FIRST-CLASS CMMs

WENZEL CMMs

Precision that pays off

PRODUCT RANGE
COORDINATE MEASUREMENT METROLOGY
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
VERSATILE APPLICATIONS

OUR APPLICATIONS

The success of our CMM series is based above all on a coherent overall concept and unconditional perfection in detail. The principle behind the success of this series is mechanical accuracy and top mechanical engineering. The machines of the XO series are the ideal entry-level models for coordinate measuring technology. They combine speed, straightforward operation and an excellent price-performance ratio. The bridge machines of the LH series have air bearing guide elements in all axes which ensure wear-free and smooth operation. The roller-bearing horizontal arm measuring machines of the R series offer a large measuring volume and perfect accessibility from all sides. Both types of design ensure a maximum of flexibility and dynamics.

High precision and user-friendly operation, all rounded off by an intelligent service package - WENZEL thinks ahead. The machines can be equipped with a variety of swivel head and stylus combinations, from rigid heads to motorized rotary heads, from simple probes to high-precision measuring probe systems.

The optimal solution for every measuring task!

OUR PRODUCT LINES

OUR FOCUS INDUSTRIES

TYPICAL BUSINESS AREAS

Quality assurance
Product development
Surface testing
Prototype creation
First article inspection
Fabrication

TYPICAL APPLICATION AREAS

Mechanical engineering
Automobile manufacturers and suppliers
Aerospace
Foundry technology
Metal and plastics processing industry
Medical technology
Mold and tool making
Electrical engineering/electronics
Inspection services
Research and Science
...and many more
WENZEL SOLUTION FINDER
THE RIGHT SOLUTION FOR EVERY TASK

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

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

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

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

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

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

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

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

*depending on the material of the component*
WENZEL SOLUTION FINDER
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<table>
<thead>
<tr>
<th>PART SIZE</th>
<th>LOCATION</th>
<th>ACCURACY</th>
<th>APPLICATION</th>
<th>MOBILITY</th>
<th>SPEED</th>
<th>FINANCES</th>
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<td>NDT + defect</td>
<td>Low</td>
<td>Medium</td>
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<td>Measuring room</td>
<td>Very high</td>
<td>Non-destructive testing</td>
<td>High</td>
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<td>Medium</td>
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<tr>
<td>Large</td>
<td>Production</td>
<td>High</td>
<td>Defect detection</td>
<td>Very high</td>
<td>Very high</td>
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PRODUCT RANGE CMM
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</table>
BRIDGE MEASURING MACHINES
PRECISION THAT PAYS OFF
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
<table>
<thead>
<tr>
<th>ACCURACY</th>
<th>GENAUIGKEIT [µm]</th>
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<td>XO 87</td>
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<td>1,0 + L/400</td>
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<td>1</td>
<td>1,2 + L/350</td>
<td>1,5 + L/350</td>
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<tr>
<td>2</td>
<td>2,0 + L/300</td>
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<td>3</td>
<td>0,8 + L/450</td>
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<td>LH 108</td>
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<td>LH 1512</td>
<td>1.2 + L/400</td>
</tr>
<tr>
<td>LH 2015</td>
<td>1.4 + L/350</td>
</tr>
</tbody>
</table>

**CMM Product Range**
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
CMM Accuracy Classes

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

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

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

YOUR ENTRY INTO COORDINATE METROLOGY

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

<table>
<thead>
<tr>
<th>Typ</th>
<th>Measuring ranges X x Y x Z (mm)</th>
<th>Volumetric length measuring uncertainty $E_{V, MPE}$ (μm)</th>
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</thead>
<tbody>
<tr>
<td>XO 55</td>
<td>500 x 500/700/1000 x 500</td>
<td>1,5 + L / 350</td>
</tr>
<tr>
<td>XO 87</td>
<td>800 x 1000/1500 x 700</td>
<td>1,6 + L / 350</td>
</tr>
<tr>
<td>XO 107</td>
<td>1000 x 1500/2000 x 700</td>
<td>1,8 + L / 350</td>
</tr>
</tbody>
</table>

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

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.
MEASURING ACCURACY

<table>
<thead>
<tr>
<th>Type</th>
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<tbody>
<tr>
<td>LH 65</td>
<td>650 x 750/1200 x 500</td>
<td>0.8 + L / 450</td>
</tr>
<tr>
<td>LH 87</td>
<td>800 x 1000/1500/2000 x 700</td>
<td>0.8 + L / 450</td>
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<tr>
<td>LH 108</td>
<td>1000 x 1200/1600/2000/3000 x 800</td>
<td>1.0 + L / 450</td>
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<td>LH 1210</td>
<td>1200 x 1600/2000/2500/3000 x 1000</td>
<td>1.9 + L / 450</td>
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<tr>
<td>LH 1512</td>
<td>1500 x 2000/2500/3000 x 1200</td>
<td>2.0 + L / 450</td>
</tr>
<tr>
<td>LH 1515*</td>
<td>1500 x 2000/3000/4000 x 1500</td>
<td>2.5 + L / 450</td>
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</tbody>
</table>

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

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.
MEASURING ACCURACY

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring ranges X x Y x Z (mm)</th>
<th>Volumetric length measuring uncertainty $E_{\text{MPE}}$ (µm)</th>
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</thead>
<tbody>
<tr>
<td>LH 2015</td>
<td>2000 x 3000/4000/5000 x 1500</td>
<td>2.8 + L / 450</td>
</tr>
<tr>
<td>LH 2317</td>
<td>2300 x 4000/5000/6000 x 1750</td>
<td>3.0 + L / 450</td>
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</table>

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

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.

