



Create a more human library

RFID 201: The Basics

An introduction to using RFID technology in your library

The first, best question: Why should I care?

In most libraries, staffing budgets aren't keeping pace with circulation growth. Librarians need new tools that will allow them to increase their productivity and improve customer service without adding personnel.

Many of these librarians are turning to RFID (radio frequency identification) technology. This established technology improves the speed and accuracy of most circulation and shelving functions, so it frees library staff to provide direct service to customers. It also helps protect your collection and ensures that your community gets the most value out of the library. Installing an RFID system requires an investment, but that investment is usually recouped within two years...and the benefits of the system can last for a decade or more.

Some new technologies can be intimidating for customers, but not RFID. Many of us already use the technology every day. Even those who aren't familiar with it soon discover that it is both highly intuitive and highly rewarding. It provides real value to librarians, but it is so simple that young children can—and frequently do—demonstrate its use to their parents.

What is RFID?

In the simplest terms, an RFID system has two parts: a tag and a reader. Information is encoded on the tag; the reader accesses that information and passes it along to the person or system that needs it.

Within the tag, there is a microchip (which holds the information) and an antenna. This assembly is usually covered with a protective overlay. (The durability of the overlay is determined by the application. If your tag is being placed inside a book, paper provides adequate protection; if the tag is affixed to a jet engine part, you'll want something more resilient.) The back of the overlay has an adhesive so the assembly can be permanently installed. In a book, the final assembly is unobtrusive, usually a couple of inches square and very thin. Book RFID tags are passive: they have no batteries or other power source. The energy needed to power and read the tag comes from the reader.

How many times have you used RFID this week?

If you purchased a new shirt or sweater, that garment could have had an RFID tag sewn into a seam. If you drove through an automatic tollbooth or bought gas at some service stations, you could have used RFID (and you might have been driving a car that uses a keyless RFID ignition system). If you've run a marathon, you might have been issued an RFID shoe tag that registered your time as you crossed the finish line. In some countries, your passport has an embedded RFID tag.

And those are only the uses of RFID technology that we hold in our hands. Behind the scenes, RFID tags and readers are used to monitor global inventories and tell lawyers where their legal files are. They help ensure that lab samples are properly identified and jet engines are properly maintained.

Rudimentary RFID devices were introduced in the 1940s. After more than six decades of research and refinement, the technology is now woven into the fabric of our lives. The application of RFID should accelerate in the next few years, as even more manufacturers and service providers exploit its cost-effectiveness and high reliability.

An RFID-equipped library usually has readers at the circulation desk and at a self-service kiosk. Another reader is installed in the security "gate"—this device detects books or other media that haven't been checked out. Many libraries also use RFID technology in an automated check-in and materials handling system. Productivity can be further enhanced with a hand-held reader, which is used to pull holds and transits after check-in or to scan shelves for misplaced books.

How does RFID work?

RFID readers emit signals that search for a tag. When a tag comes within range, the signal hits it, “awakens” the tag, and provides the power for the tag to respond with the kind of information that the reader wants.

- If a customer is checking out a stack of books, each tag instantly responds with its item’s unique ID number; this number is the same one that appears on the barcode used by many libraries. The RFID system relays the ID number to the library management system, which retrieves the title, checks it out and generates a receipt.
- If a customer is returning a book, the tag responds with the ID number and the system credits the customer’s account. If the system includes an automated materials handling system, it will direct the book to the appropriate bin for reshelving.
- If a librarian is scanning shelves for inventory, the hand-held reader beeps when it finds a missing, “claims returned” or mis-shelved volume, or a candidate for weeding.
- If a customer starts to leave the library with an item, the reader asks the tag if the item has been checked out. If the tag responds negatively, the gate reader will sound an alert, reminding the customer to return the volume or check it out.

The range of an RFID system is tailored for the application. In a large warehouse, systems need to be able to read tags that are on pallets up to 15 feet away. In a library, systems are designed to read tags that are no more than a few feet away.

RFID has a couple of advantages over other circulation technologies, such as barcodes. For example, each time a barcoded item is checked in or out, the customer or staff member must present it individually to the reader and align it with a scanner. This is a time-consuming process compared to RFID technology, which allows several items to be checked at once and which does not require alignment. Barcoded items sometimes require multiple scans before they are read. And barcodes—because they are printed on paper and must be mounted on the outside of a volume or container—can be scratched or otherwise rendered unreadable due to normal wear-and-tear.

