

# Plastic Pallets Get BAP Tags

One company is introducing plastic pallets that it says offer better RFID readability and performance options than wooden versions.

By Mary Catherine O'Connor

July 22, 2004—Applied Distribution Research (ADR), a San Jose, Calif.-based maker of reusable plastic pallets, is offering a version of its product with an embedded RFID battery-assisted passive (BAP) tag operating at 2.45 GHz. Plastic pallets cause less RF interference than wooden ones; wooden pallets' moisture content (which fluctuates with the surrounding environment) and metal nails and staples can interfere with RFID readers' ability to successfully read tags. Plastic pallets are also more durable, require less maintenance and are recyclable. Wooden pallets are less expensive, however, which is why they are more widely used than plastic.

ADR believes it will most likely fit its plastic pallets with BAP tags provided by Alien Technologies, which says it has designed the tag to be compliant with the standard that it thinks EPCglobal will set for the Class III tag. Because the pallets use a non-standards-based tag that does not meet the tag/reader requirements being enacted by Wal-Mart and other retailers who are rolling out RFID plans, most prospective ADR customers are primarily looking at the pallets for use in their internal operations. For example, an automotive company could use the plastic pallets to move components between its own assembly plants, using the BAP tag for its internal inventory management and tracking.

A BAP tag, also known as a semi-passive tag, provides greater read range and reliability than passive tags without battery assistance. The battery in a BAP tag runs the microchip's circuitry, but unlike an active tag, a BAP tag does not use its battery to communicate with the reader. Rather, it reflects the radio waves generated by the reader, just as other types of passive tags do. But a non-BAP tag also uses some of the reader's signal to power its microchip. A BAP tag, therefore, reflects back more of the reader's radio waves, making the BAP tag a better choice in environments with RF interference. It can also be programmed to hold a larger amount of information than Class 0 read-only or Class I read-write tags.

In order to meet the tag/protocol requirements of Wal-Mart and other shipment receivers, users of ADR's plastic pallets would need to affix Class 0 or Class 1 tags, which would carry the product information of the pallet's cargo, to the plastic wrap that covers each pallet load. The receiving party would not read the BAP tag on the plastic pallet.

CHEP, a provider of wooden pallets to the retail and industrial supply chains, has already rolled out RFID-enabled pallets, called PLUS ID pallets, containing Matrics UHF Class 0 tags, which meet the requirements made by Wal-Mart and other retailers (see Pallet Tracking Goes High Tech). The company says that despite the RF readability limitations generally caused by a wooden pallet's moisture and metal content, its pallets are able to achieve 100 percent readability. CHEP attains this level of performance by placing the tag on the center block located on the pallet's underside and by using Matrics' dual dipole antenna design, in which tag's antenna elements sit at a 90-degree angle to each other so that the reader will pick up the RF signal from any side of the four-sided pallet, according to CHEP's senior vice president of marketing, Brian Beattie.

In tests conducted by Alien, using ADR's plastic pallets embedded with Alien BAP tags, multiple tags could be read from stacked pallets, loaded with goods, as long as the goods did not contain enough moisture or metal to interfere with RF transmissions. ADR places its BAP tags on the pallet's center block, in the same location used on CHEP's pallets.

So, even though the plastic pallets would benefit users in terms of tag readability, the non-standardized tags on the ADR pallets would require pallet users to attach a Class 0 or Class 1 tag to each shipment. For this reason, ADR expects most of the early users of its pallets won't use the pallets for shipments to destinations that require standardized tags until a Class III specification is approved by global standards organizations and BAP tags come into wider use.

ADR is offering two types of leasing options for the pallets: expense leases and capital leases, which include an option to purchase the pallets at the end of the term. David Ankele, ADR's president and CEO, says that all of the prospective lessees thus far are considering the expense lease. ADR has made arrangements for financing deals with major equipment leasing companies, including Citicorp and Fleet Capital Corp. ADR says these firms are offering to broker the leases and to lock them in at rates competitive with the market.

