PCB Manufacturer Blends High Quality with Quick Response

Achieving the correct plating thickness the first time is critical to this manufacturer's business . . .

dvanced Quick Circuits (AQC), a division of Rossi Electronics, Inc., Melbourne, Florida, blends production and design experience for producing high-quality, high-density printed circuit boards with quick customer response. Vital to its boardmanufacturing capability are on-line inspection systems with added backup for quick response.

According to AQC, its primary market niche is in the advanced engineering arena where response time, high technology and customer service are the driving forces. In its 100,000-sqft manufacturing plant, high-density PCBs are made for manufacturers in the telecommunications, computer peripheral and military electronics industries. AQC has also provided PCBs for the Hellfire, Titan and F-16 military programs. AQC originated as Advanced Board Circuitries in 1974. In 1983, an investment group, which included Charles Rossi, Jr., purchased Advanced Board Circuitries from Storage Technologies. In 1989, Advanced Board Circuitries and Quick Circuits, Inc., merged to become AQC. Quick Circuits was started in 1980 by Charles Rossi, Jr. to serve the smallquantity, quick-turn-around PCB market.

Some of AQC's capabilities include Hi-Rel boards that are manufactured to such specifications as UL-94V-O, MIL-P-5510 Types 1,2 and 3, Bellcore, MIL-Std 2000 and MIL-I-45208. Its technological expertise includes the manufacture of multilayer boards up to 24 layers.

Materials used to make the boards include: FR-4, FR-5, BT, cyanate

ester, polyimide and Kevlar. Boards are run through a series of tests, including net list download, fine-pitch surface mount, clamshell and high voltage. "All products, both military and commercial, are measured during in-process inspections," explained Judy Gehman, quality analyst.

Critical functions must be controlled. Internal copper weight is critical for current-carrying capacity and heat dissipation. Customer specification requirements range from 50 to 300 microinches; a one mil minimum of copper is required in platedthrough holes to ensure proper contact of interconnections and for mechanical strength and stability of the hole.

Tin-lead plating provides protection for the base metal and a solderable surface for subsequent processing.

COPPER AND TIN-LEAD printed circuit board plating production line.

Requirements are typically 300 microinches minimum prior to fusing. The composition of tin-lead (63 pct tin and 37 pct lead) ensures that the plating deposit can be fused at the minimum possible temperature to avoid delamination of the circuit boards.

AQC uses its high-tech coating thickness measuring systems for inprocess inspection directly at the plating lines. The systems have helped the Quality Control Department assure proper copper weight prior to lamination. Copper and tin-lead thicknesses are measured prior to etch, to identify improper process variations that can lead to rejects. Gold-nickel and electroless nickel thicknesses are also measured.



THICKNESS MEASURING SYSTEM operates on the microresistance and eddy-current principles. A three-element probe measures holes as small as 20 mils and detects cracks, voids and non-uniform plating in the hole.

The company uses two bench-type MRX thickness measuring systems from CMI International, Elk Grove Village, Illinois. They operate on the microresistance and eddy-current principles. One MRX system is located at the Automated Optical Inspection area to ensure copper weight of inner PCB layers prior to lamination. Another MRX system is located at Plate Audit to ensure proper copper thickness of plated through holes prior to etch. A single-screen XRX xray fluorescence coating thickness measuring system is also located at Plate Audit to ensure tin-lead and alloy thickness prior to etch and to verify the thickness of gold-nickel and electroless nickel plate.

The printer-equipped thickness measuring systems take measurements from a sample of each board

lot. The statistidata cal are printed and shipped along with the lot to **Ouality** Control. Random lots are selected and thickness averages are plotted daily on X-bar and R charts as part of the process control for each plating tank. Incorrect inter-

nal copper weight results in lost materials, inspection time, processing and press time, and, more importantly, jeopardized delivery time. "If copper and tin-lead thickness are incorrect after etch, you can estimate that these costs or losses are at least five times greater," Ms. Gehman estimated.

"The savings are a combination of reduced man-hours, less scrap, reduced material costs, plus savings in process time and destructive testing. Back-up equipment is used for handling production increases. AQC strives for zero downtime and consistent on-time deliveries. "All of our back-up equipment is also maintained with current calibration certification and is ready to go on-line anytime, day or night," said Ms. Gehman.

The XRX single-screen system measures the thickness of virtually any coating on any base, including multilayers. The system's slotted chamber easily measures large printed PLATE AUDITOR Reginald Edwards measures plated through-hole copper of high-density printed circuit boards using MRX plating/coating thickness measuring system.

PAT STORK measures surface copper. Quality Analyst Judy Gehman observes. circuit boards up to 25 by 36 inches, as well as small electronic parts. The XRX also provides AQC with "Point and Shoot" automatic table positioning technology.

The correct plating thickness is crucial to the manufacturing of quality printed circuit boards. Testing the thickness while the products are on line allows for fast turnaround, allowing Advanced Quick Circuits to live up to its name. **PF**

More Information?

To obtain more information on products or processes mentioned in this article, circle corresponding numbers on the Reader Service Card.

Thickness

measuring systems Circle 284

To request an additional copy of this article, write on company letterhead to "Reprints," c/o PRODUCTS FINISHING, 6600 Clough Pike, Cincinnati, OH 45244.