

## **Adding automated inspection to automated deposition - a boost to conformal coating production throughput**

*As demand for increasing quality, lifetime and environmental resilience is placed on electronics PCBs in greater volume and wider applications, conformal coating is now typically a standard process rather than an exotic special treatment. It must therefore deliver its full protection potential without compromising pcb assembly throughput or quality. Andy Bonner of YESTech Europe looks at how techniques drawn from AOI/AXI inspection experience, coupled with automated selective coating, ensure that this happens.*

Everyday electronic devices such as mobile phone handsets are increasingly expected to withstand environmental stress while offering greater quality and longer lifetime; attributes that can be enhanced by conformally coating selected areas of their electronics PCBs. And in applications such as safety related electronics for automotive applications, or high quality industrial electronics, coating is usually regarded as essential. It provides protection against moisture, dust, chemicals, and temperature extremes that could otherwise cause a complete hardware failure.

### **Development of selective and automated conformal coating technology**

Increased demand for conformal coating has been matched over recent years by steady improvements in coating technology which now allows effective and accurate results. For example Nordson-Asymtek – a fellow of Nordson-YESTech within the Nordson group – has patented a “Film-Coating” technology. This process allows a precise and repeatable closed pattern to be deposited within designated areas of the printed circuit board, with virtually no overspray. A platform such as Asymtek’s Select Coat system automates the selective conformal coating process and allows its easy integration into existing production lines. The Select Coat’s integrated closed loop control ensures superior coating quality, while reliability, accuracy and throughput are maintained.

### **Automated conformal coating inspection systems**

A production line operator must have ongoing confidence in his conformal coating system’s output, just as for any other manufacturing process. And traceability as well as quality assurance is often required. Therefore, any critical coating process includes checks to ensure the correct position of the coat, that the coating material hasn’t strayed into any prohibited areas, critical parts are fully covered and that no splashes or drips have contaminated components such as connectors or headers.

Nordson-YESTech now supplies a fully automated system to provide this type of inspection and traceability – their Automated Coating Inspection (ACI) system, introduced in 2009. The ACI system relies on the fluorescence of conformal coatings in UV light. It draws on YESTech’s 15 years’ experience of developing and supplying Automated Optical Inspection (AOI) and

Automated X-Ray Inspection (AXI) systems used for inspection of component placement and soldering on assembled PCBs.

Soon after its launch, the ACI system found its first application in a major US military manufacturer. This company was experiencing difficulties with the time taken for manual inspection of the coating and with human fatigue factors allowing coating problems to evade detection. They needed a solution that could reliably detect the presence of the coating material and accurately find the edge position of the coated areas. Checking for sufficient coat on critical parts whilst ensuring that there was no stray material in other sensitive areas was also essential. Their manufacturing process also called for the ability to generate programs quickly to cope with their small batch sizes.

The system also had to demonstrate better repeatability and reliability than the human inspectors, and to be capable of continued inspection, allowing for the fluctuations in fluorescence of the coating material due to fluorescent content, material thickness and curing times.

The ACI uses a 5 megapixel camera with white and red lighting for alignment of the board and barcode recognition, and an ultra violet LED array to detect the coating itself. Special algorithms have been developed to detect the board's coated and uncoated areas, and programming can be easily done by self learning from a previously inspected and approved board or by manually adding special inspection areas.

A sample known good board is loaded into the ACI and the programming wizard started. The wizard takes the programmer through the initial stages of setting the board size and creating a background picture of the board, which will later be used for failure reporting. The board alignment marks are then identified using the standard white or red lighting and a standard AOI algorithm. The board is then ready for programming. This is a simple process of defining the positions of the coated and uncoated areas. The system will then lay an inspection grid over each. The programmer can adjust the brightness and tolerance for the coating on and off position. The program is then ready for basic test on the production run. All data can be stored for future use.

If the board also has specific areas that must have no coating or drips, or areas that need to be precisely coated, the programmer can apply specific tests using information from the system part library. Libraries can be common across different board programs. In addition, barcode positions can be programmed using the system camera and lighting. These barcodes can be either one per complete assembly or one for each of the boards on a panel.

By combining these features with the facilities of the standard AOI systems, the manufacturer is able to inspect the boards and output data directly to both touch up stations and to SPC data files, all logged against the board serial number.