

Avery Dennison
Intelligent Labels

Deep Dive
Food

The Future of Frictionless Food

Smarter supply chains,
social distancing, and the race
to deliver convenience above all



averydennison.com/rfid

Contents

Introduction	1
At Avery Dennison, we think frictionless ought to mean less friction for everybody — consumers and retailers alike	2
It's not just you: Investing in digitally enabled convenience is at the top of the grocery industry's agenda	4
Now arriving in your living room (and everywhere else): The frictionless future	6
Frictionless technology is coming fast. RFID is part of the wave	7
From the stockroom to the sales floor and beyond: The benefits of RFID	8
Which technology is most frictionless?	10
Should you deploy RFID or a vision-based system? The right answer might be "both"	11
"Making frictionless a reality:" Three stories about the transformative power of RFID	13
RFID and grocery: Fact vs. friction	17
The way to frictionless for food shopping is clear	19

More than ever, frictionless matters.

COVID-19 hasn't slowed the grocery industry's move toward greater convenience — it has accelerated it. Because more than ever, consumers are demanding grocery shopping that is fast, painless, and light on unnecessary interaction. Shoppers want the same thing they wanted before the pandemic, only more. And sooner. They want shopping to be frictionless.

Compelling technology has emerged to help grocers save their customers time and hassle while also allowing shoppers to choose their level of social distance. Innovations have been driven in part by Amazon and its multifaceted forays into the grocery business. But there are other, smaller companies also leading the way — newer brands like Dirty Lemon, which is pioneering not only its own stores, but also pop-up frictionless retail in the stores of other retailers and in spaces not typically considered retail at all.

Food-forward convenience stores are also at the vanguard: 7-Eleven is testing a scan-and-go concept, and no less than the Ministry of Economy, Trade and Industry of Japan has asked convenience stores in that country to implement automation to cope with a labor shortage and improve the shopping experience. Meanwhile, in the U.S. and Europe, some of the biggest and oldest names in grocery are also experimenting with frictionless technology.

Frictionless shopping is still in its infancy. It still feels new. But as with all good ideas, what is novel now will quickly become a basic expectation on the part of consumers as groceries, convenience stores and even quick-service restaurants all fight for stomach share, and as public health concerns prompt us all to shop in new ways.

As the various segments of the industry coalesce around the goal of removing pain points from their brand experience, the inevitable question has arisen: What is the best technology for doing so?

At Avery Dennison, we think frictionless ought to mean less friction for everybody — consumers and retailers alike

In this Deep Dive, we'll look at some of the ways grocery retailers are using RFID tagging to offer better — and more socially distanced — brand encounters while better managing inventory. We'll look at how RFID compares to vision-based systems, and dispel some of the myths you might have heard based on outdated understanding of RFID technology.

Because here's the thing: Frictionless shopping isn't "the future" anymore. It's happening right now. We believe that RFID is uniquely capable of not only providing a less frustrating, more empowering, and more pleasurable shopping experience for consumers. We think it's the only frictionless technology that can also transform the back end of your business and help you adjust to the realities of COVID-19 in a way that's realistic to implement, and at a level of investment that makes sense.

RFID for grocery isn't about someday. It's here now.

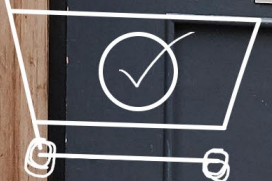
Made Possible

by Avery Dennison

RFID for grocery: Why it makes sense

RFID (radio frequency identification) tags are pressure-sensitive labels inlaid with an RFID microchip and antenna. They're applied to every item to give each a 'digital twin' that can be tracked and traced online and immediately detected with the click of a scanner or mobile phone. (NFC, an evolution of RFID, can go even further and enable products with a digital personality experienced via a smartphone.)

RFID tagging delivers huge, easily demonstrable benefits for grocers. It can enable frictionless, touchless experiences like cashierless checkout for shoppers. It also provides atomic levels of visibility into your inventory and supply chain, so you know exactly what you have, what's coming, and where it all is — no more gaps, dark spots, or question marks. RFID tagging also supplies the who, what and when of a product's provenance with certainty, so that every product can be digitally documented by blockchain or other means, enabling you and your customers to access a product's whole, true life story with a simple tap. RFID tagging enables you to waste less, sell more and ensure freshness and shelf life. It conjures new possibilities for frictionless customer encounters while letting you allocate labor more wisely. In all, RFID tagging sits beautifully at the intersection of what customers want and what grocers need at this pivotal moment in the industry.



