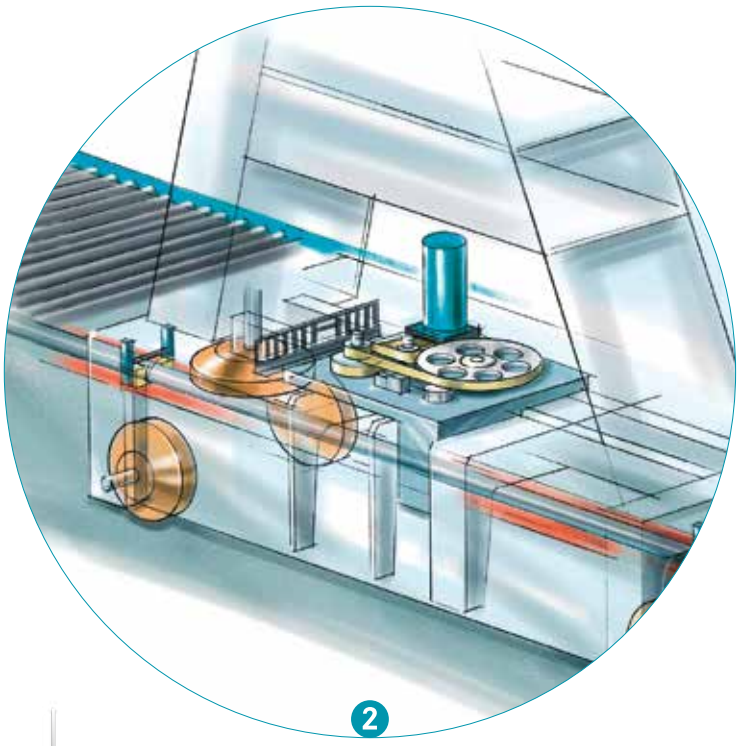
The ground level work envelope of the LHF allows excellent access to a large measuring range, and maximum freedom when loading parts. Combined with air bearings on the Y-axis beams, a dual drive system makes the LHF unbeatable in terms of dynamics and operation. Natural granite construction in all axes allows for excellent thermal stability, ensuring consistent, accurate results everytime. As this type of device does not have a stable base plate, an inherently stable foundation is required. With a normal soil ratio, a passively damped foundation is sufficient. In case of strong vibrations, vibration damping elements in the foundation are necessary.





Perfection in Detail

- Air-Bearing Guideways for Low Friction
- Ease of Loading Large Workpieces
- Designed for Servicability
- Accuracy Built In



Inherent Performance

- Dual-Drive Operation
- Thermal Stability
- Granite Construction for Longevity
- Flexible Probing Options

THE LH SERIES WITH ROTARY TABLE

FULL FLEXIBILITY FOR EVERY MEASURING TASK

All measuring machines of the LH series can be configured with an additional integrated rotary table. This enables both the precise 4-axis measurement of rotationally symmetrical components and the reliable measurement of the entire spectrum of prismatic components. The base plate and guideways are all made of thermally stable granite, which provides consistent performance of the machine over time. In order to guarantee the highest precision, air bearings are used in all axes. The optimum measuring system can be configured according to component size, component weight and measurement requirements. Different mounting heads and touch probes allow an optimal adjustment to your measuring requirements.

FIELDS OF APPLICATION

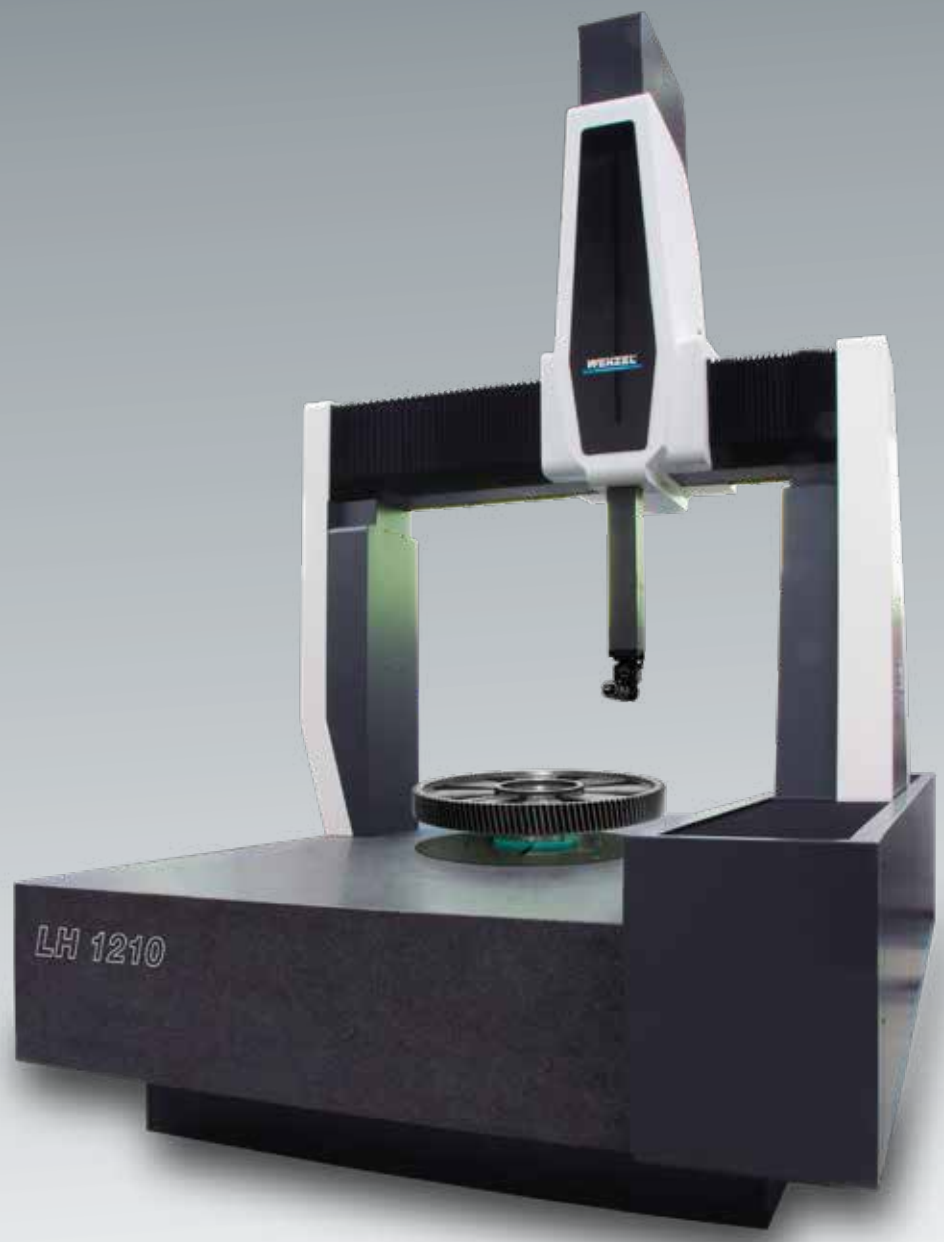
The LH series with rotary table quickly and reliably measures rotationally symmetrical as well as prismatic precision components. With a variety of sizes and accuracy levels, there is a machine to fit any measurement need.

Gears

Bearings and couplings

Shafts and axles

LH Series with rotary table



FEATURES

- **High mechanical precision**
  Granite base | Handcrafted | Precise air bearings in the linear axes
- **Low operating costs**
  Low air consumption | Reliable and inexpensive spare parts
- **Impressive speeds**
  4 axes for ultimate speed and precision | Fully automatic probe changing systems
- **High flexibility**
  Measurement of rotationally symmetrical as well as prismatic components with just one system | Numerous sizes and configurations
- **High reliability**
  High-quality components | Many years of development experience | Renishaw sensor systems

SENSORS AND CHANGE RACKS

FOR BRIDGE CMMs

When combined with a variety of innovative sensors, the LH Series is a flexible solution for a number of different applications. From the smallest injection molded parts up to large sheet metal forming dies – the LH CMM meets your needs! The LH Series can be equipped with both, manual and motorized probe heads as well as continuously recording systems and indexable probe heads. With suitable touch trigger, scanning and optical measurement systems LH CMM offers outstanding results for various applications. The compatible automatic exchange units turn the measuring instruments into homogeneous and versatile measuring systems.

PH10T PLUS / PH10M PLUS / PH10M iQ PLUS

Automatically indexable probe head PH10M: Fast probe changing (auto joint) with a variety of rack options.

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 high measurement flexibility, and thus an extremely high throughput.

TP20

Touch trigger probe. Extremely robust and flexible touch trigger probe.

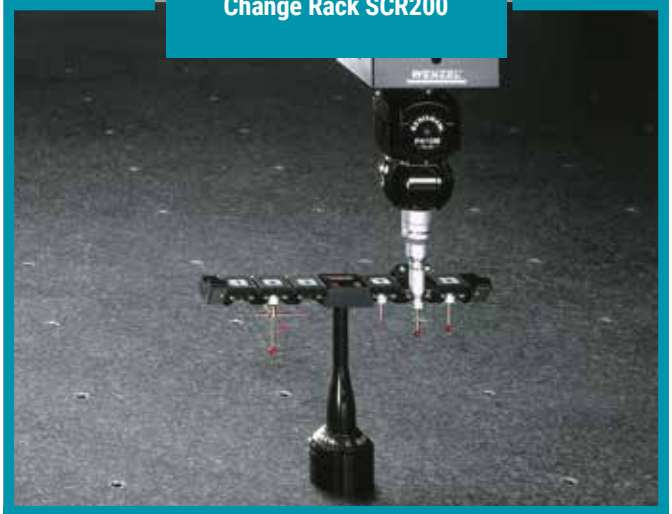
TP200

Compact, module changing touch trigger probe particularly suitable for measuring tasks with tight dimensional tolerances.

SP25M

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

Change Rack SCR200



With the SCR200 change magazine, up to six TP200 stylus modules can be changed quickly and automatically. The SCR200 is controlled by a separate interface (PI 200) and has collision protection against mechanical damage.

Change Rack ACR3

ACR3 uses Renishaw's unique autojoint connector to attach probes and extensions to the PH10M PLUS and PH10MQ PLUS motorised indexing heads. It can support a range of sensors from Renishaw and other metrology suppliers. Although the ACR3 is a four port unit, two can be linked together so that eight different probes or extensions can be stored in the rack - sufficient for any measurement task.

Change Rack FCR25

Flexible changing system for automatic changing of SP25M scanning and probe modules with 3 stations (6, 9, 12 and 15 stations possible).

MRS2 modular rack system

MRS2 is available with different column and rail lengths to allow configurations for a variety of applications. When workspace is tight, or 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.

OPTICAL SENSORS

FOR BRIDGE CMMs

Combined with our wide range of optical sensors, our CMMs become true high-speed measuring machines. Our extensive portfolio allows us to offer the right sensor for every customer in terms of cycle time, accuracy and resolution. Even CMMs already in use can be retrofitted with optical sensors. The choice of the right sensor depends on various factors. Not only component size, composition and shape, but also the batch size and manufacturing time determine the right choice. With the right combination of CMM and sensor, you can ensure that your quality control always stays within the cycle time of your production. .

WM | Shapetracer

The WENZEL SHAPETRACER II is a highly flexible 3D line scanner for the acquisition and processing of point clouds on a multi-sensor coordinate measuring machine.

WM | LS 50 & WM | LS 150

The WM | LS 50 & WM | LS 150 3D line scanners turn your coordinate measuring machine into the ideal tool for capturing and processing point clouds.

WM | LS 70

Developed for demanding applications, the WM | LS 70 enables the most accurate and fast measurements in various industrial and application areas.

NIKON LC15Dx

The LC15Dx offers significant advantages in quality control of numerous precision parts & geometries, including small details, semi-rigid materials, & complex components.

NIKON XC65

The feature scanner is ideal for gap and flush measurements as well as for applications where a large distance to the component is generally required.

NIKON L100

The L100 is ideal for testing large-volume components where productivity is a priority, but without compromising accuracy.


WENZEL
RENISHAW
PH10M
Nikon


WENZEL
RS 1512

HORIZONTAL ARM MACHINES

LARGE, FAST, PRECISE

HORIZONTAL ARM MACHINES

PRODUCT RANGE AND FIELDS OF APPLICATION

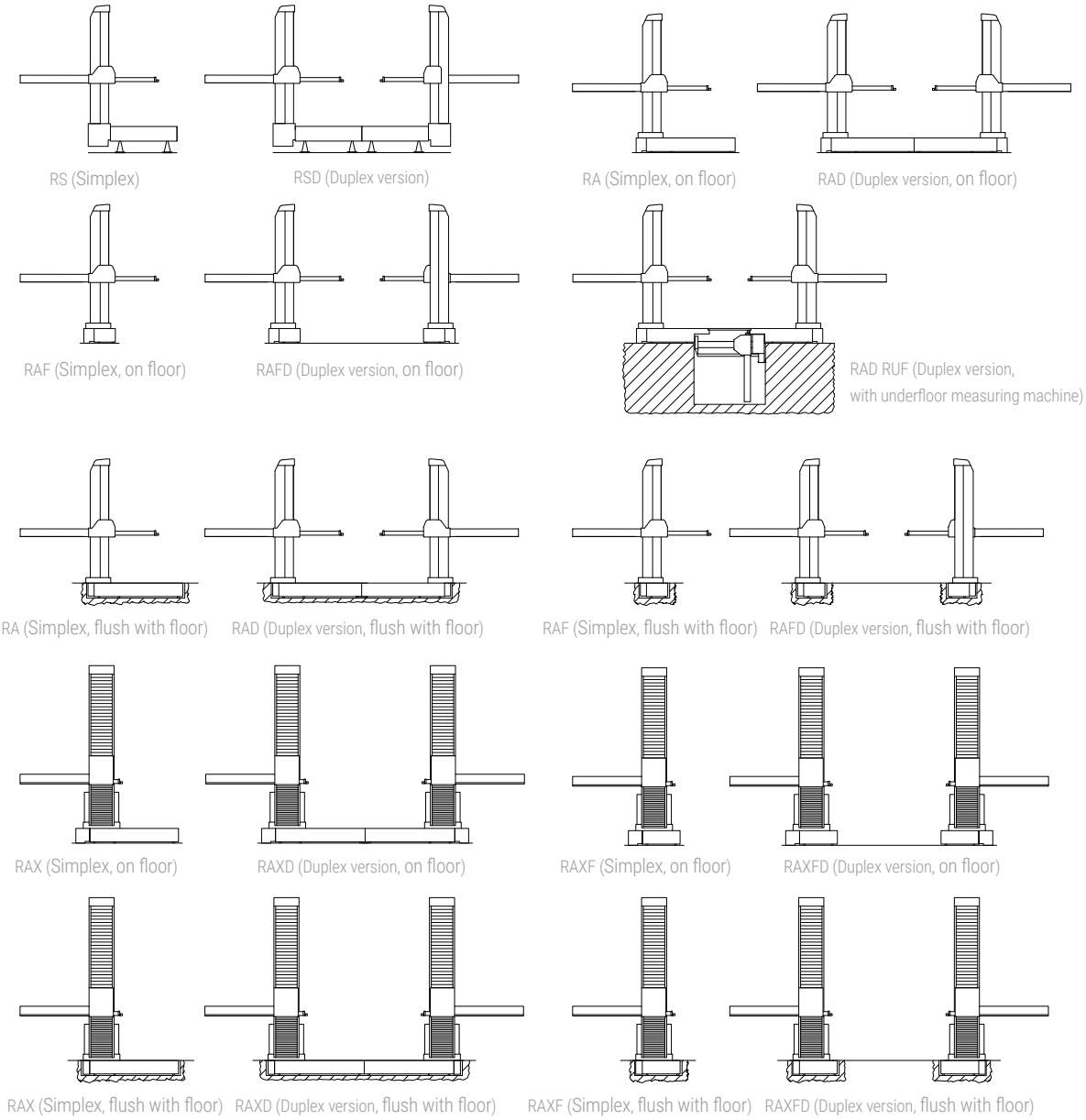
The roller-bearing horizontal arm measuring devices of the R series offer maximum measuring volume for medium to large and particularly overhanging workpieces. Combined as duplex version or by their arbitrarily extendable measuring range, the WENZEL horizontal arm measuring devices can be adapted individually to the measuring requirements and offer solutions, which go far beyond the standard. The superior design and the compact arrangement of the guide elements allow perfect accessibility from all sides and provide maximum flexibility and dynamics. The R Series CMMs can be equipped with a variety of swivel head and probe combinations, from rigid heads to motorized rotary and swivel heads, and from simple probes to high precision scanning touch probes and optical sensors.

R SERIES

- The universally applicable **RS (roller-bearing side)** stand-alone measuring device with guide elements attached to the base plate at the side can be easily integrated into existing room concepts.
- Defining characteristics of the **RA (roller bearing on base plate) / RAF (roller bearing on guide beam)** series are the floor-level base plates on which the guidance systems are mounted. Due to this design, the coordinate measuring machine can be easily equipped with heavy components up to complete vehicles.
- The **RAX (roller bearing on base plate, XL measuring range)** with its far above-average measuring range was specially developed for the needs of the automotive industry.
- The **RUF underfloor measuring machine** is the ideal supplement to the measuring centers when work pieces are also measured from below.

To extend the Y measuring range, all machines can be supplied as duplex version.

OUR VARIANTS



WENZEL RS SERIES

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

The machine concept of the RS Series is based on a stable base plate as a measuring table with a lateral guide system. The RS can be integrated extremely flexibly into an existing room concept without a specific foundation and can be moved to a new location if required.

It is available as a manual or CNC device, combined with decouplable drives, as a single, double or multi-column system, with tactile and optical sensors and also with vibration damping.

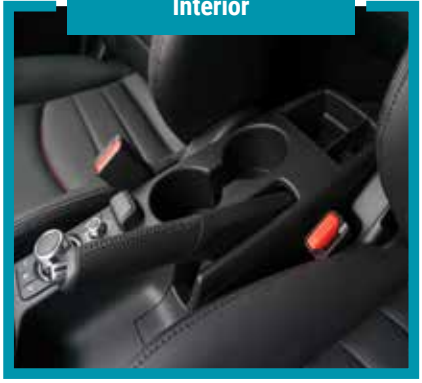
The RS allows production-related measurement of individual parts, assemblies, end products such as car bodies and other large-volume workpieces. The RS is available in two accuracy classes - Standard and Premium.

FIELDS OF APPLICATION

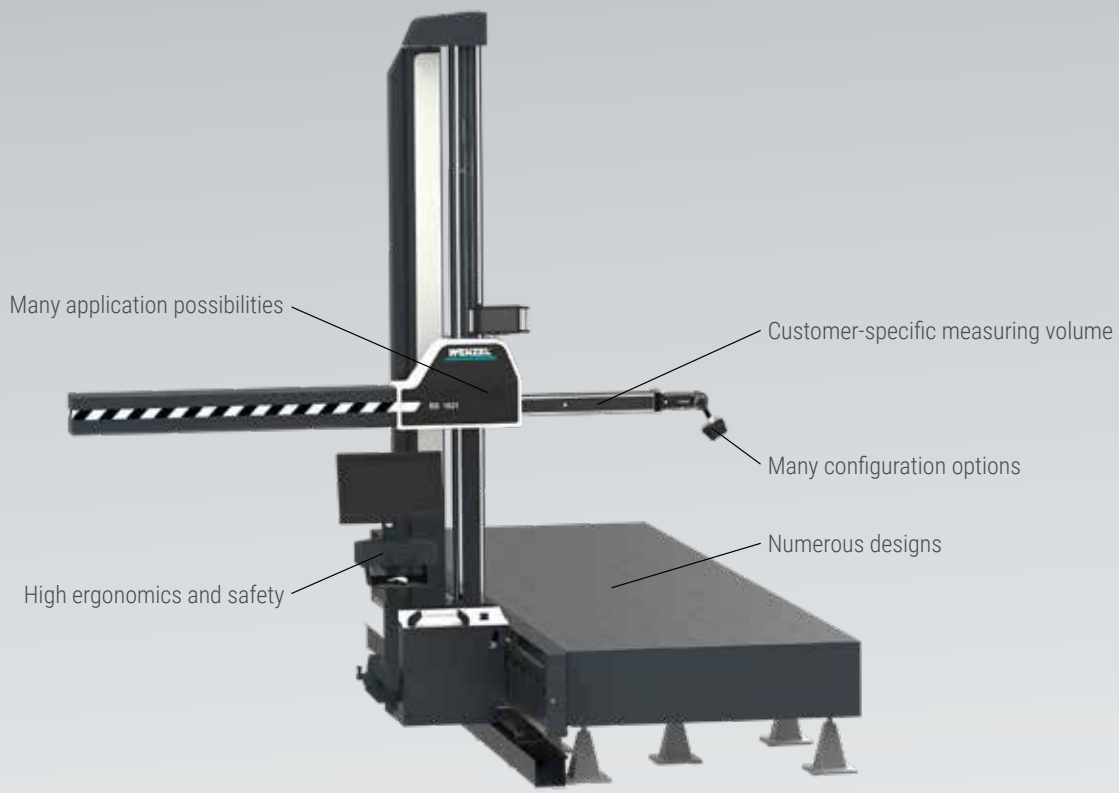
The RS Series is mainly used in the automotive industry for measuring, digitizing and scribing individual parts, assemblies or complete car bodies. Typical components are bumpers, seats, instrument panels, welded structures or fixtures.

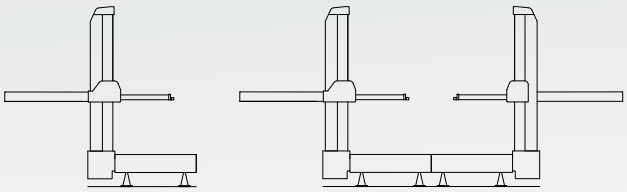
Car bodies

Interior



Wind turbines





RS (Single unit)

RSD (Duplex system)

MACHINE PROFILE

Measuring volume X-axis	**Custom**
Measuring volume Y-axis	**up to 2100; Duplex up to 4000 mm**
Measuring volume Z-axis	**up to 3000 mm**
Measurement uncertainty	**$E_{L,\,MPE}$ from 15+L/45 ≤ 50 (µm)***

*Depending on machine configuration (Premium, Standard) according to current technical data sheets

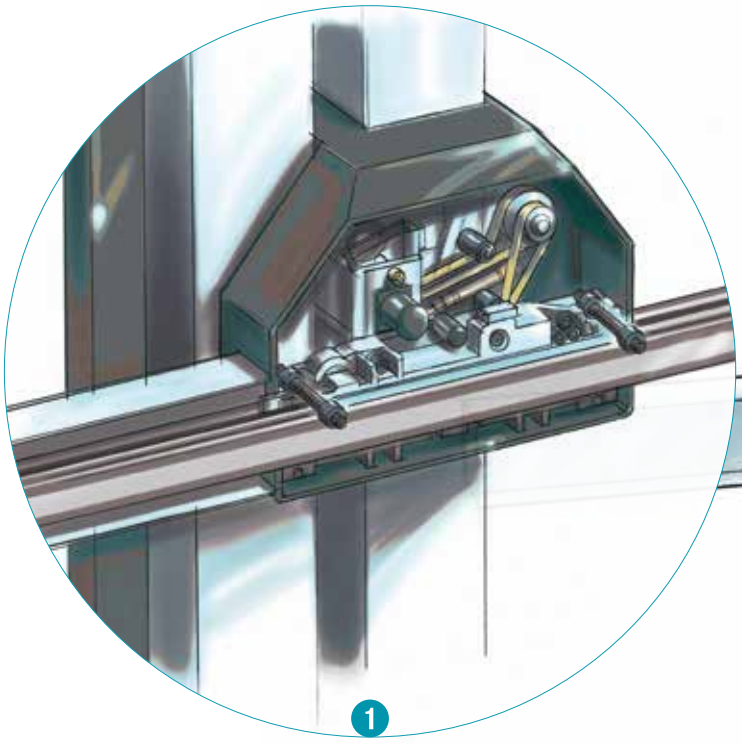
FEATURES

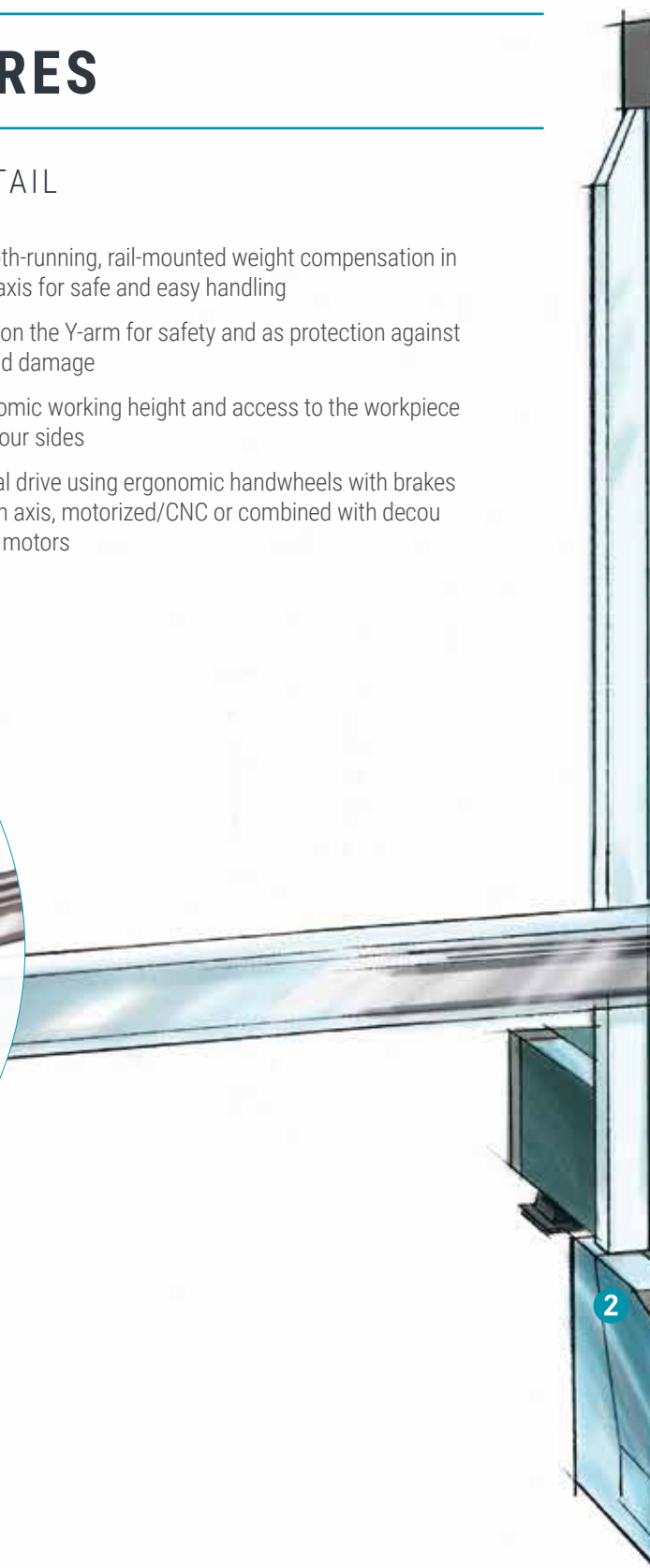
- **Highly maintenance friendly**
  Original manufacturer service | Optimum accessibility | Low downtimes
- **Long service life**
  Machine design with wear-resistant and optimized components | Investment protection through upgradeability and compatibility
- **High flexibility**
  Simple and flexible integration into existing room and building concepts | adaptive to room, building and process changes
- **Diverse fields of application**
  Ergonomic working height makes it also suitable for small parts | Measuring during production
- **You have the choice**
  Base plate available in cast iron or granite | Optionally with active vibration damping | Different operating modes

