

**The global economic crisis is driving the automotive industry to adopt RFID to cut costs and improve efficiencies in the manufacture and distribution of cars—and to embrace standards to provide visibility in the global supply chain.**

By Elizabeth Wasserman

Feb. 1, 2010—In June 2009, the world watched as General Motors filed for bankruptcy protection and took steps to become a leaner company—closing facilities and cutting jobs. Behind the scene, the Detroit-based auto giant also participated in a weeklong RFID pilot that tracked shipments of headliners—the foam-backed fabric adhered to the interior roof of automobiles—from the supplier to a GM assembly plant. An automotive industry standards group watched this test carefully, because it was designed to determine whether RFID technology could streamline manufacturing processes and reduce costs.

GM sequences its auto production so parts, such as headliners, arrive in the proper order at the assembly line. It usually tracks headliners with a combination of bar codes and paper-based sequence numbers taped to the headliners. Different vehicle models have different headliners, and an incorrect shipment throws off production and leads to costly delays.



*Daimler is RFID-tracking custom-made returnable transport items to reduce costs and improve production processes.*

During the pilot, though, the headliners were shipped in RFID-tagged containers from supplier Grupo Antolin in Lake Orion, Mich., to GM's nearby Lake Orion plant, where the Pontiac G6 and Chevy Malibu are assembled. The ultrahigh-frequency tags stored Electronic Product Codes and auto industry data identifiers, so the supplier, logistics company and automaker could track the containers and their contents. The trial found that RFID container tracking could help both GM and its supplier gain visibility into the supply chain to achieve just-in-time, just-in-sequence manufacturing.

While GM has not yet decided to move forward with the deployment, the underlying goal of the project represents a sea change in the auto industry, which for years has been reluctant to develop standards for use in tracking parts throughout the worldwide automotive supply chain. The pilot showed that two

different types of standards-based information can be carried on the same RFID tag and provide benefits for partners throughout the supply chain, says Bill Hoffman, managing director of the Hoffman Systems RFID consulting firm, who supervised the pilot for the Automotive Industry Action Group (AIAG), a U.S.-based trade group that develops technology standards for the auto industry.

As GM and other automakers retool to eke out profits during these challenging economic times, they're realizing the role RFID can play in helping them remain competitive and respond to changes in customer demand. The auto industry recognizes that RFID "is one of the things that could have helped alleviate some supply-chain pain during the economic crisis," says Michael Liard, RFID program director at ABI Research.

Many in the auto industry agree. "Demand fluctuated greatly with everything that occurred," says Morris Brown, program manager of supply chain for AIAG. "Companies had to dramatically shift their product mix from sport utility vehicles to more fuel-efficient vehicles. There were also dramatic changes in demand in response to government incentives—there were big upswings. Anything you can do to have better visibility in the pipeline can help the industry better meet customer needs."

Auto manufacturers have been employing RFID for years to replenish parts at workstations, track vehicles through the assembly process and locate completed cars in yards. Now, while they work to develop standards that will allow them to track parts in the open supply chain, they're also focusing on RFID applications that can deliver a fast return on investment by cutting costs, providing visibility into manufacturing processes and improving quality control. "Projects that they're launching have to realize ROI within 12 months," says Paul Chang, IBM's worldwide business executive for emerging technologies.

The automotive sector is expected to increase its annual spending on RFID from \$77.2 million in 2009 to \$125.3 million in 2014, according to ABI Research. Auto parts suppliers and distributors also are using RFID to improve inventory accuracy and just-in-time delivery. And some automakers and car dealers are using the technology to sell their products and services to consumers.



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### Fast ROI: Container Tracking

Container tracking is one of the most popular new RFID applications in the automotive industry, because it delivers a fast ROI. The auto industry spends more than \$750 million annually replacing returnable transport items (RTIs), including racks, totes and pallets, according to an AMR Research presentation made to AIAG members in 2005. Automakers often over-purchase RTIs, which range in price from less than \$100 apiece to as much as \$2,000 for a custom-made model. The benefits of tracking RTIs with RFID are often immediate. Automakers can reduce by 30 percent the number of containers they need to buy, says IBM's Chang.

