

RFID JOURNAL

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March/April 2013

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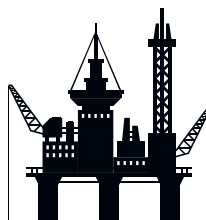
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Coming soon to RFIDJournal.com



These live interactive programs offer a convenient way to learn why and how companies are employing RFID to improve the way they do business.

Presenters will answer your individual questions. Also, be sure to check out past Virtual Events, including Using NFC to Enhance Products and Improve the Customer Experience, RFID In Manufacturing, RFID in the Supply Chain and RFID in Health Care.

- **RFID in Retail:** Hear how retailers worldwide are using RFID to track items and improve inventory accuracy, to ensure products are on the shelves when customers want to buy them.

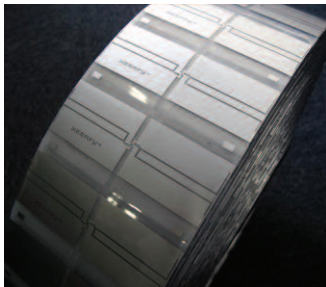
May 16, 11 am to 1 pm EDT



Find products that can help you deploy RFID successfully. Here's an example: Xerafy's **Titanium Metal Skin** is an extremely flexible and small RFID label for tagging both metallic and nonmetallic assets—from smartphones to pharmaceuticals—that

require accurate, secure identification. It is compliant with the EPC Gen 2 and ISO 18000-6C standards, and designed to be a cost-effective way to monitor items. The Titanium

Metal Skin can be used for asset tracking, product authentication, inventory management and other applica-



Most-Read Stories in March

- [Omni-ID Sues Xerafy and RFID TagSource](#)
- [International RFID Institute Prepares Certification Program](#)
- [Microchip Markets RFID Technology That Transmits via the Human Body](#)
- [NDSU Researchers Develop Method For Embedding RFID in Paper](#)
- [DPR Construction Uses RFID Building-Security Solution](#)

Top 10 Search Terms On RFIDJournal.com

- 1 Walmart
- 2 NFC
- 3 Cost
- 4 Airbus
- 5 Construction
- 6 Laundry
- 7 Jewelry
- 8 Disney
- 9 History
- 10 Library

Worldwide RFID Deployment Map



RFID JOURNAL's interactive map shows how widespread RFID adoption has become. The dots are color-coded according to industry, including aerospace, agriculture, apparel, defense, health care, logistics, manufacturing, pharmaceutical and retail. You can get more information about a particular deployment by clicking on one of the dots—a pop-up will appear.

To put your company's RFID deployment on the map, click [here](#) and fill out the form. It takes only a few minutes.



The Inside Scoop

What are end users saying behind the scenes? Why should the RFID community be optimistic about the industry? Who's spreading misinformation? Get insight and perspective at the [RFID JOURNAL Blog](#).



Ideas Exchange

RFID JOURNAL maintains an [Ask the Experts](#) forum, where you can submit questions about RFID technology and its applications. Your questions will be answered by RFID JOURNAL editors or outside experts. Recent questions include:

- What types of tags and readers should we use to monitor race horses?
- Does the use of RFID affect an organization's operational efficiency?
- Is it possible to read TID and EPC tags with a single command?
- Can RFID read 140 pieces per minute with different SKUs?

See the complete table of contents at
www.rfidjournal.com/howtochoose



How to Choose the Right RFID Technology for Your Application

Choosing the proper radio frequency identification system for your application can be a daunting task. Now, for the first time, *RFID Journal* provides a guide to choosing the right system for your needs, and explains the pros and cons of different RFID solutions for different applications.

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Waste Not



SIMPLY PUT, waste is a waste. Companies hate it. Governments struggle to reduce it. Even individuals try to minimize it. Yet, the amount of waste in the world is staggering. Consider these facts:

- 50 percent of all food produced globally is never consumed
- Administrative errors cost U.S. retailers \$4.9 billion annually
- Hospitals lose an average of \$5,000 per bed per year
- Nearly 30 million pieces of luggage are mishandled each year, costing airlines an estimated \$2.9 billion
- Roughly 8 percent to 10 percent of reusable transport items are replaced each year.

I could go on, but you get the picture. Waste is rampant. The reason, according to Carlo Nizam, Airbus' head of value chain visibility and auto-ID, is that companies have "little data or limited visibility of how their processes are performing, so they don't necessarily know where the waste is." And if you don't know where the waste is, it is hard to get rid of it.

In this issue's cover story, "Eliminating Waste," we look at how companies in different industries are using radio frequency identification to pinpoint and reduce waste of all kinds (see page 16). Airbus, for instance, introduced an RFID-based tool-management application, so workers don't have to wait to check tools in or out of a tool crib. Memove, a retailer in Brazil, deployed an RFID solution to improve shipment verification, which means employees no longer have to count and recount inventory to ensure the proper items are sent from its distribution centers to stores.

The oil and gas industry has begun to tackle

waste, thanks to recent technology advances that make it possible to read RFID tags on metal and in harsh environments. In this issue's Vertical Focus (page 24), we explore how companies are using RFID to track equipment and improve asset-utilization rates. This is particularly important in remote regions, where logistics is a challenge and missing parts can result in downtime that can cost millions of dollars.

There is also plenty of waste in commercial laundry operations, which is why companies have been RFID-tagging and tracking uniforms and linens for more than 15 years. Here, too, the industry is benefiting from technology advances, which have led to lower prices and improved performance. As a result, casinos, fitness clubs, hospitals, hotels, theme parks and other organizations have begun using RFID to track laundry items, to improve asset visibility and reduce the number of stolen towels (see Product Developments on page 32).

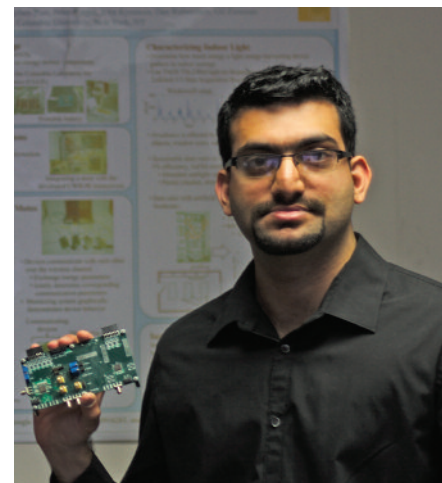
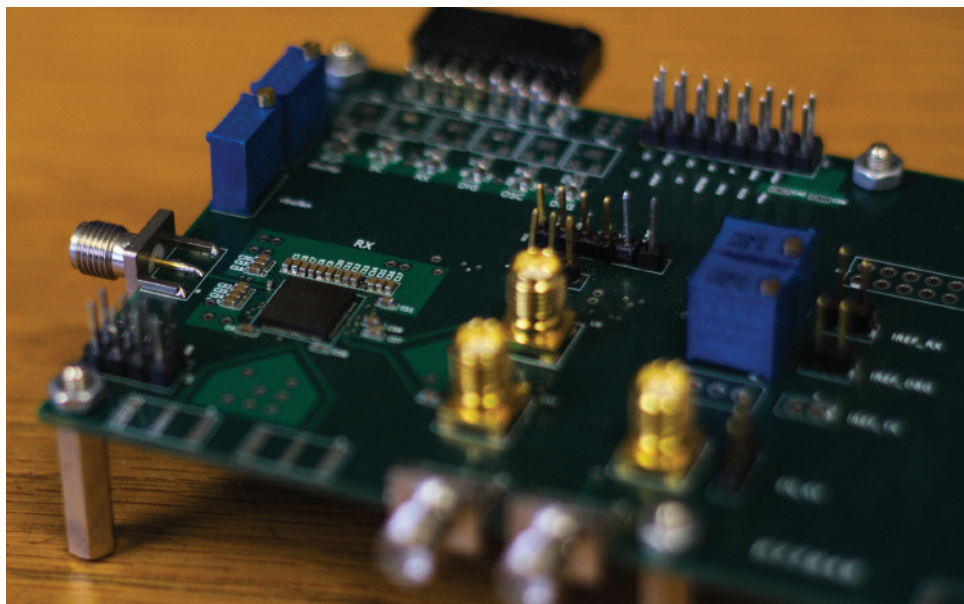
In fact, RFID products and services in general have evolved rapidly to address waste of all kinds, and many of these solutions will be on display at RFID Journal LIVE! 2013, our annual conference and exhibition, which will be held in Orlando, Fla., from April 30 to May 2. In addition, attendees will hear firsthand how Bloomingdale's, Celebration Health, Speedy Services and other organizations are doing away with waste. I encourage you to join us there and find out how RFID can help your business eliminate waste.

Mark Roberti, Founder and Editor

SENSORS

When Things Talk to One Another

Lower-power, wireless mesh-networking devices will enable objects to communicate without conventional RFID readers.



Baradwaj Vigraham (pictured) and Peter Kinget developed an energy-efficient wireless transceiver for the EnHANTs project.

THERE'S A LOT OF TALK about the Internet of Things, but researchers at New York's Columbia University have a different vision of the future. In their view, objects won't communicate with the Internet but rather with each other. And they are creating low-power active devices that will enable this to happen.

The collaborative research project is called Energy-Harvesting Active Networked Tags. EnHANTs are small, flexible devices that gather energy from light, vibration or other environmental sources. The goal is to make these devices inexpensive, so they can be attached to items, such as books, clothing, toys, furniture and maybe even produce.

The key to EnHANTs is to be able to transmit up to 30 feet (9 meters) without consuming much energy, says Baradwaj Vigraham, a Columbia doctoral student working on that challenge with Peter Kinget, a professor of electrical engineering. They have created a wireless transceiver that uses ultra-wideband communication methods to send short pulses or bursts of information. The device can, for example, communicate 2 megabits of data per second by sending 3- to 4-nanosecond pulses every half-microsecond. "Because you are communicating in bursts, up to 95 percent of the time

between pulses, the electronics can be shut down to save power," Vigraham says. The prototype is a system-on-chip (SoC) design, which means most of its functionality is built into the microchip, as opposed to having several components on a circuit board.

Other collaborators are working on energy-harvesting devices or communication protocols and data-routing algorithms that will enable the devices to form mesh networks. So instead of wandering around your house using a handheld reader to search for your missing black sock, you might one day be able to message a network of all the objects in your home that you are looking for that sock, and those objects might be able to communicate with one another until they locate the sock and message back that they found it under the bed.

