Passive RFID: Market Trends and New Market Opportunities for Systems Integrators

Written and produced
for Avery Dennison

Contents

Introduction

The adoption of radio frequency identification (RFID) technology is accelerating in many sectors. Retail, and particularly apparel, has received a lot of attention in the media throughout the past three years, but the use of RFID is expanding in other areas, including cosmetics and beauty, food production, processing automation, distribution of goods, aviation, automobile manufacturing, and logistics and fulfillment. IDTechEx Research, a firm that has been tracking the RFID market for nearly 20 years, estimates that the market for RFID products will grow to $13 billion in 2022, up from $11.6 billion in 2018*. Other research firms are predicting even faster growth.

Once viewed as a useful tool for tracking pallets and cases in the supply chain, RFID is now being employed in innovative new ways to create business value at the item level and to launch consumer-engagement applications. New on-metal tags, microwave resistant inlays and other innovative transponder designs have opened up new opportunities for companies to take advantage of RFID technology. Many companies are combining RFID with other technologies, including artificial intelligence (AI), blockchain, data analytics, geolocation, and light detection and ranging (LIDAR), to create even more business value and enhanced efficiencies.

These trends, described in this white paper, are creating vast new opportunities for systems integrators around the world with the skills to deploy RFID systems. This white paper provides insights into how the RFID market is evolving, where the biggest market opportunities are and how systems integrators can seize those opportunities.

About the Sponsor

Avery Dennison Smartrac's label technologies bridge the physical and the digital, enabling businesses to add digital connectivity to any physical item. In industries as diverse as apparel, beauty, food and aviation, for example, Avery Dennison RFID inlays and other digital trigger technologies give physical items a unique digital identity, enabling them to connect to the Internet and deliver greater capabilities for companies and consumers alike.

For businesses, Avery Dennison Smartrac's labels make inventories more visible and more productive, while providing greater insight into consumer behaviors and preferences. For consumers, our technology enhances experiences and make shopping more satisfying, informative and fun. For the planet, they increase sustainability by improving transparency across the supply chain and making the disposal of products more responsible.

On Feb. 28, 2020, Avery Dennison completed the acquisition of Smartrac's transponder business. Smartrac is now an Avery Dennison company. Avery Dennison will continue to leverage the strength of the Smartrac brand. The combination of the two companies advances Avery Dennison's global leadership with respect to customer reach, innovation, research and development, production capacity, quality and product performance to enable customers across multiple industries to digitize their products and offer them new and exciting opportunities.

AVERY DENNISON

smartrac
an Avery Dennison company

Market Trends

Retail Leads the Way

The adoption of RFID technology has gained a strong foothold in retail—particularly apparel retail—due to its ability to deliver accurate, near-real-time inventory data, enabling stores to ensure products are always on the shelf when customers want to buy them. Marks & Spencer has been a leader in Europe, while Macy's, Lululemon and others have been pioneers in North America. Recent announcements from Under Armour and other companies that they intend to tag all items in stores are fueling interest among other retailers and brand owners as well.

Ralph Lauren Corp. is taking things a step further, as it is set to digitize its entire product line, starting with its popular Polo brand. Ralph Lauren is partnering with real-time Internet of Things (IoT) software platform Evrythng and Avery Dennison to create digital product identities. Evrythng is providing the cloud-based data infrastructure and product serialization, while Avery Dennison is handling the creation and printing of product serialized labels for some 200 million items annually, via its Janela™ solution. When fully implemented, the project will provide Ralph Lauren with product visibility across its enterprise and its customers, with near-real-time information regarding inventory at any given store.

RFID is also enabling frictionless retail, including stores that do not require sales associates, and smart vending machines that allow retailers to sell items almost anywhere while having real-time visibility into what has been sold and what needs to be replenished, as well as data regarding purchase history, expiry dates and dynamic pricing capabilities. Avery Dennison customer Dirty Lemon, for example, has created a fully frictionless experience at its store in the heart of Tribeca, N.Y. Since RFID assigns a unique identifier to each beverage,

the brand is able to track product lifecycles, decrease theft, enhance consumer experience and support frictionless checkout.