Industry stalwart Daimler—parent of brands including Mercedes-Benz, Maybach and Smart—began tracking RTIs in 2008, as part of its plan to use RFID to improve processes throughout its global operation. In 2006, the company added RFID to its kanban parts-management system to trigger automatic replenishment at workstations. That year, Daimler also established the Test & Innovation Center in Böblingen, Germany, to study the possible uses of RFID throughout the company. In addition to RTI tracking, the RFID pilots and deployments initiated last year focused on parts replenishment, parts identification, production control and vehicle locating.

"Revolution is not the right word—it's more of an evolution, because we're using RFID in conjunction with a lot of other technologies for auto logistics and supply-chain management," says Frank Peters, senior manager for CoC Solutions & Information Services at Daimler. "We're still using bar codes

and EDI [electronic data interface] to conduct business with our suppliers and dealers. RFID is a new technology, but it's a next step. In some processes, RFID will be a big step. It also will enable some new processes we never thought of before."

Daimler is using RFID to track custom-made RTIs with completed engines between its engine assembly plant in Stuttgart, Germany, and Mercedes-Benz production facilities in Stuttgart and Tuscaloosa, Ala. Automakers have long used standard EDI technology to track engines and other large components from assembly to the production line. But RFID allows Daimler to track not only the engines but also the RTIs.

"We track the RTI with the engine on it, and we track the RTI itself on the way back," Peters says. "The

value of the RTI is one reason. We also need more than enough RTIs in the plant where we are producing the engines, because you can't set up the engine from the assembly line if there is no carrier."

Labor savings is another benefit of container tracking. When Volkswagen announced in March 2009 that it was implementing IBM's RFID container-management and middleware solution at its central logistics hall in Wolfsburg, Germany, the automaker predicted the technology would help reduce manual labor in the goods-receiving stage by up to 80 percent. The projection was based on the results of a pilot for which Volkswagen fit 3,000 shipping containers carrying sunroofs for the VW Golf. RFID interrogators were set up at the entrances to the manufacturing line, and RFID-enabled forklifts and handheld scanners were used to identify the containers and their contents.



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– Richard Green, Ubisense

And Volkswagen de México is tracking RTIs to improve spare parts distribution. The application tracks RFID-tagged containers filled with replacement parts from its plant in Puebla to VW dealerships in and around Mexico City. It has enabled the plant to lower yearly expenses associated with parts distribution by 30 percent, through reduced packaging costs and an automated shipment-verification process, according to Juan Manuel Rodríguez Flores, sales manager of Grupo Hasar, the RFID systems integrator that deployed the solution for the plant. Volkswagen de México plans to replicate the system at its parts distribution plants in Guadalajara and Monterrey.

### **Fast ROI: Real-Time Locating Systems**

Auto manufacturers and distributors continue to adopt real-time locating systems (RTLs) to improve inventory management, track cars through production and locate finished vehicles in large yards. Last year, for example, Tan Chong International, the exclusive distributor of Nissan vehicles in Singapore, deployed an RTL to track up to 900 cars in a four-story facility, allowing it to process vehicles in one-tenth the time. Now automakers are also adopting RTLs to gain visibility into production processes and ensure quality control.

In 2009, high-performance car manufacturer Aston Martin deployed an RTL from Ubisense at its production facility in Gaydon, England, replacing a manual system used to track its custom vehicles through the finishing process. The automaker produces 7,000 high-end cars annually, and each must undergo a series of tests to evaluate brakes, tires and watertight fittings, says Ubisense CEO Richard Green. If the tests uncover problems, the vehicles are removed from the testing line and moved to a holding area to await repair. The RTL enables the automaker to know where all its cars are in real time, so employees don't have to waste time looking for misplaced vehicles. In addition, the RTL gives Aston Martin visibility into the finishing process, so it can correct delays in production and testing, Green says.

