Tire Recalls and Tire Safety: The RFID Solution

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Introduction

Recalls have become a staple of the nightly news. Consumers are barraged with information about a range of hazardous consumer products. But it has become no easier to identify whether the product they own is included in a campaign. Tires are a case in point. They are highly engineered products and one of the most important safety components on a motor vehicle. Yet, the systems designed to alert and capture defective models are ineffective and outmoded. Despite many technological advances, consumers trying to identify a defective tire still rely on a 38-year-old recall system that rarely averages more than a 20 percent return rate. This leaves millions of potentially deadly tires on consumers' vehicles.

The system fails because there is no way to identify and track individual tires once they leave the manufacturer. To most consumers, one tire is virtually indistinguishable from another, save for the manufacturer's name on the sidewall and the price. In some ways, the tire industry treats its products the same way. Although some industry segments use labels and barcodes to track tires from the manufacturer, most are temporary and unusable for tracking or identifying the tire throughout its life. For the most part, tires move anonymously through a diffuse distribution chain.

Today's tire identification system is based on the Tire Identification Number (TIN), an 11-symbol alphanumeric code required by the National Highway Traffic Safety Administration (NHTSA). The agency created it in 1970 to function as a tire identifier in the event of a recall. The code distinguishes the tire by the plant where it was built and the week and year of manufacture, but it does not provide an individual ID. As tires move from manufacturer to automaker or wholesaler or distributor or importer to retailer to consumer, the TIN is often ignored – due, in large part, to a lack of automated processes to capture the number. At the end of the chain, purchasers are responsible for registering their tires, but this process, too, fails to capture a significant percentage of tires sold each year.

People like Carolyne Thorne of Montgomery, Alabama, and Michael Enriquez of Deltona, Florida, are the tragic legacy of this system. Both were paralyzed after rollover crashes caused by recalled tires. And in both cases, those tires were placed or left on the vehicles because there is no system that enables consumers or tire and service facilities to easily determine whether tires are included in a recall.

According to the National Highway Traffic Safety Administration, from 1995-1998 there were an estimated 23,464 tow-away crashes per year caused by "blowouts" or flat tires, resulting in an estimated 414 fatalities and 10,275 non-fatal injuries annually.[1] (Tire crash statistics are incomplete because government databases don't identify the cause of the tire failure.) Figures culled from the National Automotive Sampling System-Crashworthiness Data System show that "blowouts" cause more than three times the number of crashes in light trucks than in passenger

[1] Preliminary Economic Assessment; Notice of Proposed Rulemaking; Docket 00-8011; NHTSA; Office of Regulatory Policy and Plans; October 2001

cars and a much higher proportion of rollover crashes than non-rollover crashes.[2] Again, the rate of tire-related rollover crashes in light trucks is more than three times that of passenger cars.[3] The explosive chemistry of bad tires on light trucks is more relevant than ever, because SUVs, pick-ups and minivans now represent about half of the U.S. passenger vehicle fleet.

There is a blank spot at the intersection of tire safety and tire tracking, and it exists because the TIN is an inefficient and difficult method of identifying tires – inconveniently located on the inside of the mounted sidewall, hard to read, long and cumbersome. It is unsurprising that so few use the TIN, yet safety demands an accounting of tire's history – and not just for recalls, but for determining a tire's age or provenance. Nearly every tire and vehicle manufacturer now recognizes that tire age is linked to its safety and durability, and most recommend replacing tires older than 6 to 10 years. The burgeoning used tire market underscores the need for tracking the millions of tires anonymously recycled back into the marketplace.

Today, technology can close these safety gaps, and industries from cattle ranching to apparel to some segments of tire business have already put it to use—Radio Frequency Identification or RFID.

RFID is an automatic data capture technology that uses radio-frequency waves to transfer data between a reader and a movable item.[4] Sometimes called a "smart chip," RFID tags are used to identify, categorize and track inventory as it moves along the supply chain. RFID tags, either active or passive, use low-frequency radio waves that are read by a hand-held reader. Tags measuring as little as 3/4-inch by 1/8-inch, weigh a couple of grams.[5]

Embedded in a tire or affixed to the sidewall, an RFID tag the size of a grain of rice is a powerful tire-tracking tool. Some tiremakers have already recognized its potential. Some commercial truck and aircraft fleets use RFID to identify tires and to ensure regular service. Tires used in NASCAR racing are embedded with RFID to keep tabs on these high performance tires. Many in the auto industry have identified recalls as one of its possible uses. With a chip embedded in the sidewall and inexpensive readers installed in service shops (or an interface with the vehicle computer), motorists could have the status of their tires checked every time they take their vehicle to be serviced, or through their instrument panel.

Automakers have already identified the "critical" need to track individual tires and in 2001, formally requested the Automotive Industry Action Group to come up with a standard for RFID in tires, which is now complete (B-11).

RFID is a proven technology awaiting wider application. In 2009, the tire industry is projected to sell 356 million tires – 80 percent of which will be sold on the aftermarket.[6] How will these tires be identified or located in the event of a recall?

