

An advertising supplement to October 2005

# Manufacturing Business Technology<sup>®</sup>

IT FOR MANUFACTURING EXECUTIVES

## Walk, run, or ride

Pacific Cycle wheels  
its way to RFID gains

**Ed Matthews**, IS director, says  
what's important is getting started:

- Understand the technology
- Perform pilots and testing
- Integrate with the enterprise
- Work with customers and suppliers

# RFID, realistically speaking

Pacific Cycle, home of Schwinn, saw the Wal-Mart mandate as opportunity, not obligation; enterprise infrastructure delivers supply chain benefits

By Frank O Smith, The Writing Group

**P**acific Cycle, the largest bicycle supplier in North America, looked upon Wal-Mart's mandate to its top 100 suppliers to RFID-tag inbound cases and pallets not as an obstacle to be overcome, but rather as a business opportunity.

"It was a chance to engage with an emerging technology while changing for the better the way Pacific Cycle does business," says Ed Matthews, director of information systems at the Madison, Wis.-based company.

Yet meeting Wal-Mart's tactical requirements, which Pacific Cycle did three months ahead of the January 2005 deadline, was just the starting point in the bike maker's successful efforts to make strategic use of RFID technology (see sidebar, *What is the Wal-Mart mandate?*).

"Our goal was a highly scalable, RFID-based system integrated with our existing enterprise landscape," says Matthews. "Having that would immediately eliminate several manual steps in outbound delivery. We'd also have more visibility of tagged inventory in the retailers' supply chains, leading to reduced inventories and charge-backs."

RFID technology gives Pacific Cycle better understanding and management of its demand and fulfillment streams, with further benefits to follow as more supply chain partners take to the technology. More recently, Pacific Cycle turned its sights to China, where its manufacturing operations are located, to get RFID benefits from the supply side as well.

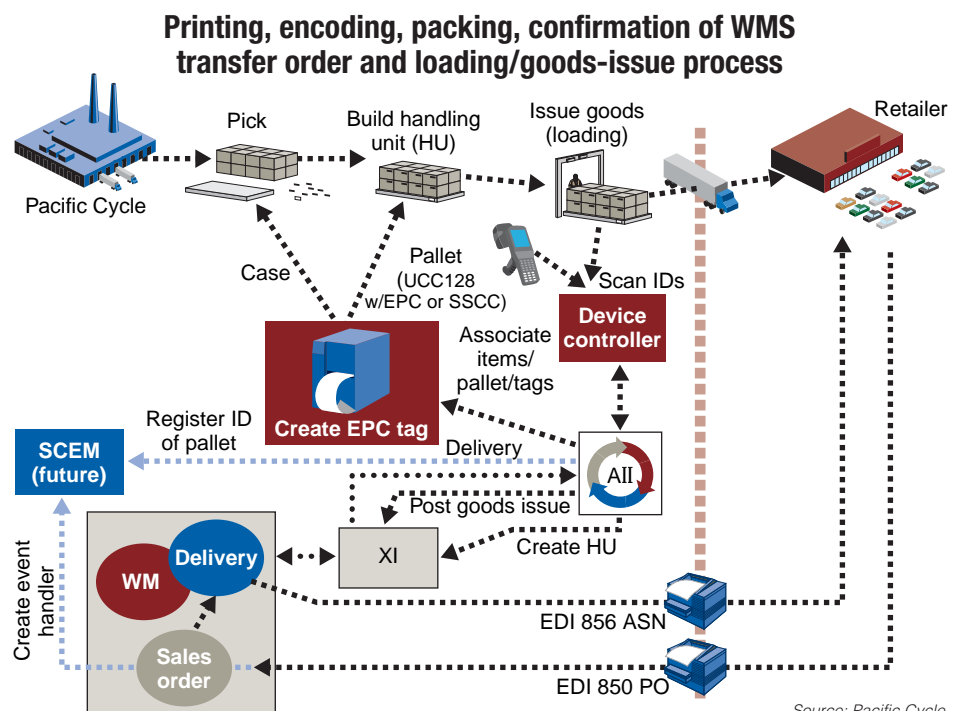
Pacific Cycle is a division of Dorel Industries. The company designs, markets, and distributes recreational products and leading bicycle brands—including Schwinn, Mongoose, GT, and Roadmaster—through mass-market

