

Inspection of bearing shells

Bearing shells are manufactured in large quantities, also for the automotive sector. Whereas the production has been extensively automated, quality assurance still relies on workers who manually sort out tested parts with surface defects and blow-outs or parts not belonging to the batch. Previous attempts at automation failed due to the many different types of bearing shell.

These problems gave rise to the demand for an automatic and versatile system for inspecting different types of sintered bearing shells.

Primary system requirements are:

- Checking for the correct type.
- Detection of damage to the faces and collar.
- Checking for foreign bodies in the central hole.
- Checking for parts joined by sintering.
- Deviations from the ideal circular shape of the external diameter.
- Cycle time of max. 2 s (incl. handling), corresponding to 30 parts per minute.

100% of the parts fed are inspected and classified as passed or failed parts.

Here, two different measurement techniques are used: a laser-based optical micrometer and three camera systems.



1 x laser micrometer, 3 x image processing cameras

Laser micrometer (ODC)

In the first step the height of all parts is checked by a high-speed laser micrometer. This prevents parts passing through which do not belong to the batch. Furthermore, those parts which interfere with the system are retained.

Measurement technique using camera systems

The basic features of a defect which can be used for the assessment of passed and failed parts are on one hand the geometrical deviation of the shape of the component and on the other hand variations (intensity, contrast, dispersion) of the reflected light energy from the regular surface structure of a passed part.

The width and the length of the defect are available as the geometrical parameters for the classification of defects.



Applikation

Measurement task of the first camera

The first camera inspects the first face of the part. Blow-outs and deviations from the ideal circular shape of the external diameter are detected and result in the rejection of the part if set limits are exceeded. In addition, a check for foreign bodies is made in the central hole. Parts joined by sintering are detected by the inspection stages for the face and are sorted out if the set limits are exceeded.

Measurement task of the second camera

The second camera inspects the collar surface of parts on which a collar is present. Blow-outs and deviations from the ideal circular shape of the external diameter are detected and result in the rejection of the part if set limits are exceeded.

Measurement task of the third camera

After the part has been turned over, the third camera inspects its second face analogously to the first camera.

System parameters

Dimensions (mechanical system incl. vibrating pan and control cabinet, without parts hopper):

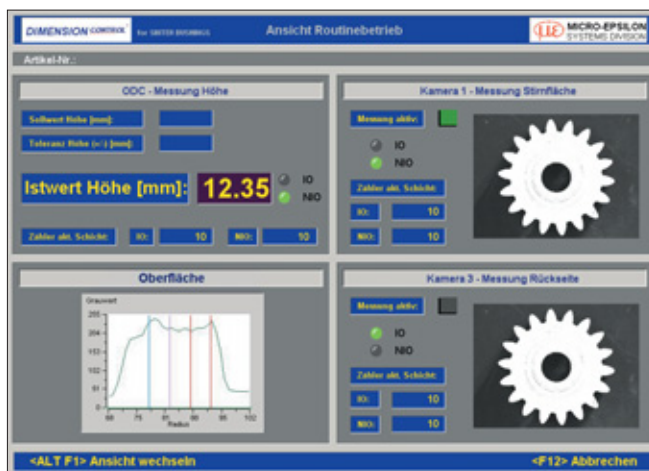
- Depth: approx. 720 mm
- Width: approx. 1,600 mm
- Height: approx. 1,900 mm excl. signal lamp

Boundary conditions:

The parts are checked in the sintered and, possibly calibrated, state. Some types of product are very thin-walled and are therefore extremely sensitive to deformation. Calibrated parts are slightly oily. Expansions to new types can be made by the customer.

Reasons for the system selection:

- High level of automation
- Highly autonomous system
- High versatility.
- Simple operation
- Easily expanded for new parts
- Short setting up times, reliable and safe fitting
- System does not damage the parts (no gripper).
- Interface of the controller to the feed hopper and sorting hopper.



Screenshot of a running measurement