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[2] Preliminary Economic Assessment; Notice of Proposed Rulemaking; Docket 00-8011; NHTSA; Office of Regulatory Policy and Plans; October 2001
[3] IBID
[4] Radio Frequency Identification: What It Is and How It Works; Powerpoint presentation; Craig Harmon; Q.E.D. 2006
[5] Tire Talk Becoming Sophisticated; Sigmund J. Mikolajczyk; Tire Business; May 30, 1994
[6] Michelin Expands RFID Tests; Information Week; Laurie Sullivan; October 12, 2004

The Tire Recall System: Broken

Even after several high-profile tire recalls that claimed hundreds of lives and exposed the weaknesses in the system, there are no databases accessible to consumers or service professionals that can quickly identify a recalled tire. Yet, consumers often believe that the professionals servicing their tires know about recalls and would be able to alert them if one was on their vehicles.[7] [8]

How are tire recall notifications handled? Even if a recalled tire is part of a vehicle's original equipment, the tire maker is responsible for the campaign. However, tire manufacturers can only identify consumers by working with the automakers and their dealerships to find the first purchasers of the vehicle, based on the Vehicle Identification Number (VIN) and tire lot records.

If the tire were purchased as a replacement, the consumer – with assistance from the tire retailer – would have had to fill out the tire registration form and send it back to the manufacturer to create a record of ownership. But studies show that neither consumers nor tire dealers consistently register tires, even though the latter are responsible under federal regulations for providing tire registration cards to their customers. Both NHTSA and the Rubber Manufacturers Association have estimated that only 10 percent of tires are properly registered, because the manufacturer may not provide the registration cards to retailers, retailers may not give the card to the consumer, or the consumer may not fill it out.[9] [10] More recently CIMS Inc., an Akron-based tire registration services firm, estimated that 28.6 percent of aftermarket passenger and light truck tires are registered properly.[11]

If a tire is purchased used – as an estimated 30 million are annually – there are no registration requirements.

Today's tire recall system was established nearly 38 years ago, at a time when recalls and government defect investigations of tires were rare, and manufacturers neither desired nor expected the consumer to be an active participant in the process. It remains a spectacularly unsuccessful system. There are many reasons for these failures, but foremost are the two essential components of the recall system: the TIN and the tire registration system.

The Tire Identification Number – the primary means of distinguishing a tire by plant and date-of-manufacture – is molded on the sidewall that is most frequently mounted toward the inside of the vehicle. The consumer who wants to check to see if his tire is the subject of a recall must lie under the vehicle with a flashlight, a pad and a pen to capture the TIN, or take it to a dealer

[7] Deposition of Jeffrey Kennedy; Carolyne Thorne v Ford Motor Company, Inc., et al. Montgomery County Circuit Court: Civil Action Number: CV-Q4-3069; October 20,2006
[8] Who's Responsible? Letter to the Editor; Jeff Voight; Tire Business, July 16, 2007
[9] Docket 70-12; Notice 26; 51 FR 45916; December 23, 1986
[10] Tire registration; Often overlooked by dealers-nonetheless, it is the law; Tire Business; September 22, 2003
[11] IBID

where the car can be put on a lift. (Confounding matters, most consumers do not understand or have access to deciphering the alphanumeric code.[12])

Identifying the TIN is but the first step. The only public repository of tire recall information is located on the NHTSA website. It does not allow users to search tire recalls by the TIN. Rather, a consumer would have to enter the tire's make and model to see it has been recalled. Then, users have to retrieve the documents the manufacturer filed in support of the recall and find the one that specifies which TIN lots are being recalled. (In most cases, tires from specific lots are being recalled, rather than the entire line.) This process is time-consuming and challenging for the uninitiated.

At the service shop level, it is totally impractical. Typically, tire service shops affiliated with a manufacturer learn about recalls directly from the tire maker. Electronic Recall Service Bulletins are issued at the beginning of the campaign and service shop personnel are briefed at the onset. But as time passes, recollections fade. And if tire technicians service a tire that appears similar or has a similar brand name, they would need to check the TIN against the recall documents to determine if that tire was part of a recall – an impractical process in the time-sensitive service business.

Independent tire dealers who sell and service multiple brands often don't receive any recall notification from manufacturers. They, like their customers, learn about recalls through the media. So, for example, if a Firestone tire is serviced at a Goodyear dealership, those tire technicians would have no recall bulletins or any practical means of determining whether that Firestone tire was part of a recall.