In October 2018, Sodexo, one of the largest multinational corporations providing food services, piloted SmartChef, a grab-to-go food concept powered by SmartFridge, to provide convenient, all-day food access. Invented by CryoWerx, a Singapore-based engineering and technology company, SmartFridge is a fully automated self-service vending machine that provides ready-to-eat options including hot entrees, healthy snacks and beverages. It is also RFID-enabled, providing a frictionless customer experience.

Each item in a SmartFridge is tagged with Avery Dennison's AD-251r6-P RFID inlay. Through the SmartChef app, consumers simply scan the machine's unique QR code to unlock the fridge and take what they want. As soon as the door closes, SmartFridge reads the remaining items to identify the consumer's selections, which are then automatically billed to his or her preferred payment mode.

One challenge that needed to be overcome was tagging items that may a customer may use in a microwave oven. Metal, such as aluminum, could potentially cause sparking or even create a noticeable flame when exposed to microwave energy.

To solve the problem, AD-251r6-P, Avery Dennison's first microwave resistant UHF RFID inlay, offers a comprehensive solution for item-level tagging of frozen packaged foods, while ensuring food safety compliance. These inlays are designed to prevent arcing or heat build-up during exposure to microwave energy, while still delivering highly accurate read rates for item tracking. This patent-pending innovation opens an additional product application in the food sector. Frictionless or unmanned retail is not only convenient to the users, but it also helps companies lower labor costs, reduce food waste and better manage their inventory. Precise tracking and tracing enable operators to efficiently replenish and manage the machines, while promotions can be digitally displayed on the face of the fridge to offer discounts on items nearing expiration.

Given the value retailers are currently achieving with RFID, growth is expected to accelerate throughout the next five years. Hundreds of thousands of stores will need to be outfitted with RFID readers and servers to collect and analyze the data, creating a massive opportunity for systems integrators. Retail adoption is also signaling to other industries and market segments that RFID technology has matured and is now delivering real value, which is likely to encourage other sectors to invest in RFID solutions.

Market Trends

Sustainability is a Key Driver for RFID Adoption in the Food Industry

The United Nations' Food and Agriculture Organization (FAO) estimates that 1.3 billion metric tons of food are wasted globally each year—equivalent to one-third of all food produced for human consumption. Governments and businesses around the world have begun taking steps to dramatically reduce food waste as a means to increase sustainability, minimize the impact on the environment and ultimately improve the bottom line for companies.

Reynolds Catering Supplies, one of the United Kingdom's leading suppliers of fresh produce and dairy products for the food-service and catering industries, is a great example. The company transitioned out of using disposable cardboard boxes for delivery to its restaurants, cafés and hospital customers, introducing instead a more durable, reusable and higher-value plastic crate, or tote. But that transition created a new challenge for the company, which delivers nearly one million crates of food across the United Kingdom each year. It struggled to manage those totes and ensure that they were returned from each customer.

The company decided to create a solution employing RFID technology and used its own IT team to develop software that can be integrated with its own enterprise resource planning (ERP) system. It acquired fixed RFID readers and worked with Avery Dennison to identify the most durable and effective tags for that purpose.

Today, the system automatically identifies when each crate is packed according to a specific order, as well as when it is shipped and when it returns. As a result, the company can now identify where its totes end up delayed or missing, and thus address the problem. Since the system was taken live with some of its customers one year ago, it has saved the firm approximately £150,000 ($197,000) in the cost of replacement totes, according to Richard Calder, Reynolds' IT director. "We are confident that when the plastic totes are fully rolled out to [all] clients, the annual savings will be in excess of £350,000 ($437,000)," he states.

