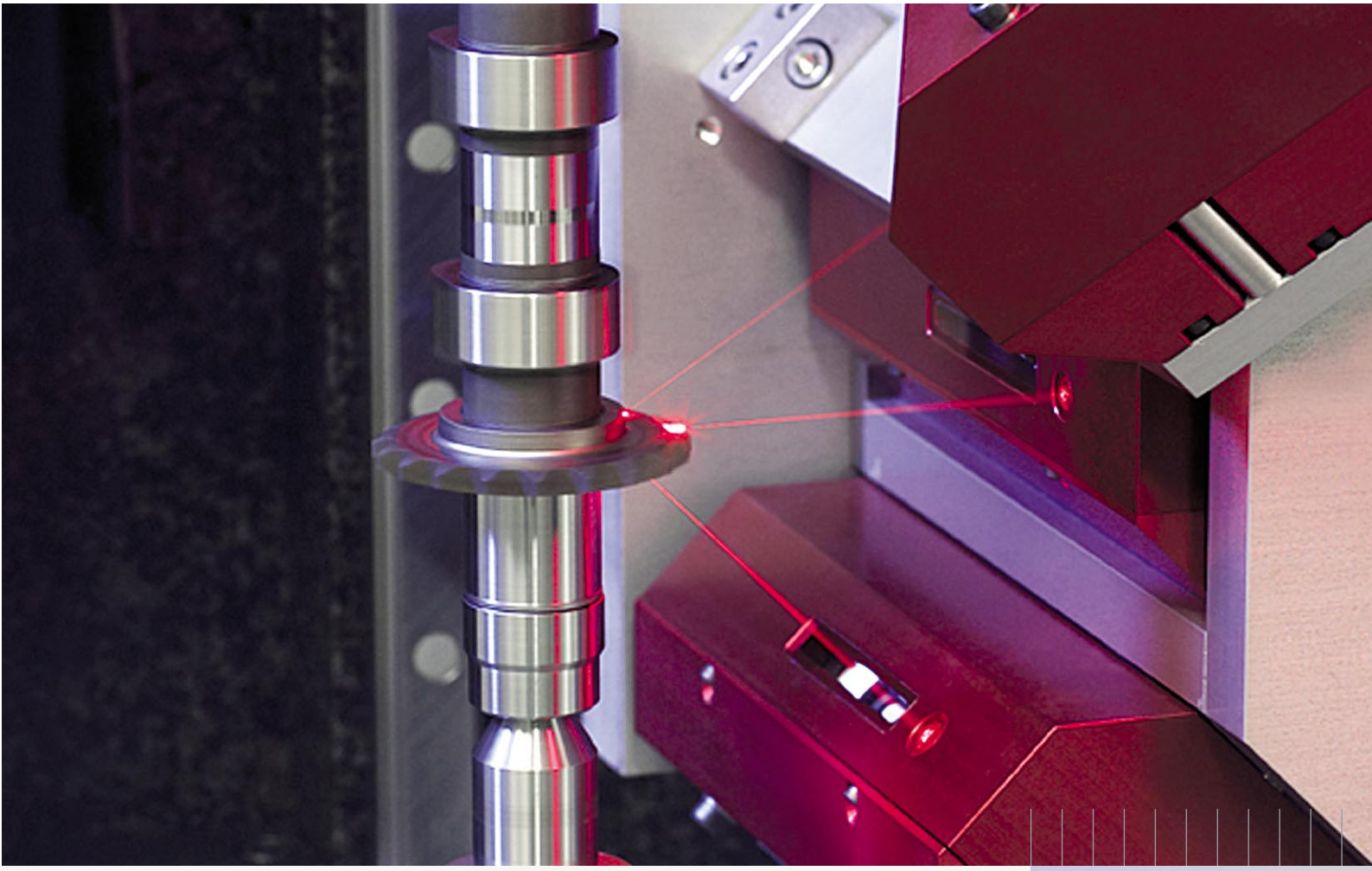
CLAAS
FERTIGUNGSTECHNIK GMBH

CLM – CLAAS laser measuring machine for rotating parts

Non contact geometrical inspection in the production cycle



CLM – advantages through modern technology

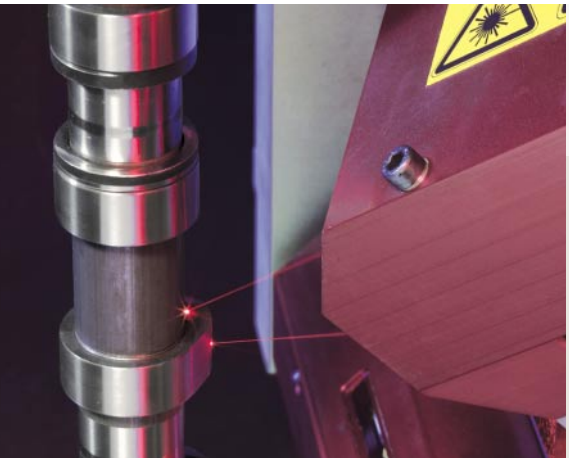
Technical features of the measuring system

- Machine frame made of stone: Reduced effect of temperature and vibrations, guarantees high measuring accuracy and high system availability
- Flexibility: Measurement of all characteristics without sensor retrofitting and without the need of special clamping
- Absolute measurement and automatic adjustment of the measuring system with an adjustment shaft
- Measurement capability according to the Measurement System Analysis Standard (MSA)
- Short measuring time through high sensor measuring frequency
- Optimized laser sensors for difficult measuring surfaces
- Error-proof clamping through engraved (EDM) barcode on clamping features that is red out automatically
- Temperature sensors in the measuring machine enable automatic adjustments to changing environmental conditions
- Simple integration in the production process through of Profibus interface
- Standardized data filing: Saving of measurement and inspection results in QS-Stat-Standard

System accessories

- Encoded clamping centers in various versions
- Reading device for barcode or Data Matrix code
- Calibrated adjustment and master shafts for automatic adjustment and monitoring
- Handling robots including gripper system

System setup	Laser measurement	Mechanical inline non contact measurement
Non contact measurement	++	–
Small measuring spot	+	O
Low maintenance effort	+	–
Setting effort during production change	++	O
Harsh operating conditions	+	+
High availability	++	+
Measuring and inspection time[1)]	++	O
Measuring accuracy	+(+)	++
Measuring characteristics during 100% inline inspection		
Lengths and distances	+	+
Diameter	+	+
Radial run out	+	+
Concentricity	+	+
Shape deviations	++	+
Axial run out and total axial run out	+	+
Angles	++	+
Angular reference without special means of clamping:		
- Through flanks and bores	+	– –
- On a tooth of a sprocket	++	– –
- Via sensor wheel	++	– –
Radial run out and roller dimension of gears	++	– –
Angle and symmetry of slots	+	– –
Presence of holes or other features	++	–

