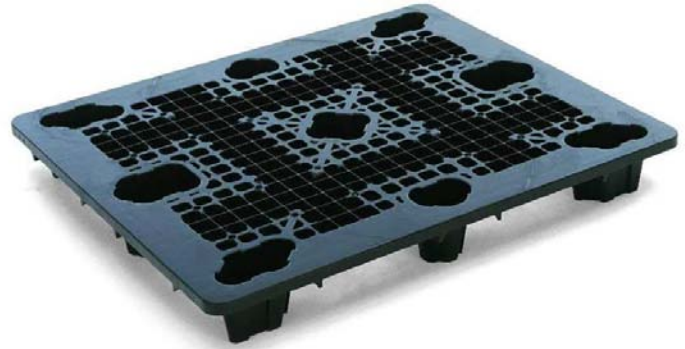




RFID for Plastic Pallet and Tote Tracking



Many companies lease pallets and other logistics containers in order to offload the cost of maintaining their own pallet fleet. However, managing the return of these items has often proven challenging for pallet providers. Although many companies currently use cheaper wood pallets, demand for reusable plastic pallets has increased in recent years because of fears about cross-contamination from meat and other food products shipped on wooden pallets (which are often scrapped afterward), and new International Plant Protection Convention (IPPC) requirements for the fumigation of wood pallets to prevent the spread of invasive insects. Plastic pallets also last longer and are lighter than their wood counterparts, which can save on freight costs.

Think you have pallet-tracking problems? Pallet providers typically distribute hundreds of thousands, if not millions, of reusable plastic pallets internationally. Keeping track of each pallet is a formidable, but essential, task. Some companies lose up to 30% of pallet stock per year—a significant drain on profitability. Deposits are normally required to cover costs should pallets be damaged or lost, but providers are constantly running into problems with pallets being returned later than expected, or not at all and having no visibility regarding their location within the supply chain. Outdated inventory systems simply do not adequately keep track of where pallets are being lost or damaged, resulting in the pallet provider incurring the costs.

A system for tracking the pallets while they are in circulation, and cradle to grave, is the answer. Bar code technology is typically proposed, but determined to be insufficient for the application for two reasons. First, because many of these pallets ultimately carry fresh produce, meat and dairy products, and cases of containers containing liquids. Each pallet re-entering the facility is treated with a variety of cleaning chemicals and high-pressure washing. Bar codes simply could not endure these conditions. Also, the life of any pallet inevitably involves a significant amount of bumping and bruising, and even a small scratch can render a barcode useless.

To provide real-time visibility of pallets in circulation, each pallet is outfitted with a ruggedized and encapsulated IPICO Dual Frequency tag that would remain with it for its entire lifetime – in many cases 7 years or more. Instead of mounting these tags to the exterior of the pallet (as is necessary with bar codes due to the line-of-sight requirement), engineers at IPICO Inc. developed a design whereby a single IPICO Dual Frequency tag is encapsulated and 'snapped' into a recessed slot in the structure of the pallet. With typical UHF RFID Tags, two to four tags are required and embedded inside opposite corners of the pallets to ensure that regardless of orientation on the conveyer, one tag will be picked up. Once installed, the tags can be written to with information and read by the antenna. When the pallets complete a cycle, the tags are cleared and rewritten.



The UHF radio-frequency identification (RFID) tags applied to opposite sides of the pallet

Two plate antennas at the entrance to the pallet-cleaning machine read the tags. Pallet history is downloaded for each pallet, and if damage is evident, the proper customer is charged. Likewise, the pallets whose origin is unknown can be identified by reading the tags.



CHEP, with a pool of over 280 million pallets and totes, offers managed, returnable and reusable packaging solutions to companies across the globe. In 2007, IPICO announced the trial and development of IPICO's passive Dual Frequency RFID tags and readers specifically for the challenging operational environment involved with CHEP's managed returnable packaging solutions. Paul McGlone, CHEP Asia-Pacific's VP Marketing Sales, and Customer Service stated, "the performance of IPICO's Dual Frequency technology is beyond our expectations. IPICO tags have achieved a 100 percent read rate in demanding environments of high moisture content and metal".



WHY IPICO?

IPICO produces smart labels, tags and readers based on the IP-X communication protocol and Dual-Frequency Tags and Readers. This protocol enables IPICO's chip designs to perform in a wide range of challenging application environments where conventional technologies fall short, such as pallets in motion carrying produce or liquids in containers. Water is a lossy material that absorbs UHF radio waves making it difficult and unreliable for UHF RFID to operate, except in restricted circumstances.

IPICO's Dual Frequency reader is able to read through water, foil and other materials, making it ideal for a wide variety of Pallet & Tote tracking and supply chain asset management applications. The IP-X protocol underpins its superior ePedigree and Chain-of-Custody offering.

Its products are designed to excel at long read range, fast multi-read anti-collision and high thru-beam read-speeds of dynamic tag populations, and to allow for multi-reader rollout in close proximity. IPICO's products are used to optimize the management of products, equipment, people, animals and processes within the logistics and other value chains.

