muRata
INNOVATOR IN ELECTRONICS

RFID in the

Fashion Industry

Not just a cost-cutting solution

Introduction

Retailing has played a huge role in driving UHF RFID adoption over the past few years, primarily because of its known benefits for enhancing the visibility of stock, driving down wastage costs and losses and improving overall supply chain efficiency.

But, as more and more retailers attempt to roll-out this solution throughout their operations, future strategies are likely to go far beyond cost-cutting.

According to Professor Antonio Rizzi, founder of the RFID Lab, a primary research center for the applications of RFID, innovators in the fashion industry are leading the way in taking a proactive approach to this burgeoning technology. In a groundbreaking study on the applications for RFID in retail, Rizzi and his team discovered that the fashion industry showcased far more use-cases for RFID than any other sector, with 18 use-cases ranging from shop-floor management to customer-relationship management, logistics, inventory, supply chain management and brand protection.

"Retailers are now adopting RFID because they have understood how to use this technology as a very powerful tool, not only to reduce costs (that is, to streamline processes and reduce losses) but also because they were able to use this technology proactively, not just to solve a problem but to create an opportunity," he said.

Rather than treating RFID tags as a pure cost-reduction tool, these retailers are coming to understand new ways of using RFID to forge new customer relationships, drive sales, enhance strategy and develop cross-channel selling opportunities.

In this white paper, we will look at the components of an RFID system; three use-cases for the technology in fashion retailing, and the five key starting points for a retail-focussed RFID strategy.

How it works: Tags, printers/readers & middleware

Any comprehensive RFID system for retail involves three core components: **tags, readers and middleware.** Developments in the design and capabilities of each of these components mean there is even greater flexibility for retailers to develop a system that suits their distinct strategy and use-case, whether that relates to logistics, inventory or shop-floor management.

Tags

Unlike traditional barcodes, RFID tags contain a unique 96-bit Serialized Global Trade Item Number (SGTIN), combining a global trade number with a serial. After being programmed once, the tag is then read multiple times throughout the supply chain and sales process.

Tags can be encrypted with both static data - data that remains the same over time, like raw materials, components and accessories - and dynamic data, which is added in the course of the product's journey.

When it comes to tagging methods, there are several options for the fashion industry. The first, and simplest, option, is to incorporate the tag into a price label: in this case, retailers simply print the tag on the price label and encode the tag together with the label and affix to clothing. This is a favourite method in fashion and apparel

because all items - no matter what colour, size, style or model - carry a price label. But it is far less effective than other options for use-cases such as preventing inventory shrinkage and tracking items after sale.

To get a greater handle on this, retailers are looking into other options, such as incorporating RFID tags into care labels, which are encoded upstream in the production facility. This delivers a longer tracking period than the price tag options - allowing for after-sale monitoring of garments - and is also a more effective anti-shrinkage tool than the temporary price-label option. More recently, permanent RFID tagging options have also become available via the development of micro-tags which can be sewn into garments for invisible, long-term tracking. Tags can also be sewn into items as small wire inlays, providing an airtight method of identification that is barely perceptible and can be used to fight counterfeiting and the spread of the grey market.

RFID tagging options for the fashion industry:

▪ Incorporate the tag into a price label

▪ Incorporating RFID tags into care labels

▪ Permanent RFID tagging - sewn into garments or intergrated during production

How it works: Printers and Readers

muRata
INNOVATOR IN ELECTRONICS

Printers and Readers

For firms who have decided to embark on an RFID-led stocktaking or tracking method, one of the first steps is to adopt a printing and encoding method, and then decide how these tags will be read at each stage of the supply chain. Tags can be printed and encoded using an RFID printer with an encoding add-on, while handheld readers are also able to encode tags, but not print them. A common method for encoding tags is 'Scan-Scan-Next' process, in which the reader scans the RFID serial and the SKU and links the data together, then moves onto the next tag.

When it comes to reading RFID tags, there are two core options:

Fixed Readers: Often utilized at transitional points in the supply chain such as ports, checkout counters and packing stations, fixed readers can drive up to 32 near- or far-field antennae; near-field offering a narrow/condensed read-field of up to 50cm, and far-field offering a higher read-range of around 8-10 meters. With fixed readers, retailers can create any kind of custom installation at any point in the supply chain in which the items move through a particular read station.

