1.9.24. ROBUST ROUNDNESS MEASUREMENTS WITH SOFT X-RAYS

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Abstract. In this paper a novel soft X-ray (XUV) measuring system for the fast inspection of soiled, cylindrical components in the production line is presented. The application of this system is inline metrology. Concerning measuring celerity and sensitivity to environmental influences both mechanical and optical measuring instruments are inappropriate.

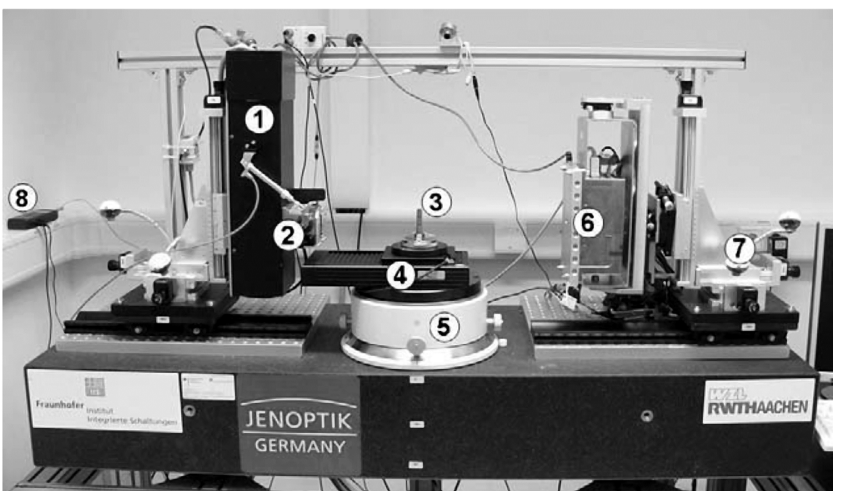

Fig. 1. System setup:
1 – X-ray tube; 2 – shutter; 3 – object; 4 – linear axis; 5 – rotary table;
6 – camera; 7 – web cams; 8 – thermometer

The measuring principle is based on projecting the shadow of a shaft onto a sensor. Contour and roundness can be deduced from the projected object edge. In contrast to geometrical shaft measurements with visible light no focusing optics are used, but XUV-light in central projection.

These soft X-rays are used for increasing the contrast between work piece (e.g. steel, ceramics, glass) and possibly present distorting debris like water, oil, dust, or swarfs.

Therefore an efficient (high-capacity) micro focus source and a sensitive high-resolution detector have been developed.

This paper presents the main elements (see fig. 1) of the novel soft X-ray projection system, analysing strategies and results with practical examples.

Keywords: inline metrology, roundness measurement, soft X-rays.