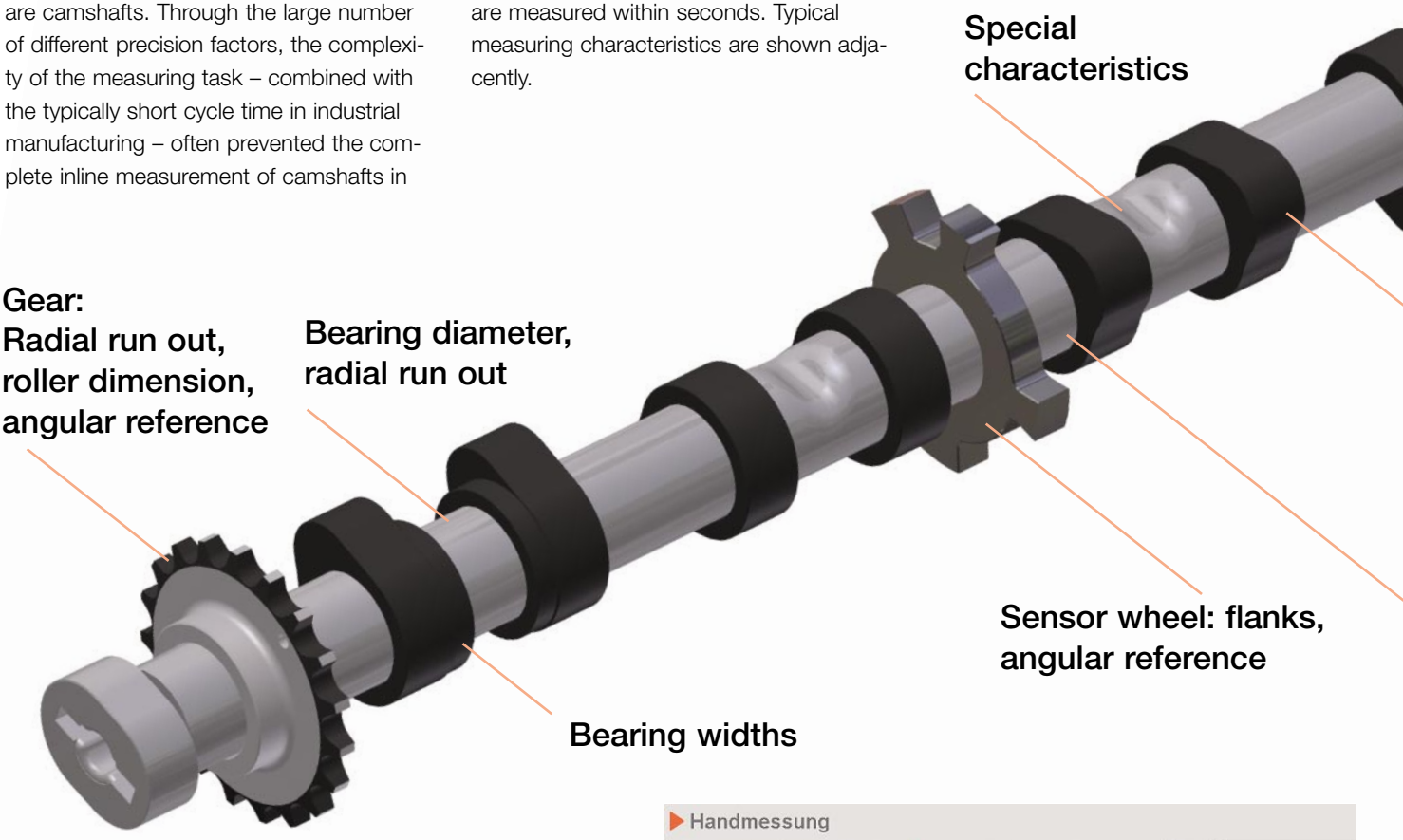


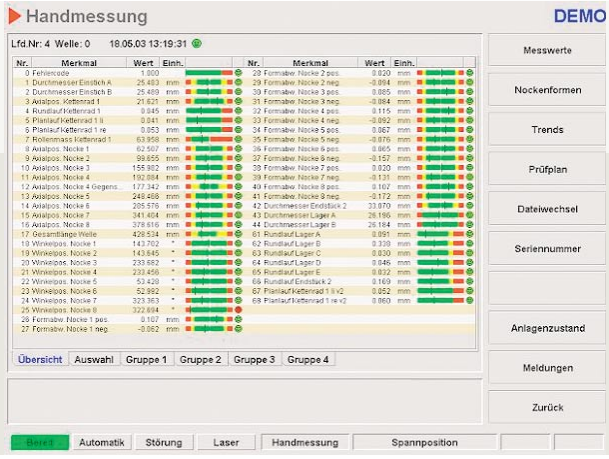
Detail view during measurement on a camshaft

1) E.g.: Laser measurement: 180 components per hour; mechanical measurement: 60 components per hour.