Vigraham presented a paper on the device at the IEEE International Solid-State Circuits Conference meeting in February. "I'm an academic, so I haven't thought much about the commercial possibilities," he says. "But there are certainly many potential applications." In addition to finding household items, it could be used to track anything, from airline baggage to IT equipment in large buildings. —Mark Roberti

Warning: Damaged Goods!

A new tag designed by Cambridge Consultants could soon alert consumers that a parcel has been dropped in transit.

WITH SO MANY consumers shopping online, it's inevitable that some items will be dropped in transit and broken. Often, the purchaser is unaware until he or she has signed for the package, taken it inside and unwrapped it. Tom Lawrie-Fussey, business development manager at Cambridge Consultants, a product development engineering and technology consulting company, says his firm has come up with a solution. It's called DropTag, and it's designed to let a consumer know if a package has been dropped.

The idea started with the development of a Bluetooth device that would allow cars to talk to one another. But when Lawrie-Fussey was trying to determine how to demonstrate the prototype for customers during an "innovation day," he realized how difficult that would be within the constraints of an office. So he began devising other uses for the technology.

"I came up with the idea of tracking parcels, because many people have had the experience of receiving damaged goods, and it was easy to demonstrate," he says. "We put the electronics in the box, wrapped it up and showed how our device could tell you the box had been dropped."

The DropTag consists of an accelerometer (similar to that in a smartphone), which can tell if a package has been dropped, a Bluetooth chip that can run algorithms on data from the accelerometer, a small printed circuit board and a small battery. Lawrie-Fussey says that in

volumes of 1 million, the bill of materials for the device would be just \$2.50. And the accelerometer could be swapped for a temperature, pressure or humidity sensor.

The DropTag currently has no ID. The device would simply communicate with the consumer's Bluetooth-enabled mobile phone

to indicate whether the packaged item had been dropped. But an ID could be added, along with proper security, so, for instance, a logistics company could use it to identify and track items as well as to monitor their condition. The ID would essentially transform the DropTag into a Bluetooth RFID tag, similar to a Wi-Fi tag.

Lawrie-Fussey says the device could also be developed with Near-Field Communication technology instead of Bluetooth. "With NFC phones proliferating, I could easily see consumers accessing the data in a DropTag via NFC," he says.

"We chose Bluetooth because of the longer read range. With Bluetooth, a driver could easily determine whether any of the packages in the back of the truck had been dropped."

Cambridge Consultants is in discussions with several logistics companies interested in commercializing the DropTag. It's also talking with firms that offer more expensive parcel-monitoring devices. So it might not be long before you know whether that flat-screen TV has been tossed around in the back of a truck or treated with kid gloves. —M.R.



Tom Lawrie-Fussey demonstrates DropTag.



Saving Workers During Oil-Rig Accidents

Lives lost during destruction of Mumbai High North platform in 2005:

22

Lives rescued during destruction of Mumbai High North platform in 2005:

362

Lives lost during explosion aboard Petrobras 36 platform in 2001:

11

Lives rescued during explosion aboard Petrobras 36 platform in 2001:

164

Lives lost during explosion aboard Deepwater Horizon drilling rig in 2010:

11

Lives rescued during explosion aboard Deepwater Horizon drilling rig in 2010:

115

—Rich Handley

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ADOPTION

The Return of RFID Certification

The International RFID Institute steps in to fill the hole left by CompTIA when it retired RFID+ certification.

IN 2005, the Computing Technology Industry Association (CompTIA) convened a group of subject-matter experts to draft a certification test designed to indicate that those who passed had a certain level of knowledge about RFID systems. The effort was supported by AIM Global (the association for automatic identification and mobility), RFID JOURNAL and several leading solution providers.

CompTIA RFID+ was launched in 2007, and several training companies began offering courses to provide the knowledge needed to pass the test. RFID JOURNAL offered training, in partnership with RFID4U, at RFID Journal LIVE! events. Several hundred people took a fast-track course during the events and passed the test.

But CompTIA felt the number of people being certified was too small to continue to support RFID+, so at the end of 2011, the organization officially retired the certification program, leaving the industry without any means of guaranteeing the professionalism of RFID practitioners.

In April 2012, I convened a meeting of subject-matter experts to discuss the prospect of creating a new body to develop a certification test to replace CompTIA RFID+. Out of that effort was born the International RFID Institute. Sylvanus Bent, a software professional who runs Bent Systems, was elected chairman, and I was elected co-chairman. The institute was formally launched in March.

Certification training will become more important as the RFID industry matures. Today, there are relatively few professionals who can deploy various types of RFID sys-

tems. As adoption ramps up, the need for more experienced professionals will increase. Some systems integrators are already struggling to hire RFID professionals.

CompTIA offered a single RFID test. The level of demand did not warrant investing in development of additional tests. The goal of the institute, however, is to develop a foundational test that all RFID professionals must pass, as well as additional certifications. While no decisions have yet been made about what those certifications will cover, they may include Near-Field Communication technology, active RFID systems and sensor networks.

Many vendors have their own certification programs, and the institute does not intend to compete with these. The institute's goal is not to say someone can program a Motorola or an Impinj reader, for example, but rather the certified professional understands the issues related to setting up a reader and ensuring it works, and understands the other concepts involved in successfully deploying an RFID system.

The International RFID Institute is now recruiting subject-matter experts to develop questions for the foundational certification test. We plan to hold a meeting in conjunction with RFID Journal LIVE! 2013, which takes place in Orlando, Fla., from April 30 to May 2. The institute needs corporate members that will help fund the test-development efforts and individuals who will help draft the tests. It is up to the industry to get behind the efforts to ensure professionalism in its ranks. —Mark Roberti

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ADOPTION

Making the RFID Market More Transparent

End users and systems integrators need more visibility into what products are available and who makes them.

WHILE ADOPTION of radio frequency identification is growing stronger, more companies would likely be considering the technology if they knew there were products that could meet their requirements or companies that could quickly develop solutions to meet their needs. End users and systems integrators also would like to feel confident that they are purchasing technology from reputable companies.

According to the *2011 RFID Marketing Strategies Report*, produced by RFID JOURNAL and Burnell Reports, 84 percent of study respondents said brand is important for RFID purchasing decisions. Yet, only 35 percent of end users recognized the top RFID brand. On

average, most companies were recognized by less than 2 percent of end users. This means there is very little transparency in the RFID market. Potential buyers of RFID technology cannot easily find the right sellers.

But transparency is something of a chicken-and-egg scenario. Solution providers don't want to waste money advertising their wares if no one is interested in buying them, and no one can buy them if they don't know they exist.

RFID JOURNAL has been working on ways to address this problem. [RFID Connect](#), our event-planning and social-media site, provides a cost-effective way for vendors to post information about their products. Some vendors are beginning to take advantage of this service, and end users are visiting the site to request information. A systems integrator recently inquired about ultrahigh-frequency RFID bangles, saying if they provide adequate read range he would order 300,000 units for a customer. Other end users and systems integrators have inquired about the cost of rugged tags, the read range of labels and whether readers are compliant with radio emissions regulations in Europe.

We also aim to inspire more productive interaction between attendees at RFID Journal LIVE!, our largest event, and exhibitors of RFID products and services. We introduced a smartphone application that will let attendees highlight exhibitors on the exhibit hall map by the products they offer or the industries they serve. And we created a free product showcase for exhibitors so attendees can quickly see some of the products being offered. The large structure has 108 panels that will feature product photos and descriptions, along with exhibitor logos and booth numbers.

Of course, RFID JOURNAL can't solve the visibility problem on its own. RFID vendors must take the initiative to market their products and increase brand awareness. Transparency in the marketplace will fuel growth by enabling more companies to deploy systems. And that, in turn, will encourage still more companies to adopt RFID. —M.R.

84%

of study respondents said brand is important for RFID purchasing decisions.

Yet, only

35%

of end users recognized the top RFID brand.

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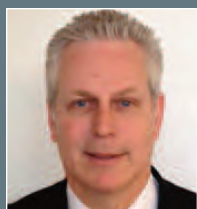
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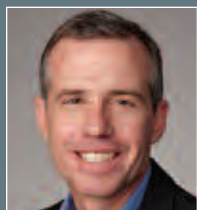
ROGER V. BLAZEK
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bloomingtondale's

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MAY 1

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BLAINE TOOKEY
Senior Technology Consultant, Chief
Technology Office, IT&S, BP

