



Dimensional routine testing

The Series DIMENSIONCONTROL was developed for the most varied tasks in dimensional inspection. If offers systems for the measurement and checking of features such as thickness, diameter, dimensions, roundness, wall thickness and the surface quality of parts directly in the production line. The precision of the systems is based not only on sensor systems to match the application, but on special mechatronics and smart algorithms for signal processing.



DIMENSIONCONTROL Series 8202 is an in-line system for the non-contact wall-thickness and profile measurement of bearing shells. Due to the exacting measurement requirements, capacitive displacement sensors with a resolution of $0.04 \,\mu$ m are employed.

An intelligent analysis software program processes the measurement signals and computes the thickness values. Then the bearing shells are sorted into up to five quality classes which can be grouped directly using an optional following sorting device.

The field of application for DIMENSIONCONTROL Series 8202 is quality monitoring and closed-loop process control directly in the production environment.

Measurement technique

DIMENSIONCONTROL 8302 uses the capacitive measurement principle for the non-contact measurement of thickness and profile of the bearing shells. The bearing shells are passed without contact on an air cushion through the measurement plane. The measurements take place with up to three pairs of diametrically opposed sensors. The front faces of the sensors are matched to the radius of the bearing shells. A reference shell is placed in the test device for automatic linearity calibration and maintained supported on air at the measuring position under computer control. The measurement system linearizes itself fully automatically by pneumatically moving the shell in the sensor measuring gap in the direction of the sensor axes.

Analysis software

The measurement data acquisition and analysis software was developed with ICONNECT. Due to the high performance and modularity of this development environment, customized requirements can be considered in terms of visualization, archiving and system parameterization without the software core being modified. Remote maintenance via ISDN or modem ensures high availability and an efficient service round the clock.



Features:

- Measurement range of up to 100 μ m of thickn. change
- Shell diameter from 30 to 85 mm.
- Repeatability down to 0.3 μ m
- Measuring rate up to 60 bearing shells/min.
- Frequency response up to 4 kHz (-0.1 dB).
- Size 500 x 500 x 1330 mm
- Weight approx: 1,500 kg

System advantages

- Dynamic measurement with highest accuracy and resolution
- Measurement sensor system independent of material.
- Wear-free measurement process due to transport of shells on air cushions.
- Sorting according to quality classes.





Image processing system for the inspection of bearing shells



Surface fault on a bearing shell (observation by an image processing camera)



DIMENSIONCONTROL 8251 is an automatic system for the dimensional inspection and surface inspection of bearing shells. The system consists of up to four measurement stations each with a camera, past which each bearing shell is guided. A modular concept enables a customer-orientated, versatile range of functions for the system. Components needed later, such as parts surface inspection, dimensional measurement, rear inspection (in development) can be included as required.



Increasing quality demands in the automotive field require the latest techniques and automated quality control. MICRO-EPSILON fulfills the requirements on interdisciplinary capabilities in image processing, mechatronics and software. It is only the interplay of complex algorithms in image processing with precisely adapted mechanical systems and user friendly application software that leads to such industrially compatible systems. The autonomously operating complete system with 100% inspection and standardized documentation fulfills the demands in the field for reliable inspection with high reproducibility. In conjunction with special lighting techniques and targetspecific mirrors, the camera systems used enable the fast and reliable detection of faulty locations as well as exact geometrical inspection.

The following features are measured:

- Hole
- Elongated hole
- Groove
- Sickle-shaped groove
- Cam
- Recess

System properties:

- Economical basic system
- Modular expansion stages
- High level of automation
- Highly autonomous system
- Simple operation
- Short setting up times



Complete system for the inspection of bearing shells with round cycling table and control cabinet

Technical Data:

- Targets: diameter 24-85 mm
- Cycle time: up to 100 parts / minute
- Measurement accuracy: $\pm 0.2 \text{ mm}$

The following faults are detected:

- Surface defects (scratches, contamination)
- Damage to the groove chamfers
- Damage to the outer chamfers
- Swarf



DIMENSIONCONTROL, Series 8203

The system DIMENSION CONTROL Series 8203 is used for the quality inspection of bearing bushes. With a cycle time of just four seconds, the bearing bushes are inspected without contact for external and internal diameters as well as coaxial properties and they are also marked for optimum installation. The measurement system operates in a production line and is designed for 100% sampling inspection.

Measurement technique

To find the external diameter three sensors are arranged at each end of the bush at an angle of 120° to one another. The sensors have a measurement range of 0.5 mm To acquire the internal diameter two capacitive sensors are integrated into a pin. Both sensors are positioned precisely opposite a pair of external sensors. The coaxial properties of the bush are determined from the measured wall thickness using this configuration.

To achieve a high throughput, the system operates with two measuring stations. One station consists of a separator device, an air-bearing block and a drive motor. The bearing bushes are passed from the oscillating conveyor to the measuring station in the correct orientation via a separating device. The measuring head alternates pneumatically between the two measuring stations. The measurement occurs without making contact. The linearity characteristics of the sensors are optimized in the analysis software such that almost an ideal sensor is provided. Based on the inspected features, the bushes are marked with an ink jet and then sorted.

Technical Data:

- Bush diameter from 14 mm
- Repeatability $< 2\mu m$
- Cycle time < 4 s
- Supply voltage 230 V/400 V
- Compressed air supply 6 bar
- Operating temperature +15...+35°C (5°C)
- Dimensions 2055x840x1730 mm



System advantages

- Dynamic measurement with highest accuracy
- No wear due to non-contact measurement
- Highest precision due to rotational movement on air bearings
- High cycle rate due to pipeline processing
- Marking of the optimum fitting orientation
- Sorting according to quality classes.

DIMENSIONCONTROL. Series 8205

DIMENSIONCONTROL Series 8205 is an automatic and versatile system for the inspection of different sintered parts, followed by sorting into passed and failed parts.

- The following features are monitored:
- Batch from which the part originated
- Damage on the face sides
- Damage on flange surfaces, shoulders, etc.
- Foreign bodies in holes
- Parts sintered together
- Geometrical deviations

Measurement technique:

Essentially, two measurement principles are employed with DIMENSIONCONTROL: a laser-based optical micrometer and an image processing system with three cameras. The non-contact measurement technique enables rapid and reliable inspection. In the first step the height of all parts is checked by the laser micrometer to prevent parts being supplied that do not belong to the batch.

Then the camera stations detect two previously defined principal features of a defect. Firstly, geometrical changes in the shape of the inspected part are detected. Secondly, surface defects are detected. Here, the system differentiates between the required surface structures (e.g. recesses) and unwanted faults (e.g. scratches, bulges or notches).

The laser micrometer supplies a measurement accuracy of 0.05 mm, whereas the defect size is defined in the image processing system to 8x8 pixels, which, taking the replication scale into account, corresponds to 0.3×0.3 mm.





System advantages:

- High level of automation
- Highly autonomous system
- High versatility
- Simple operation
- Easily expanded for new parts
- Short setting up times, reliable and safe fitting
- Careful handling of the parts

Technical Data:

- Accuracy of the laser micrometer: 0.05 mm
- Camera accuracy: 8x8 pixels (0.3 x 0.3 mm)
- Cycle time: <2 s
- Supply voltage: 230 V / 400 V
- Compressed air supply: 6 bar
- Operating temperature: +15...+35 °C (± 5 °C)
- Dimensions approx. 1600 x 1900 x 720 mm