Handheld Readers: Portable, pocket or handheld devices can be used for massive inventory counts carried out by employees, for instance in the store room of a retail premise. These generally function via bluetooth, pairing handheld RFID readers with Personal Digital Assistants (PDAs) and allowing for the seamless, instant exchange of data.

Unlike barcode scanners, these readers can scan multiple tags at once and do not requires a direct line of sight to the tag. While heavily stocked warehouses and storerooms used to represent hours of employee labour, the same bulk of goods can now be processed in a matter of minutes, with a far smaller margin of human error. Handheld readers can cover a range from a few mm up to 30cm, or up to 4-5m for larger stock takes.

How it works: Software

muRata
INNOVATOR IN ELECTRONICS

Software

RFID Middleware, otherwise known as an RFID System Administrator (RSA) is fundamental in amassing the enormous amount of data collated at each point in the supply chain and transforming it into meaningful monitoring information.

The core duties of any RSA include managing the RFID system, cleansing and filtering the data and passing this data to to the retailer's legacy system in a comprehensible format.

Crucially, this is also the point at which the raw data collated at various processing and tracking points is translated into genuine insights that can prompt informed action. All of the data is initially stored in data warehouses, and this needs to be processed by business intelligence tools that can interpret this data, transforming it into value-added information that will help key decision-makers take action to improve their processes.

Customer IT systems

- ERP - Enterprise Resource Planning
- SCE - Supply Chain Execution
- MES - Manufacturing Execution System
- WMS - Warehouse Management System
- POS - Point of Sale

