

# A game of tags

## Winning and losing with RFID

*It's fair to say that "Peak RFID" in supply chain occurred just after 2005, the year that retail giant Wal-Mart began requiring its suppliers to have the tags on inbound shipments. Since then the technology has not proved to be the hoped-for inventory-control panacea. Emily Atkins looks at the promise and perils of RFID over the past 10+ years.*

When Wal-Mart made it mandatory for suppliers to tag incoming product, the supply chain world paid attention. If the big brains running that massive supply chain operation had determined that RFID (Radio Frequency IDentification) was the way to achieve inventory visibility, then maybe they should too.

Companies quickly hopped on the new technology bandwagon, hoping its promise would bear out. But while RFID has been influential in supply chain management and is key to current market trends, there are places where it just doesn't add value.

### A long history

RFID goes way back, to around the time of WWII. Radar operators in the German air force discovered that if incoming planes rolled on approach, the radar signal reflected differently, effectively allowing the pilots to let the base know they were 'friendlies' about to land, not enemy planes on the attack.

After the war scientists saw further potential in radio waves, and developed small radio transponders that could transmit a signal either independently—pow-

ered by a battery (now known as active RFID)—or passively, only responding when hit by a signal (passive RFID). In the 1970s the technology was further developed and commercialized for numerous applications, including anti-theft tags on expensive retail merchandise, proximity cards to unlock doors and tracking whether farm animals had received proper doses of medication. These RFID applications are ubiquitous now.

In the early 1990s IBM developed an UHF (ultra high frequency) RFID system that could be read from as much as 20 feet away. Although it did some trials with Walmart, IBM did not commercialize the technology and sold the patents to Intermec, which was a bar code provider at the time. Intermec developed it, but was unable to get much traction thanks to the high costs of the product and the lack of common standards.

In the late 1990s RFID began to blossom into a supply chain technology, largely thanks to two MIT researchers, David Brock and Sanjay Sarma. Brock and Sarma worked at the university's newly established Auto-ID Center, which was created and funded by the Uniform Code Council, EAN International, Procter & Gamble and Gillette.

Until their innovation RFID was cumbersome and the tags needed to be quite large to carry enough data to be useful. Brock and Sarma proved RFID tags could be made small enough to be used for tracking inventory in the supply chain if they were simply encoded with a serial number. That number linked back to the full information about the object the tag was attached to in a database.

### The Internet of Things

Thus the Internet of things was born—RFID-enabled items—from pallets, to containers to individual products—could communicate their whereabouts to a network, which could then transmit that data anywhere it needed to go. A tag on an inbound pallet would key back to the database, letting supply chain managers know exactly what was on it and where it was.

In the first few years, RFID technology was much hyped, benefiting largely from the Wal-Mart mandate that drove its suppliers to quickly adopt “slap and ship” applications. These were relatively easy-to-implement passive solutions that used self-generated printed labels embedded with tags and required readers to be strategically located in the warehouse to ping them as tagged pallets or cases passed by.

At the time, analyst firm Gartner predicted that by 2012 most enterprises would have to redesign supply chain processes thanks to RFID's influence. Its benefits over older data capture methods, such as bar-code scanning, were its ability to automate what was previously a manual process of scanning codes on each item needing tracking.

Pallets full of tagged cases could be scanned all at once, automatically, reducing labour requirements, speeding up receiving, improving visibility and increasing the accuracy of inventory management. Benefits included the ability to reduce inventories by as much as five percent; up to 7.5 percent reduction in labour; stock-outs cut by as much as seven percent of revenue; increased inventory accuracy; and automatic replenishment.

Envisioned applications ranged from tracking consumer goods through the supply chain, to asset management, origin tracking and product recall.

### Murky and unclear

But while at the time RFID was touted as “the must-have technology for the next five years” even in this magazine (“Radio Daze: Is RFID making your head spin”, *MM&D* July-August 2004), it was not a good investment for most. The ROI for a slap-and-ship scenario was considered to be negative for plant or warehouse, unless the opportunity cost of losing a client or incurring penalties because of failing to comply with a mandate was factored in.

In 2007 a Computing Technology Industry Association (CompTIA) survey found that while 84 percent of its member resellers and service providers were offering or planning to offer the tech for sale, uptake was dismal. The association noted: “...rosy forecasts have given way to the reality of dealing with a technology whose deployment has been challenged by equipment and tagging costs, murky and unclear return-on-investment for supply chain applications and a skills shortage.”

Additional concerns included privacy issues, lack of standardization and the paucity of developers creating end-to-end solutions. On top of that, it was immediately recognized that the amount of information created by RFID tags would overwhelm existing ERP and WMS systems, forcing the development of better more robust methods for handling the pending “big data” tsunami.



**The technology works for apparel because of the wide range of colours, sizes and styles, which are incredibly hard to track through the supply chain any other way. Stock accuracy can be as high as 95 percent, minimizing costly out of stock situations, which in the world of ‘fast fashion’ can be deadly to a brand.**

### The promise

As with any new technology, RFID has areas of tremendous success and places where it may not be as functional. One success story is in the apparel industry, where research firm IDTechEx predicts 4.6 billion RFID labels will be used in 2016. And that's a market penetration of only 15 percent.

The technology works for clothing because of the wide range of colours, sizes and styles, which are incredibly hard to track through the supply chain any other way. Stock accuracy can be as high as 95 percent, minimizing costly out of stock situations, which in the world of ‘fast

fashion’ can be deadly to a brand.

