Simplifying quality control on PCBs with automatic pattern recognition

Modern printed circuit boards (PCBs) are furnished with a huge number of contact points for electrical connections, all of which are coated with metal. The metrological monitoring of these coated areas is imperative for precise process control. But especially for large-scale boards, manual positioning on these tiny measuring spots is simply unfeasible.

For the metrological monitoring of the thickness and material composition of coated contact points on PCBs, X-ray fluorescence (XRF) has been established as a very effective method. FISCHER offers several different models of its XRF systems, the FISCHERSCOPE® X-RAY series, which are specifically optimised for the measurement of contact pads on PCBs. As the demands for automation have steadily grown also for process control, the next logical step was to develop a solution for fast and effective quality control that requires minimal operator effort.

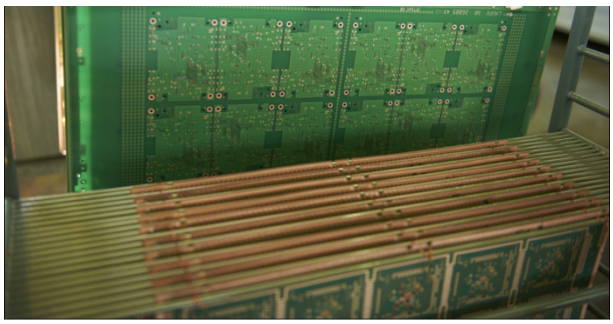

Fig.1: Typical printed circuit board with numerous coated contact points

To minimise operator involvement during measurement, the WinFTM® analysis software (version 6.30 and up) now offers automatic pattern recognition. This allows accurate and precise positioning of the measuring spot on very small structures in all XRF instruments with programmable XY tables. Especially in automated processes, pattern recognition can be used extremely effectively, for example when testing large circuit boards and measuring repeatedly at the same positions.

While is not uncommon for a small offset from the originally programmed measuring points to occur when the device is loaded with the next PCB, the true measurement position on structures in the micrometre range can only be found accurately using the fine adjustment capabilities of pattern recognition technology.

With WinFTM® 6.30, image details or patterns can be defined using the image recognition menu, which lets the user freely select the measuring position within the image frame. Then, before measuring starts, the software compares the measuring spot (in the focus of the crosshairs) with the picture detail – and automatically derives a more accurate positioning, locating and targeting the next contact pad in the row. It is also possible to define several image details or patterns in order to perform automated measurements on a variety of structures.

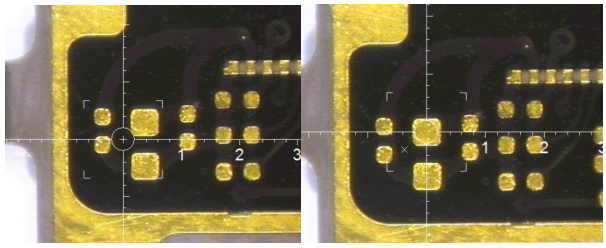

Fig.2: The programmed XY position is approached (left image); however, it does not exactly match the desired measurement target. The pattern recognition now looks for the defined image area and locates the correct measurement position (right).

Using the pre-sets in the pattern recognition menu, it is easy to run this software function even without prior knowledge. In addition, a variety of search algorithms can be chosen, as well as allowing for minor deviations from the target image (pattern) via error-checking.

The new pattern recognition feature built into the WinFTM® software enables excellent automated quality control of printed circuit boards when used with the XRF measurement systems from FISCHER. For more information, please contact your local FISCHER representative.