INNOVATIONS IN METROLOGY

PRODUCT RANGE

Our solutions for your measuring tasks

WENZEL

GENERAL CATALOG

TABLE OF CONTENTS

OUR COMPANY PROFILE 04

OUR PRODUCT LINES 16

GANTRY MACHINES 20

Accuracy classes 22

XO Series 26

LH Series 28

LH Features 30

LH Gantry Series 32

LH Gantry Features 34

LHF Series 36

LHF Features 38

LH Series with Rotary Table 40

HORIZONTAL ARM MACHINES 42

RS Series 44

RA Series 46

RAX Series 48

SHOPFLOOR MACHINES 50

WENZEL SF 55 52

WENZEL SF 87 54

Equator - Powered by WENZEL 56

WM | MMA Series 58

COMPUTER TOMOGRAPHS 62

WENZEL exaCT S 68

WENZEL exaCT M 70

WENZEL exaCT U 72

OPTICAL HIGH SPEED SCANNING 74

WENZEL CORE D 76

WENZEL CORE M 78

SENSORS, ACCESSORIES, CHANGE RACKS& EVALUATION SYSTEMS

for Gantry Machines 80
for Horizontal Arm Machines 82
REVO 5-axis-measure System 84
Evaluation Systems & Accessories 85

OUR OPTICAL SENSORS

for Coordinate Measuring Machines and Measuring Arms 86
for the CORE Series — WM | HS & WM | DS 89
WM | SHAPETRACER II 90
WM | LS 70 92

WM | SOFTWARE SOLUTIONS 94

WM | Quartis 96
WM | PointMaster 102
WM | GEAR & GEAR Analyzer 106
WM | BLADE Analyzer 108
WM | SYS Analyzer 110
WM | Generator 112

SERVICE & APPLICATION

WQP – WENZEL Qualification Program 114
WENZEL Service Contracts & Service 4.0 116
Our Locations 118

WENZEL – **INNOVATION MEETS TRADITION**

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.

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

WENZEL FACTS

About WENZEL:
Founded in 1968
100 % family owned business in 2nd Generation

Subsidiaries and agencies
in more than 50 countries

Installed machine base worldwide:
> 10.000

Number of employees worldwide:
> 600

Headquarters:
Wiesthal, Germany

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

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.

WENZEL SOLUTIONS
VARIOUS APPLICATIONS

Measurement technology has been our profession since 1968 and over the years developed WENZEL to stand for the highest quality standards and reliability - without forgetting that to continue to exist, one has to keep a clear vision of the future in one's eyes at all times.

High precision and user-friendly operation, all rounded off with an intelligent service package - WENZEL thinks through and supplies the optimal solution for every measuring task!

BUSINESS AREAS OF OUR CUSTOMERS

Quality assurance
Development
Surface inspection
Prototype construction
Initial sampling
Production
Material testing

OUR CORE INDUSTRIES

Automobile manufacturers and suppliers
Aerospace
Mechanical engineering
Medical technology
Metal and plastics processing industry
Mould and tool making
Electrical engineering/electronics
Foundry technology
Contract measurement services
Research and Science
. . . and many more

INNOVATION MEETS TRADITION
THE MILESTONES OF OUR HISTORY

AWARDS

PRODUCTS

CORPORATE DEVELOPMENT

1993 & 1996 | Bavarian State Prize for Technical Innovation Excellence

2002 | TOP 100 SMEs in Germany

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

2003 | Presentation of the first WENZEL gear measuring machine

1968 | Foundation WENZEL

1973 | Production hall with machine equipment

1983 | Extension Work 1

2002 | New construction Plant 2

1994 | Foundation America & UK

1997 | Foundation France

1968

2003

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

2016 | TOP 100 innovators of the German SMEs

2017 & 2018 | Frost & Sullivan awards the exaCT U & the SF 87

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.

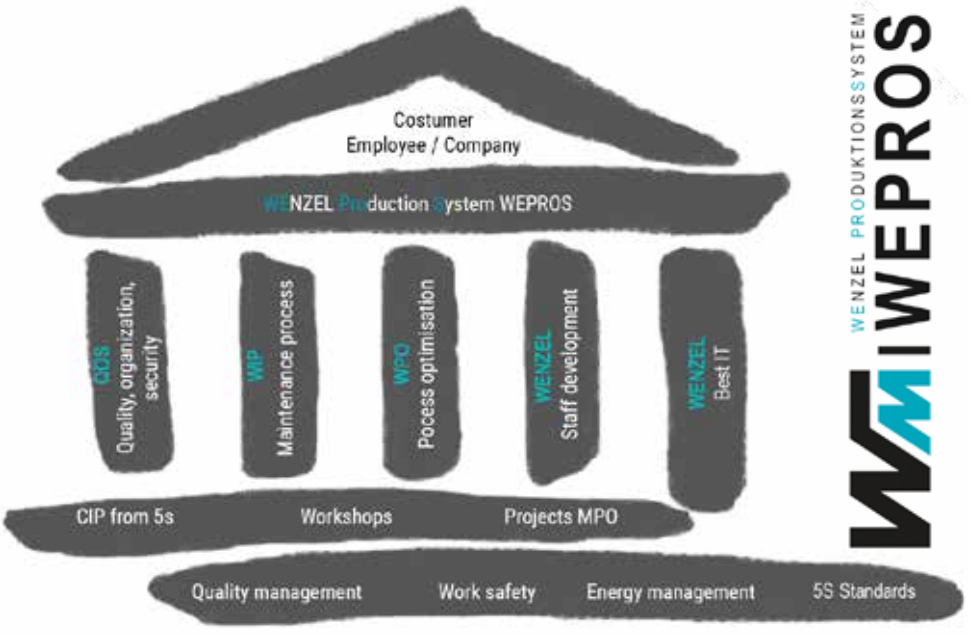
VERTICAL INTEGRATION OF MANUFACTURE AS A SUCCESS FACTOR
WENZEL PRODUCTION

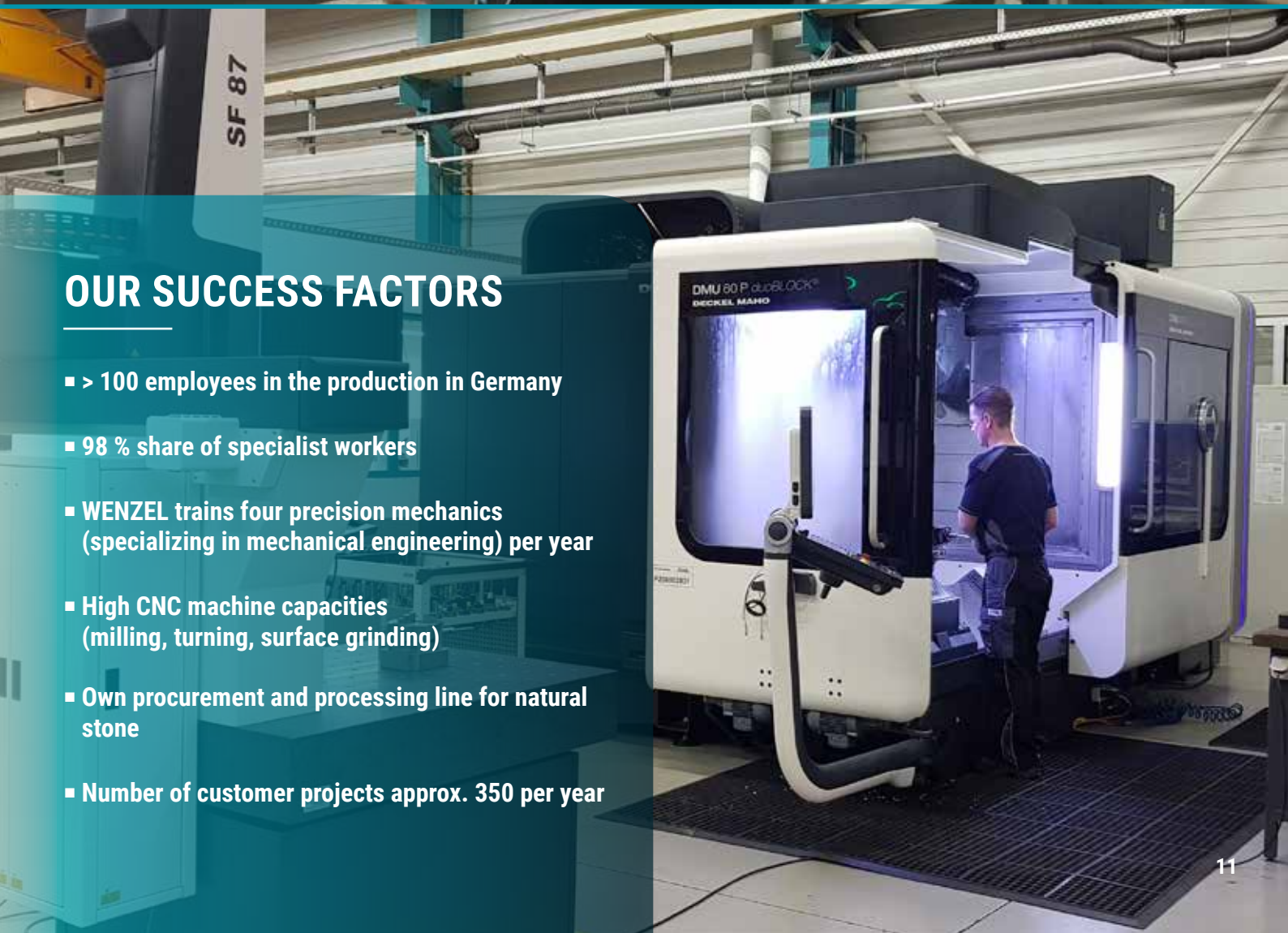
For more than 50 years we have been pursuing the strategy of a high level of vertical integration with distinct advantages for our customers. We see ourselves as a provider of customized solutions as well as series products. At all times, the binding nature of our commitments comes first. With more than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

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.

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. 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.

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.





OUR SUCCESS FACTORS

- > 100 employees in the production in Germany
- 98 % share of specialist workers
- WENZEL trains four precision mechanics (specializing in mechanical engineering) per year
- High CNC machine capacities (milling, turning, surface grinding)
- Own procurement and processing line for natural stone
- Number of customer projects approx. 350 per year

GRANITE MACHINING - MADE BY WENZEL
FROM THE RAW STONE TO THE FINISHED MEASURING MACHINE

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

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".

SERVICE CONCEPT
WENZEL LIFE CYCLE

PLANNABLE MAINTENANCE AND OPERATING COSTS
YOUR INDIVIDUAL SERVICE PACKAGE

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 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 AUCOM 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/

OVERVIEW
OUR PRODUCTS LINES

THE RIGHT SOLUTION FOR YOUR MEASUREMENT TASK
WENZEL - THE RIGHT PARTNER RIGHT FROM THE BEGINNING

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 87 and SF 55 special shop floor machines, which are also ideally suited for operator use and automation.

LH series - gantry measuring machines

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 – Shop floor measuring machine

Measurement results should be delivered faster and closer to the production line. Accordingly, WENZEL offers the 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 - Horizontal measuring machines

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.

CT series - Non-destructive work piece testing

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.

CORE Series - Optical high-speed scanning of reflective components

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.

Depending on the type and equipment, WENZEL offers the machines, the right sensors: changeable probing and styli. Proven over decades, the undisputed world bestseller PH10, the stepless PH20, the revolutionary high-performance REVO head and optical and roughness sensors from Renishaw are availlable. The systems are completed with the appropriate user-friendly software - "Made by WENZEL" -for measuring, evaluating, reverse engineering and for machine monitoring. Of course, all machines are equipped with interfaces and can be equipped for automation and data input and output and can thus be integrated into a fully automatic process. All WENZEL systems are characterized by maximum 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 training program in the training center, including the AUKOM Training Center and training of machine operators. Even before the project starts, WENZEL advises not only on the design of the measuring technology itself, but also on the planning of premises, any necessary foundations, automation and networking the measuring machine as well as subsequently during the creation of the measuring program. Thus, WENZEL is the right partner right from the start to solve your measuring task.

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.

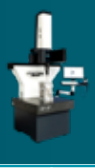
4. Application: Here we make a rough distinction between geometry, free-form surfaces, non-destructive testing and defect detection.

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 10-7/12-1	
		TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTI
LOCATION	Measuring room	●	●	●	●	●	●			●	●
	Production	●	●					●	●		
PART SIZE	Small			●	●	●	●	55 ●	●		
	Medium	●	●					87 ●	●	●	●
	Large										
ACCURACY	Very high			●		●		●		●	
	High										
	Medium	●	●		●		●		●		●
APPLICATION	Geometry			●	●	●	●	●	●	●	●
	Surface	●	●	●	●	●	●	●	●	●	●
	NDT + defect										
MOBILITY	High	●	●					55 ●	●		
	Medium			●	●	●	●	87 ●	●	●	●
	Low										
SPEED	Very high		●		●		●		●		●
	High	●									
	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.

	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL	TACTILE	OPTICAL		
CAL	LH 10-8/12-10		LH 15-12/20-15		LHF		R-Baureihe		CORE D/M		exaCT S/M	exaCT U
0	●	●	●	●	●	●	●	●	●	●	●	●
							●	●	●	●		●
									●	●	●	●
	●	●	●	●					●	●		●
			●	●	●	●	●	●				●
	●										●	
			●		●		●		●	●	●	●
		●		●		●		●				●
	●	●	●	●	●	●	●	●	●	●	●	●
	●	●	●	●	●	●		●	●	●	●	●
											●	●
									●	●	●	
	●	●	●	●								
					●	●	●	●				●
		●		●		●		●			● *	● *
	REVO ●		REVO ●		REVO ●				●	●	● *	● *
	●		●		●		●					● *
+	+++	++	++	+	+	+	+	+	++	++	++	+
++	+++	+++	++	++	+	+	+	+	++	++	+++	+
-	+++	++	+++	++	+++	+++	+++	+++	++	++	+++	++

PRECISION THAT PAYS OFF
WENZEL BRIDGE CMMs

RANGE OF SERVICES AND FIELDS OF APPLICATION
AN OVERVIEW

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.

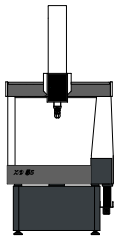
The offer extends far beyond the machine configuration: For special requirements WENZEL has tailor-made solutions ready: From the conception and planning to the turnkey handover. In addition to the production and installation of the measuring instruments, this includes, for example, the necessary static 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.

OVERVIEW
CMM PRODUCT RANGE

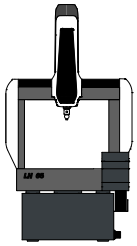
COORDINATE MEASURING METROLOGY
"MADE BY WENZEL“

WENZEL offers well-engineered coordinate measuring machines (CMMs) which have proven themselves many times in the market. In this brochure we 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.

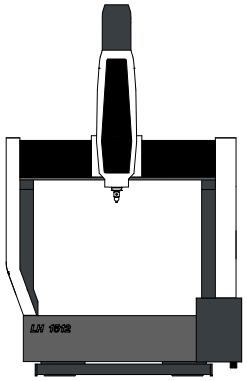
OUR SIZES – SUITABLE FOR YOUR MEASURING TASKS



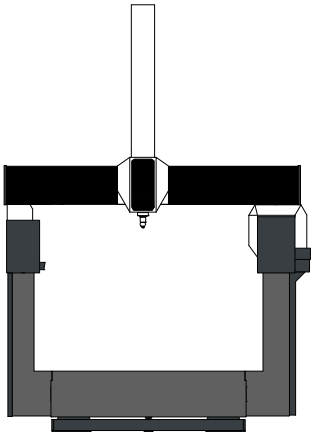
XO 55



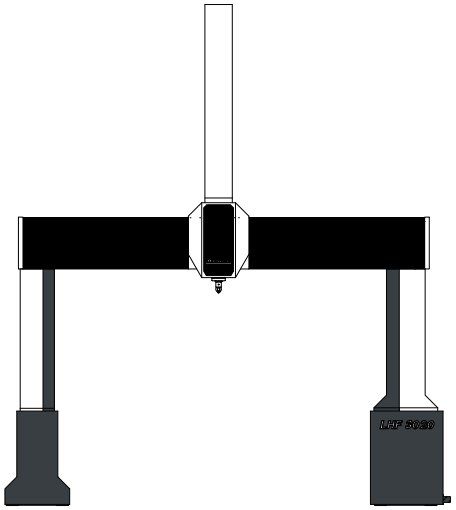
LH 65



LH 1512



LH 2015



LH 3020

ACCURACY CLASSES

THE RIGHT SOLUTION FOR EVERY REQUIREMENT STANDARD | PREMIUM | PREMIUM-SELECT

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

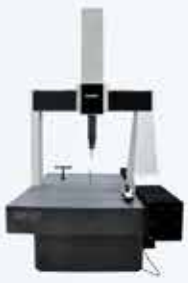
- **Online** temperature compensation
- More elaborate **premium acceptance procedure** with tighter tolerances for better CAA Compensation **(Computer Aided Accuracy)**

- 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**

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 1,5 + 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
P 1,8 + L/ 350	PS 1,0 + L/ 450 P 1,2 + L/ 400 S 1,5 + L/ 350	PS 1,9 + L/ 450 P 2,1 + L/ 400 S 2,2 + L/ 350	PS 2,0 + L/ 450 P 2,2 + L/ 400 S 2,5 + L/ 350	PS 2,8 + L/ 450 P 3,0 + L/ 350 S 3,3 + L/ 300
S 2,6 + L/ 300				
				

WENZEL XOrbit Series

YOUR ENTRY INTO COORDINATE METROLOGY

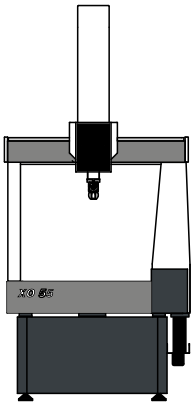
The WENZEL XOrbit is the ideal coordinate measuring machine for when the essential elements of measurement are important and when speed and ease of operation are required. The XOrbit coordinate measuring machine offers an excellent price-performance ratio and can be equipped with multiple changeable 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.

FEATURES

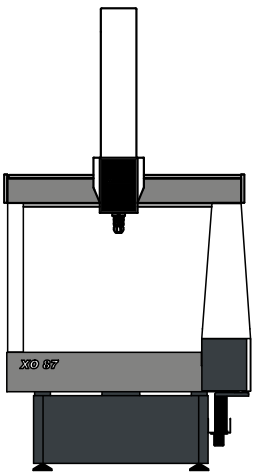
- **Economical to use** due to a favorable price-performance ratio
- Emphasis on **unlimited functionality** from WENZEL's decades of experience
- **Use of granite** in all axes ensures identical thermal behavior
- **Excellent long-term stability** due to air bearing guides incorporated into the granite base plate and high-precision lapped guide surfaces
- **Good accessibility** facilitates maintenance work

FIELDS OF APPLICATION

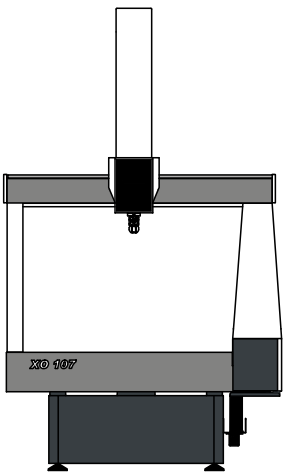
The XOrbit is the all-rounder for every field of application when it comes to measuring standard geometries and free-form surfaces. The XOrbit fulfills all important roles from use in incoming goods through to final inspection. For single or serial parts - the XOrbit is universally applicable.



XO 55



XO 87



XO 107

MEASURING ACCURACY

Typ	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 EL,MPE only valid for SP80/SP25M touch probes.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

YOUR ADVANTAGES AT A GLANCE

- **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

WENZEL LH SERIES

THE FAST AND EASY WAY TO EXACT MEASUREMENT RESULTS

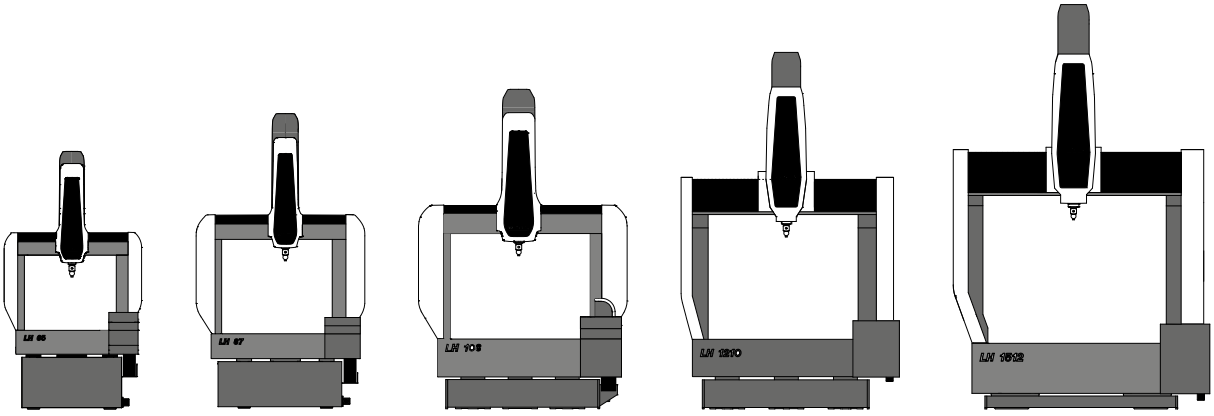
With the LH you benefit from an extremely functional, effective and flexible measuring machine that is reliable and easy to operate.The success of our coordinate measuring machines is based on a proven holistic concept consisting of first-class mechanical engineering, intelligent software and accessory 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 revolutionary 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.

