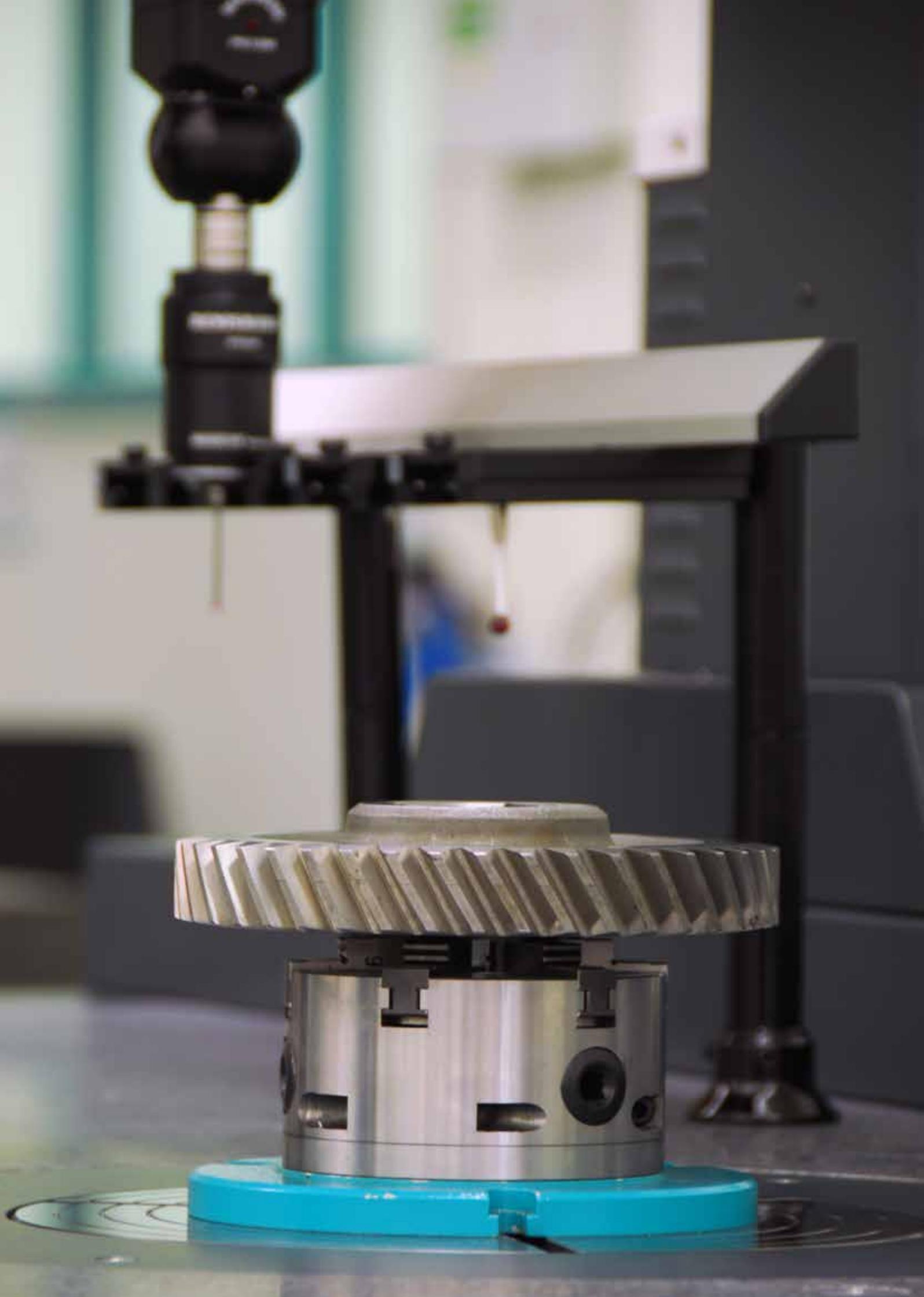


Combination of gear and coordinate measuring machine  
The LH Gear Series





Page 4-5

LH Gear Series: LH 65 Gear – LH 108 Gear



Flexible and applicable for measurements of small geometrical parts and gears

Technical Data

- Measuring volume, weight
- Connection values
- Accuracy
- Environmental conditions
- Dimensions