MAY 1

10:00 AM



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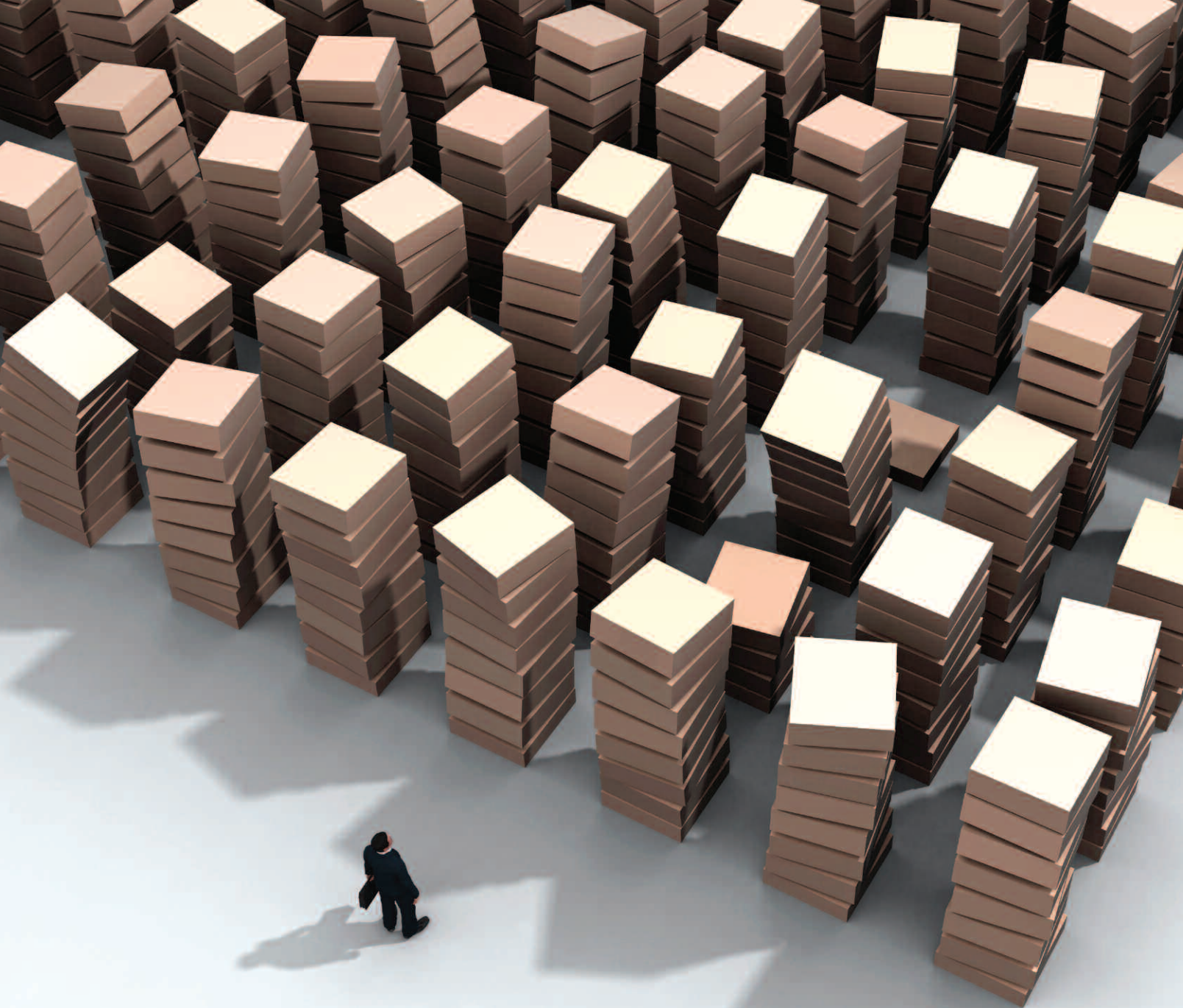
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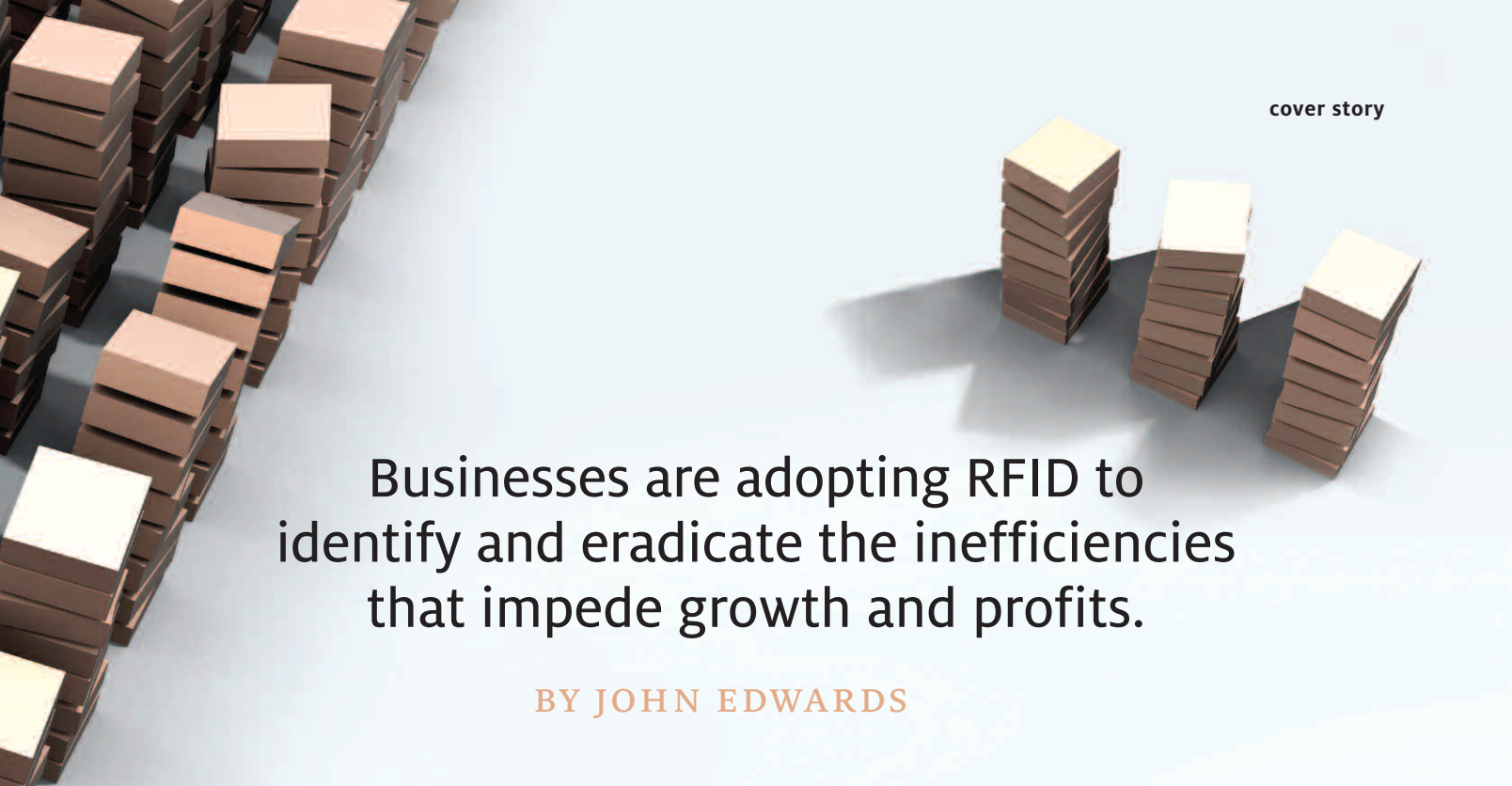
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ELIMINATING WASTE



Businesses are adopting RFID to identify and eradicate the inefficiencies that impede growth and profits.

BY JOHN EDWARDS

CARLO NIZAM is head of the value chain visibility and auto-ID program for Airbus, one of the world's largest aircraft manufacturers. He is also a waste-buster. And like many of his counterparts in retail, health care and other industries, Nizam has discovered that radio frequency identification is a powerful waste-fighting tool.

"To tackle waste, you need to be able to measure it; you need to know where it is," Nizam says. "But that's easier said than done because, in reality, people have, more often than not, little data or limited visibility of how their processes are performing, so they don't necessarily know where the waste is."

RFID provides the insight essential for spotting hidden pockets of waste lurking inside supply chains, production lines, inventories and other key areas. The technology also helps companies squeeze out waste by automating existing processes, so they run faster and more efficiently.

"If you want to really tackle waste, you really have to take a big-picture approach, because one of the things people need to realize is that waste doesn't differentiate between company boundaries," Nizam says. "It flows across boundaries, and across processes." Airbus, which began using RFID in 2005, has taken an enterprisewide approach to RFID, using the technology in its supply chain, manufacturing, assembly and in-service operations.

For manufacturers, waste in any form hampers agility, cuts into profits and reduces a company's ability to improve or maintain its market position. RFID is helping manufacturers trim several types of waste, says Michael Liard, RFID director at VDC Research. "Most importantly, RFID technology allows a manufacturer to reallocate resources or make sure that processes are optimized," he says.

Retailers often operate on microscopically thin margins, so detecting and eradicating waste is essential to surviving in ultracompetitive markets. Cutting waste is primarily a matter of achieving and maintaining inventory visibility, says Justin Patton, director of the University of Arkansas' RFID Research Center. "You might want to specifically reduce theft, or you might want to specifically reduce spoilage on a particular loading dock," he says. "But always think of your plan in terms of how the technology is going to help make your inventory more accurate and how that more accurate number will affect everything else, such as ordering and forecasting."

Facing near-runaway costs and increasingly stringent regulatory compliance mandates, health-care organizations have made finding ways to cut waste a top priority. For many years, hospitals have defined waste primarily in terms of lost physical assets, such as misplaced, misused or stolen equipment and supplies, says Mark Norris, president and CEO of Ekahau, an RFID solutions provider for the health-care industry. "Today," he says, "that definition has expanded to include time spent on unnecessary manual or duplicate processes and procedures, time spent looking for lost items and time away from patient care."

Here, then, is how RFID is eliminating waste at Airbus, Lemmi Fashion, Eastern Maine Medical Center and other businesses.

MANUFACTURERS BOOST PRODUCTIVITY

RFID allows both automated and manual production lines and maintenance facilities to operate at peak efficiency levels, by ensuring that materials and components always arrive



The RFID system can potentially add up to 25 percent more productive time to a worker's eight-hour shift.

—CARLO NIZAM, AIRBUS



at the right place at the exact moment they are needed. RFID also helps manufacturers maximize workforce productivity by shifting employees away from routine, repetitive production tasks that could be handled less expensively and more efficiently by RFID-enabled automated systems. "RFID definitely brings a higher level of automation previously not seen in a manufacturing environment," Liard says.

In addition, manufacturers use RFID to keep supply chains humming at optimal levels by feeding an array of highly accurate data into the enterprise resource planning and data warehouse systems that drive supply optimization systems. With RFID's help, forecasting, master production scheduling and distribution requirements planning systems all are able to produce higher-quality reports—based on accurate inventory and/or material shipping data—that can help managers better detect time- and money-burning bottlenecks.

One way RFID helps Airbus reduce waste is

by giving workers faster access to essential tools. At a U.K. plant that manufactures wing assemblies for A400M military transports, an RFID-based tool-management application replaced a manual system, eliminating most of the time workers once wasted standing in line simply to check out tools from a tool-storage area and return them at the end of the work shift. The RFID system can potentially add up to 25 percent more productive time to a worker's eight-hour shift, Nizam notes. The system also automatically records the number of times each precision tool has been used, enabling management to accurately identify tools that are ready for recalibration or maintenance.

