

ELECTRONICS

March 2010

ASSEMBLY

TECHNICAL SOLUTIONS FOR MANUFACTURING ENGINEERS



**Manufacturing futures:
play the winning hand**



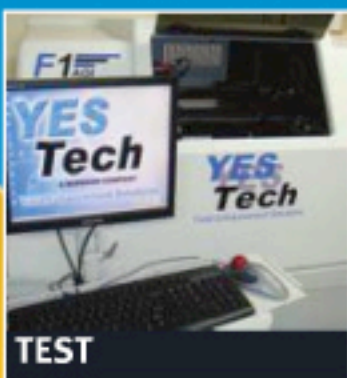
NEWS



COATING



WHAT'S NEW



TEST

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IT'S ALL PART OF THE PROCESS

Conformal coating is no longer an exotic treatment – it's a standard process. Automated deposition and inspection ensure it integrates seamlessly into the production line

As demand for increasing quality, lifetime and environmental resilience is placed on electronics PCBs in greater volume and wider applications, conformal coating is fast becoming a standard process rather than an exotic special treatment. It must therefore deliver its full protection potential without compromising mainstream PCB assembly throughput or quality. YESTech Europe's Andy Bonner looks at how AOI/AXI inspection techniques, 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 the PCB. In safety related applications such as automotive 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.

Increased demand for conformal coating has been matched over recent years by steady improvements in coating technology, designed to achieve 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 is said to create a precise and repeatable closed pattern, 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

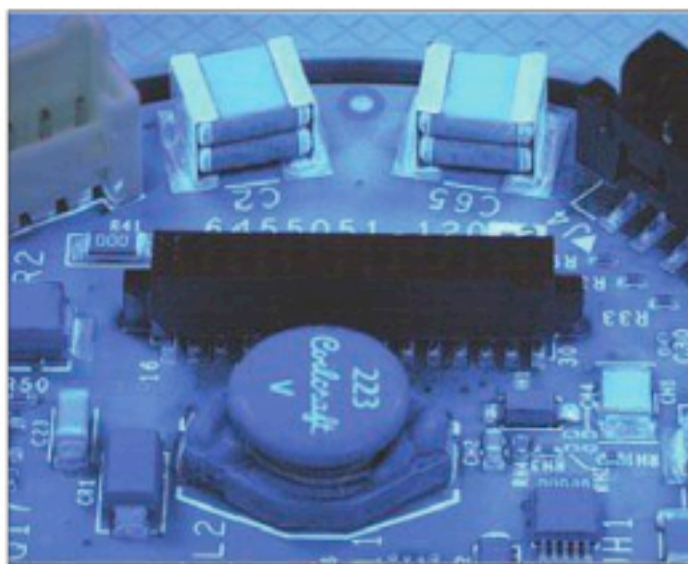
conformal coating process and allows its integration into existing production lines. The Select Coat's built-in closed loop control is said to ensure coating quality, while maintaining reliability, accuracy and throughput.

Inspection = traceability

Just like any other manufacturing process, a production line operator must have ongoing confidence in his conformal coating output. Traceability, as well as quality assurance, is often required. Any critical coating process therefore 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 supplies a fully automated system to provide this type of inspection and traceability. The company's Automated Coating Inspection (ACI) system, introduced in 2009 detects the fluorescence of conformal coatings in UV light. It draws on Yestech's 15 year history of supplying automated optical inspection (AOI) and automated x-ray inspection (AXI) systems used to inspect component placement and soldering on assembled PCBs.

Soon after its launch, the ACI system found its first application with a major US military manufacturer. This company was experiencing difficulties with the



Specific tests can be created for areas that require precision coating

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The ACI uses white and red lighting for barcode recognition and an ultra violet LED array to detect the coating



time taken for manual inspection of the coating, with human fatigue 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 coated areas. Checking for sufficient coat on critical parts while ensuring that there was no stray material in other sensitive areas was also essential. The client's manufacturing process also rapid program generation to cope with small batch sizes.

To justify itself, the system had to demonstrate better repeatability and reliability than the human inspectors and 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 five 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 self-taught from a previously inspected and approved board or by manually adding special inspection areas.

Programming = simplicity

For ease of use, a sample known good board is loaded into the ACI for use with a programming wizard. This 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. Board alignment marks are 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 testing 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, it is possible to apply specific tests using information from the system part library. Libraries can be common across different board programs. Barcode positions, which can be one per assembly or one for each board on a panel, can be programmed using the system camera and lighting.

Combining these features with the facilities of a standard AOI system, ensures 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.

Records = reliability

Fault information is passed directly to a rework station via a standard Windows network. The rework operator can access the data directly by scanning the barcode. Fault information showing

the position of missing or excess coating is shown on the PC screen. Once rework has been completed the operator moves on to the next board and the rework information is added to the SPC file. All rework and board status information is retained against the board serial number, for as long as necessary. Full pictures of the board and coating can also be kept on file for future reference.

SPC data is updated in real time, with the status of the last board inspected, and can be viewed from anywhere on the network. Standard outputs are to Access, SQL or to a text file and the data can be configured to communicate with factory automation software.

The demand for quality and resilience now routinely placed on electronics hardware means that conformal coating is becoming an essential part of mainstream PCB assembly lines. Nordson Yestech believes this automated deposition and inspection solution allows conformal coating not only to become part of an electronics manufacturer's production line, but also to integrate into his QA system.

■ www.yestech-europe.com