FEATURES

- **High-quality machine components** harmonize in perfect interaction and ensure long machine running times
- **Excellent long-term stability** due to air bearing guides incorporated into the granite base plate and high-precision lapped guide surfaces
- **Identical thermal behaviour** of granite in all axes
- **High-resolution scales** ensure exact positioning and precise measurement results
- **Innovative sensor technology** ensures precise detection of free-form surfaces and geometric elements
- **Perfect working ergonomics** for comfortable and safe operation
- **Highest investment security:** Modular design ensures future upgrade of the CMM

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

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	1.9 + L / 450
LH 1512	1500 x 2000/2500/3000 x 1200	2.0 + L / 450

Value $E_{L,MPE}$ only valid for SP80/SP25M/REVO touch probes.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

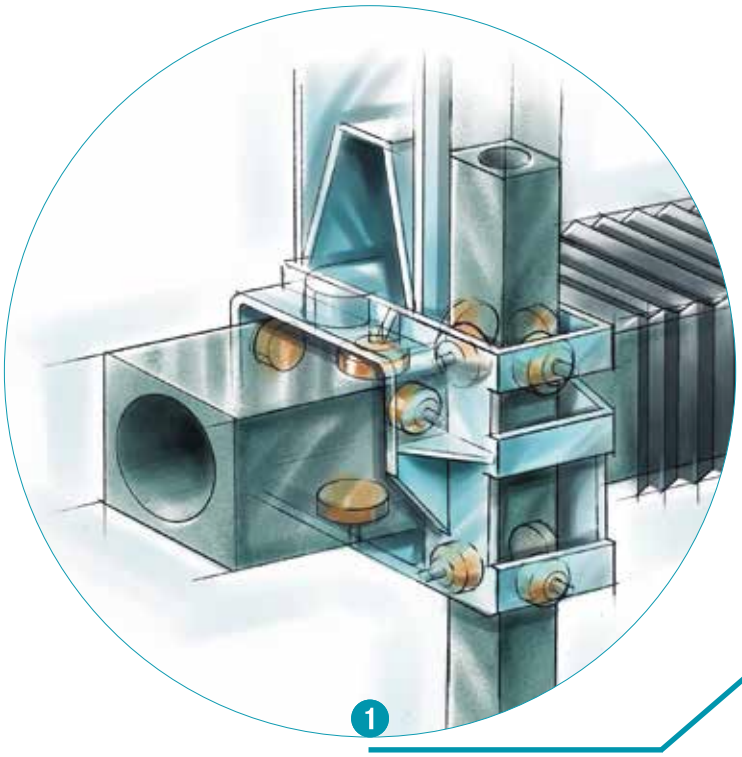
YOUR ADVANTAGES AT A GLANCE

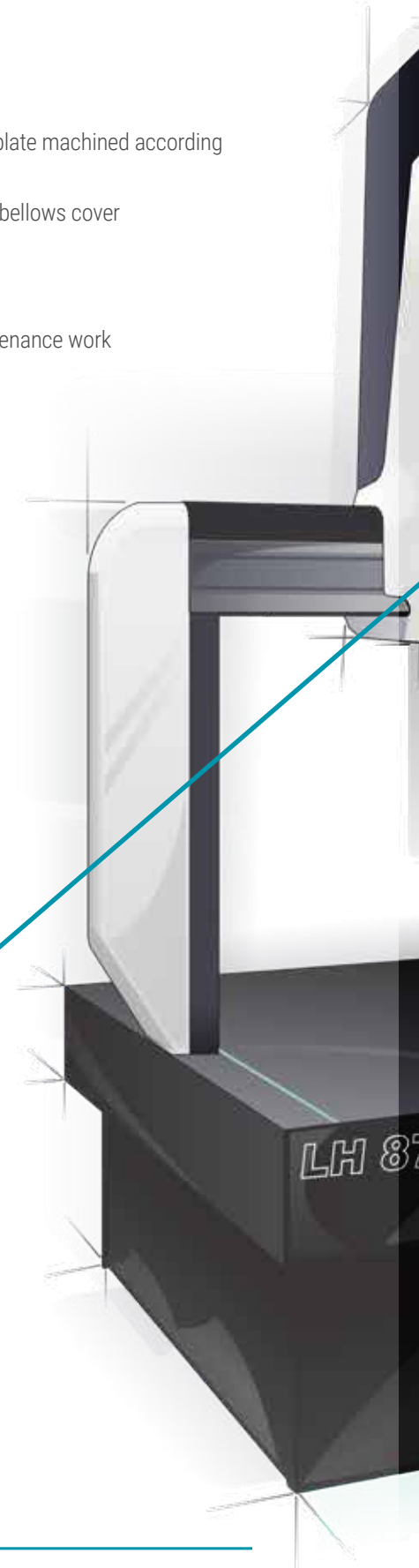
- **Highest mechanical precision**
  Granite in all axes | Handcrafted | Unique mechanical precision
- **Low operating costs**
  Low air consumption | Fast availability of reliable spare parts
- **High flexibility**
  Customer-specific measuring volume | Data compatibility | Suitable for automation
-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

THE LH-FEATURES

PRECISE IN DETAIL

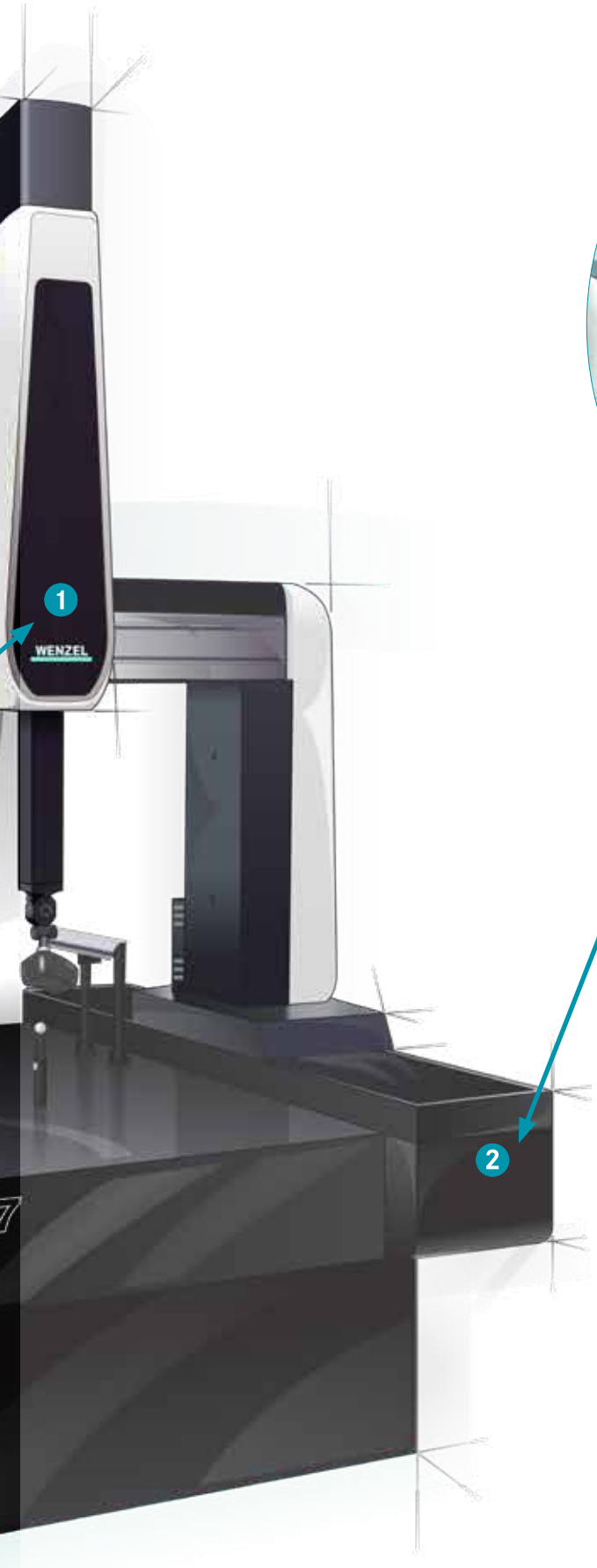
- Base plate, traverse and quill made of dark natural hard stone, thus ensuring identical thermal behaviour on all axes
- Y-axis guide system integrated directly into the base plate
- Weight compensation of the Z quill by means of a controlled pneumatic cylinder
- Available with active vibration damping
- 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

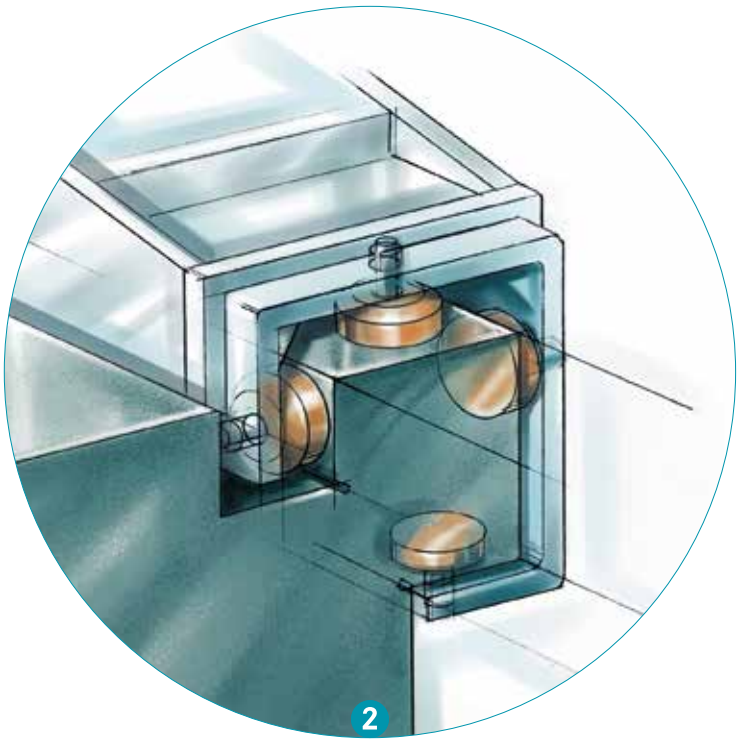




Components optimized by FEM/CAD guarantee maximum rigidity with reduced moving masses.

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

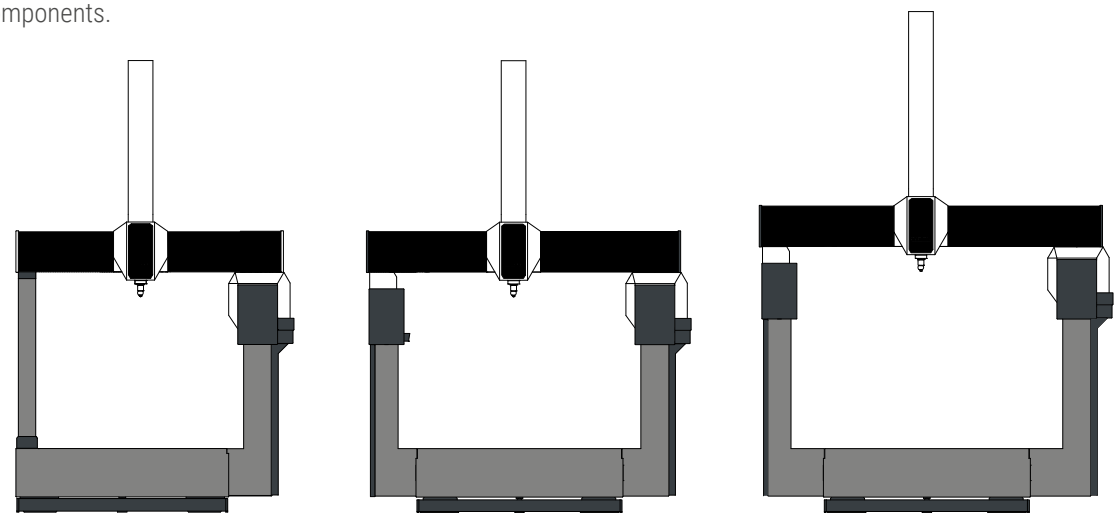
The LH Gantry is a CNC coordinate measuring machine with air bearings in all axes. It offers all the advantages and application possibilities of the LH Series and has also been specially designed for the inspection of large-volume and heavy workpieces. The raised guides in the Y-axis also ensure maximum 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.

FEATURES

- **Long-term stability** and high mechanical precision due to granite machine structure
- **Homogeneous machine structure** and integrated vibration damping (optional), no need for a separate foundation
- **Highest stiffness** and stability due to high drive, bearing and guide components in the Y-axis
- **High dynamics** due to double drive (LH 2015 / LH 2317) in the Y-axis and backlash-free friction drives
- **High wear resistance** and freedom from residual stress due to robust granite design
- **Maintenance-friendly** thanks to maximum spare parts availability and easily accessible replacement components

FIELDS OF APPLICATION

Stable, reliable and fully dynamic, LH Gantry machines are universally and flexibly 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.



LH 1515 LH 2015 LH 2317

MEASURING ACCURACY

Type	Measuring ranges X x Y x Z (mm)	Volumetric length measuring uncertainty $E_{L,\ MPE}$ (µm) Premium Select
LH 1515	1500 x 2000/3000/4000/5000 x 1500	2,5 + L / 450
LH 2015	2000 x 3000/4000/5000/6000 x 1500	2,8 + L / 450
LH 2317	2300 x 4000/5000/6000 x 1750	3,1 + L / 450

Value $E_{L,MPE}$ only valid for SP80/SP25M/REVO touch probes.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

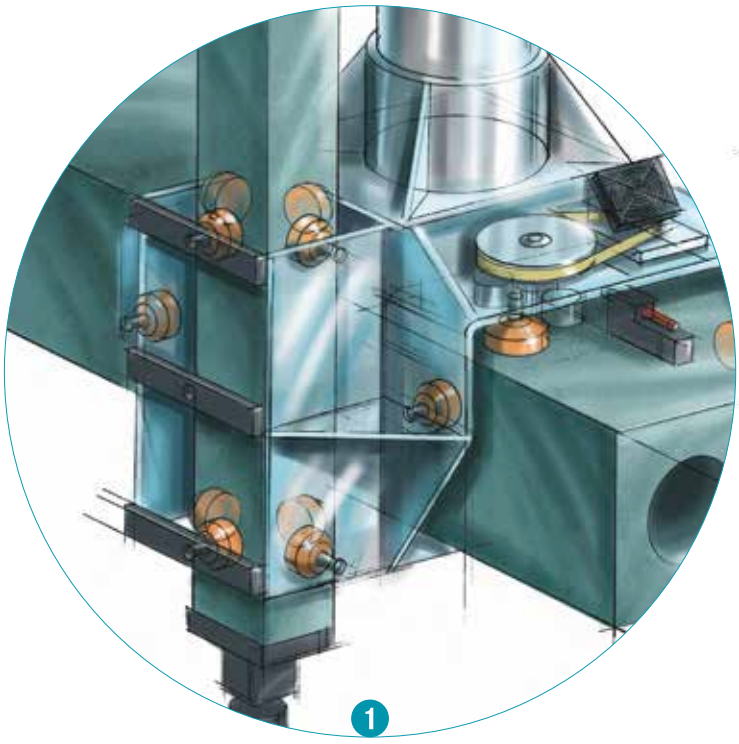
YOUR ADVANTAGES AT A GLANCE

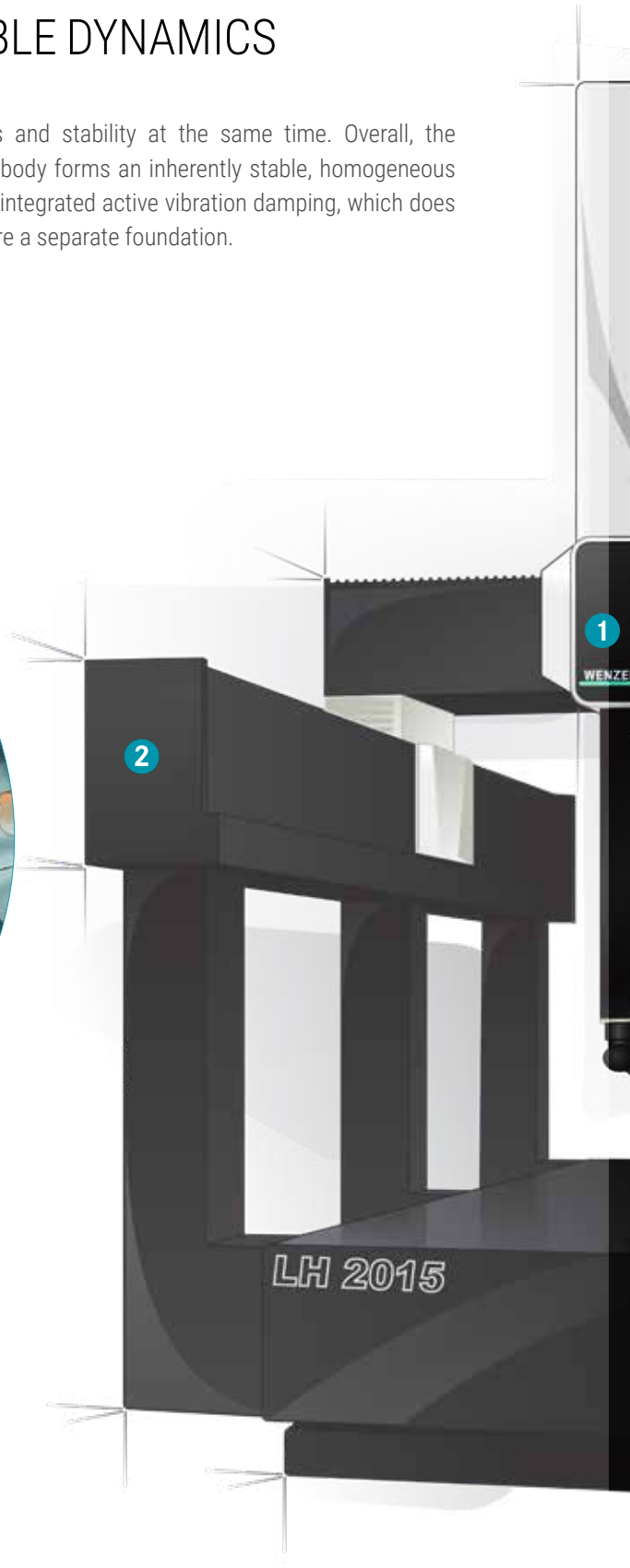
- **Air bearing guide elements in all axes**
  High mechanical precision | Granite base | Handcrafted
- **Low operating costs**
  Low air consumption | Reliable and inexpensive spare parts
- **High flexibility**
  Customer-specific measurement volume | Data compatibility with other WENZEL systems | Automation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

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.

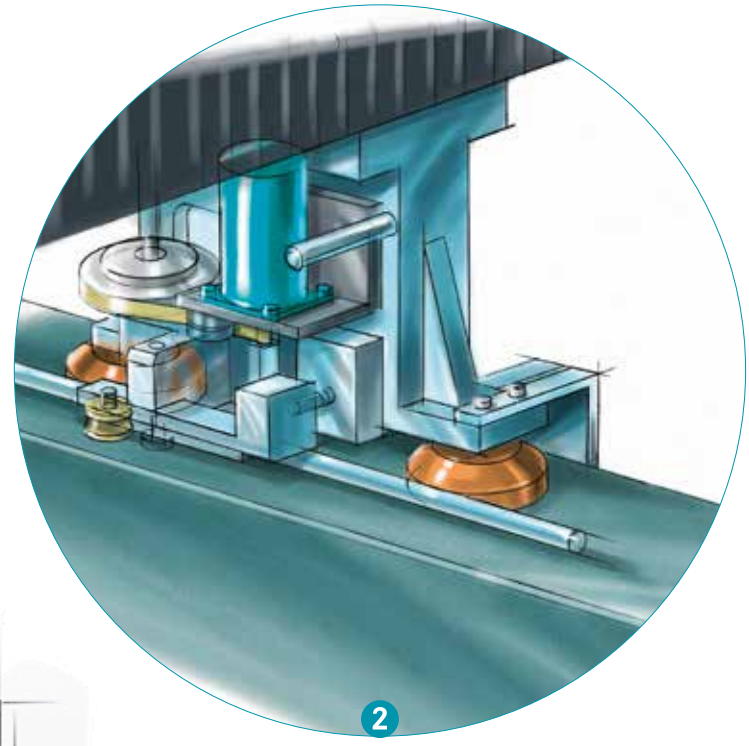


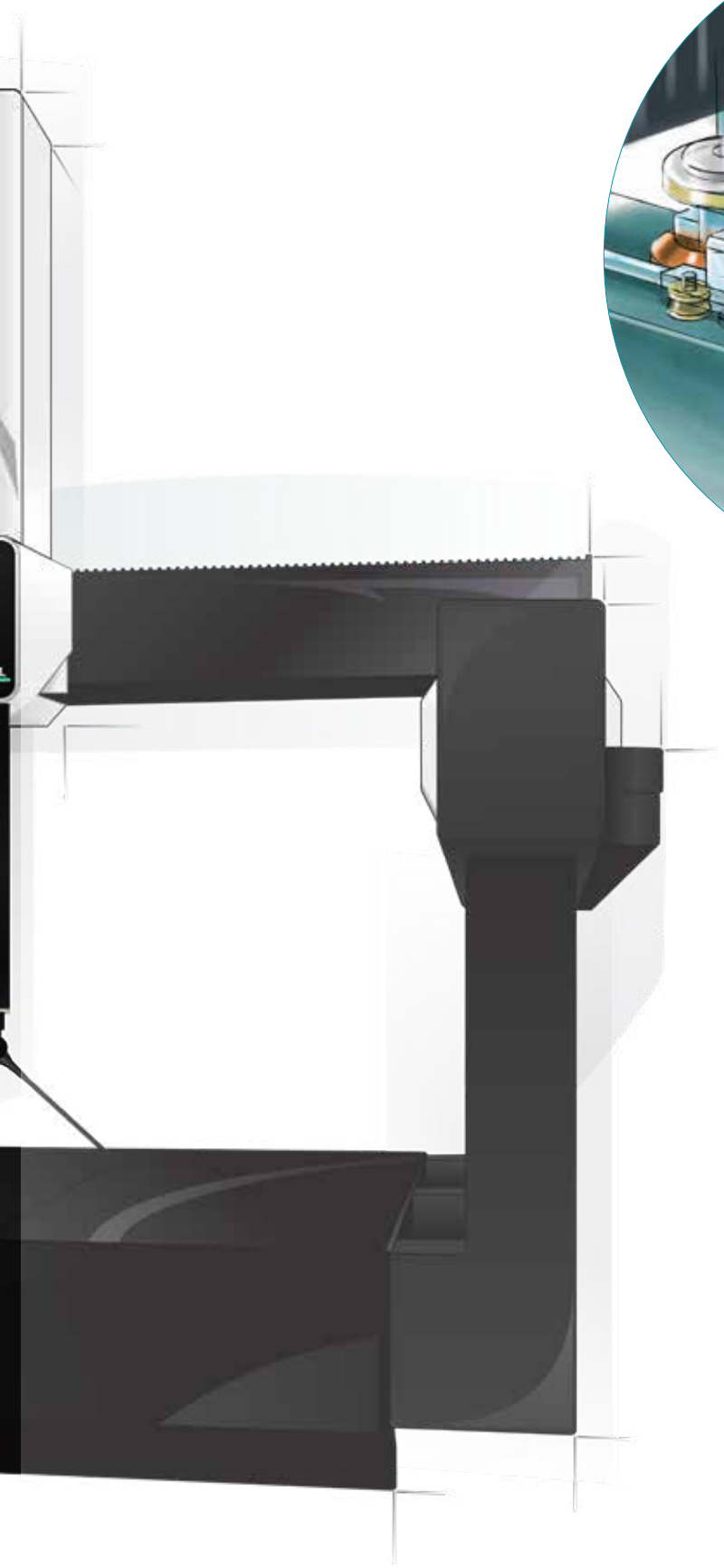


1

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

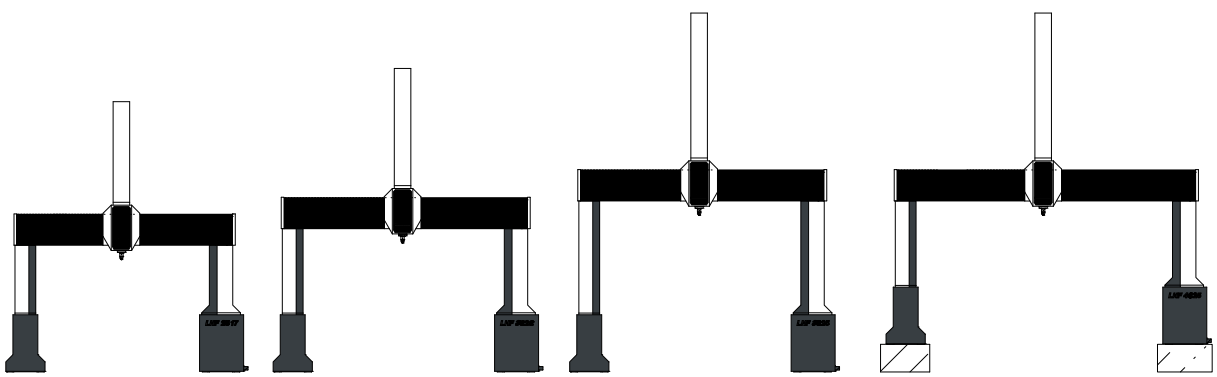
Wide measuring range and excellent accessibility. The LHF is a CNC coordinate measuring machine with air bearings on guide beams, which has been designed for high-precision measurement of large-volume and complex workpieces. Its ground-level design allows excellent access to a large measuring range with 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.

FEATURES

- **Optimum stability** due to intrinsically stable guide beams and precisely dimensioned air bearings
- **High performance** even with large extensions, eccentric loads and scanning with REVO at high speed
- **Best position stability** due to incremental displacement measuring systems with precision scales and excellent contamination tolerance
- **High dynamics** due to double drive in the Y-axis and backlash-free friction drives
- **Easy maintenance** due to high availability of spare parts and easily accessible replacement components

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

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 / 400
LHF 3020	3000 x 4000/5000/6000 x 2000	4,3 + L / 400
LHF 3025	3000 x 5000/6000 x 2500	5,2 + L / 400
LHF 4025	4000 x 5000/6000 x 2500	7,0 + L / 400

Value $E_{L, MPE}$ only valid for SP80/SP25M/REVO touch probes.
Other Y-lengths on request. Subject to changes in design and scope of delivery as well as further technical development.

