New High-Speed RFID Tag Machine

Matrics announces a new system to assemble billions of low-cost RFID tags per year.

Sept. 19, 2003 - Matrics, an RFID systems provider, announced at this week's EPC Symposium a new high-speed RFID tag assembly machine that, when fully operational, could produce up to 70 billion RFID tags per year. Such advances in assembly technology are needed to meet the demand as companies begin tracking billions of cases and pallets moving through the global supply chain.
The new assembly process is called PICA, which stands for Parallel Integrated Chip Assembly. Piyush Sodha, the CEO of Matrics, compared the new machine to Gutenberg's development of a printing press with moveable type. "Gutenberg came up with a number of innovations, such as movable type and faster drying ink," he said. "Similarly, we have come up with several innovations that will transform tag assembly."

Matrics is a member of the Auto-ID Center, which has been striving to create a low-cost RFID tag to carry Electronic Product Codes. Sodha said that with this new technology, Matrics could produce tags for 5 cents each at very high volumes. The only other company that has made such a claim is Alien Technology, which has patented a mass-assembly process known as Fluidic Self-Assembly. Philips Semiconductor is also working on assembly process that uses vibration to shake chips into holes so antennas can be attached to them (see Philips Unveils Low-Cost Chip Plans).

One of the key innovations is a fast-curing adhesive that can be used to attach the microchip to the antenna and the ability to place several chips on antennas simultaneously. The faster the adhesive cures, the faster the machine's throughput. Sodha said the curing takes place in less than a second with the new adhesive.

Another innovation is the ability to place several microchips on printed antennas simultaneously. Today, most machines have one antenna after another on a roll. The chip is added and the "inlay"—chip and antenna on a substrate—can then be converted into a finished RFID label.

Matrics has developed a way to have several antennas side by side. The antennas are printed with conductive inks on rolls of plastic or paper. The rolls are fed in a continuous stream into the PICA machine. Tiny robotic heads punch the chips down onto antenna connection points with adhesive. Ultraviolet light cures the adhesive almost immediately.

The tags are then scanned and any tag that doesn't respond is marked. When the sheets of antennas with chips are cut into RFID tags, those marked as defective are removed. The company, which built a PICA prototype machine this past spring, has filed 15 patent applications.

Currently, machines that use flip-chip assembly—adhesive is applied to pads on a microchip and then the tag is flipped over and pressed onto the antenna—can assemble 8,000 RFID tags per hour. Matrics says one PICA machine will be able to produce millions of tags per hour. Just as Gutenberg could run off pages of text, Matrics says PICA will create entire "pages" of RFID tags at once.

A PICA production machine, which will be installed at Matrics' headquarters in Columbia, Md., will begin production in first quarter 2004. Sodha said that in order to fulfill the eventual demand for billions of tags to

track cases of product, PICA machines will have to be located around the world, close to the major centers of manufacturing, to save time and shipping costs. The company is now looking for partners that will run PICA assembly machines and produce tags for manufacturers in Asia, Europe and Latin America.

Matrics also announced that it has teamed up with Apriso, Long Beach, Calif. software company that sells real-time, collaborative supply and manufacturing applications. The two companies will work together to deliver inventory- and asset-management systems to businesses looking to deploy RFID technology. The two companies recently collaborated on a first-of-its-kind warehouse tracking system for one of the world's largest paper and forest products companies.

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