RS-FEATURES

PRECISE IN DETAIL

- Base plate made of cast iron as standard, for small sizes optionally made of natural hard stone, optionally with damping system
- Surface of the base plate machined to DIN 876/2 as reference surface for the measured object
- Linear bearings in the X-axis and precision roller bear -ings in the Y- and Z-axis
- Carbon fiber Y-arm for high stiffness and dynamics
- Measuring system protected against dirt and damage
- Smooth-running, rail-mounted weight compensation in the Z-axis for safe and easy handling
- Cover on the Y-arm for safety and as protection against dirt and damage
- Ergonomic working height and access to the workpiece from four sides
- Manual drive using ergonomic handwheels with brakes in each axis, motorized/CNC or combined with decou plable motors

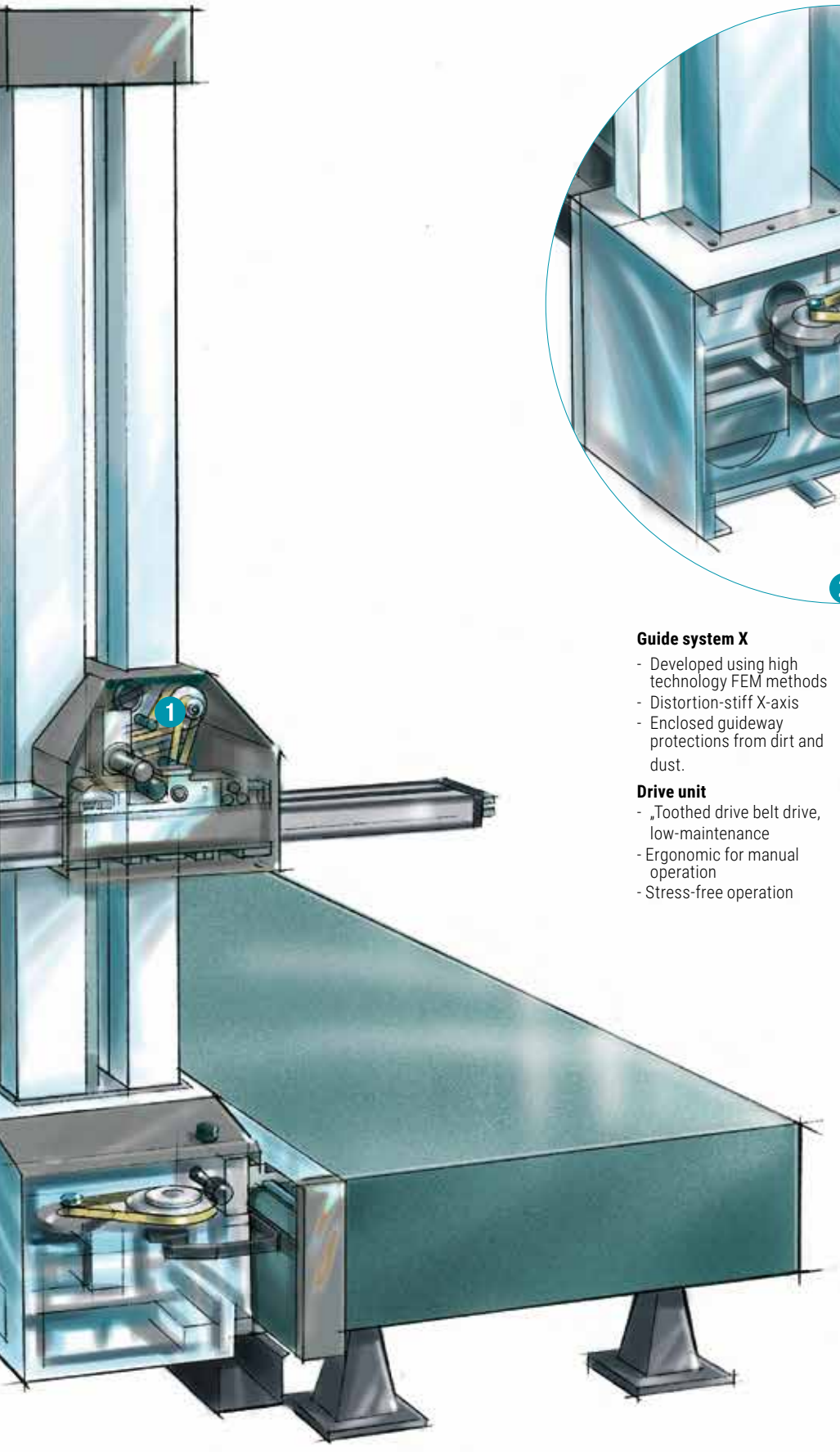


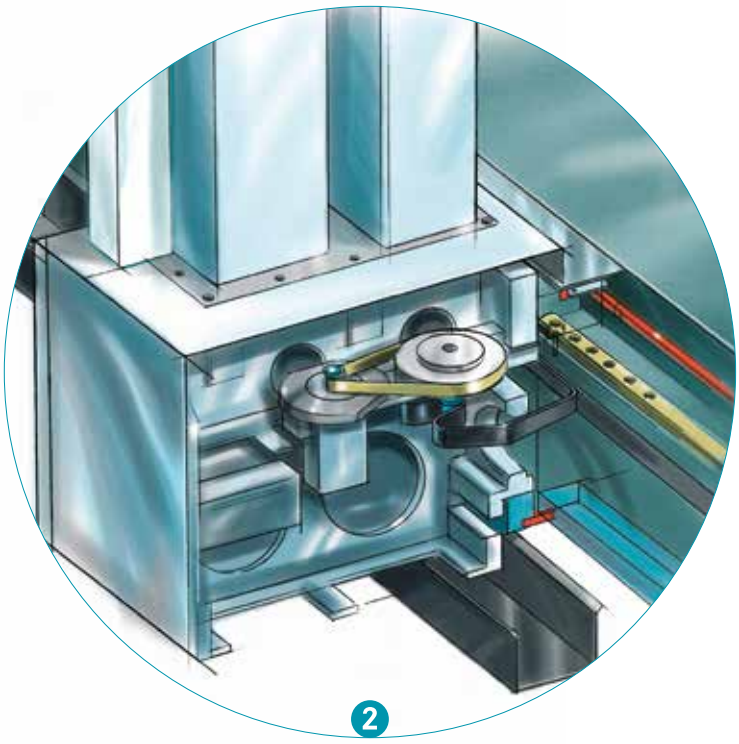


Guide system Y/Z
- Low maintenance
- High reliability
- Easily adjustable
- Robust guide elements
- Low-wear vibration free belt drive

Y-arm produced from carbon fibre
- Reduced weight with improved rigidity

Scale located underneath the arm
- Protected against contamination





Guide system X

- Developed using high technology FEM methods
- Distortion-stiff X-axis
- Enclosed guideway protections from dirt and dust.

Drive unit

- „Toothed drive belt drive, low-maintenance
- Ergonomic for manual operation
- Stress-free operation

Pneumatically disengageable drives

- Eliminate undesired heat sources

Gekapselte Linearführungen

- Hohe Führungsgenauigkeit
- Geringe Schmutzempfindlichkeit
- Hohe Lebensdauer
- Geringer Wartungsaufwand

Controller und PC

- Kompakte Bauweise durch integriertes System (optional)

WENZEL RA SERIES

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

A characteristic feature of the RA series is the floor-level base plate, into which the guide system is integrated. Due to this design, the coordinate measuring machine can easily be equipped with large and heavy components such as complete vehicles. Whether as a single boom machine, as a duplex or multi-column system with integrated underfloor measuring device - RA measuring devices deliver the desired results precisely, reliably and quickly. The machine type is available as a manual or CNC machine as well as combined with decouplable drives, with tactile and optical sensor technology and is distinguished by its excellent accessibility, even for workpieces that are difficult to handle. The RA is available in two accuracy classes - Standard and Premium.

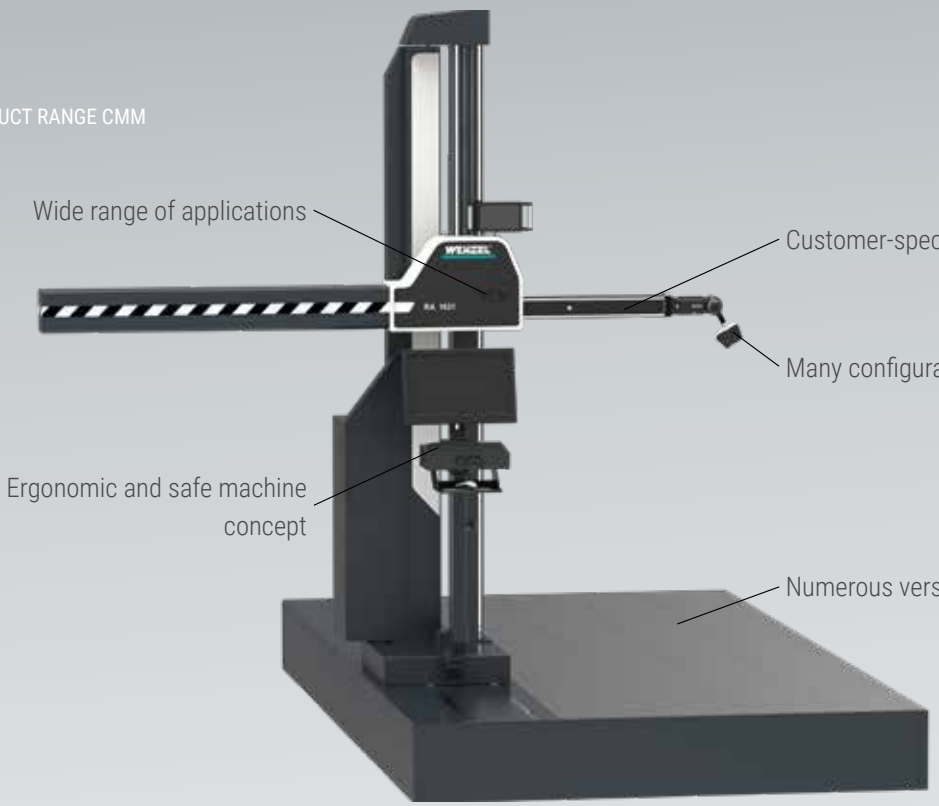
FIELDS OF APPLICATION

The RA series is used by many customers worldwide in individual operation or as a multi-column system for measuring, scribing and digitizing. The main areas of application are in vehicle construction, plant construction and for construction and agricultural machinery. Whether for individual parts, assemblies or complete bodies, the RA series measures the upcoming measuring task quickly and precisely.

Automotive industry

Railroad industry

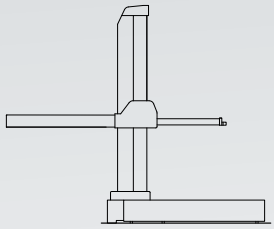
Construction machines



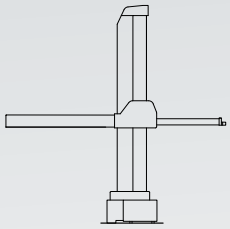
MACHINE PROFILE

Measuring volume X-axis	**Custom**
Measuring volume Y-axis	**up to 2100; Duplex up to 4000 mm**
Measuring volume Z-axis	**up to 3000 mm**
Measurement uncertainty	**$E_{L,\,MPE}$ from 15+L/45 ≤ 50 (µm)***

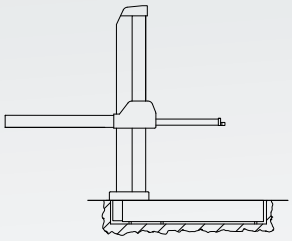
*Depending on machine configuration (Premium, Standard) according to current technical data sheets



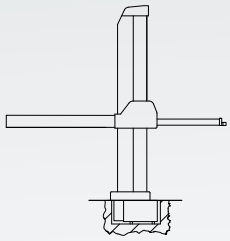
RA (Single unit, onfloor)



RAF (Single unit, onfloor)



RA (Single unit, floor level)



RAF (Single unit, floor level)

Single boom machine, also available as a duplex or multi-column system.

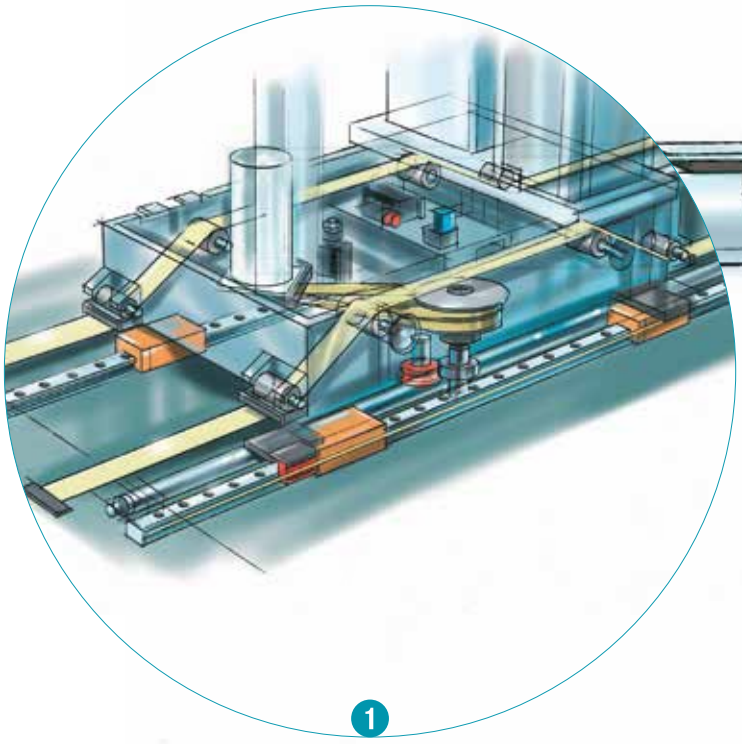
FEATURES

- **Best accessibility**
  Easy loading, positioning and accessibility of workpieces | Floor level and protected guide systems free of tripping hazards
- **High reliability**
  Technology proven over many years even in tough applications | High availability | Economical operation | Long service life
- **High flexibility**
  Modular design | Various system concepts possible | Duplex use possible
- **Precise results**
  Friction-locked power transmission | Combined recirculating ball and roller bearing guide technology | Optimized ratio of movement to precision
- **Many years of project competence**
  Consulting experience already from the plant planning stage | Design of measurement rooms and foundations | Definition and implementation of efficient measurement processes

RA-FEATURES

PRECISE IN DETAIL

- Base plate of the RA or guide beam of the RAF made of cast iron, floor-level as standard, for floor-level access to the measuring volume and workpiece, optionally on floor
- Guide system and transition to base plate covered without gaps, can be walked on or driven on, guide groove protected with stainless steel strips
- Surface of the base plate machined to DIN 876/2 as reference surface for the measured object
- Linear bearings in the X-axis and precision roller bear -ings in the Y- and Z-axis
- Carbon fiber Y-arm for high stiffness and dynamics
- Measuring system protected against dirt and damage
- Smooth-running, rail-mounted weight compensation in the Z-axis for safe and easy handling
- Cover on the Y-arm for safety and as protection against dirt and damage
- Manual drive using ergonomic handwheels with brakes in each axis, motorized/CNC or combined with decou plable motors



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1

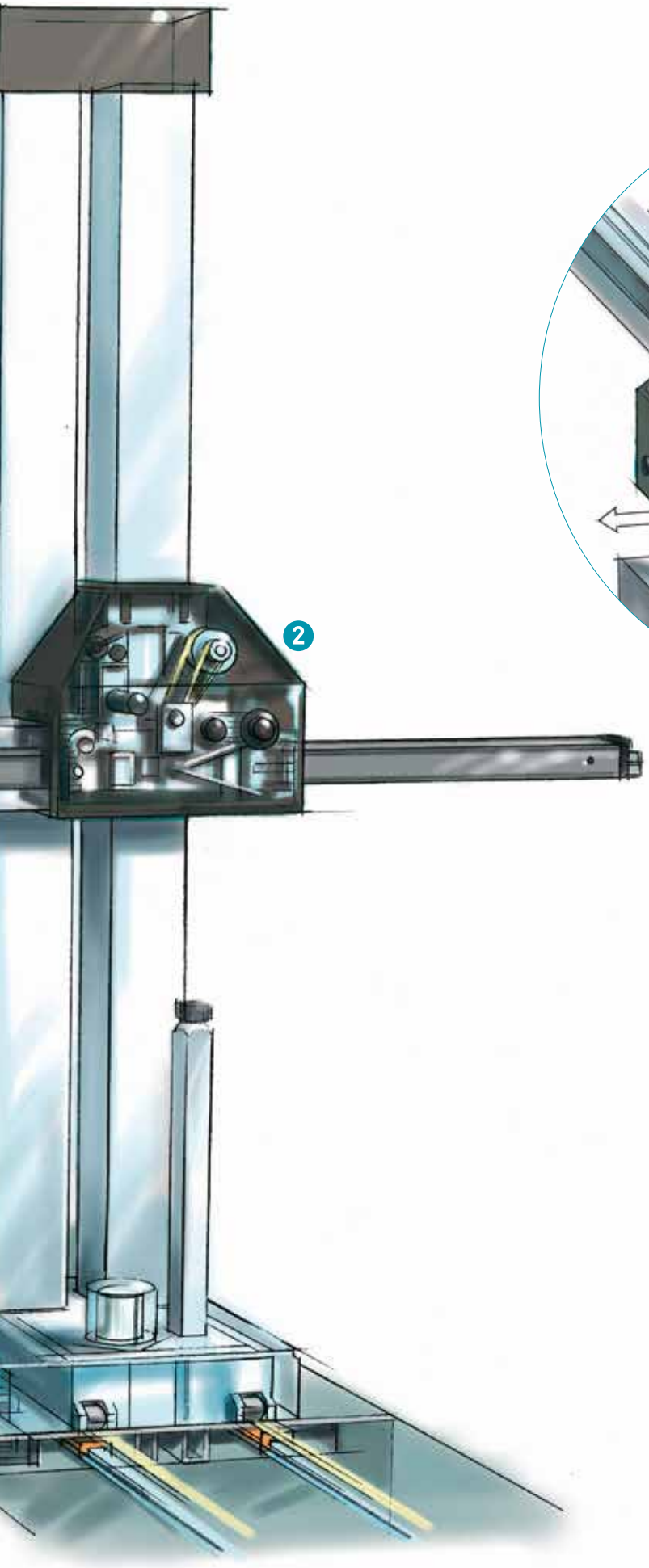
Führungssystem X
- Developed using high technology FEM methods
- Distortion-stiff X-axis

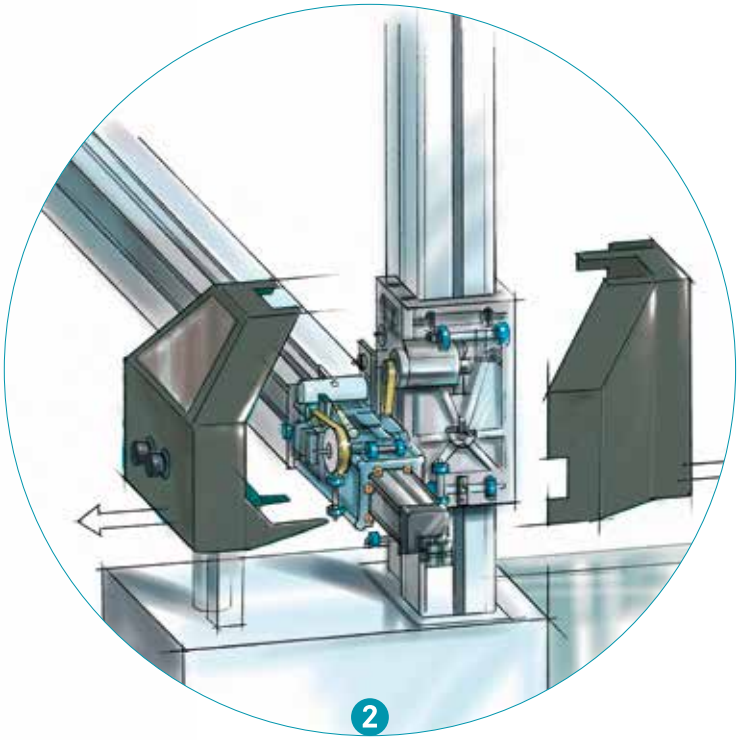
Drive unit
- Collision and Overload protection by means of frictional wheel drive

Pneumatically disengageable drives
- Eliminate undesired heat sources

Encapsulated linear guides
- High precision
- Low sensitivity to contamination
- Long life
- Low Maintenance

Steel band covers
- Steel covers on the X-axis (accessible)
- Stainless steel drive bands
- Optimally self cleaning





Führungssystem Y/Z
- Rapid replacement design providing – minimal down time
- Easily adjustable
- Robust guide elements

Y-arm produced of carbon fibre
- Y-arm produced of carbon fibre

Scale located underneath
- Protects against contamination

WENZEL RAX SERIES

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

The RAX is the CNC horizontal arm CMM from WENZEL with the largest measuring volume. The CMM was specially developed for fast and precise measurement of large volume components such as car and commercial vehicle bodies and machine parts. The Z-axis is up to 4,200 mm high. Due to the special design, the measuring range starts directly above the base plate.
For an even larger measuring volume, the RAX can be designed as a duplex system. Typically, the RA series is installed flush with the floor in a foundation for easy accessibility. High rigidity and high precision guides ensure the most accurate measurement results.
The RAX can be equipped with the latest Renishaw sensor systems, such as the PH10M and the stepless PHS, touch-trigger probes and a wide range of optical sensors.

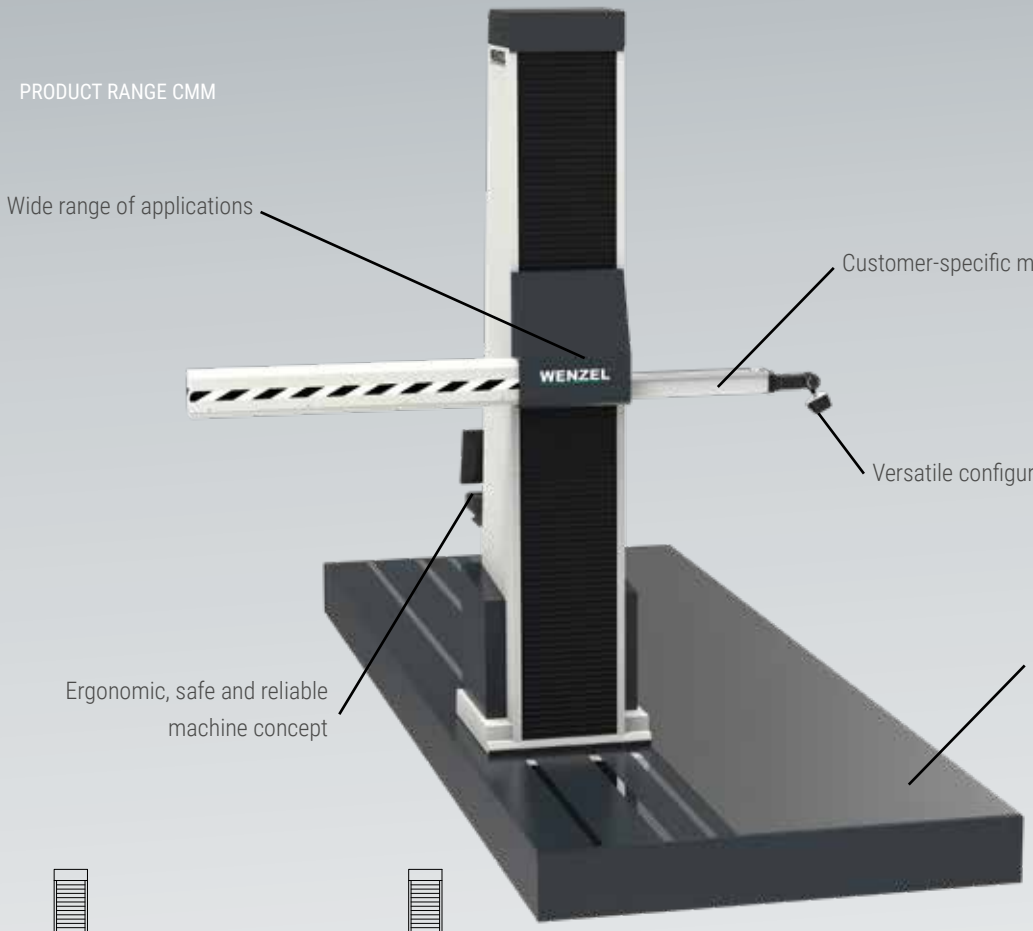
APPLICATION AREAS

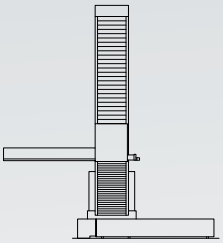
The RAX series is used by many customers worldwide in individual operation or as a multi-column system for measuring and digitizing. The main fields of application are in the following areas: Aerospace, shipbuilding, transport and construction and agricultural machinery. Whether for individual parts or assemblies, the RAX series performs the task at hand quickly and precisely.

Aerospace

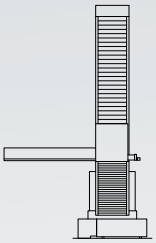
Shipbuilding

Construction machines

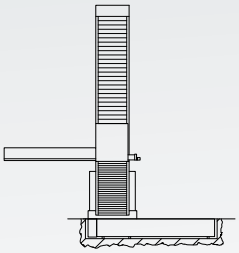




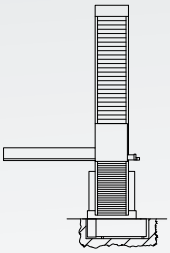
RAX (Simplex, on floor)



RAXF (Simplex, on floor)



RAX (Simplex, flush with floor)



RAXF (Simplex, flush with floor)

Machine, also available as Duplex- or multi-column-system.