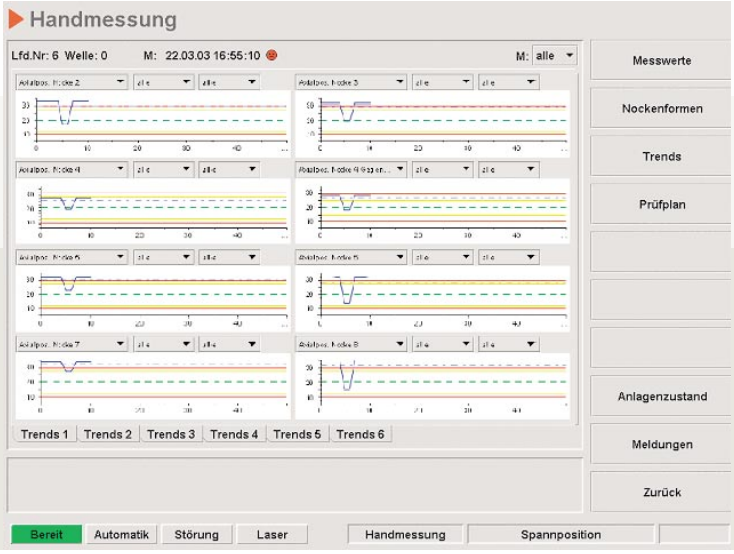
Example: Camshaft measurement

A typical application for the laser measuring machines of CLAAS Fertigungstechnik are camshafts. Through the large number of different precision factors, the complexity of the measuring task – combined with the typically short cycle time in industrial manufacturing – often prevented the complete inline measurement of camshafts in the past. With the new system of CLAAS Fertigungstechnik all relevant quantities are measured within seconds. Typical measuring characteristics are shown adjacently.

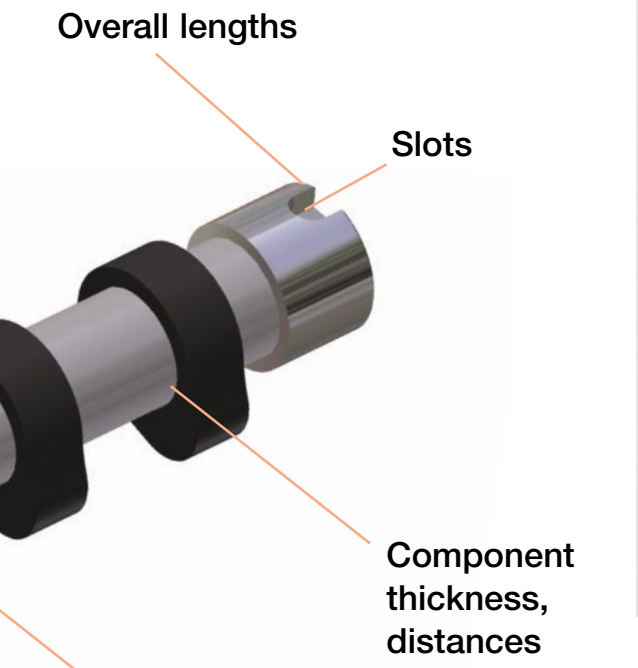




Measuring and inspection results overview



Trend display allows the timely correction of upstream processes



Graphical presentation of the cam profile

Technical data

Measuring range	
Length (Z):	700 mm
Diameter:	150 mm
Work piece:	< 30 Kg
Drive:	Servo motors
Clamping	
- MK3 adaptor:	Encoded standard centers
Laser sensors	
- Basic distance:	90 mm
- Measuring range:	20 mm
- Linearity according to DIN 32877:	0.03 % of the measuring range
- Quantity:	3 (+45° ; 0° ; -45°)
Resolution	
- Lengths/diameters:	0.1 µm
- Angles:	0.001°

Maximum measuring precision (1σ)

Length dimensions:	0.5 µm
Diameters:	1.0 µm
Angles:	0.005°
Shape deviation/concentricity:	1.0 - 1.5 µm
Radial run out:	1.0 µm
Axial run out/total axial run out:	1.0 µm

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Advanced laser measuring systems for more productivity

As a leading production equipment manufacturer for built camshafts CLAAS Fertigungstechnik knows the quality requirements of the industry. Requirements such as 100% measurement, rapid cycles and the increased documentation obligation resulted in the CLM CLAAS laser measure: an advanced laser measuring system for the inline measurement of rotating parts. CLM CLAAS laser measure can be integrated in a closed loop concept to monitor trends, recognize deviations and adjust upstream equipment. This allows a systematic reduction of the scrap rate. The fully automatic measurement results in increased production security, opens up a considerable savings potential and in this way allowing rapid amortization.

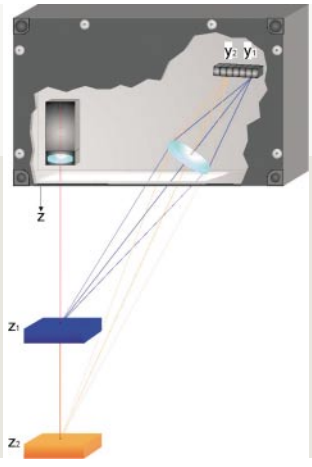
The technology:
Optical triangulation

The non contact laser measuring system of CLAAS Fertigungstechnik is based on optical triangulation. The laser light is scattered on the work piece surface and optically detected. In the sensor the detected signal is subsequently converted into the real geometrical distance between sensor and measurement object. Depending on the measuring task this measurement can take place one, two or three dimensionally.