Dashboard web KPIs / alarms

RSA RFID system administrator middleware

RFID readers

6
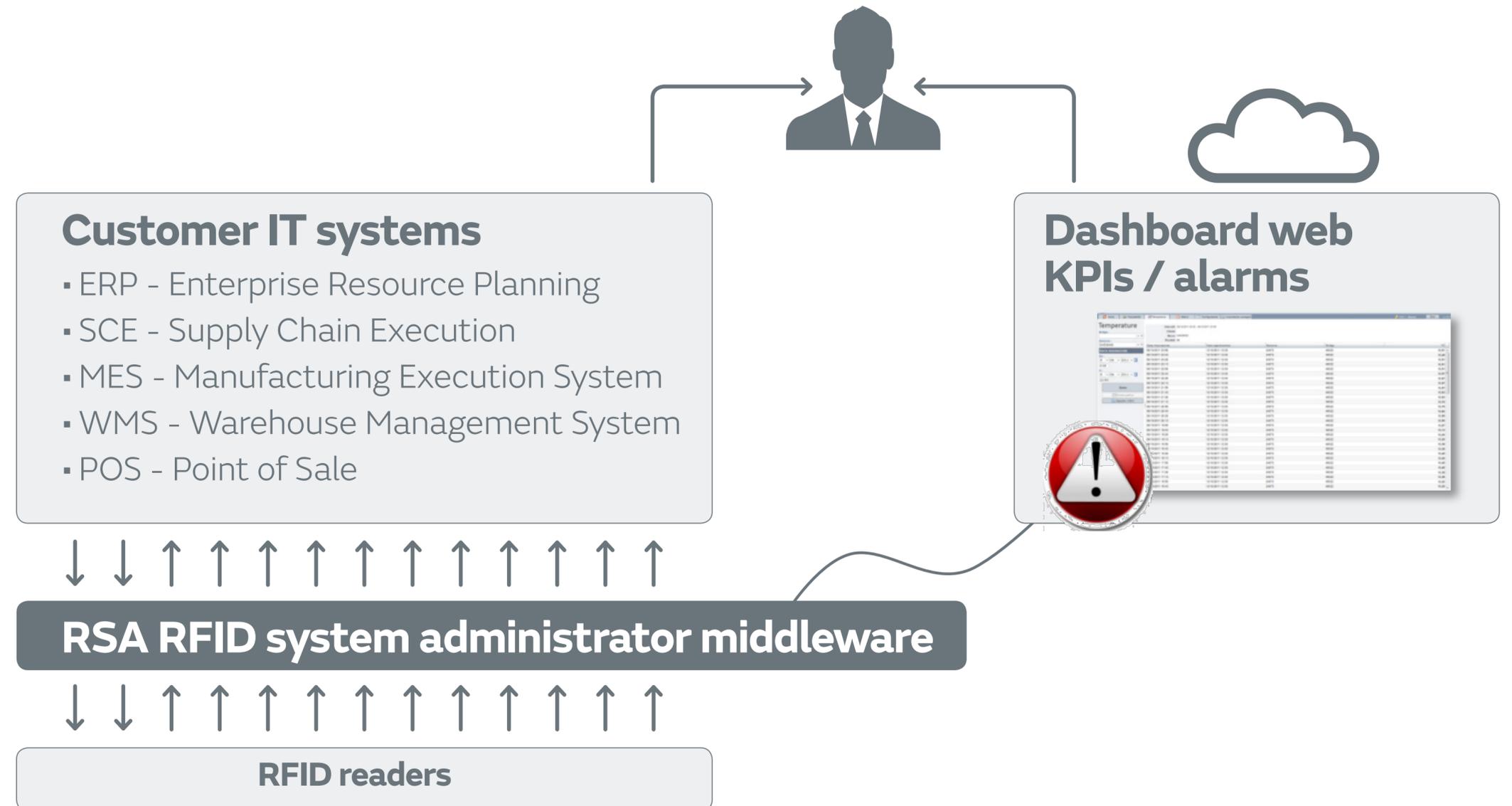
Use-case 1: Stock visibility

One of the biggest challenges retailers face is being able to drill down into the detail of why a particular item may not be selling in the quantities anticipated: is it just not resonating with customers? Are there design or pricing flaws?

It may well be that the product simply isn't destined to be a big hitter, or it may be that, somewhere in the supply chain - anywhere from the first few miles to the last few meters - something has gone wrong.

Without RFID, the last leg of the journey - from the store-room to the shop front - has been next to impossible to keep track of. End-of-season physical stock takes can give shop-owners an understanding of how well items have been selling over the past few months, but they can't give

them the day-to-day oversight they need to make sure the shop floor is continuously well stocked when it matters most.

Developments in RFID technology have given retailers a number of options for improving stock visibility. Fundamentally, RFID has made it easy to run inventories for both the storeroom and the shop front. Retailers have the option of using 'replenishment gates' - fixed read-ers that track the movement of goods between the backroom and the sales areas - or equipping staff with portable readers in order to track items across the premises.

RFID HAS MADE IT EASY TO RUN INVENTORIES FOR BOTH THE STOREROOM AND THE SHOP FRONT

In smaller stores, more and more retailers are now using handheld readers that can carry out inventory counts at a rate of 20,000 items-per-hour, counting the stock in both the storage and the sales areas. This way, employees are always armed with up-to-date, highly accurate data on what needs to be replenished on the shop front, including the sizes, models and colours that are selling most rapidly.

Employing RFID in this capacity has become a strategy not just for preventing wastage but also for maximizing sales, says Professor Rizzi: "The main issue at stake here is that customers buy what they see, and so, if you forget to replenish, customers in the store do not see that item and don't buy it, and you're definitely missing a selling opportunity."

Extensive KPI campaigns have been carried out on the sales impact of employing RFID to improve front-of-house stock replenishment. These studies have shown a consistent sales leap of around 5-10%, with some types of product experiencing an even greater boost as a result of this improved visibility. The latest generation of RFID-enabled solutions goes even deeper into the detail of a retailers' sales figures, linking sales numbers to certain high- and low-traffic areas in the shopfront. Armed with this data, retailers are now able to closely monitor and replenish certain areas of the shop that they would expect to generate higher sales - e.g. entrances and windows - as well as keeping an eye on whether sales figures for these areas are meeting expectations.

...retailers are using handheld readers with a productivity rate of

20,000
items per hour

In this use-case, RFID offers a route to a more proactive stock replenishment approach, and an even more strategic understanding of store design and product placement.

Key points

- RFID makes it easy to compile separate inventories for the shop front and the stockroom

- Fixed RFID readers can be used in 'replenishment gates' that track items moving between the stockroom and the shop front

- For smaller premises, retailers are using handheld readers with a productivity rate of **20,000 items per hour**

- Improved stock replenishment has been shown to lead to an average sales uplift of **5-10%**

Use case 2: Inventory Accuracy

For almost a decade now, pioneering early adopters have been finding ways to enlist RFID tagging in their battle to improve the accuracy of their stock takes.

