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Produce Growers and Container Coalition Conduct RFID Field Test

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The study will track 3,000 reusable containers carrying goods from produce growers in three states to Wal-Mart stores in Texas, to determine whether RFID tags can survive multiple shipment cycles.

By Claire Swedberg

Dec. 3, 2007—Nonprofit group Reusable Pallet & Container Coalition (RPCC), representing members of the reusable transport packaging industry, is conducting a field test of RFID technology by attaching tags to 3,000 reusable containers carrying goods from produce growers in three states to Wal-Mart stores in Texas. The study aims to determine whether RFID tags can survive multiple shipment cycles as the containers carry fresh produce to the retailers, and follows lab testing of Gen 2 RFID tags attached to plastic containers (see Reusable Pallet and Container Coalition Studies RFID).

Lab testing began in June 2006, when Quality Logistics Management (QLM), an RFID solutions provider, launched a study measuring failure rates of nine brands of Gen 2 tags at Michigan State University's School of Packaging. At the school's lab, researchers tested how well tags could sustain temperature fluctuations, vibration and the shock of sudden 5-foot drops, says Michael McCartney, QLM's founder and principal.

Michael McCartney

The tags were tested by Cal Polytechnic State University professor Jay Singh at The Kennedy Group in Cleveland to determine how well the tags could be read following the abuse they underwent in Michigan. Of the nine brands, McCartney says, three performed at 100 percent: Alien Technology, Avery Dennison and UPM Raflatac.

For the latest phase of project, designed to test the tags in the real world, the team picked one tag model from each the three best-performing brands (McCartney declines to specify the exact tag models). Three participating growers—Stemilt, in Wenatchee, Wash.; Tanimura & Antle, in Salinas, Calif.; and Frontera Produce, in Edinburg, Texas—have each been tagging 1,000 containers with freezer-grade adhesive labels. Each label is attached to a label holder on a container's center, below its handles, and in some cases, on the container's upper left corner. The containers will be shipped to Wal-Mart's distribution center (DC) in Cleburne, Texas, then on to 100 Wal-Mart stores, also in Texas. Each container will be shipped through three separate cycles.

In the case of Stemilt, the Washington apple grower picks its apples, loads them into bins, and brings them back to the plant for processing. The fruit is cleaned, sorted and loaded into Georgia-Pacific reusable plastic containers with Avery Dennison RFID tags. Each tag is encoded with a unique ID number. The apple-filled containers are loaded onto wooden pallets and shrink-wrapped, and a "parent" RFID tag, in the form of an adhesive paper label, is attached to the pallet load. That parent tag is discarded after one cycle.

When the shipment leaves the Stemilt facility, it passes an RFID interrogator for its first read, then is scanned again upon arrival at the entry dock of Wal-Mart's distribution center. The containers of fruit are placed in cold storage for about 24 hours. The container tags are scanned as they leave the DC, then upon arrival at one of the 100 Wal-Mart stores, and again as the containers are moved to the sales floor. Once emptied, the containers are taken back to the dock doors, where they are collapsed, scanned, stacked and shipped to an Orbis facility in Garland, Texas. There, they undergo cleaning and sanitizing at temperatures of 170 degrees, and QLM encodes a new EPC number on each container's tag before sending it back to Stemilt to begin the process again.

Orbis agreed to accept its own containers as well as those of competing companies Georgia-Pacific and IFCO (which are also field-test participants) because it is the only participating reusable container company that has a facility with the necessary RFID portals. That openness between the container vendors has been striking, McCartney says, adding, "This is one of the first times three competing companies [in this industry] have worked together like this."

Tanimura & Antle, a grower of leafy greens, brings its Orbis plastic containers (fitted with Alien tags) into the field, where lettuce is cut, wrapped and packed directly in the container. The containers are taken to Tanimura & Antle's processing plant, where the lettuce in each container is chilled, washed and inspected. The container tags are then read prior to shipping to Wal-Mart through the same pattern as Stemilt's apple shipments: After passing through Wal-Mart's DC to a Wal-Mart store, they return empty to the Orbis facility, where they are cleaned and sanitized, after which QLM encodes new EPC numbers to the tags and sends them back to Tanimura & Antle.

In the case of Frontera Produce, the grower loads its jalapeño peppers into bins, then packs the cleaned and sorted vegetables into IFCO reusable plastic containers fitted with UPM Raflatac tags. They, too, are shipped to the Wal-Mart distribution center and on to Wal-Mart retail locations. After returning empty to the Orbis facility, as with other containers involved in the test, they are cleaned and sanitized and the tags are re-encoded before being returned to Frontera for the next cycle.

The three producers were selected, McCartney explains, because of the different packaging processes and varying sizes, shapes and fluid levels of their products. For example, he says, peppers have little liquid, while apples have more and lettuce has the most, making RFID reads more challenging. "Our goal with this pilot is diversity."

The growers are using a combination of Motorola, Alien and Impinj interrogators, McCartney says. "In theory, the readers shouldn't make any difference," he states. "We haven't seen anything we could measure that would say one reader is different than another."

According to McCartney, the shipments will each take about 45 to 60 days. In June 2008, QLM intends to provide a white paper to RPCC, which will then make the report available to the public at no cost.

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"The question we are seeking to answer is whether a single-use RFID tag can be used multiple times," McCartney explains. "We have a returnable system reusing the containers [and the tags] hundreds or thousands of times. We want to see if the tags under these conditions are still readable and rewriteable."

Specifically, McCartney notes, "We hope to find out which tags work, were the tags able to survive the cycle, where the right placement is for tags." If the tags are found to be reusable, he says, they could save growers thousands of dollars that would otherwise be required for RFID printers to continually print new labels. The pilot is testing only RFID hardware rather than middleware or software, he adds. The interrogators used during the field test will store the EPC numbers of the tags they read and encode, and the results will be transferred to Excel spreadsheets.

"I'm really excited about this pilot," McCartney says. "There has hardly been any work done at this scale and level of complexity [on reusable containers]." Eventually, he adds, he'd like to see reusable containers built with embedded RFID tags.