Not surprisingly, the system works so assiduously against the public it was meant to protect because it was largely crafted for the convenience of tire makers and sellers. The regulatory history shows that manufacturers and retailers successfully fought the agency's attempts to make recalls consumer-friendly. For example, The National Highway Safety Bureau (NHTSA's predecessor) originally proposed that the TIN be mounted on both sides of the sidewall and that the date-of-manufacture be represented by four numbers. Under that scheme, 3171 in the Tire Identification Number would mean that the tire was built during the 31st week of 1971.[13]

Tire makers protested both aspects of the original proposed rule. Molding the TIN on both sides of the sidewall would create a manufacturing hazard, they complained. And many wanted to obscure the date code. BF Goodrich, for example, said that the consumer would be able to identify a recalled tire because he would be informed by a defect notification letter that would use the entire serial number.[14] Goodyear argued that it was questionable whether the consumer would be any better able to decipher the proposed four-digit date code than the internal Rubber Manufacturing Association's two-digit code they were using at time.[15] Firestone urged the bureau to adopt the RMA's two-symbol date code because "tires are not perishable items. Therefore, a conspicuous disclosure of tire age would unavoidably introduce into the

[12] Docket 01-11157-07; 66FR 65536; December 19, 2001
[13] Docket 70-12 No. 1; 35FR 11800; July 23, 1970
[14] Docket 70-12 No. 1; 35FR 11800; B.F. Goodrich Comment 47; July 23, 1970
[15] Docket 70-12 No. 1; 35FR 11800; Goodyear Comment 36; July 23, 1970

marketplace a totally artificial measure of quality unrelated to product performance and effectiveness."[16] (Thirty years later, Firestone would be proven wrong. Tire age was a key factor cited in the massive Firestone ATX / Wilderness tire recalls of 2000 and 2001. As early as 1990, some vehicle manufacturers included tire age warnings in their owner's manuals. Today, nearly all vehicle and tire manufacturers now warn consumers against using tires older than 6 to 10 years because they degrade internally, regardless of use.)

The November 1970 Final Rule dropped the requirement that the TIN be on both sides of the tire and shortened the four-digit date code to three numbers. Thus, the 31st week in 1971 would be marked as 311 in the TIN – and consumers lost in the first major skirmish over the TIN. Many in the automotive and service industry fared no better. The truncated date code, which obscured the decade in which the tire was built, also created significant confusion among those who understood how to decode the TIN.

Consumers also lost the second battle over access to the tire recall system – the industry's assistance in registering tires. During successive rulemakings, manufacturers, retreaders and dealers repeatedly weakened the system. In 1974, the tire industry persuaded NHTSA to drop a proposal that would have required them to give a completed copy of the tire registration to the purchaser.[17] In 1979, retreaders were made exempt from the registration requirements after lobbying Congress.[18] Independent tire dealers took a page out of the retreaders' book, and in 1983 won a Congressional mandate to remove the requirement that they register tire purchasers. Instead, retailers would only have to give the consumer a tire registration form with the TIN marked for consumers to fill out.[19]

In 2000, the regulations finally tipped back slightly in the consumers' favor. In that year, the agency adopted a rule changing the date of manufacture code from a three to four-digit group, in which the first two digits would signify the week of manufacture and the second two digits would represent the year.[20] This throwback to the agency's original 1969 proposal satisfied a request by the Rubber Manufacturers Association and the European Tyre and Rim Technical Organization. Both had argued for the change, in part, to harmonize the U.S. standards with those of the ECE in Europe. The agency agreed that this would help the traceability of defective tires and advance harmonization.[21]

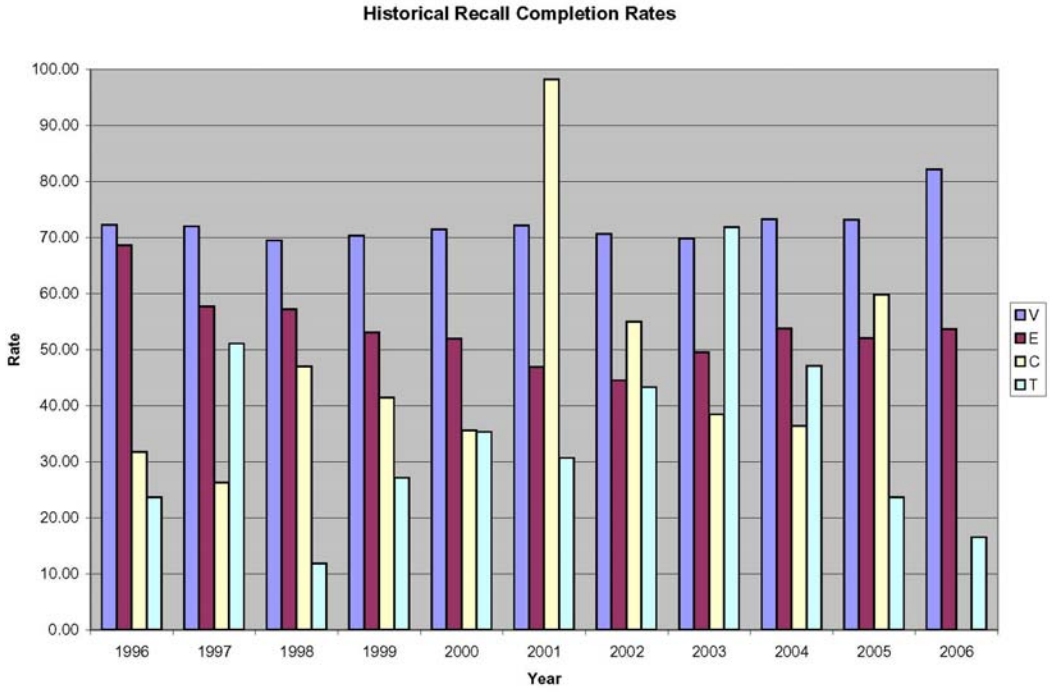
By the end of 2000, the Ford Firestone scandal drove further attempts to make the system more consumer-friendly. After a federal investigation determined that the Bridgestone/Firestone tires were prone to tread separations and had officially claimed more than 270 lives, Congress responded by passing the Transportation Recall Enhancement Accountability and Documentation Act (TREAD Act), which required NHTSA to improve tire labeling to help consumers identify tires in the event of a recall.[22] In 2004, it adopted a Final Rule that required the TIN be molded on the intended outboard side of the tire to give consumers easy physical

