



Case in Point

Selective Soldering Increases Quality at Rockwell

Rockwell Automation Group, Sumner, Iowa, had severe quality control problems on one of the assembly lines for its 1336 family of variable frequency AC automatic motor controllers. There was an unacceptable level of rework and scrap because the assemblies are extremely difficult to solder with consistent quality control due to their unusual geometry and huge thermal demand.

Bill Myers, manufacturing engineering analyst at Rockwell, found that as the production level increased, product quality decreased. The pins on a Diode Bridge and IGBT module had to be soldered to a power printed circuit board, but this process caused many problems. Rockwell's semiautomated solder pot system had poor control over wave height, immersion depths, and other critical factors. Also, fixturing was extremely difficult to make. The fixtures had to present the assemblies in a way that would effectively solder the pins, but not damage neighboring capacitors, a transformer and relays, some only 0.025 in. away.

"It is imperative to keep the heat away from them," states Myers. "The parts protrude from the board one inch or more, so they can't be masked off for protection. We created special nozzles for the solder pot, but even then it was becoming an extremely variable process."

Soldering components onto one of the large and complex 1336 internal board assemblies using the new robotic single point soldering system. (Robotic Process Systems)

Another concern was the amount of flux consumables and waste byproducts generated. Because the division is an ISO 14000 certified facility, it was imperative to greatly reduce this waste.

"We decided to use the services of Robotic Process Systems (RPS) of Liberty Lake, Washington because of their expertise in soldering technology and factory automation," said Myers.

RPS's "Opus" is a generic robotic platform. Integrating standard soldering options with custom tooling, including all Allen Bradley/Rockwell controls, created an effective custom single point soldering system.

"The most difficult problem was fixturing that would present the product to the machine in a repeatable manner," said Jess Baker, president of RPS. "The machine always had to find the pins to solder, and there were quite a few different configurations. Our engineers developed a creative solution that would always present the various drive modules to the solder robot in a consistent manner. Essentially, the drive 'hangs'

on the fixture by the PCB so all soldering takes place at the same elevation."

Cycle time remained at 2.5 minutes per drive, but since the implementation of the new system, quality improved from 78 percent to >99 percent first pass yield. Scrap and rework have essentially disappeared. Waste byproduct has been eliminated.

"The system is very versatile. In the electronics industry, there are always some 'oddball' parts that can't be soldered by standard methods, added Myers. "When quantity, quality or both create a demand, robotic selective soldering can be a good solution to the problem. It solved ours."

EP&P

Have you solved an interesting packaging or production problem? Contact Nevenka Krsmanovic at 847-390-2202.

