

Apparel Source Tagging and RFID



Facilitating Inventory Accuracy with Better Technology

Inventory management is not a new retail business problem, but in a market where brick and mortar stores compete with online retailers, increasing store inventory accuracy has taken on a new urgency. Customers have options, and product absent from the shelves results in missed opportunities. To better meet customer expectations and with an eye to increase profit and margin, retailers have raised the bar on inventory accuracy—and are looking to RFID to help drive sought-after gains.

Key Retail Driver—Inventory Accuracy

Recent studies by the University of Arkansas have revealed the remarkable improvements that RFID has brought to apparel retailers. The published projects to date have identified several operational advantages from item level RFID, but all of them stem from the same core value: superior inventory accuracy leads to reduction in out of stocks and markdowns, reduced buffer stock and re-order thresholds, reduced shelf space per SKU and better customer service. Studies have identified increased sales due to item level RFID tagging at anywhere from three to eight percent over comparable stores without RFID. Thus better inventory management translates directly to increased sales.

Using RFID, retailers can conduct a physical inventory operation 25 times faster, with less labor investment, and greater accuracy than with manual barcode-based inventory operations. After aggregating results across multiple retailers, studies have shown that the use of RFID for frequent cycle counting can increase the accuracy of the inventory database by more than 30 percentage points, from below 70% on a per-SKU basis to above 90%. Even companies with the best continuous inventory management practices based on barcode technology have seen significant gains after implementing RFID. The level of accuracy RFID provides virtually eliminates preventable out of stocks, as well as hidden or phantom inventory conditions, which leads to improved customer satisfaction.

While this news is great for retailers, are they the only members of in this party who might enjoy the benefits of RFID? What about the brand owners and other supply chain partners? To start with, better sales at retail flow to better sales for the brand owners, so the value distributes across the entire supply chain. Some studies have shown that an out-of-stock event at the retailer results in a lost sale to the retailer 42% of the time, and to the supplier

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33% of the time. And with better inventory visibility and accuracy comes improved forecasting and replenishment operations. Many retailers also have charge-back arrangements with suppliers for dealing with markdowns that result from overstock. Better visibility allows retailers to run leaner and smarter, improving margins and profit for both retailers and suppliers. Operational efficiencies accrue across the value chain by reducing the capital that must be tied up to complete each consumer sale, and by reducing the number of shopping trips that end in disappointment.

Many of the projects to date have involved applying and encoding RFID tags in stores or distribution centers. While the business results are meaningful, such downstream tagging does not scale in a cost-effective manner. Full deployment depends on reliable, scalable, and efficient source tagging.

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Source Tagging Solutions

The general (non-RFID) source tagging problem is not new. It is common for UPC barcodes, style, size and color, retail price, content, country of origin, and care instruction labels to be applied at the source. Some manufacturers rely on service bureaus to deliver pre-printed labels (sorted by order into SKU specific bundles), and others have in-factory printing capabilities.

Manufacturers can augment this traditional approach by combining printing with RFID encoding, or they can consider a new paradigm in which the management of the RFID tag is a completely separate process.

Augmenting the Traditional Approach

Figure 1 shows a traditional printed swing ticket with an embedded RFID inlay as one way to apply an RFID tag to an apparel item.



Figure 1: RFID circuit embedded in a variable data printed care label

With this approach, the tag travels through the printing process with the added requirement of writing EPC data into the embedded RFID circuit. Some off-the-shelf thermal printer manufacturers offer printer-encoders that combine these operations. For manufacturers who wish to rely on their existing business processes, which can include service bureaus for producing and managing printed tickets, this approach bears consideration. But there are also a few things to keep in mind:

- Use of RFID encoding capability available in commercial printer-encoders may slow operations.
- The installed base of printers may not support RFID encoding, and those that do may require extra spacing on the roll of blanks to ensure that they do not inadvertently write data to adjacent RFID tags on the roll. (Newer models of printer-encoders have solved the problem of on-pitch encoding.)
- Surface variations in the label due to the embedded RFID circuit may reduce the quality of printing, and care must be taken to avoid damage to the circuit from excessive pressure.
- Existing installed and distributed software systems may not support serialization requirements for managing EPC numbers.

Working with service bureaus that deliver high quality RFID tags using specialized printing and encoding capabilities helps mitigate these potential issues.

The Alternative—Dedicated RFID Tags

Figure 2 illustrates the types of RFID-only tags that suppliers apply and encode separately from other variable-data printed tags and tickets. Direct apply approaches are possible because of the unique characteristics of RFID: reading and writing data to and from RFID tags does

not require line-of-sight access, nor does it require physical isolation from other tags. These features allow manufacturers and service bureaus to configure dedicated non-printing encoders and bulk encoding systems for a wide variety of tags and material flows.