## What is the Wal-Mart mandate?

**Wal-Mart**, the world's largest mass-market retailer, announced in June 2003 that it would require its top 100 suppliers to RFID-tag all cases and pallets shipped to three major distribution centers in Texas by January 1, 2005. Each tag would transmit a unique electronic product code (EPC) containing identifying information, including the manufacturer and specific product identifier, such as to facilitate receiving and processing of inbound goods.

Wal-Mart receives roughly one billion cases per year from its top 100 suppliers, which include companies such as Procter & Gamble, Johnson & Johnson, Kimberly-Clark, and Kraft Foods.

In addition to the top 100 suppliers, 37 more suppliers signed on to participate in the initial program. Wal-Mart subsequently announced that all shipments from all suppliers must be RFID-enabled by the end of 2006, making it conceivable to track the more than 100,000 products that pass through a typical Wal-Mart retail outlet.



Source: Pacific Cycle

The most immediate benefit of integrating RFID technology into Pacific Cycle's enterprise architecture was automation of several outbound delivery processes, including warehouse transfers, customer shipments, and billing.

retailers such as Wal-Mart, Target, and Toys “R” Us, as well as through independent bicycle dealers and sporting-goods retailers.

Every day, manufacturers decide whether to adopt the latest technology or await a more sure determination of their future prospects. Pacific Cycle examined the issues, had confidence in its approach and supporting technologies, and reaped significant benefits from RFID technology.

Because the company is ahead of the RFID technology adoption curve—one characterized by broad interest leavened with caution when it comes to full-scale deployments—Pacific Cycle had to devise its own road map to RFID realism.

SAP, the world’s most successful enterprise software vendor; **PEAK Technologies**, an integrator of automatic identification and mobility solutions for SAP; and **Zebra Technologies**, a specialty printing solutions vendor, were—and are—Pacific Cycle’s trusted partners in the project.

### Initial efforts, project scope

Pacific Cycle sells its make-to-order and make-to-stock products through multiple distribution channels. Most of the production volume goes to mass merchants, while the majority of the SKUs are for independent bike dealers. It services these sales channels from two U.S. distribution centers, as well as FOB Orient, POE west coast, and worldwide dropships to 100-plus distributors in more than 25 countries.

At the two major distribution centers in Olney, Ill., and Vacaville, Calif., customer orders are picked and loaded on trucks for hundreds of daily shipments. Bikes move in cartons from manufacture to retail storage, where they’re assembled as needed for retail display.

Pacific Cycle launched its RFID initiative in early 2004. As is well known, an RFID tag is encoded with an electronic product code (EPC) that uniquely identifies the object to which it is attached. The encoded chip is identified by an RFID “reader.”

A pilot program at the Olney warehouse encoded Class-1 tags that were applied in slap-and-ship fashion to cartons ready for shipment. To begin, only four products were tagged, but the project evolved over time to include 50 products, and between eight to 15 weekly shipments.

“The most important thing with RFID is to get involved,” says Matthews. “You don’t have to spend millions, but you need to start. There’s a lot to learn.”

The pilot program let Pacific Cycle gain knowledge and hands-on experience needed to master an RFID application’s physical environment. The ability to read a tag can vary dependent on its environment. Factors to con-



“We were able to create an end-to-end, integrated architecture,” says Ed Matthews, director of IS at Pacific Cycle. “There are no third-party pieces of middleware that had to be shoehorned in to make it work.”

sider include the type of material the tags will be placed on—wood, paper, or metal—and how far the readers will be from the tags when it’s time for data to be transmitted (see sidebar, *RFID’s physical requirements*).