It's not just you: Investing in digitally enabled convenience is at the top of the grocery industry's agenda

Deployment of digital technology is up, much of it in pursuit of providing a more frictionless experience. Amazon and convenience stores — the fastest-growing segment in retail — are driving the trend. But grocers everywhere have realized that, in the words of one industry consultant, “whether you knew it or not, you’re working at a technology company.” Here are some numbers reflecting the evolution toward both digital investment and the demand for convenience:



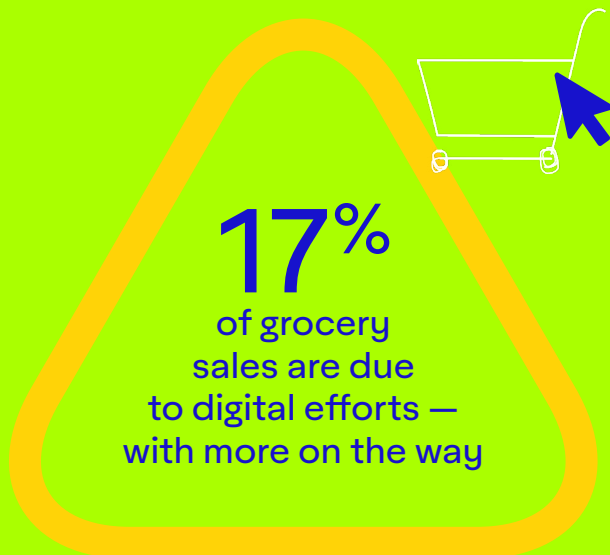
Source: Nielsen



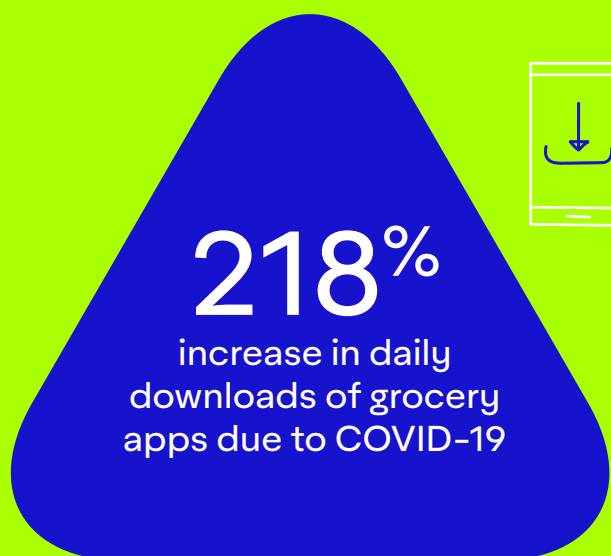
60 Million to 1 Billion

increase in venture funding for U.S.-based food tech companies, 2008-2015

Source: Pitchbook



Source: RIS-Grocery Trends Study



Source: Apptopia Data



Source: IoT...& The Imminent Supply Chain Revolution Whitepaper

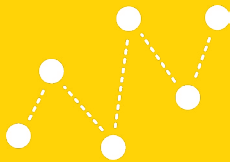


Source: China Chain Store and Franchise Association (CCFA)

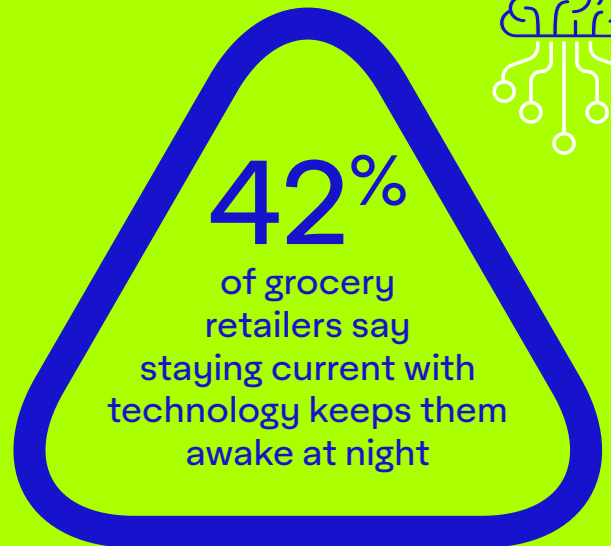
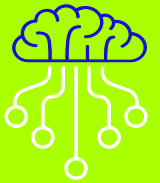


