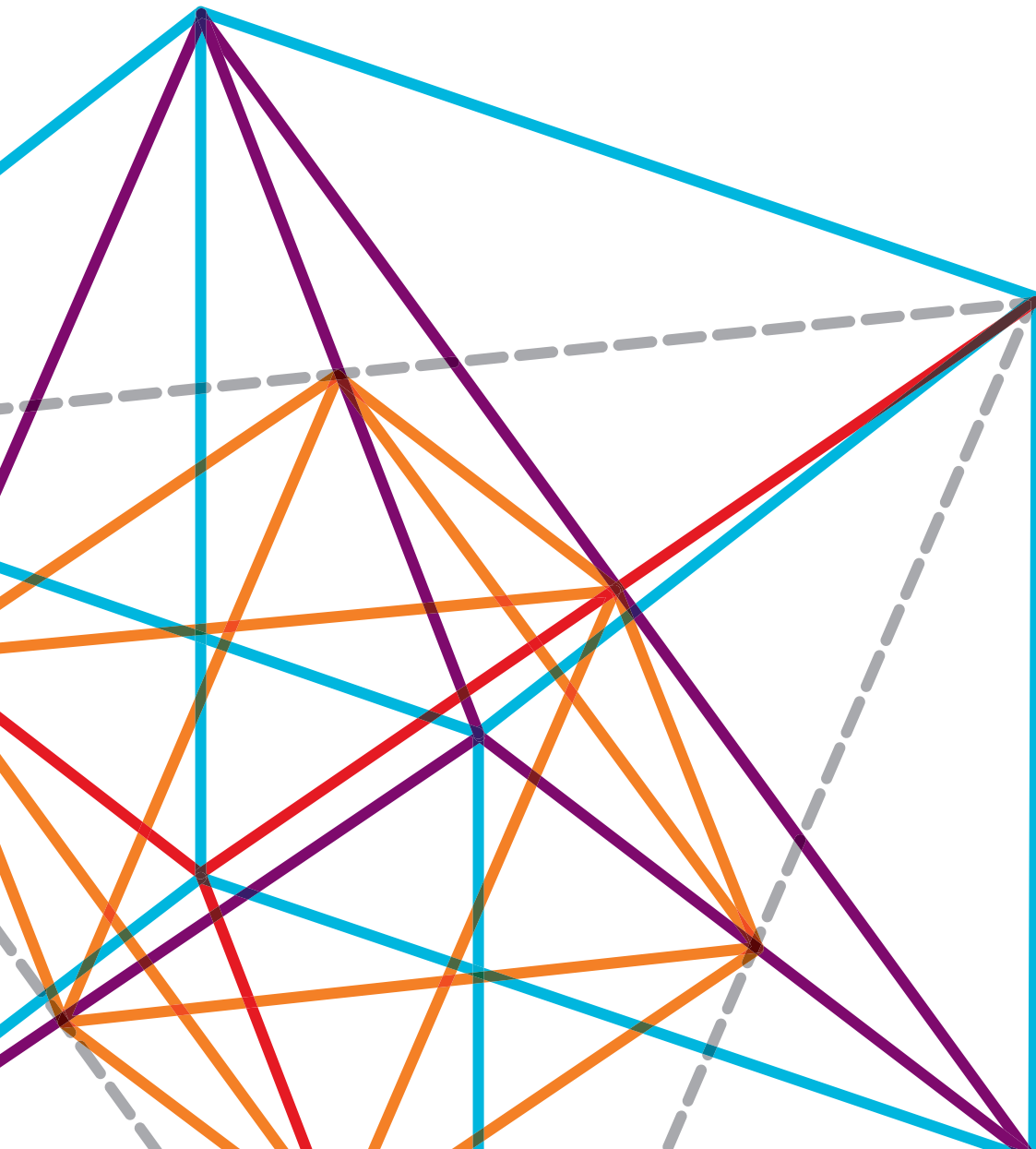


# TRACEABILITY IN RETAIL: Reducing RFID Media Costs for Best Value

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# EXECUTIVE SUMMARY

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Retailers are facing enormous pressure to gain the most return from their business process investments. Radio frequency identification (RFID) enables business intelligence throughout an organization's value chain to provide critical information for fast and accurate decision-making. RFID continues to grow as a proven solution to increase inventory visibility and accuracy, which helps reduce out-of-stocks, increase sales, and lower cycle counting labor. Achieving the most value from RFID demands an innovative method for ensuring accuracy while shrinking the reoccurring costs of label media.