### Beyond the mandate

Soon after the original pilot was completed, Pacific Cycle quickly realized although it had gained significant understanding of RFID dynamics, it had not attained the automation and transparency that RFID promised.

“We weren’t doing anything with the data,” says Matthews. “The information went into a database and just sat there.”

### Areas immediately impacted; benefits received

#### Functions automated at Pacific Cycle by RFID technology:

- Warehouse transfer-order confirmation
- Post goods issue to customer order
- Advance ship notification
- Goods receipt by customer
- Billing

#### Eventual benefits following from RFID technology implementation:

- Accurate, certified order fulfillment
- Improved sales with reduction of stock-outs
- Reduction of discrepancies needing reconciliation
- Improved sales management with retail stock-movement visibility
- Overall improved efficiencies

As RFID deployments scale from pilot to full production, the process for transporting and translating RFID data flow to upstream business applications grows more complex as the number of reader points and kinds of devices escalate exponentially.

Pacific Cycle chose SAP RFID technology with the aim of scaling the RFID pilot project, reducing total cost of ownership by receiving immediate supply chain automation benefits, and leveraging existing SAP investment for further gains across global operations.

"We knew SAP was in it for the long haul—and committed to the future development of RFID," Matthews says.

SAP RFID technology is not an application by itself, but rather a composite of applications necessary to allow companies to effectively incorporate RFID data into business processes. A core component is the SAP Auto Identification Infrastructure (AII), which closes the loop in acquiring real-time RFID data, converting it to actionable business information, and automating all associated transactions and processes. In association with SAP Exchange Infrastructure, SAP Business Warehouse, and SAP Event Manager, the vendor offers a complete framework to manage large volumes of streaming RFID data, EPC commissioning, complex event management, business process validations, internal and external reporting, and integration to back-end SAP applications. Leveraging the SAP NetWeaver platform, SAP RFID technology enables an adaptive supply chain network by creating a real world-aware enterprise.

The need to move beyond slap-and-ship is key if manufacturers are to receive substantial benefits from RFID technology. At least three issues are involved. The first is

having a scalable and flexible infrastructure that can model the business process. Second is the ability to automate the associated business transactions. Finally, the ability to translate RFID-related visibility into business value is key.

The tangible opportunity is to gain real-time supply chain visibility through integration of tag information with the enterprise system, allowing for dynamic rebalancing of inventory flows through production and distribution channels.

With scanned RFID data immediately available within its SAP enterprise system, Pacific Cycle has automated its warehouse operations. There, inventory movements generate transactions without human intervention. In addition, real-time alerts are communicated to warehouse operators if errors have been made.

"We wanted to tie all the RFID data back to mySAP to improve shipping and receiving," says Matthews. Doing so allowed early exception warnings, positive proof of deliveries, and serialization of products for returns or trade promotions.



PHOTO COURTESY ZEBRA TECHNOLOGIES

*Zebra Technologies' R110Xi printer supports SAP integration and RFID capabilities. It is XML-enabled, allowing direct linkages to other systems without middleware.*

## RFID's physical requirements

*Fine-tuning equipment for unique warehouse environments based on RFID signal-wave physics is typically first step in getting RFID value*

Placement of tags and readers can be crucial in best use of RFID technology. Ed Matthews, director of IS at **Pacific Cycle**, and the manufacturer's implementation team sought expert advice from **PEAK Technologies**, and subsequently worked with the technology within Pacific's own unique environment. An initial repositioning of readers and antennas boosted read rates from a dismal 60 percent to better than 90 percent, as follows:

- Readers were moved from the top of the dock doors down to the sides to get more consistent reads.
- Reader power was tweaked for a range that captured only tagged product destined for imminent shipment.
- For the same reason, it was determined space around the doors couldn't be used as a preliminary inventory staging area.
- Forklift drivers monitored operating speeds to improve read rates as pallets moved through the doors.
- Workers doing slap-and-ship were cautioned against walking around with a fistful of tags in hand while within scanning range of readers.