Page 6-7

LH Gear Series: LH 1210 Gear – LH 1512 Gear



For the measurement of medium sized gears and prismatic parts

Technical Data

- Measuring volume, weight
- Connection values
- Accuracy
- Environmental conditions
- Dimensions

Page 8-9

WENZEL Software



WENZEL Software for gear metrology

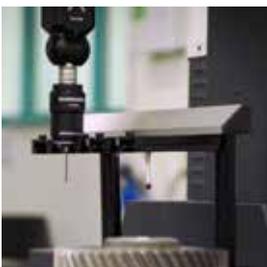
- Measurement and Analysis
- Evaluation standards

WENZEL Metrosoft CM Software for 3D coordinate measuring technology

- Measurement and Analysis

Page 10-11

Probe systems and change racks



Total flexibility for every measuring task

- Probe heads and probe systems
- Automatic change racks

## LH GEAR SERIES: LH 65 GEAR – LH 108 GEAR

Flexible and applicable for measurements of small geometrical parts and gears

The LH Gear Series combines the measurement principles of gear metrology and the flexibility of a coordinate measuring machine. Equipped with an integrated rotary table and a Wenzel Geco controller rotationally symmetrical parts as well as prismatic parts can be measured quickly and precisely with a LH Gear.



# TECHNICAL DATA

## LH 65 Gear, LH 87 Gear and LH 108 Gear

Machine Type		LH 65 Gear			LH 87 Gear			LH 108 Gear				
<b>Measuring Ranges, Weights</b>												
X	[mm]	650			800			1000				
Measuring ranges [mm]	Y	[mm]	750	1200	1000	1500	2000	1200	1600	2000	3000	
Z	[mm]	500			700			800				
Machine weight	[kg]	1410	1965	2345	3280	4410	4550	5610	6995	10460		
Permissible part weight (on granite)	[kg]	500	700	800	1000	12000	2000	2250	2400	3300		
Rotary table diameter*	[mm]	300			400			400				
Rotary table loading*	[daN]	180			400			400				
Workpiece diameter	[mm]	600			800			1000				
Module range	[mm]	0,5 - 20			0,5 - 20			0,5 - 25				
Measurable face width	[mm]	400			500			600				
Measurable face width	[°]							< 90				
<b>General Requirements</b>												
Electrical		Single-phase AC 1P+N+PE, 115/230 V ± 10 %, 50/60 Hz, max. 1000 VA, acc. to EN 60204/1										
Compressed air		Supply pressure 6-10 bar, pre-filtered, quality according to ISO 8573-1: Class 4 or better										
Air consumption passive	[ <sup>NI</sup> /min]	Ø 35	max. 42 (9 <sup>l</sup> /min)	Ø 52	max. 71 (15 <sup>l</sup> /min)	Ø 67	max. 91 (19 <sup>l</sup> /min)					
Air consumption active	[ <sup>NI</sup> /min]	Ø 56	max. 84 (17 <sup>l</sup> /min)	Ø 76	max. 120 (24 <sup>l</sup> /min)	Ø 91	max. 137 (28 <sup>l</sup> /min)					
Air consumption rotary table	[ <sup>NI</sup> /min]	141-183 (max. 37 <sup>l</sup> /min)			141-183 (max. 37 <sup>l</sup> /min)			141-183 (max. 37 <sup>l</sup> /min)				
<b>Measuring Accuracy</b>												
Accuracy	Gear Metrology		Gear inspection according to VDI/VDE 2612/2613, Group I (with a maximum variation of the reference temperature + 2K)									
	Coordinate Measuring Machines		Acceptance and confirmation in accordance with ISO 10360-2									
<b>Operating Environment</b>												
Gear Metrology	Operating temperature	[°C]	15 - 30									
	Temperature range		20 °C ± 2 K, ΔT: 1 K/h, 1 K/m, 2K/d									
Coordinate Measuring Machines	Operating temperature	[°C]	15 - 30									
	Temperature range for E <sub>L, MPE</sub>		20 °C ± 2 K, ΔT: 1 K/h, 1 K/m, 2 K/d									
Relative humidity		[%]	40 - 70									
<b>Dimensions</b>												
External dimensions	L	[mm]	1720	2190	2080	2670	3170	2690	3120	3520	4550	
	B	[mm]	1380			1700			2100			
	H	[mm]	2600			2962			3210		3220	3180

\* Various rotary table versions on request.