[16] Docket 70-12 No. 1; 35FR 11800; Firestone Comment 76 July 23, 1970
[17] Docket 70-12; Notice 19; Final Rule; 39FR 19482; June 3, 1974
[18] Docket 70-12; Notice 23; 44 FR 7963; February 8, 1979
[19] Docket 70-12; Notice 24; 48 FR 22572; May 19, 1983
[20] Docket 99-5928; 64FR 36807; July 8, 1999
[21] Docket 1998-4450; 63FR 55863; October 19, 1998
[22] TREAD Act

access to the TIN. Manufacturers also had the option of molding a partial TIN, minus the date code, on the other side of the tire.[23] NHTSA set the compliance date at September 1, 2009, and declined to change the date code to a readily recognized format using the month, day and year.[24]

Ultimately, the amendments may have less impact on consumers than the agency intends. For one, a four-digit, week-year date code is no clearer to consumers than a three-digit date code. And, save for some high performance tires, most can be mounted in either direction, so the full TIN may still be mounted on the inward side. And without a non-coded date of manufacture, consumers will still have difficulty understanding when their tires were actually built.

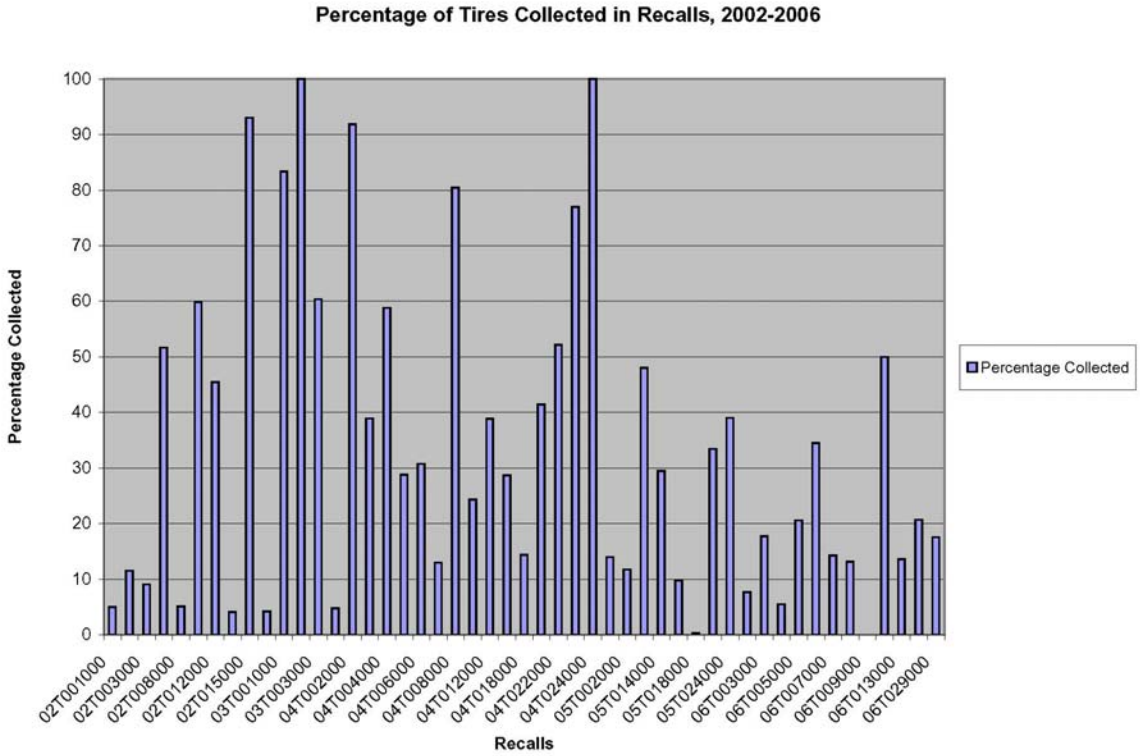
An examination of the historical recall completion rate shows that the current recall system is ineffective. According to NHTSA, tire recall completion rates are routinely much lower than recalls involving vehicles, equipment or child restraints.