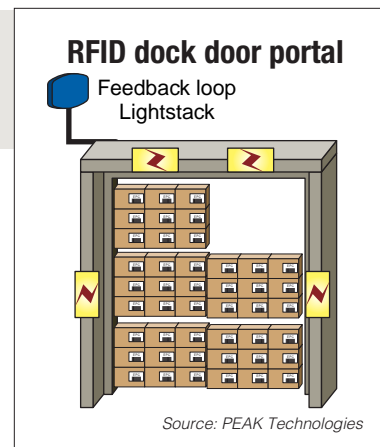
"We adjusted and changed things as we went along," Matthews says. "We

changed vendors to get better reads, going from Class 1 to Class 0+ tags." All equipment in place will be able to handle Gen 2 tags with appropriate upgrades of firmware.

Read rates continue to improve, with the goal of 100-percent accuracy.

"If we turn them up all the way, we're close to a 100-percent read rate—but that includes everything

to the back wall of the warehouse," adds Matthews. Power is set at 25 percent, which delivers about 80-percent read on movement Pacific Cycle wants to track and record. The company is looking to use shielding around the dock doors to allow increased reader power for complete read of targeted inventory.



*Pacific Cycle experimented with reader placement and power to attain the best RFID read-rate possible.*



*“One of the most important things you should do when beginning an RFID project is to pick business partners — not just vendors.”*

*— Ed Matthews,  
Director, IS, Pacific Cycle*

**The path to RFID success isn't always easy to navigate.**

**Great partners can help you find your way.**

Do you have a clear path to RFID success?

Trust the experience and agility of Zebra Technologies and PEAK Technologies — the leaders in SAP® RFID solutions — to get you safely up to speed.

PEAK and Zebra are long-time SAP business partners with proven RFID success. Pacific Cycle selected PEAK and Zebra for their SAP Auto-ID Infrastructure (RFID) implementation. As market leaders, Zebra and PEAK have the experience, products, and SAP integration services to get your RFID project up and rolling. Why trust us? Just ask Pacific Cycle, one of the fastest growing consumer product goods companies in the United States... they did.

To find out why SAP customers choose PEAK and Zebra as their RFID partners, or to request your free Pacific Cycle RFID video and case study, call +1-877-219-4878, email: [info@peaktech.com](mailto:info@peaktech.com) or visit [www.peaktech.biz/peakzebrarfid](http://www.peaktech.biz/peakzebrarfid).



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Pacific Cycle was already an SAP shop and familiar with SAP technology. With needed skills already in-house, training and implementation costs were reduced. In addition, SAP long-term support and service was well understood and common practice within the organization. There was no need to create or maintain interfaces. The entire project, from integration to business-process automation, was eased.

The project was a collaborative effort—with a team made up of representatives from Pacific Cycle's IT warehouse operations organization, SAP Consulting, and PEAK Technologies—an SAP partner and an expert in RFID technology.

Architecture scalability was enhanced with PEAK Technologies' Automation Controller, which facilitates greater ease of RFID integration in complex environments characterized by a high mix and number of devices and distributed applications across multiple facilities. The PEAK Automa-

### Product technologies employed

- mySAP enterprise system
- SAP Auto-ID Infrastructure (SAP AII)
- SAP NetWeaver XI
- SAP NetWeaver application server
- WebSAPConsole for handheld devices
- SAP Business Warehouse—analysis/reporting
- Microsoft SQL Server
- Dell servers running Microsoft Windows NT
- Zebra R110Xi smart label printer/encoder
- Symbol Technologies/Matrics readers
- PEAK Automation Controller
- Symbol Technologies/Matrics Class 0+ RFID tags

tion Controller is built on the SAP NetWeaver platform for a unified look-and-feel within the enterprise architecture, and deployed on the same server with SAP AII.

Printer technology used to encode and issue RFID tags never fails to impress people. That's because the wafer-thin tags are embedded in what for all intents and purposes seems like a standard packing label that also carries printed matter and even bar codes as alternative means of unit identity.

