Avery Ramps Up RFID Inlay Production

The RFID tag and label manufacturer claims that its new system can manufacture RFID inlays at least 10 times faster.

By Bennett Voyles

May 30, 2005—RFID tag and label manufacturer Avery Dennison RFID has brought online a new system to manufacture RFID inlays. The firm claims the system is at least 10 times faster than “conventional production methods.”

The new technology simplifies the creation of the RFID inlay, the microchip and antenna core of an RFID tag, by eliminating the need for high-precision robotic tools needed to join the two elements, according to Stan Drobac, vice president of RFID strategy and planning for the company's RFID division in Clinton, S.C.

"We think that's a big deal," Drobac says. "There are bottlenecks everywhere you look at RFID, from systems integration to software to label converting to putting adhesive on these things, but from what we can see, the biggest and most difficult bottleneck was actually inlay capacity."

Until now, the industry standard for manufacturing inlays has involved a $1 million system called a "flip-chip," according to Drobac. A robot head with a precise vacuum nozzle picks up an individual silicon chip cut from a 6- to 8-inch-wide wafer. The chip is then carried to a transfer station, where it is flipped over so its two electrical contact points are facing down. Another vacuum nozzle sets the chip down, matching contact points only a few microns wide to the equally tiny pads of the antenna. At that point, the chip is pushed down, and heat and pressure cure the electrically conductive epoxy to bond the connection between chip and antenna.

Although flip-chips can manufacture up to 10,000 inlays an hour, the speed has not been fast enough to satisfy current demand, according to Drobac. He says the new system can generate speeds 10 times greater than the conventional system, but is reluctant to quantify what that would mean in terms of units because many variables affect performance.

In Avery's new process, the 1-mm-square chip is first mounted on a strap of approximately 4 mm by 8 mm, which makes for simpler handling. A metal pattern etched on the plastic surface acts to create a much larger connective surface. It is then matched with an Avery-designed printed antenna that also has much larger connective pads. This enables Avery to create a completed inlay without the same degree of precision the flip-chip process entails.

"Basically, the strap takes the contacts from the chip and spreads it out to much bigger contacts on a bigger piece of film that can be slapped down onto antennas very rapidly," Drobac explains. While the idea of strap-mounting is not new—Alien Technology of Morgan Hills, Calif., developed a process for adding straps to chips several years ago—Drobac claims that Avery's system is the first to use an automated process to create inlays.

Avery plans to buy straps from Alien Technology, and possibly some semiconductor companies as well. The company claims to have filed a number of patent applications for the new process. Avery will not be licensing the technology to other firms, Drobac says, but instead sees it as the basis of a proprietary advantage.

Avery's RFID manufacturing facility has already been converting some of the inlays into labels, but it also has been shipping 96-bit UHF EPC Class 1 inlays produced with the new process. The inlays are being sent out to some of its lead customers—the converter companies that supply the big packaged good manufacturers with labels. "We've got teams of guys going out to the key converters with rolls of material to make sure that everything goes smoothly as they convert them and turn them into labels," he says.

That doesn't mean Drobac expects any problems. The new inlays manufactured on the high-speed lines are no different from the old ones, he says, and clients should experience very little difference. "From their perspective...an inlay is an inlay. As long as the contacts are rugged enough, which they are, using this kind of inlay versus a flip-chip inlay is a 'don't care' for them. The main impact...is this will loosen up the supply for them, and supplies won't be so tight," he says.

But potential customers shouldn't get their hopes up that the productivity advance will reduce their costs any time soon. Drobac says that although the new process will give them almost "an order of magnitude" in greater productivity for the same outlay as the flip-chip process, he doesn't expect Avery inlay prices will drop. Their current prices don't actually reflect Avery's present costs, which he says are much higher than what clients are charged. "Today's market prices don't have any relationship to cost," he says. "It just means we won't be losing as much [money]."

The new process will enable the firm to meet the huge demand expected for RFID UHF labels as manufacturers try to meet the new RFID tagging requirements of Wal-Mart and other large retailers.

Other companies are also working on solutions aimed at helping meet that demand. Mark Andy, a maker of narrow-web printers, recently demonstrated a system capable of producing large volumes of converted RFID labels made with Texas Instruments straps (see RFID Label Making Picks Up Speed).