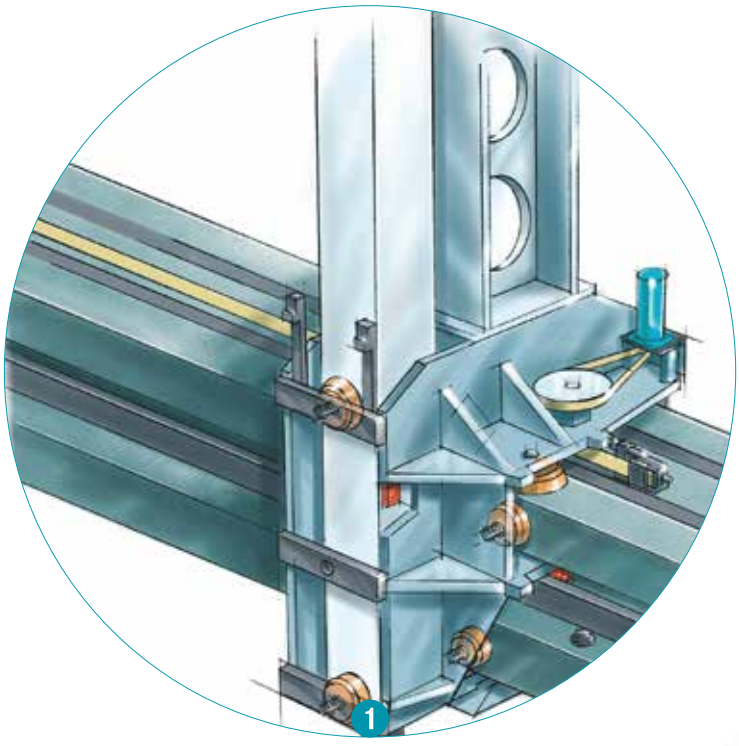
YOUR ADVANTAGES AT A GLANCE

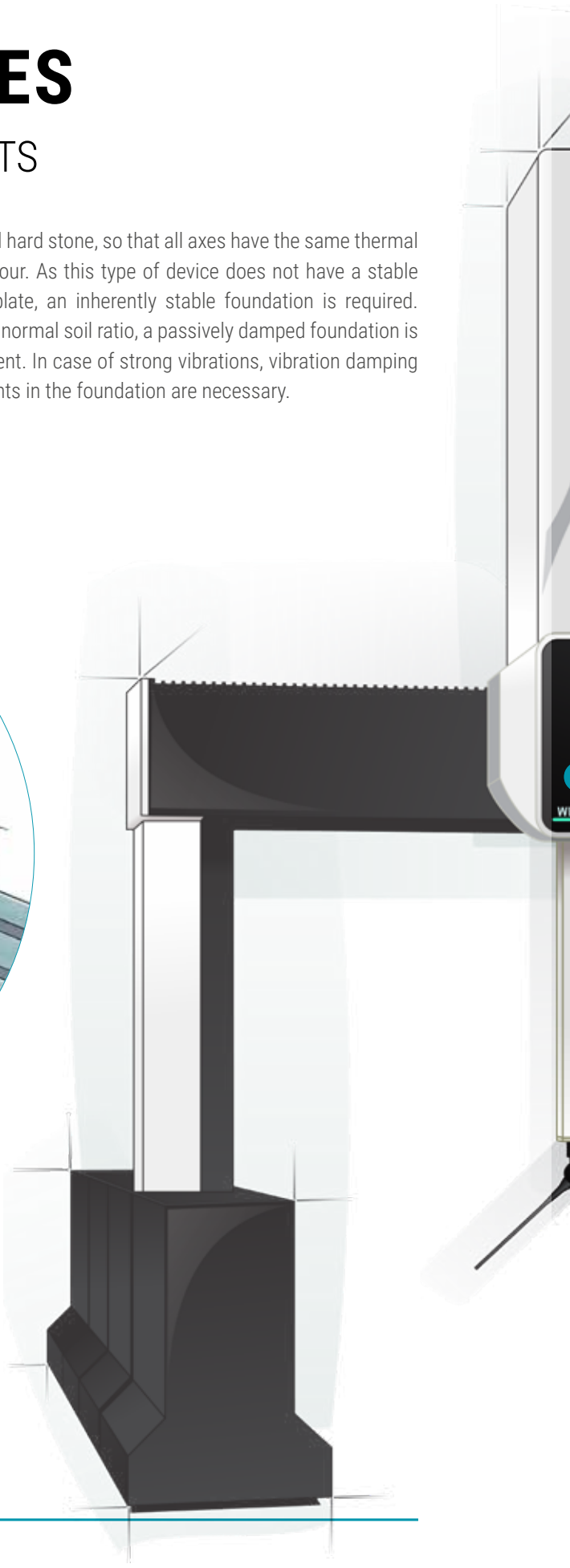
- **Long term, mechanical accuracy**
  Temperature stable structure | Hand finished | Air bearing guide elements in all axes
- **Low cost of ownership**
  Low air consumption | Reliable and cheap replacement parts | Less effort in recalibration
- **High flexibility**
  Special measuring sizes on request | 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

THE LHF-FEATURES

EASY ASSEMBLY FOR LARGE PARTS

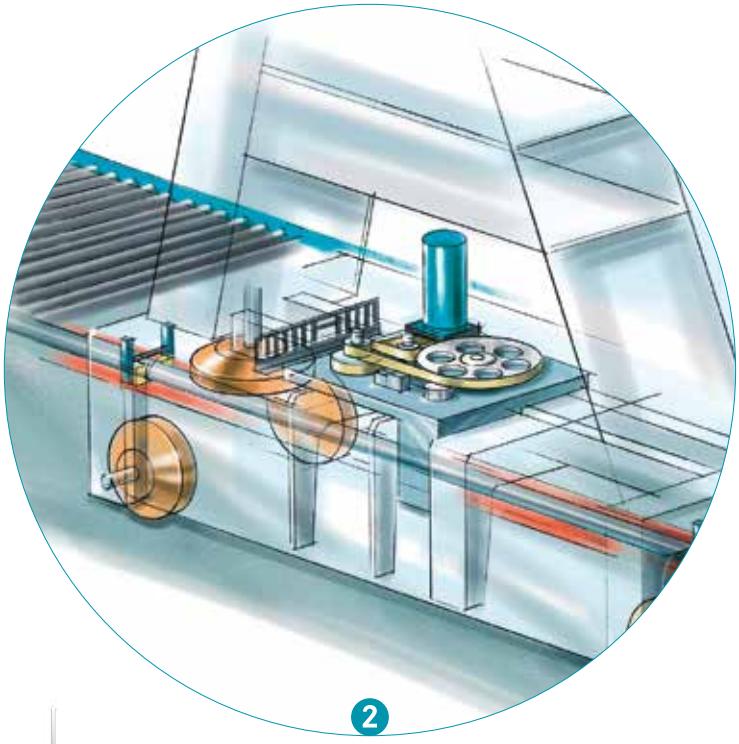
Air bearings on the guide beam in the Y-axis. The ground-level design of the LHF allows excellent access to a large measuring range with maximum freedom of movement. A double drive in the Y-axis of the LHF makes it unbeatable in terms of dynamics; and that with unique stability of the guides. Similar to the LH-Gantry, the LHF air bearing guide elements also guarantee wear-free operation with precise guidance. Crossbeam and guide beam are made of dark natural hard stone, so that all axes have the same thermal behaviour. 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.

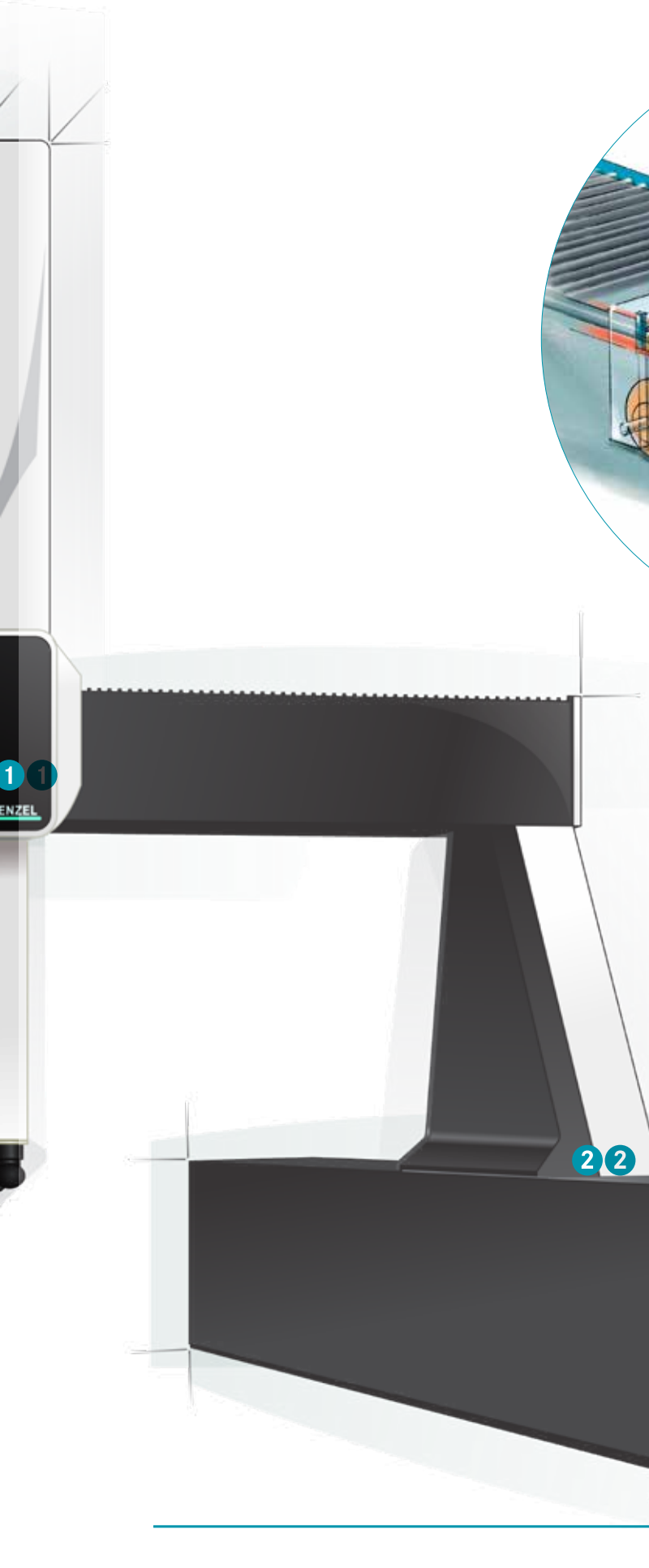




Symmetry everywhere

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





Double drive in the Y-axis

- High dynamic
- Stability of the guide (base)
- Self-stable guide beams
- Backlash-free friction drive for maximum Acceleration/Speed

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 linear axes are made of temperature-stable materials. This ensures excellent temperature behavior of the entire measuring system. 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.

FEATURES

- **High accuracy** due to identical thermal behavior of the granite in all axes
- **Excellent long-term stability** due to air bearing guides incorporated into the granite base plate and high-precision lapped guide surfaces
- **Extreme wear resistance** and freedom from residual stresses thanks to high-quality granite components
- **Excellent durability** based on innovative drive, bearing and guidance technologies
- **High-resolution scales** ensure exact positioning and precise measurement results
- **WM | Gear Analyzer** software based on the open GDE standard allows numerous measurement and evaluation options

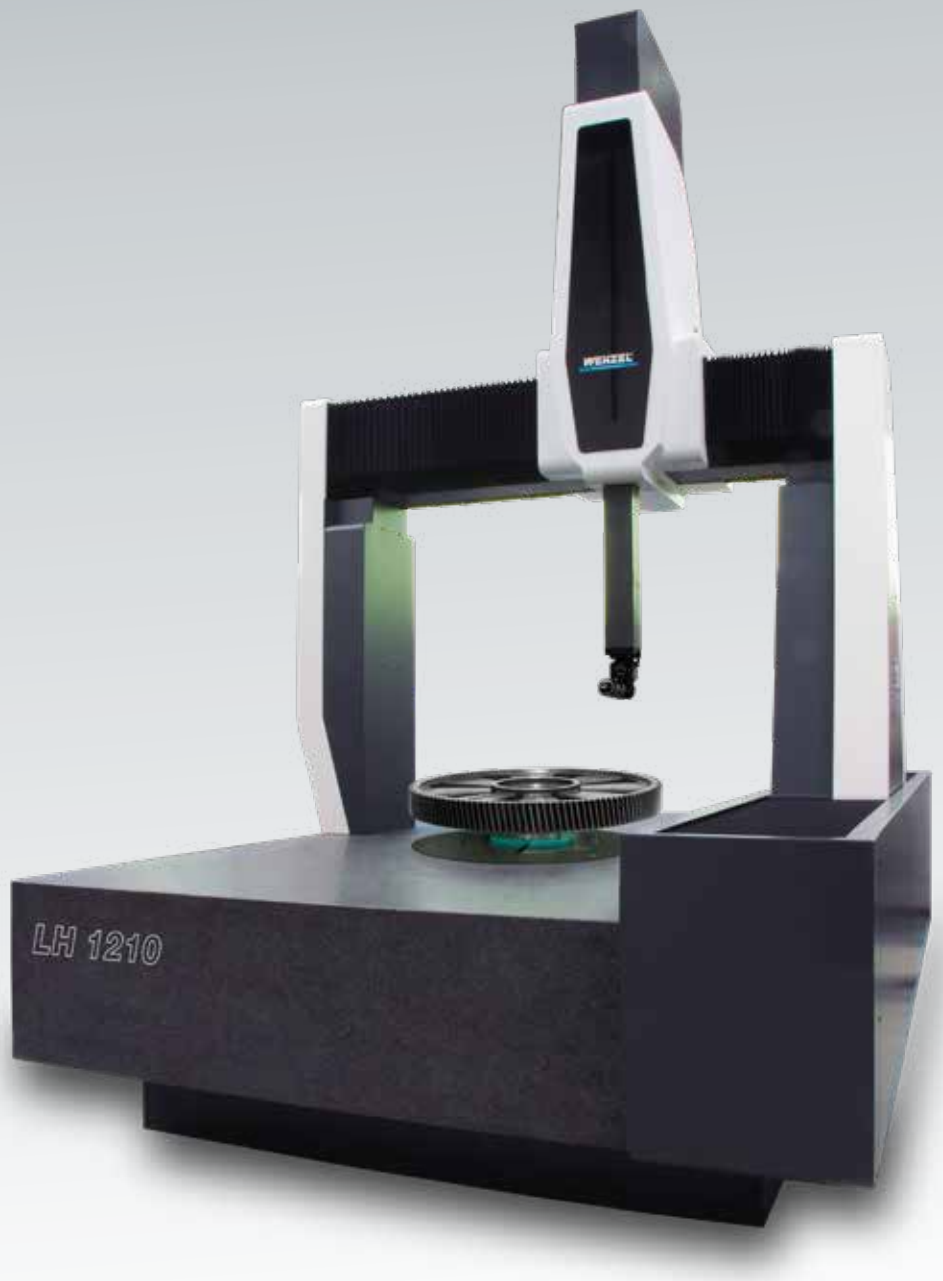
FIELDS OF APPLICATION

The LH series with rotary table quickly and reliably measures rotationally symmetrical as well as prismatic precision components. The numerous models and equipment options allow optimum adaptation to your measuring requirements.

Gears

Bearings and couplings

Shafts and axes



YOUR ADVANTAGES AT A GLANCE

- **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

WENZEL
HORIZONTAL ARM MACHINES

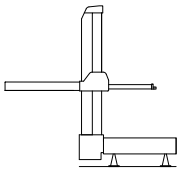
PRODUCT RANGE AND FIELDS OF APPLICATION
AN OVERVIEW

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.

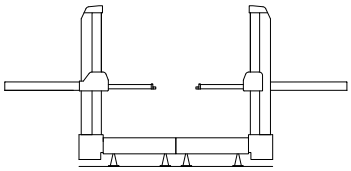
VARIANTS AND DESIGNS
SUITABLE FOR YOUR MEASURING TASKS

- 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.

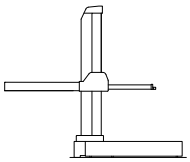
To extend the Y measuring range, all machines can be supplied as duplex version.



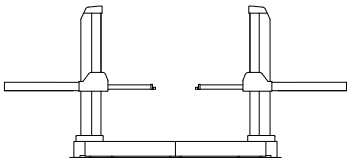
RS (Simplex)



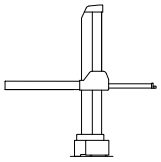
RSD (Duplex version)



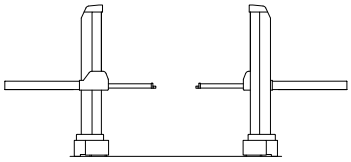
RA (Simplex, on floor)



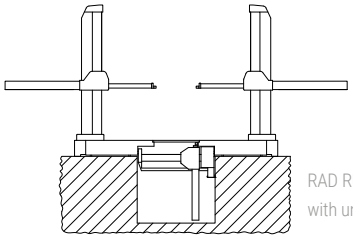
RAD (Duplex version, on floor)



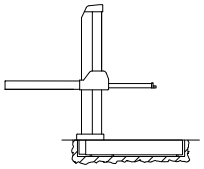
RAF (Simplex, on floor)



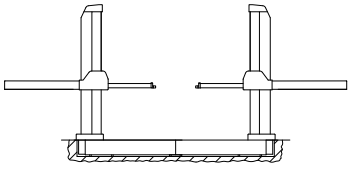
RAFD (Duplex version, on floor)



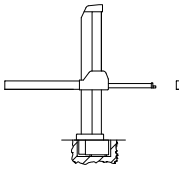
RAD RUF (Duplex version, with underfloor measuring machine)



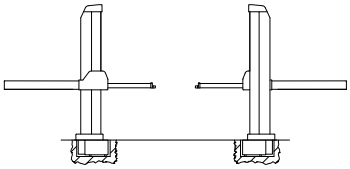
RA (Simplex, flush with floor)



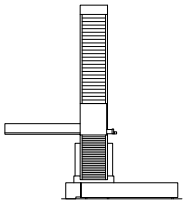
RAD (Duplex version, flush with floor)



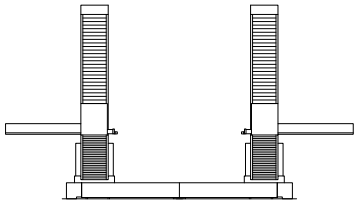
RAF (Simplex, flush with floor)



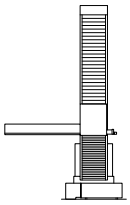
RAFD (Duplex version, flush with floor)



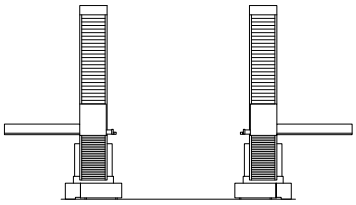
RAX (Simplex, on floor)



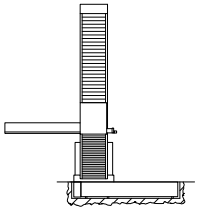
RAXD (Duplex version, on floor)



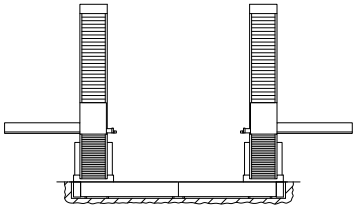
RAXF (Simplex, on floor)



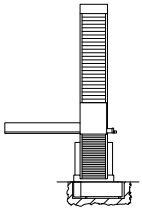
RAXFD (Duplex version, on floor)



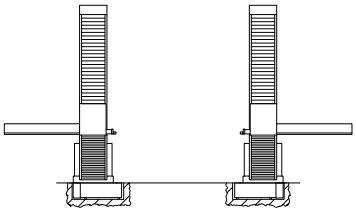
RAX (Simplex, flush with floor)



RAXD (Duplex version, flush with floor)



RAXF (Simplex, flush with floor)



RAXFD (Duplex version, flush with floor)

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.

FEATURES

- **Numerous designs** and operating modes with cast or granite base plate and optional damping
- **Customer-specific measuring volume** in all axes, also available as a duplex system
- **Many configuration options** for probes, sensors, marking tools and software
- **Various application possibilities** in production or in the measuring room – manual or automated
- **High investment security** through retrofitting, longevity and ease of maintenance
- **High ergonomics and safety** due to mobile control unit, ideal working height and portable control panel

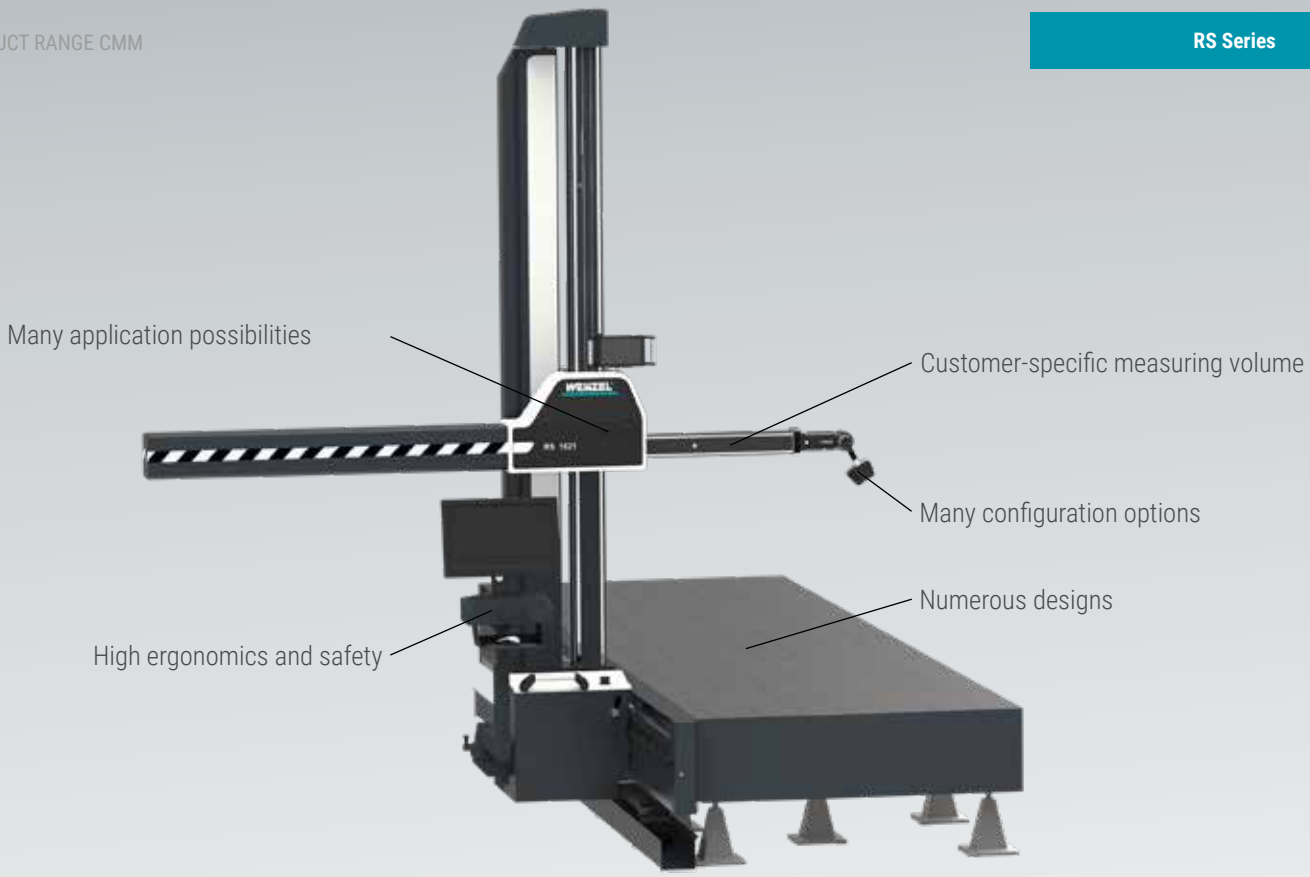
FIELDS OF APPLICATION

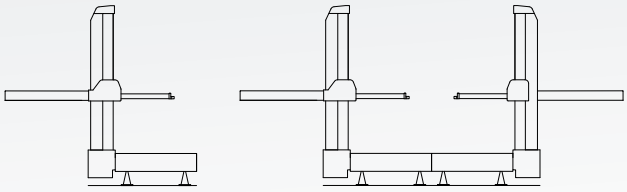
The RS Series is mainly used in the automotive industry for measuring, digitizing and scribing individual parts, assemblies or complete car bodies. Typical components are bumpers, seats, instrument panels, welded structures or fixtures.

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

YOUR ADVANTAGES AT A GLANCE

- **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

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.