As its use of RFID technology grew, Pacific Cycle upgraded to Zebra Technologies' R110Xi printer, based on Zebra's close development partnership with SAP, support for SAP AII, and the printer's advanced RFID capabilities. Pacific Cycle especially liked that the printer system was XML-enabled, thereby allowing direct linkage with SAP AII without integration middleware.

The Zebra Technologies Xi series smart label

## Make RFID strategies actionable

*Rules of thumb for realistic, ROI-focused projects*

**P**acific Cycle, Madison, Wis., says RFID technology gives it closer connections with customers and suppliers, automates logistics transactions, and allows keen insight to supply and demand. But to get there, the bike maker had to learn the technology and how to get best results from it.

First and foremost, says Ed Matthews, IS director, look beyond mandates and simple slap-and-ship to the technology's full ROI potential. "Slap-and-ship is merely the cost of doing business. By itself, it'll never produce ROI," he says.

**Launch and learn:** Start—start small, even—but start. Form a cross-functional team, and pilot the technology to gain experience as you move forward.

"If you get in early, if you're learning along with your customers, they're going to be gracious," says Matt Ream, **Zebra Technologies'** senior manager for RFID solutions. "If you wait, they may not be so tolerant."

**Select key partners early:** "In these projects, there are three kinds of information from the client's perspective," says Tom Barber, RFID solution manager for **PEAK Technologies**. "There's what they know they know; what they know they don't know; and what they don't know they don't know. It's the partner's job to inform them about what they don't know they don't know, which, if it happens earlier on, saves a lot of intense effort down the road."

PEAK Technologies understands all facets of RFID technology, is an SAP-centric solutions provider, and, as an international company, is well-positioned to support Pacific Cycle with its RFID rollout in China.

**Develop a comprehensive blueprint:** Map the parallel business process flows of physical inventory and its associated information. Assign responsibility to team partners for managing integration and implementation of the RFID

components and infrastructure highlighted in the blueprint.

"Taking the time to do a comprehensive blueprint up front was one of the key reasons the Pacific Cycle project was so successful," says Eric Domsik, director RFID Solutions, **SAP**.

**Evaluate device-management options:** A fully deployed RFID infrastructure may involve hundreds of devices, making device management critical to success. Understand the merits of direct connection via XML-enabled technology, including ease of implementation and reduced cost, which can be particularly useful with key components such as printers.

"Device controllers also enforce business rules and provide logic at the operations level that higher-level software can't deliver," says Barber. "Business software can't monitor and regulate the most effective speed of forklifts loading product for shipment. It also doesn't have the logic to effectively filter repeat tag readings that occur as tag signals are inadvertently read multiple times as they pass in proximity of readers."

**Pilot early and often:** A multiphase implementation strategy is an opportunity to pilot and test components. Pilots can include a laboratory phase; off-line phase, stand-alone phase; production stand-alone phase; and full, integrated production phase.

**Expect the unexpected—from obstacles to opportunities:** Being aware exploits the value of several earlier strategy elements, including a "launch-and-learn" approach, and piloting early and often.

**Plan for flexibility and scalability:** RFID technology and standards are evolving. Be sure what you deploy has the same flexibility to adapt—and that it can scale as you move from controlled pilot to full deployment.

printer/encoder verifies tag viability before and after encoding with a unique EPC. The Xi series uses a software-based UHF radio-frequency controller, rather than one that is "hardwired." This permits flexibility and upgrading as RFID technology matures, new protocols are added, and Gen 2 tag usage becomes widespread.

## Additional value

Once live at the Olney warehouse, Pacific Cycle quickly extended use of RFID to its second distribution center in Vacaville.

"Work at the second warehouse went remarkably well," Matthews says. "We understood the technology. Printers, software, and readers were changed during the first warehouse implementation. With the second, everything stayed consistent. We were up and running in a couple weeks."

The second customer to receive tagged product was, like Wal-Mart, a major national mass-market retailer. "All we changed was the printer label format," Matthews says.

