

Manufacturer Saves \$70K a Year

With New Dispensing and Curing Process

By Jim Victoria

Recent changes to an adhesive dispensing process are saving a leading manufacturer of low-pressure air switches used in heating, ventilating and air conditioning systems an estimated \$70,000 a

operation accompanied by frequent bottlenecks.

The calibration screw sits in a small well. After the screw has been adjusted to the OEM's specified set point, the well is filled with adhesive to keep the screw in position and discourage tampering. Since screw height and displacement vary with the switch configuration, the amount of adhesive needed to fill the well is different for each job.

Tubs of calibrated switches were carried to dispensing tables, where they were unloaded and placed in racks. Operators then used plastic squeeze bottles to carefully fill the wells with a water-based adhesive. Since there was no way to control the amount of adhesive dispensed, they often applied more than necessary and had to wipe off the excess. Although the water-based adhesive was relatively inexpensive, waste-related costs and cleanup time were significant.

Once all the switches in a rack had been filled with adhesive, the rack was placed under a fan to speed the curing process. At least five minutes was required for the adhesive to form enough of a "skin" so that the switches could be handled and boxed. Since final curing and quality control audits had to take place before the order could be shipped, there was often a

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New dispensing/curing lines have helped this pressure switch manufacturer eliminate bottlenecks and increase productivity more than 25%. Universal fixturing, dedicated dispense valve controllers and adjustable curing equipment give them the flexibility to handle any product configuration with just a few minutes of setup time.

year—even after switching to a more expensive adhesive and four new assembly lines.

Introduction

The company offers original equipment manufacturers (OEMs) dozens of standard switch configurations that can be factory-calibrated to an individual manufacturer's specifications. This innovative approach allows the company to offer customers greater design flexibility at no additional cost and without the long lead times often associated with custom products.

Bottlenecks Pose Problem

Until recently, the adhesive application/curing process was a time-consuming, labor-intensive batch

considerable backlog of product on the shop floor.

Taking Advantage of a New Technology

To minimize work-in-process and reduce no value-added activity, the switch manufacturer looked into the benefits of changing from the water-based adhesive to a different adhesive that cures quickly under ultraviolet light. A Three Bond adhesive was chosen. The manufacturer then replaced the racks and dispensing tables with four new automated dispensing/curing lines.

Even though the new adhesive was ten times as expensive as the old one (\$300/gallon vs. \$30/gallon) and an investment in capital equipment was required, a cost/benefit analysis showed the extra expense would be more than offset by higher efficiency and productivity.

To keep the cost of the new assembly lines down and expedite their implementation, off-the-shelf equipment was used wherever possible. Application-specific components, such as universal fixtures capable of accommodating all of the various switch designs, were fabricated in-house.

Air-operated precision dispense valves offered the accuracy, fast cycle rate and drip-free cutoff needed to rapidly fill each screw well with a consistent volume of adhesive. Each valve was paired with a microprocessor-based controller that makes it simple to adjust shot size for different switch designs and screw depths on-line, without stopping production.

Using a dedicated valve controller also eliminates the need to reprogram the main PLC (programmable logic controller) for product changeovers—a very useful feature when dealing with so many different product styles and specifications. The adhesive is cured



Calibration screws on low-pressure air switches are covered with UV-cure adhesive to keep them in position and discourage tampering. Switching to a new adhesive and an automated dispensing/curing process has cut process time from five minutes to five seconds.

with a UV-spot curing system with 320-500 nm power output and a glass dichroic reflector.

Fast Results and Multiple Benefits

The new dispensing/curing lines quickly eliminated the bottlenecks by providing much faster throughput with minimal parts handling. Under the new system, a calibrated switch is handled only once—when it is placed in the fixture that moves along the conveyor to the dispensing station.

As the switch moves into position under the tip of the valve, the PLC signals the valve controller to start the timed dispensing cycle, and in less than a second the well is filled with the correct amount of adhesive. Curing under the UV-spot curing unit takes about another four seconds.

The switch manufacturer's investment in new adhesive and dispensing/curing technology is saving the company approximately \$70,000 per year. Through a combination of higher output, less work-in-process, and greater overall efficiency:

- Overall productivity has increased between 25-30%.
- The new adhesive/equipment combination has made the dispensing/curing process extremely accurate and virtually instantaneous. Product appearance is more consistent, and process time has dropped from more than five minutes to less than five seconds.
- No value-added activity such as redundant product handling has been eliminated, and work-in-process is kept to a minimum.
- The universal switch fixtures, dedicated valve controllers and adjustable curing equipment provide the flexibility to handle any product configuration with just a few minutes of setup time.
- To maintain output under the old system, as many as four operators were required at each dispensing station. With the new system, only one operator is needed to load the fixtures on each assembly line.

Conclusion

Stepping back to take a critical look at their dispensing process helped this manufacturer move from a time-consuming batch process to an efficient, continuous flow system without bottlenecks or backlogs.

Besides increasing throughput, the new system design also allows for Statistical Process Control (SPC) functions online, which has eliminated the need for lengthy quality audits. Switches are now packed as they come off the line, fully cured and ready for immediate shipment. ▸

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