MACHINE PROFILE

Measuring volume X-axis	**Custom**
Measuring volume Y-axis	**up to 2000; Duplex up to 3800 mm**
Measuring volume Z-axis	**up to 4200 mm**
Measurement uncertainty	**$E_{L,\,MPE}$ from 18+L/40 ≤ 60 (µm)***

*Depending on machine configuration (Premium, Standard) according to current tech. Datasheets

FEATURES

- **Large measuring range**
  Up to 4200 mm in the Z-axis | Start directly above the base plate | Optimum utilization of the measuring range due to mirror image construction
- **High precision**
  Rigid machine body | Selected linear guides in all axes
- **High flexibility**
  Various system concepts | Various Probes and sensors | Duplex insert possible
- **High measuring performance**
  High dynamics | High speed in combination with safety technology
- **Ergonomics during operation and assembly**
  Control units on wheels | Safety options | Optimum access for loading and operation | Flush with the floor | Free of tripping hazards

SENSORS AND CHANGE RACKS

FOR HORIZONTAL ARM MACHINES

The R series can be equipped with manual, motorized, infinitely variable or indexable probes and swivel heads. These can be combined with an extensive range of touch trigger, scanning and optical measuring systems.

PH10T PLUS / PH10M PLUS / PH10M iQ PLUS

Automatically indexable probe head PH10M: Fast probe changing (auto joint) with a variety of rack options.

PHS2 servo positioning head

Can be swiveled continuously. Minimum probe calibration efforts. Extensions of up to 750 mm possible.

SP600

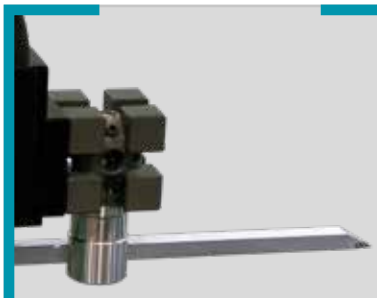
A universal robust probe with scanning functions. Ideal for scanning forms and fine surface details.

TP20

Touch trigger probe. Extremely robust and flexible touch trigger probe with stylus change modules.

Universal mounting head

The mounting head allows the mounting of probe systems and marking tools for all axial directions in a fast, secure and user-friendly way.



Scribing tool

The manual mode of operation of the R series allows the scribing of models in metalworking, mould making, tooling, tooling, etc. and design area.

ACR2 Autochange rack

ACR2 can store up to six probe extensions or probe adaptors. It makes a change of probe extensions or probe adaptors possible so that the measuring tasks do not have to be carried out manually.

Change Rack ACR3

ACR3 uses Renishaw's unique autojoint connector to attach probes and extensions to the PH10M PLUS and PH10MQ PLUS motorised indexing heads. It can support a range of sensors from Renishaw and other metrology suppliers. Although the ACR3 is a four port unit, two can be linked together so that eight different probes or extensions can be stored in the rack - sufficient for any measurement task.

Change rack MCR20

Module change rack enabling automated changing of TP20 stylus modules. The MCR20 module changing rack can store up to six TP20 probe modules for automatic changing under measurement program control.

The pick-up heads and probes shown here are only a small selection from our extensive product range.

For further information please contact your local WENZEL representative.

OPTICAL SENSORS

FOR HORIZONTAL ARM MACHINES

Combined with our wide range of optical sensors, our CMMs become true high-speed measuring machines. Our extensive portfolio allows us to offer the right sensor for every customer in terms of cycle time, accuracy and resolution. Even CMMs already in use can be retrofitted with optical sensors. The choice of the right sensor depends on various factors. Not only component size, composition and shape, but also the batch size and manufacturing time determine the right choice. With the right combination of CMM and sensor, you can ensure that your quality control always stays within the cycle time of your production. .

WM | Shapetracer

The WENZEL SHAPETRACER II is a highly flexible 3D line scanner for the acquisition and processing of point clouds on a multi-sensor coordinate measuring machine.

WM | LS 50 & WM | LS 150

The WM | LS 50 & WM | LS 150 3D line scanners turn your coordinate measuring machine into the ideal tool for capturing and processing point clouds.

WM | LS 70

Developed for demanding applications, the WM | LS 70 enables the most accurate and fast measurements in various industrial and application areas.

WM | LS 600

The line width of up to 600 mm makes the WM | LS 600 particularly suitable for especially large components with a low level of detail.

NIKON XC65

The feature scanner is ideal for gap and flush measurements as well as for applications where a large distance to the component is generally required.

NIKON L100

The L100 is ideal for testing large-volume components where productivity is a priority, but without compromising accuracy.


RENISHAW
RENISHAW
PHS-2
WENZEL

ACCESSORIES & OPTIONS

FOR COORDINATE MEASURING MACHINES

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

CONTROL PANEL HT400RC

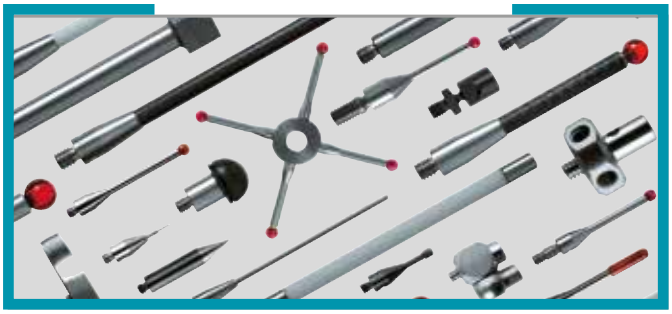
- Wireless control panel HT400RC incl. receiver
- 1 charging cable each 0.5 and 6.0 m
- Charging station and spare battery
- Power supply

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 CMMs IN DETAIL

Guarantors for stable results

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

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

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.

Customer-specific measurement volumes and solutions

One of our strengths are customer-specific designs and individual solutions. Just as the LH machines are also available in particularly long lengths, all axes and design details of the horizontal arm machines can be individually adapted to customer requirements. We advise and support you from project planning to commissioning.

High resolution scales

Accurate positioning thanks to the optimal position measuring system technology
The LH Series is 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 SHOP FLOOR MACHINES

RANGE OF SERVICES AND FIELDS OF APPLICATION

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.

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.

WENZEL SF SERIES

ROBUST, FAST & PRECISE

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 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 foot print. 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 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.

WENZEL SF 1210

The latest model in the SF series is the SF 1210, which offers a measuring volume of 1,200 x 1,500 x 1,000 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.

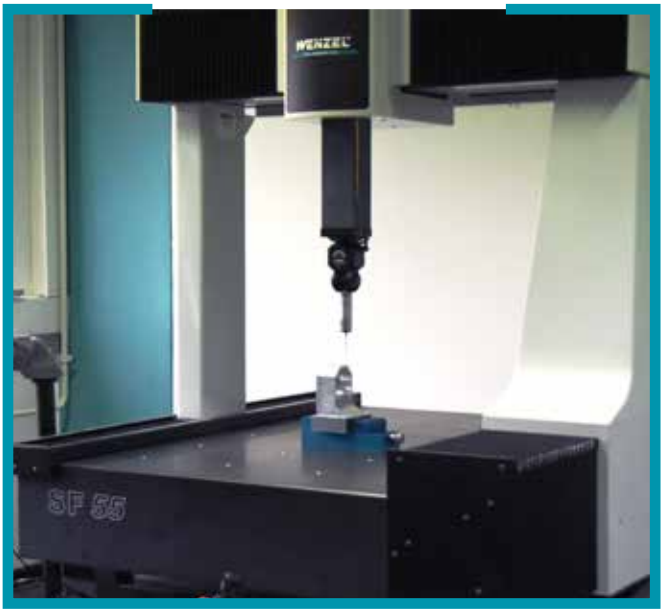
WENZEL SF 55

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.

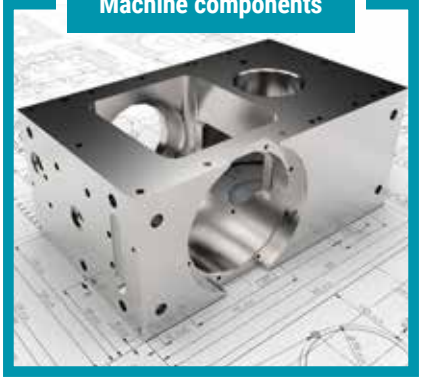
FIELDS OF APPLICATION

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.

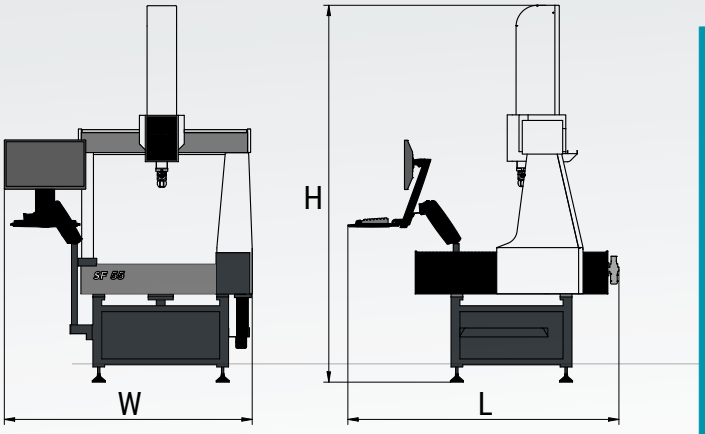


Steel bushings

Machine components



Gearboxes



MACHINE PROFILE

Space Requirements (L x W 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

FEATURES

- **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.

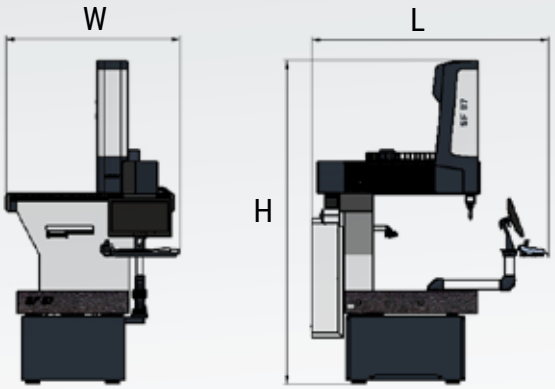
FIELDS OF APPLICATION

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 W 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

FEATURES

- **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

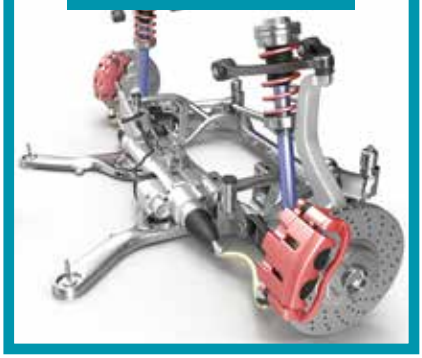
MEASURING IN THE PRODUCTION ENVIRONMENT

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.

APPLICATIONS

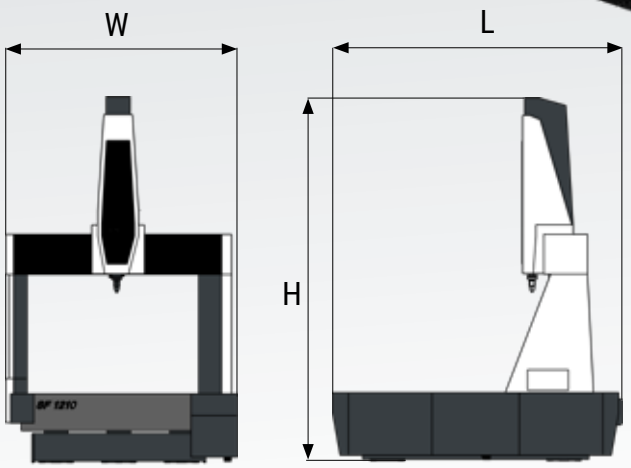
The SF 1210 is a 3D coordinate measuring machine for measuring medium to large production parts in the shop floor environment. The intelligent and compact design is suitable for a wide range of applications in the production environment, especially in the cutting and forming industry. Examples are:

Suspension parts



Electric motors

Cast housings



MACHINE PROFILE

Space Requirements (L x W 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

FEATURES

- **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 I SYS Analyzer

SENSORS & CHANGE RACKS

MOUNTING HEADS, PROBES AND SCANNERS

Combined with a variety of innovative sensors, the WENZEL SF series machines are flexible even for the most difficult of applications. From smallest injection moulded parts 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 results for all 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 PH10M: Fast probe changing (auto joint) with a variety of rack options.

PH20

The 5-axis PH20 and CMMs 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 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.

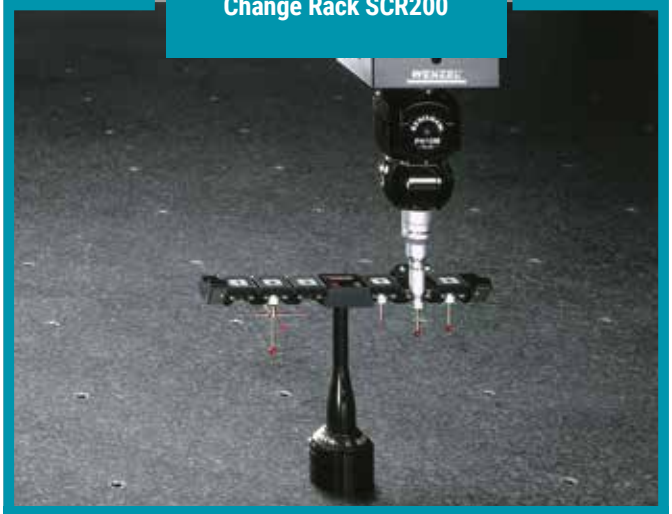
TP200

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

ACR3 uses Renishaw's unique autojoint connector to attach probes and extensions to the PH10M PLUS and PH10MQ PLUS motorised indexing heads. It can support a range of sensors from Renishaw and other metrology suppliers. Although the ACR3 is a four port unit, two can be linked together so that eight 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 many 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.

OPTICAL SENSORS

FOR OUR SF SERIES

Combined with our wide range of optical sensors, our CMMs become true high-speed measuring machines. Our extensive portfolio allows us to offer the right sensor for every customer in terms of cycle time, accuracy and resolution. Even shop floor CMMs already in use can be retrofitted with optical sensors. The choice of the right sensor depends on various factors. Not only component size, composition and shape, but also the batch size and manufacturing time determine the right choice. With the right combination of shop floor CMM and sensor, you can ensure that your quality control always stays within the cycle time of your production.

WM | Shapetracer

The WENZEL SHAPETRACER II is a highly flexible 3D line scanner for the acquisition and processing of point clouds on a multi-sensor coordinate measuring machine.

WM | LS 50 & WM | LS 150

The WM | LS 50 & WM | LS 150 3D line scanners turn your coordinate measuring machine into the ideal tool for capturing and processing point clouds.

WM | LS 70

Developed for demanding applications, the WM | LS 70 enables accurate and fast measurements in various industrial and application areas.

NIKON LC15Dx

The LC15Dx offers significant advantages in quality control many precision parts & geometries, including small details, semi-rigid materials, & complex components.

NIKON XC65

The scanner is ideal for gap and flush measurements as well as for applications where a large distance to the component is generally required.

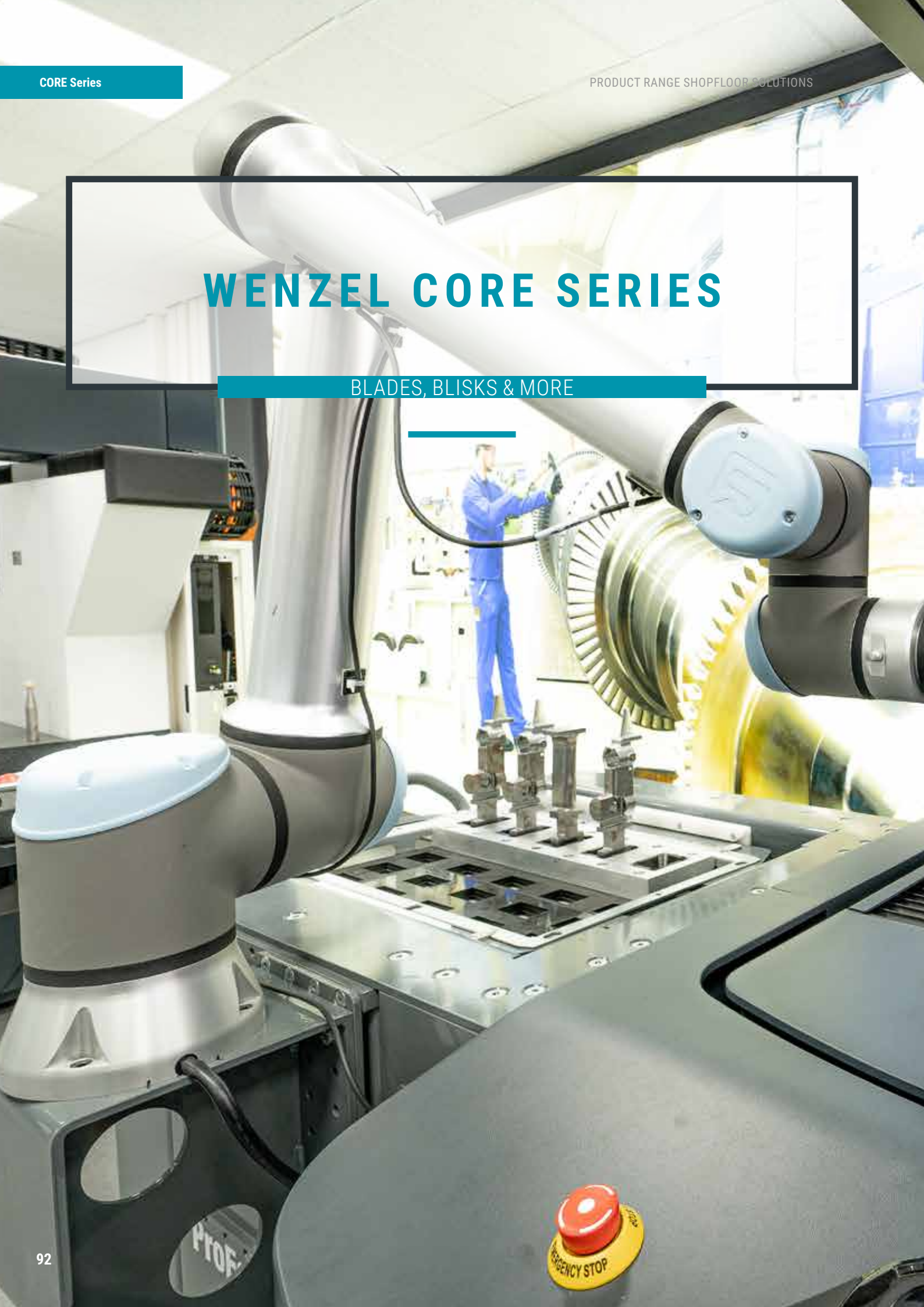
NIKON L100

The L100 is ideal for testing large-volume components where productivity is a priority, but without compromising accuracy.


WENZEL
7
SF 1210

WENZEL CORE SERIES

BLADES, BLISKS & MORE



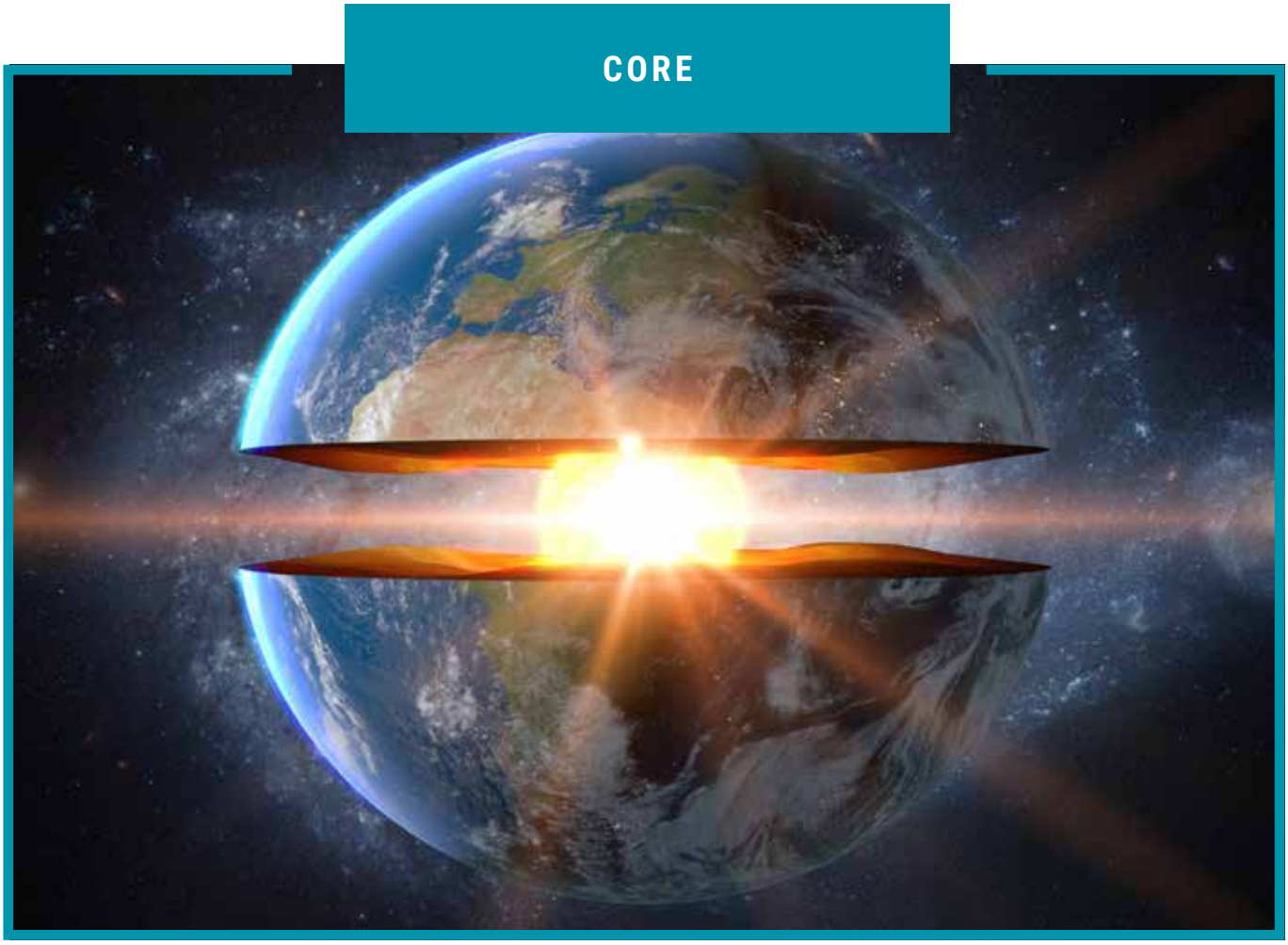
WENZEL CORE

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 matte. 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.

OPTICAL MEASUREMENT OF TURBINE BLADES

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.

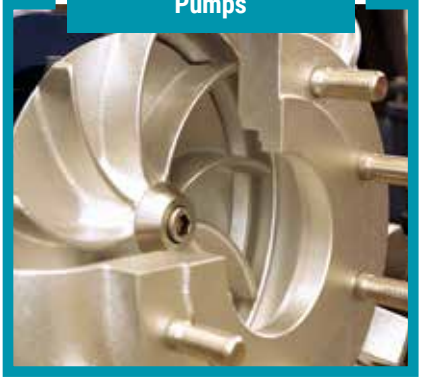
FIELDS OF APPLICATION

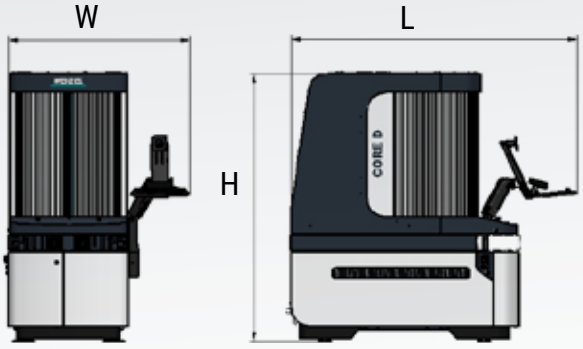
Typical applications of CORE can be found in a wide variety of industries, for example in tool and mold making, prototype construction, the automotive industry, reverse engineering and above all in medical technology and aviation. CORE is used to measure turbine blades, joints, implants and vehicle parts.

Knee and hip prostheses

Turbine blades

Pumps





MACHINE PROFILE

Space Requirements (L x W x H)	**2255 x 1500 x 2100 mm**
Machine weight	**1500 kg**
Acceleration	**> 3000 mm/s²**
Measurement system resolution	**0,1 µm**

FEATURES

- **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 mechani cal structure, developed and manufactured in WENZEL's renowned production facility in Germany. This forms the cornerstone for its accuracy, reliability and quality.

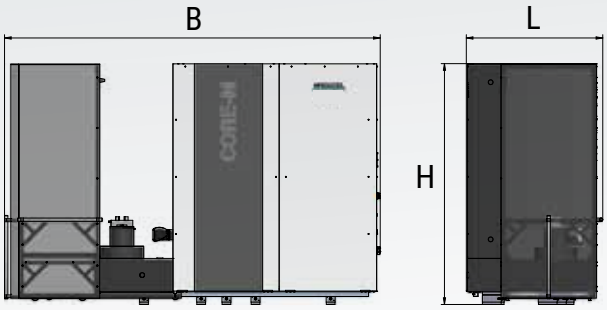
FIELDS OF APPLICATION

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)	**1140 x 3970 x 2530 mm**
Machine weight	**6300 kg**
Acceleration	**10.000 mm/s²**
Measurement system resolution	**0,1 µm**

FEATURES

- **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

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.

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.

WM | MMA

7 AXIS MEASURINGS ARMS


WENZEL

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.

MEASURING ARM

- 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.

		Tactile (at the scanner)		
Type	**Arm length**	**EUNI**	**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

FEATURES

- **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 I Quartis Mobile

		Optical		
LDIA	**SPAT**	**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

WENZEL mScan

MOBILER HANDHELD 3D-SCANNER

Der mobile Handheld 3D-Scanner WENZEL mScan ermöglicht schnelle und zuverlässige Messungen bei einfacher Bedienung. Das System zeichnet sich durch ausgereifte Technologie, hohe Flexibilität, Präzision, Geschwindigkeit und Zuverlässigkeit aus. Das ergonomische Design ermöglicht für den Anwender eine komfortable Bedienung. Der Scanner kann problemlos in anspruchsvollen Umgebungen für komplexe Bauteile eingesetzt werden und ist das ideale Tool für die Flächenrückführung (Reverse-Engineering) und vielfältige industrielle sowie medizinische Anwendungsgebiete. Der WENZEL mScan kann mit vielfältigen Software-Produkten kombiniert werden und beeindruckt mit seinen technischen Parametern sowie einer umfangreichen Palette an praktischem Zubehör.