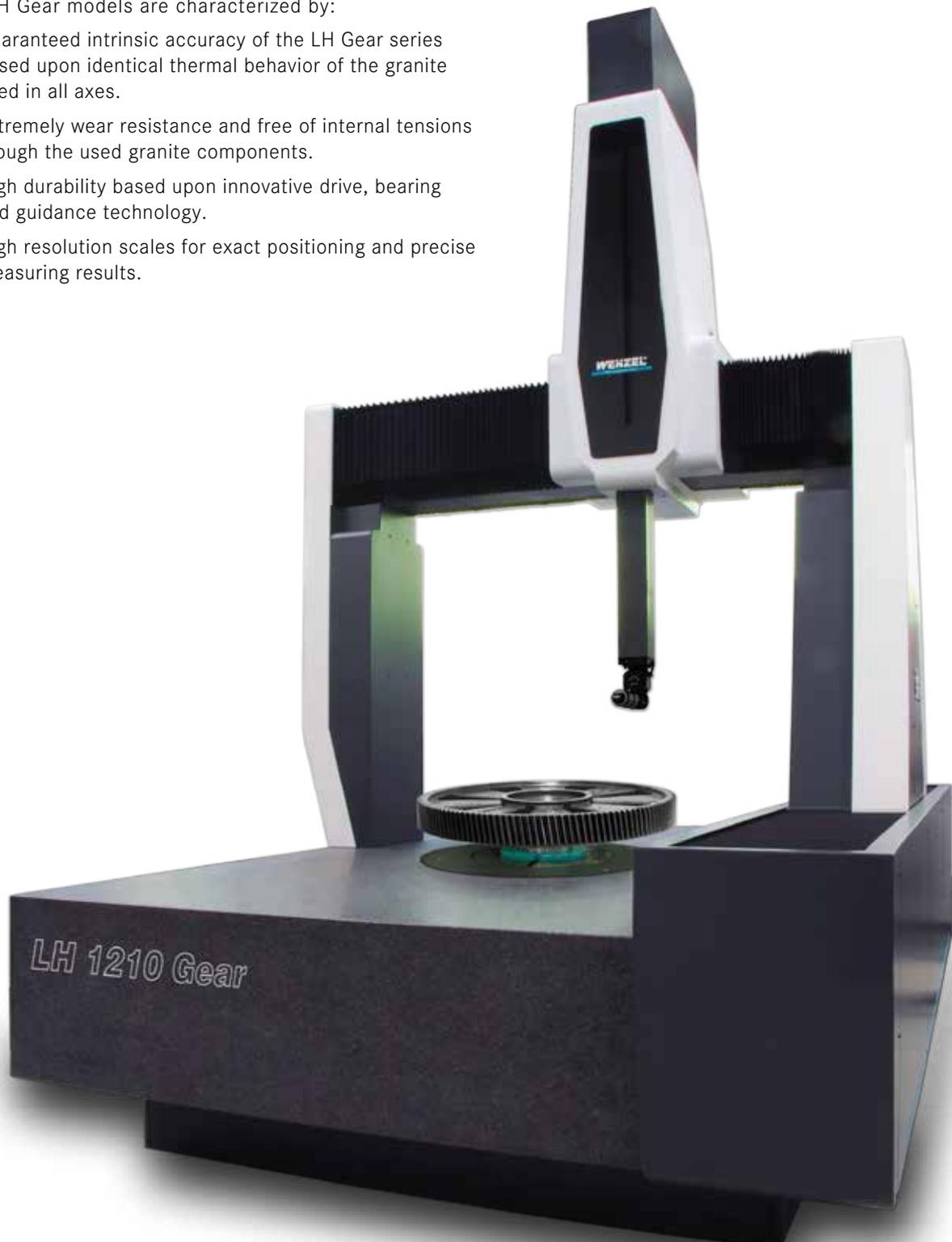
## LH GEAR SERIES: LH 1210 GEAR – LH 1512 GEAR

For the measurement of medium sized gears and prismatic parts

The broad variety of bridge type measuring machines of the LH Gear series offers ideal machine configurations for every measuring task. Depending on part size and weight and measurement requirements the optimal measuring system can be configured.

All LH Gear models are characterized by:

- Guaranteed intrinsic accuracy of the LH Gear series based upon identical thermal behavior of the granite used in all axes.
- Extremely wear resistance and free of internal tensions though the used granite components.
- High durability based upon innovative drive, bearing and guidance technology.
- High resolution scales for exact positioning and precise measuring results.