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Market Trends

Airlines Seek to Reduce Lost and Mishandled Bags

In 2015, Delta Air Lines announced that it would invest $50 million to equip 344 stations worldwide with RFID, in order to enable the airline to track the 120 million passenger bags it handles annually with the technology. The RFID data is linked to Delta's mobile app, so customers are notified when their bags have been loaded onto their plane or have reached the baggage carousel. The system has not only reduced the incidence of lost baggage and lowered the cost of finding and returning mishandled bags, but it also has become a competitive advantage for Delta, as customers value the reassurance that their bags will make it to their destination.

Although the global spread of the COVID-19 coronavirus in early 2020 drastically reduced air travel, the majority of the airline industry is expected to follow Delta's lead (some have already begun to do so) once travel gets back to normal and airlines are back on a stable financial footing. At its 75th annual General Meeting, held in Seoul, South Korea,

in June 2019, the International Air Transport Association (IATA) adopted a resolution supporting the global deployment of RFID tracking technologies for checked airline baggage. The move to RFID has been a wide-scale collaboration between all stakeholders across the baggage industry, including airports, airlines, luggage handlers and technology providers. IATA has said its ambition is to work with airlines and airports to bring RFID to 80 percent of baggage checked for air travel by the end of 2022, although that is likely to be delayed as a result of the disruption of air travel. Eventual adoption of RFID is expected to save the airlines a total of $3 billion annually, by reducing the number of mishandled bags by 25 percent and more.

RFID could eventually be installed at all 1,200 international airports, as well as at thousands of domestic airports. In addition, airlines and airports will need to install readers along miles of conveyors and at key loading and unloading points.

Market Trends

RFID Enables Other Technology Applications

The adoption of RFID has received an unexpected boost from other technologies. In this section, we will look at technology trends and how they are influencing RFID adoption.

Blockchain

Counterfeiting, diversion and product safety are global problems for many industries, and numerous companies are looking to blockchain systems to solve them. Blockchain is "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way," according to the Harvard Business Review. A list of records, or blocks, are linked to one another using cryptography. The data can be shared but previous records (blocks) cannot be modified, so a blockchain provides a secure, verifiable history of information about an item of value.

Most industries are now global, with products produced in one country traveling through several others before arriving at the place where they will be sold. This has enabled unscrupulous players to sell counterfeit products into the legitimate supply chain, and to divert legitimate products to the gray market for profit. Even if goods are not being counterfeited or diverted, the nature of global supply chains makes it difficult to guarantee the products' quality.

In the cattle industry, for example, free-range Wyoming ranchers produce some of the highest-quality beef in the United States, raising cattle free of the stressors that impact commodity cattle such as concentrated feeding operations. However, they have sometimes failed to be paid premium prices because their cattle are largely indistinguishable in the marketplace from commodity beef cattle, since they cannot prove that a specific piece of beef came from one of their animals.

Beefchain® is working to change this. It's one of the first companies to ever place cattle into a blockchain. It has created an initiative with the Wyoming Business Council and Avery Dennison that will allow consumers to track the steak on their plate all the way back to the ranch on which the animal was raised. This gives ranchers greater control over the value of their sales by proving, via blockchain technology and RFID, that the beef they are selling is what they claim it is.

Each case of Wyoming beef is tagged with a passive UHF RFID tag, which contains a unique digital identifier that can be used to trace the product in an individual case from farm to table. These identifiers are then utilized in Beefchain's blockchain network to provide a verifiable history of every case of beef.

The project began with a pilot that traced beef from Wyoming all the way to Taipei, Taiwan. Once the product arrived at the participating restaurant, customers were able to scan a QR code connected to the unique RFID digital identifier, which showed them the more than 7,500-mile journey the product had undergone to reach their plate, thereby providing assurances that they were enjoying high-quality, blockchain-tracked, Wyoming-ranched beef.

As more food producers and manufacturers in other industries adopt blockchain technology to ensure the authenticity of their products, it's likely they will choose RFID as the means of automatically capturing data as the product moves.

Internet of Things

Companies around the world are embracing the Internet of Things (IoT) by adding sensors and a means of communicating captured data to the cloud via some form of radio (Wi-Fi, Zigbee® and so on). RFID is being deployed as part of this effort. In many cases, brand owners are using RFID to create smart IoT-enabled products.