Technische Parameter	mScan I	mScan II
Laser Typ	14 + 1 Blauer Laser gekreuzte Linien Klasse II Sicherheit für die Augen	22 + 1 Blauer Laser gekreuzte Linien Klasse II Sicherheit für die Augen
Messrate	800,000 Messungen/s	1,300,000 Messungen/s
Punktauflösung	0.025 mm	0.025 mm
Oberflächenauflösung	0.100 mm	0.100 mm
Genauigkeit*	0.035 mm	0.025 mm
Scanbereich	310 mm x 350 mm	355 mm x 375 mm
Volumetrische Genauigkeit (mScan)* Volumetrische Genauigkeit (with m-LOCATOR)*	0.020 mm + 0.060 mm/m 0.020 mm + 0.015 mm/m	0.020 mm + 0.040 mm/m 0.020 mm + 0.015 mm/m
Stand Off Distance	425 mm	425 mm
Tiefenschärfe	350 mm	350 mm
Teilgröße	0.05–4 m	0.05–4 m
Software	mScan	mScan
Ausgabeformat	.igs, .asc, .txt, .ply, .stl	
Kompatible Software	WM | PointMaster, WM | Quartis, Dassault (CATIA V5 undSOLIDWORKS), 3D Systems (Geomagic® Solutions), InnovMetric Software (PolyWorks), PTC (Creo), Siemens (NX und Solid Edge), Autodesk (Inventor, Alias, 3ds Max, Maya, Softimage)	
Übertragungsschnittstelle	USB 3.0	USB 3.0
Betriebstemperaturbereich	0–40°C	0–40°C
Betriebsluftfeuchtigkeit (nicht kondensierend)	10–90%	10–90%
Zertifizierung	Entspricht den EG-Normen (Richtlinie für elektromagnetische Verträglichkeit, Niederspannungs-Richtlinie), kann mit wieder aufladbaren Batterien verwendet werden (falls zutreffend), IP50 WEEE	

Standard:
VDI/VDE 2634 Blatt 3*
Änderungen in Ausführung und Lieferumfang sowie technische Weiterentwicklungen vorbehalten.

Hochgeschwindigkeitsabtastung durch gekreuzten blauen Laserlinien

Die Oberflächenauflösung beträgt bis zu 0,100 mm, um komplexe Details darzustellen und qualitativ hochwertige Ergebnisse zu liefern

Hochwertige Standard-Kernkomponenten, die die Gesamtstabilität und Zuverlässigkeit des Geräts gewährleisten

Einzellinienabtastung, um tiefe Löcher und konkave Oberflächen perfekt zu bearbeiten um jedes Detail zu erfassen

Großer Referenzabstand bis 15 cm sorgt für einen geringen Aufwand, da wenige Punkte geklebt werden müssen

Basierend auf fortschrittlichen Algorithmen, kann Hervorhebungen und schwarze Oberflächen scannen

FEATURES

- **Portabilität**
  Flexibel und bequem in der Bedienung | Kompaktes System | Plug-and-Play Lösung
- **Hohe Genauigkeit**
  Hochauflösender Industrie-CCD-Sensor | Hochpräzise Messungen | Genauigkeit bis zu 0,025 mm
- **Hohe Geschwindigkeit**
  22 gekreuzte blauen Laserlinien | Bis zu 1.300.000 Messungen pro Sekunde | Schneller Systemaufbau
- **Besonders wartungsfreundlich**
  Optimale Zugänglichkeit | Kostengünstiges Software- und Hardware-Upgrade-Programm
- **Benutzerfreundlich**
  Ergonomische Oberfläche | Einfach zu bedienen | Plug and Play, unabhängig von der Benutzererfahrung
- **Vielfältige Einsatzgebiete**
  Produktanalyse | Kundenspezifische Vermessung, | Konzeptdesign | Reverse Engineering | Profilanalyse

Hochpräziser Abtastmodus

ACCESSORIES & OPTIONS

FOR SHOP FLOOR MACHINES

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

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

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.

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.

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.

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.

WENZEL GT SERIES

APPLICATIONS & INDUSTRIES

The GT series offers the right solution for your measuring task. It is suitable for small gears and rotationally symmetrical components, from the automotive industry to toothed workpieces and shafts used in commercial vehicles, railroad transmissions, and construction and agricultural machinery, as well as the measurement of marine gears. For easy loading of the gear measuring device, they are equipped with a tailstock. Using the tailstock, diameters of up to 1,200 mm can be measured. Flat components whose measurement does not require a counter holder can even be measured precisely up to a diameter of 1,600 mm. WENZEL, therefore, supports and provides solutions to a wide variety of industries including the automotive and energy industries, materials handling, agriculture-machinery, the aerospace industry, and mechanical & plant engineering.

AEROSPACE

In aerospace, the technical requirements of gears include high efficiency, low noise emission, and high durability. These requirements are fundamental and the measurement of these parts need reliable and precise gear measuring machines. Furthermore, the software has to allow for easy and meticulous documentation of measuring results according to certified standards. The GT series offers this combination of hardware and software.

INDUSTRIAL VEHICLES & GEAR BOXES

Gearboxes in commercial vehicles are exposed to extreme mechanic and environmental conditions. In order to guarantee high durability, the complex components have to be measured exactly and be documented in a traceable manner. Besides the measurement of gears, the measurement of geometrical references and their evaluation concerning accuracy in size, form, and position is of great importance. All these measuring tasks can be solved with a GT.

WIND ENERGY

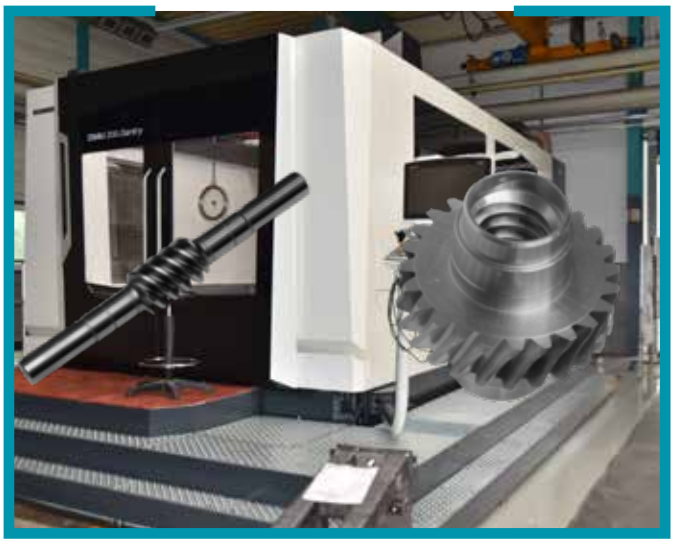
Gearboxes in modern wind turbines are subjected to extreme cyclic loads. Together with the low speeds of a wind turbine, even smallest breakouts on the gear flank can be enough to cause expensive gear damage. Therefore, wind turbines require a reliable and highly accurate choice of gearbox.

AUTOMOTIVE INDUSTRY

In the construction of modern gearboxes, high efficiency, low noise emission, and weight reduction for high durability are a priority. Precise and reliable measuring systems in quality assurance are essential. Because of its ease of use, a GT can easily be integrated into production, ensuring resource saving and efficient measuring procedures.

MACHINE & PLANT ENGINEERING

The requirements in machine and plant engineering are as diverse as their applications. They range from the measurement of small gears (module 0.3 mm), to the measurement of high accuracy gears and the geometrical evaluation of pump housing. The measurement of large bevel gears used in ship propulsion is also part of this spectrum. To fulfill these diverse requirements, a measuring system with high accuracy and high flexibility is essential. The GT series offers exactly this precision and flexibility.



WENZEL GT SERIES

TOP CLASS GEAR METROLOGY


GT
+
Z
-

THE NEW WENZEL GT SERIES

TOP CLASS GEAR METROLOGY

WENZEL GT 300

The GT 300 was specifically developed for the measurement and analysis of smaller gears and rotational symmetrical parts used in the automotive industry. Additionally, the GT 300 can be equipped with a tailstock for measurements between centers.

WENZEL GT 450

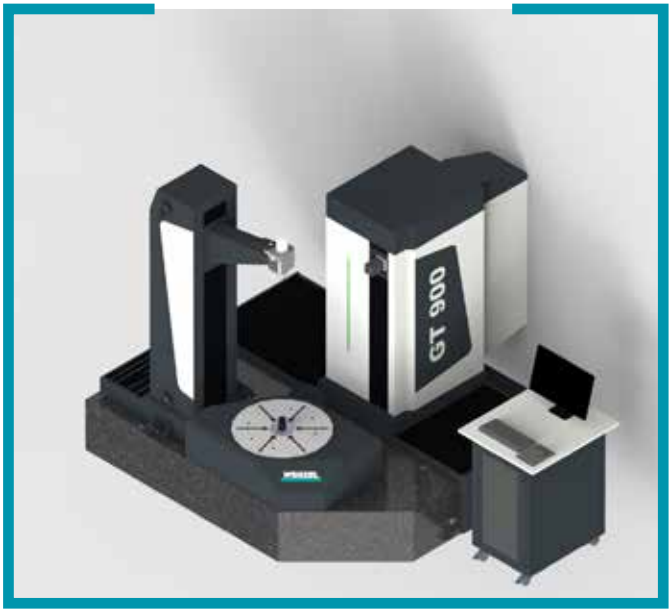
The GT 450 gear measuring machine is typically used in the aerospace and automotive industries, as well as their supplier industries. It allows for the precise analysis of gears and rotationally symmetrical parts up to a diameter of 450 mm. Equipped with a tailstock, shafts with a maximum length of 650, 900 or 1200 mm can be measured using this gear measuring machine within a measuring range of 650 to 800 mm.

WENZEL GT 650

Due to the maximum measurable diameter of 650 mm, the GT 650 is especially well suited for the analysis of geared parts and shafts used in commercial vehicles, rail transmissions, as well as construction and agricultural machinery. In the standard version of this gear measuring machine, face widths of up to 650, or optionally even 800 mm, can be measured.

WENZEL GT 900

When engine components for aviation or smaller marine gear units need to be measured, the GT 900 is the ideal gear measuring machine. It is equipped with a movable tailstock, allowing the measuring machine to be easily loaded. When using the tailstock, parts with a maximum diameter of 900 mm can be measured. The GT of this size is standardly equipped with active damping, assuring high precision measurements of big parts, even during production.



WENZEL GT 1200

Components for large-scale machines from the machinery and plant engineering field need a suitable gear measuring machine, which is the GT 1200. It is the largest measuring machine of the GT series and is equipped with a movable tailstock. This makes loading easy of large and heavy parts. When using the tailstock, parts with a maximum diameter of 1200 mm can be measured. The GT 1200 does not need a separate foundation. Active damping absorbs vibrations and ensures reliable measurement procedures.

Max. Workpiece Diameter [mm]		300
Measuring range* X- Axis [mm]		400
Measuring range* Y- Axis [mm]		225
Measuring range* Z- Axis [mm]		500/650
Allowable workpiece weight [kg]		50/400
ISO 10360 Specification		
Single Probing deviation P_{FTU}, MPE [µm]		1,8
Repeatability span $R0$, MPL [µm]		1,8
Length measurement deviation $E0$, MPE / E_{150}, MPE [µm]		1,8 + L/350
Length measurement deviation E_{0X}, MPE / E_{0Y}, MPE / E_{0Z}		1,3 + L/400
Temperature Ranges and Gradients		
VDI/VDE 2612 Bl. 1 and 2	**2613**	
Net weight Machine [~kg]**		1560 - 1740
Machine dimensions [mm]		
Length [mm]		1183
Width [mm]		1079
Height [mm]***		1843/1993
Height [mm] depending on counterholder		1962/2212
Counterholder		650/900

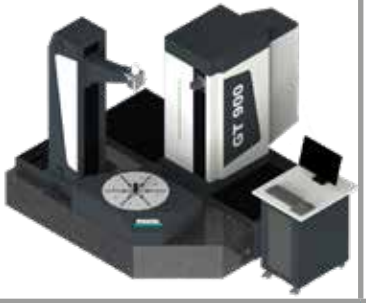
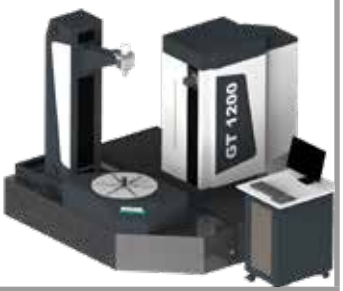
We reserve the right to make changes to the design and scope of delivery as well as to further technical developments.

*Measuring ranges depend on the respective machine configuration.

**Weight depending on machine configuration.

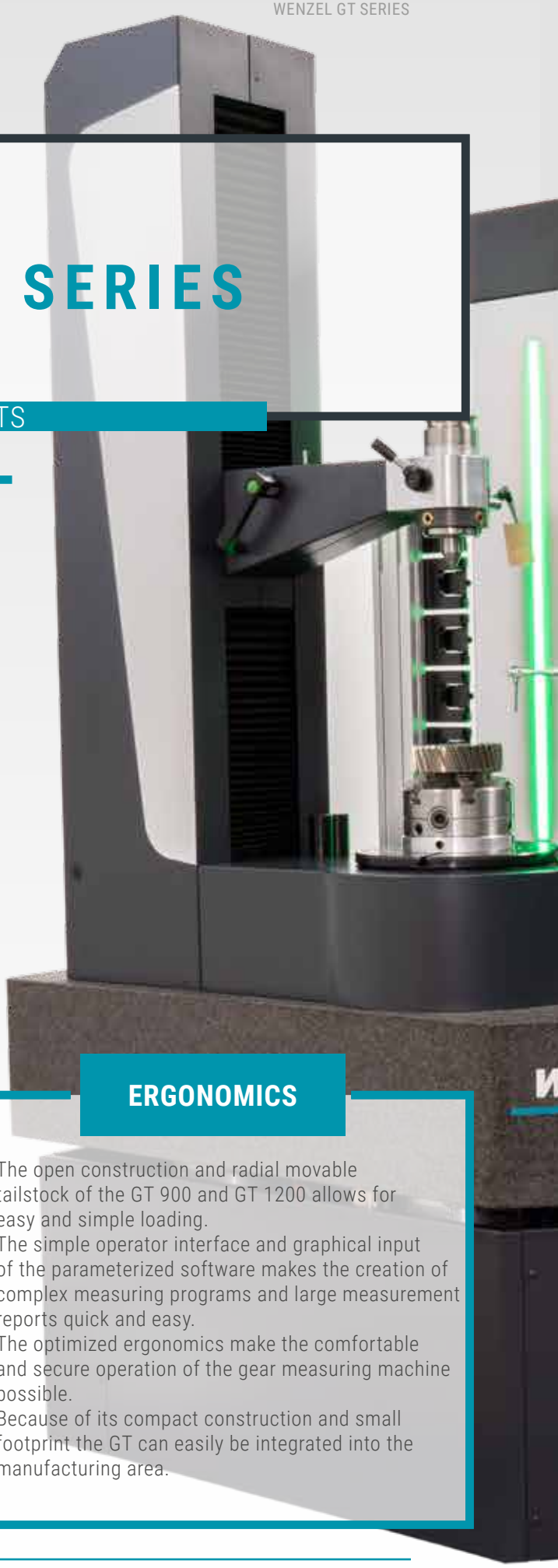
***Height without counter support, depending on Z-column

GT300

450	650	900	1200
535	710	930	1200
300	400	500	650
650/800	650/800	850/1000/1500	1000/1500
50/400	500	1500	3000/6000
2,0	2,0	2,7	2,9
2,0	2,0	2,7	1,8
2,0 + L/350	2,0 + L/350	2,7 + L/350	2,9 + L/350
1,5 + L/400	1,5 + L/400	2,2 + L/400	2,4 + L/400
18°C – 22°C ; 1 K/h; 1 K/m 2 K/d			
Class 1			
1580 - 1770	1610 - 1800	9020 - 9560	9710 - 10250
1378	1678	2302	2677
1229	1429	2902	3202
1993/2143	1993/2143	2250 (for Z 850 mm)	2400 (for Z 1000 mm)
1962/2212/2512	2212/2512	2372/2672/3072	2672/3072
650/900/1200	900/1200	900/1200/1600	1200/1600
			
GT450	GT650	GT900	GT1200

WENZEL GT SERIES

HIGHTLIGHTS

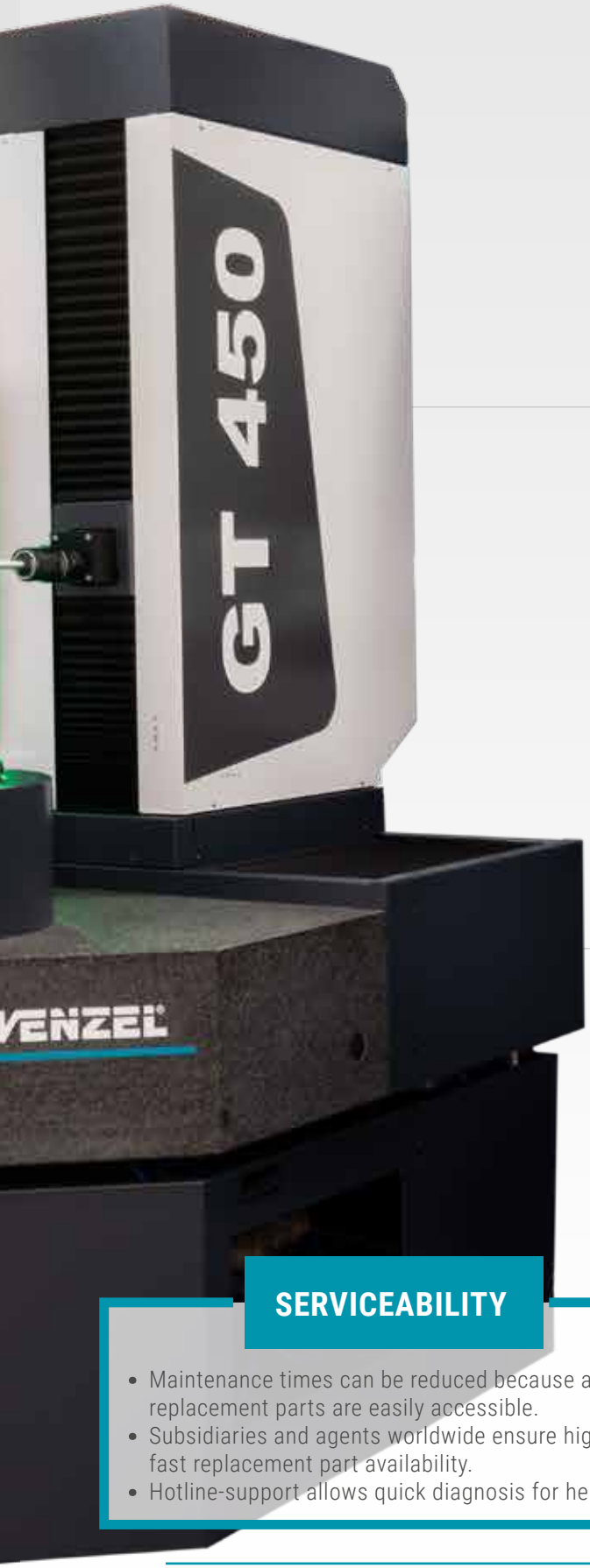


PRECISION

- For the highest precision, air bearings are used in all axes.
- The baseplate and guides of the linear axes are made of granite, ensuring identical thermal behavior of the complete measuring system.
- The standard WENZEL controller WPC guarantees an excellent 4-axis measuring performance and machine correction in real time.
- The rotary table is either pneumatic or hydraulic, depending on the size and configuration of the GT, ensuring a very high accuracy.
- High-resolution scales provide accurate positioning and precise results.

ERGONOMICS

- The open construction and radial movable tailstock of the GT 900 and GT 1200 allows for easy and simple loading.
- The simple operator interface and graphical input of the parameterized software makes the creation of complex measuring programs and large measurement reports quick and easy.
- The optimized ergonomics make the comfortable and secure operation of the gear measuring machine possible.
- Because of its compact construction and small footprint the GT can easily be integrated into the manufacturing area.



DURABILITY

- The solid base of the WGT is made of granite and provides the highest level of stability.
- All axes are protected against oil and dust by covers
- The air bearing technology in combination with the impala granite is absolutely wear-proof and ensure a long-life cycle of the material as well as accuracy.
- The modular system concept of the GT allows for easy adaption to changing requirements and offers security for your investment in the future.
- The exclusive use of high-quality components guarantees long machine operating times

SERVICEABILITY

- Maintenance times can be reduced because all replacement parts are easily accessible.
- Subsidiaries and agents worldwide ensure high and fast replacement part availability.
- Hotline-support allows quick diagnosis for help.

GEARS

QUALITY PARAMETERS AND TOOTH FLANK MODIFICATION

Quality Parameters of Gears

WENZEL

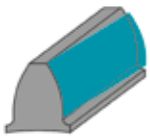
Tooth Thickness

s_t	 Tooth thickness deviation	The tooth thickness S_t results from the difference between the actual and nominal tooth thickness.

Profile

$f_{H\alpha}$	 Profile slope deviation	The profile slope deviation $f_{H\alpha}$ is derived from the deviation of the actual slope of the involute of a tooth flank and the nominal slope without influence of the form deviations.
$f_{f\alpha}$	 Profile form deviation	The profile form deviation $f_{f\alpha}$ is derived from the deviation of the actual to the nominal form without the angular influence.
F_α	 Total profile deviation	The total profile deviation F_α is derived from the superposition of the profile slope deviation and the profile form deviation.

Lead

$f_{H\beta}$	 Helix slope deviation	The helix slope deviation $f_{H\beta}$ is derived from the deviation of the actual slope of a lead trace to the nominal slope deviation without influence of form.
$f_{f\beta}$	 Helix form deviation	The helix form deviation $f_{f\beta}$ is derived from the deviation of the actual to the nominal form without the angular influence.
F_β	 Total helix deviation	The total helix deviation F_β is derived from the superposition of the helix slope deviation and the helix form deviation.

Quality Parameters of Gears

Pitch

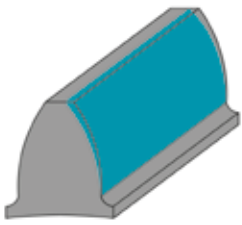
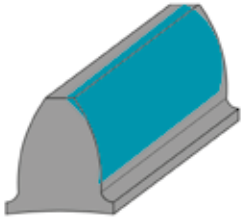
f_p	 Single pitch error
F_p	 Total pitch error

Runout

F_r	 Runout error

Tooth Flank Modification

Profile Corrections

C_a C_f	 Tip and root relief
$C_{H\alpha}$	 Profile angle modification
C_α	 Profile crown height

With kind permission of FRENCO GmbH

The single pitch error f_p is derived from the deviation of the actual and the nominal position of a single transverse pitch, separately evaluated for the left and right flank.

The total pitch error F_p results from continuous addition of the single pitch errors for left and right flanks.

The runout error F_r of a gearing is the radial position deviation of a stylus tip (ball) which is successively placed in all tooth gaps in such a manner that simultaneous contact is made with both the left and right flanks of each tooth gap at the center of the profile.

Mostly evaluated out of the pitch measurement.

Tip relief C_a and root relief C_f are an intended additional removal of material in profile direction at the tip and/or root area.

The profile angle modification $C_{H\alpha}$ is an intended angular deviation from the nominal pressure angle.

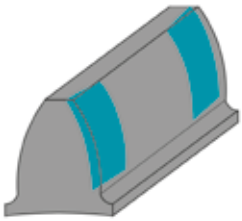
Profile crown height C_{α} is an intentional deviation of the theoretical form in the direction of the profile, so that the actual profile is curved towards the inside of the tooth.

Tooth Flank Modification

Helix Corrections

$C_{\beta s}$

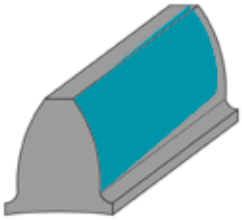
$C_{n\beta s}$



End relief reference side
End relief non-reference side

The amount of end relief on the reference side $C_{\beta s}$ and the amount of end relief on the non-reference side $C_{n\beta s}$ are specified as reduction of tooth-thickness at the reference side and/or non-reference side of the tooth flank.

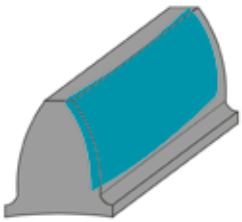
$C_{H\beta}$



Helix angle modification

The helix angle modification $C_{h\beta}$ is an intended angular deviation according to the nominal helix angle.

C_{β}



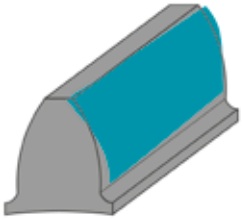
Helix crown height

Helix crown height C_{β} is an intentional deviation of the theoretical tooth flank form in the direction of the face width, so that the actual lead is curved towards the inside of the tooth.

Profile and Helix

$R_{fH\alpha}$

$R_{fH\beta}$



Profile twist
Helix twist

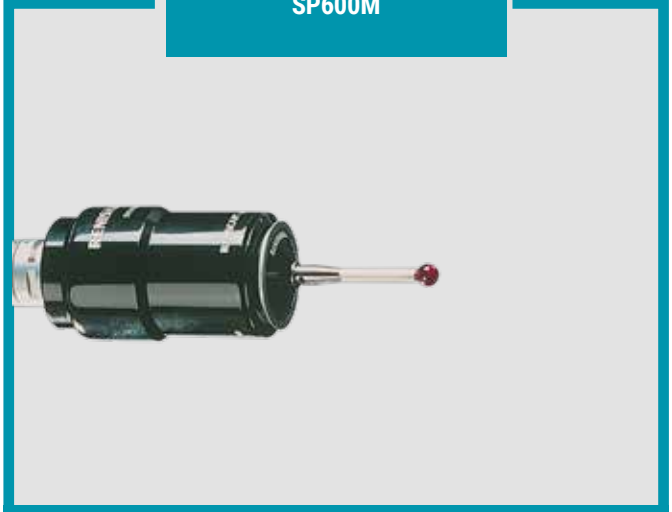
Due to targeted corrections, production influences or heat treat distortion, teeth can have a twist.

$R_{fH\alpha}$ describes the range of the profile twist.
$R_{fH\beta}$ describes the range of the helix twist.

ACCESSORIES

PROBES AND CONTROLLERS

SP600M



The SP600M is a very reliable scanning probe with an excellent product life. The robust design of the probe withstands moderate collisions. With the corresponding changing rack system SCP600 it is possible to change automatically to different SH600 stylus holders within a measuring procedure. The SH600 stylus holders can be configured with styli in different size and length. The SP600M is used on all sizes of the new GT series.