How does RFID benefit my customers?

Faster, easier checkout and check-in. A stack of RFID-equipped books can be read and checked out simultaneously, by a librarian or a customer. Because the technology is so easy to use, and so fast, customers are more inclined to serve themselves. Check-in is also much faster and easier with an RFID system. (And if RFID is paired with an automated materials handling system, the productivity gains are dramatic: the system can accept a return, credit the customer’s account, and sort the item for reshelving while the librarian is out on the library floor, helping a customer.)

Increased attention from library staff. With RFID, librarians spend less time handling items—turning them, scanning them, stacking them for customers—and more time handling questions and requests.

A more productive visit to the library. Libraries face an astonishing challenge in keeping track of their resources. They hold thousands—or even millions—of individual items, each one unique, each vitally important to the customer who wants it for a report or because it’s the latest work by a beloved author. With RFID, those items are where they are supposed to be, where customers and librarians can find them. (In the process of converting to RFID, libraries typically get an immediate benefit from the recovery of misplaced books—often hundreds of them—that were thought to be lost.)

RFID benefits staff, too: Job satisfaction goes up and repetitive stress injuries may go down when librarians spend more time helping customers and less time hefting volumes.

Traditionally, the library’s mission has been to provide equal access to knowledge and ideas. Today, communities also expect their libraries to serve a focal point for a range of civic activities, from classes and lectures to art shows and performances. By improving staff productivity and satisfaction, RFID can help libraries fulfill their traditional role while meeting the new and often challenging expectations of customers and boards.

What do critics say about RFID?

The technology behind RFID is generally accepted today. It is durable, reliable and cost-effective—which is why it is becoming increasingly common in our day-to-day lives.

One commonly mentioned concern is privacy. If a book or CD is equipped with an RFID tag, will someone be able to read that tag remotely and know what I’m listening to or reading?

Privacy is a serious issue and it deserves to be treated as such. Libraries have instituted sophisticated protocols to ensure that customers can withdraw materials with the utmost confidence that their activities will not be monitored. RFID systems are consistent with these efforts to protect customer privacy.

First, the information in an RFID tag is analogous to the information on a barcode. And both are harder to read than the title, which is printed in large letters on a book's cover and spine.

Second, the short range of most library RFID systems—again, no more than a couple feet—means that it is extremely unlikely that someone would be able to access the tags on books or other media once the customer has checked them out of the library. (In fact, privacy can be heightened when self-checkout is combined with RFID. A prying observer would have a very difficult time trying to scan all the titles when a stack of books is placed on an RFID reader and instantly checked out.)

Frankly, if there were a practical way to read high-frequency RFID tags (such as those used by libraries) from five or six feet away, RFID suppliers would be delighted. In reality, the physics of high-frequency RFID make this impractical. (To read high-frequency tags from six feet away, you would need a high-powered, truck-sized transmitter.) Bottom line: We've been a high-tech company for too many years to say it could never happen, but we don't believe this is a practical threat.

How do I encode the tag?

Putting information on an RFID tag is usually simple, easy and remarkably fast. Each manufacturer has its own system. Here's how the conversion from barcodes to RFID works when you partner with 3M Library Systems:

- All the equipment you need has been consolidated in an easy-to-manuever conversion station that rolls between shelves (so you don't have to haul stacks of books from the shelf and then return them). These stations are usually rented for a major conversion; subsequent additions to the collection can be easily equipped with RFID tags using the workstation at the circulation desk.
- The librarian places the item's barcode under a scanner and the information is captured.
- The station dispenses a blank RFID tag.
- While the librarian adheres the tag to the item, the station automatically encodes the information that was just scanned from the barcode.
- The librarian replaces the volume on the shelf and removes another book.

With 3M, the conversion process is highly automated. There is no complex setup, no complicated manual input of access codes or other data. Once the conversion station has been turned on, the staff member doesn't have to push another button. Using just one station, a staff member can convert as many as 500 items an hour. Using several stations, one library was able to convert a collection of 160,000 items in 10 days.

What are the risks?