Rebecca Minkoff® is one such company. In 2017, it became a pioneer among fashion brands by creating a series of 10 limited-edition handbags, partnering with Avery Dennison and Evrythng to infuse each style with IoT technology. The studded, top-handle bags, dubbed the

Things are being done for you. Your devices are connected and they're able to take action based on a certain stimulus. That's the world that we're starting to move toward."

By offering customers incentives and rewards through partnerships with other brands and retailers, Minkoff also hopes that the new technology will cultivate customer loyalty. "For example, it might be that a certain coffeehouse allows [a shopper] to get a discount if she is carrying the bag," he says. "The bag will become her access pass to experiences, events and loyalty perks, giving the bag a digital life post-purchase."

> **Things are being done for you. Your devices are connected and they're able to take action based on a certain stimulus.**
>
> Uri Minkoff, Rebecca Minkoff® CEO

#ALWAYSON Midnighter style, came with a hangtag that, when scanned, unlocked a ticket to Minkoff's spring 2017 fashion show, as well as other exclusive offers and experiences with the brand. Each bag automatically qualified the customer for a loyalty program, as well as access to e-commerce services, private styling sessions, style recommendations, video content and an invitation to Minkoff's next fashion show.

"There's such explosive growth in this idea of the Internet of things," says Uri Minkoff, the company's CEO. "Your [smartphone] map knows that you're walking toward the subway. It automatically knows that your meetings are done for the day....

The IoT enables brands to connect with consumers in a personalized way. For retailers and brand owners, this means apparel and footwear products can now be manufactured with a unique digital identity. For example, Avery Dennison's smart product solution Janela™ enables apparel and footwear products to be "born digital" by giving them a unique digital identity and digital profile at the point of manufacture. This unique identifier connects to the cloud and gives retailers and brands the ability to unlock a myriad of personalized and interactive content for their customers.

Market Trends

## RFID Enables Other Technology Applications

Geolocation

Geolocation is another trend that is helping to boost RFID adoption. Geolocation is defined as the identification or estimation of an object's real-world geographic location. It can be accomplished via Wi-Fi, Bluetooth, cellular transmission, RFID, GPS and other technologies. Retailers and brand owners are using geolocation to engage customers and add value to their products.

New York-based brand Rochambeau® created a limited run of just 15 jackets, each with an embedded RFID tag that acted as a VIP pass to highly sought-after events hand-picked by the founders, including a tasting menu for two at a high-end restaurant and velvet rope entry to an exclusive nightclub. The Bright BMBR jackets were powered by Avery Dennison's Janela™ solution. Each had a custom Near Field Communication (NFC) tag and a QR code under a hidden zipper pocket in the left

sleeve. The tag and QR code had serialized codes that connected the jackets to their data profiles in Evrythng's IoT cloud. Consumers only had to use their smartphones to access the hidden content behind them. The experience of the jacket was also extended through geolocation. When a wearer read the NFC tag within 500 yards of one of the stores, he or she gained access to another personalized gift.