When automakers alternate production between models or customize vehicle features, they need all the right tools in place, and the tools must be torqued

correctly—set to rotate a part with the right amount of force—depending on the vehicle model or part being assembled. BMW, Daimler and Volkswagen are using an RTLS from Ubisense to match the cars being assembled with the proper tools for the job, thereby automating a system to provide each vehicle with custom assembly. "This is error-proofing," Green says. "It's removing one of the last frontiers of a human being engaged in the process of determining settings for a particular model of car."

### **Future ROI: Total Visibility**

While closed-loop RFID applications are helping individual auto companies become leaner and more competitive, it's increasingly important for the auto industry to take a global approach to improving efficiencies. Asian automakers such as Honda, Kia and Toyota are manufacturing cars in the United States, and Detroit's "big three"—Chrysler, Ford and GM—are making cars in Canada and Mexico. Suppliers such as Autoliv, Bosch, Denso, Johnson Controls and Visteon, which now produce significant portions of vehicles, make parts and systems in a variety of locations, from Bangladesh to Berlin and São Paulo to Shanghai.



*Aston Martin deployed a real-time locating system to track its custom vehicles through the finishing process.*

But until recently, the auto industry was reluctant to commit to using RFID to track parts between supply-chain partners, due to economic constraints and concerns that automakers and suppliers would have to overhaul existing numbering standards and processes. Despite the existence of some industry data standards, each automaker has its own parts numbering scheme, and the numbers are embedded in various legacy systems. Entering 2010, however, automakers and industry groups are stepping up standards development around open-loop RFID tracking, hoping it will reduce parts inventory needed at assembly plants, automate supplies receipt, prevent parts counterfeiting and improve the ability to pinpoint vehicles recalled due to faulty parts.

That's no easy feat. The automotive community is split on how to develop these standards. The Joint Automotive Industry Forum (JAIF), a consortium of auto-industry associations from Asia, Europe and North America, is developing guidelines for tracking RTIs and parts at the item level using existing industry data-ID numbering.

"The whole key for what we've been trying to achieve is to have a complete open-loop system to allow containers to travel the world and be identified easily," says John Canvin, general manager of Odette International, a nonprofit automotive industry group representing European manufacturers and suppliers. "That involves having a common tag format and reader rather than having a lot of different proprietary solutions."

Other automakers and suppliers, including BMW, Daimler and Ford, pressed EPCglobal, a division of the international standards body GS1, to create a global automotive discussion group, to develop standards for using the proprietary EPC numbering system to track parts and containers throughout the worldwide automotive supply chain. Some suppliers, such as tire-maker Michelin, already use EPC numbers in doing business with retail chains and the U.S. Department of Defense. In the first quarter of 2010, BMW, Daimler, Ford, Volkswagen and some auto suppliers plan to launch a pilot sponsored by the German government to use EPC in tracking parts from suppliers to assembly plants and on to auto dealers.



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The solution may involve using UHF tags that have more memory than the standard 96-bit technology, enabling some automakers and suppliers to use both numbering systems. AIAG, a JAIF member, spearheaded GM's pilot at Lake Orion last year, which tested a variety of extended-memory RFID tags containing both GM's ISO/IEC-based data identifiers for parts and EPC numbers.

The benefits of standards are now clear to automakers. RFID tracking could stem the counterfeiting of parts in the global supply chain and cut the cost of recalls due to faulty parts. What's more, says Daimler's Peters, "if you're using standards, you will see better and cheaper prices in the technology."

The U.S. Chamber of Commerce estimated in 2007 that counterfeit auto parts have become a \$12-billion-a-year global trade, with \$3 billion in sales in the United States. Ford alone loses \$1 billion per year, according to the Chamber. Daimler is working with researchers at the Fraunhofer Society, Europe's largest applied research organization, to determine whether RFID technology could be embedded in the tire rims of some of its high-value cars without interfering with vehicle operation to prevent counterfeiting. RFID tracking could also help validate authenticity of parts and provide a pedigree of their manufacturing origins to aftermarket dealers and customers.