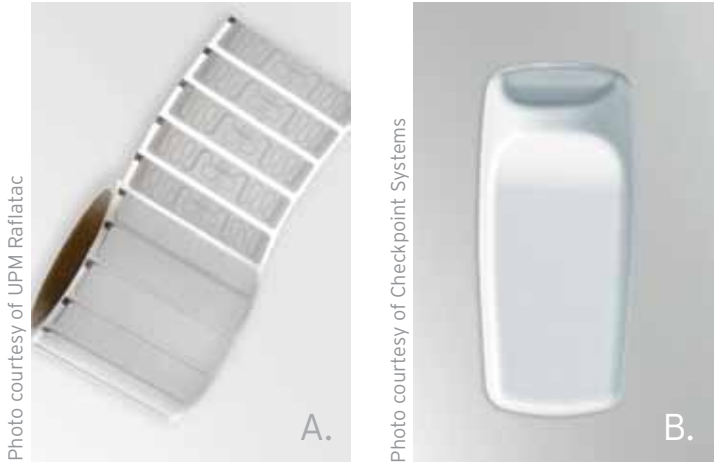


Figure 2: Two direct apply methods:
A) pressure sensitive label B) hard tag

Separating the RFID tag from the printed ticket and separating the encoding from the printing process also helps minimize the cost and complexity of RFID source tagging. The direct-applied RFID tag method has the following benefits:

- > Does not disrupt or slow down the existing printing business process or impact print speed and quality.
- > Tolerates variations in characteristics or placement of the RFID tag, increasing flexibility for the manufacturer.
- > Supports embedded RFID tags in printed labels or other elements, as well as tags that carry no variable data, such as hard tags, visible source tags (VSTs), and adhesive labels.
- > Increases speed and/or accuracy of the packing process.
- > Helps to centralize serial number management.

With a dedicated RFID tag, the manufacturer may apply it directly to the garment or packaging element, sew it into a pouch like an EAS VST, or apply it as a hidden adhesive label that carries no visible variable data. In all such direct-apply methods, the manufacturer can manage the tags as blanks, eliminating SKU proliferation and driving down costs. However, the manufacturer must still encode the tags, either just before application using dedicated in-line, non-printing encoders, or with bulk-encoding systems that help to centralize and simplify serial number management while possibly improving the speed and accuracy of the finishing and packing process.

In-line Encoding

It is possible for batches of direct-apply RFID tags to be encoded prior to final garment application. With labels or other roll-based media, a print shop or a separate high-speed (non-printing) in-line encoder on the factory floor can encode tags to bundle with existing printed labels (see Figure 3). For recycled hard tags (not roll-based), the factory personnel or service provider could sort by specific SKUs for bulk-encoding prior to application.

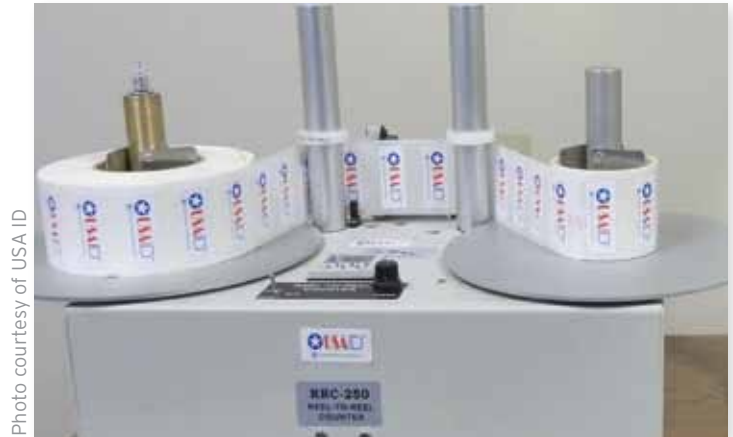


Figure 3: In-line method for encoding direct apply tags

Bulk Encoding

After applying a tag to the garment, whether it is part of a printed label, but not yet encoded, or applied directly, suppliers can write the RFID data to the tag using a bulk-encoding method. Figure 4 shows an example of the bulk encoding process for direct apply tags.



Figure 4: Bulk encoding method for encoding direct apply tags

With this approach, the supplier writes unique EPC data to each RFID tag in a set of items. For example, in some packing facilities, operators must barcode-scan items one at a time into a shipping carton as they fill the order. With bulk encoding, the operator could gather bundles or stacks of items together, encode them in less than a second, and obtain an accurate count of the items. Or, operators could simply load the items into a shipping carton, which they then pass through a bulk-encoding station for counting and encoding on its way to being loaded onto a pallet for shipment. For example, test results with denim garments demonstrate that an Impinj Speedway® reader can encode 14 pairs of jeans with RFID tags based on the Impinj Monza® 4 tag chip in about 1 second. Note that because sets of tags are encoded in a batch with this approach (with a unique EPC or serial number written to each item), it follows that the items packed within the case must be of the same SKU.

Impinj and Partners Enable RFID Success

Impinj provides tag chips, tag design support, and reader-encoder products to its network of source tagging solution providers who enable manufacturers to reliably encode RFID tags in-factory or as part of the printing process. Impinj works closely with printer vendors and service bureaus to provide the best products and support possible. As the world's leading UHF RFID technology provider, Impinj enables a variety of options for apparel suppliers to add high quality RFID tagging to their product offering with minimal cost and disruption to the manufacturing process. For more information visit www.impinj.com.



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