As they contemplate a significant investment, board members and staff must consider the potential pitfalls. Typically, they start by researching other libraries' experiences with RFID. When they do, they find that catastrophic failures are virtually unknown.

Research also shows that some libraries have a smoother implementation than others, and some are more satisfied with post-implementation functionality and technical support. In most cases, problems can be avoided by taking a few simple precautions.

1. Consider only established suppliers: your system could last a decade or more, so you'll need a supplier with that same kind of longevity. Ask for references.
2. Once you've decided on the best match for your needs, don't be afraid of commitment. The most successful RFID installations result from a close working relationship between the library and a single supplier that "owns" the system. Insist that the supplier assume responsibility for hardware, software, integration with the ILS (Integrated Library System), initial training and technical service. If the supplier is unwilling or unable to play this role, consider using another supplier. (This of course means that the supplier has a local or regional presence. If your technical support provider is across the continent—or on another continent—your downtime may be unacceptable.)
3. Be attentive to system design. Because RFID systems bring immediate and dramatic improvements in productivity, staff might be tempted to overlook small deficiencies in system design. They are willing to accept what appear to be minor annoyances in order to enjoy the benefits as soon as possible. This is understandable but ill-advised. In a short time, small annoyances grow large. For example: some RFID systems have a clumsy interface with the ILS. The result is an overly complex circulation system and an ILS with less functionality. Staff and customers quickly take the benefits of RFID for granted and focus on those once small deficiencies. Look around; there are affordable systems that don't require you to compromise on efficiency.

4. Get a system with a mobile conversion station. Some librarians recall the transition to RFID as a long-running imposition; others remember it as a task among other tasks. Libraries that used a mobile conversion station are usually in the latter group. A mobile station allows staff to work among the stacks, converting a volume at a time. This makes the process faster, easier on staff (no hauling a cartful of books to a separate location and then hauling it back) and less disruptive for customers. (You don't need to purchase the station; often, the mobile conversion stations can be rented for the conversion process.)
5. Avoid proprietary RFID tags. In the early days of RFID technology—before standardized protocols were adopted by the industry—every company came up with its own vision of what would be practical for users. Today, most tags use industry standards that will continue to be recognized as the technology evolves. Some proprietary tags remain, though; building a new system using these proprietary tags could limit your options going forward.

Why 3M?

Library boards and staff have a responsibility to research the many RFID suppliers and compare their systems. After they do, they usually decide to work with 3M. Why?

Excellent technology. To be worth the investment, an RFID system needs to improve customer convenience and staff productivity. That means it must be durable, reliable and accurate—time after time after time. 3M systems are, because they are grounded in decades of research on the key technologies, from signal processing and adhesives to systems software and advanced manufacturing. We also subject our products to rigorous accelerated aging and other tests.

Excellent design. The 3M™ RFID System is intuitive, easy to use, and attractive—thanks to decades of experience designing and building similarly complex, highly integrated systems in a variety of industries. (Examples include systems for handling medical information, for manufacturing precision components for electronic devices, for the automated testing of biological materials, for high-speed packaging—the list goes on.) We've had decades of experience in software, electronics and mechanical engineering, and we've learned how to integrate that expertise with human factors and industrial design. The result is a blend of functionality and elegance that invites customers to try the system and rewards them when they do:

more than 90 percent of users succeed the first time they try the 3M SelfCheck system.

Library experience. For more than 35 years, 3M has been working with librarians. We've been there as they made the transition from dog-eared card catalogs to integrated databases. We've helped as they've expanded their collections from classic novels to DVDs. We understand customer demands, the extraordinary challenge of tracking a half-million or more unique items, the commitment of your staff. We also understand your customers and the way they want to interact with software and hardware.

Unparalleled service. Librarians know how to dig for information. And when they research suppliers, they usually find that 3M's service is second to none. That's how we've maintained our position in the library industry for over three decades, and why our current customers keep coming back to us. (But don't take our word for it; ask around.)

We're not going anywhere. 3M has been serving its customers for over a century. Every day, many libraries use some of our products. For some, it's a simple Post-it® Note or a length of tape. For others, it's a computer privacy screen or a virtually flawless security system. What they find is that 3M not only maintains an unparalleled level of quality and service—we get better at it.



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