FEATURES

- **Numerous versions** with or without base plate, flush or surface mounted
- **Customer-specific measuring volume** in all axes, also available as multi-column system or with an underfloor measuring system
- **Many configuration options** for probes, sensors, marking tools and software
- **Wide range of applications** in production or in the measuring room - manual or automated
- **Ergonomic and safe machine concept** meets high safety standards

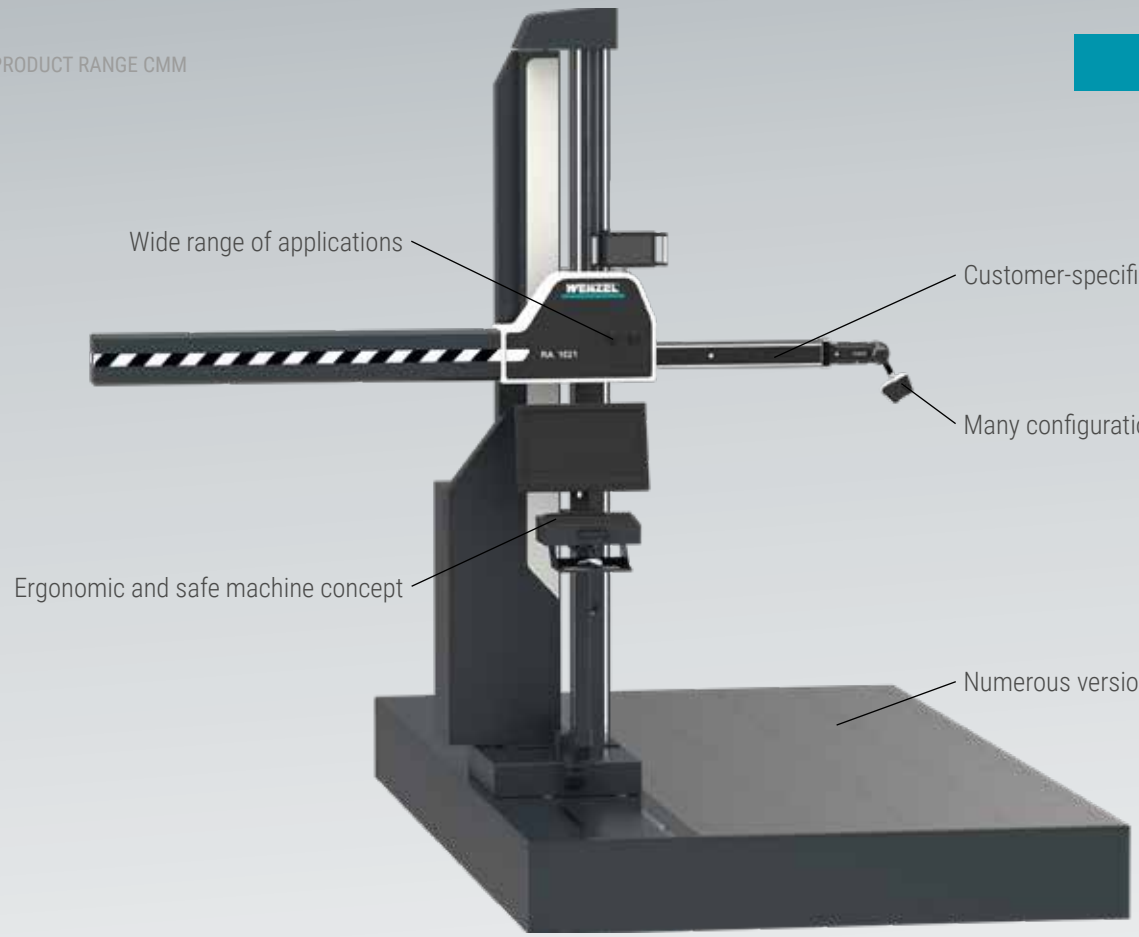
FIELDS OF APPLICATION

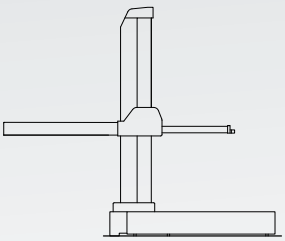
The RA series is used by many customers worldwide in individual operation or as a multi-column system for measuring, scribing and digitizing. The main areas of application are in vehicle construction, plant construction and for construction and agricultural machinery. Whether for individual parts, assemblies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

Automotive industry

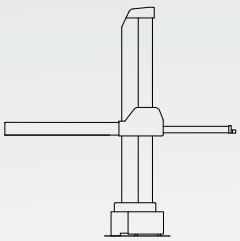
Railroad industry

Construction machines

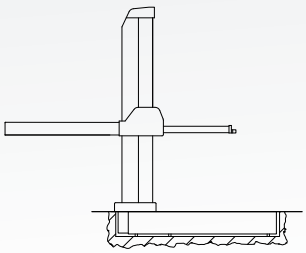




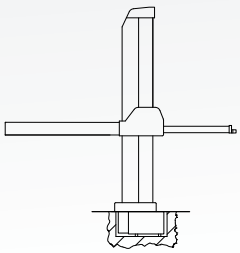
RA (Single unit, onfloor)



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.

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

YOUR ADVANTAGES AT A GLANCE

- **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

WENZEL RAX Series

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

The RAX is the newest CNC horizontal arm measuring device from WENZEL and was developed for the needs of vehicle technology and large machine construction. With its particularly large measuring volume, the RAX is especially designed for the very precise measurement of high and large volume components. Thanks to the special design, the measuring range starts immediately above the the base plate. With its particularly high Z-axis, the RAX has an extremely large measuring volume. The highest rigidity and smooth-running drive and guide elements guarantee high-precision measurement results.

FEATURES

- **Numerous versions** with or without a base plate, flush or flush with floor, simplex or duplex
- **Customer-specific measuring volume** in all axes, also as multi-column system
- **Multiple configuration options** for probes, sensors, software and accessories
- **Wide range of applications** due to high precision, large measuring volume and high dynamics
- **Ergonomic, safe and reliable** for single measurement and series monitoring

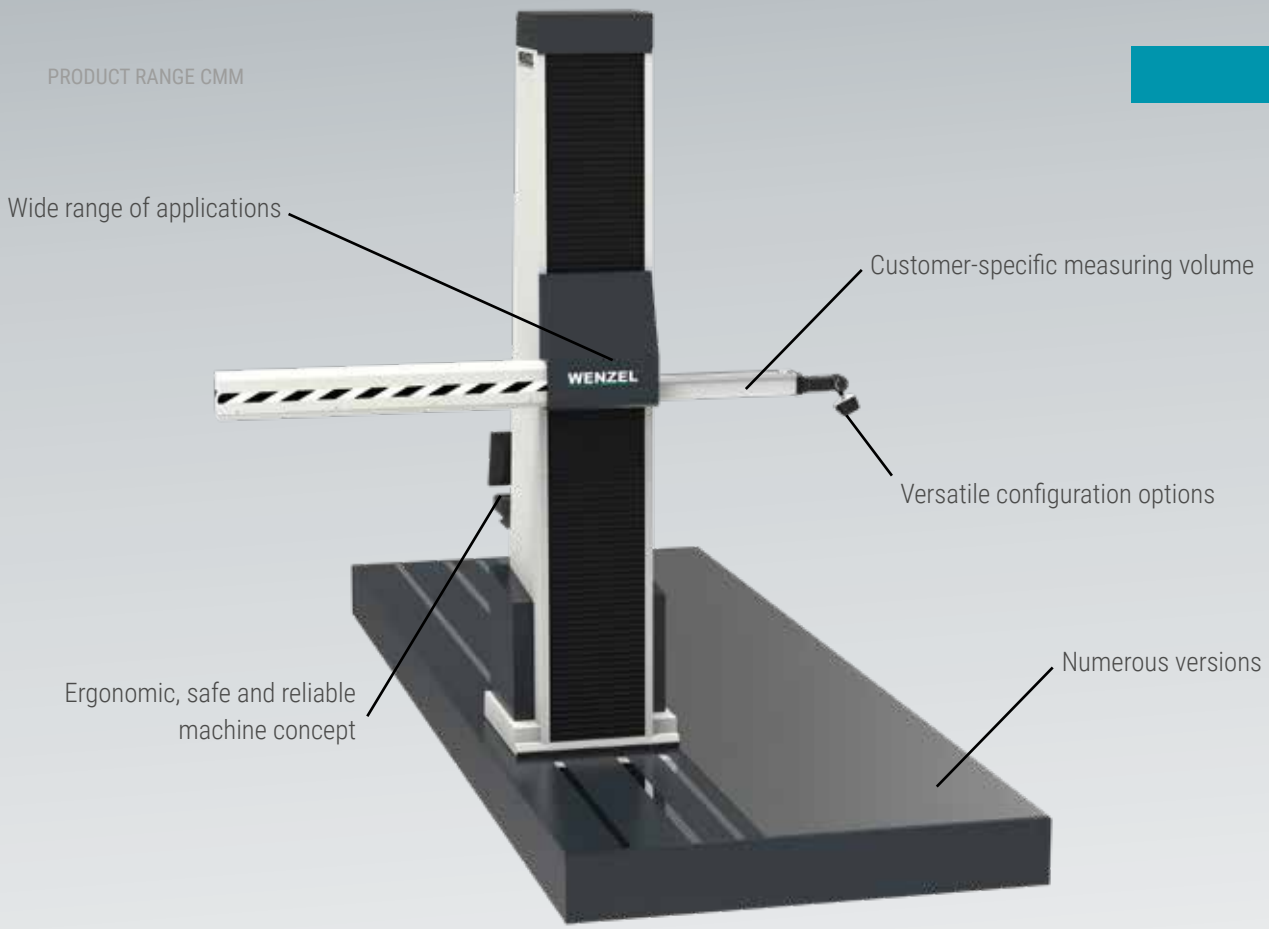
APPLICATION AREAS

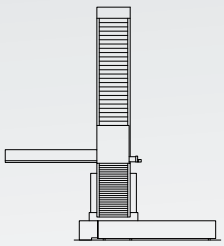
The RAX series is used by many customers worldwide in individual operation or as a multi-column system for measuring and digitizing. The main fields of application are in the following areas: Aerospace, shipbuilding, transport and construction and agricultural machinery. Whether for individual parts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

Aerospace

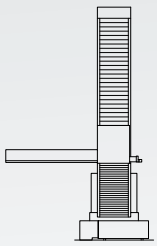
Shipbuilding

Construction machines

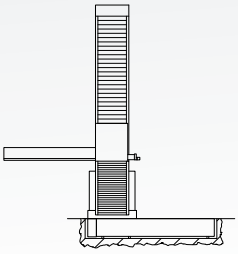




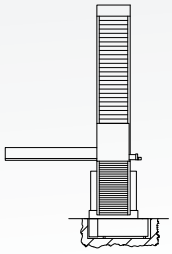
RAX (Simplex, on floor)



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

YOUR ADVANTAGES AT A GLANCE

- **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

FOR USE IN THE WORKSHOP

THE NEW WENZEL SHOPFLOOR SERIES
CMMs FOR USE IN THE WORKSHOP

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

WENZEL SF 87

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

WENZEL SF 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 foo 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.

Multisensor capable and ready for automation

SF 87's bionic structure and unique low center of gravity design make it efficient, ergonomic, productive, and insensitive to shop floor vibrations. SF87 is flexible when it comes to sensors. SF87 is multi-sensor capable and supports both optical and Renishaw tactile sensors including the PH10MQ PLUS that can be equipped with extensions and SP25M analogue scanning probes. SF 87 can be configured with a tool-change rack to switch probes and extensions automatically, without need for time consuming requalification. The new coordinate measuring machine is a directly usable production line and automation solution and can be integrated through the optional WENZEL Automation Interface (WAI) for material handling, without losing any footprint. The accessibility of the measuring volume from three sides is optimal for automated assembly by robots and can be flexibly adapted for more complex tasks with customer-specific substructures. In addition, SF 87 uses an active damping system and does not use air bearing technology, which helps customers avoid using expensive clean air and operate with only a 230V power supply, all achieved without compromising measurement accuracy.

WENZEL complements its strong product range with an optional service package which includes all services such as preventive maintenance, calibrations and repairs.

Best Practices Award 2018 goes to WENZEL

Based on the latest analysis of the global market for coordinate measuring machines (CMMs), Frost & Sullivan honors the WENZEL Group with the "Global New Product Innovation Award 2018" for the revolutionary shop floor CMM SF 87. With a larger measuring volume, a smaller footprint, a larger operating temperature range and seamless integration into automation solutions, the SF 87 meets all requirements for successful measurements in the direct production environment. Every year, Frost & Sullivan presents this award to companies that have developed innovative products using state-of-the-art technologies. The award recognizes the value added nfeatures and benefits of the product and the associated higher return on investment (ROI) for customers, which in turn increases customer acquisition and overall market potential.

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.

FEATURES

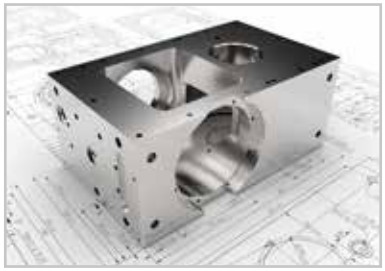
- **Cost-effective entry into coordinate measuring technology** due to excellent price-performance ratio
- **Flexible and universally** applicable in the workshop and in production
- **High measuring throughput** with scanning measuring heads
- **High accuracy** over a wide temperature range due to the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

FIELDS OF APPLICATION

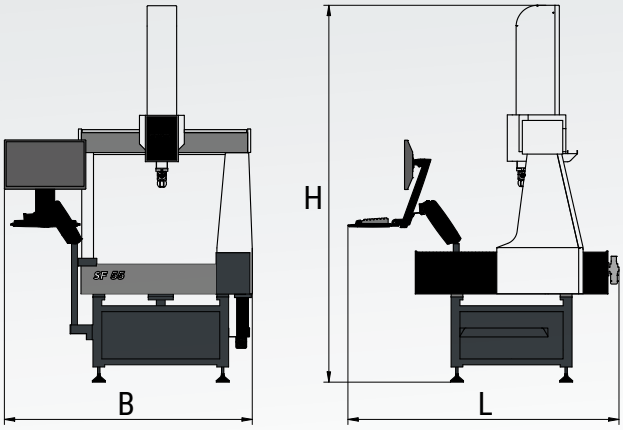
The SF 55 can be used universally. Serial and individual prismatic and free-form workpieces can be measured with the coordinate measuring machine in a production environment, for incoming goods and for classic quality assurance.

Steel bushings

Machine components



Gearboxes



MACHINE PROFILE

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

* with touch probe PH10M PLUS

YOUR ADVANTAGES AT A GLANCE

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

WENZEL SF 87

MEASURING IN THE PRODUCTION ENVIRONMENT

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

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

FEATURES

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

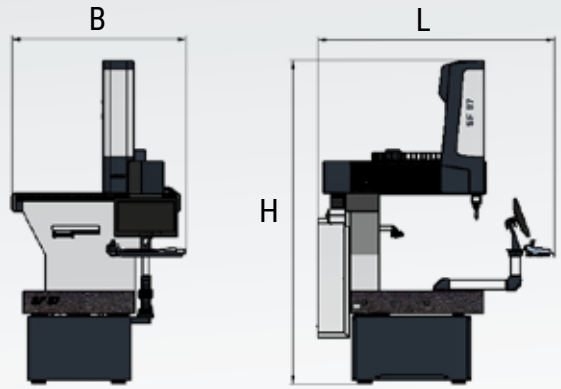
FIELDS OF APPLICATION

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

Steel bushings

3-cylinder engine block

Gearboxes



MACHINE PROFILE

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

* with touch probe PH10M PLUS

YOUR ADVANTAGES AT A GLANCE

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

Renishaw Equator

POWERED BY WENZEL

In the past, various measuring instruments were used to control manufacturing processes, e.g. Calipers, go/no-go gauges or bore gauges were used. The Equator Gauge combines these measurements in one device. This independent inspection system offers a good repeatable accuracy at an appropriate speed, with light weight and a high operability for manual and automated applications in production. For direct quality assurance in the process, the Equator enables timely corrections to the process for specific manufacturing processes. By checking at more frequent intervals, the following occurs; A fast reaction to possible process fluctuations. Almost independent of the production environment, constant accuracy can be guaranteed in a temperature range from 5°C to 50°C at a humidity of 80%. The system is designed for ease of use, cost reduction and improved process control through an appropriate test system concept.

FEATURES

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

APPLICATION AREAS

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

YOUR ADVANTAGES AT A GLANCE

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

WM | MMA SERIES

MOBILE MEASUREMENT IN THE PRODUCTION ENVIRONMENT

Mobile measuring arms from WENZEL are characterized by great flexibility, enabling use in both production and quality assurance processes. By combining a portable 7-axis measuring arm with a high-resolution line scanner, which captures every detail contact-free, the measuring arms represent a useful complement to your established classical coordinate measuring systems. The use of the latest materials makes the measuring arm a lightweight unit that delivers highly accurate and reproducible measurement results in mobile applications. The measuring arm can be used directly on the component - both with optical and tactile sensors - without any warm-up time and without sticking markers to the component. The measurement results obtained can then be transmitted via a WiFi interface for further use. The capacity and low consumption of the integrated battery ensure reliable operation of the measuring arm over a long period of time.

FEATURES

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

MEASURING ARM PROFILES

The measuring arm is available in different versions - suitable for individual measuring requirements and tasks.

			Tactile (with Scanning)		Optical		
	Axis	**Arm length**	**Single point repeatability**	**Accuracy**	**WM | MLS 100P**	**WM | MLS 200**	**WM | MLS 100**
WM | MMA 2.0	7	2,0 m	0,022 mm	0,032 mm	0,038 mm	0,042 mm	0,047 mm
WM | MMA 2.5	7	2,5 m	0,027 mm	0,038 mm	0,044mm	0,048 mm	0,053 mm
WM | MMA 3.0	7	3,0 m	0,042 mm	0,051 mm	0,057 mm	0,061 mm	0,066 mm
WM | MMA 3.5	7	3,5 m	0,054 mm	0,062 mm	0,068 mm	0,072 mm	0,077 mm
WM | MMA 4.0	7	4,0 m	0,069 mm	0,074 mm	0,080 mm	0,084 mm	0,089 mm
WM | MMA 4.5	7	4,5 m	0,078 mm	0,089 mm	0,095 mm	0,099 mm	0,104 mm

YOUR ADVANTAGES AT A GLANCE

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

			Tactile (without Scanning)		Optical
	Axis	Arm length	Single point repeatability	Accuracy	WM | MMA + WM | LS70
WM | MMA 2.0	7	2,0 m	0,022 mm	0,032 mm	0,039 mm
WM | MMA 2.5	7	2,5 m	0,027 mm	0,038 mm	0,045 mm
WM | MMA 3.0	7	3,0 m	0,042 mm	0,051 mm	0,058 mm
WM | MMA 3.5	7	3,5 m	0,054 mm	0,062 mm	0,069 mm
WM | MMA 4.0	7	4,0 m	0,069 mm	0,074 mm	0,081 mm
WM | MMA 4.5	7	4,5 m	0,078 mm	0,089 mm	0,096 mm

Magnetic MOUNTS 6“ und 8“

An excellent way to attach a measuring arm to an iron surface such as a steel plate or a table is to use a magnetic mount. Some customers use it as a flexible mounting solution on a large steel table or even mount them directly on the bed of a machine tool. They can easily be turned on and off, allowing the user to quickly change the position while he measures a large part on a table. The magnets are switched on and off with an Allen key. In some cases, customers even use a magnetic mount, to attach the measuring arm directly to the part to be measured. This creates a desirable situation in which the part does not move relative to your measuring device. Our magnetic fasteners include a universal 3-1/2”-8 stainless steel mounting ring. The magnetic brackets are delivered in a hard foam case to a simple to ensure transport to the workplace

.

TRIPOD-HDP

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

TRIPOD-HDP-PRO

The measuring stand is suitable for measuring arms with up to a length of 5 m. The portable measuring stand made of lightweight aluminium and can be folded in our optional plastic case.

Workshop trolley with granite plate 600 x 920 mm

Our workshop trolley with a dimension of approx. 600 x 920 mm is provided with a granite slab. The cart is narrow enough to pass through a doorway to fit in standard size and contains two 3-1/2 “-8 mounting rings. It has lockable cupboard doors and handles at both ends to ensure easy manoeuvrability of the cart. The interior of the case stays open to all devices, Power supplies, printers or computers.

Workshop trolley with granite plate 720 x 1220 mm

Our workshop trolley with a dimension of approx. 720 x 1220 mm is provided with a granite plate. The car is still narrow enough to go through one Door opening in standard size to fit, and contains three 3-1 / 2 “-8 mounting rings. It has lockable cupboard doors and handles at both ends to ensure easy manoeuvrability of the trolley. The interior of the case remains open to accommodate all devices, power supplies, printers or computers.

WM | Quartis Mobile

THE UNIVERSAL STANDARD MEASURING SOFTWARE

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

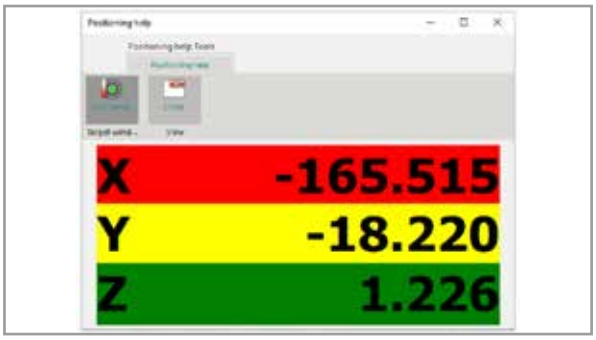
User Interface

Suitable for every task

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

Positioning aid

The new working window “Positioning aid” is used to position the touch points of the elements as accurately as possible during the execution of measuring programs with manual measuring instruments. The target window of the positioning aid is defined by the measuring distance and can be found under the current probe radius taking into account the normal direction of the point to be scanned. The target point is thus identical to the touch point of the stylus on the material (for actual = nominal). The “Positioning aid” working window can be displayed via “Quartis button / Working window / Positioning aid” and edit” will be displayed. When the “Positioning aid” working window is switched on and the active manual measurement of an element during the execution of a measuring program, the X, Y and Z values are displayed numerically in the working window.



Clear measurement reports

Everything at a glance

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

MEASURING SOFTWARE

	WM | Quartis Mobile	Metrolog	Polyworks
Tactile measurement	X	X	X
Optical measurement of surfaces	From 10/19	X	X
Optical measurement of features	From 10/19	X	X

OVERVIEW
CT PRODUCT RANGE

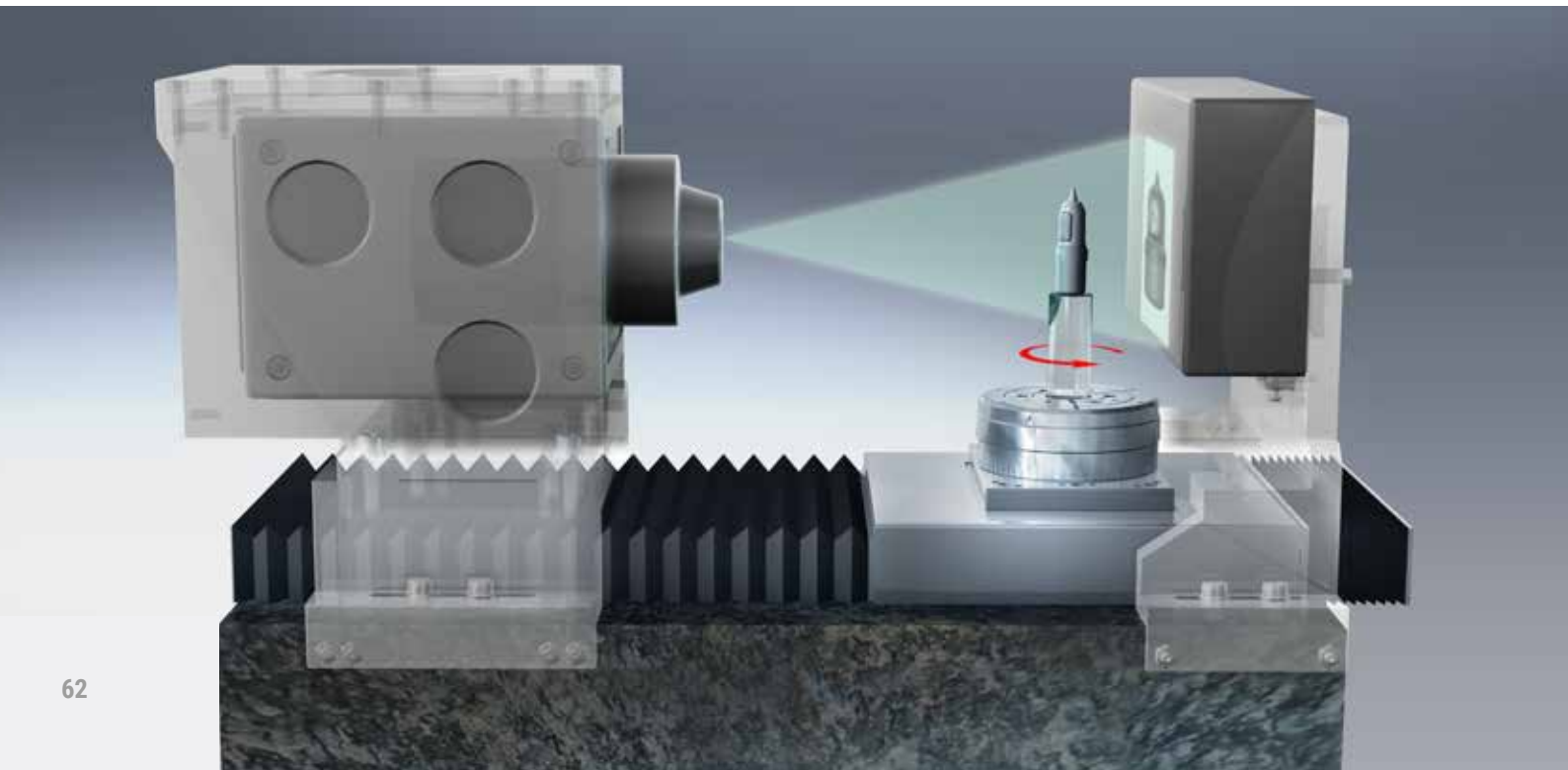
WHAT IS VOLUME MEASUREMENT TECHNOLOGY?
AN OVERVIEW OF COMPUTED TOMOGRAPHY

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.
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

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.

