事例研究

電子基板製造ラインにおける検査改善
—低解像度画像を用いたMTシステム判別手法による組立異常監視—

Improved Inspection for an Electronic Circuit Board Production Line
—MT-System Approach to Monitor Assembly Faults with Low-resolution Images—

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Following our earlier report of the use of online quality engineering to reduce inspection loss in the printed wiring board assembly (PWBA) process through overall optimization by integrated inspection, we now report on a low-cost inspection system in which the MT-system is used to replace visual inspection. Many expensive high-precision image processing systems are used to automate visual inspection, but by use of the MT-system, even low-resolution images can provide discrimination accuracy equivalent to that achieved by visual inspection. For two PWBA connector fault modes, when the multirecognition-Taguchi (multi-RT) method was applied with the normal state as the unit space, the images of the relevant parts were partitioned, and the distance D was calculated synthetically from the individual β and η values, the result was a pass/fail difference exceeding a factor of ten, demonstrating that this low-cost method is adequate for practical use. When the RT-method is employed for image inspection, the discrimination sensitivity and processing speed can also be adjusted by partitioning the image, provided the position and shape of the imaged object and its fault modes are known. Given this simplification of the inspection equipment, further loss reduction can be achieved by optimal positioning in the production process. Cost reductions of 4.9 % for inspection and 1.0 % for equipment were obtained, totaling 2.29¥ per part.

Key words : MT-system, Maharanobis-Taguchi system, Assembly failure, inspection, monitoring

1. はじめに

1.1 電子基板製造における検査の課題と前報の取組み

弊社の複合機も年々と機能の多様化・複雑さが進んでおり，その制御を行う電子基板（Printed

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