Airbus is also cutting wasted time at its Toulouse, France, assembly line, where RFID-tagged and tracked "logistics media units"—containers of various shapes and sizes—will be used to deliver components as needed to workers on the new A350 jetliner's final assembly line. "We track when they leave the warehouse, track where they are on the final assembly line and then confirm delivery when they're delivered to the right place," Nizam says. The system will help ensure that production is never held up simply because a vital component hasn't yet arrived.

In addition, RFID helps Airbus work faster and more efficiently by automating aircraft inspection and configuration-management processes. Airlines are delivered with seats and life vests installed in exact accordance with customer requirements. Just a couple of years ago, the final cabin inspection was a largely manual process, requiring clipboard-toting workers to walk along aisles, bend down to check serial numbers and write down the information—ideally, without any mistakes, Nizam says. "It used to take a person 14 hours to do that on what we call a long-range aircraft, which are our A330 and A340 families," he says.

Now that Airbus has added RFID tags to the seats and life vests, just one person carrying a lightweight handheld reader can complete the cabin inspection for an entire airliner in approximately 26 minutes. The system automatically confirms the presence of each



RFID all but eliminated the waste associated with refulfilling incorrect shipments.

—GÖTZ PFEIFFERLING, LEMMI FASHION



required item, verifies its location and then looks up critical data associated with the part, such as its “birth record” and expiration date. “This information can then be used to determine the aircraft configuration and also in-service later on, to prioritize maintenance planning for items due for inspection, overhaul or replacement,” Nizam says.

Unlike Airbus, Lemmi Fashion, in Fritzlar, Germany, doesn’t operate a series of massive manufacturing plants. The children’s clothing designer prefers to outsource production to Asian contract manufacturers. Yet, Lemmi still uses RFID to cut waste, relying on the technology to automatically check incoming shipments for correct quantities and styles.

Götz Pfeifferling, Lemmi’s CIO, says that prior to adopting RFID, the firm often found significant discrepancies between the number and types of garments that manufacturers claimed they had shipped and the items that actually arrived at the company’s distribution center, “especially when it came to the sizes and colors,” he says. “On a SKU basis, our data was very, very rough in relation to the shipments.”

By requiring its manufacturers to tag their shipments, Lemmi was able to eliminate a tedious manual verification operation, reducing wasted time and allowing employees to focus on more productive tasks. “We also implemented packing tables and readers at our manufacturers, so when they packed the goods

MORE WASTE-BUSTING APPLICATIONS



RFID JOURNAL’s annual conference and exhibition will feature more than 50 end-user case studies, including many that focus on eliminating waste. Here are some highlights.

BLOOMINGDALE’S has been RFID-tagging items to improve inventory accuracy, reducing overstocks and understocks. Roger V. Blazek, the company’s VP of shortage control for omnichannel, will deliver a keynote address on the retailer’s RFID journey from concept to rollout.

AMERICAN APPAREL has RFID-enabled roughly 100 stores. Stacey Shulman, the company’s CTO, will speak about how the clothing manufacturer and retailer uses RFID to improve inventory accuracy and reduce shrinkage.

TAP PORTUGAL, the country’s national airline, uses RFID to track engine-overhaul components and tools. Fernando Matos, head of information technologies at TAP Maintenance and Engineering, will discuss how the solution improves visibility into its parts and tools, and eliminates the need to conduct time-wasting manual inventory searches.

SPEEDY SERVICES developed an RFID-enabled onsite mobile equipment pod that provides workers with continuous access to tools, to help crews meet schedules. Glyn Matthews, Speedy’s senior project manager, will explain how the solution eliminates waste for the tool-rental company and its customers.

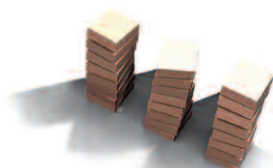
CELEBRATION HEALTH, a Florida Hospital facility, deployed a real-time location system to reduce the many miles nurses typically walk during a shift. Todd Frantz, associate CTF, will detail how the solution improves efficiencies at its new patient tower.

To see the full agenda, visit [RFID JOURNAL LIVE! 2013](#).



"If a retailer loses sales due to an out-of-stock situation, that must be considered waste."

—JOERG NIEDERHUEFNER,
INTELLIGENT LOSS PREVENTION



we would actually get a detailed inventory on each carton," Pfeifferling says. The approach gave Lemmi a four-week heads-up on incoming shipments, allowing the firm to head off any problems and better coordinate deliveries to its retail customers.

At Lemmi's warehouse, the tagged shipments eliminated a major source of wasted time. "Previously, we mostly had to do manual counting, then type the totals into a computer," Pfeifferling says. "This process was slow, and it was very easy to make mistakes." Accuracy rates under the manual system never surpassed 85 percent, and may have actually been worse, he notes.

The RFID system provides virtually perfect accuracy. "It streamlined our receiving process, making it much quicker to add items to our warehouse," Pfeifferling says. The technology also assured that Lemmi retailers would always receive the exact garments they had ordered, all but eliminating the waste associated with refilling incorrect shipments.

RETAILERS STAY COMPETITIVE

Comprehensive RFID-driven inventory visibility and management capabilities help retailers maximize sales. "If a retailer loses sales due to an out-of-stock situation, that must be considered waste," says Joerg Niederhufner, director of business development for Intelligent Loss Prevention, a company that sells RFID-enabled merchandising systems. "False data can also create overstocking, which also must be defined as waste."

Apparel retailers worldwide are employing RFID to slash waste attributable to inventory miscounts, stock shrinkage and other factors. Swiss fashion retailer Charles Vögele was an early adopter, deploying an RFID system in 2008 to track items from manufacture to its stores. The solution quickly justified its cost by generating a 70 percent or more time-savings when calculating store and warehouse inventories, as well as a 7 percent increase in the accuracy of picked orders in factories. It has resulted in increased sales, due to fewer out-of-stock items, and more accurate planning information.

In 2011, Valdac Group, a São Paulo-based fashion retailer that operates more than 100 stores throughout Brazil, turned to RFID to trim waste. For its Memove chain, the firm created an RFID solution designed to save time at the distribution center and inside each store. It improves shipment verification, because employees know exactly what products, including which sizes and colors, are inside each of the boxes they receive. The solution also helps stock replenishments keep pace with sales, which increases revenue and prevents customer disappointment.

Jewelry retailers are also adopting RFID to improve inventory management. In 2009, Cleor, a French retail jewelry chain, began deploying RFID because its sales staff was spending more time on inventory than on sales and customer service. Today, the solution has been deployed at 50 retail locations. "The solution's greatest value has been in improved accuracy," says COO Aurélien Sénéchal. "It has reduced errors in shipping and receiving." An



"With technology enabling the process, you're talking about moving from a first-in, first-out process to a first-expired, first-out system."

—JUSTIN PATTON, RFID RESEARCH CENTER



inventory check that used to take several days now takes only a few hours, he says.

The RFID system that Borsheims, a Berkshire Hathaway-owned jewelry retailer in Omaha, Neb., deployed in 2012 has already paid for itself, says CFO Erin Limas. Tagging and tracking high-value jewelry reduces the amount of time required for inventory counts, eliminates shrinkage and provides better control over store inventory.

Supermarkets and other grocery-oriented merchants face a unique challenge among retailers: products with shelf lives that are measured in terms of days or weeks rather than months or years. Food retailers have an opportunity to use cold-chain monitoring and other types of RFID systems to ensure food quality and prevent spoilage. "Produce and meat are what generally draw people to stores and are what makes a good grocery store or a bad grocery store," Patton says. "If you ask most grocers what their problems are with waste and loss, they'll generally identify spoilage, damage in the back room and then theft."

Inventory insight and seamless control are key to addressing all of these challenges, Patton says. "With technology enabling the process, you're talking about moving from a first-in, first-out process to a first-expired, first-out system," he notes. "Instead of just making decisions based on when the truck came and dropped this off, you're now making decisions based on which of these shipments has the most time left before it spoils."

For food merchants, waste reduction can also be turned into a powerful tool for building market share. "If you're using RFID or some other type of supply-chain technology to ensure that you're getting better quality, or to remove the bad-quality items, you're potentially differentiating yourself from others in the space," Patton says.

HOSPITALS MEET HEALTH-CARE CHALLENGES

Time is an asset all health-care organizations strive to use more efficiently. "More time allows hospitals to elevate the patient experi-

ence, shift resources to innovative care-giving models and more effectively allocate staff time to impactful activities," Ekahau's Norris says. While hospitals, clinics, emergency-care centers and long-term care facilities continue to consider real-time location system (RTLS) technology a way to help managers spot and eliminate the waste that occurs when assets go missing, new time-oriented applications are also appearing. "RTLS technology helps automate health-care delivery, and this leads to quicker feedback on procedures, admissions, discharges, room availability and asset inventory," he says.

Slashing wasted time equals saving money, says Brenda Clements, manager of nursing services at Eastern Maine Medical Center's Cancer Care department in Brewer, Maine.



"RTLS technology helps automate health-care delivery, and this leads to quicker feedback on procedures, admissions, discharges, room availability and asset inventory."

—MARK NORRIS, EKAHAU



"Shuffling patients via paper is very inefficient, and there's a good chance of losing that piece of paper and creating long patient delays," she notes. The facility began using an RTLS for patient and employee tracking in 2009, and Clements says process improvements followed quickly. "We are able to expedite patient flow, lean processes, and improve patient and staff satisfaction," she says. "Now, we're able to see where all our patients and coworkers are at any given moment."

An RTLS can generate reports that help managers maintain close oversight over anything—or anyone—tagged within the hospital environment. "We can see where bottlenecks occur," Clements says. "If I have complaints that patients have been kept waiting for a long period of time, I can track the patient flow—

where they waited, how much time they spent there—and see if I can flush out process issues that created the patient delays.” The system has already saved the hospital time equivalent to that of three full-time employees as well as “miles of walking” for staff members, Clements notes. “Step minimization equals increased efficiency, dollar savings and more time spent with patients,” she says.

The RTLS also helps the hospital cut waste in other ways. “Maintaining multiple waiting areas where patients can sit can be a waste,” Clements adds. “Requiring extra resources to facilitate patient flow is a waste; patient delays that subsequently delay providers is a waste.”

Indeed, hospitals worldwide are deploying RTLS solutions to better manage patient care. England’s Royal Wolverhampton Hospitals

efficient, and we can get our patients through services in a timely fashion, minimizing their wait time, they’re going to be happier,” she says.