SP80H

The GT 650, GT 900 and GT 1200 equipped with the passive scanning probe SP80H. This high accuracy scanning probe was especially designed to be mounted on a horizontal quill and is therefore very suitable for the use on gear measuring machines. Using the SCP80 stylus change ports it is possible to automatically change between SH80 stylus holders with different styli configurations.

SP25M

Compact and versatile touch probe for scanning and triggering applications, which can be optionally configured to any machine size of the GT series.

WPC 2040 / 2050

Only a sophisticated control technology turns a gear measuring machine into an efficient CNC gear measuring machine. The WPC controller realizes the complete integration of the sensor technology into the control procedures. This guarantees an optimal 4-axis measurement and an accurate scanning performance. Continuous, fast and precise, the WPC controls every measurement.

- All measurement-relevant data, like position & touch probe data as well as temperature information are transmitted at high speed.
- The machine compensation is carried out in real-time and makes for precise machine movement.
- The wobble of the measured part is compensated in real-time, even during measurements of completely unknown curves.
- The controller is optimized for the use of scanning probes
- For technical support via remote maintenance access to the WPC can be permitted

TECHNOLOGY AND SUPPORT

WENZEL GEAR SOLUTIONS IN DETAIL

Service and application support - We are at your side

Professional user training
Training is offered as individual training, group training, and in seminar form. The training courses can be held on your premises or in our WENZEL training centers.

Qualified service team
Our service team is at your side with advice and support for repair work, maintenance and retrofitting through telephone support or with the innovative and simple WENZEL Online Service (WOS) - the internet-based remote diagnosis and maintenance service. Detailed information can be found in our service brochure.

Reliable results on the shop floor

Active damping
Optionally, the GT series machines can be equipped with active pneumatic vibration damping, which isolates the measuring device from external vibrations.

Temperature compensation
The GT machines can be equipped with automatic temperature compensation to compensate the thermal influences of the environment.

High resolution scales

Accurate positioning thanks to the optimal position measuring system technology
The GT Series is equipped with an incremental measuring system, which has very fine-scale pitch, and excellent dirt immunity. This enables the best position stability and resolution at high speed. The high-precision and robust scale tapes have very small, compensable length errors.

Robust and efficient

Measuring systems from WENZEL are not only robust, but also characterized by high dynamics and productivity, having a small footprint and good accessibility, which makes them ideally suited for the harsher, often cramped conditions in series monitoring or automation.

OVERVIEW CT PRODUCT RANGE

WHAT IS VOLUME MEASUREMENT TECHNOLOGY?

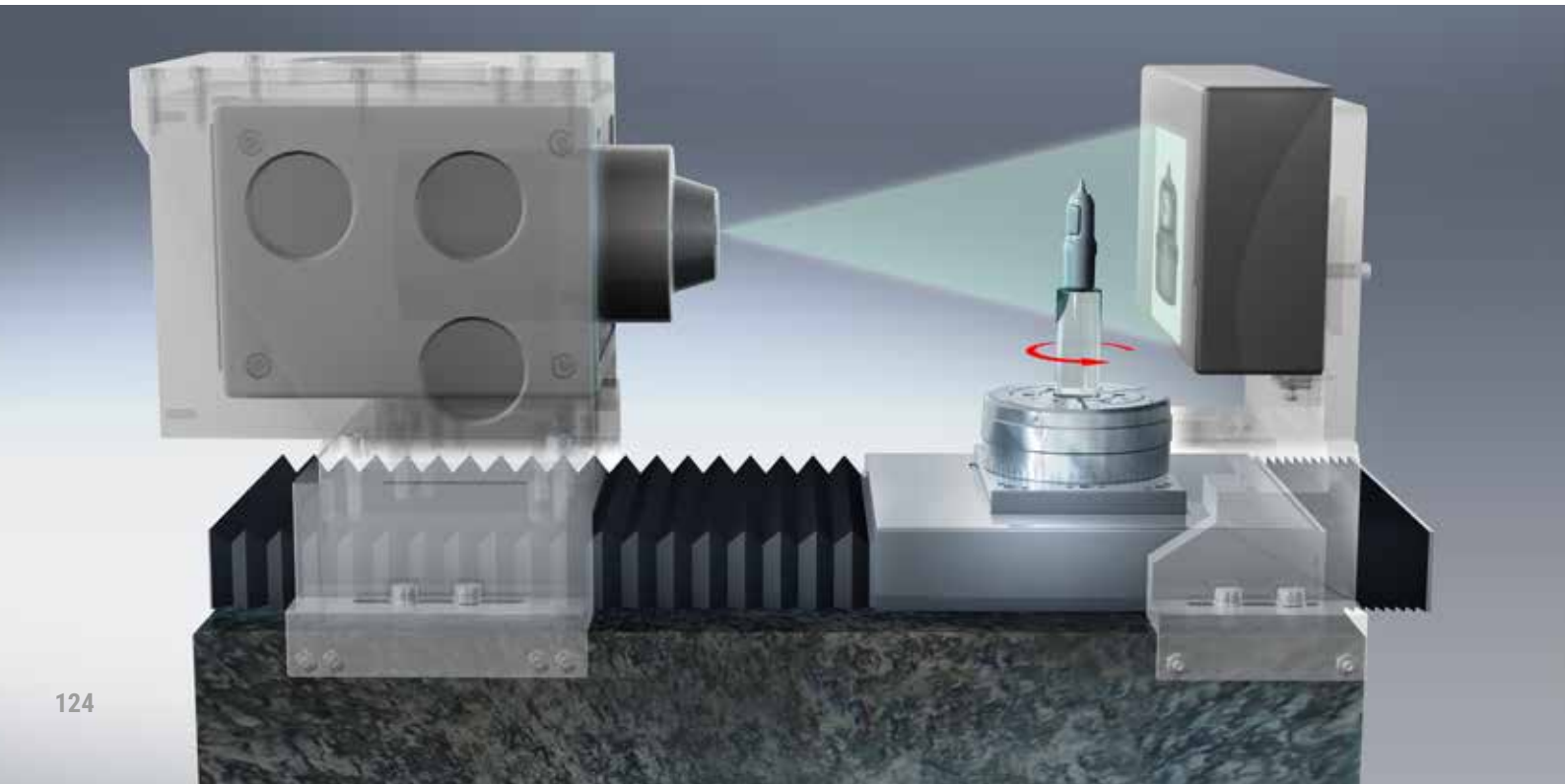
Computer tomographs are best known from the field of medical technology. They represent a further development of the classical X-ray technology.
While radioscopy X-ray machines are creating two-dimensional radiographic images of objects, computed tomographic volume measurement technology from WENZEL generates three-dimensional volume data. The scanned data can be used to reconstruct a complete dataset of materials and geometry.

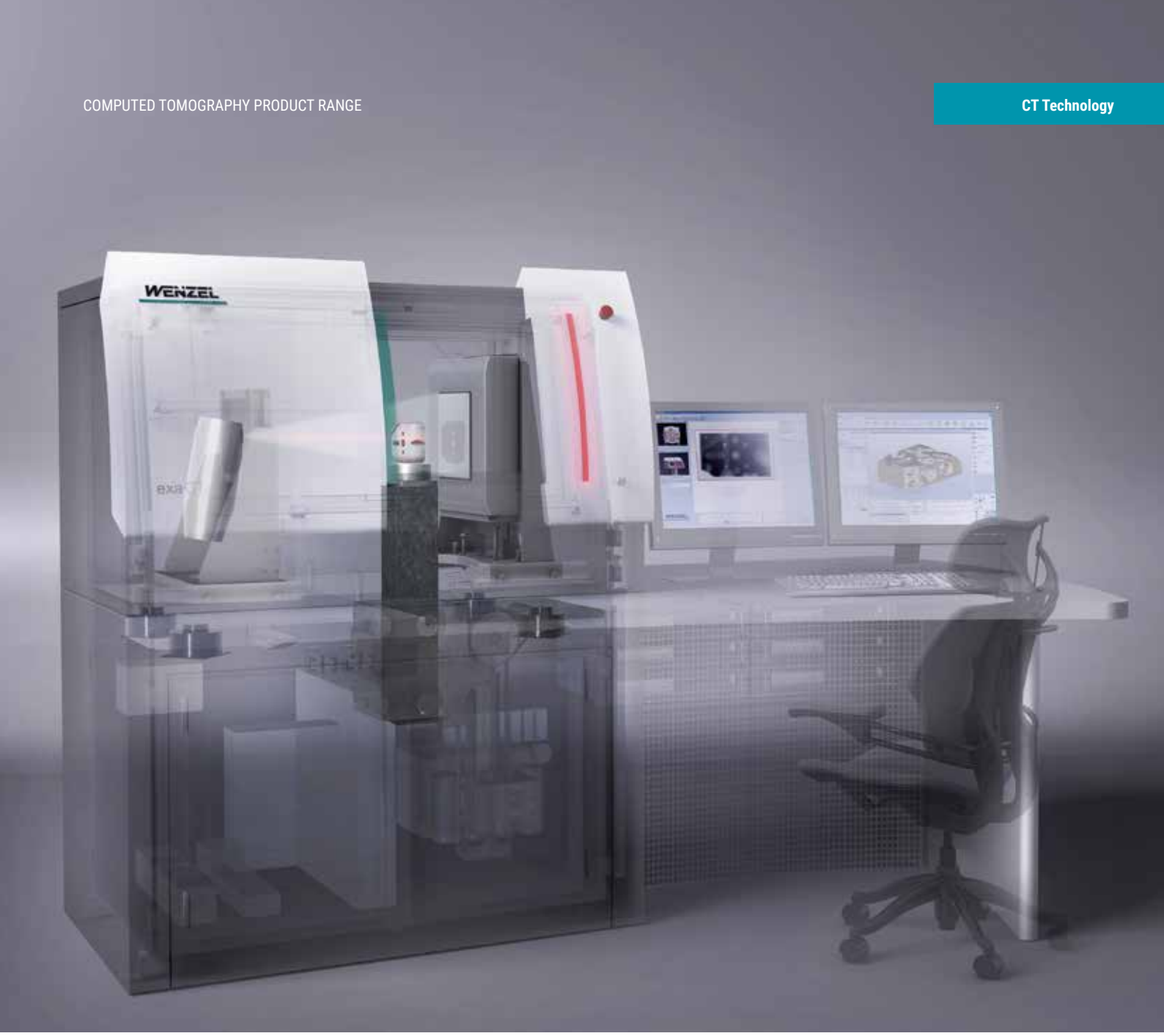
Use in the industrial sector has proven itself in practice and the market potential increases continuously. The technology in the WENZEL computer tomographs is designed for applications in a wide variety of industries where the internal and external structures of the components are captured completely and holistically.

The picture below illustrates the functional principle of computer tomography: The component is X-rayed and shot in the optical path.

For the CT scan, the object is rotated 360°. During the rotation, two-dimensional radiation images are recorded by the detector using X-rays. In the computer, the component is calculated (reconstructed) as a 3D volume model from the radiographic images.

Functional principle of a computer tomograph: The component is X-rayed and rotated in the beam path and a three-dimensional model is reconstructed from multiple two-dimensional projections.





The exaCT computer tomographs from WENZEL have an innovative system concept. WENZEL has consistently focused on the needs of the user.

Surface data is generated from this solid model, which forms the basis for all subsequent evaluations. Small components are measured near the X-ray source and larger components near the detector. Even the smallest details can be resolved by magnification. From this volume data surface models are created forming the basis of all subsequent evaluations. Small components are measured close to the X-ray source and larger components nearer the detector. Due to the magnification, even the smallest details can be resolved.

Compact and powerful Computed Tomography Systems from WENZEL offer an unmatched ability to no-destructively test every aspect of a part and capture its very DNA.

CT Systems play an increasingly important role as measuring devices. The advantage over tactile or optical systems lies in the fact that the X-rays measure hidden features in a part and the measurement data is recorded non-destructively. Virtual programming and measuring of that data is supported by intelligent software products. This method of measurement offers the only solution to the quality assurance challenges of complex 3D-printed components.

OVERVIEW CT PRODUCT RANGE

VOLUME MEASUREMENT „MADE BY WENZEL“

Since 2008 WENZEL has been one of the innovators among the CT manufacturers and offers high performance and precise equipment with which 3D measurements of internal and external structures of objects can be carried out without contact and non-destructively. The WENZEL CT product range is broadly based and covers a wide range of applications.

When the name WENZEL appears on a device, this means innovation. The exaCT series combines decades of experience in measurement technology, outstanding WENZEL quality with the highest level of competence in CT development. A modular system concept and an innovative detector technology enables a large number of device variants that allows adaptation to different customer requirements.

Tactile and optical measuring systems are limited to measuring only what they can reach or see inside a component but exaCT CT technology allows the measurement of any feature in the part even, if hidden inside. Additionally, the high rate of data acquisition means that all the data from all component can be gathered in a very short length of time.

HIGHLIGHTS

- **Better performance thanks to impressive speed**
  Quick Scanning | Quick Reconstruction | Fast evaluation
- **Low operating costs**
  Precision mechanics for guaranteed high machine availability | Long calibration intervals
- **High efficiency due to low space requirement**
  Largest measuring volume with smallest footprint | Production-compatible setup | Desktop versions for easy loading
- **Flexible solutions**
  Wide range of applications | Newest technologies | Easy operation
- **One scan, many evaluations, maximum saving of time**
  High-precision measurement results with virtual coordinate measuring machine (CMM) | Non-destructive testing (NDT) and defect analysis | Microstructure analysis of materials

exaCT®S

The compact **desktop CT exaCT S** is designed to be the ideal solution for volume measurement of small components. It can be placed on a desk and offers the highest performance in the smallest space.

exaCT S 80

Space Requirements (L x W x H)	890 x 635 x 605 mm
X-Ray (Voltage, Power)	80 kV, 40 W
Detector Resolution	1000 x 690 Pixel, 100 µm
Max. Measuring range	Ø 83 / H 46 mm*

exaCT S 130

Space Requirements (L x W x H)	890 x 635 x 605 mm
X-Ray (Voltage, Power)	130 kV, 39 W
Detector Resolution	2300 x 1300 Pixel, 50 µm
Max. Measuring range	Ø 83 / H 46 mm*

*The measurable height depends on the component diameter

exaCT®M

The **exaCT M CT workstation** is a modularly constructed system with integrated desk, where measuring and evaluation functions have been integrated in a perfectly designed workstation. Its applications are the measuring and testing of small to medium-sized components and assemblies of single or mixed materials.

exaCT M 225

Space Requirements (L x W x H)	2315 x 1275 x 1415 mm
X-Ray (Voltage, Power)	225 kV, 800 W
Detector Resolution	3600 x 1000 Pixel, 50 µm
Max. Measuring range	Ø 150 / H 250 mm*

*The measurable height depends on the component diameter

exaCT®L

The **compact power system exaCT L** is universally applicable and can scan even large components with higher densities due to its high measuring volume. The exaCT L offers a simplified, cost-effective and completely automated workflow for the entire CT analysis process.

exaCT L 150

Space Requirements (L x W x H)	1810 x 905 x 1910 mm
X-Ray (Voltage, Power)	150 kV, 75 W
Detector Resolution	3000 x 2500 Pixel, 100 µm
Max. Measuring range	Ø 235 / H 330 mm*

exaCT L 225

Space Requirements (L x W x H)	1810 x 905 x 1910 mm
X-Ray (Voltage, Power)	225 kV, 1600 W
Detector Resolution	3000 x 2500 Pixel, 100 µm
Max. Measuring range	Ø 235 / H 330 mm*

*The measurable height depends on the component diameter

exaCT®U

The **powerful universal system exaCT U** is configurable and can be adapted to individual user requirements due to its high measuring volume large components with higher densities made of plastic, metal or multi-materials can be scanned.

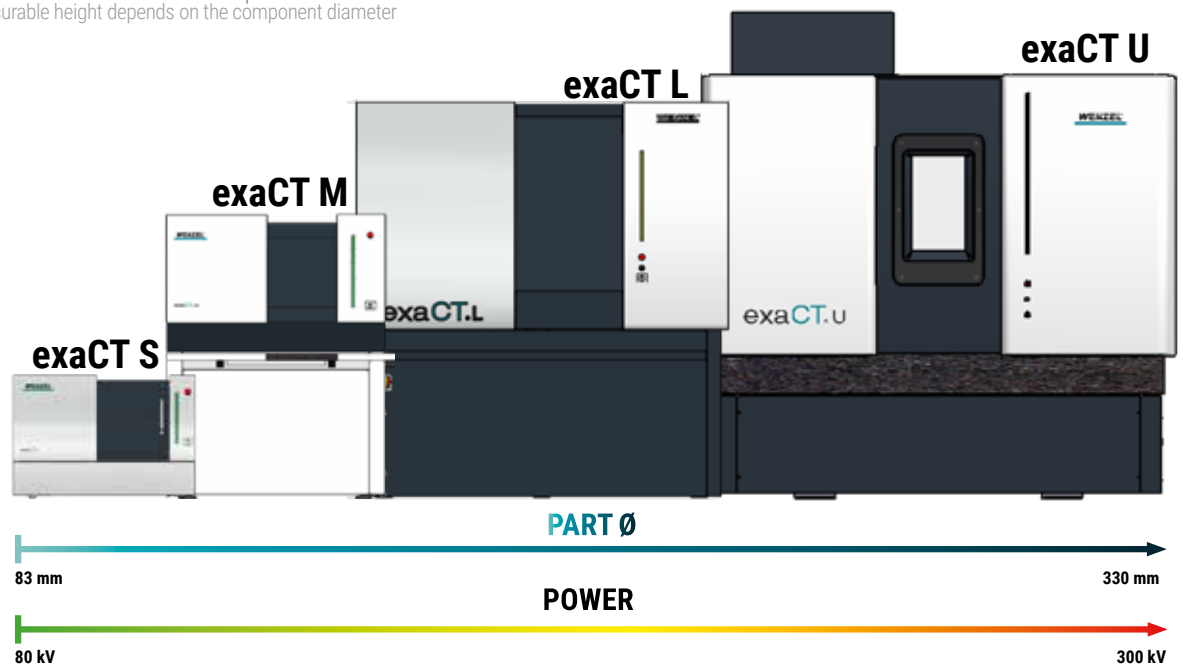
exaCT U 225

Space Requirements (L x W x H)	2315 x 1960 x 2400 mm
X-Ray (Voltage, Power)	225 kV, 350 W
Detector Resolution	2900 x 2900 Pixel, 150 µm
Max. Measuring range	Ø 330 / H 700 mm*

exaCT U 300

Space Requirements (L x W x H)	2350 x 1960 x 2400 mm
X-Ray (Voltage, Power)	300 kV, 350 W
Detector Resolution	4000 x 4000 Pixel, 100 µm
Max. Measuring range	Ø 330 / H 700 mm*

*The measurable height depends on the component diameter



FIELDS OF APPLICATION

exaCT IS THE SOLUTION FOR MANY TASKS

Computed tomography makes it possible to perform measurements on a very broad range of parts, from plastic parts to fibre composite components up to and including light metal parts. The density of the material as well as the geometry and wall thicknesses of the objects ultimately determine if they can be measured this way.

The exaCT S has a measuring volume up to 46 mm in height, 83 mm in diameter and voltage of up to 130 kV.

The exaCT M has a measuring volume of 250 mm in height, 150 mm in diameter and voltage of 225 kV.

The exaCT L has a measurement volume of 330 mm in height, 235 mm in diameter and a voltage of up to 225 kV.
The exaCT U has a measurement volume of 700 mm in height, 330 mm in diameter and a voltage of up to 300 kV.

APPLICATION AREAS

MEASURING TECHNOLOGY	TESTING TECHNOLOGY
Dimensional checks Measurement of standard geometries and freeform surfaces including shape and position tolerances	**Material defect analyses** Non-destructive testing for e.g. blowholes, pores or cracks
Wall thickness analysis Color representation of component wall thickness distribution	**Structural analysis** Visualization of material and component structures
Nominal-actual comparisons Representation of deviation from CAD model or master component	**Assembly checks** Control of assembly results, functional and error analyses
Tool and component optimization Compensation of shrinkage and warpage	**Joining technology tests** Checking errors in welded, soldered, glued or riveted joints
Development, Rapid Prototyping and Reverse Engineering Creation of CAD models from the scan data	**Electronics testing** Inspection of soldered and glued joints

FIELDS OF APPLICATION

exaCT

Real life applications demonstrate the strengths of the exaCT systems. Here we show typical applications, which demonstrate the advantages of computer tomography. With exaCT volume measurement technology, both material and geometry data of the entire component are available, multiple measurements and evaluations can be carried out on the basis of only one measurement.

Assembly control of a PC wireless mouse

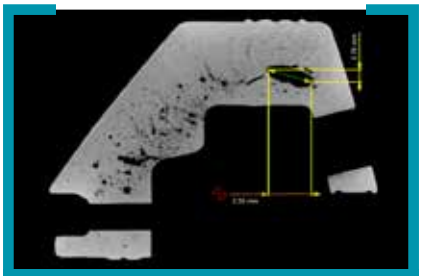
PC wireless mouse

Side view into the partially opened housing. The position of the individual parts in relation to each other can be analyzed in the assembled state.

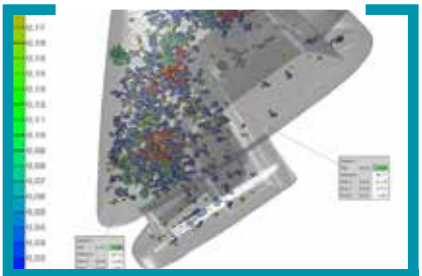
Exploded view of the wireless mouse. The individual parts can be virtually rearranged for better visualization.

Blowhole analysis of an aluminium casting

Aluminium casting



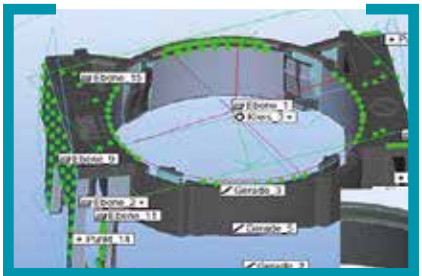
The 2D section shows blowholes and porosity in the component



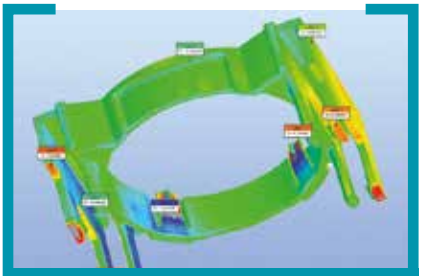
The 3D blowhole analysis shows the size, distribution and position of the blowholes in the component

Dimensional measurement technology on a plastic injection-molded component

Injection-molded component with complex internal structures.



The measuring program includes internal and external structures. Virtual touch points are set for dimensional measurement.



Nominal-actual comparison determines the deviations of the manufactured component from the CAD and makes them visible in a color-map.

WENZEL exaCT® S SERIES

NON-DESTRUCTIVE MEASURING & TESTING

The compact desktop CT exaCT S is the ideal solution for volume measurement of small components. It fits on any desk and offers maximum performance in the smallest space. The high resolution enables detailed evaluations of even the smallest components, ranging from micro-measurement to micro-material testing.

The exaCT S in compact design and sophisticated ergonomics combines performance and flexibility in the smallest space. The maintenance-free radiation source ensures low operating costs with high reliability.

APPLICATIONS

The exaCT S is the first choice for measuring and testing components with low material densities. Despite its compact system size, the system offers a measuring volume of up to 46 mm in height and 83 mm in diameter. The exaCT S is particularly suitable for non-destructive testing (NDT) of plastics, composites and multi-materials.

Connectors

Non-Destructive Testing (NDT)

Hearing aid

Assembly inspection

Insert ring

Metrology

FEATURES

- **Space-saving table installation**
  Integration of electronics and control in a compact system | No need for a separate control cabinet | Perfectly thought-out work ergonomics
- **Best performance through high efficiency**
  Optimized ratio of measuring volume to floor space | Efficient scanning and reconstruction processes | Suitable for workshops
- **One scan, maximum time saving**
  Measurement with virtual CMM I NDT and error analysis I Microstructure analysis
- **Flexible 'Plug and Play' solution**
  Micro metrology | Software for all applications | Quick set-up of workpieces
- **Low operating costs**
  Maintenance-free radiation source | Precision mechanics for higher availability | Longer calibration intervals

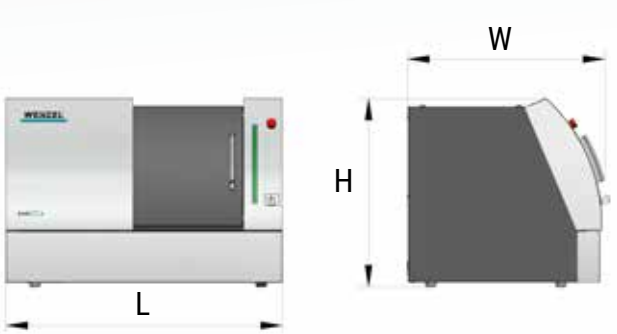
MACHINE PROFILE

exaCT S 80

Space Requirements (L x W x H)	**890 x 635 x 605 mm**
X-Ray (Voltage, Power)	**80 kV, 40 W**
Detector Matrix, Pixel Size	**1000 x 690 Pixel, 100 µm**
Detector Matrix, Pixel Size	**Ø 83 / H 46 mm***
Device weight	**380 kg**

exaCT S 130

Space Requirements (L x W x H)	**890 x 635 x 605 mm**
X-Ray (Voltage, Power)	**130 kV, 39 W**
Detector Matrix, Pixel Size	**2300 x 1300 Pixel, 50 µm**
Detector Matrix, Pixel Size	**Ø 83 / H 46 mm***
Device weight	**380 kg**



* The measurable height depends on the component diameter.

WENZEL exaCT® M

NON-DESTRUCTIVE MEASURING & TESTING

The exaCT M is based on a workstation-concept, which unites high X-ray performance and high scan speeds on a small foot-print.
The exaCT M workstation has an integrated evaluation unit in a common desk workstation. The compact design, the well thought-out ergonomics and the idea to combine more power and flexibility with less space requirements characterize the system. The workstation version enables easy loading and is ideally suitable for automating measuring and testing processes.

APPLICATIONS

With a measuring volume of 250 mm in height and 150 mm in diameter, the exaCT M workstation is used for measuring and testing technology for small to medium-sized components. The exaCT M is particularly suitable for non-destructive testing (NDT) of plastics, light metals, composites and multi-materials.