# TECHNICAL DATA

## LH 1210 Gear und LH 1512 Gear

Machine Type		LH 1210 Gear			LH 1512 Gear* <sup>1</sup>			
<b>Measuring Ranges, Weights</b>								
X	[mm]	1200			1500			
Measuring ranges [mm]	Y	[mm]	2000	2500	3000	2000	2500	3000
Z	[mm]	1000			1200			
Machine weight	[kg]	8200	10250	12650	10850	12550	15200	
Permissible part weight (on granite)	[kg]	2750	3000	3250	3500	3750	4000	
Rotary table diameter*	[mm]	600			600			
Rotary table loading*	[daN]	1000			1000			
Workpiece diameter	[mm]	1200			1500			
Module range	[mm]	0,5 - 25			1 - 32			
Measurable face width	[mm]	800			850 (1000)			
Helix angle	[°]	< 90						
<b>General Requirements</b>								
Electrical		Single-phase AC 1P+N+PE, 115/230 V ± 10 %, 50/60 Hz, max. 1000 VA, acc. to EN 60204/1						
Compressed air		Supply pressure 6-10 bar, pre-filtered, quality according to ISO 8573-1: Class 4 or better						
Air consumption passive	[ <sup>NI</sup> / <sub>min</sub> ]	Ø 71	max. 100 (20 <sup>1</sup> / <sub>min</sub> )		Ø 80	max. 118 (24 <sup>1</sup> / <sub>min</sub> )		
Air consumption active	[ <sup>NI</sup> / <sub>min</sub> ]	Ø 98	max. 155 (31 <sup>1</sup> / <sub>min</sub> )		Ø 103	max. 160 (32 <sup>1</sup> / <sub>min</sub> )		
Air consumption rotary table	[ <sup>NI</sup> / <sub>min</sub> ]	450 (90 <sup>1</sup> / <sub>min</sub> )			450 (90 <sup>1</sup> / <sub>min</sub> )			
<b>Measuring Accuracy</b>								
Accuracy	Gear Metrology		Gear inspection according to VDI/VDE 2612/2613, Group I <small>(with a maximum variation of the reference temperature + 2K)</small>					
	Coordinate Measuring Machines		Acceptance and confirmation in accordance with ISO 10360-2					
<b>Operating Environment</b>								
Gear Metrology	Operating temperature	[°C]	15 - 30					
	Temperature range		20 °C ± 2 K, ΔT: 1 K/h, 1 K/m, 2K/d					
Coordinate Measuring Machines	Operating temperature	[°C]	15 - 30					
	Temperature range for E <sub>L, MPE</sub>		20 °C ± 2 K, ΔT: 1 K/h, 1 K/m, 2 K/d					
Relative humidity	[%]	40 - 70						
<b>Dimensions</b>								
External dimensions	L	[mm]	3500	4000	4500	3500	4000	4500
	B	[mm]	2200			2580		
	H	[mm]	3600			4100		

\* Various rotary table versions on request.

\*<sup>1</sup> The LH 1512 Gear is available only in machine design 'Classic'. This does not correspond to the adjacent image.

## WENZEL SOFTWARE

# WENZEL Software for Gear Metrology

All measuring systems of the LH Gear series are equipped with extensive modular gear measuring software. It provides all functions needed for the measurement and analysis of gears, tools and shafts. This software, certified by the German metrology institute PTB, is divided into the main

menu for the comfortable management of part parameters and measuring results and the single application related modules with diverse measuring and evaluation possibilities.

