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RFID Boosts Store Turnover by Nearly 10 Percent in Italian Pilot

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A study conducted by the University of Parma's RFID Lab, working with a retailer, apparel suppliers and logistics providers in Italy, reveals significant benefits throughout the supply chain.

By Mark Roberti

Oct. 20, 2010—The University of Parma's RFID Lab recently announced the results of radio frequency identification's impact on operational efficiencies and sales in an end-to-end supply chain study. The lab reports that store sales increased by nearly 10 percent during the pilot, due to increased replenishment, and that labor efficiencies and data accuracy also improved throughout the supply chain.

"The results of this pilot show unequivocally that passive UHF RFID technology can increase labor efficiency, improve data accuracy and lead to more sales," says Antonio Rizzi, the RFID Lab's founder and director, which has spearheaded several other RFID studies involving the fashion industry (see Italian RFID Lab Gets Fashion-Forward and Fashion Group Expects Positive ROI Within 3 Years).

Antonio Rizzi, founder and director of the University of Parma's RFID Lab

The companies that collaborated with the RFID Lab on the pilot were intimate apparel manufacturer DBApparel, fashion house Trussardi, retailer Miroglio Fashion, IMAX (the knitting manufacturing arm of the Max Mara Fashion Group), logistics provider Norbert Dentressangle, and clothing maker Dolce & Gabbana Industria, along with its third-party logistics providers, TNT and DHL.

The pilot's goals were to assess the technical feasibility of using RFID in the fashion industry supply chain, including in retail stores; determine whether the technology provides real-time traceability of fashion items throughout the supply chain; and assess the business benefits of RFID, with a particular focus on packing, marking and shipping within a distribution center (DC), as well as on receiving, inventory management, fitting-room use, replenishment and checkout within a store. A key goal was to quantify the RFID's impact on store turnover.

The University of Parma's RFID Lab organized the project, but each participating company helped to fund it, define its objectives and choose the technical solutions involved. The participants also shared the results. The pilot ran from Apr. 2 to Aug. 31, 2010, and tracked 12,690 items in Miroglio Fashion's spring/summer 2010 collection. Of those garments, 11,346 were sold.

Individual clothing items and accessories were tagged at a Miroglio Fashion DC in Pollenzo, Italy, using UPM Raflatac EPC Gen 2 passive UHF RFID inlays made with Monza 3 chips from Impinj. The inlays were inserted into paper hangtags that were applied as they would normally be.

The researchers tagged 827 styles of garments that were displayed on hangars within the store, 336 styles that were folded and displayed on store shelves, 50 styles of shoes and 43 styles of footwear and

leather goods. Each tag was encoded with a unique ID number associated with the product characteristics of the particular item to which the tag was attached, including its model, size, color and price.

At Miroglio Fashion's DC, the items were placed in boxes or hung on racks, and were then shipped to an Elena Mirò store in Fidenza Village Outlet, located just outside of Parma. Using either a fixed RFID reader from Impinj, or a Skeye handheld RFID interrogator, workers identified items as they left the DC to check whether they precisely matched the store's order request—something not currently done as part the retailer's supply chain process (without RFID). Productivity in shipping and receiving processes improved by 80 percent with RFID, while shipping accuracy increased by 8.6 percent.

Miroglio Fashion normally takes a physical inventory count within its stores once each season. The company maintains inventory by counting the total number of items received at the store (it does not track the quantity of each style received), and by comparing expected inventory on hand minus sales.

For the pilot, each individual item received at the store's back room was read using either the handheld unit or a fixed Impinj reader installed at the doorway to the sales floor (on the sales floor side of the door). Before the store opened, employees indicated on a touch screen that they were receiving goods, then rolled a rack through the portal and checked the tag reads against what was shipped. Store inventory was then updated accordingly. Each time an item was replenished, its tag was read as it passed by the Impinj reader on its way to the sales floor.

According to Rizzi, regular inventory counts were performed in the store using a fixed Impinj reader adapted to work like a handheld (the interrogator was hooked up to a battery and put in a knapsack, and a handle was mounted to an antenna cabled to the reader), because the handheld's processing power was too slow when reading thousands of tags. Tagged items were also read in four fitting rooms by two fixed Impinj readers, each driving two antennas. The antennas were installed in the fitting-room walls, in order to collect data regarding which items were tried on.

Another RFID reader was installed at the point of sale. Tags were read at checkout, and the items were removed from the store's inventory once the purchase was completed. Signs were posted throughout the store to alert customers to the presence and use of RFID tags. The tags were not killed at the point of checkout, because a shop associate would remove and discard the RFID-enabled hangtags, thereby eliminating the possibility that shoppers could be tracked using RFID. "No one asked for more information about RFID," Rizzi states. "Privacy was not a big concern."