Source: National Association of Convenience Stores (NCAS)

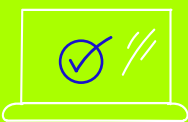
\$48.1 Billion
is the projected worth
of the convenience
store market by 2024



Source: Goldstein Research



Source: Goldstein Research



Source: FoodDive

How is COVID-19 reshaping the grocery industry?

Although the new normal for doing business during the pandemic is still being defined, there are some early takeaways. One of them: Consumers are buying more groceries online. Online ordering jumped by 210 percent between March and April 2020. Meanwhile, grocers — catering to customer demand and stung by persistent out-of-stocks early in the pandemic — are approaching investment in omnichannel and home delivery platforms with greater urgency while accelerating their transition to automated, more agile supply chains. In short, the trends towards automation and frictionless shopping that were in play before the pandemic have been accelerated by COVID-19.

Now arriving in your living room (and everywhere else): The frictionless future

Technology at home and in stores has already begun to take the friction out of shopping and set consumer expectations. Frictionless retail will continue to become more predictive, support smarter interventions, and feature a higher degree of automation.

What?

Friction-free shopping.

With advances like cashierless stores and Amazon's Alexa voice assistant, friction is being removed from the FMCG shopping and buying.



La Esse store was conceived as a state of the art technology, where all products are tagged with RFID and customers can check out directly from their mobiles.

Why?

Making the buying process seamless.

Friction-free shopping is all about making the buying process as convenient (and in some cases as automated) as possible.



Amazon Dot – U.S.; UK; Australia. Amazon's Alexa-equipped Dot enables voice-activated shopping.

How?

Redefining “ultimate convenience”.

Recent friction-free shopping advances like voice activated ordering are redefining what ultimate convenience means.



The Morrison's supermarket chain (UK) now accepts voice orders from Alexa.

Frictionless technology is coming fast. RFID is part of the wave

Through the Internet of Things and much more, nearly everything in our lives as consumers is evolving toward less friction. Only RFID tagging lets you extend that experience to grocery shopping while making your operations more friction-free, too.

What?

Multiple and varied new technologies are leading fast, radical, and lasting change

Big Data, CRM, artificial intelligence, automation, virtual/augmented reality, smart homes, social media... the list seems endless - and growing.

Why?

We are already in the new digital age.

Concept-to-market times are getting shorter while consumer acceptance and adoption of new technology is faster and more widespread.

How?

Embrace UHF RFID and NFC to engage with forward thinking consumers.

UHF RFID level tagging enables better supply chain efficiency, increasing food retailers competitive advantages.

NFC applications can be used across many sectors to better engage consumers' smartphones.



Wearable proof – world's first wearable alcohol intake measuring and monitoring device.



Smart appliances. One-tap ordering.



Robomart, Inc. has created the world's first store-hailing service through its on-demand, self-driving stores.

From the stockroom to the sales floor and beyond: The benefits of RFID

The advantages of RFID begin in the supply chain and continue through every sale. Here are just some of them:



Save time and hassle for shoppers

This is the most obvious advantage for your customers: The ability to get what they need, when they need it, faster and easier. From cashierless stores to ordering via smartspeaker, time-strapped consumers are gravitating to shopping that's less of a chore.



Dramatically improve inventory management

See exactly what's come in, how much product you have, and when it leaves — with 99 percent certainty. Automate. Maintain quality and shelf life without compromise. Locate lost product. Redirect what needs to be redirected. Withdraw only what needs withdrawal. Delight your customers — and your employees.



Reduce labor costs

Spend dramatically fewer dollars and employee hours on inventory: RFID can eliminate the need for store employees to manually check sell-by dates item-by-item; with an RFID reader, they can scan 700 to 1,000 items per second, either on the shelves or in back-stage storage. We're conducting pilots to confirm our estimate that RFID-enabled efficiencies can cut labor costs by up to 50 percent, making it possible to take advantage of reduced labor costs or reallocate employee hours toward delivering a standout customer experience.