Geolocation can be used across many different industries. In aviation, for example, reading the RFID tag on an airplane part at a repair facility could automatically trigger an update regarding the status of that part—indicating, for example, it is out of service. In logistics, areas of a warehouse could be fitted with readers, and when parts bins or returnable transport items are placed at such spots, that could signal that they were ready to be picked up or shipped back to the supplier.
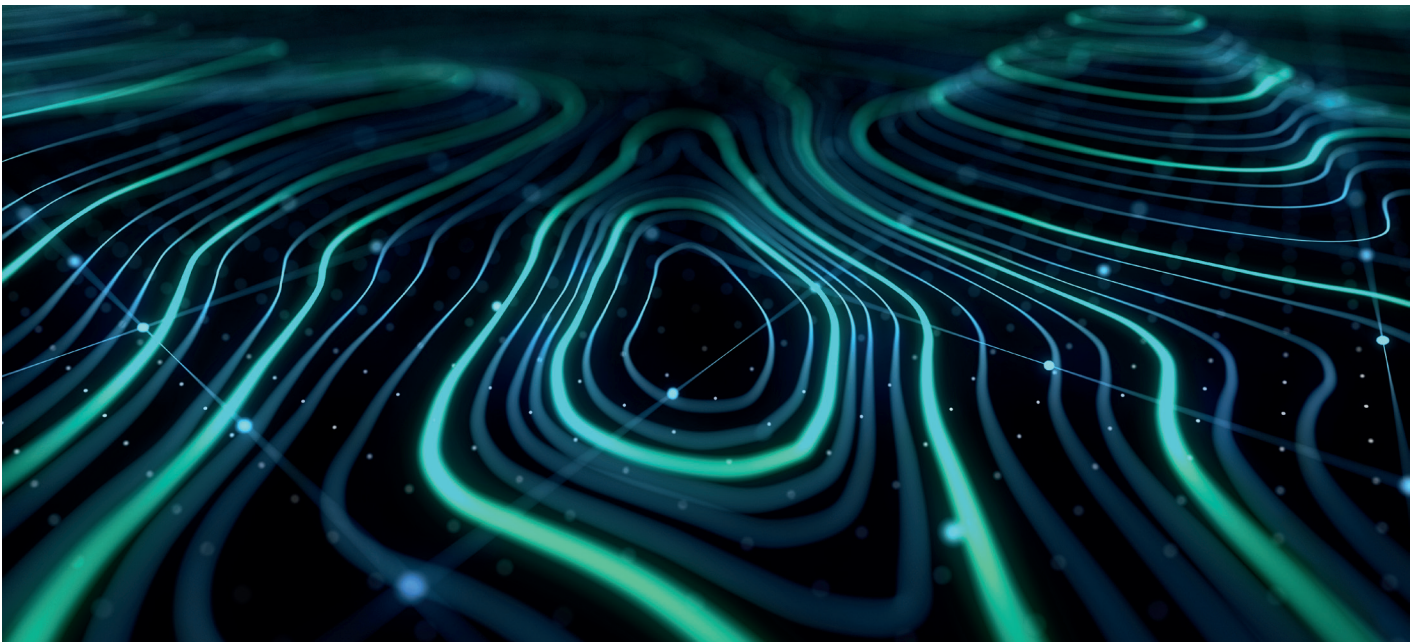
Market Trends

Drones

The advent of low-cost drones has enabled companies to automate inventory counts in warehouses and large laydown yards using RFID. For example, German multinational automotive corporation Daimler is using RFID technology to perform automated inventory counts within warehouses, including third-party locations, to locate "empties" (pallet structures, racks or containers that hold manufactured parts, but without having those parts in the unit). The RFID-enabled technology, in combination with an autonomous flying drone, has allowed the firm to use an alternative to fixed RFID gates at the warehouse entrance, thereby bringing greater accuracy to inventory counts.

Age Steel, a United Arab Emirates (UAE) company that operates multiple steel yards in Dubai, is utilizing an RFID reader mounted on a small drone to quickly and accurately track the locations of pipes, plates and other metal products stored onsite. The firm imports structural steel products, such as pipes, plates, coils, angles and hot-rolled bars, and sells them for use on construction projects throughout the Middle East. The company operates three yards in Dubai and a fourth in Saudi Arabia, and the steel pieces at each location are stored in bundles. A staff member writes each bundle's ID number in chalk on its label.

Approximately twice annually, personnel conduct an inventory count of what was stored within each yard. If a bundle is purchased and needs to be picked and shipped from one of the yards, workers at that location must walk around the yard manually searching for it. According to the company, this could be a time-consuming and highly unpleasant process, since temperatures in the yards typically reach 45 to 50 degrees Celsius (113 degrees to 122 degrees Fahrenheit). If a product cannot be located, Age Steel must then contact one of its own local competitors and buy the same item at an elevated price—meaning that there would typically be no profit, or even a loss in the sale, if the firm failed to negotiate a replacement.