Remote control

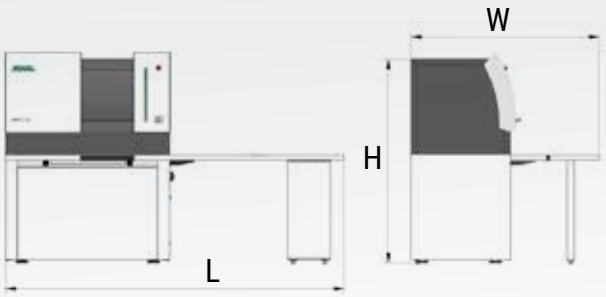
Assembly inspection

Aluminum casting

Blowhole test

Hose Connectors

Measurement Technology



MACHINE PROFILE

exaCT M 225

Space Requirements (L x W x H)	**2315 x 1275 x 1415 mm**
X-Ray (Voltage, Power)	**225 kV, 800 W**
Detector Matrix, Pixel Size	**3600 x 1000 Pixel, 50 µm**
Max. Measuring range	**Ø 150 / H 250 mm***
Device weight	**1500 kg**

* The measurable height depends on the component diameter.

FEATURES

- **Flexible compact system**
  Scanning of plastics, light metals and multi-materials | Integrated computer and control cabinet
- **High performance on a small footprint**
  Best performance during scanning and reconstruction | Workstation version for easy loading | Suitable for workshops
- **One scan, maximum time saving**
  Measurement with virtual CMM | NDT and error analysis | Microstructure analysis
- **Reliable measurement results**
  High resolution | Powerful application software | Integrated vibration damping
- **Optimized operating costs**
  Low-maintenance radiation source | High availability due to precision mechanics | Longer calibration intervals

WENZEL exaCT® L

NON-DESTRUCTIVE MEASURING & TESTING

The exaCT L offers a simplified, cost-effective and completely automated workflow for the entire CT analysis process. Due to its high X-ray performance in combination with a fast detector, the exaCT L enables the measurement and inspection of components in a short time. Due to the intuitive user guidance, exact measurement results can already be generated after a short training period. The exaCT L thinks ahead: Measuring parameters are automatically optimized by the system. In its performance class, the exaCT L is one of the most compact computed tomographs on the market. It has three independent axes and offers an impressive X-ray performance. Hardware and software offer the possibility of automated integration into the production line and are the appropriate answer to questions regarding Industry 4.0 solutions.
WENZEL was awarded the Global New Product Innovation Award 2020 from Frost & Sullivan for the exaCT L.

APPLICATIONS

The exaCT L is widely applicable and is able to scan even large components with high densities due to its large measuring volume. It is best suited for measuring and testing parts made of plastic, light metal, composite materials or multi-materials. With its closed microfocus X-ray tube, the exaCT L 150 impresses above all with its very high detail resolution. The exaCT L 225 ensures minimum scan times with a closed variofocus X-ray tube with up to 225 kV and a power of up to 1600 W.

Remote control

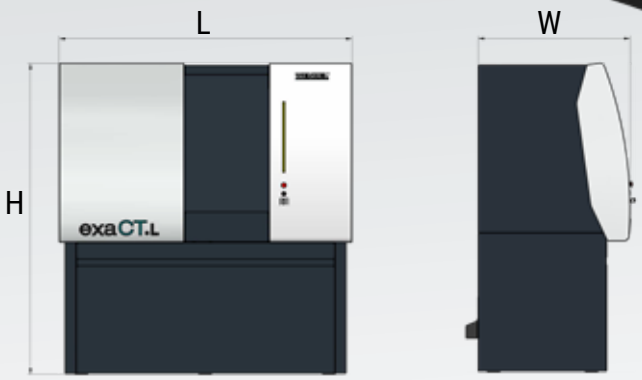
Non-Destructive Testing (NDT)

Automotive interior equipment

Assembly inspection

Titanium-ceramics implant

Defect analysis



MACHINE PROFILE

exaCT L 150

Space Requirements (L x W x H)	**1810 x 905 x 1910 mm**
X-Ray (Voltage, Power)	**150 kV, 75 W**
Detector Matrix, Pixel Size	**3000 x 2500 Pixel, 100 µm**
Max. Measuring range	**Ø 235 / H 330 mm***
Device weight	**2950 kg**

exaCT L 225

Space Requirements (L x B x H)	**1810 x 905 x 1910 mm**
X-Ray (Voltage, Power)	**225 kV, 1600 W**
Detector Matrix, Pixel Size	**3000 x 2500 Pixel, 100 µm**
Max. Measuring range	**Ø 235 / H 330 mm***
Device weight	**2950 kg**

* The measurable height depends on the component diameter.

FEATURES

- **Best results through high performance**
  Fast scanning | Fast reconstruction | Fast evaluation
- **One scan, many evaluations, maximum time saving**
  Metrology with virtual CMM | NDT and failure analysis
- **High efficiency due to small space reqiurements**
  Large measuring volume | Suitable for workshops | Automation solutions
- **High flexibility**
  Three independent axes | Software for all applications | Powerful radiation source for different material densities
- **Low operating costs**
  Precision mechanics for higher availability | Longer calibration intervals | Low maintenance X-ray technology

WENZEL exaCT® U SERIES

NON-DESTRUCTIVE MEASURING & TESTING

The exaCT U offers a simplified, cost-effective and fully automated workflow for the entire CT analysis process. Due to its high performance combined with a large measuring volume, the exaCT U enables the measurement and testing of large components with higher densities.
Due to intuitive user guidance, exact measurement results can be generated after a short training period. The exaCT U thinks along with you: Measurement parameters are automatically optimized by the system.

In its performance class, the exaCT U is one of the most compact computer tomographs on the market. It has five independent traversing axes and offers impressive resolution. Hardware and software offer the possibility of automated integration into the production line and deliver market-driven answers to questions about industry 4.0.
WENZEL was awarded the Customer Value Leadership Award 2017 from Frost & Sullivan for the exaCT U.

APPLICATIONS

The exaCT U is universally applicable and can also scan large components with higher densities due to its high measuring volume. It is ideally suited for measuring and testing parts made of plastic, light metal, composite materials or multi-materials. The exaCT U 225 ensures short CT scans with its fast detector. With its high-resolution detector, the exaCT U 300 impresses above all with maximum detail detectability. With its 300 kV, it also penetrates denser materials.

Vehicle headlamps

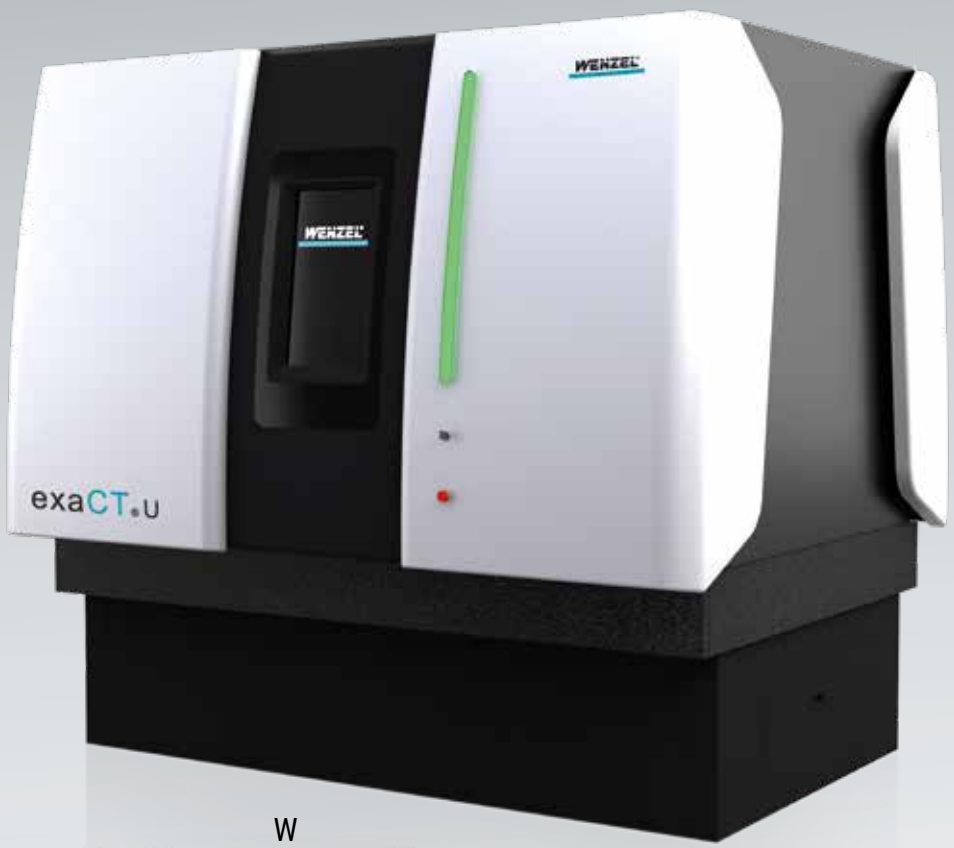
Assembly inspection

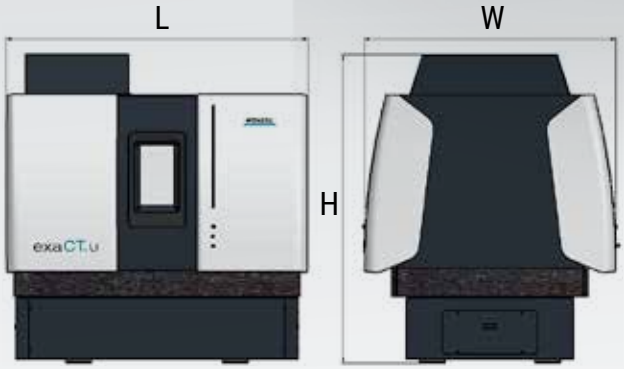
Internal combustion engine

Defect analysis

Titanium-ceramics implant

Metrology





MASCHINE PROFILE

exaCT U 225

Space Requirements (L x W x H)	2350 x 1960 x 2400 mm
X-Ray (Voltage, Power)	225 kV, 350 W
Detector Matrix, Pixel Size	3000 x 3000 Pixel, 150 µm
Max. Measuring range	Ø 330 / H 700 mm*
Device weight	10200 kg

exaCT U 300

Space Requirements (L x B x H)	2350 x 1960 x 2400 mm
X-Ray (Voltage, Power)	300 kV, 350 W
Detector Matrix, Pixel Size	4000 x 4000 Pixel, 100 µm
Max. Measuring range	Ø 330 / H 700 mm*
Device weight	10200 kg

* The measurable height depends on the component diameter.

FEATURES

- **Best results through high performance**
  Fast scanning | Fast reconstruction | Fast evaluation
- **One scan, many evaluations, maximum time saving**
  Metrology with virtual CMM | NDT and error analysis I Microstructure analysis
- **High efficiency due to low space requirements**
  Large measuring volume | Suitable for workshops | Automation solutions
- **High flexibility**
  Various volumes and configurations | Software for all applications | Choice of radiation sources and detector resolutions
- **Low operating costs**
  Precision mechanics for higher availability | Longer calibration intervals

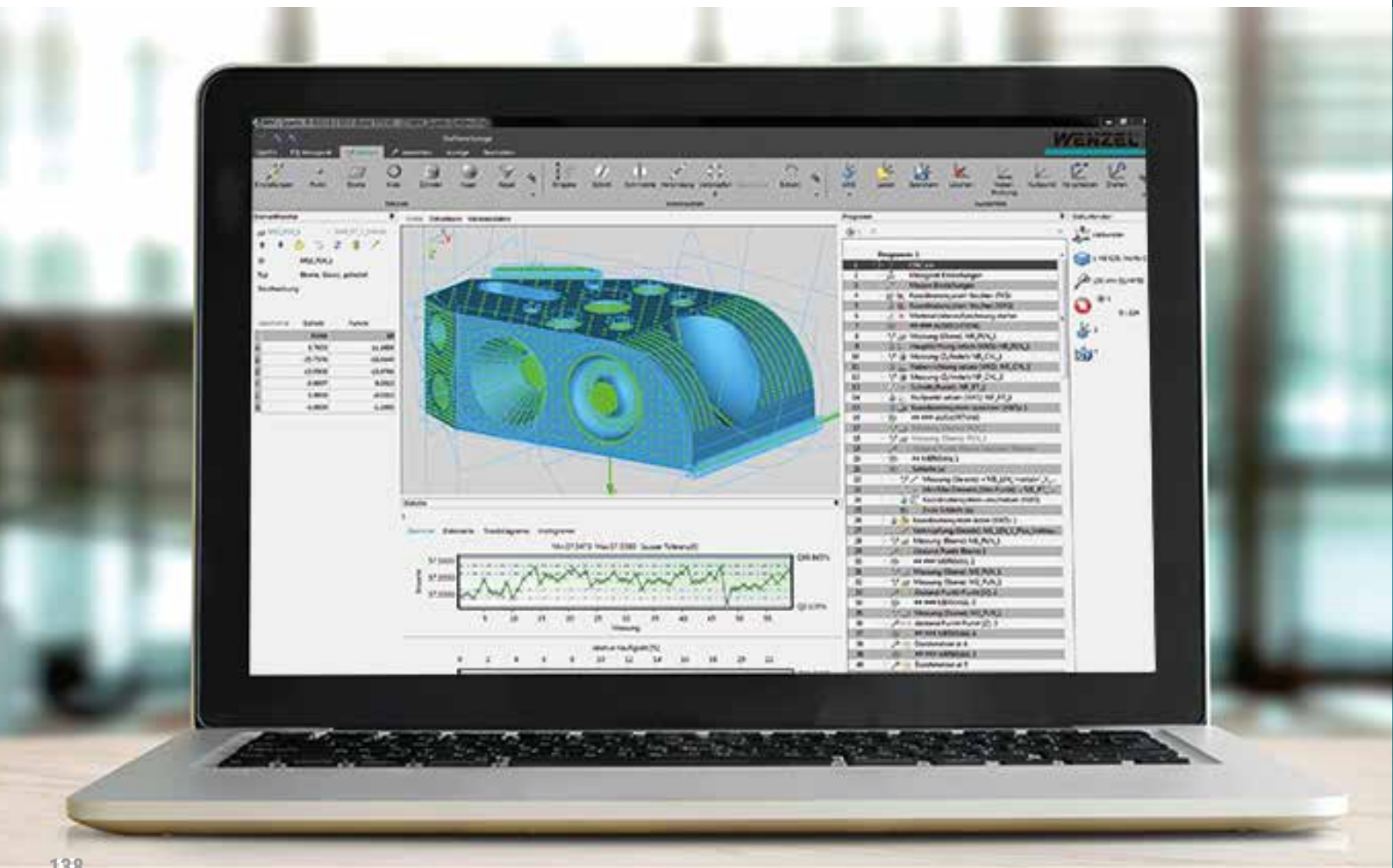
exaCT SOFTWARE FAMILY

A SOLUTION FOR THE CUSTOMER

In order to operate a CT from WENZEL, you do not need to be a computed tomography specialist. The intuitive user guidance can provide good measurement results after a short training period. High precision and a fast scanning time is ensured by the special CT control and monitoring system developed for industrial applications. Reconstruction software from WENZEL will ensure that individual components are optimized to ensure that high quality standards are achieved.

The data acquisition software provides optimized control of the computer tomograph. Reconstruction software guarantees the exact calculation of the volume data. On the basis of a single measurement metrological evaluations, material testing, nominal-actual comparisons against a master component or CAD data, reverse engineering and shrinkage compensation within the shortest possible time.

WM | Quartis – Dimensional Metrology

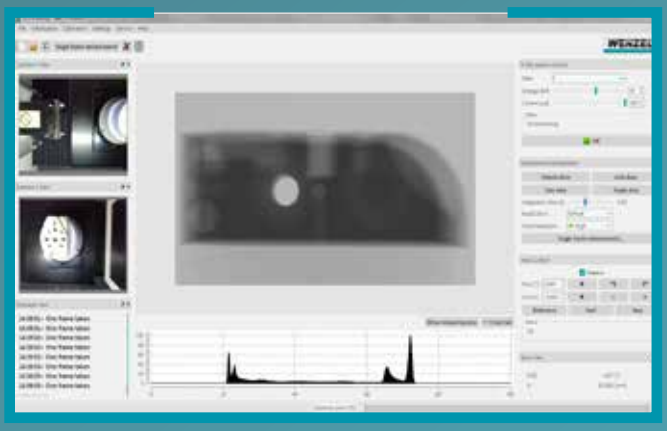


WENZEL CT SOFTWARE

AT A GLANCE

WM | exaCT CONTROL – CONTROL SOFTWARE

- User friendly control of the system hardware
- Simple preparation of CT scans and automatic optimization of the measuring parameters



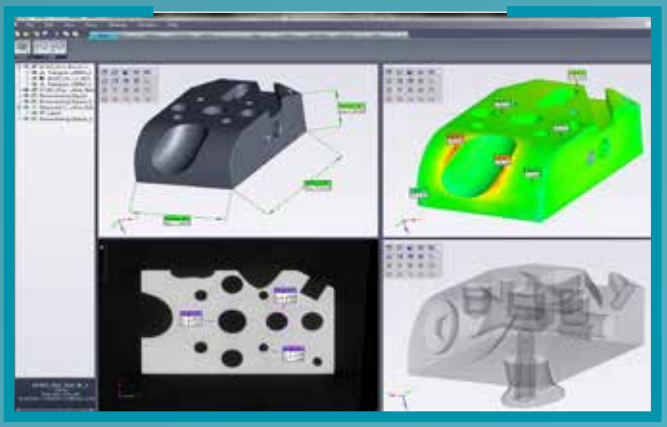
WM | CT Control - Control software

WM | QUARTIS – DIMENSIONAL METROLOGY

- Non-destructive and non-contact metrological analysis of all data at component surfaces as well as the internal structures of workpieces.
- Clearly arranged, flexible and result-oriented user interface with proven design and alignment functions
- Complete functionality for the evaluation of form, position and dimensions with simple display of the measurement results in meaningful measurement reports
- Intuitive measurement programming for automation of measurement processes including statistical functions

WM | POINTMASTER FOR CT – EVALUATION SOFTWARE

- Powerful analysis software for visualization and processing of voxel and surface data
- Surface generation tools for the generation of exact freeform surfaces and standard geometries
- NDT functions, such as 3D shrinkage analysis, testing for inclusions, wall thickness analysis as well as segmentation and visualization of composite materials with different densities
- Reverse engineering
- Nominal-actual comparisons to 3D CAD models displayed via color maps
- Innovative functions for iterative compensation of material shrinkage in the case of injection tools and casting molds



WM | CT Analyzer – Evaluation Software

> WENZEL's exaCT workstation is the optimal solution for the requirements of our customers. The coordinated process chain and last but not least the use of the same software for our coordinate measuring machines and industrial computer tomograph have convinced us of this.
>
> *Hermann Rodler, CEO, Wild Hi-Precision GmbH*

WENZEL METROLOGY SOFTWARE SOLUTIONS

The basic idea of the WENZEL software architecture is to offer SW solutions from WENZEL for all machines and applications, which have the same operating concepts but cover specialized functional scopes.
The importance of software has also increased enormously in mechanical engineering in recent years. WENZEL recognized this many years ago and established its own development site for core software in Switzerland with the acquisition of Metromec AG.
There, and at other locations, around 50 employees now work on WENZEL software solutions, which are installed at thousands of workstations.
But not only the importance, but especially the type and intensity of software use is constantly changing. According to the choice of a machine, WENZEL has the most suitable software solution for each machine in its portfolio.
In the meantime, however, the measuring tasks are also combined on different machines, e.g. when measuring gears or turbine blades on a classic CMM or when changing tactile probes and optical sensors.
The WENZEL software architecture is designed for this multiple and redundant integration into different solutions. Based on a common HW abstraction layer, the different application solutions are built up (see figure).

- The base – WM | Quartis
- The skyscraper – WM | PointMaster
- The process optimizers – WM | Sys Analyzer and WM | Generator
- The specialists – WM | Gear und WM | Blade Analyzer

The WENZEL SW family follows a similar concept as Microsoft. There are good reasons for the parallel existence of word processing, spreadsheet, e-mail and presentation software. However, similar interface concepts make it easier to familiarize oneself with and switch between solutions. This is exactly WENZEL's claim! The best possible solution for each application - from WENZEL and from a proven uniform concept.

Die Basis – our WM | Quartis

The versatile, reliable, modern and easy to use measurement software. A clear, flexible and results-oriented user interface for all industrial applications.
WENZEL - WM | Quartis - is presented in detail on the following pages.

The skyscraper – our WM | PointMaster

Our WM | PointMaster is distinguished by its processing of large data volumes of point clouds, polymeshes and voxels as well as a high degree of application flexibility. In 2018, the new interface solution was implemented along with a number of additional functions. PointMaster offers a wide range of modules that enable the user to process point clouds, model polymeshes, perform reverse engineering and create CAD models.
Furthermore, WM | PointMaster forms the basis for our special solutions in computed topography and styling.

The process optimizers

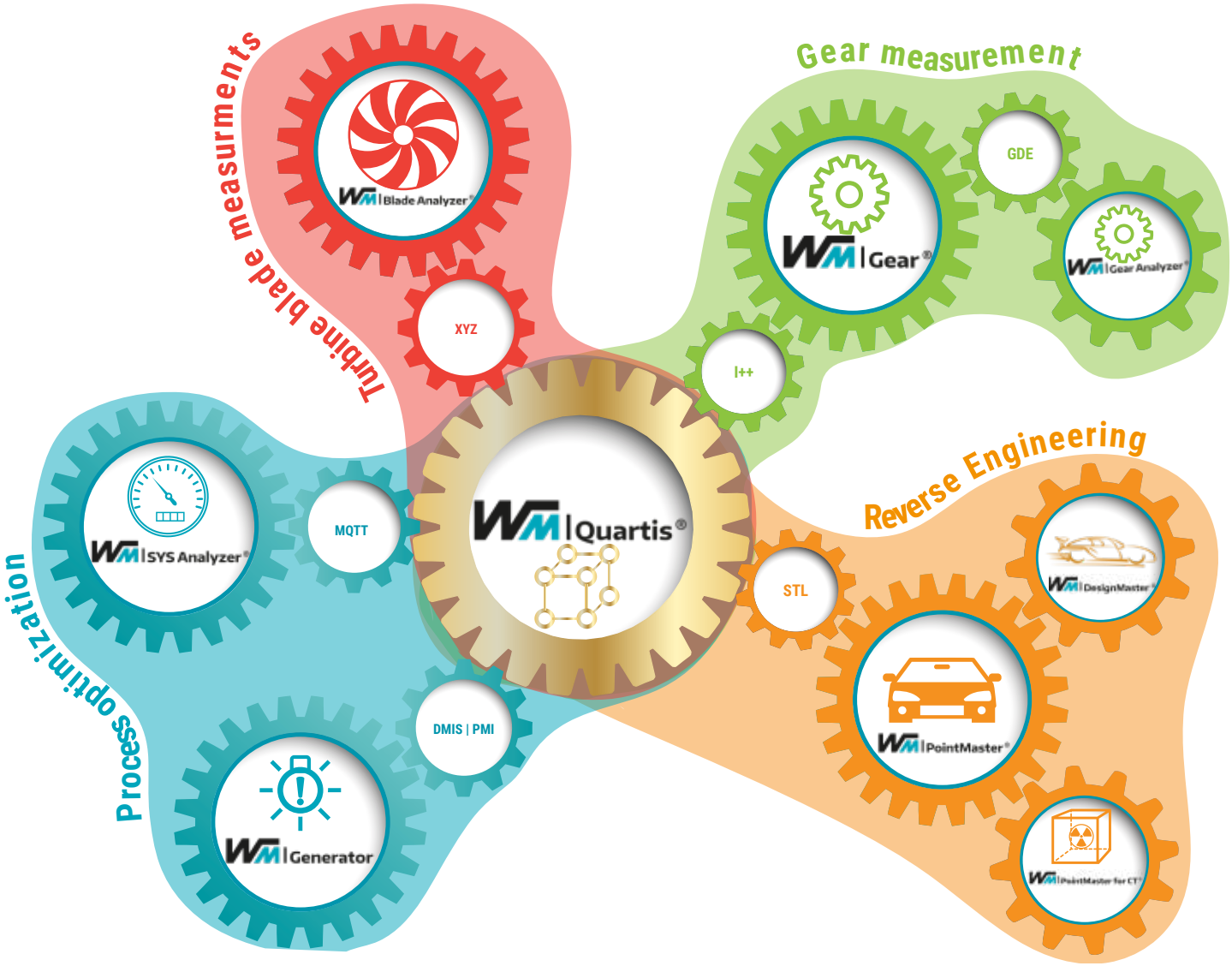
Automated measurement & evaluation – our WM | Generator

The WM | Generator is used to automatically generate measuring programs from measuring plans. The newest development at WENZEL, for customers who want to reduce the effort for generating measuring programs.

Transparency for operation and control – our WM | SYS Analyzer

The WM | SYS Analyzer offers all information around the operation and use of the installed WENZEL measurement solutions at a glance.

WM | Software Solutions®



The specialists

Measurement, analysis and visualization of gears - our WM | GEAR & GEAR Analyzer

The requirements for the evaluation of gears have increased enormously. The WM | GEAR & GEAR Analyzer solution, which is based on the open standard GDE, offers significantly more advanced options for analyzing and visualizing measurement results.

Evaluation of turbine blade measurements - our WM | BLADE Analyzer

In addition to standard parameters, the software also supports evaluations according to various manufacturer standards, various best fit algorithms for determining the blade position, as well as the evaluation of head and foot dimensions.

WENZEL Software Finder
HIGHEST FLEXIBILITY

Machine	WM | Software Solu		
	WM | Quartis®	WM | PointMaster®	WM | Gear® WM | Gear Analyzer
WM | MMA 	✓		
XO Series 	✓	✓*	✓
LH Series 	✓	✓*	✓
SF Series 	✓	✓*	✓
R Series 	✓	✓	✓
GT Series 	✓		✓
CORE Series 	✓	✓	✓
exaCT Series 	✓	✓	✓
Offline 	✓	✓	✓

* Only in conjunction with WPC controller
** Only in conjunction with UCC controller

tions			Partner products		
	WM Blade Analyzer®	WM SYS Analyzer®	Metrologic (Metrolog/ Silma)	Polyworks	Renishaw Modus
	✓	✓	*	*	**
	✓	✓	*	*	**
	✓	✓	*	*	**
	✓	✓	*	*	**
		✓			
	✓	✓			
	✓	✓			
	✓		SilmaX4		

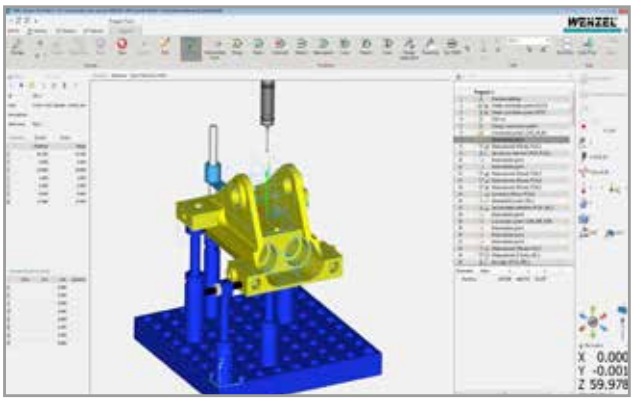
WM | Quartis

DIE UNIVERSELLE STANDARDMESSSOFTWARE

WM | Quartis is the versatile, reliable, modern and easy to use measurement software from WENZEL. With WM | Quartis WENZEL offers a new generation of innovative measurement software with a clear, flexible and result-oriented user interface for all industrial applications. Meaningful measurement reports can be generated even faster and easier. The user interface of WM | Quartis, based on Microsoft Office Fluent, significantly simplifies the application of the powerful functions. You can obtain correct measurement results, impressive test reports and meaningful statistics more quickly and easily. The optimized screen layout and the dynamic, result-oriented ribbons significantly speed up workflows and ensure greater efficiency in day-to-day business.