Adapt to the COVID-19 pandemic

Enable shopping with less contact through cashierless checkout and other innovations. Get vastly improved visibility into your supply chain so you can replenish products faster and avoid the lost sales and diminished customer loyalty that results from out-of stocks and substitutions.

From the stockroom to the sales floor and beyond: The benefits of RFID (continued)



Extend shelf life

Track “use by dates” and replenish stock more regularly, so that your customers always take home the freshest product with plenty of shelf life.



Enable greater transparency and traceability

More consumers than ever expect transparency in their food supply. They want to know who made it, how it was processed, and where it comes from, all the way back to the source. At the same time, product recalls are a major business risk, with millions of dollars worth of product at stake. Our solutions enable you to verify a food item’s journey across the entire supply chain, from its source to its final destination, and pinpoint any trouble spots along the way, minimizing risk and cost.



Waste less and improve sustainability

Imagine it’s possible to be 20 percent better: RFID tagging can help you reduce waste by as much as 20 percent by aligning your inventory with variable demand across different regions. Data provided by RFID also gives you far greater visibility into expiry, enabling you to discount or otherwise promote soon-to-expire items. You can also monitor temperature-sensitive products during their journey through the supply chain, to help you avoid waste through spoilage. Over time, the amount of revenue re-captured just by avoiding waste can pay for the cost of implementing RFID.







Make your supply more predictive

Tracking inventory with RFID enables you to flexibly adapt to the market and better satisfy consumer demands. In particular, RFID solutions can create more advanced models for fulfillment and replenishment. This means replenishing products sooner, and reducing customer dissatisfaction and sales lost from out-of-stocks.

Which technology is most frictionless?

There are a lot of companies offering varying technology aimed at providing a frictionless experience. But when you dig into the details, you quickly see that some solutions are more frictionless than others. Other technology requires customers to download apps, scan items during shopping, and generally spend time navigating processes and technology. Only RFID provides a friction-free experience start to finish. The chart below makes it easy to compare:

	Early consumer journey		Shopping	Point of sale
	 Opt-in, app download	 Enter store	 Identity check-in	 Purchase chart
Video / AI	●	●	●	●
RFID	●	●	●	●
MRC* with assisted device	●	●	●	●
MRC* with mobile app	●	●	●	●

● No friction
 ● Low friction
 ● Significant friction
 ● Heavy friction

*MRC: Machine Readable Code



Should you deploy RFID or a vision-based system?

The right answer might be “both”

Vision-based systems developed by Amazon and others are impressive technology. The interplay of cameras, sensors, and artificial intelligence is a wonder, and who wouldn't love the “just walk out” experience?

Yet for many grocers, vision-based systems are costly and impractical to implement. They require a specific, controlled store environment that means retrofitting existing stores and designing new ones to fit the system rather than your brand. Plus, the benefits of vision-based systems are largely limited to the customer experience.

RFID tagging, in comparison, not only provides a frictionless experience for customers — it also delivers compelling benefits to your entire operation, and to your bottom line. Among them:

- **Easier integration.** RFID-based systems can be integrated into existing store designs without retrofitting. Stores can be laid out to fit the brand (and the optimal customer experience), not the technology.
- **Item-level traceability from source to shelf.** Unlike vision systems, RFID tags enable dramatically improved visibility and traceability across the supply chain.
- **Better with blockchain.** RFID enables the logging of chain-of-custody, making it a perfect complement to blockchain solutions.
- **Less waste from expired products.** RFID enables automated management of expiry, saving cost and reducing waste. While vision systems cannot easily track expiry.

The good news is that RFID and vision-based systems aren't mutually exclusive.

Grocers can deploy RFID tagging to complement vision-based frictionless shopping in stores while also capturing RFID's unique benefits on the back end. Ultimately, the decision of which technology to use comes down to your business objectives and digital strategy — and how deeply you want to transform your business.