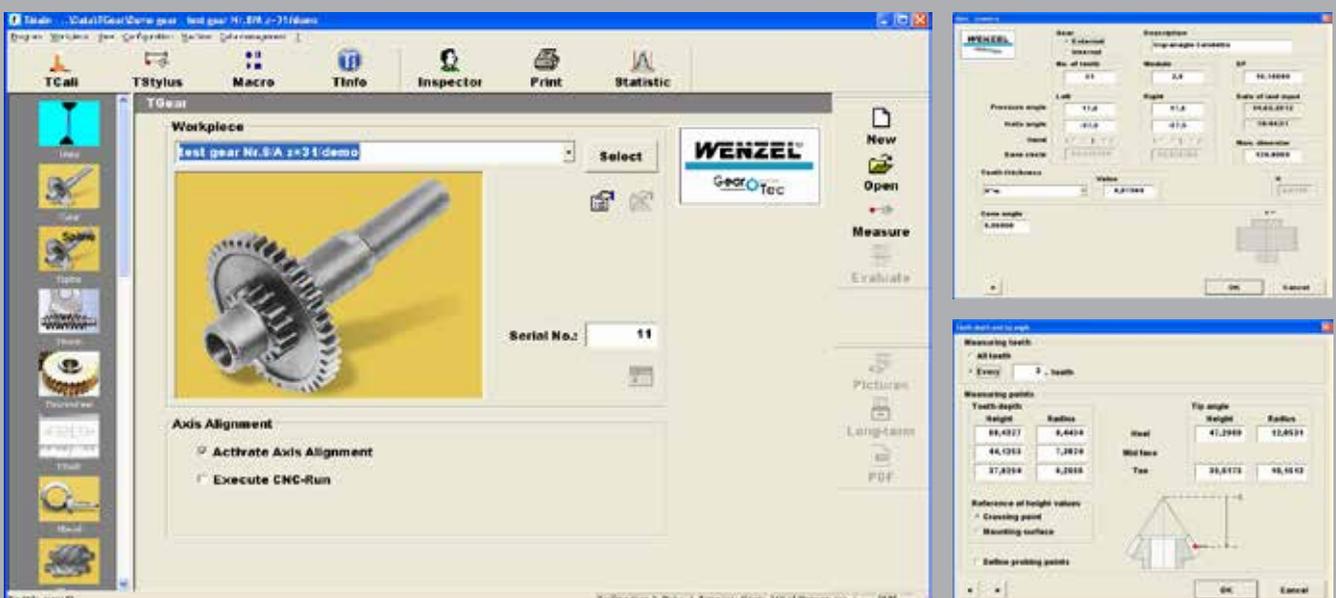
## Measurement and Analysis

- Spur gear inspection
  - Timing relationship measurement of gears
  - Interrupted Lead Traces
  - Inspection of Segment Gears
  - Determination of tip- and root circle diameter
  - Face coupling and clutch teeth gear inspection
  - Checking the root filled radius
  - Feed Mark Inspection
  - Dimension over balls
  - Undulation height along profile and lead traces
- Measurement of tools – Hob, shaving cutter and shaping cutter inspection
- Bevel gear inspection
- Cylindrical gear and worm gear inspection
  - Master gear method
- Inspection of camshafts
- Inspection of stroke and radial cams
- Rotor inspection

Further information on modules and option on request

## Evaluation standards

- DIN 3960/62 and AGMA 2000
- Spur gears according to ISO 1328
- Cylindrical worms according to DIN 3974
- Spline shafts and spline bore hubs with straight flanks as well as serrated toothing according to ISO 14 / DIN / ISO 5472 or DIN / ISO 6413 etc.
- And more ...



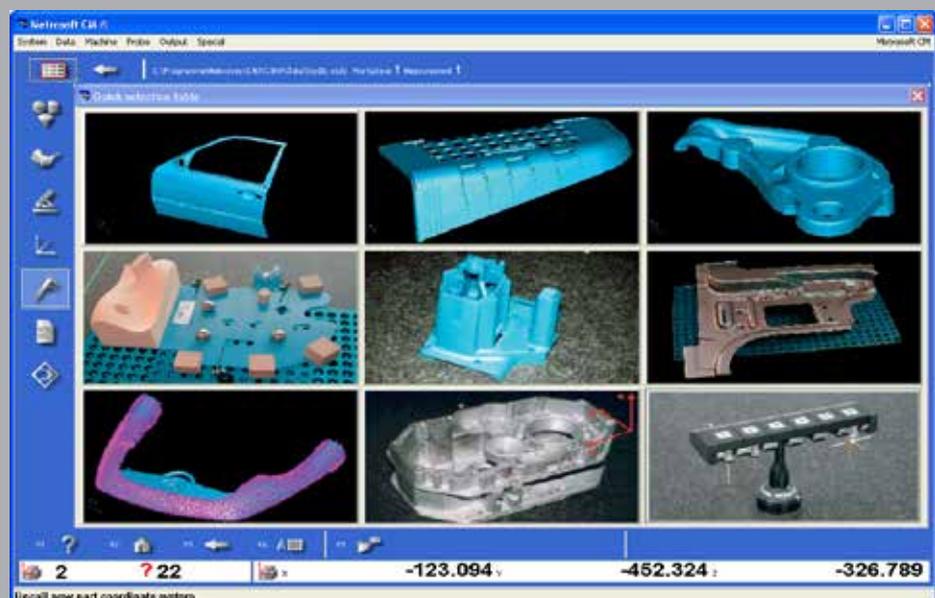
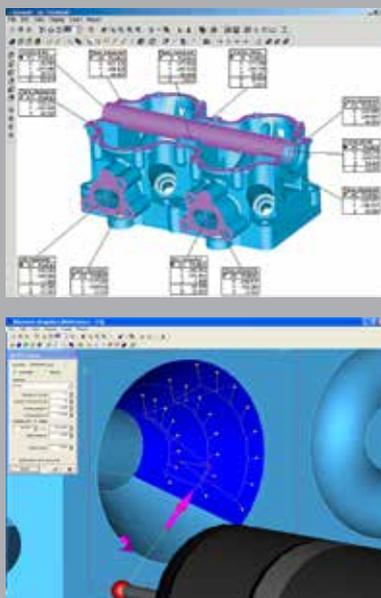
## WENZEL Metrosoft CM Software for 3D coordinate measuring technology