"We have seen a large upswing in business over the last 15 months, and the quantity of stock that is moving through our yards has increased dramatically," says Raed Siddiqui, Age Steel's director. "The yard itself is in a state of expansion, and the ability to locate particular items of stock in a timely and efficient manner was becoming a challenge." He adds, "The increased pressure on our logistics team to receive stock swiftly has created challenges in our ability to track the tens of thousands of bundles of steel that are transiting our yard at any point in time."

Drones can also be used with RFID in the agricultural sector. The Southern Alberta Institute of Technology (SAIT) worked on a three-year research project to prove that drones could be used for precision ranching. Animals were each tagged with an RFID ear-tag. The drones reduced manual labor by automating herd counts, and were also used to locate individual animals that required attention.

It's likely that the use of drones and RFID will expand across logistics and other sectors during the next five years.

Other Technologies

GA variety of additional technologies will boost RFID adoption in the coming few years. The interest in artificial intelligence (AI) applications by businesses around the world will likely also contribute to the adoption of RFID, since RFID provides accurate, real-time data about what's happening in the world.

Vision systems are gaining traction in retail and other sectors as well. Such systems can be used, for example, to determine traffic patterns within stores. When vision systems are combined with RFID, retailers can monitor how long customers interacted with specific products or displays. RFID can also supplement vision systems in frictionless stores, ensuring that computer systems can distinguish between two similar-looking products.

Additionally, RFID can deliver data for supply chain, workforce and other optimization technologies. These systems need accurate data regarding what is happening in the real world in order to deliver value. It's likely that as more companies deploy such solutions, they will consider employing RFID systems along with them.

Ensuring RFID
Delivers Value

As RFID technology spreads across various retail sectors and in different industries, it becomes critical to select the correct tag for the right application. With an apparel-tagging project, a systems integrator needs to work with a tag provider that can offer high-performance tags in a variety of sizes. For example, Avery Dennison offers AD-238u8, a 3.0" x 0.8" die-cut label recommended for general apparel and accessories, as well as a larger 4" x 2"shoe box label. As RFID expands beyond apparel into other retail categories, more specialized tags are required. Here's a look at some sectors that are starting to embrace RFID in a big way.

Cosmetics, Health and Beauty

Many products in this sector are small, and tags need to be less conspicuous, so as not to take away from product presentation. Avery Dennison's AD180u7 transponder is a 1.15" circular tag that can be placed on the bottom of a powder compact or other cosmetics to avoid detracting from the look of an item, while enabling rapid inventory taking.

Food Products

Companies and governments are, as mentioned earlier, eager to reduce food waste. As more individual food items are tagged, companies face potential challenges with consumers not removing tags before consuming or heating up products. To help prevent safety issues with consumers inadvertently placing a tagged item into a microwave oven, Avery Dennison developed the microwave resistant (AD25Xr6-P) tag, which can withstand up to five minutes in a microwave based on the recommended wattage.

Finally, it's now possible to add RFID tags to items made of metal and those containing liquids. Avery Dennison's On-Metal Inlays (AD-456u8) make it possible to extend the benefits of RFID to canned beverages or metal foil packaging, enabling retailers to get unprecedented inventory visibility down to the last item, in stores and across their entire supply chain.

Ensuring RFID Delivers Value

Aviation, Automotive and Manufacturing

The aviation sector has been leading the way for using RFID to track inventory and historical data of component parts. The automotive industry and other industrial manufacturers are also finding that tracking work-in-process, parts bins, individual parts, tools and other critical assets delivers a significant return on investment. The ability to use RFID to track and trace critical components also dramatically increases supply chain integrity, improves customer safety and reduces liabilities, which is why industry observers are forecasting accelerated growth for RFID in these sectors throughout the next few years.

Tracking industrial components has been a challenge, but new inlay designs have overcome these obstacles. The Avery Dennison AD-66x is a highly versatile series of tags ideal for industrial applications. The AD-229 series of inlays are designed for industrial, logistics and supply chain applications, while the AD-55x is suited to the aviation sector, including baggage tracking.

