

For 100% Production Quality:

Continuous Control of Diameter and Ovality of Cylindrical Profiles with Basler ace GigE Cameras

Customer

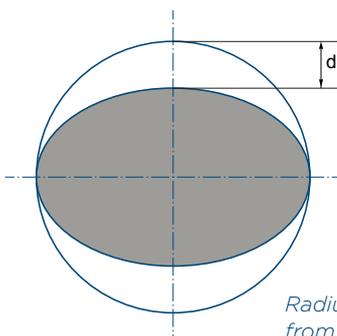
- FCC PS
- Location: Prague, Czech Republic
- Industry: Industrial automation
- Implementation: 2014

Application



Machine vision system for continuous control of diameter and ovality of products with cylindrical shape.

FCC PS is a Czech company supplying machine vision systems and components for industrial automation. They offer a solution for continuous control of diameter and ovality of products with cylindrical shapes, such as structural hollow sections like steel tubes.



Radius difference d of oval object from ideal circular shape.

The ovality (or out-of-roundness) of a profile as defined by the CSN EN 10210-2 standard is the ratio in percent of the difference between the largest and smallest profile diameters to the mean diameter of the profile. In practice it can be imagined as a measure for the deviation of a circular shape towards an ellipse. The ovality is then the ratio of the difference between large and small half axes of the ellipse, which are perpendicular to each other.

In real production, deviations from the ideal circular cross section are more or less always present due to production errors. For example, increased ovality may occur when the calibration die is worn.

Structural hollows present a manufacturing challenge in this area. They are typically produced continuously, without stops. There is no chance to rotate them in order to check the maximum and minimum diameter. So the measurement solution must determine the ovality from as few diameter measurements as possible, in a short time.

Solution and Benefits

In the solution developed by FCC PS, the measured profile runs through measurement head rollers, where it is imaged in collimated light by a high definition camera equipped with a telecentric lens. This setup allows for continuous measurement of moving profiles with various diameters.

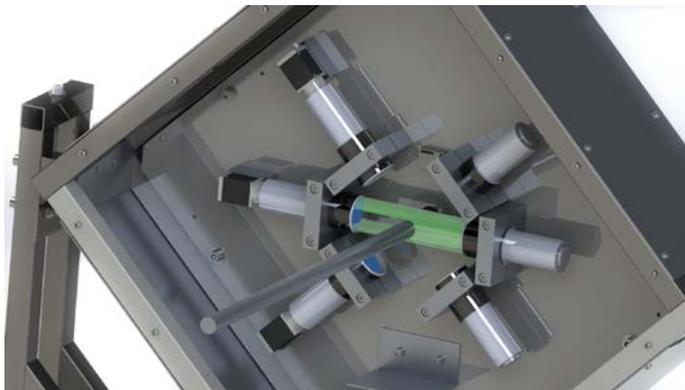
In order to determine the ovality of a piece according to the CSN EN 10210-2, it is necessary to measure the profile diameters in three radial directions. An ovality value can then be calculated quickly (e.g. every 50 ms) from these three pieces of data by use of mathematical procedures. With the corresponding sampling frequency of 20 Hz, a rod that is moving at a speed of 1 m/s can be measured every 50 mm. The difference between maximum and minimum diameter (the value $2 \cdot d$ in the picture above, often referred as the ovality in absolute values) can be obtained with a high accuracy of $5 \mu\text{m}$ (0.005 mm).

The advantage of this method is that it enables the detection of ovality while the measured object is moving. It can also be used to check the wear of shafts, collectors, commutators, and other cylindrical objects

without the need of exact position fixing. The only condition is alignment of the measured object with the measurement head axis.

This method generally enables equipment to check circularity in the sense of any deviation from circular profile, such as bulges on cable casings.

However, this type of measurement is less sensitive to concave variations (depressions in the profile). In these cases, it is necessary to find the possible types of requested defect detection on actual production samples, and propose a suitable modification of the measurement head.



Detail of machine vision system of FCC PS with 3 cameras on the left and three collimated light sources on the right side of the rod.

This method of measuring for ovality/circularity involves three Basler ace acA2000-50gm cameras. Jakub Heller, key account manager responsible for machine vision products at FCC states: "We have worked with Basler cameras before and they are very familiar to us. They fit well into our software concept and also their reliability, availability and price are very convincing."

Technologies Used

- 3 Basler ace GigE cameras (acA2000-50gm)
- Software developed by FCC PS
- Collimated illumination
- Telecentric lenses

More Information

www.fccps.cz

www.machine-vision.cz/

FCC PS
www.fccps.cz

For information on Disclaimer of Liability & Privacy Statement please see www.baslerweb.com/disclaimer

©Basler AG, 06/2014

Basler AG
Germany, Headquarters
Tel. +49 4102 463 500
Fax +49 4102 463 599
sales.europe@baslerweb.com
www.baslerweb.com

SENSORS
INTEGRATION

507 Kelsey Street • Delano, MN 55328
Phone 763-972-1040 Fax 763-972-1041
Toll Free 888-920-0939
Sensorsintegration.com

BASLER
the power of sight