With the proven measuring software Metrosoft CM, complete measuring programs for the analysis of size, form and position can easily be created in addition to the measurement of gears, prismatic parts and freeform surfaces.

The integrated database allows long term storage of measuring results allowing statistic control of serial measurements.

### Measurement and Analysis

- Measurement of geometrical elements
- Measurement of free form surfaces and curves
- Evaluation of size
  - Distance
  - Angle
  - Element size (diameter, apex angle, etc.)
  - Position
- Form and position evaluation
  - Position
  - Roundness, straightness, etc.
  - Coaxiality, concentricity
  - Surface and line shape
- Evaluation of run-out tolerances
- Graphical and tabular measurement reports



## PROBE HEADS, PROBE SYSTEMS, SCANNER AND CHANGE RACKS

### Total flexibility for every measuring task

The different probe heads and probe systems allow optimal matching to every measuring task, choosing between fixed and indexable probe heads; The part size and the necessary probe length can always be accommodated.

### Probe heads and probe systems

---



#### PH10T -/PH10M PLUS

Automatically indexable probe head. PH10M PLUS: Fast probe replacement with the corresponding change rack system.



#### SP80

Passive measuring probe. Passive scanning probe using digital scale and readheads which enable a system resolution of 0.02  $\mu\text{m}$ . This gives exceptional scanning performance, even with long probe extensions (500 mm).



#### SP25M

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



#### SP600M

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

For diverse measuring tasks and requirements it is possible to change between different styli and probe systems by using an automated change rack. The changing procedure can be fully automated with repeatable probe position.

## Change racks

---



**Change rack FCR25**

With FCR25 all SP25M system components can be changed (3, 6, 9, 12 or 15 ports possible).



**Change rack SCP80**

The SCR80 change rack ports are used for SP80 stylus holder. The single ports are mounted to a modular rack system, so the change rack is flexibly extendable.



**Change rack SCR600**

Change rack for SP600 stylus holder. One change rack system can hold up to four SH600 stylus holders.



The accessories illustrated here are a small selection from our extensive product range. For more information, please contact your local WENZEL representative.

## Innovation for success

WENZEL Group GmbH & Co. kG is one of the leading manufacturers of industrial metrology solutions. The wide range of WENZEL products includes solutions in the fields of coordinate measuring machines, gear metrology, computed tomography and optical high speed scanning. Founded in 1968 as a family business, WENZEL Group combines tradition with innovation, and

relies on values such as reliability, trust and respect for the environment. Subsidiaries as well as sales and service partners worldwide represent the company in more than 50 countries. The WENZEL Group employs more than 630 people worldwide.

**WENZEL Präzision GmbH**  
**D-97859 Wiesthal**  
**Phone: +49 6020 201-0**  
**Fax: +49 6020 201-1999**  
**info@wenzel-cmm.com**  
**www.wenzel-group.com**

**WENZEL Präzision GmbH**  
**Branch office Karlsruhe**  
**Im Mittelfeld 1**  
**D-76135 Karlsruhe**  
**Phone: +49 721 17087-0**  
**Fax: +49 721 17087-200**