Quick inventory counts of the entire store could be taken with the adapted Impinj reader in seven minutes, Rizzi reports. During quick counts, staff members waved the Impinj reader antenna around the racks and shelves until they no longer heard a beep, which indicated a tag read. The accuracy of these counts was 97.83 percent.

More careful inventory counts were conducted by two employees, one waving the reader antenna and

the other moving garments around to ensure that one tag did not shield another one nearby, preventing the second tag from being read. These counts took approximately 30 minutes, yielding an accuracy of 98.73 percent. By combining the results of three quick counts and a single "more careful" inventory count, 99.35 percent accuracy was achieved. The staff typically performed one quick count in the morning, and one or more additional quick counts during the day.

The University of Parma's RFID Lab employed an EPC Information Service (EPCIS) infrastructure for the project. ID-Solutions, a company spun off from the lab, created the EPCIS application using free Fosstrak EPCIS software developed by the Auto ID Labs at St. Gallen University, in Switzerland. ID-Solutions integrated its own middleware platform, known as RSA (RFID System Administrator), to filter and store the RFID data. The company also provided back-end applications that manage DC and store processes (tagging, shipping, receiving, replenishment, fitting and checkout). By accessing the EPCIS information, the DC and store managers were able to view the items' location in near real time. Employees could, for instance, see which items were in the store's back room at any given time, as well as which were on the sales floor.

The RFID system also provided raw data for business-intelligence software to analyze. Consequently, the business-intelligence software could displays the length of time between when an item was tried on and when it was sold, the days and times at which the most items were tried on, the items that were tried on and sold, and those that remained unsold (indicating a potential problem with, for example, an outfit's cut).

Turnover Increase

The researchers and end users involved in the project decided not to determine the sales increase resulting from using RFID by comparing sales with a control store, as they felt sales could be affected by a wide variety of variables that could not be controlled, such as weather and location.

"We all agreed that RFID helps to boost sales by reducing the number of times that customers enter the store and can not find the item they like in the right style, size or color," Rizzi says. "For every customer that asks for a different style or color, at least 10 leave the store without buying. And when a customer asks if a different size or color is available in a style they like, the shop assistant is not always able to answer in a reasonable time."

So the team engineered two applications to improve on-shelf availability. The first is designed to provide sales associates with the information they require in order to answer a customer's question. If a shopper requests a particular style in a different size or color, the sales associate can wave the garment in front of the fixed reader installed near the back-room doorway, and the system will show that worker, on a touch screen mounted by the door, the different sizes and colors for that same style available in the store, as well as in the back room. If the customer wants, for instance, the same style of an outfit, but in blue, the associate can load the unique serial number of the blue version in a Psion Teklogix handheld RFID-enabled handheld computer, to quickly locate it in the back room.

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"To assess the impact on sales, we tracked the use of this application, and cross-checked it with checkout data," Rizzi explains. "The application was used more than 300 times over a period of about three months, and we found that about one-sixth of those items wound up being sold, which corresponded to about a 0.4 percent increase in total sales for the store."

The team also developed a replenishment application that helps store associates maintain an assortment of all top-selling styles, colors and sizes on the sales floor. Hot-selling items are often sold and then not quickly replenished from the back room, resulting in customers entering the store, failing to find the item they want and then leaving without asking if it is available, and thereby resulting in a lost sale.

The software provides employees with a dashboard showing, in real time, which styles, colors and sizes need to be replenished when some of those items are stocked in the back room but there are none on the sales floor. The system determined what needed to be replenished, by combining RFID data from the inventory counts with sales data acquired from the RFID reader at the checkout counter. Store associates were trained to print a list of items to be replenished each morning. The system then tracked when the list was printed, along with the time that those items were moved from the back room to the sale floor.

"Without RFID, it would be a full-time job to find which sizes and colors have to be replenished," Rizzi states. "With RFID, we could track precise inventory levels for the back room and for the sales floor, and know when items were replenished."

The team cross-checked the replenishment data—items read at the Impinj reader by the entrance to the sales floor—with reads at the checkout counter, in order to determine how many of the replenished items were sold. According to Rizzi, the replenishment list was printed 18 times from June 12 to Aug 31, and nearly 90 percent of the items that workers replenished during that period were sold. The additional sales amounted to approximately a 10 percent increase in total store turnover.

"Since the store was not replenishing items daily, it is clear that almost all of the increase in sales was due to the use of RFID," Rizzi notes. "The companies involved were impressed, and have decided to continue the pilot to track sales during the fall/winter season. Benetton will also participate in the next phase."

Rizzi will present additional details about this project at RFID Journal LIVE! Europe 2010—to be held on Nov. 2-4, in Darmstadt, Germany—during a breakout session scheduled for Nov. 3.