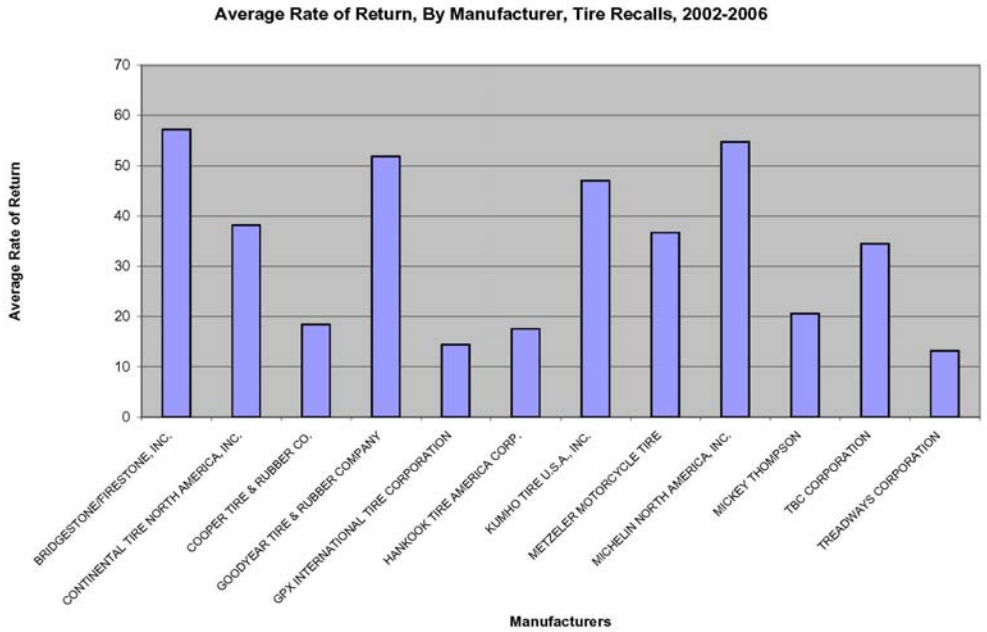


Source: NHTSA

While the 10-year historical average recall completion rate for tires is about 30 percent, further analysis reveals widely varying ranges between campaigns. A number of factors – including the tire manufacturer, recall population, replacement or original equipment tires, and media coverage – affect the rates. The wide ranges in the completion rate by manufacturer is illustrative: manufacturers who control retail outlets and sell a substantial number of original equipment tires are more likely to have greater completion rates than are manufactures who only sell replacement tires through independent dealers. Recalls involving very low numbers of tires or large numbers of tires tend to result in the greatest completion rates. In the case of larger recalls, widespread media coverage tends to drive up the completion rate; small recalls allow easier retrieval.

[23] Final Rule; 67FR 69600; Docket 02-13678; November 18, 2002
[24] Final Rule; 69 FR 31306; Docket 2004-17917; June 3, 2004


Percentage of Tires Collected in Recalls, 2002-2006
Percentage Collected
100
90
80
70
60
50
40
30
20
10
0
02T001000
02T003000
02T008000
02T012000
02T015000
03T001000
03T003000
04T002000
04T004000
04T006000
04T008000
04T012000
04T018000
04T022000
04T024000
05T002000
05T014000
05T018000
05T024000
06T003000
06T005000
06T007000
06T009000
06T013000
06T029000
Recalls
Percentage Collected


Average Rate of Return, By Manufacturer, Tire Recalls, 2002-2006
Average Rate of Return
70
60
50
40
30
20
10
0
BRIDGESTONE/FIRESTONE, INC.
CONTINENTAL TIRE NORTH AMERICA, INC.
COOPER TIRE & RUBBER CO.
GOODYEAR TIRE & RUBBER COMPANY
GPX INTERNATIONAL TIRE CORPORATION
HANKOOK TIRE AMERICA CORP.
KUMHO TIRE U.S.A., INC.
METZELER MOTORCYCLE TIRE
MICHELIN NORTH AMERICA, INC.
MICKEY THOMPSON
TBC CORPORATION
TREADWAYS CORPORATION
Manufacturers

The Recall System in Action: Three Case Studies

The following is an examination of three high-profile tire recalls and the resulting problems associated with the current tire identification and consumer notification system. They demonstrate the different ways in which the process can break down, and why tracking and an automated individual ID is important in tire campaigns.

The Bridgestone/Firestone ATX/Wilderness Recalls: Recalls Left Unfinished

In August 2000, and again in June and October 2001, Bridgestone-Firestone and Ford Motor Company conducted massive campaigns to retrieve some 20 million P235/75R15 ATX and 15, 16 and 17-inch Wilderness AT tires.[25] [26] [27] The recalls were covered extensively in the print and broadcast media. In addition, the tires were the subject of Congressional hearings and, in months, led to the passage of the TREAD Act.

Despite the recalls' prominent public profiles, defective Firestone ATX and Wilderness AT tires remain in circulation. In 2006, after mounting evidence showed that a significant number of defective ATX and Wilderness tires were still mounted in the spare tire well on Ford Explorers, Safety Research & Strategies, Inc., requested that NHTSA initiate an investigation, and that Firestone and Ford notify current Explorer owners that their vehicles might still have defective tires. At the time, SRS cited four known crashes in which a defective recalled tire caused a serious crash, resulting in one fatality and three victims coping with paralyzing injuries. In each case, the spare tire—a recalled Firestone—was unknowingly put on the vehicle by a service shop post-recall.