Traditional RFID label media are printed on inlays spaced at regular intervals defined several years ago to help ensure accurate data encoding. Today, on-pitch printing and encoding technology is available that supports very close inlay spacing, which can reduce the cost of media by as much as 10 percent.

The discussion that follows presents the significant benefits item-level tagging brings to the retail industry, and reveals how on-pitch printing and encoding solutions can boost the value of RFID beyond the supply chain.

## INTRODUCTION

### WHERE IS MY PRODUCT?

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Imagine walking into your favorite retailer with the expectation of buying the latest apparel style in your size and seasonal color. Instead of quickly finding what you want, you spend precious time sorting through jumbled shelves and mismatched clothing racks. Finally, a store associate arrives to assist. The associate is sure your item is somewhere in the store, but just cannot find it.

Pressed for time, you visit a competing retailer. You notice a product-locating kiosk. Within seconds, the system shows not only that your item is in stock, but its precise location. You conveniently retrieve the item, scan it through a smart checkout system, and leave the store—all in minutes.

The above scenario is rapidly becoming reality throughout the retail world. Item-level RFID tagging is making fast, easy product location and checkout possible. Retailers who are adopting item-level tagging throughout their operations are realizing enormous results in inventory accuracy and efficiency. At the same time, customers are also winning with a much-improved shopping experience. Retailers who embrace item-level RFID tagging will win the hearts and minds of their customers, while lifting sales and boosting their brand's image.

# ITEM-LEVEL TAGGING CREATES POWERFUL BENEFITS

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Retailers—from specialty and mass-volume apparel to big-box—are realizing significant benefits from RFID technologies. The return on investment (ROI) for RFID comes from reducing the time and labor required to track and manage inventory, reduce losses and theft, and enhance the customer experience for improved sales lift.

## **Comprehensive Inventory Management**

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Until recently, most RFID applications targeted pallet and case-level tracking. The focus is now shifting to item-level tracking that achieves 100 percent inventory accuracy. RFID tags affix directly to the item or its packaging, and are easily removable after a customer purchases the product. Item-level tags originate at the manufacturer and extend through the distribution channel to the retailer. Tagging integrated with data management systems allows a retailer to experience higher accuracy on goods from factories that use RFID for verifying outbound shipments. Knowing the in-store location of each product provides the retailer precise accounting for each item, who can then execute a physical inventory in minutes—as opposed to hours, or even days.

As the retailer receives products, an RFID reader automatically scans each item in the shipment and updates the retailer's data management system, which then verifies product type and quantity. Scanners in the store track the item's purchase, or if the item leaves the store without the shopper paying for it.

When a retailer has full visibility of each product in their store—from price, to product type, to location—true 100 percent inventory management becomes a reality. Some retailers are using combined Electronic Article Surveillance (EAS)/RFID tags to provide in-store loss prevention intelligence regarding what item left the store and when the theft took place.

Item-level tagging allows cashless shopping and reduces the need for sales clerks or even cash registers. Smart checkout applications are emerging that speed checkout by allowing the associate to drop the customer's items on the counter; then the system automatically rings up the sale. 100 percent accuracy as items enter the store, full visibility of items in the store, and precise tracking of items as they leave the store—all contribute to improving a retailer's bottom line.

## **Real-World Results**

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Consider the following example. In 2009, the University of Arkansas Information Technology Research Institute completed a study to determine the business value of RFID item-level tagging for day-to-day operations at a major luxury retailer. The chain's management evaluated the use of RFID tags in the denim category. The results demonstrated that overall inventory accuracy improved by more than 27 percent, understocks decreased by 21 percent, and overstocks decreased by 6 percent.<sup>1</sup>

The study also compared how long it took to count items using RFID vs. a barcode reader. With RFID, scanning 10,000 items took two hours; scanning with a barcode reader took 53 hours. This translated into an average of 4,767 counted items per hour using RFID, and 209 items per hour using a barcode system—a 96 percent reduction in cycle-counting time.<sup>2</sup>

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1. University of Arkansas: Information Technology Research Institute, "Item-Level RFID for Apparel: The Bloomingdale's RFID Initiative," August 8, 2009.