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.

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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.

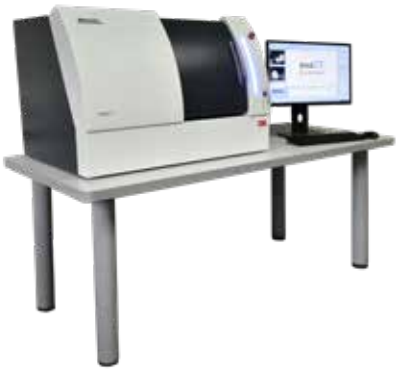
Tactile and optical measuring systems are limited to measuring only what they can reach or see inside a component but exaCT CT technology allows the measurement of any feature in the part even if hidden inside. Additionally, the high rate of data acquisition means that all the data from all of the component 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 B x H)	**635 x 890 x 605 mm**
X-Ray (Voltage, Power)	**80 kV, 40 W**
Detector Resolution	**1000 x 690 Pixel, 100 µm**
Work Piece Dimensions	**Ø 80 x 45 mm***

exaCT S 130

Space Requirements (L x B x H)	**635 x 890 x 605 mm**
X-Ray (Voltage, Power)	**130 kV, 39 W**
Detector Resolution	**2300 x 1300 Pixel, 50 µm**
Work Piece Dimensions	**Ø 85 x 45 mm***

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 B x H)	**1275 x 2315 x 1415 mm**
X-Ray (Voltage, Power)	**225 kV, 800 W**
Detector Resolution	**3600 x 1000 Pixel, 50 µm**
Work Piece Dimensions	**Ø 150 x 250 mm***

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 B x H)	**1960 x 2350 x 2400 mm**
X-Ray (Voltage, Power)	**225 kV, 300 W**
Detector Resolution	**2900 x 2900 Pixel, 150 µm**
Work Piece Dimensions	**Ø 330 x 700 mm***

exaCT U 300

Space Requirements (L x B x H)	**1960 x 2350 x 2400 mm**
X-Ray (Voltage, Power)	**300 kV, 300 W**
Detector Resolution	**4000 x 4000 Pixel, 100 µm**
Work Piece Dimensions	**Ø 330 x 700 mm***

* Depending on the part 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 of 45 mm in height, 85 mm in diameter and voltage of up to 130 kV.
The exaCT M has a measuring volume of 300 mm in height, 200 mm in diameter and 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

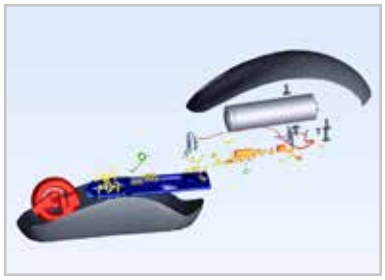
MEASURING TECHNOLOGY	TESTING TECHNOLOGY
Dimensional checks Measurement of standard geometries and freeform surfaces including shape and position tolerances	**Material defect analyses** Non-destructive testing for e.g. blowholes, pores or cracks
Wall thickness analysis Color representation of component 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.

PC wireless mouse

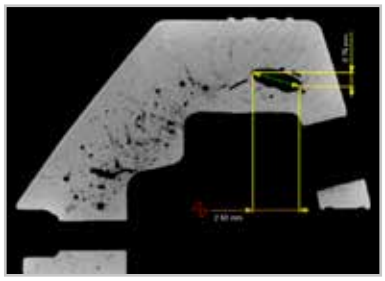
Side view into the partially opened housing. The position of the individual parts in relation to each other can be analyzed in the assembled state.



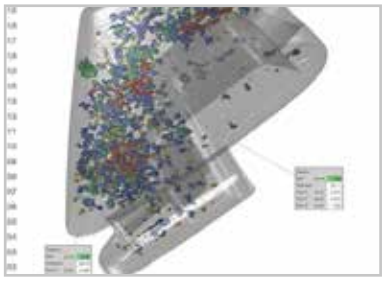
Exploded view of the wireless mouse. The individual parts can be virtually rearranged for better visualization.

Blowhole analysis of an aluminium casting

Aluminium casting

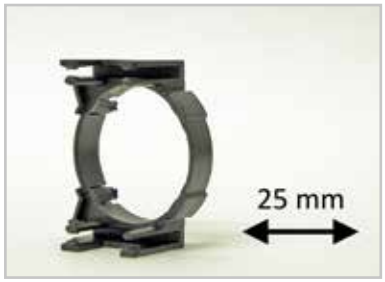


The 2D section shows blowholes and porosity in the component

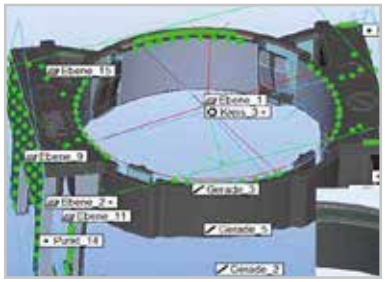


The 3D blowhole analysis shows the size, distribution and position of the blowholes in the component

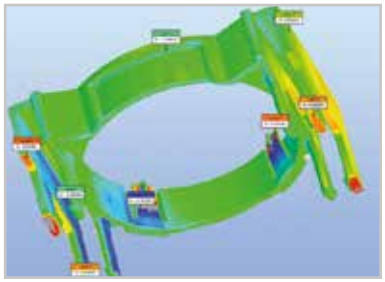
Dimensional measurement technology on a plastic injection-molded component



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.

FEATURES

- **Space-saving desktop CT** through compact integration of the complete electronics and control system
- **High power** of from 80 up to 130 kV with integrated vibration damping
- **Flexible system** with compact design and sophisticated ergonomics
- **Fast set-up of workpieces** thanks to integrated video cameras and special software features
- **Easy operability** and **high performance** of the application software

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 45 mm in height and 85 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

MASHINE PROFILE

exaCT S 80

Space Requirements (L x B x H)	**635 x 890 x 605 mm**
X-Ray (Voltage, Power)	**80 kV, 40 W**
Detector Resolution	**1000 x 690 Pixel, 100 µm**
Work Piece Dimensions	**Ø 80 x 45 mm***

exaCT S 130

Space Requirements (L x B x H)	**635 x 890 x 605 mm**
X-Ray (Voltage, Power)	**130 kV, 39 W**
Detector Resolution	**2300 x 1300 Pixel, 50 µm**
Work Piece Dimensions	**Ø 85 x 45 mm***

* Depending on the part diameter

YOUR BENEFITS AT A GLANCE

- **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

WENZEL exaCT® M 225

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 footprint.
The exaCT M CT 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.

FEATURES

- **Compact system** through the integration of computing power and control cabinet
- **High output** of 225 kV with a small space requirement
- **Sophisticated operating concept** automatically opens and closes the loading door at the right moment
- **Minimization of environmental influences** through integrated vibration damping
- **Easy operability** and **high performance** of the application software
- **Maintenance-free** or **low-maintenance** due to special stability of the X-ray source

APPLICATIONS

With a measuring volume of 300 mm in height and 200 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

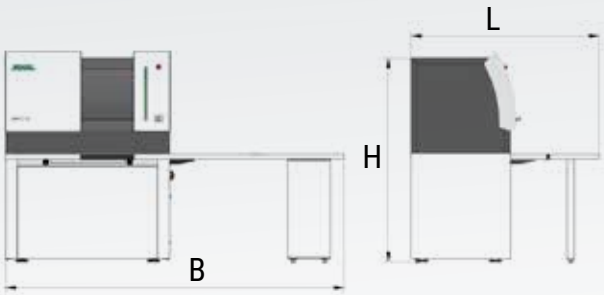
Assembly inspection

Aluminum casting

Blowhole test

Hose Connectors

Measurement Technology



exaCT M 225

Space Requirements (L x B x H)	**1275 x 2315 x 1415 mm**
X-Ray (Voltage, Power)	**225 kV, 800 W**
Detector Resolution	**3600 x 1000 Pixel, 50 µm**
Work Piece Dimensions	**Ø 150 x 250 mm***

* Depending on the part diameter

YOUR BENEFITS AT A GLANCE

- **Flexible compact system**
  Scanning of plastics, light metals and multi-materials | Various available configurations and detector resolutions | 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**
  Maintenance-free or low-maintenance radiation source | High availability due to precision mechanics | Longer calibration intervals

WENZEL exaCT® U

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.

FEATURES

- **Configurable system**, to address individual user requirements and automation
- **High power** from 225 kV up to 300 kV sets new standards for reconstruction speed
- **Large measuring volume** of 700 mm in height and 330 mm in diameter
- **High resolution** (2900 x 2900 pixels / 4000 x 4000 pixels) for measuring components with tight tolerances and complex structures
- **Five independent travel axes** for high speeds and short measuring and testing times

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.

Vehicle headlamps

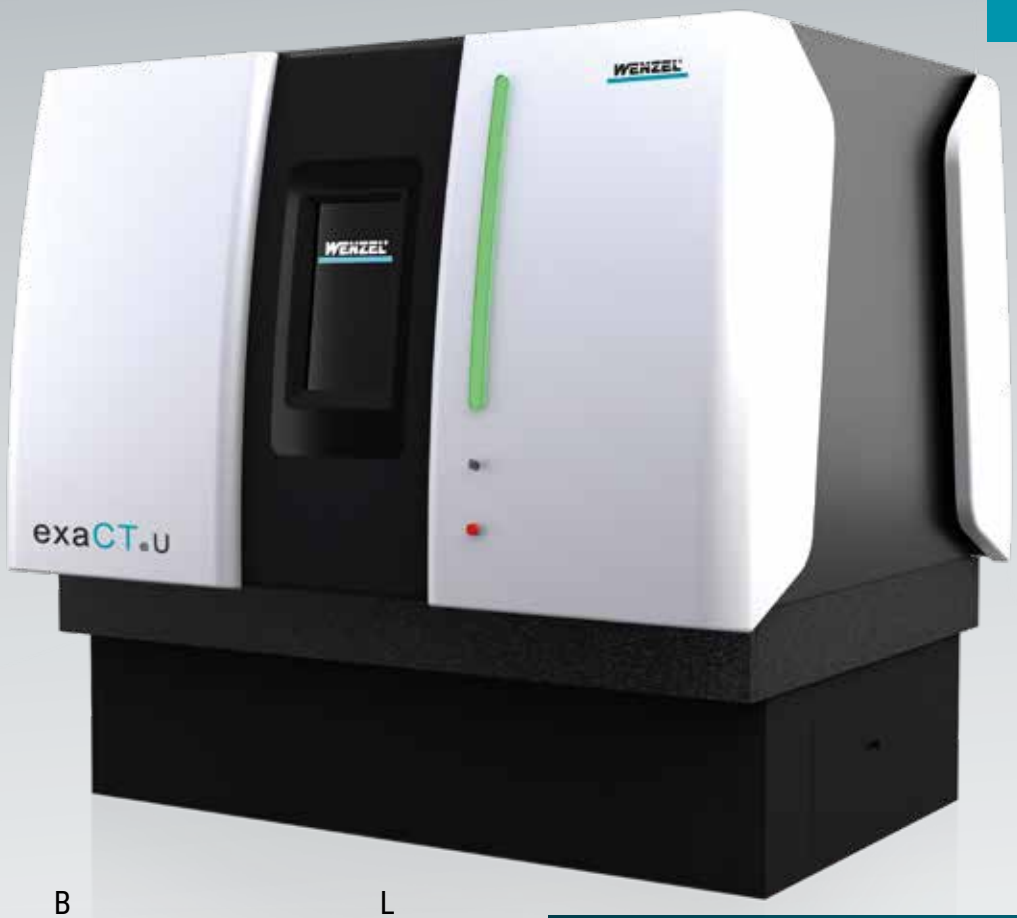
Assembly inspection

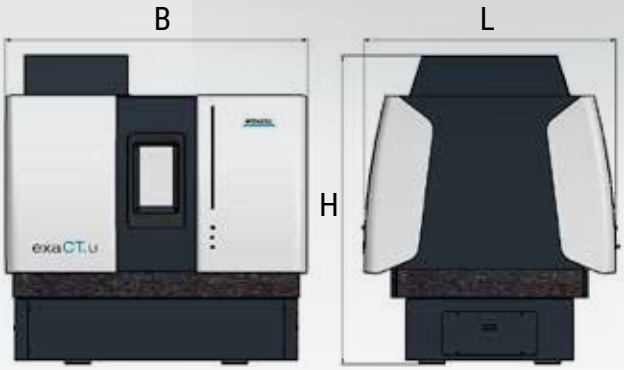
Internal combustion engine

Defect analysis

Titanium plastic implant

Metrology





MACHINE PROFILE

exaCT U 225

Space Requirements (L x B x H)	**1960 x 2350 x 2400 mm**
X-Ray (Voltage, Power)	**225 kV, 300 W**
Detector Resolution	**2900 x 2900 Pixel, 150 µm**
Work Piece Dimensions	**Ø 330 x 700 mm***

exaCT U 300

Space Requirements (L x B x H)	**1960 x 2350 x 2400 mm**
X-Ray (Voltage, Power)	**300 kV, 300 W**
Detector Resolution	**4000 x 4000 Pixel, 100 µm**
Work Piece Dimensions	**Ø 330 x 700 mm***

* Depending on the part diameter

YOUR BENEFITS AT A GLANCE

- **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**
  Maintenance-free or low-maintenance radiation source | Precision mechanics for higher availability | Longer calibration intervals

OVERVIEW
WENZEL CORE

OPTICAL HIGH SPEED SCANNING
MEASUREMENT OF BLADES, BLISKS AND IMPLANTS

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

In addition to measurements in the measuring room, it is now important to move metrology into the production area close to the processing machines in order to be able to react quickly to deviations. With this in mind, WENZEL's CORE product range was developed for the central part of a production plant - the quality of the products. No matter whether the measurement is carried out directly after production or during post-processing within the maintenance cycle at a later point in time, the CORE is the appropriate coordinate measuring machine for this. The measuring machine can be used directly in the production area and measure the relevant characteristics. It is possible to measure on almost all surfaces, whether shot peened, lacquered, polished or matt. Due to the unique optical sensors of the CORE product line it is possible to measure all these surfaces. Some may now think that optical sensors cannot measure everything. That's right, every technology has its limits. For this reason, WENZEL has developed a hybrid sensor that combines the characteristics of optics and tactile sensors and is outstanding in this regard, but not only are the sensors to be emphasized here, also the machine itself impresses with its small space requirement in comparison to similar measuring machines. The CORE product range is also characterized by its incredible flexibility. Depending on the model, the CORE can be equipped with 6 axes and a measuring turntable. This combination allows almost unrestricted access to the components in order to measure as many features as possible in a single operation without re-clamping. This measurement is not done in hours, days or weeks, no, the development of the CORE product line has been designed to measure within the cycle time of production. Fast measurements can be achieved as a result of

high acceleration of the individual axes. yet the accuracy is not overlooked, resulting in the best possible relationship between measurement time and accuracy. In addition, the CORE product range can also be integrated into a fully automated production line. Whether using a robot or an automatic feeding system - with the CORE, WENZEL can make real almost any automation.

What would a measuring machine be today without the right software? It would probably only function in a limited way. For this reason the CORE is now available with the well-known WM | Quartis software from WENZEL. The areas of application for CORE are wide. For example, turbine blades from the aerospace industry or industrial gas turbines can be inspected. In medical technology, joints and prostheses can also be measured, as can components from other diverse markets. Small, medium and large components with a length of more than 2m can be measured with the CORE product range. No matter whether you want to check the quality of your products directly after manufacture or at a later point in time, CORE will not let you down. Do not leave the quality of your products to chance, but entrust this important central part of the CORE to WENZEL.

WENZEL CORE D

OPTICAL MEASUREMENT AT PRODUCTION CYCLE SPEED

Designed to increase the speed of the production process, the CORE Optical High Speed Scanning System offers a highly flexible 3D inspection solution for demanding measurement requirements in global manufacturing. The CORE is based on a proven mechanical structure, developed and manufactured in WENZEL's renowned production facility in Germany. This forms the cornerstone for its accuracy, reliability and quality. With a scanning speed of up to 400 mm/s, the CORE provides time savings by a factor of about 4 compared to tactile coordinate measuring machines.

FEATURES

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

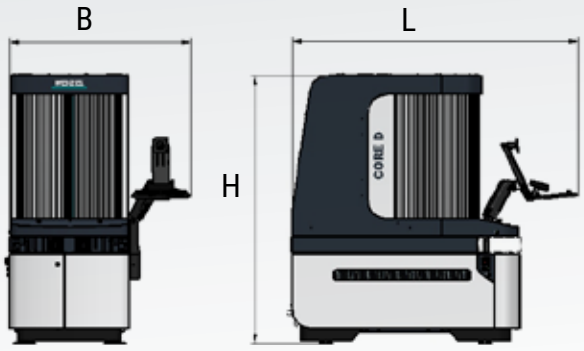
FIELDS OF APPLICATION

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

Knee and hip prostheses

Turbine blades

Pump



MACHINE PROFILE

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

YOUR ADVANTAGES AT A GLANCE

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

WENZEL CORE M

OPTICAL MEASUREMENT AT PRODUCTION CYCLE SPEED

The CORE M High Speed Optical Scanning System is a device that was developed to meet the increasing demand for 100 % inspections. It works quickly and efficiently directly in production. Designed to increase the speed of the production process, the CORE M offers a highly flexible 3D optical inspection solution for large components and demanding measurement requirements in global manufacturing. The CORE is based on a proven mechani cal structure, developed and manufactured in WENZEL's renowned production facility in Germany. This forms the cornerstone for its accuracy, reliability and quality.

FEATURES

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

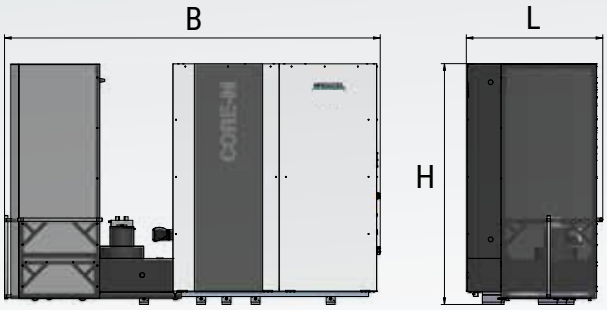
FIELDS OF APPLICATION

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

Vane blade segment

Turbine blade

Common Rail



MACHINE PROFILE

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

YOUR ADVANTAGES AT A GLANCE

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

SENSORS AND CHANGE RACKS

FOR GANTRY MACHINES

Combined with a variety of innovative sensors, the WENZEL gantry machines are applicable flexibly even for the most different of applications. From smallest injection moulded parts up to large sheet metal punching tools - our product series meet your requirements! They can be equipped with manual, motorized, infinitely variable or indexable mounting heads. With the corresponding touch-trigger, scanning and optical measuring systems, our product series achieve meaningful results for a wide variety of applications. The compatible automatic changing racks turn the measuring machines into homogeneous and versatile measuring systems.

PH10T PLUS / PH10M PLUS / PH10M iQ PLUS

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

PH20

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

REVO-2

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

TP20

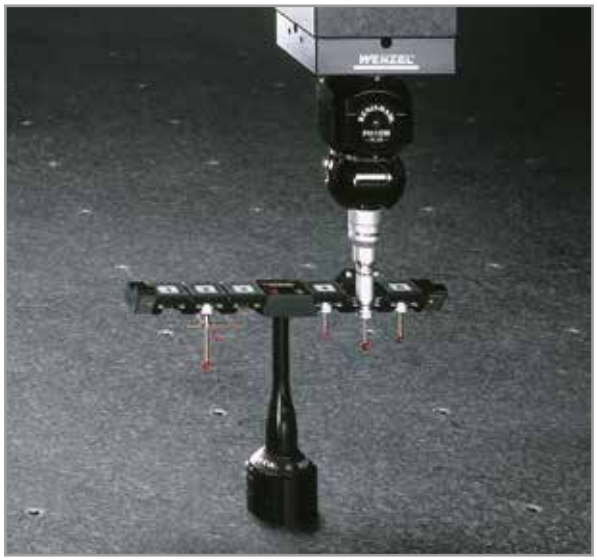
Touch trigger probe. Extremely robust and flexible touch trigger probe with stylus module.

TP200

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

SP25M

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

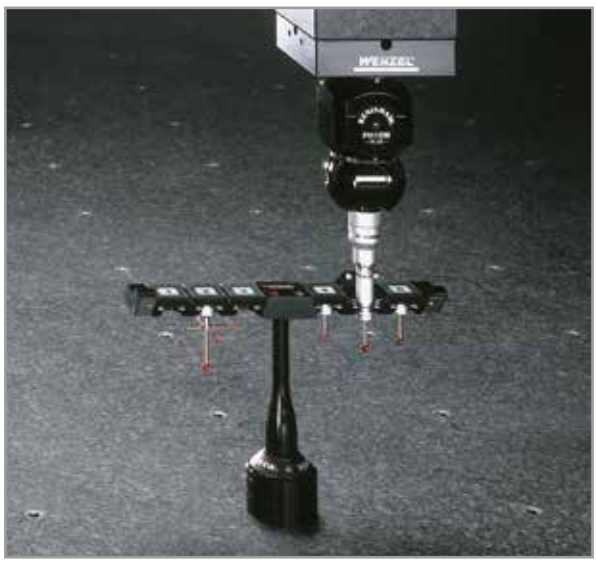


Change Rack SCR200

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

Change Rack ACR3

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



Change Rack FCR25

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

MRS2 Stylus Module Rack

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

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.

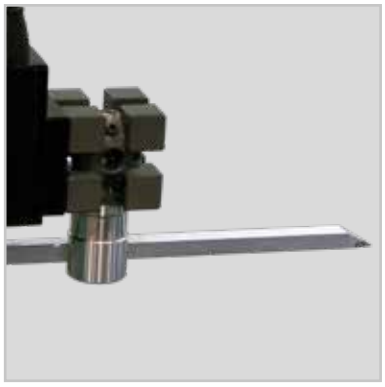
PH10T PLUS / PH10M PLUS / PH10M iQ PLUS
Automatically, indexable probe head, Fast probe replacement (auto joint) with the corresponding change systems.

PHS2 servo positioning head
Can be swiveled continuously. Minimum probe calibration efforts. Extensions of up to 750 mm possible.

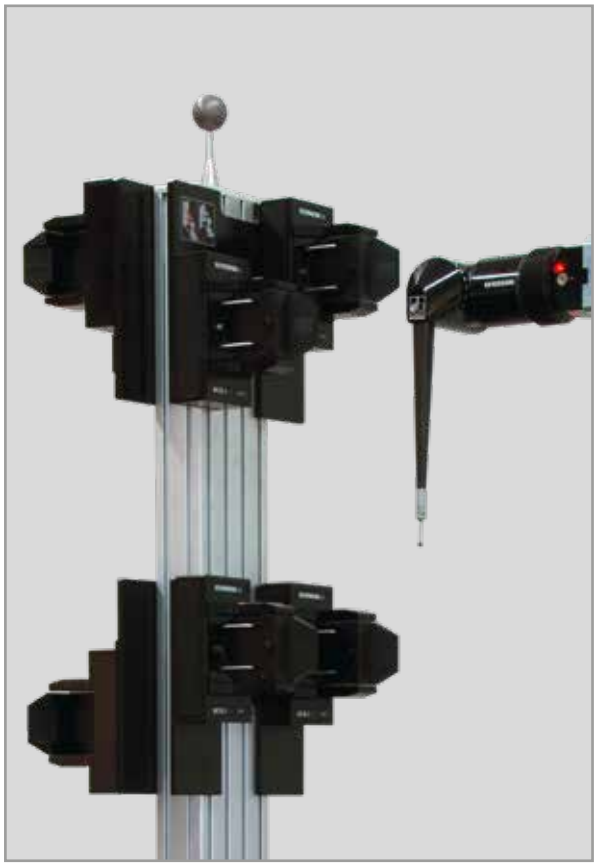
SP600
A universal robust probe with scanning functions. Ideal for scanning forms and fine surface details.