Currently, automakers have to cast a wide net when recalling vehicles, because they don't always keep precise data on which parts from which lots were used in each vehicle. RFID parts tracking would enable them to automatically capture the lot, manufacturer and production date and store it all in a database. "If you can use standardized information, you can have transparency through the supply chain," says Mike Henn, project manager of the EPCglobal automotive discussion group. "At the moment, they can't be 100 percent sure which part is in which car. That's why they don't make a recall of 10 cars; they make a recall of thousands."



*Currently, automakers have to cast a wide net when recalling vehicles.*

Ultimately, one of RFID's biggest benefits to the auto industry may be to speed industry response to changes in customer demand, IBM's Chang says. He recently met with one of the world's largest automakers, which discovered during the economic meltdown it had no easy way to gain visibility into all finished vehicles in its global supply chain. Chang says using RFID in conjunction with information-management tools can potentially give automakers that global view and help them decide to ramp up or slow down production. "During the past few months, a lot of manufacturers were caught with excess inventory they weren't aware of," he says. "These companies are saying, 'I need to be able to go to one place and see all my inventory. That way, if there is a change in the economic climate, I can make a decision on my production.'"

### **RFID Distinguishes Consumer Products and Services**

During last year's college football finals, Ford Motor Co. advertised a new RFID asset-tracking

application, developed with RFID vendor ThingMagic. The TV ads showed how Ford's Tool Link feature, an option in the company's popular F-series pickup trucks and E-series vans, could help contractors, plumbers and other building professionals ensure all the equipment they need is stowed in the vehicle bed or cargo hold.

This year, Ford's target audience for in-vehicle RFID applications might be found watching American Idol. Ford is promoting Transit Connect—an energy-efficient family van with the optional tool asset-tracking system, which busy moms and dads can use to ensure junior's sporting goods or the baby's diaper bag are in the trunk. Customers receive RFID labels to attach to important items. ThingMagic's Mercury 5e readers and antennas, installed in the vehicle bed, are wired to a dashboard computer that alerts the driver if items are missing.



*RFID is an optional feature that lets families keep track of important items.*

"The genie is now out of the bottle," says Ravi Pappu, ThingMagic's cofounder and VP of advanced development. "Three years ago, people didn't believe we could make an economical, high-performance RFID system that consumers could use themselves. Now, we've shown it's possible, economical and it works."

Ford is one of the first automakers to showcase passive RFID as an add-on feature in its vehicles, but analysts say it's a sign of things to come. "We're likely to see more interesting, consumer-facing applications using RFID technology to enable stuff," says Michael Liard, RFID program director at ABI Research.

Luxury auto dealers are also using RFID to provide more personalized service for customers. Mercedes-Benz of Buckhead, in Atlanta, deployed the Service Drive Concierge system from MyDealerLot in October 2008, to identify customers and their vehicles when they come in for maintenance or repairs. A passive RFID tag is placed on the back of a car's rearview mirror, and RFID interrogators are installed at various service stations. The system greets arriving customers, alerts technicians so they can begin servicing more quickly, and allows patrons to monitor their car's progress on plasma screens in the waiting area.

"The number-one focus in dealerships around the country—especially at the high end—is how to create more personalized customer service experiences and be able to respond faster to your customer," says George Cresto, founder and CEO of MyDealerLot, which in the past two years has installed its technology at 14 dealerships nationwide. Cresto says the RFID system also has the potential to help dealers measure the performance of their service operations, as well as foster additional sales by stimulating interaction between sales personnel and customers and engendering customer loyalty. "That's a much better way to interact," he says, "than just sending them an e-mail on their birthday."

*Photos: iStockphoto*