Many industrial applications require RFID tags for the demanding environments commonly found in the aerospace, automotive, chemical, general manufacturing, maritime, and oil and gas industries. With the acquisition of Smartrac, Avery Dennison is now able to meet the specific requirements of companies in these sectors. Among the key features of the Smartrac hard tags are resistance to dust, chemicals and mechanical stress, as well as protection against temporary immersion in water. Several hard tags in the portfolio can also be used on metal assets and are resistant to high temperatures.

For example, the MAXDURA® BRICK, made by Smatrac has been designed with a rugged construction for high durability on metallic surfaces. It can be read from up to 7 meters (about 23 feet). Its compact size makes it suitable for tracking metal objects, such as tools, parts, components and metal containers.

Choosing an
RFID Tag Provider

One of the keys to growing your systems integration business is choosing the right tag provider and partner. The right tag often determines the success of a particular RFID implementation from the very beginning.

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Large systems integrators understand that they need to be part of the ecosystem, the days when you could buy generic labels from anyone are over. For large projects, many partners need to work together.

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Frank Smits, Avery Dennison's European Business-Development Manager for Intelligent Labeling and RFID

With that in mind, on the following page are some key issues that systems integrators need to consider when working with a tag provider on a project.

Choosing an RFID Tag Provider

Product Portfolio

You will need to choose a tag provider that has a broad product portfolio so that you can provide tags with inlays that will work on a wide variety of products. Avery Dennison, for example, provides not just passive HF, NFC and passive UHF RFID inlays, but also an array of inlay sizes, shapes and features to meet the needs of its customers. The addition of Smartrac's portfolio to the Avery Dennison product lineup gives it the broadest array of inlays and tags in the market. In fact, with the addition of Smartrac's intellectual property, the combined company now has more than 1,750 patents and patent applications worldwide, which is by far the most in the industry.

Quality

Just as important as a strong product portfolio is quality. A fraction of RFID tags in a production run can have a short read range or be completely dead due to a defective chip or some other issue. It's important that these not be converted into labels and delivered to customers. Avery Dennison has extensive quality-control processes in place at each stage of the production process, in order to ensure high-quality product performance. The company not only marks defective inlays, as most inlay providers do, but actually smashes the chip so the tag will not work and cannot be used. Both Avery Dennison and Smartrac have received ARC accreditation for quality from the Auburn University RFID Lab, and through the acquisition are now the only company worldwide with ARC certification for quality.

R&D and Technical Support: Choosing the correct tag for a specific item a customer wants to track is crucial. It's important to work with a tag provider that can provide advice about the best tag to use and the proper placement of the finished label on the product. In some cases, Avery Dennison will take product samples to its systems labs and simulate the environment that a customer plans to use for their labels (tracking cases moving past a portal or down a conveyor, for example). It will conduct a professional analysis and recommend an inlay to use and the positioning for the finished label. Some projects will also require custom tags. Avery Dennison's design facilities will develop custom tags or labels if there will likely be enough demand for them, at no charge to its system integration partners.

Sampling Service

It's important to be able to get sample tags quickly so that you can provide samples to your customers, as they begin exploring whether RFID will work for their needs. Avery Dennison can provide samples of most of its tags within 24 hour.

Capacity

It's important to choose a tag provider that has the manufacturing capacity to deliver the tags you need in a timely manner. Avery Dennison, for example, has invested in expanding its capacity throughout the past five years, and it has set up distribution facilities around the world to be able to deliver inlays when and where they are needed.

In September 2019, the company opened a new RFID manufacturing facility within its existing distribution center for label materials in Timisoara, Romania. This facility will help service the demand for intelligent labeling across the European market. And in February 2020, Avery Dennison announced plans for a new plant in Vinhedo, Brazil, for the production of RFID tags. This will be the company's eighth plant around the world capable of producing tags, in addition to those in the United States, Mexico, Europe, Malaysia and China. The factory, scheduled to open in 2021, will serve customers in Brazil and throughout Latin America.