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.
**MEASURING ACCURACY**

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring ranges X x Y x Z (mm)</th>
<th>Volumetric length measuring uncertainty $E_{L, MPE}$ (µm) Premium Select</th>
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<td>3000 x 4000/5000/6000 x 2000</td>
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<td>LHF 3025</td>
<td>3000 x 5000/6000 x 2500</td>
<td>5,2 + L / 400</td>
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<tr>
<td>LHF 4025</td>
<td>4000 x 5000/6000 x 2500</td>
<td>7,0 + L / 400</td>
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</table>

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

**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
SENSORS AND CHANGER RACKS

PROBE HEADS, PROBE SYSTEMS AND SCANNERS

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

**PH10T PLUS / PH10M PLUS / PH10M iQ PLUS**
Automatically indexable probe head PH10M: Fast probe 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.

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

Changer Rack FCR25
Flexible changing system for automatic changing of SP25M scanning and probe modules with 3 stations (6, 9, 12 and 15 stations possible).

Changer Rack ACR3
The ACR3 probe changing system allows automatic probe change without the need for recalibration. Although the ACR3 is a unit with four memory locations, several systems can be connected to each other in such a way that further different measuring probes and probe extensions can be accommodated in it.

MRS2 modular rack system
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.
HORIZONTAL ARM MACHINES
LARGE, FAST, PRECISE
Horizontal arm machines
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

SUITE 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.
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.
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

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MACHINE PROFILE

<table>
<thead>
<tr>
<th>Measuring volume X-axis</th>
<th>Custom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring volume Y-axis</td>
<td>up to 2100; Duplex up to 4000 mm</td>
</tr>
<tr>
<td>Measuring volume Z-axis</td>
<td>up to 3000 mm</td>
</tr>
<tr>
<td>Measurement uncertainty</td>
<td>$E_{L,MPE}$ from $15+L/45 \leq 50$ ($\mu$m)*</td>
</tr>
</tbody>
</table>

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

PRECISE IN DETAIL

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

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

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

Scale located underneath the arm
- Protected against contamination
**Guide system X**
- Developed using high technology FEM methods
- Distortion-stiff X-axis
- Enclosed guideway protections from dirt and dust.

**Drive unit**
- "Toothed drive belt drive, low-maintenance"
- Ergonomic for manual operation
- Stress-free operation

**Pneumatically disengageable drives**
- Eliminate undesired heat sources

**Gekapselte Linearführungen**
- Hohe Führungsgenauigkeit
- Geringe Schmutzempfindlichkeit
- Hohe Lebensdauer
- Geringer Wartungsaufwand

**Controller und PC**
- Kompakte Bauweise durch integriertes System (optional)
WENZEL RA SERIES

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

A characteristic feature of the RA series is the floor-level base plate, into which the guide system is integrated. Due to this design, the coordinate measuring machine can easily be equipped with large and heavy components such as complete vehicles. Whether as a single boom machine, as a duplex or multi-column system with integrated underfloor measuring device - RA measuring devices deliver the desired results precisely, reliably and quickly.

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.
**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

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**MACHINE PROFILE**

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

PRECISE IN DETAIL

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

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

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

Pneumatically disengageable drives
- Eliminate undesired heat sources

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

Steel band covers
- Steel covers on the X-axis (accessible)
- Stainless steel drive bands
- Optimally self cleaning
Führungssystem Y/Z
- Rapid replacement design providing minimal down time
- Easily adjustable
- Robust guide elements

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

Scale located underneath
- Protects against contamination
WENZEL RAX Series

FAST, PRECISE MEASUREMENT OF LARGE COMPONENTS

The RAX is the 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.
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

**MACHINE PROFILE**

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<tbody>
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<td>Measuring volume Y-axis</td>
<td>up to 2000; Duplex up to 3800 mm</td>
</tr>
<tr>
<td>Measuring volume Z-axis</td>
<td>up to 4200 mm</td>
</tr>
<tr>
<td>Measurement uncertainty</td>
<td>$E_{\text{MPE}}$ from $18+L/40 \leq 60 \text{ (µm)}$</td>
</tr>
</tbody>
</table>

*Depending on machine configuration (Premium, Standard) according to current tech. Datasheets*
THE R SERIES
CUSTOMIZED SOLUTIONS

Horizontal arm machines are used for the various tasks and the different machine types can be adapted very individually to every challenge and configured customer-specific in their high variability. From different axis lengths, the number and arrangement of the individual machines, the integration into the existing infrastructure via various operating modes, different probes, sensors and changers, software modules, automation, as well as additional equipment such as lifting and rotary tables, the possibilities are almost unlimited. Whether in development, prototype construction, material handling or molding, for sampling, analysis or series monitoring automated in the line, in the measuring room or in the production environment, whether individual parts or large assemblies such as commercial vehicle bodies, our stand machines provide reliable measuring results without time-consuming preparation and reworking, even of hard-to-reach elements and undercuts, but can also be used for marking and scribing.