Technology	Process and manufacturing				Logistics			Retail		
	Farming	Processing	Distributing	(Conveyor)	Logistics	Factory	In Transit	Retail	Restaurant	Consumer
Convolutional neural networks	●			●				●	●	
Proximity								●		
Heat mapping								●	●	
Inventory	●					●				
Facial recognition										●
RFID	●	●	●	●	●	●		●	●	●

● Available

RFID offers value from source all the way to the end-consumer



“Making frictionless a reality”: Three stories about the transformative power of RFID

Already, companies using our RFID solutions in different segments of grocery and food service are reporting success — and there are new use cases emerging globally. Here are three of the most compelling:

Esselunga puts the “s” in frictionless with La Esse

- Esselunga’s La Esse store is a completely innovative format for the Italian grocery giant, offering groceries and a cafe in a smaller, hip space in central Milan, covering a 400 square meter surface.
- All 2,500 items in the store are tagged with RFID labels.
- At four different checkout points, sensors instantly scan and total all the items in a shopper’s bag, enabling a fully cashierless experience.

“Semplice, vicino, fresco”— simple, close, and fresh — is the brand promise of La Esse, a neighborhood market in central Milan opened by leading Italian grocer Esselunga. In a small, state-of-the-art space, La Esse features a cafe with hot food and pastries as well as groceries. All items are tagged with RFID labels, which are applied along with pricing labels. Customers pay by inserting their shopping bag into compartments on one of several “Presto Cassa” checkout stations; the system reads the RFID tags and instantly calculates

the total cost — “without waiting, and without beeps.” The store also offers “Clicca e vai” (click and go) lockers for patrons who want to order from more than 15,000 items online and pick up their groceries at the store. Early positive response to the store, as well as demand for automated shopping created by COVID-19, suggest the future of grocery will look a lot like La Esse.



“Making frictionless a reality”: Three stories about the transformative power of RFID (continued)

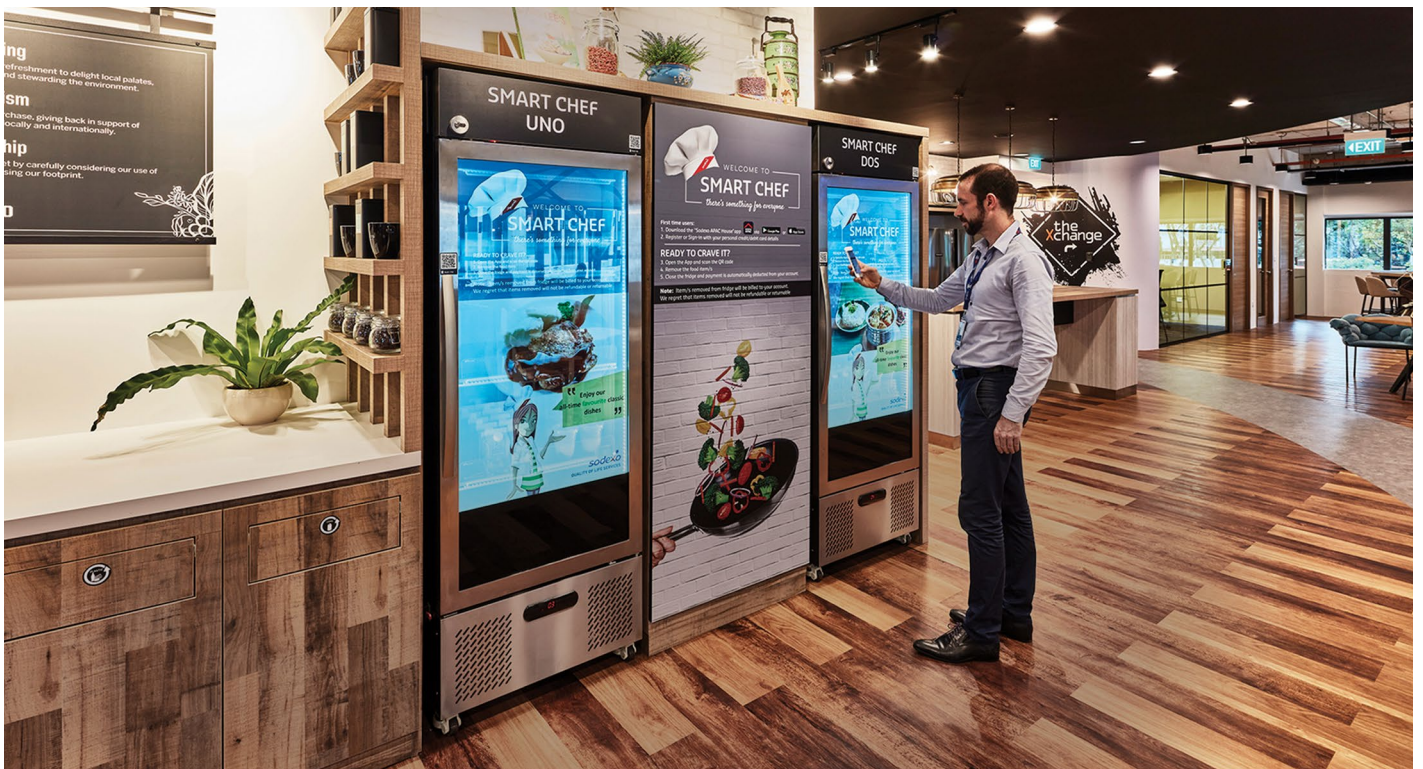
Sodexo: Hot grab-and-go with a side of safety