ADR says it will charge a monthly lease fee of \$2.77 per pallet. Assuming a customer uses the pallet three times a month, that means the per-trip cost of a pallet would be 92 cents. If the pallet is being shipped to a closed-end location, a third-party logistics provider, commissioned by ADR, would return it to the lessee, which would pay a return fee of ranging from \$3.50 to \$4 for each pallet, each time it is returned. ADR is also offering to sell the RFID-enabled pallets outright for \$140 each.

For its RFID-enabled pallets, CHEP currently charges a premium of \$0.49 per pallet, per pallet trip, over its daily rental fee, according to Beattie. Without disclosing this daily fee, he said the average amount paid by renters of CHEP pallets is \$5 to \$6 per pallet trip.

CHEP says it has been developing its own RFID-embedded plastic pallet, but the price of plastic resin is holding the company back. "As soon as it makes economic sense for us," Beattie says, "we'll use them."

Because the plastic is more durable than wood, fewer repairs are needed. And at 52 pounds, the plastic pallets are 17 to 30 pounds lighter than hardwood pallets, depending on the water content of the timber, so their use could lead to lower transportation-related fuel costs for ADR's customers, versus fuel costs for renters of wooden pallets.

An important and unique element of ADR's leasing program is that, because the BAP tag embedded in each pallet is assigned to its renter, the lessee uses the same batch of pallets throughout the term of the lease. This is an extra value to the renter, who can download valuable shipping/tracking information from that BAP tag, which can hold up 4K of data.

For an additional monthly lease fee of \$10 per pallet or an added \$10 to the cost of purchasing the pallet, ADR can provide its customers with pallets embedded with an BAP tag that is programmed to hold a manifest log. Using the manifest log, companies could keep a record of all of the tagged items shipped on the pallet throughout its use, as well as a log of its destinations. And for an additional fee, which would vary depending on the log's complexity, ADR would maintain the log for companies that would prefer to outsource that task.

ADR would also offer BAP tags that include sensors, to track things such as temperature and shock, for an additional \$10 monthly fee added to the lease, per pallet, or an additional \$10 to the cost of purchasing the pallet.

Mark McDonald, director of production for Alien Technology, says plastic is superior to wood for reading RF because of the significantly lower moisture content and the lack of metal screws or staples. ADR's plastic pallet is especially well suited to be used with RFID, according to McDonald, because there are no ferrites or other elements in the plastic that would cause problems with RF transmissions. "In tests with the ADR pallets, we were able to get reads on multiple pallets at once," he says.

McDonald notes that Alien has not done formal testing with CHEP's RFID-enabled wooden pallets, but did informal tests with both CHEP's and other maker's wooden pallets and found that wooden pallets were more difficult to read than plastic pallets in general.

Alien is a potential supplier of BAP tags to ADR for large orders of pallets. "At present, we believe Alien has the best BAP tag and it matches our needs and those of our customers," says Ankele. "If and when other chip manufacturers offer better solutions, we will evaluate their potential use too," he says.

ADR spent six years researching and testing the design and resin material used for its pallets. It currently uses a nylon fiber that has proven to be stronger than other materials tested, including high-density polyethylene and polypropylene. Until now, ADR has been offering its pallets, which do not contain RFID tags, for sale only, rather than lease, because all of its clients have been government agencies that do not lease items.

ADR's RFID-enabled pallets will be used in a small warehouse the U.S. Navy will open in Guam this fall. The warehouse will store items such as uniforms and toiletries. The proposed planned rollout would use pallets embedded with the Alien BAP tags programmed to accommodate manifest logs, and each to a particular location within the warehouse. Individual items tagged with passive 915 MHz Class 1 tags will be brought into the warehouse and be assigned to a pallet location. For example, 10 shirts would be brought in and assigned to pallet 1234. To do inventory on the warehouse, readers located throughout the facility, some that read the manifest logs on the BAP tags and others that read the Class 1 tags, would feed information into one PC. From this data, personnel would see the exact number of each item within the facility. This would allow the Navy to maintain a "par inventory" system, meaning that it could maintain a target number of supplies on a day-to-day basis. It would also provide quick information on inventory loss and theft.

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