For almost a decade now, pioneering early adopters such as Macys and Marks and Spencer have been finding ways to enlist RFID tagging in their battle to improve the accuracy of their stock takes. This proactive move was spurred on by one realization from retailers: across the industry, they had been suffering from incredibly poor rates of inventory accuracy. In fact, average rates of accuracy for pre-RFID stocktaking systems were languishing at around 60%, representing huge discrepancies between the stock listed on the legacy system and actual levels of physical stock.

Discrepancies between stock listed and physical stock in store can be costly: for most retailers, the worst-case scenario occurs is one of overestimated stock levels,

where the legacy system mistakenly lists several items more than there are. In this domino sequence, nobody orders the stock they think is still there, and numerous sales opportunities are lost over the course of days, weeks or even months.

With traditional stock-management systems, a case of overestimated stock may only be discovered when somebody carries out a physical inventory at the end of the season. Conversely, the ease and speed of RFID scanning enables stock checks to be carried out once or twice a week - or even daily - and this data can be used to update the legacy system, which can in turn be used as a prompt to replenish and reorder. A recent literature review has shown that, with RFID, retailers have seen inventory accuracy improved to 98-99%, which in turn leads to a notable increase in sales by reducing those avoidable 'out-of-stock' moments.

RFID as a springboard for cross-channel selling

An ever-greater number of retailers are now opting to use this foundation as the springboard for a whole new omni-channel sales strategy. Increasingly, customers are expecting a greater symbiosis and a fluidity of experience across both retail and detail channels; purchasing methods that merge the two - like the ever-popular 'Click and Collect' - are becoming a cornerstone of modern-day retail.

As the high-street stores continue to battle rising overheads, it's perhaps understandable that brick-and-mortar shop-owners are now trying to exploit their physical premises and online channels to propose whole new ways of shopping. Different sales channels can be combined in a huge variety of ways: **customers can research online, buy in store; buy online, ship to store; buy in store, ship from store; buy online, pick up in store.**

As RFID experts are keen to stress, the technology alone is not enough to build an omni-channel strategy - but it does constitute a fundamental part of it. For the first time, RFID allows retailers to see their shops like warehouses that fit

> For the first time, RFID allows retailers to see their shops like warehouses that fit seamlessly into a wider distribution chain

seamlessly into a wider distribution chain. Pooling stock and resources across stores in this way can about bring about huge reductions in holding costs while also reducing the problem of missing sizes and creating a more efficient process for correcting stock level issues, without returning whole models to a central distribution centre.

According to Rizzi, the difference that RFID makes is offering a firm foundation of inventory accuracy on which

to build a reliable cross-channel offer. "Why is RFID important? Because you cannot base an omni-channel strategy on a ground of poor inventory accuracy," he says. "Because the first time you sell something you don't have, you lose the trust of your customer."