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 markingt 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 adapters possible so that the measuring tasks do not have to be carried out manually.

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

For further information please contact your WENZEL contact person.

Change rack ACR3

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.

REVO® 5-AXIS-SYSTEM

HIGH PRECISION SCANNING AT HIGH SPEED

With the REVO, the measuring machine has the ability to perform the most accurate measurements with extremely high scanning speeds and data rates due to its unique technology. By means of the Active-Head function, the fast Scanning movements performed by the stepless axes of the head, while the machine axes perform slower movements. This ensures reliable results, even with large extensions, and the Head-Touch Function for quick single point fantasies. The infinitely variable axes provide maximum workpiece accessibility with minimum need for probe change, probe material and calibration time. The exchangeable roughness sensor with sixth axis turns the measuring machine into a surface measuring device. In combination with the user-friendly measuring software WM| Quartis, the REVO offers unprecedented speed and flexibility.

FEATURES

- **Active head function** enables scanning at extremely high speed (up to 500 mm/s²)
- **Fast single point probing** with head-touch function
- **Undercuts** with conventional 3-axis mode and angled probes
- **Extensions** up to 800 mm possible
- **Short calibration time & few probe changes** due to unlimited positioning possibilities
- **Low cost** of probe material
- **Full integration** into user-friendly measurement software WM | Quartis
- **Surface roughness sensor** optionally possible

REVO IN WM | Quartis

- Full integration of REVO functionalities in WM | Quartis
- Simply set probing strategies and scan paths via menu ribbon and view in preview graphic
- Fast surface measurement with sweep scan; simple cylinder measurement as helical scan
- Complete integration of the REVO in graphic display, swivel dialog and probe catalogue
- Fast measurement even with high point density (up to 6,000 points/second)

EVALUATION SYSTEMS AND ACCESSORIES
PRECISION IN DETAIL

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

WENZEL evaluation system CNC
- Optimized machine performance
- Optimized for WENZEL & Renishaw sensors
- Scanning probe possible via option cards

Interfaces WPC2040
- Ethernet
- RS232
- Readerhead input (5V TTL)
- Probe input (5V TTL)
- Motor connections

Standard control panel HT400, wired
- Ergonomic shape for one-hand operation
- 1 joystick for all axes
- Multifunction pad
- Stepless adjustment of the CNC travel speed
- Emergency stop function according to EN 60204 and EN ISO 13850

Wireless control panel HT400RC
- Wireless control panel HT400RC incl. receiver
- 1 charging cable each 0.5 and 6.0 m
- Charging station
- 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 WENZEL representative.

OPTICAL SENSORS

FOR CMMs AND MEASURING ARMS

Coordinate measuring machines can be equipped with touch-trigger as well as tactile and optical measuring sensors. Which sensor is the right choice depends on many factors, e.g. what the measuring task is, which surface has to be measured, the measuring speed and much more. Whereas measurements used to be carried out mostly in measuring rooms, it has now been apparent for some time that it is increasingly being shifted towards production, e.g. IN-Line or AT-Line, in order to ensure the quality of the products during series production. The optical measuring technology enables the user to perform completely new measuring tasks without contact and with the desired accuracy in a reasonable time, whether these are vehicle seats or medical implants, does not matter. WENZEL sees the next step as the integration of optical sensors to measure roughness on a coordinate measuring machine. This makes a CMM a true multi-sensor device. Today, optical sensors can already be mounted on many measuring machines.

FOR COORDINATE MEASURING MACHINES

WM | SHAPETRACER II

The WM | SHAPETRACER II from WENZEL is a flexible sensor, which was developed for the measurement of point clouds on a coordinate measuring machine. With a maximum line length of 120 mm, even larger components can be captured and processed in an efficient time.

WM | LS 70

The WM | LS 70 from WENZEL convinces with a high resolution of 50 µm and a line width of max. 70 mm. Combined with a temperature compensation and the new optics, use in the production environment is no problem. Furthermore, this sensor is multifunctionally applicable, can also on a measuring arm WM | MMA from WENZEL and can be equipped e.g. with a TP20 from Renishaw for additional tactile measurement.

Typically, the sensors (except those of CORE) are designed for use with all WENZEL coordinate measuring machines by using a Renishaw Autojoint adapter. This enables you to upgrade your existing measuring systems (RS, RA, RAX, etc.) with an optical sensor from WENZEL and thus ensures the cost-effective adaptation of your coordinate measuring machine to current requirements. You can combine the advantages of tactile measurement with those of optical measurement and thus prepare your system for future measuring tasks.

As already mentioned WENZEL keeps pushing the development of its optical metrology sector. You will be interested in a line sensor with a large line width, which enables you to quickly detect large components. In addition, the use of strip light projection sensors opens up new possibilities in 3D coordinate measuring technology. The sensor portfolio is rounded off with a roughness depth measuring device that can always be mounted at the same position on the CMM during series production in order to reliably determine the roughness.

FIELDS OF APPLICATION

It makes no difference whether the optical sensors are mounted on a multi-column system, a portal machine or a shop floor machine. WENZEL offers for each application a suitable sensor with the corresponding performance, e.g. line width and other features. This results in innumerable possible application areas in the aerospace and automotive sectors, in medical technology as well as in many other industrial sectors.

Automotive

Railway industry

Construction equipment

FOR MEASURING ARMS

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

WM | MLS 100

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

WM | MLS 100P

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

WM | MLS 200

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

WM | HS & WM | DS

FOR THE 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.

WM | DS

WM | HS

WM | SHAPETRACER II

HIGHEST FLEXIBILITY & CONVINCING PERFORMANCE

The WM | SHAPETRACER II is a highly flexible 3D line scanner for the acquisition and processing of point clouds on a multisensor coordinate measuring machine. The optical sensor is integrated into the software of
Wenzel integrates with both WM|PointMaster and WM|Quartis and thus delivers high-quality, precise and repeatable results. With the
WM | SHAPETRACER II sets WENZEL standards in the field of digitization. In comparison to the predecessor model, an increase in the measuring range and the measuring speed has resulted in an increase in performance. of over 400 %. By using a blue laser line and a better resolution, a higher tolerance towards critical surface structures was achieved. The WM | SHAPETRACER II works with the lens and ambient light filter independently of ambient light and offers a high degree of flexibility with regard to a wide range of workpiece colors. Firmware updates can be easily controlled via the multiwire interface of the Autojoint adapter. Since the calibration data of the 3D line scanner is stored on an intelligent camera system, the installation is very easy. The connection to the coordinate measuring machine
is carried out via an automatic, fully integrated Multisensor-Interface. The combination of optical and tactile measurement ensures effective work for every application.

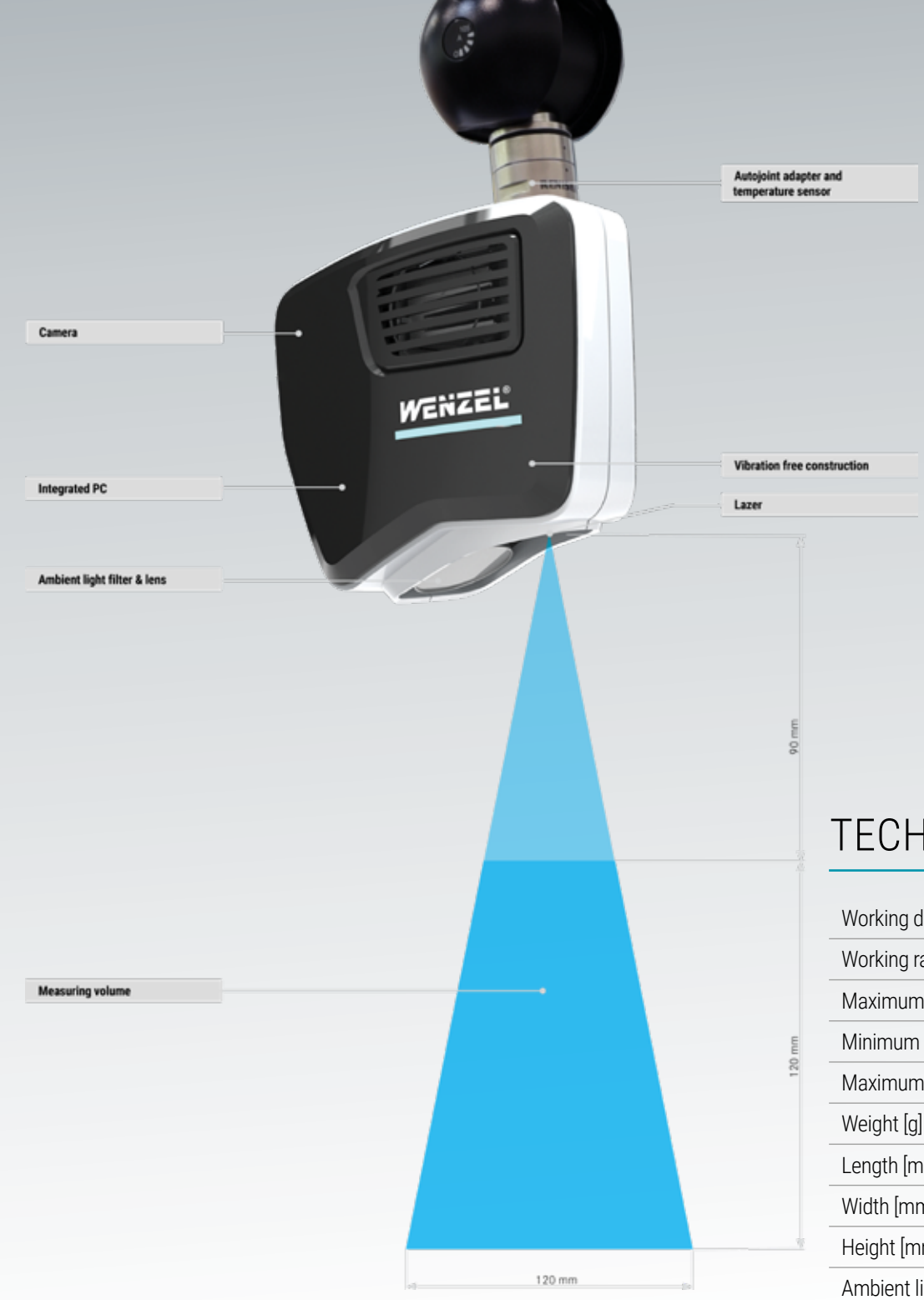
FEATURES

- **Automatically replaceable** with Autojoint adapter
- **Optimized line width**
- **Low unit weight**, enabling use on various turning and swivel heads, e.g. PH10, etc.
- **Fast reverse engineering** possible
- **Fast detection** of surfaces
- **Can be used for various materials**, e.g. aluminium, sheet metal, plastics and other...
- **Different surfaces and colors** can be measured
- **Virtually independent of ambient light** due to ambient light filter

APPLICATION AREAS

The 3D line scanner WM | SHAPETRACER II turns your coordinate measuring machine into the ideal tool for recording and editing point clouds. WM | SHAPETRACER II can be used in the following industrial and application areas, among others:

- Styling- and designstudios
- Tool and mould making
- Prototype construction
- Automotive industry
- Reverse Engineering
- Automation technology
- Verification and evaluation
- Nominal – actual color maps
- Digitization of design applications



TECHNICAL DATA

Working distance [mm]	approx. 80
Working range [mm]	approx. 120
Maximum line width [mm]	approx. 120
Minimum point distance [µm]	29
Maximum point rate [Pkt./s]	approx. 100
Weight [g]	495
Length [mm]	124
Width [mm]	124
Height [mm]	68
Ambient light filter	Yes

YOUR ADVANTAGES AT A GLANCE

- **High Productivity**
  Fast data transmission | Hardly any surface pretreatment necessary | Large measuring range
- **Low operating costs**
  Integrated in the WENZEL software family | Fast and reliable spare parts availability | Can be retrofitted to existing systems
- **High flexibility**
  Renishaw probe changer | Independent use of tactile and optical sensors | Independent use of tactile and optical sensors | Compatible with tactile sensors from Renishaw
- **Ergonomic design**
  Simple operation | Maintenance-friendly | Aesthetic design

WM | LS 70

MULTIFUNCTIONAL WITH IMPRESIVE PERFORMANCE

The WENZEL WM | LS 70 was developed for use in many different applications. It can be used on the mobile measuring arm WM | MMA as well as on a WENZEL CMM. The WM | LS 70 enables the user to make accurate and fast measurements.
By using a blue laser it is possible to measure reflective surfaces as well as workpieces with dark surfaces. The WM | LS 70 also has an adapter for mounting of Renishaw's TP20 probe and can therefore measure both optically and tactilely almost simultaneously. The WM | Quartis measuring software can be used on both the CMM and the measuring arm, thus all functions are available through the user-friendly user interface familiar to the user.

FEATURES

- **Automatically replaceable** by Autojoint adapter
- **Optimized line width** of max. 70 mm
- **Low own weight**, therefore also applicable on different probe heads, e.g. PH10, and many more
- **Many application possibilities** - CMM and measuring arm
- **Optical & tactile measurement** almost simultaneously
- **Can be used for various materials**, e.g. aluminium, sheet metal, plastics and many more.
- **Laser class 2M - blue** enables measurement of high-gloss or extremely dark components

APPLICATION AREAS

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

- Styling and design studios
- Tool and mould making
- Prototype construction
- Automotive industry
- Reverse Engineering
- Automation technology
- Verification and evaluation
- Nominal - actual color maps
- -Digitization of design applications

YOUR ADVANTAGES AT A GLANCE

- **High Productivity**
  250,000 pts/sec. | Accuracy of 10 µm | Optimized line width
- **Low operating costs**
  Integrated in the WENZEL software family | Fast and reliable availability of spare parts | Easy to retrofit to existing systems
- **Ergonomic design**
  Simple operation | Maintenance-friendly | Aesthetic design
- **High flexibility**
  Use on WM | MMA measuring arm and CMMs | Compatible with Renishaw tactile probes in changer | Scanning of different surfaces

WENZEL METROLOGY SOFTWARE SOLUTIONS

The fundamental idea is that we can offer software solutions from WENZEL for all machines and applications that offer the same operating strategies but cover specialist functional scopes. The importance of software in machine engineering has also increased dramatically over the last few years. We recognized this many years ago and with the takeover of Metromec AG in Switzerland, we have established an in-house development center for our core software. At the Swiss site and other sites, around 50 employees are working on our solutions that are installed at several thousand workstations. It is not just the importance of software that is continually changing, so too are the type and intensity of use. Depending on the choice of machine, we offer the ideal software solution from our portfolio for every machine. However, customers now combine different measuring tasks on different machines, they also want toothed gears or turbine blades on classic coordinate measuring machines or they switch between 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 build up (see figure).

- The basics – WM | Kernel
- The all-rounder – WM | Quartis
- The skyscraper – WM | PointMaster
- The construction kit – WM | Software Module

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.

The basics – our WM | Kernel

The WM | Kernel is delivered in the background with all our solutions. The drivers to connect the probes and sensors as well as the different machine types are plugged into it. Via the I++ interfaces, numerous third-party products can also be integrated into the WENZEL landscape.

The all-rounder – our WM | Quartis

The new version of our flagship – WM | Quartis is presented in detail in this edition of the General catalogue. Even at first glance, it is clear that there is a significant difference. The interface now follows the new Group-wide style guide and has a fresh, modern design.

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.

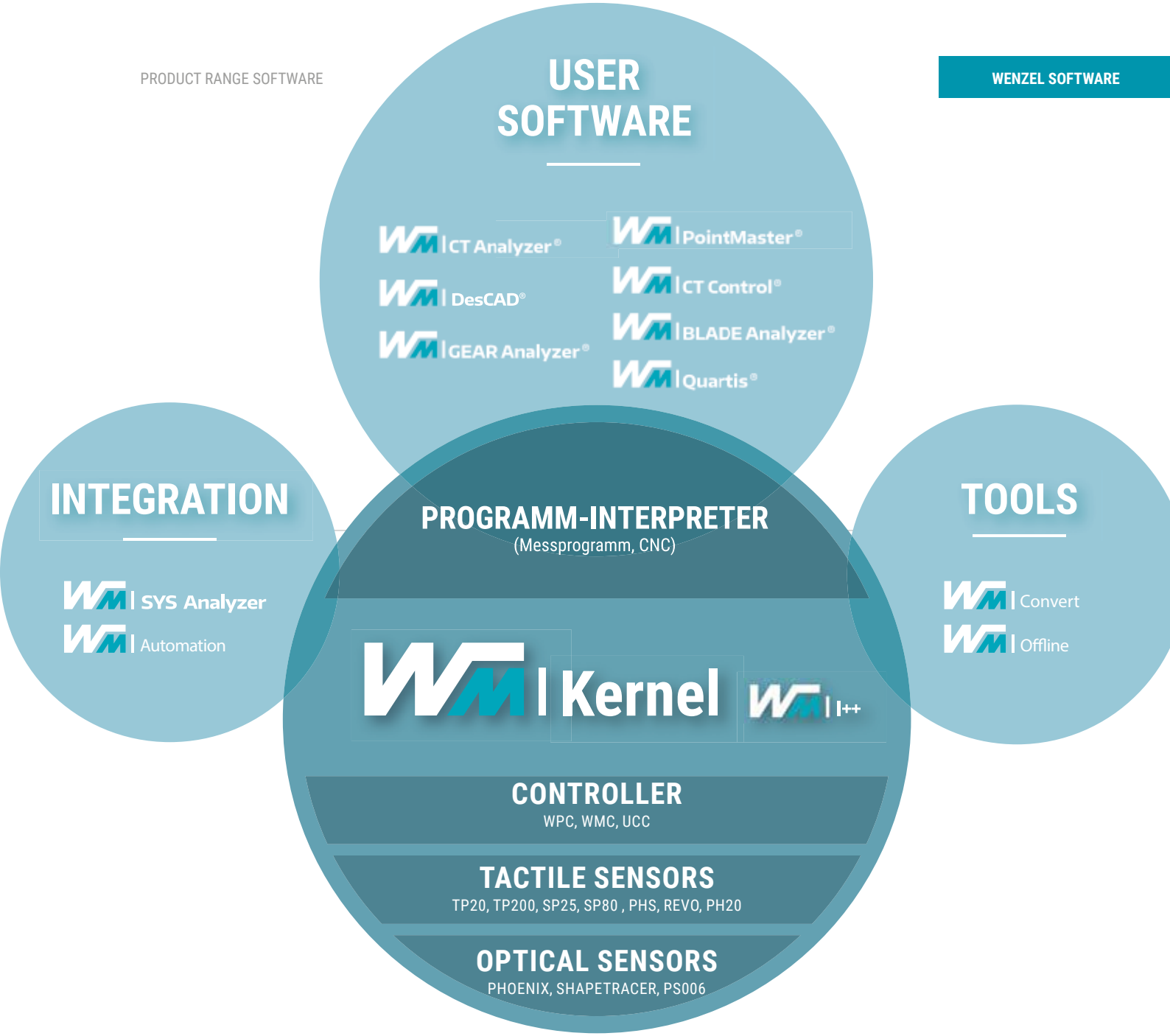
Furthermore, WM | PointMaster forms the basis for our special solutions in computed topography and styling.

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.



The modular system - WM | Software modules for various applications

The specialist - our WM | PointMaster for CT

WENZEL's CT control and reconstruction software, specially developed for industrial use, guarantees high precision, a fast scan time and the exact calculation of 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 compensation of shrinkage and warpage are possible within a very short time.

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

Demand for evaluating gear wheels have increased dramatically. The WM | GEAR Analyzer solution that is based upon the open GDE standard offers the customer considerably more opportunities for analyzing and visualizing the 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. Different Best Fit algorithms, for the determination of the blade section position, as well as the evaluation of shroud-tip and root dimensions.

WM | Quartis

AUTOMATED MEASUREMENT & EVALUATION

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.

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**

HIGHLIGHTS

Universal measuring software

One solution for all task

One software for measuring and evaluating geometry, freeform and curves. WM | Quartis supports manual and CNC measuring machines with tactile and optical sensors. Renishaw REVO and PH20 5-axis probes increase measurement throughput and allow roughness measurement. Efficient creation of measuring programs as well as intuitive teach-in offline and directly at the coordinate measuring machine. Numerous direct interfaces for various measuring machines, but also a universal, manufacturer-neutral measuring device interface (I++ DME). Form and position characteristics can be evaluated according to the latest ISO GPS and ASME standards.

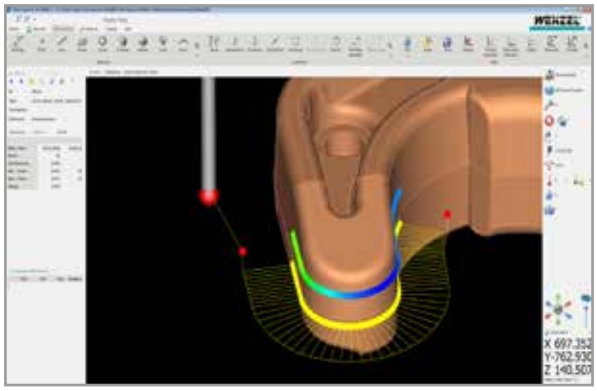
WM | Quartis the universal measuring software

User interface

Suitable for every task

The easy-to-use, task-oriented and individually configurable graphical user interface is suitable for every measuring task. The measuring programs can be started quickly and easily with just one click via the quick selection panel or by 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

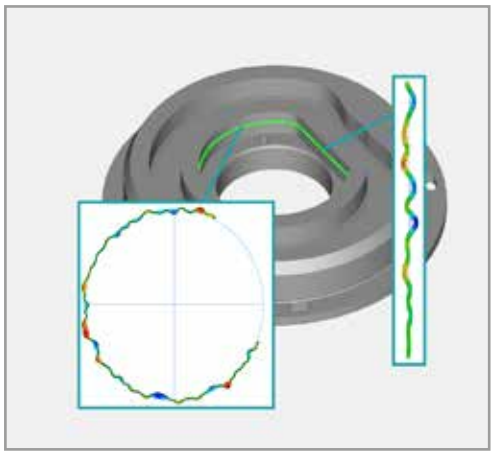


Measure and evaluate curves

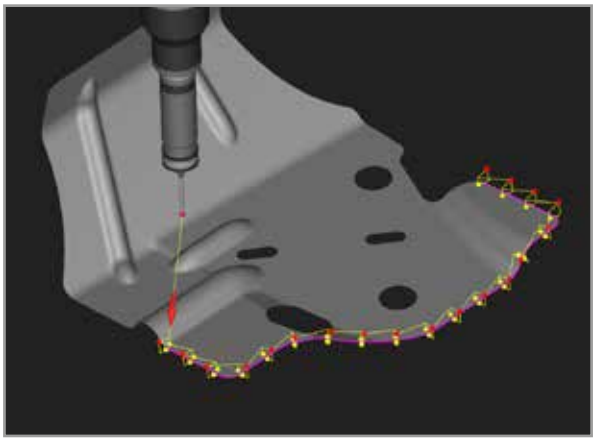
Measurements

Complete tasks smartly, efficiently and quickly

WM | Quartis measures geometric components, freeform 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.