Confirmation of warehouse transfers and shipments to customers was automated, as was automating customer shipment notification and billing. "As more retail customers become RFID-enabled, we'll get automatic verification of goods received, eliminating discrepancies that require time-consuming and costly resolution," says Matthews.

Other retail customers will benefit from Pacific Cycle's initiative as well, wholly dependent on becoming RFID-enabled. One unique opportunity for Pacific Cycle comes with detailed visibility into Wal-Mart's handling and display of the bicycles.

This involves Pacific Cycle, on a pilot basis, opening select containers of certain popular bicycles to place the RFID tag inside the plastic warranty bag affixed to the bike.

Though labor-intensive, this extra step keeps the tag with the bike as it goes onto the display floor. This is important because usually only one or two units of a model are put on display at a time. If not immediately replaced when purchased, a unit's absence might as well be a stock-out from the next customer's perspective, even if another unit is in the storeroom.

"We didn't have visibility into what was happening in Wal-Mart's back room," Matthews says. "We lost that when the bike was taken out of its tagged container. Half our expected ROI will come in knowing what the retailers are doing."

## A look ahead

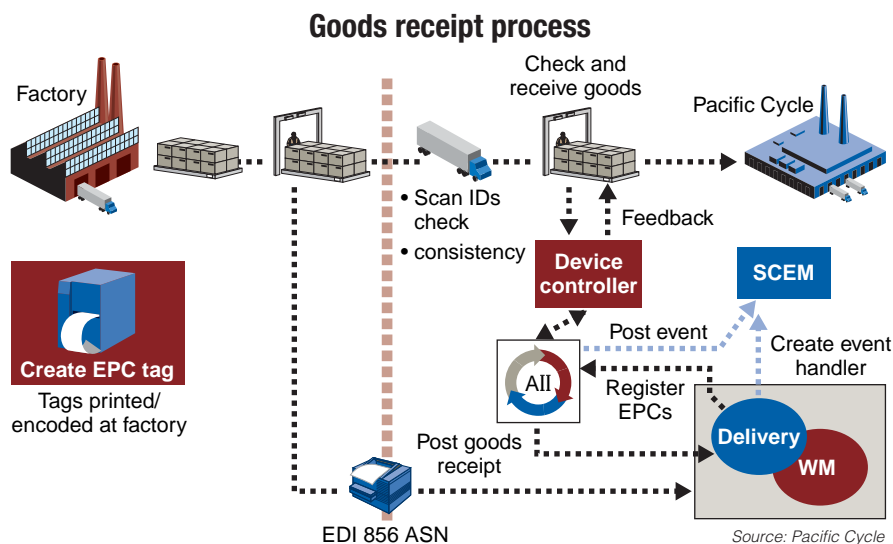
"This is a unique implementation," continues Matthews. "We were able to create an end-to-end, integrated architecture that makes total use of SAP-centric solutions. There are no third-party pieces of middleware that had to be shoe-horned into the infrastructure to make it work."

The next big step for Pacific Cycle is to move RFID into manufacturing. Says Matthews, "We already send printed tags to China to apply to pallets and shipping containers."

Full deployment on the supply side depends on how rapidly China embraces RFID, adopts standards like EPCglobal's Gen 2, and develops a capable RFID infrastructure. Having tags affixed to bicycles in China, rather than to cartons, "will enable automated inbound receiving at our warehouse," says Matthews.

Pacific Cycle expects a one- or two-percentage point improvement in retail sales once its entire customer network is RFID-enabled. With distribution channels enabled for end-to-end visibility, Matthews anticipates a 10-percent drop in overall inventory needed to service customers.

A big payback will come from reducing costly deductions based on discrepancies in shipment quantities. Says Matthews, "Our studies show once we get this fully operational, we're likely to see a 20-percent savings, which is really significant." ■



Tagging goods shipped to Pacific Cycle by its contract manufacturers will automate inbound receiving at the warehouse.

For more information

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