

Evaluating Screen Printer Options

How the three most common features impact board quality and throughput.

Sophisticated material printing equipment has a number of options designed to improve quality and reduce cycle and setup time. Options vary by manufacturer, but a common set of features is offered by all suppliers. The performance of each option must be evaluated and judged by the process engineer selecting the screen printer.

Stencil cleaning. Stencil cleaning is almost standard. The equipment's capability to efficiently clean stencils is vital in developing a stable, repeatable printing process. Most stencil cleaning systems wipe the bottom of the stencil using wiping paper, with or without cleaning solvent. Many also remove material from stencil apertures using a vacuum system. When evaluating cleaners, consider:

- How efficient is the stencil cleaning system in actually cleaning the stencil, including the inside of the stencil apertures?
- What is the cycle time of the stencil wiping system? This will contribute to the total cycle time and total throughput of the printing process.
- How much wiper paper and solvents are consumed?

PCB support systems. Many board support systems are available. Of the two primary factory-installed board support systems, one type selects support pins from a tray and places them in programmed locations. Variations include the number of support pins that can be placed, the speed at which the support pins are placed, the size of the support pins and how the system is programmed.

The second type provides a pattern of support pins on a particular grid pattern. Each individual support pin in the grid can be activated individually to support the product being printed. For either type, consider:

- How efficiently does the system support the board during printing? Are there sufficient support pins and can they be located in optimum positions to provide the required support? This is especially important when processing boards with fine pitch components, large boards or thin boards that deflect from the downward force of the squeegee blade.

- What is the setup time of the support pin placement or activation process?
- How easy is it to clean the support pins? If solder paste or other materials can easily get onto the support pins, they prevent the board from sitting flat on top of the support pins, possibly leading to solder bridges, misaligned paste and excessive solder.

Post-print inspection. Two post-print inspection systems have been available for a number of years: 2-D and 3-D. Both 2-D and 3-D post-print inspection systems examine the solder paste on the board after printing.

The 2-D systems evaluate the length and width of the paste deposit in relation to how much paste is covering the pad. In most cases, the existing vision system, with some additional software, is used for 2-D inspection.

The 3-D system adds a laser to measure the height of the deposit. Both systems permit users to define the acceptable limit of paste coverage and height.

A newer innovation is the capability to "look" between the pads for solder paste. Paste in this area can cause wet solder bridges and, more than likely, actual solder shorts. Other areas for evaluation:

- What is the repeatability and reproducibility of the 2-D and 3-D systems? A formal Gauge R&R study should be conducted before any purchase. (Gauge R&R is the only method available to evaluate any inspection or test system.)
- How do the 2-D and 3-D systems factor into the overall inspection and test process? What other inspection and test systems may be capable of identifying the same defects and where are those defects discovered?
- How does inspection impact the cycle time? When the printer is performing an inspection, it cannot print boards. The impact on throughput can be significant and will determine if it makes sense to perform inspection.

Although many factors influence the performance of screen printers, these three options are the most common features that dramatically impact final board quality and throughput. ■

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