2. Ibid.

## Boost the Customer's Experience and Lift Sales

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Nearly 15 billion pairs of shoes and 10 billion fashion apparel items ship from manufacturers every year.<sup>3</sup> The costs for conducting manual inventory of these items, managing out-of-stocks, and preventing theft continue to rise. Apparel retailers are rapidly adopting item-level tracking to enable accurate visibility of each garment. Perpetual inventories are running at 60-70 percent in real-time, making it difficult to make proactive business decisions for creating in-store sales lift. With RFID-enabled 100 percent inventory accuracy, apparel retailers are gaining visibility into what is selling, where, and when—powerful metrics that marketing departments can quickly leverage to improve sales, branding, and customer loyalty campaigns.

RFID tags provide enough data storage for a wide range of information and applications. Tags attached to apparel can contain three dimensions of information: style, size, and color. In practice, store associates read RFID tags on garments hanging on a mobile rack, or read the tags at the point of sale. The ability to know that a specific item is available in a style, size, and color when a customer walks into the store helps ensure the sale and provides the customer with a positive experience. Associates can quickly find the item, which lifts sales by having the right item, in the right place, for the right customer, at the right time. Customers leave the store feeling confident that their next visit will be just as positive, and the retailer can always meet their needs.

## Unique Benefits for Diverse Markets

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The benefits of item-level tagging vary greatly depending on the retailer's specific business and market. Specialty stores will experience different results than big-box retailers whose stores have a low employee-to-customer ratio. Specialty apparel retailers that design, source, and sell products bearing their own brands are realizing significant results, such as a 14 percent sales lift and a 90 percent reduction in the time required to conduct weekly inventory.<sup>4</sup>

Moderately priced department stores that sell branded and private label apparel and other merchandise types are also reporting an increase in inventory accuracy. Retail manufacturers can also benefit from item-level tagging by improving cash flow turnaround. For example, the manufacturer sends the retailer a bulk shipment but must wait 30 or more days because the retailer must manually verify the type and quantity of items shipped. Items tagged with RFID allow the retailer to quickly scan the shipped items, verify against the system management database, and release payment to the supplier in 10 days or less.

Achieving 100 percent inventory accuracy clearly drives improved inventory management, which meets a critical apparel industry initiative. Using RFID for inventory management immediately improves on-shelf availability of merchandise, and enables a wide range of customer-friendly applications, such as smart checkout, smart fitting rooms, and product-locating tools.

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3. ABI Research, "RFID Item-Level Tagging in Fashion Apparel and Footwear," 4Q, 2009.

4. Ibid.

# RFID CONSIDERATIONS

## TAG ACCURACY AND MEDIA COSTS

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RFID tags used in retail operations, their suppliers, and service bureaus contain a low-power integrated circuit (IC)/antenna (inlay). A protective material (label media) encloses the inlay. Technically, an inlay is an RFID tag on a flexible substrate that is ready for conversion into a smart label. RFID tags come in many forms and sizes, some as small as 10 x 10 mm. On-board memory within the IC stores data written by an encoder. The IC then transmits/receives information through the antenna to an external reader. Depending on the application, users sometimes call tags “transponders” or “inlays.”

By leveraging Electronic Product Code™ technology, the EPC global organization developed the UHF Gen 2 RFID standard so users could accurately identify multiple items using an open, interoperable protocol. The International Standards Organization (ISO) ratified UHF Gen 2 as a standard for use worldwide. UHF Gen 2 is the dominant RFID smart labeling technology for supply chain applications, industrial automation, asset management, inventory monitoring, personal ID, and access control. For more information, see [www.epcglobalinc.org](http://www.epcglobalinc.org) and [www.gs1.org](http://www.gs1.org).

Retail manufacturers, distributors, and store chains must take into account not only the process and system considerations of an RFID deployment, but also how to achieve the best value from their investment. Tag accuracy and media costs are vital aspects for maximizing results for any RFID implementation.

### Accuracy Requirements

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The path to 100 percent inventory accuracy starts with the data encoded into the RFID tag. When a retailer places a product order from a brand owner, the owner then places orders with various manufacturers. Some manufacturers use service bureaus to print RFID labels. These changing variables present challenges to ensuring RFID data integrity. Each smart label must contain unique, 100 percent accurate data. Different plant locations, or multiple production lines producing the same product for different retailers, cannot have duplicate serialization. Otherwise, inventory becomes “lost” within the supply chain. If there is a defective tag, or if a tag falls off, the retailer will not pay for the merchandise.