Before RFID tagging started to become more widely used, retailers had to give themselves leverage of around 8-10 items in order to list something online and compensate for human error. Now, the near-perfect track record of these systems has given retailers the confidence to list all items with an inventory of one or more on their online platforms and marketplaces.
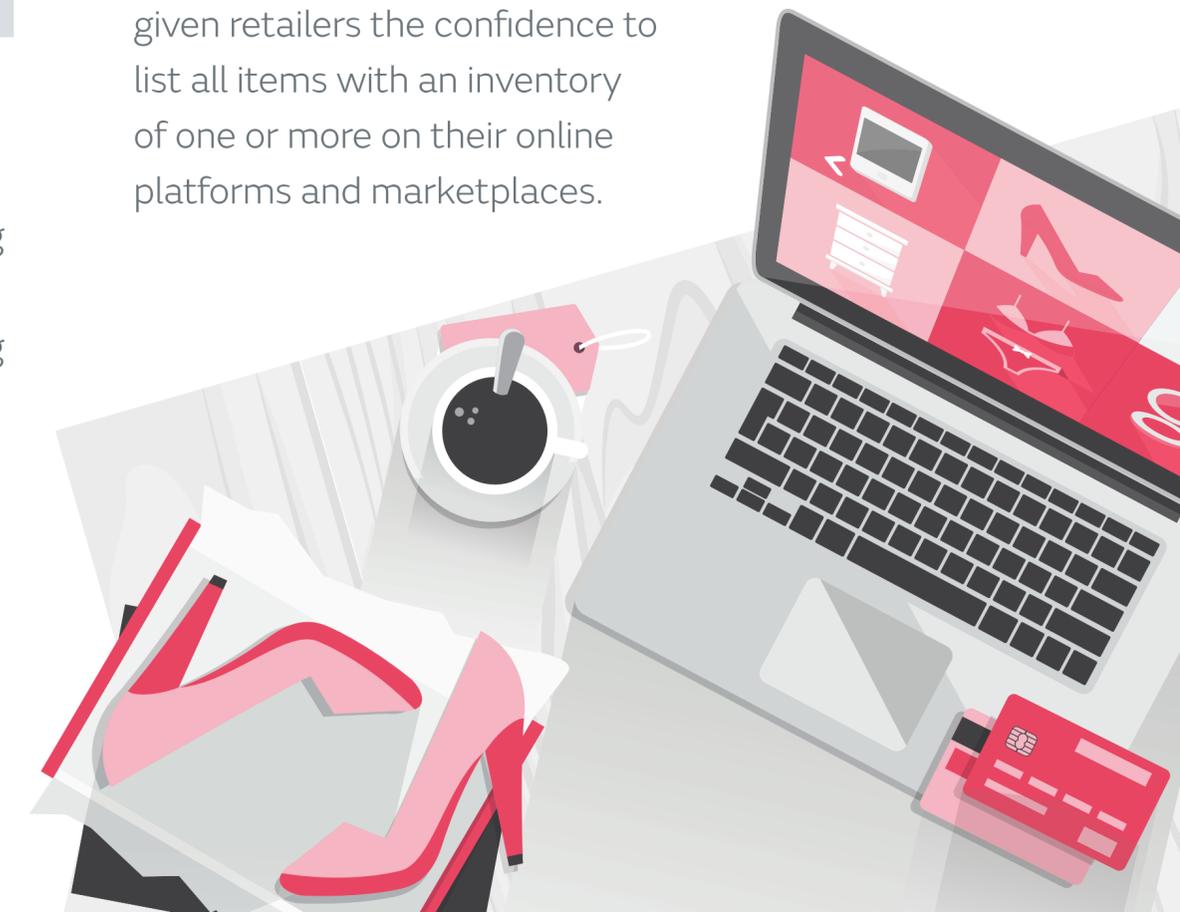
Key points

- Inventory accuracy is a cornerstone of RFID retail usage, delivering accuracy rates of around 98-99%

- This has led the foundation for lucrative cross-channel selling, with retailers establishing schemes like Click and Collect

- By treating retail premises like warehouses and pooling stock across stores, retailers can radically reduce holding costs and boost the efficiency of their processes

Use case 3: Anti-counterfeiting and Grey Market

Counterfeiting is a growing issue for the fashion industry, with increased global trade providing ever greater opportunities for counterfeiters to infiltrate the supply chain and create cut-price versions of branded goods.

In 2016 alone, European Union border officials seized more than 41 million counterfeit and fake goods, and it's been estimated that counterfeit goods currently account for 2.5% of trade worldwide and 5% of EU trade.

Increasing levels of international trade have also spurred on a thriving grey market for unauthorized dealers who sell goods on to customers in grey markets. When it comes to luxury fashion labels and products like designer watches, this trend is particularly pernicious: well-known branded products can often end up listed on unauthorized dealerships, who drastically undercut original pricing and undermine brand value and strategy.

Within this complicated global trading environment, grey-market distributors have typically been able to operate under a protective cloak of obscurity. With RFID, however, these operations can be uncovered at their very source. Uniquely for RFID, the SGTIN associated with a particular tag can be linked to an intended customer, and retailers have an unprecedented ability to track goods from source to destination. If the items then emerge in an unauthorized market, the original seller has crucial information about the dealer and shipment of the item.

It is perhaps for this reason that global fashion retailers have started to employ RFID as part of major anti-grey market campaigns: it constitutes a particularly powerful tracking tool that has so far been unanticipated by these unofficial dealers.

According to Rizzi, there is also a clear financial incentive for tackling these unlicensed and unregulated operations. "Sometimes retailers neglect the amount of lost revenues at stake with the grey market or the black market, but in visibility studies we've carried out with some companies, we've seen that those values can be in the range of millions of euros per year," he says.