HIGHLIGHTS

WM | Quartis is the versatile, reliable, modern and easy-to-use measurement software from WENZEL. With WM | Quartis WENZEL offers a new generation of innovative measurement software with a clear, flexible and result-oriented user interface for all industrial applications. Meaningful measurement reports can be generated even faster and easier. The Microsoft Office Fluent™ based user interface of WM | Quartis significantly facilitates the application of the powerful functions. You get correct measurement results, impressive test reports and meaningful statistics faster and easier. The optimized screen layout and the dynamic, result-oriented ribbon bars significantly speed up workflows and ensure greater efficiency in day-to-day business.



WM | Quartis, die universelle Messsoftware

FEATURES

- Geometry, freeform and curves combined in one measuring software
- Supports manual and CNC measuring devices of various types
- Scanning with tactile and optical sensors and 5-axis measuring heads
- Form and position evaluation according to the latest ISO GPS and ASME standards
- DMIS 5.2 Standard complements the intuitive Quartis programming language
- Structured data management in relational database (MS Access / SQL-Server)
- Report generator for descriptive measurement reports
- Operator-friendly operation with quick selection panel, 1-click program start
- Ready for special applications thanks to numerous interfaces and add-ons

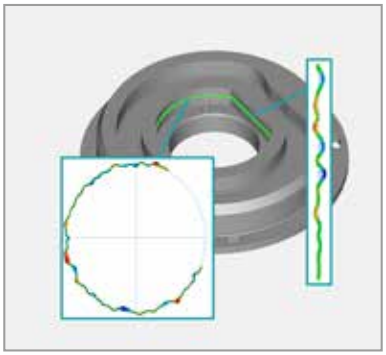
USER INTERFACE

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 using of a barcode scanner. The relational database also ensures traceable measurement results. The nintegrated statistics package guarantees a rapid assessment of manufacturing processes. The CAD functionality of WM | Quartis is the basis for efficient measurement. The integrated live preview ensures the correct application of the standard-compliant evaluation according to ISO GPS and ASME. WM | Quartis supports 3D mice. The two-handed, simultaneous mode of operation additionally accelerates work in 3D Graphics WM | Quartis impresses with a result oriented, tidy user interface.

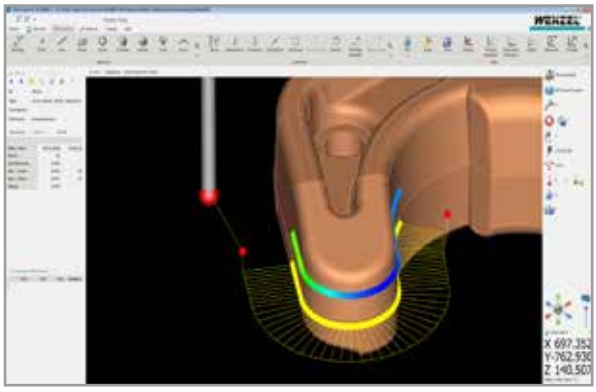
WM | Quartis convinces with a result-oriented, tidy user interface

MEASUREMENTS

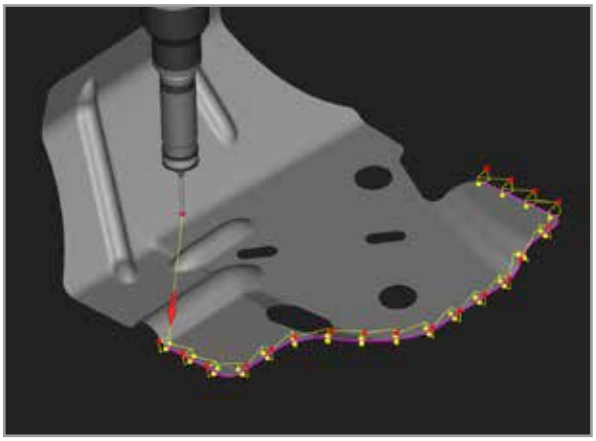
WM | Quartis measures geometric components, free-form and curves. With the proven Click 'n' Measure™ functionality, a dynamic measurement strategy library and numerous sophisticated tools, measuring tasks are quick and easy. The basis for measuring is the centrally arranged, large working window with the 3D graphics. The live preview shows the active measurement strategy and guides the user more quickly to the correct settings. Measurements can be made by single point acquisition, scanning and self-centering. Safety levels and collision checking prevent damage to the measuring device. With powerful alignment functions and a world-class best-fit, all alignment tasks can be performed easily. Standardized filters and outlier removal eliminate disturbances on the material surface.



Measure and evaluate curves. The "Extract" construction function generates circles and straight lines from measured curves



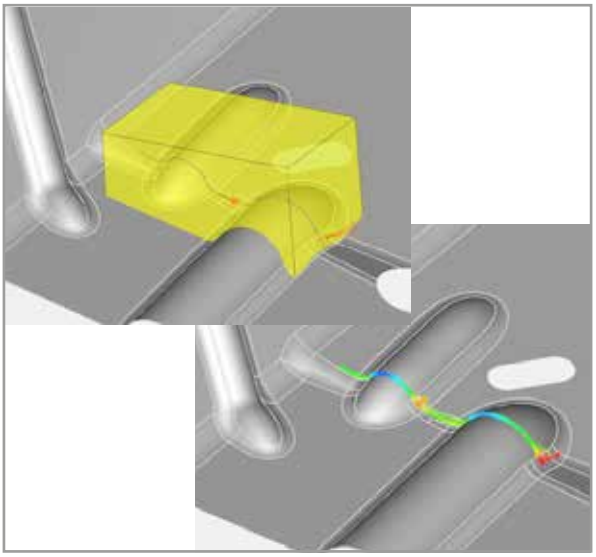
Measure and evaluate curves



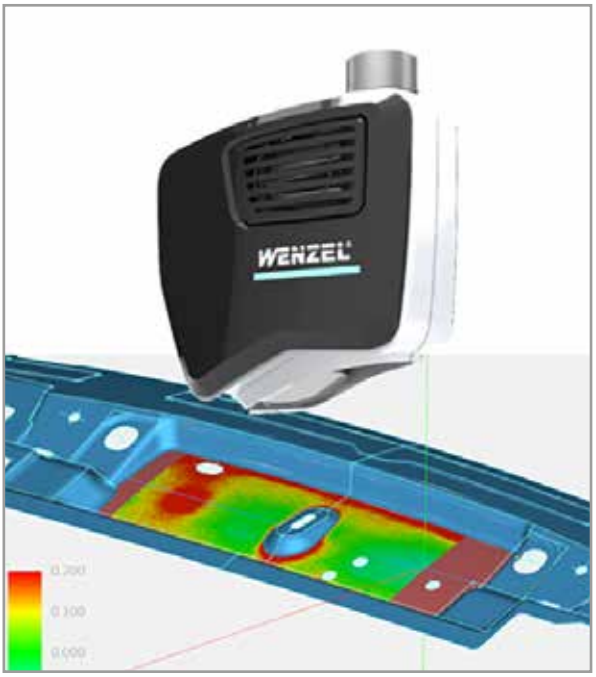
Measuring and evaluating edge points

MEASUREMENTS

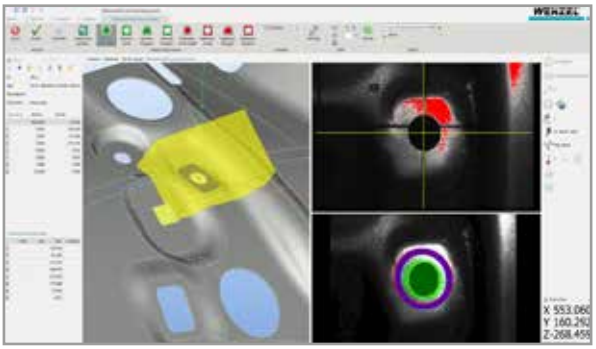
WM | Quartis supports manual and CNC measuring machines with tactile (touching) and optical (non-contact) sensors and is therefore predestined for automated multi-sensor applications. Scanning with high point density allows the acquisition and evaluation of surface shape tolerances as well as the color-coded representation of component deviations.



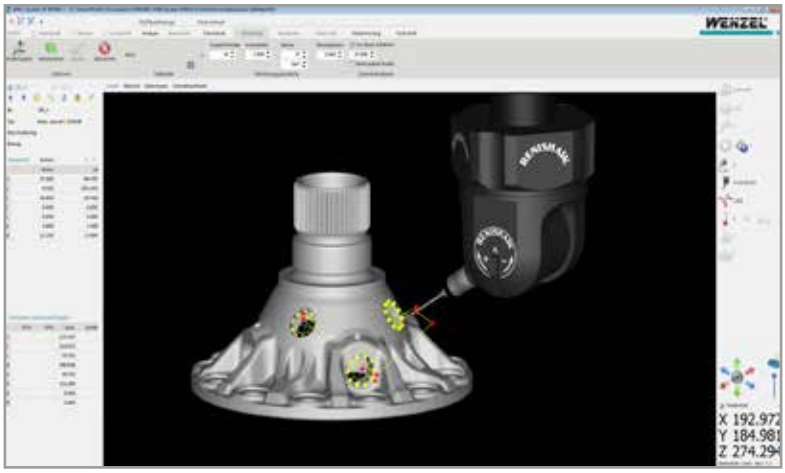
Profiles can be captured and evaluated with one image



Detection of surface shape with optical sensor and color-coded display of component deviations



Non-contact measurement with optical sensors

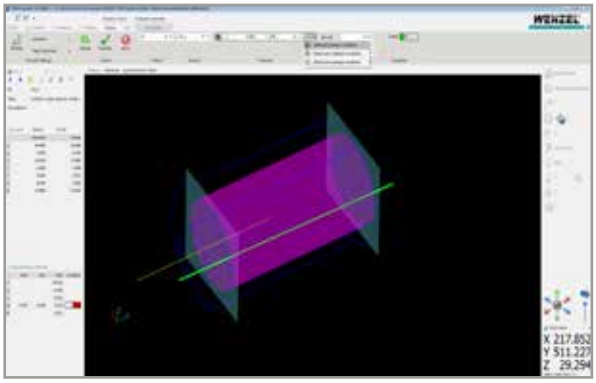


5-axis probes such as PH20 significantly increase measurement throughput

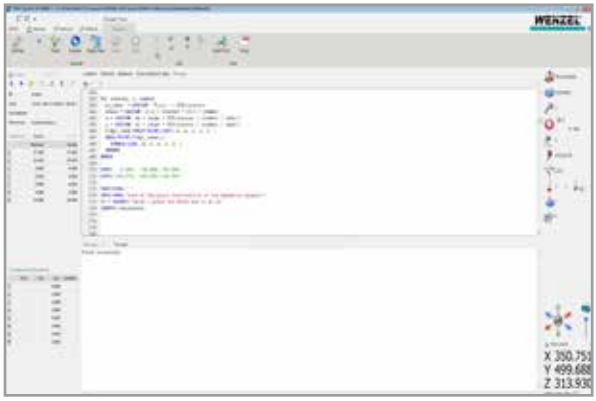
Renishaw REVO and PH20 5-axis probes increase measurement throughput with very high scanning speeds and point rates. Stepless rotation and swivel angles allow time-saving, through optimum alignment of the probe to the component. Measurement with the rotary axes leads to high system accuracy due to minimal traverse paths of the measuring device. In addition, the REVO system allows the measurement of roughness.

EVALUATION

Standard features such as dimension, position, distance, angle etc. are available to the user. Shape and position evaluations are evaluated according to the current ISO GPS / ASME Y14.5M standards. The live preview ensures correct application and avoids incorrect data input. The input fields in the menu band correspond to the drawing specification. WM | Quartis automatically selects the correct algorithms for standard-compliant evaluation with references and tolerated elements.



Evaluate characteristics according to standards



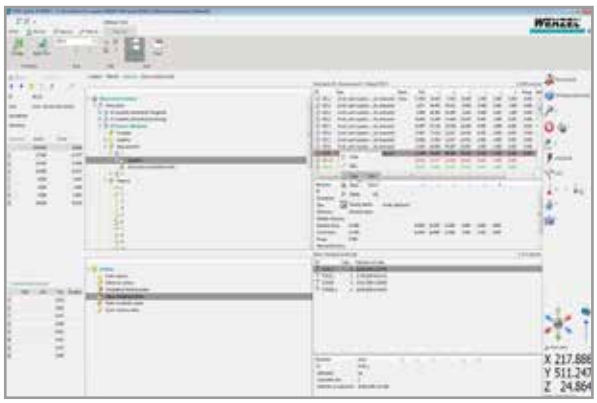
Powerful and flexible programming in DMIS for programming experts

PROGRAMMING

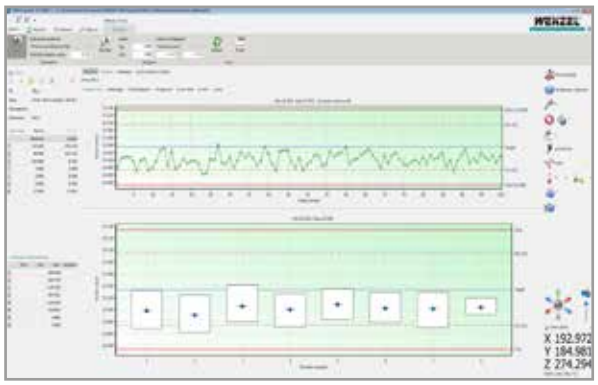
Measurement programming in WM | Quartis is intuitive and powerful. Measuring programs are efficiently created on the basis of CAD models, online directly on the coordinate measuring machine or offline on a virtual measuring machine. Various intelligent tools help the user to do this. Traverse paths are simulated, collisions are detected and avoided. Measurement sequences can be processed graphically-interactively and very efficiently. For correct programming cracks and even more advanced, flexible measuring programs with variables, formulas, conditional instructions and loops etc., the manufacturer-neutral programming language according to DMIS 5.2 standard is available.

DATA MANAGEMENT INCLUDED

Data (workpieces, measurements, programs, features, etc.) are secure, structured and in good hands in WM | Quartis thanks to the integrated Microsoft Access® database. This ensures traceability and, if necessary, later evaluation of measurements. For large data volumes and several measuring systems, the system can be scaled to a central Microsoft SQL Server® database. Data management is as clear and simple as in a Microsoft Windows® file explorer. The option of automatic data backup saves users from unpleasant surprises.



Secure, clear and structured data management



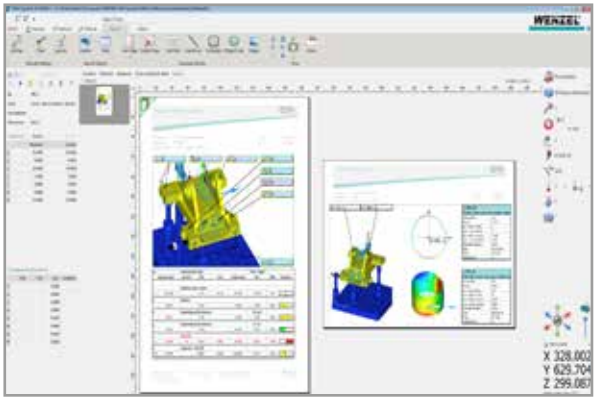
All important characteristic values at a glance with the built-in statistics

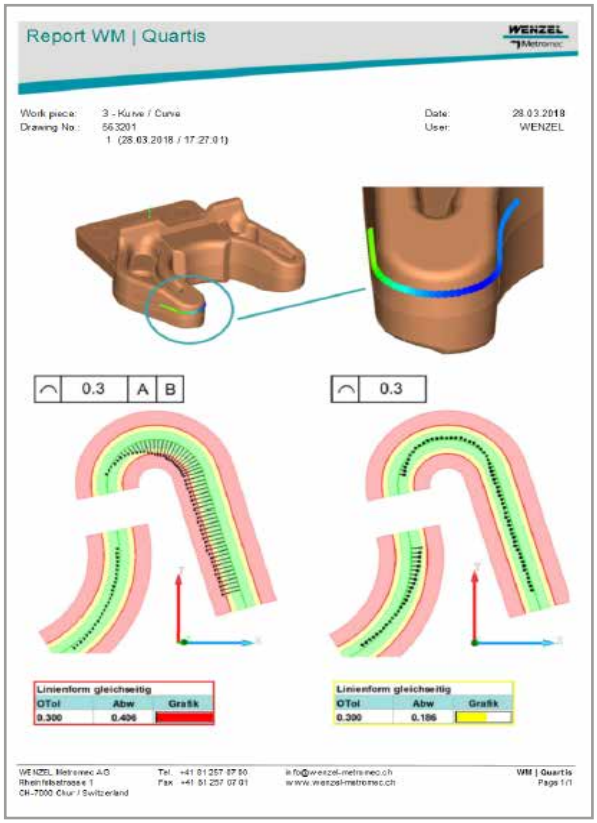
STATISTIC

The integrated statistics package guarantees a fast assessment of the manufacturing processes by machine and process capability (SPC), statistical data, trend diagram, histogram, X-, R- and s-card. The most important parameters are always at a glance in the overview window. Configurable views and diagram areas meet all requirements. Data can be exported in various formats for external evaluation.

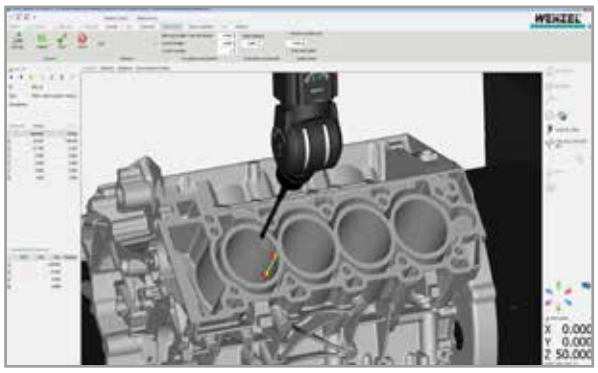
IMPRESSIVE REPORTS

The integrated report generator allows a free configuration of the measurement reports (table and graphic views with freely configurable data- and statistics boxes). With the extensive template-library you can create impressive presentations of measurement results in no time. Deviations can be displayed color-coded. With the powerful drawing tools, inserted images and texts, measurement reports can be completed. Language and units of measurement in the measurement report can be configured independently of operation. WM | Quartis also offers various export options (PDF, ASCII, MS Excel®).

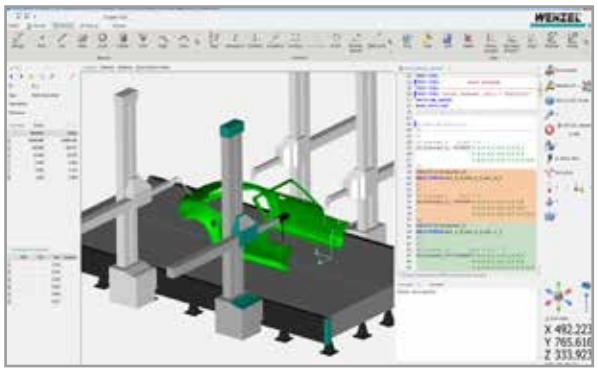




Geometry and freeform, graphics and tables can be displayed quickly and easily in a meaningful measurement report



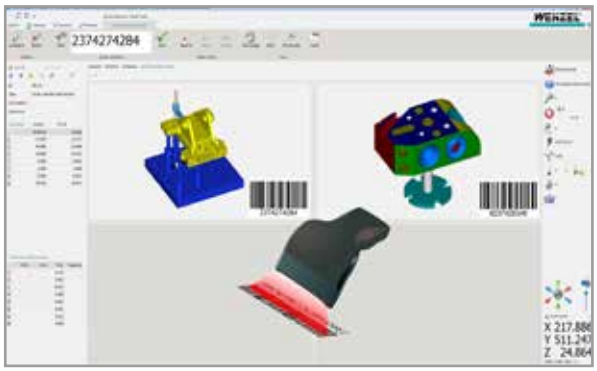
Measure roughness with Renishaw REVO SFP2 roughness sensor



Multi-device operation with up to 8 measuring devices

SPECIAL APPLICATIONS

- Measure and evaluate roughness with Renishaw REVO
- Use of third-party measurement software via WM | I++ DME Server based on WM | Quartis
- Virtual measurement on actual data from Computertomographs and optical scanners using WM | CTAnalyzer and WM | PointMaster
- Multi-column systems can be operated simultaneously and collision-free with up to 8 CNC measuring devices. This dramatically reduces the measuring cycle time
- Measurement of turbine blades in WM | Quartis and evaluation in WM | BladeAnalyzer on WENZEL CORE multisensor measuring devices
- Export of tool correction data, e.g. for eroding machines
- Automation and integration of the measuring system in the production process
- Use as a test device with the Renishaw Equator



Program start and data transfer from bar and data matrix codes

YOUR ADVANTAGES AT A GLANCE

- **Powerful, universal measurement software**
  Measurement of standard geometry, freeform and curves | For manual and CNC measuring devices | With tactile and optical sensor technology | For single point and scanning acquisition | Standard-compliant evaluation | Impressive measurement reports
- **Simple operation**
  User-friendly Microsoft Fluent Interface | Dynamic Ribbons | Structured Workspace
- **Low operating costs**
  Low training costs | Investment protection thanks to ongoing further development and regular updates | Software maintenance contract at a reasonable price | Volume discounts
- **Connectivity**
  Imports from all common CAD systems | Data transfer to external statistical software | Connection of various measuring machines | Automation solutions
- **Swiss Made Quality**
  Reliable | Precise | Innovative | Down-to-earth | Windows 10 compatible

Windows 10 Compatible

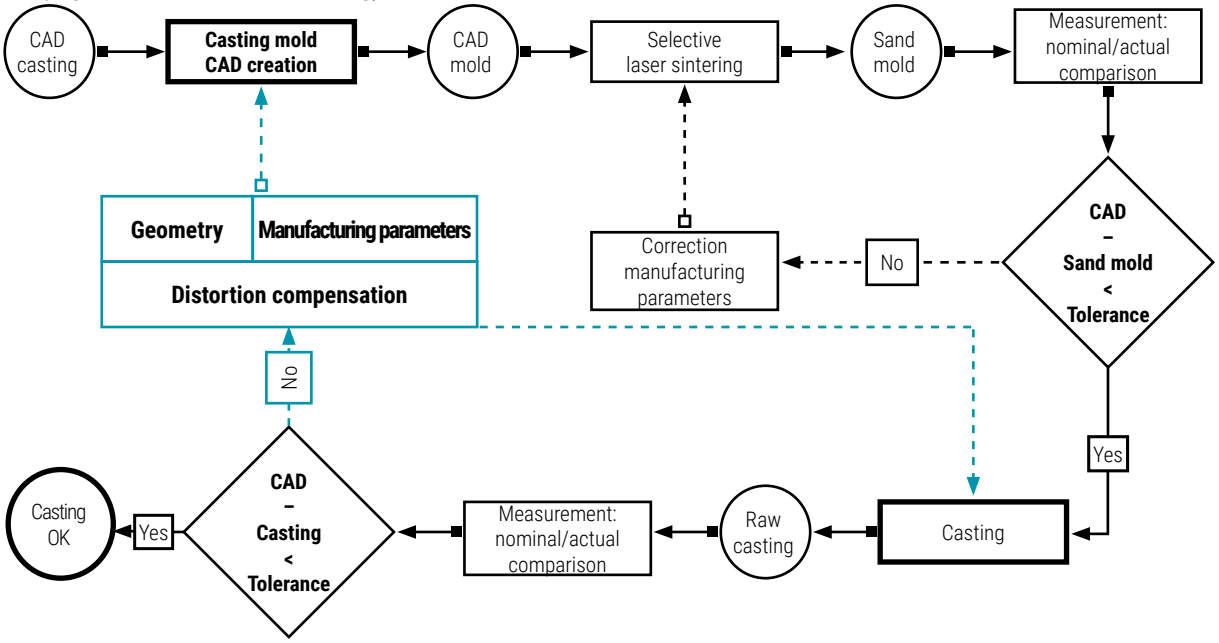
WM | PointMaster

THE ALL-ROUNDER FOR SCAN DATA PROCESSING

The processing of optically as well as tactile measured data is an indispensable and efficient tool in the development and manufacturing process in many industrial areas and applications, such as tool and mold making and quality control.
WM | PointMaster primarily supports users in the further processing of point clouds and poly meshes up to the process of reverse engineering and this almost in Strak quality. The innovative procedures and process chains are based on the WM | PointMaster geometry kernel and ensure excellent data quality and outstanding machining processes.

NEW COMPENSATE MODULE

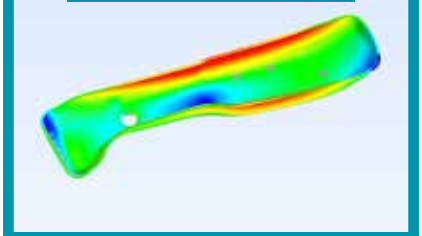
Fully automatic calculation of error-compensated new tool geometry taking into account a nominal geometry, the shrinkage factor of materials as well as the original tool geometry (represented in the process diagram for the compensation of shrinkage and warpage for tool and mould making).



