Apply Machine Vision to Inspect Cylindrical Surfaces of PU-Packings

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Abstract

PU-Packing is widely used in machinery to prevent fluid from leaking. Due to the high demand in productivity and quality, bare-eye-inspection approach becomes extremely inadequate. In view of that, we developed a machine-vision-based system for detecting flaws occurred in PU-packings. The system consists of three inspection stations. The first station uses area-scan cameras to check the top and bottom surfaces of a packing. The second station uses an area-scan camera to check the interior of a packing incorporated with an infrared LED backlight. The third station uses two line-scan cameras to simultaneously scan inner and outer cylindrical surfaces of a packing. After images have been scanned, variance of radius inspection, projection, coordinate transformation, and normalized grayscale absolute difference inspection methods were applied to locate seven frequently detected defects, including deformations, burrs, interstices, scratches, blisters, air bubbles, and inclusions. The high flaw detection rate of 95.1% indicates that the proposed inspection apparatuses and methodologies are appropriate.

Keyword：Automatic Optical Inspection, Line Scan, Flaw Detection, Sealing Elements