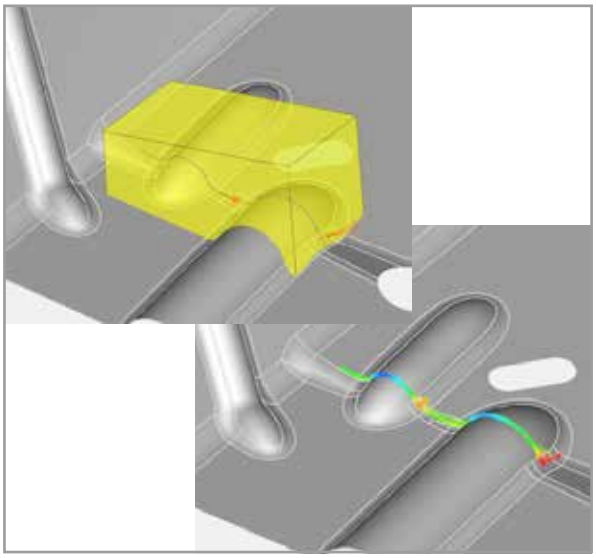


Measure and evaluate curves. The "Extract" construction function generates circles and straight lines from measured curves

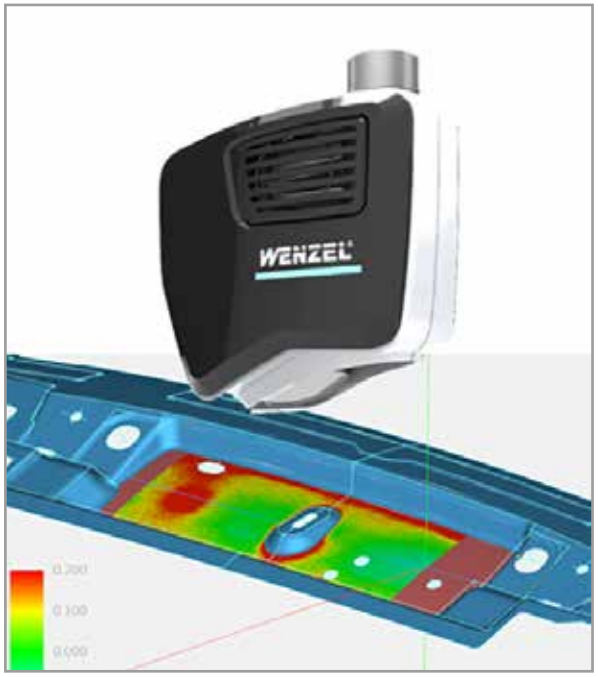


Measuring and evaluating edge points

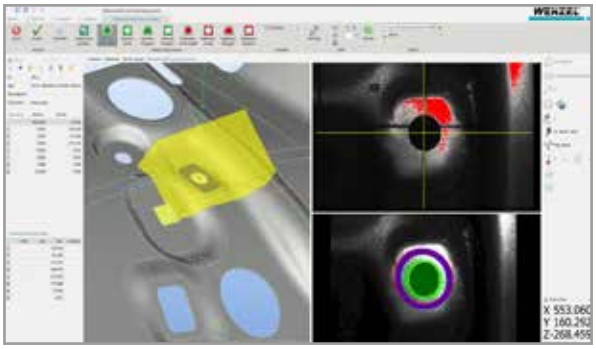
WM | Quartis supports manual and CNC measuring machines with tactile (touching) and optical (non-contact) sensors and is therefore predestined for automated multi-sensor applications. Scanning with high point density allows the acquisition and evaluation of surface shape tolerances as well as the color-coded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



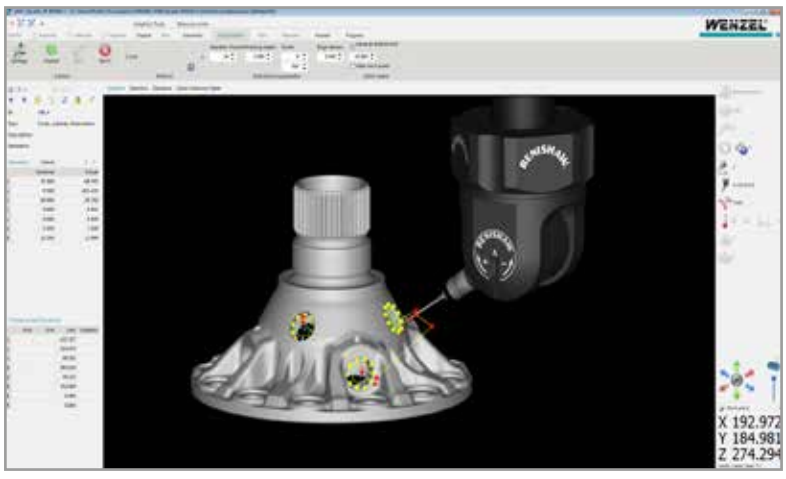
Profiles can be captured and evaluated with one image



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



Non-contact measurement with optical sensors



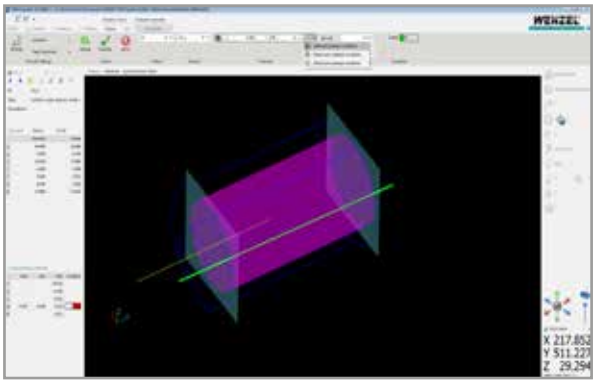
5-axis probes such as PH20 significantly increase measurement throughput

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.

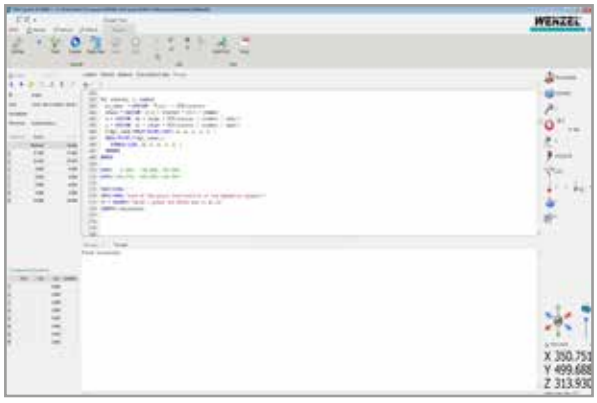
Evaluation

Determine characteristics according to standards

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

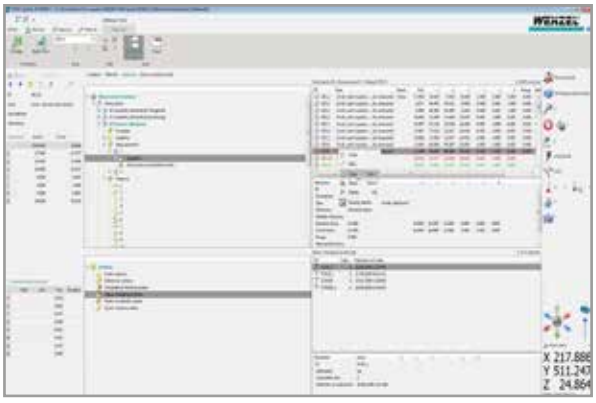
Intuitive and flexible

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

Secure, clear and structured

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.

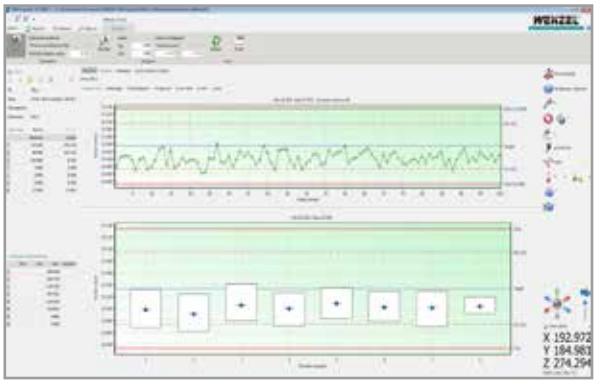


Secure, clear and structured data management

Statistic

Keeping the process under control

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.

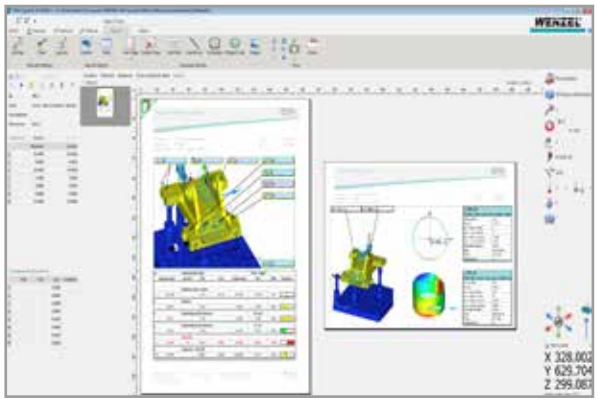


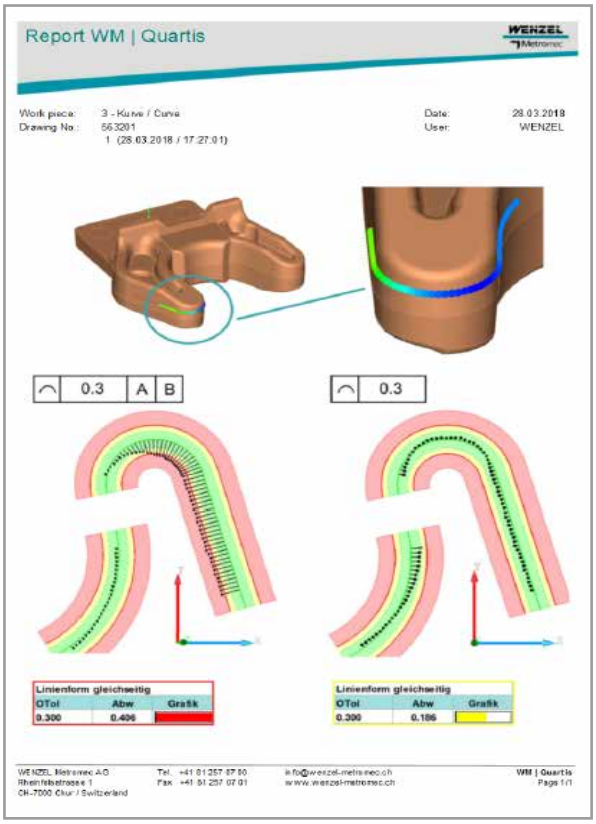
All important characteristic values at a glance with the built-in statistics

Impressive, vivid measurement reports

The results at a glance

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®).



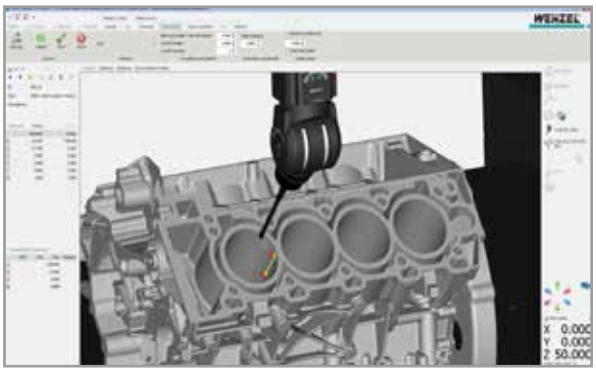


Geometry and freeform, graphics and tables can be displayed quickly and easily in a meaningful measurement report

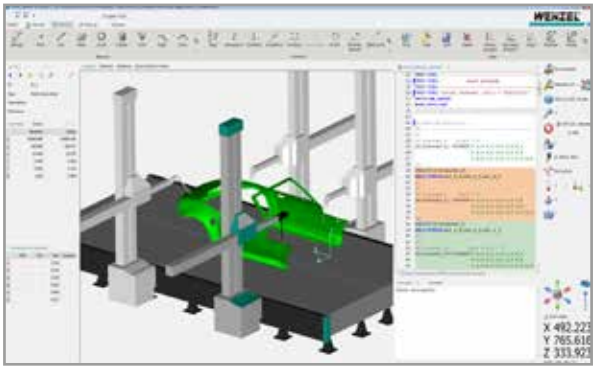
Special applications

Get the most out of your measurement software

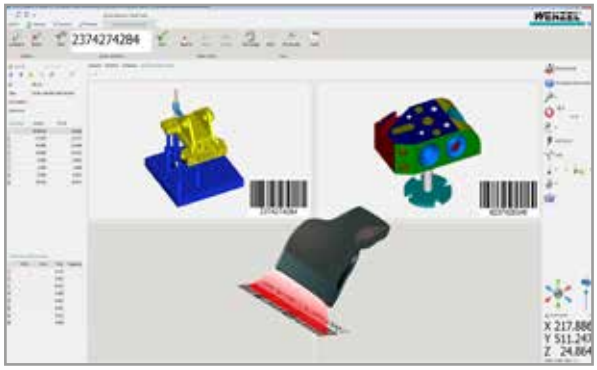
- Measure and evaluate roughness with Renishaw REVO
- Use of third-party measurement software via WM | I++ DME Server based on WM | Quartis
- Virtual measurement on actual data from Computertomographs and optical scanners using WM | CTAnalyzer and WM | PointMaster
- Multi-column systems can be operated 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



Measure roughness with Renishaw REVO SFP2 roughness sensor



Multi-device operation with up to 8 measuring devices



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

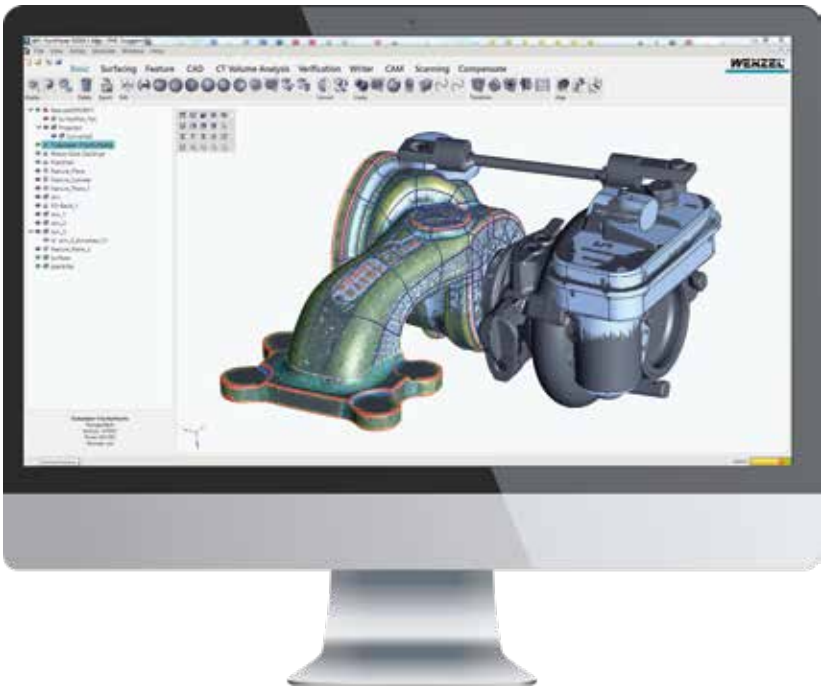
THE ALL-ROUNDER FOR SCAN DATA PROCESSING

The processing of optical and tactile measured data is an indispensable and efficient element in the development and manufacturing process in many industrial sectors and applications, such as tool and mould making and in quality control. WM | PointMaster primarily supports users in the further processing of point clouds and polymer meshes right up to the reverse engineering process and quality control. The innovative processes and process chains are based on the WM | PointMaster geometry kernel and ensure excellent data quality and outstanding machining processes.

Precise digital 3D models

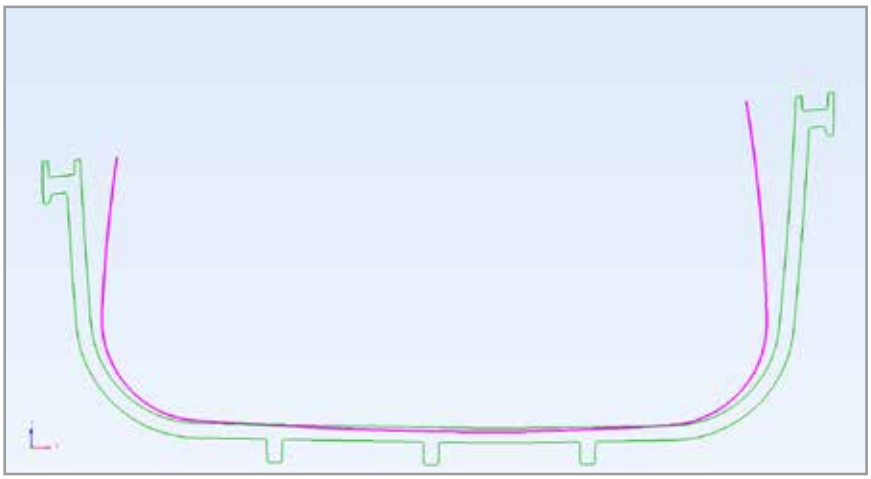
Whenever it comes to converting existing components of physical objects into virtual data by scanning, we recommend our WM I PointMaster. You will receive digital 3D models for industrial design, construction, medical technology, mold and tool making and manufacturing quickly and precisely. Modeling complex and detailed organic shapes, as well as modeling based on regular geometry bodies, is effortless with our industry-leading, powerful tools.

Compensation surfaces for a new tool shape that have been reconstructed with the WM | PointMaster



New Compensation Module

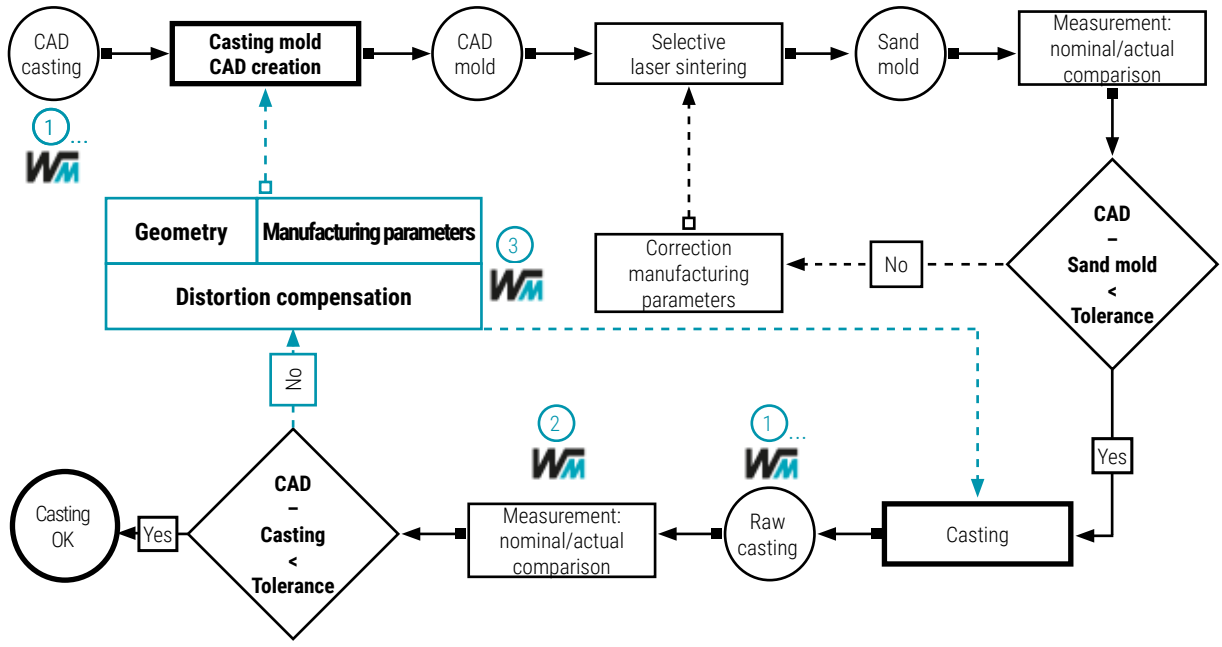
With WM I PointMaster, almost all existing geometric types can be processed. Due to this enormous flexibility, the WM | PointMaster offers, in addition to the geometric reconstruction of scanned components, analysis methods such as the comparison of scanned components (actual data) with CAD data (nominal data). The measured deviations are displayed in a so-called deviation color map. In addition, with WM I PointMaster we also offer complex process-leading applications, such as a comparison of actual data with nominal data, which is used to control conversion and original forming processes



Comparison of the nominal contour (green) with the scanned actual contour (red) of a component whose mold form was not compensated for shrinkage and distortion

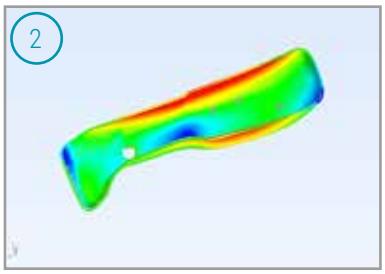
Analysis and process control in tool and mould construction

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).



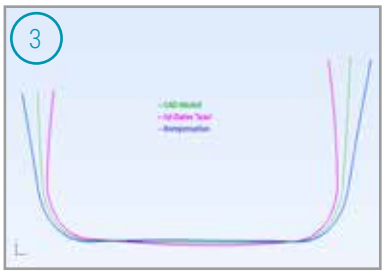
Alignment of actual- to nominal component

Analysis of the actual component



by nominal/actual comparison

Compensation strategy

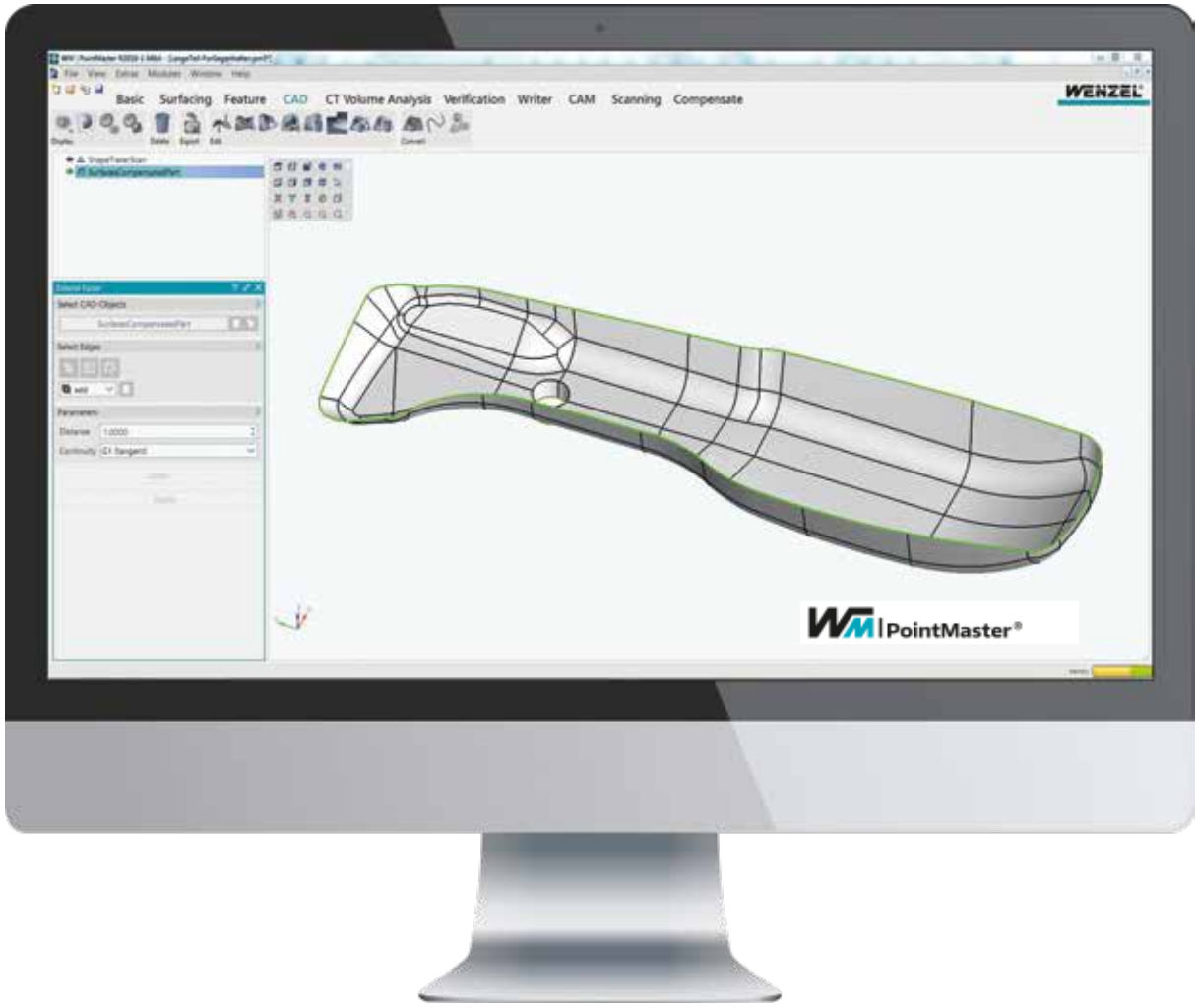


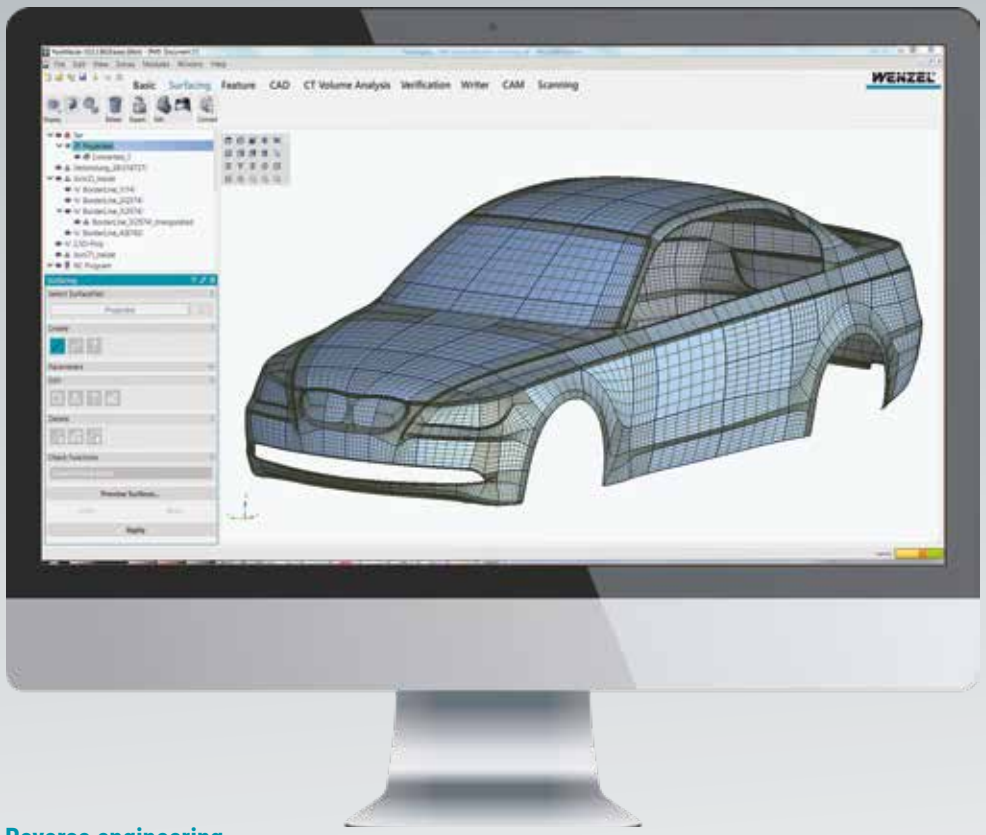
represented by sections

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

Fully automatic calculation of warping results

After the demoulding of plastic parts, a deformation occurs due to shrinkage and distortion of the plastic component. This deformation is usually compensated in the injection mould by the shaping, so that the plastic part is first shaped into a "wrong" shape. After the plastic has cooled down, the component is then deformed back into the desired shape due to shrinkage and distortion in order to correspond as closely as possible to the nominal shape. The traditional compensation of the tool geometry is carried out by iterative post-processing (milling, grinding or eroding) of a new or existing tool shape. This post-processing is associated with immense effort and ultimately leads to the fact that the mould insert can often no longer be used. In virtual deformation, on the other hand, the deformation specifications are derived from simulation systems or measurement results of actually scanned components. This enables WM | PointMaster to calculate the deformation result fully automatically. Factors such as local volumes, shrinkage and the experience of toolmakers are taken into account. The fully automatically calculated distortion-compensated geometry is then converted into CAD surface models using the powerful reverse engineering functionality of WM | PointMaster and entered into the existing tool data.