1 Alignment

Alignment actual- to nominal component

2 Analysis



Analysis of the actual component by target/actual comparison of actual component to nominal component

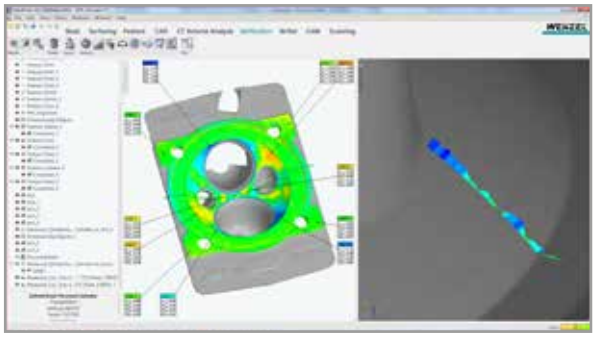
3 Strategy

Strategy of compensation represented by sections

Green section = Nominal geometry
Red section = Nominal geometry (Scan)
Blue section = Compensated geometry

REVERSE ENGINEERING

A surface boundary on the polymesh is sketched interactively. The Geometry Navigator then calculates the optimal boundary curves for this area and approximates the surfaces. At the press of a button, the entire surface structure is given continuous curvature surfaces (C2-continuity). A plus point of WM I PointMaster is the visual support by the interactive feature "Shading". Artifacts and discontinuities as well as the form guidelines important for the surface structure are displayed. New functions such as surface trimming using B-Spline curves, the transfer of surfaces created in CAD for reverse engineering and rule geometry recognition round off the range of functions.



NOMINAL/ACTUAL VALUE COMPARISON

The user transforms the measured data (scan data = actual data) into the coordinate system of the reference object (CAD data = target data), starts the analysis and receives a deviation color map as result. The measured deviations are displayed in a so-called deviation color map. Measuring points can be taken directly from the analysis object and transferred to a measuring protocol. Measuring programs created for a tactile measuring machine in WM I Quartis can be sent via I++ to WM | PointMaster. WM | PointMaster then functions as a virtual measuring machine, calculates the contact point from probe to component and then sends it back to WM I Quartis.

FEATURES

- **Shrinkage and distortion correction**
  For tool and die makers | Sophisticated functions and algorithms | Compensation of the formed or original components
- **Comprehensive format support**
  Handling scan and CT data | Support of all common scan, CAD, CT and CNC formats
- **Extensive functions**
  Creation of documents including presentation tools for measurement reports, documentation | Reports for order preparation | Freely available viewer
- **Support of numerous data types**
  Point clouds, polylines, polymasks | Surfaces and curves of higher order | Pixels and voxels |
  CNC traversing polyhedron

WM | GEAR & GEAR ANALYZER

THE ALL-ROUNDER FOR GEAR MEASUREMENT

WM | Gear, together with WM | Gear Analyzer, is the innovative software package for data acquisition, measurement and evaluation of involute gears on CMMs. Operators may use extensive possibilities of WM | Quartis (e.g. probe management, probe calibration, determination of workpiece coordinate system and rotary table axis) without additional training effort. Communication between WM | Gear and WM | Gear Analyzer is based on open GDE-Standard (VDI / VDE Guideline 2610).

APPLICATION AREAS

Spur and helical gears with involute profile, internal and external gears and bevel gears.

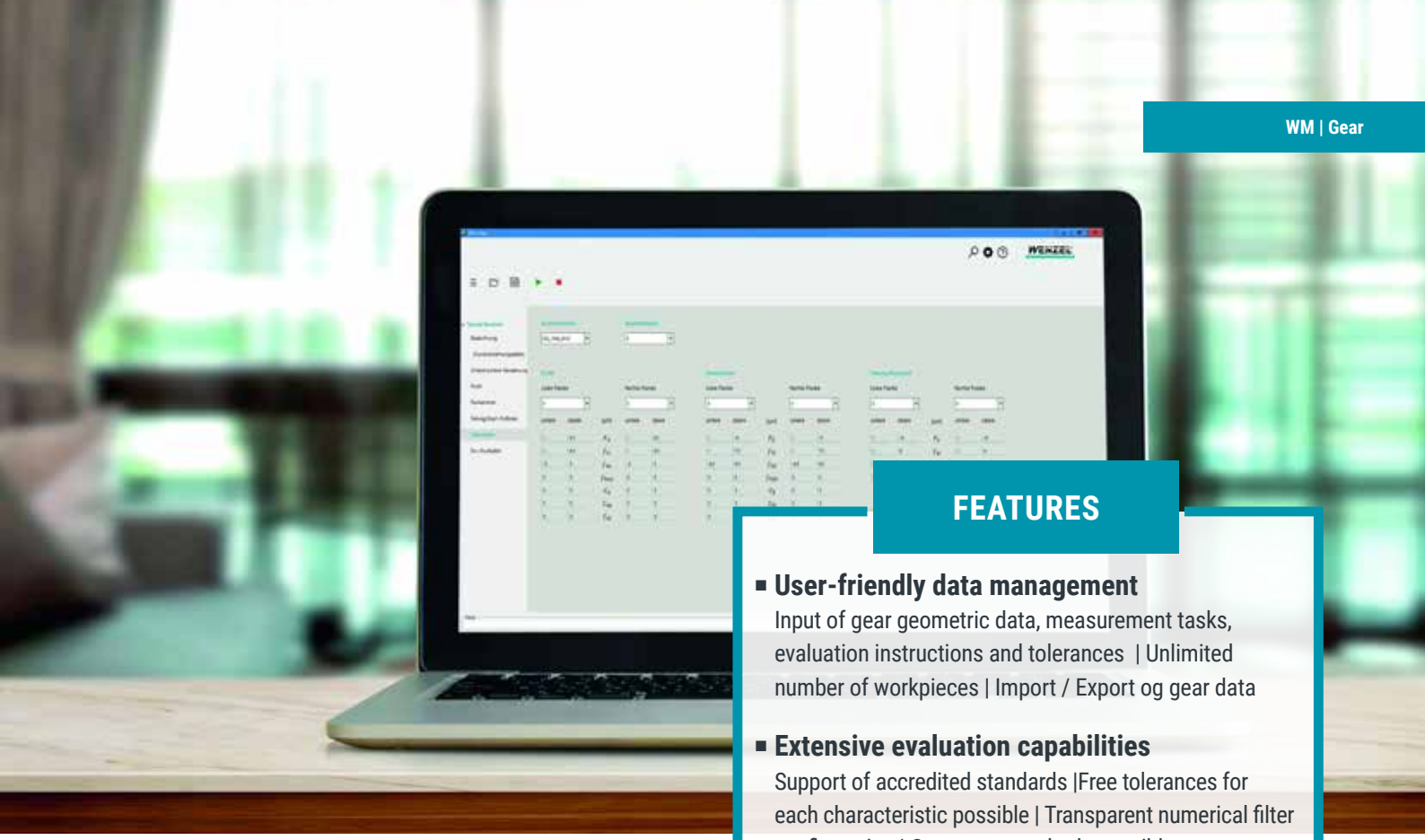
HIGHLIGHTS

Profile inspection

Extensive parameterization of measuring tasks. All common profile characteristics can be determined. Profile testing on any number of teeth possible. Multiple profile checks on one tooth. Profile modifications may be selected separately for each measuring position (profile crowning, tip- / root relief, profile slope modification, K-chart, design profile).

Lead inspection

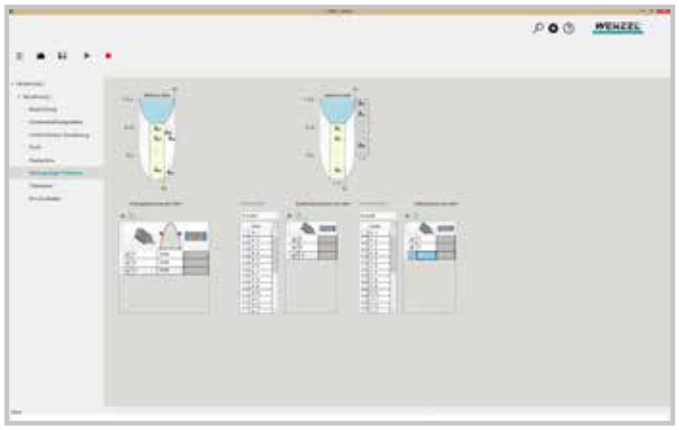
Extensive parameterization of measuring tasks. All common lead characteristics can be determined. Lead testing on any number of teeth possible. Multiple lead checks on one tooth. Lead modifications may be selected separately for each measuring position (lead crowning, end reliefs, lead slope modification, K-chart, design lead).



FEATURES

- **User-friendly data management**
  Input of gear geometric data, measurement tasks, evaluation instructions and tolerances | Unlimited number of workpieces | Import / Export og gear data
- **Extensive evaluation capabilities**
  Support of accredited standards |Free tolerances for each characteristic possible | Transparent numerical filter configuration | Company standards possible on request
- **Interactive measurement diagram**
  Magnification automatic / fix | Dilation automatic / fix | mm / inch switching | Subsequent modification of measurement sheet form | Temporary switching of presentation language | PDF file archiving of measurement results
- **High flexibility**
  Fully automatic measurement sequence | Evaluation and presentation parameters may be modified subsequently | Manufacturer–independent evaluation of measurement data available in valid GDE-format

Division inspection & absolute dimensions



PITCH AND RUNOUT INSPECTION

Extensive parameterization of measuring tasks.
All common pitch / runout characteristics can be determined. Up to three pitch tests at different tooth positions can be determined.

DETERMINATION OF ABSOLUTE DIMENSIONS

The following characteristics may be determined by up to three different tooth positions:

- Tip circle diameter
- Root circle diameter
- Dimension over one ball
- Dimension over two balls
- Dimension over one roll
- Dimension over two rolls
- Tooth span width
- Tooth thickness

WM | BLADE ANALYZER

EVALUATION OF TURBINE BLADE MEASUREMENTS

With the program WM | Blade Analyzer WENZEL introduces a new tool for the evaluation of turbine blade measurements. The software supports besides standard parameters like:

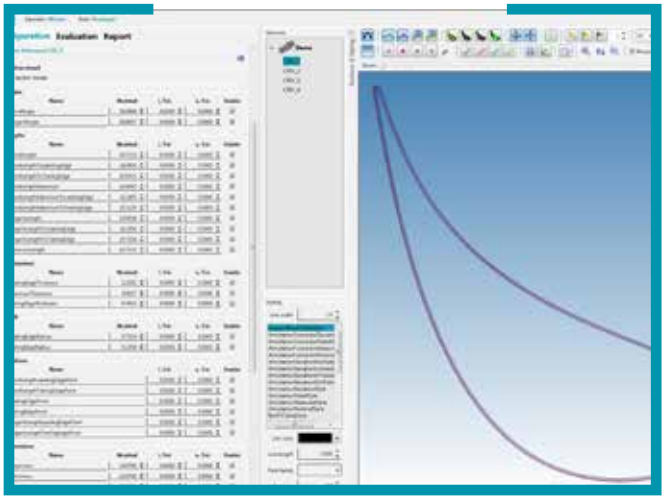
- Maximum thickness
- Leading and trailing edge radius
- Edge thickness
- Sheet length
- Blade angle

The software supports evaluations according to various manufacturer standards (GE, Safran, Rolls Royce, Pratt & Whitney). Various best fit algorithms for determining the blade position are also included in the scope of services, as is the evaluation of head and foot tolerances. A pre-defined workflow makes it easy for the user to create the measurement report. A generated report can be saved as a template and used for all further measurements. The measurement data is transferred in file format. Different formats such as vda, iges, csv and xml are supported. Besides manual use, the software can also be automated by command line parameters. For statistical recording of the results the data can be stored in different formats.

ALL STANDARD EVALUATIONS

All standard evaluations of blade sections are already integrated and can be individually selected or deselected for reporting.

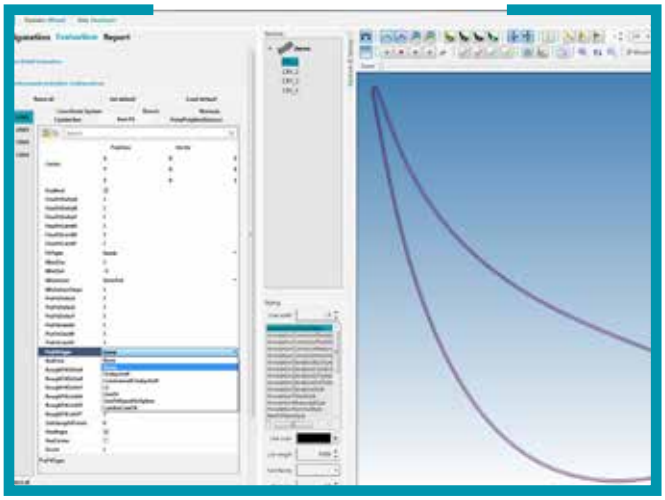
- Angles (chord, tangent)
- Lengths (chord, max., tangent,...)
- Thickness (leading edge, max., trailing edge)
- Radii (leading edge, trailing edge)
- Positions (leading edge point, trailing edge point, ...)
- Dimensions (max. extension X, max. extension Y)
- Deviations (max. devation, min. deviation)



BESTFIT OPERATOR

The Bestfit Operator can be applied to entire cuts as well as to individual cut segments. The supported algorithms include:

- Camberline Fit
- Spline Fit
- Gauss
- Chebycheff
- Constrained Chebycheff
- L1

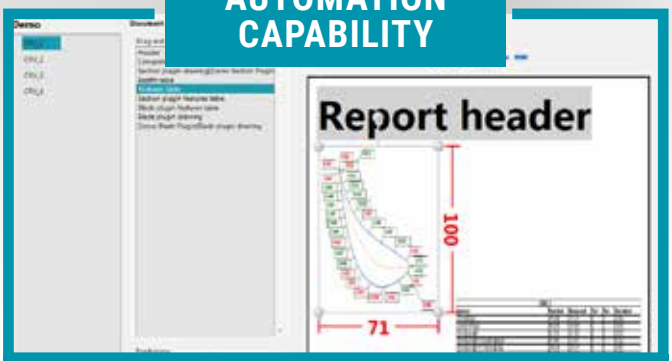


FEATURES

- **User-friendly data management**
  Input of parameters, evaluation specifications and tolerances | Any number of workpieces can be stored | Import / export of blade data including individual tolerances and evaluation specifications
- **Extensive evaluation possibilities**
  Support of recognized standards | Individual selection or deselection integrated standard evaluations | Bestfit operator for entire cuts or individual cut segments | Maximum flexible and configurable evaluation of point deviations
- **Interactive measurement report generation**
  Freely configurable report with display of any blade, foot or head section | Use templates for other blade types

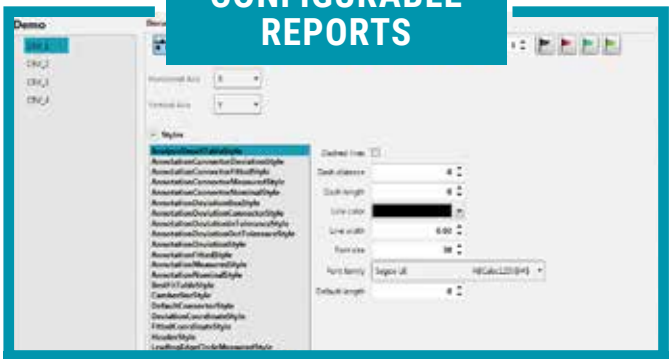
High flexibility
Fully automatic measuring sequence | Flexible solution for the analysis of sheet sections | Seamless integration into any environment - defined by measuring machine type, measuring program and software

AUTOMATION CAPABILITY



WM | Blade Analyzer projects can be opened completely automatically after creating a file containing measurement data, so that an automatic evaluation of these data can be performed using the specified options.

CONFIGURABLE REPORTS



The desired form of presentation as well as the information contained in drawings and tables can also be freely configured, to meet all of the customer's requirements.Furthermore, the format and layout of the report can be freely customised. The predefined views and tables configured according to customer requirements can be freely placed and fitted within a page preview.

TOLERANCE BANDS

For each nominal data point, a lower as well as an upper tolerance limit can be configured to allow a maximum flexible and configurable evaluation of point deviations.
In addition, a tool is provided to automatically segment these tolerance bands based on distances from the leading and trailing edges and to configure the configured limits.

WM | SYS Analyzer

TRANSPARENCY FOR OPERATION AND CONTROL

With the WM | SYS Analyzer software solution WENZEL offers extensive possibilities for controlling and analyzing measurement tasks and machines used. This allows the customer to have a "digital twin" of their part and analyze their measurement data in an intelligent and flexible way. The WM | SYS Analyzer offers total data transparency for measuring machines and their measuring environment. Authorized users are provided with all necessary information in real time through an attractive interface. The WM | SYS Analyzer consists of three software modules. The basic module "Monitoring" is installed on the machine's computer as standard on delivery. The advanced modules "Operations" and "Analytics" can be added at any time depending on the requirements of the machine.

FEATURES

- **Networking of local and global information** of all connected measuring machines
- **Intuitive** interface and usability
- **Automatic backup of all information,** e.g. machine data and data from the measuring environment
- Possibilities of **further analyses**
- **Platform independent** usage and encryption

VERSIONEN

	Monitoring	Operations	Analytics
Max. Number of CMMs	1	unbegrenzt	unbegrenzt
Machine status	++	++	+++
Error status	+	++	+++
Machine use spatially	0	+	++
Measurement program information	0	+	++
Service information	+	++	+++

+ = Basis, ++ = Extended scope, +++ = Maximum scope

FEATURES

- **High machine utilization**
  Monitoring of machine running times | Reduction of errors | Lower downtime
- **Transparency of information**
  Machine data | Measurement environment | Measurement sequences
- **Versatile use on all platforms**
  Smartphones | Tablets | Desktop Computers
- **Improvement of service**
  Wear indicator | Open maintenance | Avoidance of downtime
- **Backup and Reuse**
  Automatic storage | Versatile comparability | Automatic archiving

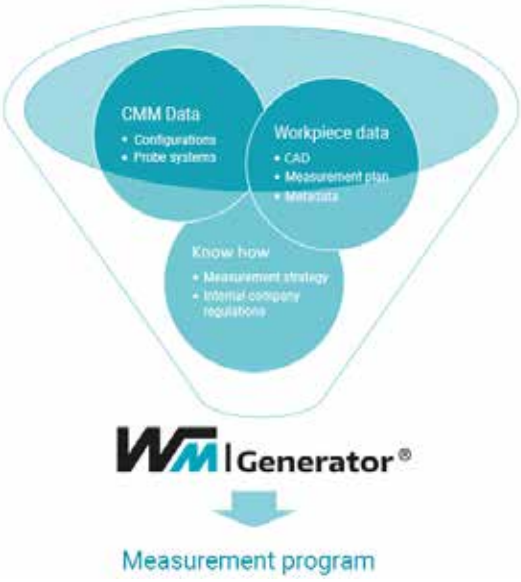
WM | Generator

AUTOMATED MEASUREMENT & EVALUATION

The WM | Generator is the basic tool for quickly and flexibly generating a measuring program in Quartis from CAD models with stored PMI information.

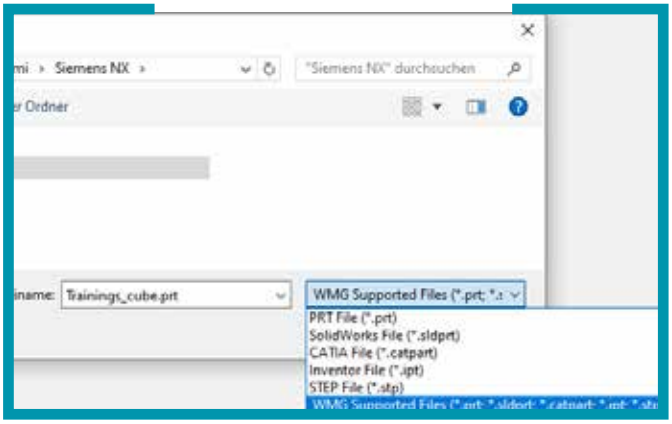
For this purpose, the WM | Generator has powerful import interfaces to common CAD programs and a descriptive PMI viewer for visualizing the drawings including the defined inspection characteristics and tolerances.

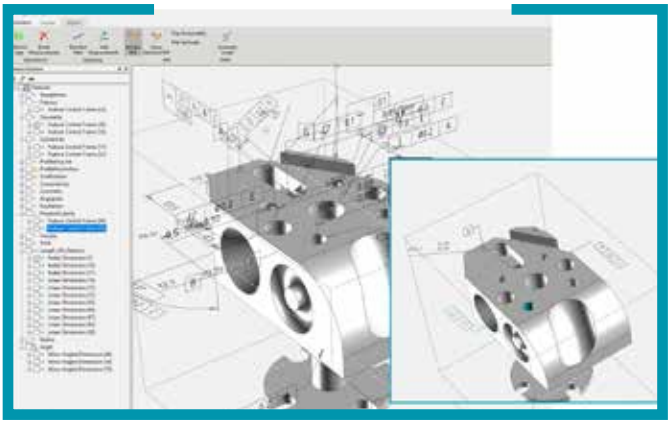
An inspection plan can thus be created quickly and flexibly and then automatically transferred to WM | Quartis, where these inspection plans are then integrated into predefined measuring program modules with just a few mouse clicks.



CAD FORMATE

- **Import CAD models including semantic PMI. CAD formats that support PMI (Product Meta Information):**
- Siemens NX
- CATIA V5
- Inventor
- SolidWorks
- STEP AP242

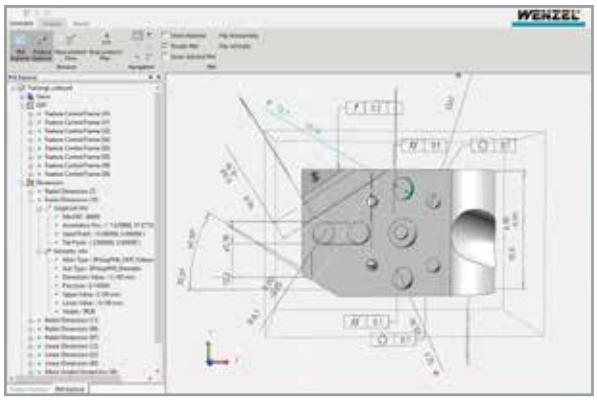




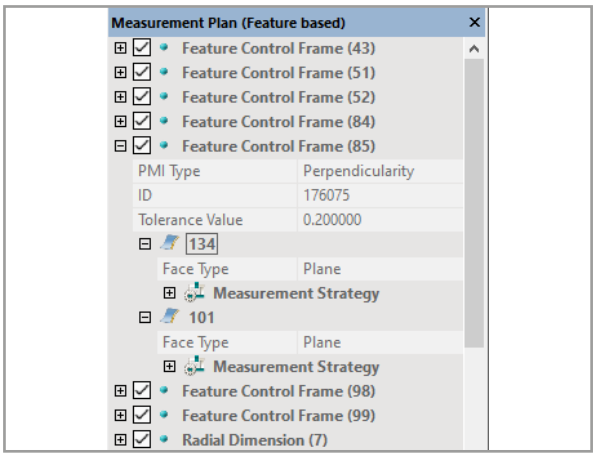
AUTOMATION

- Create measurement sequence with few user interventions
- View PMI data in PMI Explorer
- Keep track by optionally displaying only selected PMI in the graph.
- Add missing tolerances in the Feature Explorer / add incomplete tolerances
- Calculate time-optimized, collision-free measurement sequence

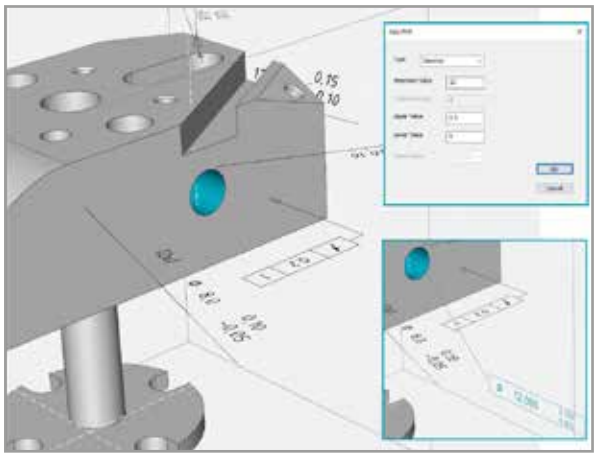
FUNCTION



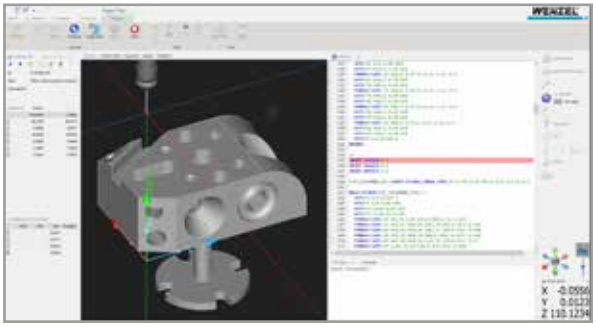
When importing the CAD model, not only the CAD data but also the semantic PMI are converted.



The measurement plan is automatically generated from the PMI - the basis for the measurement process. For the characteristics to be evaluated and the elements to be recorded accordingly, the measurement strategy can still be edited in the measurement plan if required. Characteristics that are not to be evaluated in the measurement process are deactivated.



If necessary, PMI can still be added or edited.



Based on the measurement plan, the measurement sequence is calculated, which is the preliminary stage for program generation.

FEATURES

- **Reduce the time required to generate measuring programs**
- **Improve resource utilization through time-optimized measurement program flow**
- **Electronic data exchange saves time and reduces transmission errors**
- **Create time for the essentials by automating processes that can be automated**

WENZEL Sensor Program
THE RIGHT SOLUTION FOR EVERY TASK

	WM | Shapetracer	WM | LS 50	WM | LS 70	WM | LS 150	WM | LS 600	WM | DS
						
Technical Basic principle Line length	120 mm	50 mm	70 mm	150 mm	600 mm	40 measu
Resolution						
Accuracy*						
Part size***						
Typical measuring tasks						
Supported Software	WM Q WM P	WM Q	WM Q	WM Q	WM Q WM P	
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

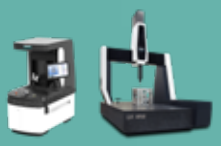
- Laser Triangulation
- Striped light projection
- White light interferometer

Resolution

- Medium
- Accurate
- Precise

Accuracy

- Medium > 100 µ
- Accurate > 50 µ <
- Precise < 10 µ

& WM | HS	WM | MLS 100 WM | MSL 100 P WM | MLS 200	Nikon LC15Dx	Nikon XC65Dx	Nikon L100	WM | RS-C
					
0 µm ring point	100-200 mm	18 mm	3 lines offset by 120°	50 mm	
					[1]
					****** 

[1] vertically < 5 nm

Die hier abgebildeten optischen Sensoren zeigen nur einen Teil der von uns angebotenen Sensorik-Produktpalette. Mehr Informationen zu unseren Sensorsystemen finden Sie unter: www.wenzel-group.com/de/product/category/sensoren/

Part size

Small | Medium | Large

Typical measuring tasks

Surfaces | Features | Gap and flush

Supported Software

WM | Quartis
WM | PointMaster
Metrolog
Polyworks

OUR LOCATIONS

THINK GLOBALLY, ACT LOCALLY -
THAT'S WENZEL.

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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 10,000 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 600 people worldwide.

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