Conformal coatings protect sensitive electronic circuitry from moisture, dust, chemicals, solvents, and other harsh environments. In the past, conformal coatings were reserved solely for expensive military or aerospace applications. Today, they are commonly used to protect a variety of automotive, commercial, industrial, medical, and consumer electronic devices.

For many manufacturers, conformal coating starts as a manual process where coatings are applied by brushing, dipping, or hand spraying. Manual processes are initially attractive since they require a minimal upfront investment and are relatively easy to implement.

However, manual coating processes come with risks and challenges. Operators are at risk of overexposure to harmful solvents and vapors, masking and de-masking steps can become overly labor-intensive, and the quality of the coating process is completely dependent on the skill level of the operator. Throughput also depends on the skill level and number of available operators. In addition, constant manual handling of PCBs increases their risk of physical damage.

As production volumes ramp up, throughput, quality, and safe operating conditions become more and more challenging to maintain. If manufacturers are grappling with any of these manual coating challenges, they might want to consider automating the process by investing in an automated selective conformal coating system.

The Decision to Automate

Making the decision to transition from a manual coating process to an automated one can be challenging. For most managers, the five primary areas of consideration are cost, safety, quality, repeatability, and throughput.

Cost. Cost is usually the most influential factor. The initial cost of a new robotic coating system may seem high, but a simple cost comparison against a manual process can yield surprising results.

The cost of the spray booth, coating material and associated solvents is fairly straightforward. The total labor cost should include not only the actual spray time, but also any masking and de-masking steps, rework or touch-up time, and any cleanup that might be required.

With proper configuration and programming, an automated coating process generally eliminates the labor costs associated with manual masking, de-masking, rework, and touch-up. Since selective coating systems only apply coating where it is required, overspray and material waste is greatly reduced or eliminated, leading to an overall reduction in material cost.

Safety. To maintain a safe and healthy work environment, it is important to understand how frequently and how long operators are exposed to harmful solvents and vapors. Is adequate ventilation provided? Are proper safety procedures being used during production? Do operators use personal protective equipment such as masks, gloves, and suits, and are they using them properly?

Automated selective coating systems address these concerns by providing a “hands-off” coating process. In an automated process, coating is done inside a ventilated enclosure. This significantly reduces or eliminates any exposure to harmful solvents and vapors. Automatic door and hood safety locks and automated SMEMA-compliant conveyors prevent operator injuries while running production.

Quality. A highly skilled operator can deliver excellent quality. However, consider the amount of time it takes to
reach that skill level and the variable quality that naturally occurs as skills improve. It can be challenging to find, train, and keep skilled operators.

With the right hardware configuration and optimized programming, an automated selective coating system can maintain production quality regardless of operator skill level or personnel changes.

**Repeatability.** Repeatability is the essence of automation. When an automated selective coating system has been optimized to produce the best possible quality, the result is repeatable and consistent output, cycle after cycle. As long as the system is properly used and maintained, it can reproduce the same level of quality every day, every week and every month.

**Throughput.** To increase throughput in a manual process, it is generally necessary to hire and train new employees or to add a shift. Additional spray booths and floor space might also be necessary. If there are constraints in any of these areas, coating automation could offer a viable solution.

The decision to convert from a manual coating process to an automated one may seem daunting, but with careful planning and consideration, manufacturers can increase throughput and improve quality. Important considerations include initial investment and long-term labor costs, operator safety requirements, quality standards, repeatability, and throughput goals.

**Contact:** Nordson ASYMTEK, 2747 Loker Avenue West, Carlsbad, CA 92010 ☎ 760-431-1919  fax: 760-431-2678  E-mail: info@nordsonasymtek.com  Web: www.nordson.com