Bridgestone/Firestone claimed that it had collected 95 percent of the defective tires it made.[28] But no matter how the numbers are analyzed, four separate actions to recall defective Firestone ATX and Wilderness AT tires only corralled a fraction of the total estimated population.

- The initial recall in August 2000 was the most effective, collecting more than 5.8 million tires—less than half of the 14.4 million production total.[29]

- Bridgestone's expanded customer satisfaction program, launched in September 2000 to capture 1.2 million more tires removed about 39,000 tires, according to a third quarter

[25] Firestone Tire Recall; Dealer Notification letter; Ford Motor Company; August 2000
[26] Ford Motor Company To Replace All 13 Million Firestone Wilderness AT Tires On Its Vehicles; media. Ford.com; June 22, 2001
[27] NHTSA Concludes Some Wilderness AT Tires Contain Safety Defect, While Monitoring Remaining Tires; Statement by Sue Cischke; vice president, Environmental and Safety Engineering; Ford Motor Company; October 4, 2001
[28] Firestone to take new, additional steps to recover recalled tires; Press Release; Bridgestone/Firestone; July 21, 2006
[29] Sixth Quarterly Report; Recall 00T005; Firestone Bridgestone; January 30, 2002

report (Note: The third quarter report is the latest available).[30] A supplemental report estimated the surviving population at 284,000 tires.[31]

- On June 22, 2001, Ford announced an Owner Notification Program to replace 13 million 15,16 and 17-inch Wilderness ATs.[32] This action captured less than half of the population – about 6 million.[33]

- The final NHTSA-influenced Bridgestone-Firestone recall on November 7, 2001, for 2.8 million Wilderness ATs removed about 71,000 tires from service.[34]

Even if Bridgestone/Firestone achieved the 95 percent rate of return it claimed, another 1 million tires would remain in service. In May 2006, Safety Research and Strategies launched an independent probe into the efficacy of the recall, after learning about four crashes involving recalled Firestone spares left on vehicles, which claimed one life and resulted in serious injuries for four other victims.

SRS's research showed that some recalled tires remained on vehicles because there was confusion among vehicle owners about whether the spares were covered under the recalls. Full-sized spares marked Temporary were excluded, but many vehicles had a fifth ATX or Wilderness AT as a spare. The massive number of tires included in the recall created shortages of the appropriate size tires and prompted some dealerships and tire centers to focus on the four in-service tires first. Many consumers assumed that the spare was changed as well, and its location under the vehicle made it impossible for the consumer to check, without removing it. Other consumers were told they would have to wait up to a year for a spare replacement. Despite complaints, some spares were not replaced. When the original owners sold their vehicle, the forgotten spare was passed along, and, in some cases, placed into service because of a flat, or by a shop who recommended installation of what appeared to be a "new" tire, years after the original recalls were issued and long forgotten by service technicians.

NHTSA validated SRS's findings in a small-scale survey. According to news reports, the agency examined Explorers in a large Washington, D.C.-metropolitan area parking lot and found that 10 percent of the vehicles still had the defective tires in the spare well more than five years after the recall.

The Bridgestone Firestone Wilderness ATX campaign was considered one of the most successful tire recall campaigns ever. But Michael Enriquez, a 28-year-old ventilator-dependent quadriplegic, was a victim of its failures.

In December 2004, the Enriquez family purchased a 1993 Explorer from a local used car dealer. Six months later, Michael Enriquez was traveling eastbound on SR400 in Sanford, Florida, when

[30] February Report; Consumer Advisory 00X003; Bridgestone Firestone; March 9, 2001
[31] Supplemental Report; Consumer Advisory 0000X003; Bridgestone Firestone; May 18, 2001
[32] Ford Motor Company To Replace All 13 Million Firestone Wilderness AT Tires On Its Vehicles; Press Release; Ford; June 22, 2001
[33] NHTSA concludes some Firestone Wilderness AT tires contain safety defect, while monitoring remaining tires; Press Release; Ford; October 4, 2001
[34] Sixth Quarterly Report; Recall 01T016; Bridgestone Firestone; April 11, 2003

the right rear tire of his Explorer – a recalled Firestone ATX – experienced a tread separation. The vehicle became uncontrollable and traveled through a grassy median, overturned in the westbound lanes of SR400 and was struck by an oncoming vehicle. The driver of the oncoming vehicle in the westbound lanes of SR400 was also catastrophically injured and later expired as a result of his injuries.

An investigation into the Enriquez crash revealed that the failed tire appeared to have been the original equipment spare that was left on the vehicle – despite having been inspected several times by automotive service technicians after the recall, including some at Sears Automotive Center. Just months before the Enriquez family purchased the vehicle the spare Firestone tire was rotated into service on the vehicle – likely because it looked new and retained good tread depth.