- Food-service leader Sodexo is using RFID-enabled SmartFridge vending machines by CryoWerx in locations where grab-and-go meals are popular.
- The system provides fast, cashless vending of ready-to-eat meals, including frozen microwavable entrees. RFID tracking lets operators cut labor costs, better manage inventory, and reduce waste.
- Avery Dennison WaveSafe™ tags have enabled Sodexo to keep SmartFridge users safer by eliminating the fire risk associated with RFID tags on microwavable packages.

Sodexo, a Paris-based, global leader in food services and facilities management, is placing SmartFridge vending machines in its facilities on corporate campuses, in government agencies, at schools, and in other locations where grab-and-go meal options are popular. Created by Singapore-based engineering and technology company CryoWerx, the SmartFridge is an RFID-enabled, fully automated machine that provides cashless vending of ready-to-eat meals, including frozen microwavable entrees.

Each item in a SmartFridge is tagged with an RFID inlay. By scanning a unique QR code

provided by the SmartFridge mobile app, customers can open the vending machine and simply take the items they want. Their purchases — tracked by RFID — are automatically billed to their credit card via the app. In addition to providing convenience for users, the RFID tracking central to the SmartFridge lets operators cut labor costs, better manage inventory, and reduce waste. In addition, using Avery Dennison WaveSafe™ tags has enabled Sodexo to keep SmartFridge users safer by eliminating the fire risk once associated with RFID tags on microwavable packages.



“Making frictionless a reality”: Three stories about the transformative power of RFID (continued)

Dirty Lemon quenches the Big Apple’s thirst for convenience

- Iris Nova has created a completely automated store for its successful Dirty Lemon brand of health beverages.
- The Tribeca store deployment has already delivered inventory accuracy of 98 percent and increased on-shelf availability of product.
- Customers take what they want from the store and inform the company by text. Payments are automatically debited, and the system logs the inventory change while capturing customer data.
- With an RFID tag on every bottle creating the bottle’s ‘digital twin’, Iris Nova is able to track a product life cycle, decrease theft, enhance consumer experience, and support frictionless checkout.

Iris Nova’s Drug Store is an engaging, highly branded model of frictionless beverage-buying. The compact space in New York City’s Tribeca neighborhood stocks just one thing: Iris Nova’s brands of health beverages.

The way it works is simple: Customers walk in, open a cooler, grab the bottle they want, and send the company a text describing what they took. Payments are automatically debited from their accounts via mobile payment; Iris Nova’s system automatically logs the inventory change at the store, while capturing data about the customer.

The secret? An unobtrusive, inexpensive RFID tag on every bottle that creates the bottle’s digital twin in Iris Nova’s inventory system, enabling it to be tracked and traced across its lifetime.

The RFID tags on the beverages enable sales validation when the customer logs a purchase via SMS. They also provide unprecedented, atomic visibility into inventory, which results in far better stock management and knowledge of where any item is at any point in the supply chain. The tags also allow automated monitoring of product expiration, better-informed analysis of sales trends, and ongoing, mobile-based encounters with customers that let shoppers discover the “who, what and where” of the beverage, take part in promotions, and learn about other Dirty Lemon products – as Dirty Lemon, in turn, learns more about the customer.

Iris Nova now plans to install its RFID-enabled refrigerators in the stores of other retailers, and in non-retail spaces full of thirsty people, like gyms.