In the fight against counterfeiting, RFID contains another unique feature: the TID, or 'Tag Identifier', which is encoded into the tag chip and represents a forceful weapon against would-be counterfeiters. "The TID cannot be counterfeited – and therefore once it is tracked to the EPC and is tracked to the product, it cannot be modified," explains Rizzi. "Due to this, it can be used to understand whether a product is genuine or not."

Key points

- Grey market and counterfeit goods are on the rise, and represent a serious threat to brand value and trust

- If RFID-tagged products end up in unintended markets, unauthorized dealers can be identified and tracked down

- RFID tags feature a Tag Identifier that is impossible to counterfeit, making it a powerful tool in the fight against fake goods

Five tips for implementing RFID

For retailers considering overhauling their current supply chain with an RFID tagging system, Professor Rizzi has **5 primary tips for getting started**:

1 **Don't doubt the efficacy of the technology:** RFID may be around half a century old, but in recent years, a huge amount of R&D effort has gone into improving the technology: tag performance is increasing, and readers are reading at a faster rate and with higher accuracy than ever. Aside from very new and innovative use cases, it's not worth spending time testing the technology - there are more efficient and cost effective ways to start that will probably maximise the benefits your business gets from RFID.

2 **Identify the 'why' of your RFID strategy:** Rather than starting with the tech or assuming that RFID will be a one-size-fits-all solution, Rizzi recommends starting instead from an assessment of the issues and opportunities at stake. What issues do you currently have? What data is needed to solve these issues? "It's a kind of doctor approach," he advises. "When you go to the doctor, you don't start from the prescription, you start from the symptoms; that is, your problem or opportunities – then you have the diagnosis; that is, what data is needed – and finally you have the prescription; that is, what the system is."

3 **Conduct an analysis of the actual processes:** Once you know the issues that you need to solve, design the 'as-is' scenario: the actual processes at work. "Design the to-be RFID scenario: what technology, what readers, what tags, what information, what integration with the legacy systems you need, but also the entire new way of doing things," argues Rizzi. "And this feasibility study should lead to a twofold objective: on the one hand, to provide a roadmap for the whole RFID deployment, and on the other hand, to calculate the ROI and other economics to assess the value of the deployment."

4 **Follow the 80-20 rule:** Rather than taking an 'all-or-nothing' approach to RFID technology adoption, Rizzi says it's important to recognise that sometimes 20 percent of the changes can reap 80 percent of the rewards. With the specific issues in mind - whether counterfeiting, stock accuracy or shop management - a tailored solutions can often be found.

5 **Be part of the Early Majority:** When it comes to the timing of your RFID roll-out, the time is now. Apparel and footwear are driving the adoption of RFID, with the amount of units being produced expected to more than double over the next few years in this sector alone. Over the past decade and a half, the trajectory in RFID has moved from 'innovators' - the first 2.5% of firms experimenting with the tech in the early 2000s, including Walmart and Metro - to the 12.5% early adopters, including Macys, Decathlon and M&S, who were employing RFID between 2008 and 2015. Now the 'early majority', who waited to see provable benefits before investing, are starting to adopt the strategy - while the next decade will likely see mainstream adoption.

Conclusion

With its unprecedented stock-taking and tracking capabilities, RFID tagging represents a unique answer to many of the salient issues faced by fashion retailers today. In addition, in an era of increasing global trade, the potential of RFID to act as a weapon in the battle against the flow of counterfeit and grey-market goods offers another huge incentive for retailers to consider RFID as a brand-protection measure.

Having proven its credentials as an effective cost-cutting and anti-fraud tool for retailers, the future of RFID adoption looks to be an increasingly creative and innovative one. RFID's accurate stock-taking capabilities have become the foundation for multiple successful omni-channel strategies, as well as being utilized to boost stock visibility and sales in-store.

Unsurprisingly, then, adoption and production rates are currently showing a steep upward curve: by 2020, the

Internet of Things will consist of 50 billion objects, with more than half of these containing passive RFID tags and around 25 billion tags produced in the year 2021 alone. According to experts, the start of the next decade is likely to see widespread adoption of RFID technology in retail - with the late adopters and 'laggards' being the last to catch on.

At this transitional point in RFID's development, there are proven benefits for to adopting RFID: with simple, targeted changes, retailers can see immediate boosts to sales, as well as significant efficiency savings. But to maximize benefits, the message from the experts is clear: "The time is now."