A similar scenario resulted in the death of 12-year-old William Moreno of Los Angeles, California. Like the Enriquez' family, the Morenos purchased a secondhand 1994 Explorer. The SUV was equipped with four Goodyear tires and – unbeknownst to the Morenos – a recalled Firestone ATX in the spare well. When the Morenos experienced a flat tire and brought the tire to American Tire Depot, the tire service technician suggested that they use the Firestone ATX, because the tire looked new. Several months later, on May 24, 2006, the recalled tire experienced a tread separation causing a rollover crash. William Moreno, who was belted and seated in the rear, died from head injuries.

The Continental Conti-Trac / Grabber AW Recall

Carolyne Thorne of Montgomery, Alabama, was the kind of meticulous vehicle owner who paid attention to the care and maintenance of her tires.[35] In June 2002, when the left rear Continental Grabber AW P275/60R17 tire on her 2000 Ford Expedition detreaded at low speed, Thorne had all four of the tires replaced with new Continental tires.

On August 19, 2002, Continental Tire recalled the original equipment Grabber AWs, because they had a lower-than-specified rubber gauge between the belt edges. According to Continental's defect report to NHTSA, this condition could lead to a tread separation, resulting in loss of control of the vehicle and a crash. Like many Continental tire owners, Thorne promptly sent in her proof-of-purchase and was reimbursed for her new tires.

When Thorne took her Expedition into Friendly Ford that October, she had them check the tires again to ensure that none had been recalled. Thorne also had purchased a lifetime tire maintenance service with Wal-Mart so that her tires would be regularly inspected, balanced and rotated. Between 2002 and 2004, Wal-Mart auto technicians serviced her tires nine times.[36]

But today, Carolyne Thorne is a wheelchair-bound paraplegic who depends on assistance for all of her daily needs. On April 24, 2004, Thorne's Expedition rolled over on the highway after her

[35] Carolyne Thorne v Ford Motor Company, Inc., et al. Montgomery County Circuit Court: Judge Johnny Hardwick Civil Action Number: CV-Q4-3069
[36] IBID

left rear tire experienced another tread separation. Thorne, who was wearing her seatbelt, suffered a permanent spinal injury when the Expedition's roof collapsed. Despite Thorne's attention to detail, service techs from the dealership to the retailing giant never noticed that Carolyne Thorne's Expedition still included a recalled Grabber AW, two years after the recall.

How did that happen? The Expedition, like the Explorer, came with a full-sized spare. When Thorne had her first tread separation crash, a tire technician left the spare on the vehicle and put three of the new Continental P265/70R16 tires on the ground and the fourth in the spare well, under the vehicle. How did Friendly Ford and Wal-Mart miss so many opportunities to catch the error?

In a deposition filed in Thorne's civil case, Jeffrey Kennedy, Wal-Mart's corporate representative and a former regional manager for its Tire-Lube Express business, testified that Wal-Mart's tire inspection service does not include a check of the TIN to ensure that a tire has not been recalled.[37] Wal-Mart only records the Tire Identification Number if the customer buys the tire there, for the sole purpose of giving the tire registration card to the consumer to finish filling out and return to the manufacturer.[38] Wal-Mart was aware of the recall, and like others in the tire and service business, had no system in place to keep records of tire recalls or keep their techs fully informed about tire recalls.[39] Without this information readily available, service tire technicians offer less-than expert care to customers who depend on them to validate the safety of their tires.

When a jury found Wal-Mart negligent in Thorne's case and delivered a $4 million verdict against the retailer, some tire dealers were outraged. One expressed his ire in a published letter to the trade publication *Tire Business*:[40] "Since when does the burden of checking on recalled tires fall on the person/company that changes your oil or rotates your tires," fumed Bridgestone/Firestone dealer Jeff Voigt in a letter published in the July 16 issue. "Where is the magic database where we tire dealers must enter the DOT number of every tire we touch to see if it is on a recall list?"[41]

Maria Mascorro of Watauga, Texas, owned a 2000 Ford Expedition. But unlike Thorne, Mascorro was unaware of the 2002 Continental recall that affected her tires. Despite having had her vehicle serviced by Park Cities Ford, the dealer failed to notice the recalled tires. On August 1, 2006, the Mascorros were driving their 2000 Ford Expedition on Highway 35 in Bell County, Texas, proceeding northbound when the vehicle's left rear General Grabber AW tire suffered a catastrophic tread-belt separation. The rollover crash left Miriam Mascorro, Hilario Mascorro, and Tomasa Mascorro severely injured, and killed Mascorro's 5-year-old daughter Carolina Garcia.

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[37] Deposition of Jeffrey Kennedy; Carolyne Thorne v Ford Motor Company, Inc., et al. Montgomery County Circuit Court: Judge Johnny Hardwick Civil Action Number: CV-Q4-3069; October 20,2006
[38] IBID
[39] IBID
[40] Who's Responsible? Letter to the Editor; Jeff Voight; TireBusiness.com
[41] IBID

Foreign Tire Sales Recalls Chinese Made Tires: Losing the Tire Trail

This year, another high profile tire recall produced disappointing results and evidence suggesting that defective tires of similar construction remain in service. In June, Foreign Tire Sales appealed to NHTSA for aid in recalling an estimated 255,000 light truck tires sold under the names Westlake, Telluride, Compass and YKS. The Union, New Jersey, importer claimed that the tires were defective because the manufacturer, the Hangzhou Zhongce Rubber Company, had left out the gum strips, a critical component that improves durability and helps to prevent tread and belt separations.