Global retailer Zara offers an example of the successful implementation of item-level tagging for fashion. The company is able to re-use chips by embedding them in removable security tags, saving millions of dollars in costs, while speeding up inventory taking and enabling instant replenishment.

### Pitfalls

And yet inside most large DCs and warehouses today you'll still see bar codes being scanned. RFID has not yet achieved the wide-

spread adoption that early analysts expected, largely thanks to its continuing high cost. Nonetheless many optimistically believe the technology can be applied in a variety of ways. Unfortunately, they are not always right.

One area where RFID is not living up to the promise seems to be in the increasingly important function of yard management. In 2005 a report on “The pros and cons of RFID in supply chain management” by two University of Wollalong, Australia researchers glowingly anticipated its application in yard management. The report correctly notes that large amounts of capital are tied up in yards and need to be efficiently managed.

“It is often difficult for these organizations to know what goods are on which truck without first unloading the truck, which also makes it complicated to direct the truck to the right drop off or parking yard location,” the report states. “RFID tags can be placed on truck trailers and RFID readers placed at entry and exit points of yards allowing management systems to log the incoming and outgoing data in real-time. The incoming truck driver can then be directed to the most efficient drop-off location. Items are unloaded faster with the yard being managed in the most resourceful manner, maximizing an organization’s utilization of the asset and order fulfillment capabilities.”

### Theory vs. reality

It’s lovely in theory, and with ever-larger DCs and third-party logistics operations with fantastic volumes of vehicles arriving and departing each day, the ability to track and monitor their whereabouts with pinpoint accuracy would indeed make operations smoother and less costly.

However, reality looks a little different.

For James Noseworthy, a ‘busy’ yard means keeping track of between 1,200 and 1,800 trailers at any one time at one of the biggest DCs in North America. He is a senior process improvement leader with 3PL ES3, and it’s been his job to make sure that all those trailers are where they need to be when they need to be there.

He took over the systems at the DC in York, Pennsylvania when his company acquired it. They were using RFID for real-time location of trailers, in a process where big tags were affixed to the incoming boxes.

The problem, Noseworthy says, is the variety of equipment and the nature of the tags themselves. The tags don’t always fit in the right place and end up obscured, or they fail, or their range dwindles as the batteries lose power. Ultimately the result was the accuracy of locating the trailers was low.

“You don’t know where they are in the yard and it could take hours to find them,” he says.

“Somewhere in the world RFID seems to be working very well, but when you put it on a sixty-foot metal box, I just don’t see it at this point being reliable enough to be the only thing out in the yard,” Noseworthy says.

Likewise for Jaret Willis, a project manager with Penske Logistics in Ontario, the use of RFID in the yard has not increased efficiency. In fact, he notes that in his experience, RFID has increased costs, not only through the direct expense of the technology itself (tags and readers) but also in the time needed to manage tags as well as inefficiencies created when drivers believe they can leave a trailer anywhere since it’s got a tag on it and they think it can be instantly found.

“Drivers tend to park wherever is most convenient, rather than follow the instruction given to them,” he says.

Both managers believe that RFID is just not accurate enough in this context to reliably keep track of containers in the yard.

### Technology can’t fix disorganization

It’s a point that Greg Braun finds interesting. His company, C3 Solutions, produces yard management solutions that can integrate with RFID—or not—depending on a client’s specifications.

“No one can deliver 100 percent accuracy,” he says. “And without that you need a backup plan, an alternative in case the technology fails.”

It’s unfortunate, he notes, that an RFID solution is brought in to help—to automate manual processes—but in reality the problem is simply disorganization. If you apply general business logic to the problem of yard management, “that initial problem you had goes away substantially,” Braun adds.

It takes smart process planning. Noseworthy took seven months to rewrite the processes for his yard, seeing what worked and what didn’t, fine tuning the orchestration of yard jockeys, pad locations, improving lighting, and training staff. In the end, just by improving processes, he doubled moves in the yard from four per hour to almost eight.

“Any errors or exceptions that do occur are far easier to identify and resolve with strong process and good focus on compliance and individual accountability, rather than relying on the false sense of security created by tag tracking systems,” Willis says.

### A single source of truth

Thanks to Wal-Mart’s early adoption, RFID was clearly over-hyped in the early 2000s. Its great promise of streamlining inventory control across the supply chain has just not materialized as expected.

Demand for the technology is growing, however, and as costs decline there will no doubt be increasing uptake. Additional sectors will find ways to make use of what can be an astonishingly useful tool. In 2015, the total RFID market was worth \$10.1 billion, up from \$9.5 billion in 2014 and \$8.8 billion in 2013, according to IDTechEx. In total, IDTechEx expected that 8.9 billion tags would be sold in 2015 and 10.4 billion in 2016. It’s expected to reach \$13.2 billion in 2020, with most of that growth is from passive UHF RFID (the cheap tags used for fashion).

Oracle analyst Melanie Massel told *MM&D* back in 2005, “In the long term, RFID turns the supply chain into a powerful, demand-driven fulfillment system that links customer behaviour back into inventory planning, logistics and even product design.”

E-commerce operations are increasingly adopting the technology, particularly in the apparel industry, as the Zara example demonstrates. Online shopping, with its fast pace, immediate deliveries and pinpoint-accurate inventory information offers plenty of ways to utilize for the technology.

The true test, as with any technology, is the ability to use it to make a profit. As Massel said 11 years ago: “The value of an RFID system will only be realized by an organization if it can use the information RFID provides to gain competitive advantage—through performing analytics on relevant data, streamlining and integrating RFID information into business processes and empowering decision makers with information to make timely and profitable decisions from a quality, single point of truth.”