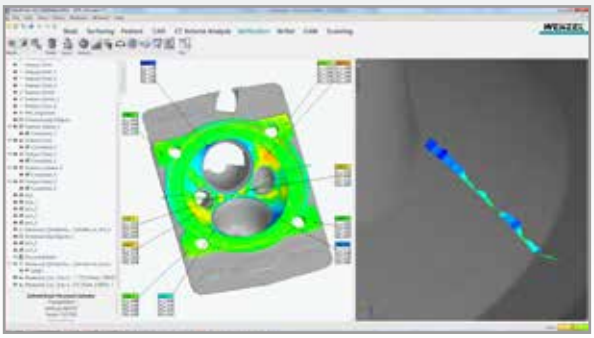




Windows 10 Compatible

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 touch 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 the measuring software.

YOUR ADVANTAGES AT A GLANCE

- **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 the WM | Gear Analyzer is the innovative software package for data acquisition, measurement and evaluation of involute gears with coordinate measuring machines. Users can use the extensive possibilities of the measuring software WM | Use Quartis without additional training effort (e.g. probe management, calibration of probes, determination of the workpiece position and determination of the rotary table system). Communication between WM | Gear and WM | Gear Analyzer is based on the open GDE standard (VDI / VDE Guideline 2610).

APPLICATION EXAMPLES

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

Gears

Bearings and clutches

Shafts and axles

HIGHLIGHTS

Profile inspection

Extensive parameterization of the measuring tasks. All common profile characteristics can be determined. Profile testing on any number of teeth possible. Several profile inspections on one tooth possible. Profile corrections can be selected separately for each measuring position (convexity, head/foot relief, nominal inclination, K-template, design profile).

Flank line testing

Extensive parameterization of the measuring tasks. All common edge line characteristics can be determined. Flank line inspection on any number of teeth possible. Several flank line inspections on one tooth possible. Flank corrections can be selected for each measuring position (crowning, end relief, nominal inclination, K-template, design flank).

Pitch and concentricity inspection

Extensive parameterization of the measuring tasks. All common pitch and concentricity characteristics can be determined. Up to three pitch tests at different tooth positions possible. Eccentric-corrected evaluation possible.

Division inspection & absolute dimensions

Determination of absolute dimensions

The following features are possible at up to three different tooth positions:
Diameter of tip circle
Base circle diameter
•Ball dimension
•Two-ball dimension
•Single roll dimension
•Double roll dimension
•Tooth width
•Tooth thickness

YOUR ADVANTAGES AT A GLANCE

- **User-friendly data management**
  Input of geometry data, measuring tasks, evaluation regulations and tolerances | Any number of workpieces can be saved | Import / export of gear data
- **Extensive evaluation possibilities**
  Support of recognized standards | Free tolerances for each feature possible | Transparent filter configuration | Company standards possible on request
- **Interactive measurement sheet display**
  Over-height automatic / fix | Stretching automatic / fix | mm / inch switching | Subsequent modification of the measurement sheet form | Temporary switching of the output language | Archiving of measurement results in PDF format | Coupling to statistical system possible
- **High flexibility**
  Fully automatic measuring sequence | Evaluation and presentation parameters can be modified subsequently | Manufacturer-independent evaluation of measurement results | CNC traversing polyhedron

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.

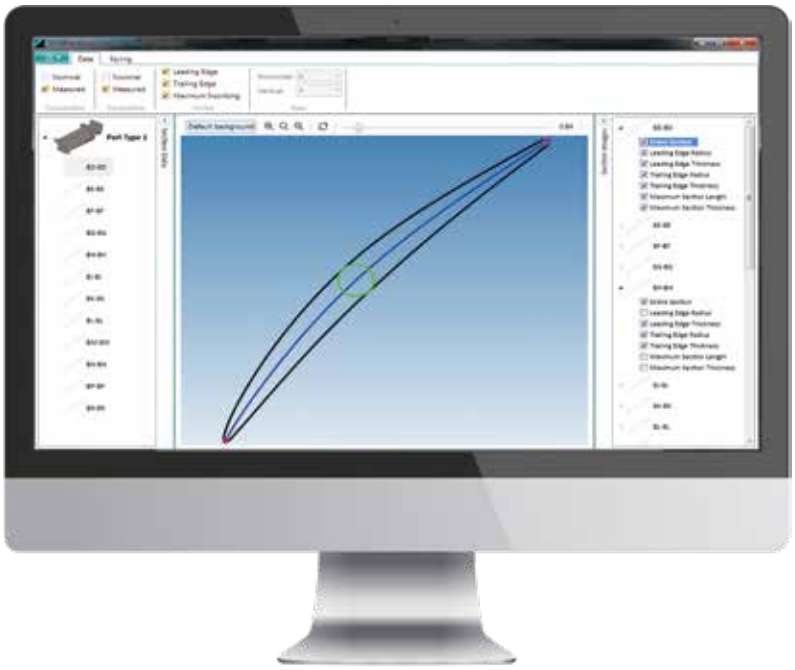
the software supports standard parameters such as

- Maximum thickness
- Entry and exit edge radius
- Edge thickness
- Blade length
- Blade angle

Defined elements can be freely placed on the measurement report

Analyses according to various manufacturer standards (GE, Safran, Royce Rolls, Pratt & Whitney). Different Best Fit algorithms for determining the blade position are just as much a part of the scope of services as the evaluation of tip and root dimensions.
A defined workflow makes it easier 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 like vda, iges, csv and xml are supported. In addition to manual use by an operator, the software can also be automated by command line parameters. The data can be stored in various formats for statistical recording of the results.

Different views can be defined in the designer




WENZEL
ProFeeder
Robotics.dk

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

VERSIONS

	Monitoring	Operations	Analytics
Max. Number of users (simultaneous)	1	3	unlimited
Machine status	++	++	+++
Error status	+	++	+++
Machine use spatially	0	+	++
Measurement program information	0	+	++
Service information	+	++	+++

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

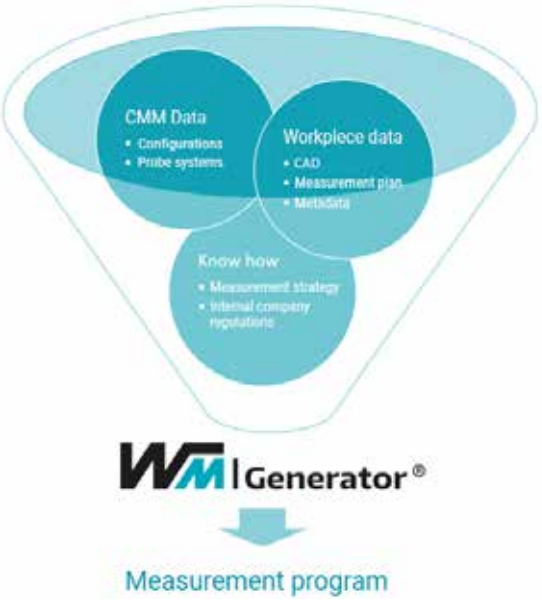
YOUR ADVANTAGES AT A GLANCE

- **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

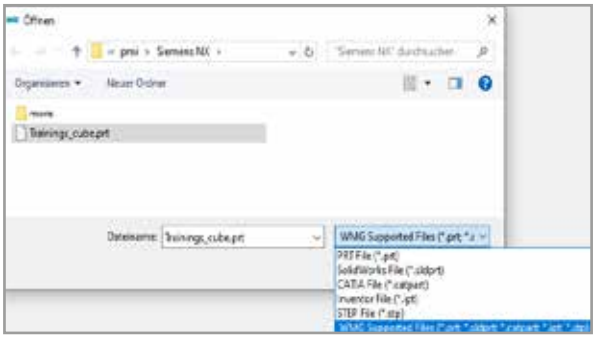
The WM | Generator is used to automatically generate measuring programs from measuring plans. The WM | Generator is still a very visionary product in the early stages of development. It will still take years until the CAD-models contain the corresponding information all over the country, but WENZEL is on the topic. The WM | Generator is being developed for customers who want to reduce the effort of generating measuring programs. Initially, the focus is on tactile, touch trigger probe systems with PH10 in combination with CAD models that contain measurement plans in the form of semantic PMIs. Other technologies - and other measurement plan formats - will also be supported later. At the trade fair Control 2019 we presented a Proof of Concept of the WM | Generator.



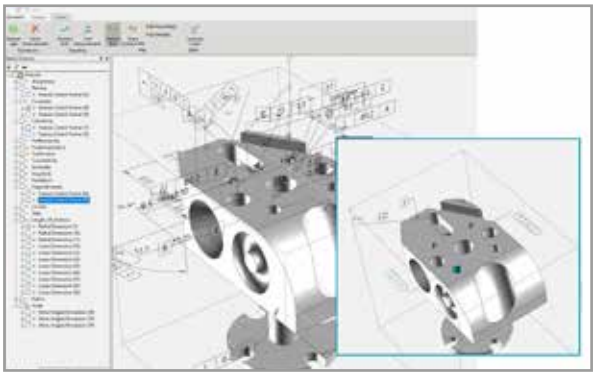
FEATURES

Import various CAD formats, including their semantic PMIs

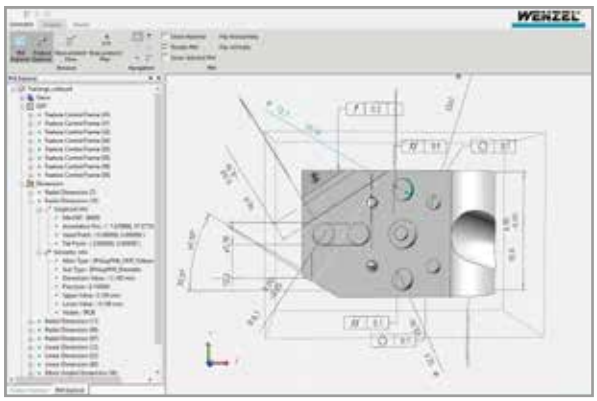
- Siemens NX
- CATIA V5
- Inventor
- SolidWorks
- STEP AP242



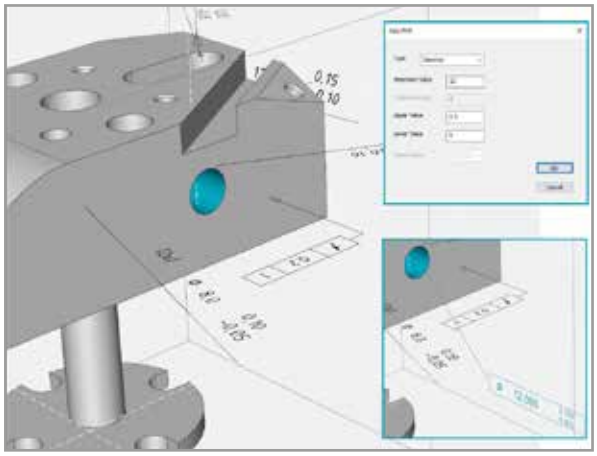
- Create measuring program with few user interventions
- View original PMI data in the PMI Explorer
- Keep the overview by optionally displaying only selected PMI in the graphic.
- Add Missing Tolerances in Feature Explorer / Add Incomplete Tolerances
- Calculate time-optimized, collision-free measuring sequence



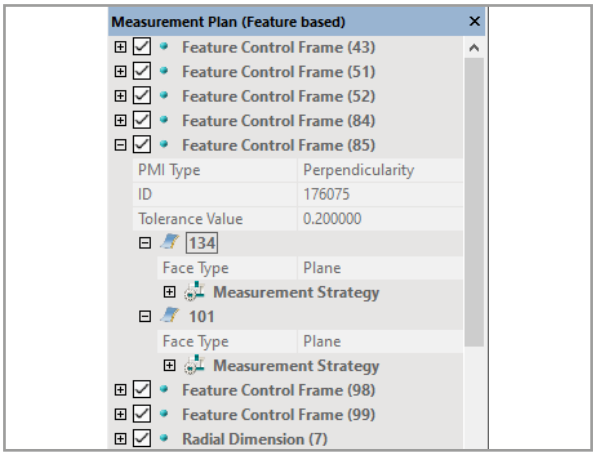
FUNCTION



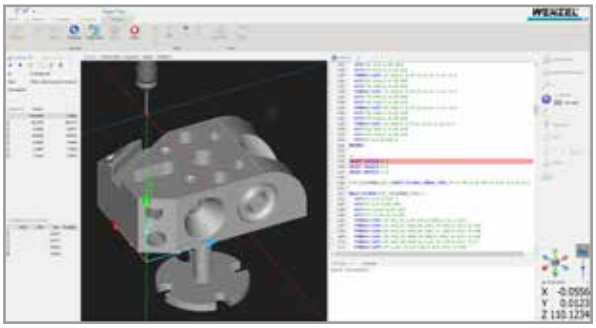
When importing the CAD model, not only the CAD data but also the semantic PMI are converted.



If necessary, PMI can still be added or edited.



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



Based on the measurement plan, the measurement procedure is calculated, which represents the preliminary stage for program generation. From the measurement plan, the WM | Generator generates the measurement program, which can be executed in WM | Quartis..

YOUR ADVANTAGES AT A GLANCE

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

WQP – WENZEL QUALIFICATION PROGRAM
WENZEL IGNITES THE NEXT STAGE

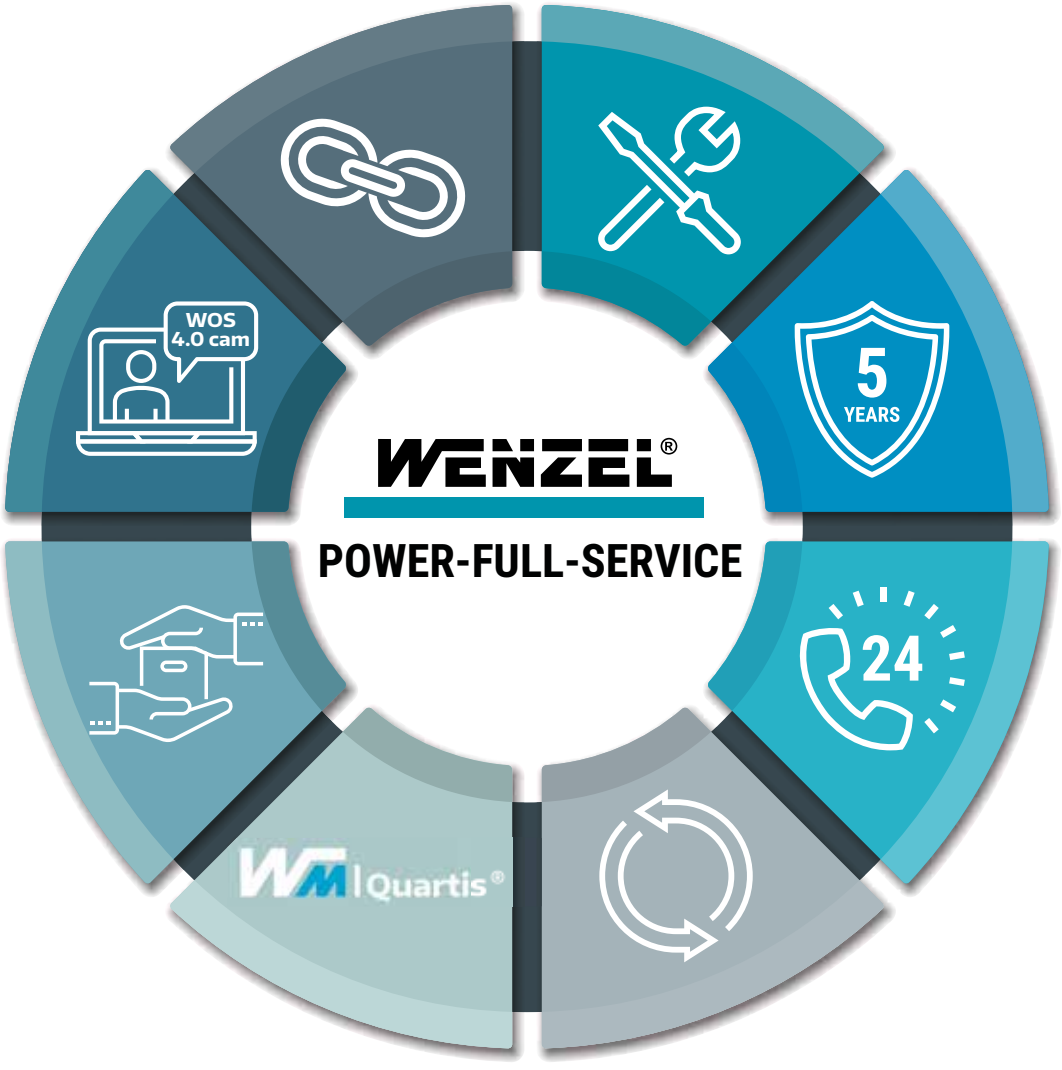
After the introduction of a qualification program in 2016, the existing program will be expanded to include the area of application technology and given a new name. With the WENZEL Qualification Program (WQP) WENZEL implements a worldwide qualification program. This is in line with rising customer expectations for application technology and after-sales service. With the WQP, WENZEL guarantees a worldwide uniform standard at the highest level. WENZEL thus ensures that training courses and technical application support as well as the execution of work, repairs and corrections of your measuring machines are carried out by trained and qualified personnel.

In a strict examination process WENZEL partners certify themselves for the duration of 36 months for the WQP. For each WENZEL product line, a certificate will need to be acquired. This applies to portal, horizontal arm, optical high-speed scanning systems and computer tomographs. The evaluation covers a whole range of different criteria such as the qualification of service and application technicians, tools and information technologies used, and business processes. For each criterion, 5 to 20 subheadings are evaluated. In addition, the options for training courses and demonstrations of WENZEL products are evaluated and included in the evaluation. "The focus of the WQP is on qualified employees", explains Karl Nagel, Head of the Service & Application Center at WENZEL. "The acquisition of certification is a continuous expansion of the WENZEL network and thus an investment in the future". The participants of the qualification program have appropriate demo machines as well as hardware and software tools to ensure the regional support of the machines.

ALL-ROUND CAREFREE SERVICE PACKAGES FOR CMMs
WENZEL SERVICE CONTRACTS & SERVICE 4.0

Wiesthal - WENZEL Group GmbH & Co KG offers as a manufacturer of measuring machines with its portfolio of different service contracts a variety of options from which customers can choose the best solution for them.

In addition to traditional maintenance and software maintenance contracts, customers are offered further contract models tailored to their needs. The aim is to offer the most attractive service package possible, which exactly matches the requirements profile of each customer. For this there are different models among other things for the extension of the manufacturer warranty of the machine, as well as the Premium product; the WENZEL Full Service 4.0. Full service, the outstanding performance promise, includes all services such as preventive maintenance, calibrations and repairs. The Full Service 100% manufacturer warranty includes original spare and wear parts, the controller, the measuring computer, the control panel as well as the measuring system. Only pushbuttons are excluded. In addition, the delivery of the latest release of the



- MAINTENANCE / CALIBRATION
- SOFTWARE SUPPORT
- GUARANTEE EXPANSION / FULL-SERVICE
- WENZEL TOP INSURANCE
- WENZEL HOTLINE
- WENZEL ONLINE SERVICE (WOS 4.0)
- EXCHANGE SERVICE
- WM | SYS ANALYZER®

WM | QUARTIS measurement software is included, if desired. The Full Service Package has a duration of 3 to 7 years and offers an extended range of services with guaranteed response time, extended on-call service and the WENZEL Online Service.

Maximum availability at an attractive price

"With the individually coordinated Full Service WENZEL takes over the cost risk and the maintenance planning", explains Karl Nagel, head of the Service & Application Center at WENZEL. In addition to absolute cost transparency and easy budgeting over the entire life of the machine, maximum machine availability is guaranteed and preventive maintenance can be easily planned. "Our customers can concentrate fully on their core business and transfer the responsibility for the operational readiness of their measuring machine to WENZEL", Nagel adds. In addition to the full service contract WENZEL offers flexible leasing models and thus a whole bundle of supplementary services, which represent a clear added value for the customer. Leasing secures liquidity and financial independence and, as an off-balance-sheet instrument, can increase the scope for financing. This creates planning security and competitive advantages.

The customer has full investment security and costs that are manageable and calculable in the long term. "Our quotations are calculated in such a way that the customer spends significantly less compared to individual orders. He can even save a lot compared to our service contract models", Karl Nagel is sure.

The WENZEL Full Service 4.0 is offered in Germany for tactile and scanning WENZEL portal measuring machines of the series XO and LH up to size 1210 (X=1200 mm, Y=1000 mm). The SF 55 and SF 87 machines, for production-related applications, are a particular focus here, as customers are particularly dependent on these machines due to their direct connection to production output.

OUR LOCATIONS

THINK GLOBALLY, ACT LOCALLY -
THAT'S WENZEL.

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INNOVATION MEETS TRADITION

The WENZEL Group is a market leader in innovative Metrology. WENZEL offers a comprehensive product portfolio in the fields of Coordinate Metrology, Computed Tomography and Optical High Speed Scanning. The technology of WENZEL is used in all industries, including the automotive sector, aeronautics, power generation and medicine. WENZEL looks at today on an installed base of more than 10,000 machines worldwide. Subsidiaries and agencies in more than 50 countries support sales and provide after-sales service for our customers. The WENZEL Group today employs more than 600 people.

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