Avery Dennison also has an extensive network of label converters that can turn high-quality Avery Dennison and Smartrac inlays into tags and labels for a project.

A Word About Sustainability

Governments and businesses around the world are looking to increase recycling efforts and reduce the amount of waste going into landfills, especially waste that can leach chemicals into soil and groundwater. Besides many aspects of sustainability globally, it's also important for businesses across many segments to partner with an RFID inlay manufacturer that takes sustainability seriously. The key is to make sure that RFID-enabled labels attached to or embedded in a product do not prevent the recyclability of the product or packaging when it reaches the end of its life. Avery Dennison has been making its inlay materials more environmentally friendly for years. Its proprietary Smartface® products replace polyethylene terephthalate (PET) with a paper substrate, reducing the contamination of the recycled paper with plastics.

Prior to its acquisition by Avery Dennions, Smartrac had developed a Green Tag program designed to reduce the use of RFID tags' impact on the environment. Green Tags are plastic-free (they use a recyclable paper substrate), utilize antenna materials free of heavy metals and do not employ chemical etching. Green Tag printable antennas are directly applied to recyclable cardboard. A minimal amount of adhesive is used for chip bonding, and a life-cycle assessment (LCA) is conducted by independent consulting firm Thinkstep.

Consider also how the inlay is produced. Many companies use antennas that require harsh chemicals to etch away the conductive material to create an antenna. Avery Dennison and Smartrac's aluminum antennas aren't etched so aluminum residue can be fully recycled. Hence, these antennas have a lower carbon footprint compared to traditional metal antennas. As another positive effect, aluminum also supports the circular economy (75 percent of all aluminum ever produced is still in use).

Avery Dennison and Smartrac are continuously working on future innovations that will further strengthen and enhance their sustainability efforts. New antenna-cutting and forming techniques, for example, could reduce the amount of chemicals and energy used in production.

Additional Resources

RFID Journal
rfidjournal.com

RFID Journal is the leading source of news and information about radio frequency identification (RFID) and the Internet of Things (IoT) and their many business applications. RFID Journal publishes news stories about RFID products and deployments daily. In addition, Premium Members have access to a vast archive of end-user case studies and recordings of presentations from RFID Journal's events.

RFID Journal LIVE!
rfidjournallive.com

RFID Journal LIVE! is the world's largest conference and exhibition focused on radio frequency identification and its many business applications. It features keynote addresses by leading end users and an extensive conference program broken up into tracks focused on vertical-industry applications (retail, manufacturing, health care, etc.) and on various aspects related to RFID deployments, such as integrating RFID and blockchain technology.

RAIN RFID Alliance
rainrfid.org

The RAIN RFID Alliance is a global alliance promoting the universal adoption of UHF RFID technology in a way similar to other wireless technology organizations, including the NFC Forum, the Wi-Fi Alliance and the Bluetooth Special Interest Group.

Avery Dennison RFID
rfid.averydennison.com

Avery Dennison's website provides information on how to get started using RFID (rfid.averydennison.com/en/home/gettings-started-with-RFID.html), as well as information about industry solutions (rfid.averydennison.com/en/home/product-portfolio/search-by-industry-apparel-footwear-homewear-accessories.html), Avery's large RFID product portfolio (rfid.averydennison.com/en/home/product-portfolio.html), and news about RFID (rfid.averydennison.com/en/home/about-us/newsroom.html).

Avery Dennison Product Selector
rfid.averydennison.com/en/home/product-portfolio.html

This unique tool allows systems integrators to choose the industry their project is in (such as aviation), the industry subsector (luggage tagging), type of product (inlay and tags), frequency range and other factors, such as operating temperature, to see the products that match their needs.

GS1
gs1uk.org

GS1 developed the standards for the Electronic Product Code (EPC) numbering system and the original passive UHF RFID air-interface protocol. Its website offers a wealth of data about these standards, as well as their application in retail, general merchandise, consumer product goods and other industries.

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rfid.averydennison.com