In addition to the classic designs as single and double column systems in table and floor-level versions, triplex systems with underfloor measuring equipment or in a triangular arrangement are used, as well as systems with several columns on one side up to long multi-column systems. Depending on type, environment and task, the systems can be installed on existing flooring, on or in a separate or specific foundation and, if required, with vibration damping. No matter what the task is.

Challenge us and benefit from our decades of experience. On the basis of our state-of-the-art products and our countless completed projects, from small businesses to large international corporations, we can advise you on the design and configuration of the system, support you in the planning, design, scheduling and project management, even beyond installation and commissioning, e.g. also for foundations, safety engineering, automation and integration into existing infrastructure and processes.
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 marking tools for all axial directions in a fast, secure and user-friendly way.

**Scribing tool**
The manual mode of operation of the R series allows the scribing of models in metalworking, mould making, tooling, tooling, etc. and design area.
**ACR2 Autochange rack**

ACR2 can store up to six probe extensions or probe adaptors. It makes a change of probe extensions or probe 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.
Software Solutions®

Process optimization

Turbine blade measurements

WM | Software Solutions
EVALUATION SYSTEMS AND ACCESSORIES
PRECISION IN DETAIL

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

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

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

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

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

Styli
Comprehensive range of styli for every application

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

For further information please contact your local WENZEL representative.
Guarantors for stable results

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

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

Service and application support - We are there for you

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

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

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

High resolution scales

Accurate positioning thanks to the optimal position measuring system technology
The LH Series is equipped with an incremental measuring system, which has very fine scale pitch, and excellent dirt immunity.

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

**THE RIGHT SOLUTION FOR EVERY TASK**

<table>
<thead>
<tr>
<th><strong>Technical Basic principle</strong></th>
<th>WM</th>
<th>Shapetracer</th>
<th>WM</th>
<th>LS 70</th>
<th>WM</th>
<th>LS 150</th>
<th>WM</th>
<th>LS 600</th>
<th>WM</th>
<th>DS &amp; WM</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line length</strong></td>
<td></td>
<td>120 mm</td>
<td></td>
<td>70 mm</td>
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<td>150 mm</td>
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<td>600 mm</td>
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<td>40 µm measuring point</td>
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<tr>
<td><strong>Resolution</strong></td>
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<tr>
<td><strong>Accuracy</strong></td>
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<td><strong>Part size</strong>*</td>
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<td><strong>Typical measuring tasks</strong></td>
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<tr>
<td><strong>Supported Software</strong></td>
<td>WM</td>
<td>Q</td>
<td>WM</td>
<td>P</td>
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<td>Q</td>
<td>WM</td>
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<td><strong>Supported machines</strong></td>
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</tbody>
</table>

* based on MPEEn-2 according to manufacturer
** available from 10/20
*** depending on cycle time & measuring speed
**** WM | MMA with accessories
***** from LH 2010
****** under development

**Basic technical principle**

- Laser Triangulation
- Striped light projection
- White light interferometer

**Resolution**

- Medium
- Accurate
- Precise

**Accuracy**

- Medium > 100 µ
- Accurate > 50 µ <
- Precise < 10 µ
<table>
<thead>
<tr>
<th>WM</th>
<th>MLS 100</th>
<th>WM</th>
<th>AS 3036**</th>
<th>Nikon LC 15 Dx</th>
<th>Nikon XC65 Dx</th>
<th>WM</th>
<th>RS-C</th>
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</thead>
<tbody>
<tr>
<td>Part size</td>
<td>100-200 mm</td>
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<td>3 lines offset by 120°</td>
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<tr>
<td>Resolution</td>
<td>Medium</td>
<td>Accurate</td>
<td>Precise</td>
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<tr>
<td>Basic technical principle</td>
<td>Laser</td>
<td>Triangulation</td>
<td>White light interferometer</td>
<td>Striped light projection</td>
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<tr>
<td>Accuracy*</td>
<td>&gt; 100 µ</td>
<td>&gt; 50 µ &lt;</td>
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</table>

### Technical Specifications

- **Line length**
  - WM | MLS 100: 120 mm
  - WM | AS 3036**: 70 mm
  - WM | MLS 200: 150 mm
  - 40 µm
- **Measuring point**
  - WM | MLS 100: 100-200 mm
  - WM | AS 3036**: 300x360 mm
  - WM | MLS 200: 18 mm
  - 3 lines offset by 120°

### Typical Measuring Tasks
- **Surfaces**
- **Features**
- **Gap and flush**

### Supported Software
- WM | Quartis
- WM | PointMaster
- Metrolog
- Polyworks
INNOVATION MEETS TRADITION

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

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