NO OPPORTUNITY WASTED

Manufacturers like Lemmi have succeeded in cutting waste by focusing on the processes that generate the most waste, Liard says. “Businesses really need to evaluate what their processes are, what costs are tied to these processes and how an automatic identification technology such as RFID can help alleviate some of these pain points,” he explains. “It starts with a review of one’s processes, and then moves to assets and then to people—they’re all intertwined within a manufacturing environment.”

Retailers, regardless of the market they serve, can build a waste-busting RFID system to achieve visibility and control, Niederhuefner says. “Make sure you have a good understanding of all the positive impacts RFID can have on your business model, but prioritize which segments of your business would benefit most from RFID deployment,” he says. “Define which level is most important and start there.”

RTLS is becoming the go-to solution for health-care business intelligence, “providing insight and analysis on what works and what doesn’t, giving hospitals the information they need to make smart decisions in areas of staffing, resource planning, patient workflow and process improvement,” Norris says. Rich RTLS-generated data helps health-care organizations better understand how to reduce costs and drive more revenue. “Underutilization of time and resources remains one of the health-care industry’s biggest challenges,” he says, “and RTLS can help the health-care industry address this challenge with location awareness.”

Airbus’ Nizam offers one last thought on eliminating waste. “There’s an old saying: The bolt is only tightened on the last turn, and everything else is just movement,” he says. “There are many things we’re doing to try to minimize all that movement inside the company. The use of RFID is helping us focus and make sure we’re only doing the things that need to be done.” ■



“Requiring extra resources to facilitate patient flow is a waste; patient delays that subsequently delay providers is a waste.”

—BRENDA CLEMENTS,
EASTERN MAINE MEDICAL CENTER



NHS Trust, for example, deployed an RTLS solution to improve patient flow, as well as manage assets and ensure hand-hygiene compliance. India’s Fortis Escorts Heart Institute is using RFID to reduce wait times for the roughly 300 outpatients that visit the medical facility daily for testing. And at Malaysia’s Pantai Hospital Ipoh, which has a rapidly growing local population and a chronic skilled labor shortage, RFID automates routine tasks so nurses have more time to focus on patients.

In the United States, health-care facility waste and inefficiency can also negatively impact Medicare and Medicaid reimbursements. The federal government’s Centers for Medicare & Medicaid Services agency is now basing reimbursements partially on patient satisfaction, Clements says. “If we can be lean, and we can be

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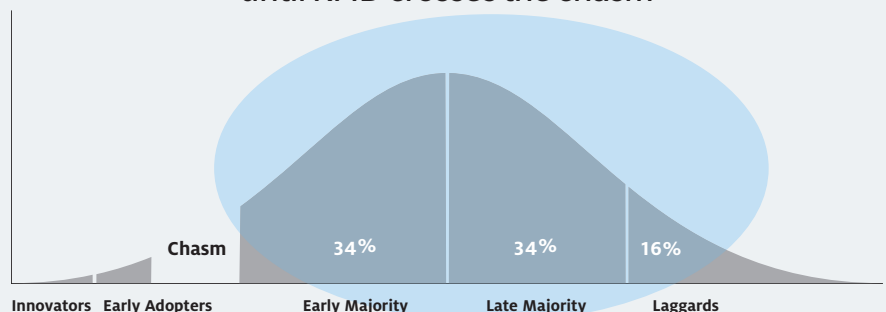


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Benefits

Fuel RFID Deployments

Oil and gas companies are adopting radio frequency identification technology to better manage assets and inventory, improve drilling and maintenance operations, and protect workers in dangerous environments. But industry experts say they're missing out on a powerful application. BY JENNIFER ZAINO



FRACKING—SHORT FOR hydraulic fracturing, which uses water pressure to create fractures in rock through which to extract natural gas and oil—has become a hot-button issue, as technology advances make recovering previously unreachable natural gas reserves economically feasible. Proponents argue for its role in boosting energy independence while opponents cite water contamination and other environmental concerns.

That's a debate for other venues. But what can't be disputed is the value RFID can bring to fracking operations. In 2011, for example, GreenHunter Water, a Grapevine, Texas, provider of water-management solutions and services to oil and gas companies, began



Cameron, a provider of flow equipment products, systems and services to worldwide oil, gas and process industries, has been RFID-tagging valves and rental equipment for U.S. and Canadian hydraulic fracturing companies, to improve asset tracking and inventory management.

installing its RFID-based wellhead-management system at six oil-drill sites in West Virginia. The solution lets the company track wastewater pumped out of temporary storage tanks and provide data showing it was deposited in authorized waste wells.

For the past year or so, Cameron, a provider of flow equipment products, systems and services to worldwide oil, gas and process industries, has been RFID-tagging valves and rental equipment for U.S. and Canadian hydraulic fracturing companies, to improve asset tracking and inventory management. Cameron links the unique serial number on each passive ultrahigh-frequency EPC Gen 2 tag to information about the part stored in its database. More than 10,000 pieces of equipment have been tagged, says Daniel Baxter, a senior technology and development research engineer at the firm.

Cameron moved fast to RFID-enable its 22 facilities that rent fracking equipment, be-

cause parts are not always returned to the location from which they were shipped. It was important to have all facilities go live as soon as possible, Baxter says, so everyone contributes to and can benefit from more accurate data. The RFID solution provides visibility into what equipment has been shipped to and returned from customers, and identifies items that are being repaired.

"Cameron sees great value and potential in RFID technology," Baxter says. The company can speed up billing and bring greater efficiency to other business processes, including turning around customer order cycle time, he says, adding that knowing the status of equipment is key to providing better service.

Improving asset tracking and inventory management is a major driver of RFID in the energy sector. A Louisiana service company became interested in RFID when it discovered that the pipes it had rented from another

source to complete a customer's requirements were actually its own property. Only physical markings on the pipes gave away the truth, says Patrick King, founder of RFID rugged tag provider and consulting company Technologies ROI (TROI), and a standards and technology advisor to the Oil and Gas RFID Solutions Group (OGR), a consortium of experts working to promote RFID adoption in the energy sector. "When the boat out of Houma, Louisiana, goes out to an offshore wellhead and picks up parts for service, resurfacing or retooling, all the parts go on to that one boat barge," King says. "It comes in and someone does sorting, and the process is not very good. If 10 parts look the same, they end up in one pile, even if they're owned by three different companies. So you might or might not get your parts back."

Managing assets in remote regions is particularly challenging. "It's very costly to send vessels to offshore oil rigs, so they need to make sure they're taking everything that needs to leave—that's a very laborious process to try to do manually," says Moses Chang, sales manager at RFID tag manufacturer Xerafy, which is working with one of the largest oil and gas logistics companies in the world on an effort to tag every production supply before it goes on board the vessels that service offshore operations in the Gulf of Mexico and other regions. Companies, for example, hoist slings and other pieces of equipment for lifting heavy gear into large containers, but counting them by hand is difficult, if not impossible, Chang says. "If you leave out one component, like one sling, or even one little tool, that can be a huge amount of downtime," he says. Downtime for offshore rig operations can run into the millions of dollars, and heading it off or recovering from it by sending out a helicopter with forgotten supplies can cost tens of thousands of dollars.

Oil and gas companies are also using RFID to improve drilling and maintenance operations, thanks to technology advances that make it possible to read tags on metal and in harsh environments (see [BP Refines Maintenance Operations](#)). In addition, they are im-

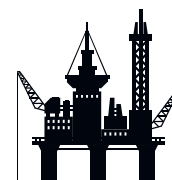
plementing RFID-based real-time safety solutions to monitor employees in dangerous workplace environments. But most RFID deployments in the energy sector are closed-loop applications. The holy grail is to have RFID used across the supply chain—from the manufacturing site, where it can be attached to equipment being produced, to the wellhead, where it can be used in operations, King says.

Technology That's Up to the Job

To monitor valves and other equipment used in fracking, Cameron needed metal-friendly tags that could survive stress and harsh environments, so they would be readable when the assets were returned to its facilities. "There are all sorts of harsh chemicals that tags are exposed to, so the tags and attachment mechanisms have to hold up" on multiple fronts, Baxter says. "UHF tag technology has advanced so far recently and become so much more robust with companies like Xerafy, Omni-ID and Confidex. The tags have become so much more reliable in harsh environments, and offer improved performance when reading them on metal. It's become a good option for us. The technology has gotten to the point where Cameron is confident using these tags, which have a high survival rate."

The advancements in UHF technology also can facilitate oil and gas drilling operations and other processes that take place in the field, says Konrad Konarski, co-founder of the OGR. Workers can read RFID-tagged pipes to ensure the right pipes are going into a hole in the right sequence, for example, or that a pipe has been inspected following its use in multiple drilling cycles. Identifying drill pipes had its start with low-frequency RFID technology, he says. It provides adequate reliability but is hampered by a short read range that isn't best suited to work in complex drill rig environments.

While the OGR promotes passive UHF EPC Gen 2 technology as a standard for asset management, low-frequency RFID continues to play a role. Last summer, for example, global oil and gas firm Statoil began deploying an LF



"It's very costly to send vessels to offshore oil rigs, so they need to make sure they're taking everything that needs to leave—that's a very laborious process to try to do manually."

—MOSES CHANG, XERAFY

Workers can read RFID-tagged pipes to ensure the right pipes are going into a hole in the right sequence, or that a pipe has been inspected following its use in multiple drilling cycles.



RFID solution from Trac ID Systems at offshore oil wells to monitor the lifespan of drill pipes. Each time a pipe is lowered into and then raised out of the well, its tag ID number, along with the time and date, are automatically recorded. Tracking the pipes with fixed and handheld readers provides more accurate data than recording the information manually, and it also minimizes the time the rig crew must spend on the main deck, where they are exposed to various hazards.

Safety Takes a Front Seat

When it comes to the RFID projects being implemented around the world, personnel safety is right up there with asset-management solutions, says OGR co-founder Sam Falsafi. All five of the major oil companies—BP, ConocoPhillips, Chevron, Exxon and Shell—have major projects using RFID for personnel safety, he says. Some have been in place a few years, and at least one is tracking more than 4,000 people on a remote offshore platform.

