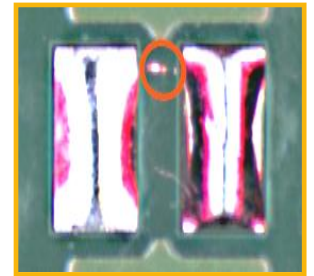
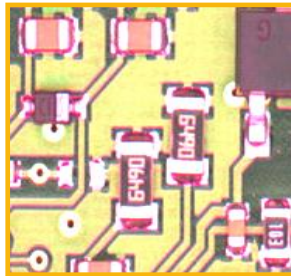
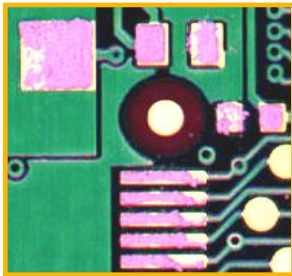


## ■ REQUIREMENTS

The production of PCBs is a complex process with many steps, all of which affect the end product. The layout of the circuit board, solder paste storage facility, accuracy of component placement, temperature of the solder oven and over sixty other factors affect the single processes that lead to an end product. At the end of the production process, the finished product is then tested. One of the typical test methods used is an electrical or function test in combination with a manual optical inspection. The ICT (In-Circuit-Test) is effective in testing small groups of components but its high setup costs often cause it to become uneconomical and unprofitable. Pin-pointing the production step where errors were caused is almost impossible at this stage and the recognition of a series of defective components often comes too late for a cost-effective correction.



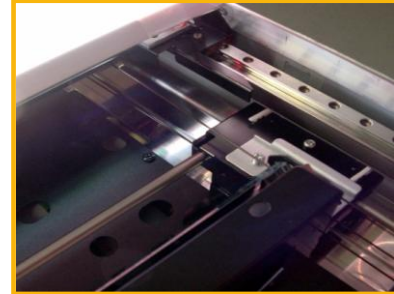
## ■ SOLUTION

The optical inspection systems from **modus** offer a cost-effective inspection solution for the single production steps and prevent defects from proceeding and causing more expensive defects. This allows the ICT to be reduced to purely a function test of critical component groups. The **modusAOI** is optimal for the inspection of solder paste application, manual and robotic component placement and especially THT (Through Hole Technology) components after selective and wave soldering processes. Production defects, such as insufficient solder paste, missing or incorrect components, open solder joints and short circuits can be accurately detected with minimal programming investment. Production inspection with the **modusAOI** guarantees not only an economically-sound quality assurance but also a continual optimization of single production processes (closed-loop).



## INSPECTION TECHNIQUE

**m**odus is a pioneer in the field of scanner-based automatic optical inspection. A high-resolution CCD scanner makes a high-speed acquisition of the entire surface of the test object possible without the use of a complicated multi-axis system. The heart of the modusAOI MLD1200 is a color CCD line camera with a resolution of 14,040 x 20,400 pixels per scan (21  $\mu$ m/Pixel). The innovative multi-colored LED lighting system illuminates the test object from multiple angles, which aids greatly in the detection of slanted surfaces, such as solder joints, in the resulting image. Using the One-Pass scan technology, circuit boards can be tested in three to twenty-five seconds. The mirror and lighting module moves along a single axis while the camera and objective remains stationary, resulting in a closed, maintenance-free system.



## TEST METHODS

**D**he optical inspection with a modusAOI is based on a predefined test plan. This test plan contains the necessary information to check if the test object meets the specified quality requirements. The existing test object library can be combined with CAD or Placer data to generate test plans. The test process starts with the acquisition of one or both sides of the test object. The test field's form and position are then compared with the predefined parameters. The vectoring used by this process makes an accurate test result possible. Using this process, deviations from the given values can easily be found and defects prevented. Certain test modes have been optimized to provide a more reliable and faster test process for specialized test functions such as solder paste application, component placement, THT or Reflow soldering, full surface recognition of solder balls and inspection of coatings and ceramic. The test plan's settings and values can be optimized offline with previously-scanned images using a intuitive and user-friendly interface. In the case of an error, the monitor displays a magnified view of the defective test field along with its relative position on the complete test object and the corresponding test field on the "golden test object" to allow a direct visual comparison.