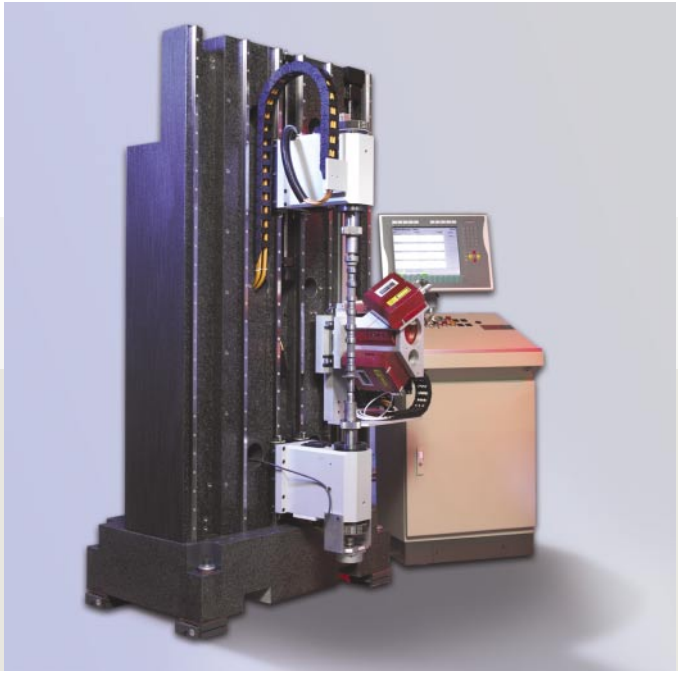
To achieve best possible results CLAAS Fertigungstechnik includes customer requirements directly in the development of the measuring sensor system. The results are optimized sensors for any application. The large number of projects in production equipment manufacturing, the resulting experience and innovative power of our employees ensure that these systems are continuously further developed and adapted to the requirements of the market.

Adaptation and integration

Each machine is adapted to the appropriate task by the specialists of CLAAS Fertigungstechnik. Whether stand-alone or process-integrated: software and hardware are optimized for the respective application and integrated in the concept of the customer. In accordance with the project and service-orientated organization structure of CLAAS Fertigungstechnik the customer has only one dedicated contact person from the design to the integration.



Measuring principle during laser triangulation



Measuring machine upright version with operating panel

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Services around the laser measuring machine

Training

A standardized software surface, with clearly arranged displays, graphic surface configuration and intuitive operator prompting permits simple handling of the measuring machines. Training courses – from instructing the operating personnel to intensive training of the customer's technical personnel – are conducted to suit the customer's needs.

Maintenance and service

Due to the non contact measuring method, CLAAS measuring machines are particularly low in maintenance. Sensors of CLAAS Fertigungstechnik can be replaced within a few minutes. The measuring machines were also developed for optimum maintenance friendliness and through online maintenance the specialists are always available when support is required. Due to the corporate structure CLAAS Fertigungstechnik is also able to work out and offer individual service concepts for its customers.

Laser measuring technology – Innovations made by CLAAS

CLAAS is continuously giving new inputs to manufacturing technology. Be it in the cooperation with customers or in the project or development of in-house machines and equipment. It is not only these in-house developments that make CLAAS Fertigungstechnik one of the leading medium-sized tool and production equipment manufacturers in Germany. CLAAS Fertigungstechnik is an enterprise of the CLAAS group of companies which is also a leading manufacturer of agricultural machinery with over 8,000 employees. This background gives CLAAS Fertigungstechnik the perfect support for general contracting responsibility and for large projects of any dimension. The deliberate exchange of know-how between the technology-intensive industries automotive and aerospace is the basis of our multiple corporate synergies. The innovative solutions for quality assurance using non contact laser measurement technology developed from this comprehensive technological know-how and the experience at many levels of automation and production equipment manufacturing.

Trusted cooperation with customers

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