Other energy firms are also deploying personnel safety solutions. Mexican oil-industry maintenance and transportation company Cotemar uses an RFID solution from AeroScout to automatically monitor employees, and the services they use, on four offshore platforms

that serve as their living quarters while they work on oil rigs in the Gulf. This helps the company locate employees in the event of an emergency, and to provide food and laundry supplies more efficiently.

Agip Kazakhstan North Caspian Operating Co., a subsidiary of Italian oil and gas giant Eni, is deploying an RFID personnel safety solution in conjunction with the construction of a new complex and drilling site in the North Caspian Sea, off the coast of Kazakhstan. The oil field is expected to produce extremely toxic and flammable gas. Agip plans to monitor up to 1,000 staff members, so in an emergency it can determine which employees have reported to their assigned mustering stations as well as the locations of those who have not, and it can issue alerts in the right areas if a rescue is in order.

RFID-based personnel safety solutions provide real-time visibility into worker locations, to help prevent accidents and enable companies to respond should an incident occur. They can help keep accidents at bay by, for example, triggering alarms when nonauthorized contractors enter restricted work zones or notifying managers if noncertified operators near heavy machinery. “There have been incidents already where RFID technology has helped prevent accidents,” Falsafi says, though the companies are careful about

publicizing such events.

In an emergency, “the company can provide a better message publicly—explaining when the event took place, how many people were evacuated, that there are still people here in a certain sector, and so on,” Falsafi says. “That’s a much, much more powerful statement than just saying we know something took place, and we don’t know where people are in the building or the facility, but we are trying to get them out.”

Most personnel safety solutions consist of a combination of real-time location systems based on ultra-wideband, ZigBee or Wi-Fi active RFID and GPS capabilities. “The unpredictable movement of persons and the complex petrochemical environments require, most of the time, a solution based on active RFID infrastructure,” Falsafi says. Typically, he explains, workers are equipped with RFID-enabled ID badges; some also have panic buttons or embedded auxiliary sensors that could detect a fall to the ground or off a harness.

RFID technology allows us to effectively track people in an environment where GPS alone can’t track people, Konarski says. While GPS on its own is sometimes suited to the task, “in a facility like a refinery, there is so much metal obstruction, and when you do have a GPS signal, it can be very diluted,” he says. “GPS generally doesn’t really let you track well in 3-D, so if a person is up on a stairwell, it’s not easy to track him using a simple GPS receiver.” That isn’t helpful for localizing emergency response teams to where individuals are in trouble.

In addition to monitoring workers in dangerous environments, RFID can automate safety inspections. Omni-ID, for example, is working with a customer that sends ships back and forth to offshore rigs, says Andre Côté, the firm’s SVP of business development. A strict inspection program on each ship requires not only ensuring the presence of fire extinguishers but also stress-testing on-ship components and parts of the ship itself, such as a doorway to ensure its hinges and locks work properly. With durable passive UHF tags attached to the appropriate locations and components on the ship, personnel need only ping the tag with a

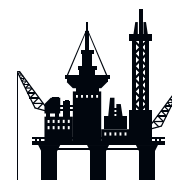
handheld reader to access complete instructions for what testing to do at each location. “And once they complete the tests, there’s a full electronic record to show compliance with safety regulations for that ship,” Côté says. The project is going live now across seven or eight ships, with some 10,000 tags per ship.

Connecting the Energy Dots

In the near future, more U.S. oil and gas companies may turn to RFID to comply with federal regulations. “The U.S. government is coming up with some very defined and stringent regulations for all the oil companies and producers in the U.S.,” says Layne Tucker, founder of the EchoRFID solution for pipeline integrity management. “It’s changing the way [the government is] going to regulate them, and how the oil companies have to keep track of their assets, and any changes they make in those assets over a 25- to 35-year life cycle, whether in an aboveground facility or a belowground pipeline.”

The EchoRFID solution should be in use in the next few months, though the company is not disclosing customers now. Manufacturers or the oil companies constructing the pipelines can tag the equipment with Omni-ID’s passive UHF Ultra on-metal tag. The tag was selected for its durability and read distance (more than 100 feet), Côté says. A cloud database will store information about each tagged piece every time its unique serial number is read—when the piece is transported to a construction site and when it’s deployed as part of a pipeline project, including being buried deep within the ground. “When the pipe needs to be dug up in the future, the tag can be read and identified even before exposing the pipe,” he says. As pieces of a pipeline deteriorate, new tagged parts can be put in their place; any database lookups would show the old tags are out of service and the new tags that have replaced them.

Pictures, voice and video also could be attached to the unique tag’s information, and GPS technology would record where the asset



“All five of the major oil companies—BP, ConocoPhillips, Chevron, Exxon and Shell—have major projects using RFID for personnel safety.

—SAM FALSAFI, OIL AND GAS
RFID SOLUTIONS GROUP

The EchoRFID solution for pipeline integrity management is designed to help oil companies keep track of their assets, and any changes they make in those assets over a 25- to 35-year life cycle, whether in an aboveground facility or a belowground pipeline.



has been placed. “You would be able to recall any changes for the full life cycle of that asset to those who need it out in the field,” Tucker says. “You can’t see the buried asset anymore, but we would be able to find any component a tag was on and reaffirm through GPS that that is the correct tag, you are at the spot you think you were, and this tag holds this information that was taken during construction, whether that was last week or five years ago,” he says. “An engineer through his computer, without traveling to the field, can actually confirm the type of valve that’s there, or people in the field can shoot the tag to see when and where the equipment was last serviced.”

New federal guidelines could encourage more energy suppliers to RFID-tag equipment. For now, most RFID deployments in the energy industry tend to be of a closed-loop or otherwise isolated nature. That’s something many parties would like to see change. There is still little agreement on data, material and referential standards to promote interoperability and usefulness, both within and across corporate borders, TROI’s King says. “Unlike the auto industry, where at least there is an attempt by competitors to come together and drive common standards, the energy community does not really do that,” he observes. “It is far more competitive.”

“Tag specifications need to address the environmental and functional requirements of the entire life cycle of the product [the tag] is attached to,” Konarski says. “But when efforts aren’t thought of in an end-to-end way from the start, that’s unlikely to happen.

“If you build a closed-loop system, you are isolating other partners from using RFID and it doesn’t become as pervasive as it should,” Konarski says. Consider, he suggests, the example of a large oil company whose warehouse group sponsors an RFID project to solve problems such as shrinkage or to receive inventory faster. The company selects RFID tags and technology to address its particular requirements. The tags may accompany parts out to the field, but the odds are they won’t support requirements that would make them useful there.

“Even if someone else in the supply chain does decide to use RFID technology, if the original project did not take into account the types of information this trading partner would like to see in the tag memory, or the physical environment of the piece of equipment while in the hands of this partner, the tag may not work or simply will not provide [the secondary user] with any value,” Konarski says. “Planning across different organizational units or different companies is key to leveraging the true value of RFID.” ■

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COMING clean

About RFID Laundry Systems

COMMERCIAL LAUNDRY companies have been RFID-tagging and tracking uniforms and linens for more than 15 years to identify customers' items, which must be sorted, cleaned, packaged and loaded on the correct truck for delivery. More recently, casinos, fitness clubs, hospitals, hotels, theme parks and other organizations have begun using RFID to track laundry items, to improve asset visibility and reduce the number of stolen towels.

"Laundry tracking manually is very labor-intensive, because keeping detailed records requires that different types of laundry items must be separated, counted, recorded on paper and then later entered into a computer," says Jeff Welles, VP of RFID laundry solution provider InvoTech Systems. "RFID automatically identifies, counts and records the items without even separating or sorting."

While laundry-tracking systems have been in use for a long time, recent advancements in the tech-



nology have led to price drops and increased performance, says Michael Liard, RFID director at VDC Research. Low-frequency and high-frequency solutions dominated the market in the early days, he says. Passive ultrahigh-frequency solutions able to withstand washing conditions have entered the market as lower-cost alternatives. In general, he adds, these systems cost approximately 20 percent less than the older offerings.

UHF RFID tags designed to withstand commer-

cial laundry processes first became available in 2010, Welles says. "These tags each contain a unique ID number and are attached to each uniform or linen item to identify specific inventory items," he explains. "The UHF RFID laundry tags allow inventory items to be processed from a much farther distance than the RFID laundry tags that were previously available." The greater reading distance allows for entire laundry carts of uniforms or linens to be processed and the content recorded instantly, he adds.

Some companies hire a systems integrator to develop a laundry-tracking system; the in-

to hotels and entertainment venues, the demand for tracking clothing and linens is increasing in many markets for a variety of reasons." Hospitals need to track linens and materials not only entering and exiting facilities, but in many cases from floor to floor and room to room, Dalton says. Hotels need to ensure linens are available for guests. And with the rising cost of cotton, loss of items can have a significant impact on a hotel's bottom line.

"Laundry tags can also be used to track cleaning equipment, such as textile mops and broom heads, which are laundered and sterilized," says Richard Aufreiter, director of product man-

Technology advancements, lower costs and complete solutions are among the reasons to consider automating the tracking of linens, towels and uniforms.

tegrator then purchases laundry tags from an RFID provider. Other firms design their own RFID laundry solutions. Disney, for instance, purchased passive UHF tags from Fujitsu Frontech North America and readers from ThingMagic, and created RFID software that integrates with its existing Garment Utilization System.

During the past few years, providers have developed complete laundry solutions, which include readers, tags and software—an option that makes sense, Liard says. In 2011, for example, Fallsview Casino Resort, in Niagara Falls, Canada, adopted InvoTech's GIMS Uniform System. Still, employees needed to sew the tags into tens of thousands of employee uniforms.

Analysts and solution providers expect continued growth in the RFID laundry market. "There is an explosion in usages for washable RFID tags," says Dan Dalton, director of new products development at Fujitsu Frontech North America. "From hospitals and health care

agement, identification technologies, at HID Global. "Textiles of all types, including napkins and tablecloths, are tracked for accountability, efficiency and traceability purposes."

While the RFID laundry sector is growing, Liard says, companies in the industry face the ongoing challenge of communicating the business benefits of RFID for laundry-related applications. "Education is still a challenge, and with the new UHF solutions as part of the equation, customers now have more of a choice," he says. "They need to understand things like total cost ownership and ROI."