RFID systems contain technology designed to minimize interference, ensure data integrity, and provide optimal read range for the application and environment. Specially designed RFID printer/encoders create the label, print text and graphics on the label, then encode the tag with data. The printer must reliably transfer data in an accurate, predictable manner. In classic domino effect, the success or failure of the item-level RFID system depends on meeting these requirements.

### Media Cost Considerations

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Traditional RFID printer/encoders require an inlay pitch of 50 mm to ensure accurate data encoding. Pitch is the distance from the leading edge of an inlay to the leading edge of the next inlay on the printing web. Shipping compliance and immature chip technology originally drove the 50 mm requirement. Most RFID printers available today contain older RF encoding technology designed for legacy applications, such as pallet tracking, forcing them to support a minimum inlay pitch of only 50 mm.

Pitch depends on the inlay size, and the smallest inlays currently specified for item-level tagging today use a 16 mm pitch. Unfortunately, traditional RFID printer/encoders cannot take advantage of these reduced-pitch inlays. As a result, the inlay manufacturer must add an extra process to space out the inlays prior to encoding or tagging, which adds unnecessary overhead to media costs—approximately \$0.01 cent per tag, or 10 percent of the overall media expense.

Although such a small cost may seem intangible, it adds up quickly when considering the scale of product movement in retail operations. For example, a large apparel retailer can easily move 15 million garment items per quarter. A \$0.01 per tag of label media overhead creates \$150,000 in unnecessary costs—resources that the retailer could use to design new sales campaigns, improve marketing analytics, or create other revenue-lifting initiatives.

# THE SOLUTION

## ON-PITCH PRINTING AND ENCODING

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The optimal solution for achieving best value from item-level RFID tagging leverages innovative on-pitch printing and encoding technology. On-pitch RFID printers encode tags at the same pitch as specified by the inlay manufacturer, thus eliminating the extra process of spreading apart the inlays prior to encoding. Successful on-pitch printing requires printers designed with tight mechanical tolerances, advanced RF technology, and intelligent firmware. On-pitch RFID printers also support easy integration with wireless networking, provide a future-proofed path for upgrades as RFID standards evolve, and flexibility to support various inlay types and smart label requirements.

Zebra delivers intelligent RFID printer/encoders that accurately and cost-effectively create smart labels down to 16 mm of pitch. Zebra printers require no mechanical changes, additional RF shielding, or other

modifications, allowing fast setup and efficient long-term operations. To give users peace of mind that their operations will flow seamlessly, embedded firmware automatically drives the printing/encoding process, and provides flexible support for different media label sizes.

Zebra RFID printers deliver an average of 10 percent cost savings per tag, which is significant when factoring the scale of product movement in the apparel and other mass-volume retail industries. For example, consider the retailer described above that produces 15 million tags per quarter, at 10 cents a tag—Zebra printers can save \$150,000 per quarter. By deploying on-pitch RFID printers, businesses gain an enormous return on their printer investment value. In many operations, daily tag cost alone exceeds the initial on-pitch printer/encoder acquisition cost.

## ZEBRA DELIVERS PRECISE, COST-EFFECTIVE RFID PRINTING

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Retail businesses, their suppliers, and manufacturers across the world print and encode millions of RFID smart labels annually. RFID-driven business intelligence gives retailers the precise information they need for timely, smart decision-making. RFID tagging at the item level yields 100 percent inventory accuracy and improves inventory management, enhances the customer experience, and lifts sales.

On-pitch RFID printer/encoders from Zebra overcome the limitations that encumber traditional RFID printers. Selecting an intelligent, programmable printer/encoder from Zebra helps retailers optimize their inventory management operations and reduce the cost of media by as much as 10 percent. Now, retailers can realize the enormous benefits and value that item-level RFID tagging makes possible.

A global leader respected for innovation and reliability, Zebra offers technologies that illuminate organizations' operational events involving their assets, people and transactions, allowing them to see opportunities to create new value. We call it the Visible Value Chain.

Zebra's extensive portfolio of marking and printing technologies, including barcode, RFID, GPS and sensing, turns the physical into the digital to give operational events a virtual voice. This enables organizations to know in real-time the location, condition, timing and accuracy of the events occurring throughout their value chain. Once the events are seen, organizations can create new value from what is already there.

For more information about Zebra's solutions, visit [www.zebra.com](http://www.zebra.com).