IPICO Dual Frequency technology delivers accurate read rates even when 'lossy' materials containing water or foil are involved



Unique Abilities of Dual Frequency RFID

DF (Dual Frequency – energize at 125 kHz, communicate at 6.8 MHz):

- ! Good anti-collision (~100 items/second)
- ! Acceptable read range (up to 1.5 m)
- ! Reads through liquids and metal foils

Only DF has all required capabilities for Food & Beverages:

- ! LF has insufficient anti-collision (can't count all items in shipment)
- ! HF has insufficient read range (can't read all items in shipment out of warehouse into truck)
- ! UHF can't penetrate liquids so only items on outside are read

Pallets on the Supply Chain Road

RFID is enabling pallets and containers to be correlated to their contents, fully integrating the supply chain and providing unprecedented information and manageability. Many early adopters who chose conventional RFID technology got beat up in trials – or rather their pallets and totes did. Two main problems arose:

- **Damage:** RFID tags were affixed to the outside of pallets at the four corners to ensure readability. But when the pallets got banged up, tags were damaged and effectiveness was compromised
- **Poor Read Rates:** Tags affixed to the centre often experienced reading problems because contents like paper, foil or liquids interfere with conventional RFID signals

IPICO RFID from FSN has unique and proven performance on both fronts:

- IPICO's one tag per pallet, placed in the protected centre, solves the damage issue as well as assisting project economics
- IPICO's IP-X™ and dual frequency technology performs flawlessly in real world environments involving distance, lossy materials, crowding and limited spectrum.

In this application, pallets and totes with IPICO Dual Frequency Tags arrive at the warehousing hub of a major supermarket. Supermarket operators use a portable IPICO handheld computer to read and write time and date stamp, as well as handling instructions, to the tag. The pallets are then loaded with perishable goods, and the tags are written to with information such as product expiration date and storage instructions. The full pallets are then delivered to the neighborhood grocery store, where grocery workers scan them as they arrive to ensure freshness and quality.

Empty pallets are loaded into the trucks and returned to the pallet provider where they are again read. After relevant charges are processed, pallet information is then cleared, and the tag is written to with date/time information for its next global destination.

Results of the RFID system are impressive. Each pallet has a self-contained recordkeeping system, eliminating the paperwork that is common with pallet shipments. The combination of resilient IPICO Dual Frequency RFID tags, 100% read rates and reusable pallets is a cost-effective, mission critical solution: wooden pallets and bar-code labels are both consumables, while plastic pallets and RFID tags are recycled and reused.

By accessing the shipment history of each incoming pallet, the pallet provider is able to recoup for lost and damaged pallets by having a record of who was responsible for the product at any given time. Customers pay for the length of time they have the pallets as well, so usage costs can be immediately determined and charged.

Theft, formerly a rampant problem, is greatly reduced with RFID. If a stolen pallet re-enters the facility, operators can determine when and where the pallet was taken.

How it Works

Manufacturing partners can imbed IPICO Dual Frequency RFID tags in the plastic pallets at the point of manufacture. The serial number encoded on the tags is then uploaded into the database before the pallets are shipped to various facilities. Tags are scanned at receipt using an RFID reader portal, hand-held reader, or forklift-mounted readers. Once a customer orders a shipment of pallets, they are scanned again on the outbound side before being handed over to a third-party logistics carrier for transportation to the customer.

After customers receive the pallets and load them with merchandise, the pallet tags are scanned before being shipped to retailer locations. For customers who can't read the RFID tags, a non-removable bar code label (which also includes human readable information) is placed on the outside of the pallet.

FALKEN Secure Networks implementation to meet these types of multi-location operational requirements positions Network Edge servers from Omnitrol Networks running the Middleware and Application at the various customer depots and customer locations are used to collect data on the pallets. As the pallet labels and RFID tags are scanned, the Omnitrol edge servers push that information up to the central Omnitrol system so that real-time data on the location of its pallets is immediately available. In this way, multiple locations are federated and provide one single real-time view of the entire operation.

After the volumes of data from readers are treated according to a customer definable business rules engine, the Omnitrol edge servers send data to the central Omnitrol server for consolidation, and that's passed to the back-end ERP system. Typically, the system would also transmit information to the edge servers at the customer depots to provide the schedule of orders and shipments that are about to come in at that location.

Customer-configurable rules can be set up such that the system automatically sends an alert if a pallet has gone missing. Using the tracking data, a company can triangulate where the pallet left the system. This provides enhanced asset control for both pallet companies and its customers.

Billing is also improved, since a more accurate record of pallet use and loss is provided for each customer.

As more retailers require RFID pallet tagging, customers of the pallet rental companies may also be able to utilize the existing RFID tags to meet those requirements. The next step would be using that linkage between the serial number on the pallet and the data about the specific shipment to meet retailer requirements for pallet tagging.



FALKEN Secure Networks(FSN)—Your partner for RFID automation

If you choose to pursue RFID implementation in your organization, here is the FALKEN Secure Networks commitment to you:

- FSN will provide solution architects to work with you to define system requirements for your particular installation. Multiple locations can be networked together for a central and real-time view and centralized management.
- FSN will do a RFID site survey to validate radio frequencies, tag types, system design and performance
- FSN will provide all necessary hardware and software to make the system work for you
- FSN will integrate the system with your existing enterprise management software
- FSN will provide documentation for the system, including operating procedures
- FSN will train your people
- FSN will provide warranty and continued system support

Contact Us



FALKEN Secure Networks (FSN) is the leading System Integrator and Solution Architect for advanced Active/Passive Unified RFID systems that leverage standards-based technologies. FSN integrates RF technologies for asset visibility, using EPC global standard RFID, Wi-Fi and Real-Time Location Systems (RTLS) for cost-effective design, and turn-key project implementation.

Contact FSN at **905-880-4044** or sales@falkensecurenetworks.com