RFID LAUNDRY TAGS

Companies that want to build their own laundry-tracking systems or invest in additional tags to expand monitoring capabilities have several options; the table on page 35 provides information on some leading RFID laundry tag providers. All the RFID laundry tags are rugged—that is, they can withstand hundreds



(Top left) HID Global's Slim Flex Laundry Tag; (above) William Frick & Company's RFID Wire Laundry Tag.

Fujitsu's WT-A521 and WT-A522 tags are washable and non-metallic, so they can be used in hospitals with MRI rooms where large magnetic fields are present.



Solution providers say the laundry tags usually outlive the uniforms and other linens they track.

of industrial washings at high temperatures with bleach and other chemicals, as well as repeated ironings. Solution providers say the laundry tags usually outlive the uniforms and other linens they track.

Industrial laundry typically is not dried primarily with air but with a water-extraction press. "Although using an extraction press expedites the drying process, it places additional stress on the laundry and the tag's antenna," HID Global's Aufreiter says. "Therefore, HID tags are tested up to 70 bar pressure (½-ton per square inch) and 500 twist tests of 180 degrees for the flexible antenna to survive repeatedly in modern water-extraction presses."

The tags differ when it comes to size, form factor and read range. Fujitsu's WT-A521 and WT-A522 tags, for example, measure 55 millimeters by 10 millimeters (2 inches by 0.4 inch), so they can be inserted easily into the seam of a sheet or towel, Dalton says. "Because of the ultrasoft exterior, the tag can be inserted into clothing seams, linings or pockets and is virtually unnoticeable to the wearer," he says. Also, because of its nonmetallic design, the tag can be used in hospitals with MRI rooms where large magnetic fields are present, he adds.

Some tags offer security features, such as

the ability to protect customer data on tags. "We can lock down as much or as little data as the client needs," says Brent Howell, business development manager at William Frick & Co., which provides the RFID Wire Laundry Tag and Silicone RFID Laundry Tag.

The EPC and user memory can be locked or password-protected to prevent someone from changing data on tags, Howell says. "Additionally, each chip comes with its own unique serial number that cannot be changed," he says. "If a user combines chip ID along with [the user's] own unique EPC code, this allows for additional security."

RFID LAUNDRY SOLUTIONS

InvoTech Systems, RFID Laundry Consultant and Towel Tracker are among the RFID providers that offer complete laundry solutions, including tags, readers and software (see vendor table on page 37). With a turnkey system, the hardware and software components work together, and the solution typically includes installation and training, and, in some cases, software updates and support services.

InvoTech offers GIMS systems to manage linens, uniforms, laundry (linens and uniforms) and multiproperty (for clients with

more than one site). The company says it has nearly 500 customers in 20 countries worldwide, including casinos, hospitals, hotels, laundries, medical centers, stadiums and theme parks. All the UHF systems automatically track and record laundry activity, and manage inventory, repairs and billing. A “restricted item control” feature can be deployed at employee exits to catch individuals trying to leave the property with uniforms, Welles says, or it can be used at pools or water parks to prevent guests from stealing towels.

The implementation time for a laundry system can take as little as one day or as long as a month, he says, depending on what the customer is looking to do. “Cost varies tremendously depending on the size of the operation,” Welles says. InvoTech provides custom pricing proposals and a return-on-investment analysis, he adds.

RFID Laundry Consultant’s Simple Sort was



Simple Sort ships sewing machines to customers to help in the tagging process.

developed with help from RFID company Data-mars. The HF system is designed for industrial laundry and cleaning companies, specialized laundry facilities, such as those that handle clean-room uniforms, and hotels, says Scott Meyer, the firm’s owner and product engineer. The system features a “cube” that automatically sorts floor mats and uniforms, reducing

SOME LEADING PROVIDERS OF RFID LAUNDRY TAGS

| COMPANY | TAGS | FREQUENCY | INDUSTRY SERVED | FEATURES |
|-------------------------------------------------------------|-----------------------------------------------------|-------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fujitsu Frontech North America www.fujitsu.com/us | WT-A521 and WT-A522 Tags | Ultrahigh-frequency | Laundry service providers | WT-A521 is a special-order tag with a permanently locked EPC ID number for security; WT-A522 is a standard global tag with a password-locked EPC code |
| GAO RFID www.gaorfid.com | Gen 2 Laundry Tag | Ultrahigh-frequency | Industrial laundries and hotels | Meets the extreme demands of rotary ironing; can be fixed to any fabric using a heat-sealing machine |
| IdTronic idtronic-group.com/en | Laundry Tag HF | High-frequency | Commercial laundries | Guaranteed minimum lifetime of 200 washing cycles; available in 15 mm diameter; thickness is always 2.4 mm so tags can be integrated easily into clothes |
| HID Global www.hidglobal.com | Logi Tag, Logi Button Tag, SlimFlex Laundry Tag | High-frequency, ultrahigh-frequency | Commercial laundries, hospitals, hotels and uniform companies | Tags can be used to track mops and other cleaning equipment that must be laundered and sterilized; also can track surgical sponges and other medical reusable assets to verify cleaning and sterilization processes |
| William Frick & Co. www.fricknet.com | RFID Wire Laundry Tag and Silicone RFID Laundry Tag | Ultrahigh-frequency | Hospitality and garment industries, hospitals and nursing homes | The EPC and user memory can be password protected or locked for security; tags can be customized to meet end users’ needs |



Towel Tracker's solution is designed for fitness clubs and hotels, which lose millions of dollars in stolen towels every year.

Many companies see the initial inventory tagging as a challenge.

errors and labor. It also alerts the operator to any special requests, such as repairs needed or the fact that a replacement item has been sent to the customer.

The cost of Simple Sort starts at \$25,000, including software, one reader station, installation, training and some tags, Meyer says. Customers pay more for additional tags, on-site training and programming modifications. "Each system is customized for each customer," he says.

Towel Tracker's solution is designed for fitness clubs and hotels, which lose millions of dollars in stolen towels every year, according to CEO Steven Molewyk. An introductory version includes a towel-dispensing unit, a towel-return unit, RFID-tagged towels, two rolling carts for dispensing clean towels, and two rolling laundry bins for dirty towels. Towel Tracker costs approximately \$30,000. "Our clients have seen ROIs between 10 weeks and five months," Molewyk says. "This is due to lower towel theft, reduced laundry expenses, and the ability to charge patrons the

purchase price for stolen towels."

When a guest swipes his or her fitness-club membership card or hotel key card through a card reader, a cabinet door opens automatically, allowing the user to remove as many towels as needed. Then, the system performs a tag scan and determines the exact number of towels taken. "Towel Tracker's computer system automatically assigns those towels to your account," Molewyk says, "It's like checking out books from a library."

Used towels are placed in the Towel Tracker's return unit, which scans the RFID tags and automatically removes those towels from the guest's account. Managers can pull up a real-time list showing guests' names, the number of unreturned towels, and the date and time the towels were checked out. The system can be set to automatically generate polite e-mail reminders asking patrons to return the missing towels or face potential replacement fees.

People use significantly fewer towels when they're responsible for returning them, Molewyk says, which means fewer towels to wash. Laundering costs about eight cents per towel, he says, and the savings can add up quickly.

CLEANING UP

Many companies see the initial inventory tagging as a challenge. If a company is ordering new uniforms and linens, InvoTech sends the laundry tags to suppliers to be sewn in during the manufacturing process. For existing uniforms and linens, the company provides the laundry tags pre-inserted in fabric pouches, which can be sewn into the uniforms and linens, he says. Another option is tags that can be heat-sealed to uniforms and linens; the company offers a heat-seal machine.

Simple Sort's Meyer says he has shipped machines to customers to help in the tagging process. "Most every company ends up buying its own, because of the need to tag existing stockroom inventory," he says. "A typical company will have a stockroom that is 15 percent of the active inventory. So if it converts 100,000 active garments, it will need between 10,000 to

20,000 tags for the stockroom. It is more cost-effective to add the tags only when they are put into service.... This same machine can be used for sewing on name and company emblems.”

Domestic linen mills “have a huge opportunity to provide value by tagging towels at the mill and shipping them directly to customers’ sites,” Towel Tracker’s Molewyk says. “I believe only domestic mills can excel at this lean supply model. Unfortunately, nobody, to my knowledge, has adopted this model yet.”

The laundry tracking market “is focusing much of its attention on UHF RFID technology and the adoption rate is extremely fast,” Welles says. “However, UHF RFID laundry tags have only been available a few years, so only a very small percentage of qualified businesses have implemented systems to date.”

Adoption rates will continue to vary depending on the application, Dalton says. “Several years ago, washable UHF RFID adoption



InvoTech’s GIMS systems automatically track and record laundry activity, and manage inventory, repairs and billing.

was limited to higher-priced uniforms and costumes,” he says. “Recently, however, Fujitsu has seen an increase in adoption rates in the hospitality and health-care segments. We expect this rapid adoption rate to continue into the future, as the cost of linens and clothing continues to rise and the cost of tags continues to fall.” ■

SOME LEADING PROVIDERS OF RFID LAUNDRY SOLUTIONS

| COMPANY | SOLUTION | HARDWARE | SOFTWARE | INDUSTRY SERVED | FEATURES |
|-------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| InvoTech Systems www.invotech.com | GIMS laundry, linen, uniform and multiproperty systems | Impinj readers, Motorola Solutions antennas and handheld readers, Fujitsu Frontech passive EPC Gen 2 RFID tags | GIMS software and GIMS mobile inventory software | Casinos, hospitals, hotels, stadiums and theme parks | Extensive reporting capabilities; password protection to secure information; portable reader identifies items without hand sorting |
| RFID Laundry Consultant www.laundrytechnology.com | Simple Sort | Datamars RFID readers and antennas, HF LaundryChip RFID tags | RFID Laundry Consultant software | Industrial laundry companies | Software tracks when and how often items are laundered; the “cube” feature streamlines sorting, reducing labor and errors |
| Towel Tracker www.toweltracker.com | Towel Tracker | Impinj readers, Fujitsu WT-A522 UHF RFID tags | Towel Tracker software | Fitness clubs and hotels | Solution includes a towel-dispensing unit, towel-return unit, RFID-tagged towels, two rolling carts for dispensing clean towels and two rolling laundry bins for dirty towels; automatically assigns towels to a user’s account and can be set to generate e-mail reminders asking patrons to return missing towels by a certain time and date |

Checking Services

A new GS1 standard will make it cost-efficient for retail pharmacies and distributors to verify e-pedigree data.