“Making frictionless a reality:” Three stories about the transformative power of RFID (continued)

Dirty Lemon quenches the Big Apple’s thirst for convenience



“

With RFID technology as a foundation, we have a lot of potential to make frictionless shopping a reality and engage even further with our customers

”

Zak Normadin, Iris Nova’s CEO

RFID and grocery: Fact vs. friction

Even as RFID adoption grows, myths and misunderstandings persist. Here, we correct some of the most common mistaken beliefs:

RFID technology has been around a long time and has seen limited use within the food industry. Why are we talking about it now?

It's true that some major grocers experimented with RFID in the early 2000s. The technology — and the opportunities — have improved vastly since then.

Early versions of RFID were limited by cost, incompatible packaging materials, and the computing technology of the time. Today, the cost of RFID tags has decreased dramatically. And packaging limitations have been overcome.

It's now possible to tag every item in a store — including metals, liquids and microwavables — due in part to Avery Dennison's innovations in RFID tags. Also, improved tags and readers have dramatically improved accuracy and read rates. And mobile devices have put the power of Intelligent Labels into the hands of any employee and any consumer.

There's also more consumer demand for the kinds of capabilities RFID enables, including omnichannel sales, reductions in food waste and complete transparency in sourcing and processing.

RFID can't be used on food or liquids, right?

Wrong! It's now possible to tag every food item — including foil packaging, liquids and microwavables — due in part to our innovations in RFID tags. We have over 1,000 RFID-related patents, including patents for breakthrough products that work on food and liquids.

Isn't RFID cost-prohibitive?

It's not. RFID tags now cost as little as a few cents each, and innovation will continue to bring prices down. At Avery Dennison, we are working with PragmatIC® to enable the manufacture of billions of low cost RFID tags annually, which will provide the opportunity for us to leverage economies of scale.

How reliable is RFID technology?

Read rates are greater than 99 percent — more accurate than manual, line-of-sight barcode scanning. Barcode scanning relies on human accuracy, and barcodes on products can become damaged and unreadable. RFID enables far greater accuracy and full visibility across the supply chain.

RFID and grocery: Fact vs. friction (continued)

I already have printed barcodes. Why should I use RFID?

RFID does not require line of sight and is considered a “one to many” technology, meaning it can batch-read hundreds of products in a matter of seconds. Barcodes, on the other hand, are cumbersome, slow, and error-prone. But RFID doesn’t force you to choose — you can include the human readable barcode information printed on the face stock with the RFID inlay placed discreetly behind it.

Is RFID compatible with other technologies such as blockchain, AI, and machine learning?

Our RFID tags automatically supply data to blockchain-based inventory-management systems — no manual scanning necessary. RFID is serving as the backbone of a number of systems built on blockchain and other technologies, providing automated digital data-entry.

Ultimately, most retailers will provide frictionless shopping experiences by taking a holistic approach that integrates AI automation, human intervention, and data sharing to provide personalized and predictive interactions between innumerable touchpoints across multiple channels. RFID fits perfectly into this ecosystem.

Which retailers are using RFID now?

Our RFID tags are being used by some of the most familiar names in retail — in apparel, and beauty as well as food (and though it doesn’t exactly count as retail, the airline industry has embraced RFID tagging to better track luggage.) Brands that have deployed our solutions include Macy’s, lululemon, Marks & Spencer’s, Reynolds, and Ralph Lauren among others.



The way to frictionless for food shopping is clear

In the swirling sea of frictionless technologies, RFID tagging emerges as the best choice for grocery retailers of any size. It not only offers an easier, more enjoyable experience for your customers — it also provides powerful advantages for your business.

The best way to experience the RFID advantage is to experience it for yourself. We'd love to welcome you at one of our customer experience centers and show you our solutions in action in a setting much like your own stores.

In the meantime, visit our website averydennison.com/rfid to learn more or contact rfid.info@averydennison.com.

Welcome to the frictionless future.

Made Possible
by Avery Dennison

Why RFID? A recap

- Frictionless isn't just coming — it's here, driven by big industry players, innovative upstarts, increasing consumer demand, and now COVID-19.
- Only RFID provides a frictionless experience for shoppers AND powerful back-end benefits like vastly improved inventory management and better management of expiry.
- RFID can be integrated into existing retail spaces without a large investment. You can design your stores around your brand, not around your technology.
- Technologies can complement each other, the concept of Hybrid Ecosystem and Value of Technology becomes more important.