By Mark Harrison



WHEN COUNTERFEIT drugs infiltrate a pharmaceutical supply chain, they can endanger the safety of patients and damage the reputations of legitimate manufacturers. For several years now, identifying pallets, cases and individual packages of medicine with unique Electronic Product Code numbers (via RFID or 2-D bar codes) and tracking them from manufacture through distribution and on to retail pharmacies has been promoted as a way to make the supply chain safer and more secure.

Several pilots have demonstrated that the hardware, software and network standards, such as EPC Information Services (EPCIS) for sharing serialized event data securely in near-real time, can verify chain of custody. The EPCIS standard provides a way to capture and share physical event data—each time an EPC tag is read as it moves through the supply chain, for example. Information regarding changes of containment, such as when items are packed into cases and bound to pallets, can also be recorded as EPCIS event data.

But one hurdle has remained. Given the large volumes of pharmaceutical packages in circulation, this solution would put a huge burden on companies that must check their shipments. In my previous column, [A New Approach to Pharmaceutical E-Pedigrees](#), I introduced the concept of “Checking Services,” a way to handle serialized data verification by automating the process or outsourcing it to an accredited checking operator.

Since October 2012, the Cambridge Auto-ID Lab has been actively working on the design of Checking Services within a new GS1 technical work group. We view Checking Services as a new component within the GS1 EPC network

architecture. The goal is to standardize the interfaces, to ensure interoperability and develop robust accreditation requirements. That will let companies have a choice of providers and give them the confidence that the checks will be performed consistently and correctly.

We are just beginning to tackle the technical part of the standardizing work, and we expect more solution providers will become involved in the near future. Participation is important because technology providers will likely offer the service; just as there are multiple providers of EPCIS repositories, there will be many providers of Checking Services. Their prototypes must be well aligned with the direction of the standard and ready to meet expected legislation deadlines for electronic pedigrees.

Checking Services will be able to automatically gather EPCIS event data, then perform a number of procedures on the data to identify any gaps or inconsistencies. Companies will be able to receive summary reports of the results before they receive the physical goods, enabling them to decide which to accept and which to quarantine for further investigation, without slowing the receiving process.

This work is initially intended to support the U.S. pharmaceutical sector, which will likely need to comply with e-pedigree legislation in 2015. But Checking Services will provide a flexible framework to allow multiple checks to be selected and configured, including those which might be defined in the future in response to traceability legislation in other sectors or regions. ■

Mark Harrison is director of the Cambridge Auto-ID Lab.



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Document Your Software Deployment Design

Every RFID project needs a blueprint that details software components, interfaces and other issues.

By Ken Traub



YOUR RFID PROJECT has been green-lighted. You know where you're going to deploy the technology and what benefits you hope to achieve. The next step is for your systems integrator or in-house development team to create

a solid design document. It's as essential to your project as a blueprint is to a new home construction. Often these documents focus on the hardware. But to ensure your company will gain from the RFID data your new system collects, the design document must also address the following software issues.

Decide what data will be programmed into the tags. Some tags carry just a unique identifier, while others include a section for user memory that can be programmed with passwords or store data about tag reads for asset tracking, maintenance records or other uses. The identifier could be a random code programmed by the tag manufacturer or a standard, such as an airline industry baggage code, library item identifier or Electronic Product Code. If it's an EPC, will you use a Serialized Global Trade Item Number (SGTIN), Global Individual Asset Identifier (GIAI) or another variation? If you are encoding the tags yourself, the design should include a software component that assigns unique IDs and tracks available numbers in a database.

Keep track of all software components with a block diagram. The block diagram should include all components at the business level, such as enterprise resource planning, warehouse management and inventory systems, as well as reporting dashboards. Also include any components deployed in the

field, such as middleware and software embedded in mobile and fixed readers.

Define each interface between the block diagram components. This will ensure you are collecting all the data needed to support your business goals. Make sure these interfaces can support changes as your business evolves. Can data elements be added without disrupting operations? Each interface should be extensible via a documented mechanism.

Also be sure the data flowing in each part of the block diagram is appropriate for that layer. Close to the readers, the data may be low-level and designed to exploit a particular tag hardware feature or reader command. Closer to the enterprise applications, the information should become more independent of the data-capture technology. A good test is to ask if a change in data-capture technology would imply a big change to the information at the enterprise level. If so, it's a sign that the software design is not layered properly.

Consider standards. They can make your design more resilient to changes in requirements and allow you to choose hardware and software from different vendors. Relevant standards include the Low Level Reader Protocol (LLRP) to talk to your readers, Application Level Events (ALE) to bridge readers to data-capture business logic, and EPC Information Services (EPCIS) to bring events to the enterprise in a technology-independent way. ■

Ken Traub is the founder of Ken Traub Consulting, a Mass.-based firm providing services to software product companies and enterprises that rely on advanced software technology to run their businesses. Send your software questions to swsavvy@kentraub.com.



Don't Just Automate—Innovate!

RFID can do much more than speed up existing processes.

By Bill Hardgrave



IN MY COLUMN, [Move to OHIO](#), I discussed a common mistake retailers make: substituting RFID for bar-code technology and keeping the same manual processes in place. But automating processes to reduce mistakes and

improve efficiencies is just the first step. To truly benefit from RFID, retailers must move beyond incremental improvements and use the technology to introduce innovations.

Take Retailer X, for example, which wanted to better understand its customers' needs and shopping habits. A few years ago, Retailer X created a process to gain insight into the clothes customers tried on but didn't purchase. Any items taken to the dressing room were held there until the end of the day, at which time a store associate would bar-code scan every item. It was a laborious process that usually took a couple of hours. In addition, the retailer was missing potential sales opportunities, because those items were kept off the sales floor.

Recently, Retailer X conducted its first RFID pilot to improve inventory accuracy. But it used the same process to monitor items left in the dressing rooms. Instead of bar-code scanning the items, a store associate used an RFID handheld reader. This took significantly less time—a few minutes rather than a couple of hours—but that was the extent of the improvement. The same data was collected as before.

The retailer missed a great chance to create a whole new process that would have delivered more valuable data and sales opportunities. If, for instance, the retailer had installed RFID portals near the dressing rooms, it would be able to monitor all items going into and coming out of the dressing rooms—and

any items not purchased could be returned to the sales floor. That data could be married with point-of-sale data, so the retailer could determine the conversion rate of items taken into the dressing rooms—impossible to know with the existing process.

As an alternative to portals, RFID antennas could be installed in each dressing room, providing the opportunity to understand the “basket” of items customers consider. An interactive display, sometimes called a magic mirror, could be added to each dressing room. It could read the RFID tags on the items the customer tries on, and then display related information, such as other available colors and sizes, accompanying accessories or garment care instructions.

There are many more examples, but I'm sure you get the idea. Using RFID opens up an amazing number of possibilities—but only if a retailer is open to viewing the technology as a way to do things that have been difficult, if not impossible, to do with existing technology. Sure, you can use RFID to make incremental improvements, but don't let your thinking go there immediately. It's time to think process enablement, not just process improvement. ■

Bill Hardgrave is the dean of Auburn University's College of Business and the founder of University of Arkansas' RFID Research Center. He will address other RFID adoption and business case issues in this column. Send your questions to hardgrave@auburn.edu.





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The Crisis of Consumption

Information can save us from eating, drinking and powering our way to extinction.

By Kevin Ashton



SINCE I WAS BORN in the late 1960s, the world population has doubled. Back then, the average person lived to be 52 years old. Today, the average lifespan is 70. With more of us living longer, our consumption of food, water and other resources is increasing. Food intake, for example, was 800,000 calories per person per year in the late '60s. Today, the average person consumes more than a million calories annually. The amount of water each of us consumes—to drink, bathe and grow all that food—has doubled: from 160,000 gallons per year to nearly 330,000 gallons.

Despite the rise of the Internet and the decline of the newspaper, our use of paper has more than doubled since I was born: from 55 pounds per person annually to 120 pounds. We have more energy-efficient technology, but we also have more technology overall, and more of the world has access to electricity. We used 1,200 kilowatt hours per person per year in 1968, and today we each use 2,900 kilowatt hours. Our consumption of plastic has increased more than fivefold, from 14 pounds per person per year to 75 pounds.

When I was born, climate change was not an issue. Today, no matter what oil-sponsored shills would have us believe, climate change is both real and dangerous, and it is a consequence of our crisis of consumption. Climate change threatens our ability to feed, water and otherwise care for the world's growing population.

This crisis of consumption is the result of good things. More of us are living longer, healthier lives, with enough to eat and drink. Technology helps heal us when we are sick, warm us when we are cold and cool us when we are hot. We're not going to select suffering instead of comfort to avoid the distant danger of extermination from overconsumption.

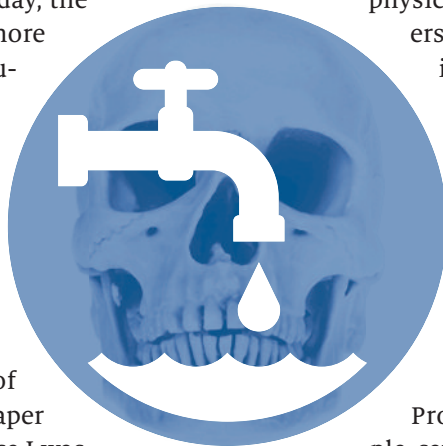
We cannot consume our way out of our consumption crisis. The answer is, and must be, information. Information is barely

physical; it requires only computers, cables and a bit of electricity. A lack of information about the physical world is one big reason we are in this mess in the first place. We cannot clearly see what we have and what we are doing with it—and that results in massive amounts of waste.

The U.S. Environmental Protection Agency, for example, says leaks account for an average of 10,000 gallons of water wasted in the home every year—enough to fill a backyard swimming pool. Most of us do not know how much water we use personally—or how much of that water we waste, and on what. We can say the same of anything else we consume. If we had access to that information, most of us would waste a lot less.

The system that will capture that information is the ubiquitous network of RFID and sensor technologies called the Internet of Things, which we are building now. And we had better hurry up. By 2100, the world population is expected to double again. ■

Kevin Ashton was cofounder and executive director of the Auto-ID Center.





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