FTS filed a Notice of Defect and Non-Compliance after the families of victims of a 2006 tread separation crash sued the importer, claiming that the tires caused the rollover that killed two van passengers and seriously injured a third. FTS also warned NHTSA that other companies had imported Hangzhou tires of similar construction.[42]

Initially, FTS said that a recall would bankrupt the company. [43] But, under pressure from NHTSA, FTS took responsibility and launched a campaign in August.[44] The news broke just as broadcast and print media were running recalls of tainted Chinese toothpaste and lead-paint coated toys, and the recall received extensive coverage. In the first quarterly recall report FTS filed with NHTSA, the importer captured about 6,000 tires –5,481 from dealer inventories and 549 from consumers.[45] But one month into the campaign, the recall had only collected a total of 4,000 tires, with 282 coming from consumers. FTS president Richard Kuskin expressed his bewilderment.[46] "Frankly, I'm confused by this," Mr. Kuskin said. "Our video release has been seen by 41 million people, we've had ads in newspapers with total circulation of 5 million, and our Web site has received more than 500,000 hits."[47]

The agency's Office of Defects Investigation did not independently investigate whether the tires were defective, but it did query 16 other wholesalers about the possibility that they had imported similar light truck tires from Hangzhou. One tire importer, Strategic Import Supply, allowed that it may have inadvertently purchased light truck tires from Hangzhou "of the old construction." "And if purchases of the older construction occurred, these purchases were limited in number." [48] But the other importers flatly denied that their tires bore any resemblance to the defective tires or that any Hangzhou tire had caused a problem. ODI closed its probe without taking further action.[49]

Meanwhile, FTS continues to allege that other importers have sold tires "indistinguishable" from the recalled tires. It has submitted to NHTSA two letters it wrote to tire dealers in New York and

[42] Defect and Non-Compliance Report; Foreign Tire Sales; Recall 07T-003; June 11, 2007
[43] IBID
[44] IBID
[45] Equipment Safety Recall Quarterly Report Information; Recall 07T003; FTS; October 3, 2007
[46] Kuskin: Chinese tire recall numbers below expectations; Miles Moore; TireBusiness.com; September 7, 2007
[47] IBID
[48] Distributor Strategic Import Supply's Response to EQ07-002; Recall 07T003-2574; David Penn; July 10, 2007
[49] Closing Resume; Office of Defects Investigation; Recall 07T-003; August 23, 2007

New Jersey indicating that the tires that were returned to them by consumers may be the right sizes, brand names and fall within the production period of the defective tires, but they were not imported by FTS.[50] [51]

As a small tire-import business, FTS maintained no warehouse. It never took physical possession of any of the tires it distributed to other wholesalers. FTS merely commissioned and bought tires from the Hangzhou Zhongce Rubber Company and arranged their shipments to other entities. FTS didn't track its tires by the TIN, and interviews with other tire sellers reveal that they don't use the TIN to manage their inventories either.

Beyond Recalls: General Tire Safety

These recalls also make the broader case for a better system to identify and track tires as they move through the supply chain and into the market. The ability to track tires also becomes important in three other areas: aged, used and counterfeit tires. The Ford Explorer/Firestone Wilderness ATX fiasco was a watershed event that re-focused regulators, safety advocates and manufacturers on the hazards associated with tire age degradation, and prompted new research into the problem. Tire aging research, has, in turn, raised the profile of the dangers of buying used tires. In addition, tire manufacturers have been expressing concerns about the increase in counterfeit tires. The following is an overview of these issues.

Tire Aging

Nearly 20 years ago, automakers, such as Toyota and Volkswagen, first acknowledged the dangers of aged tires. In their 1990 owner's manuals, foreign automakers warned motorists against the use of tires older than 6 years.[52] [53] These advisories followed studies published in Germany in the late-1980s that found a disproportionate number of tire failures in tires older than 6 years.[54] [55] Throughout that decade, tire age notices spread to many other vehicle manufacturers' manuals, but the issue received little attention until federal investigations into the ATX and Wilderness tires showed that they were more likely to fail after several years in service. In the last few years, tire makers Continental, Michelin, Bridgestone-Firestone, and Cooper have also acknowledged tire aging, issuing Technical Bulletins specifying that all tires should be removed after 10 years regardless of the remaining tread depth. The bulletins also advised consumers to have their tires inspected annually once a tire reaches 5 years old.[56] [57] [58] (Vehicle manufacturers and some tire associations have taken a stricter approach, recommending tire replacement after 6 years, regardless of tread depth.)

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[50] Letter to Sullivan Tire Service; Foreign Tire Sales; Recall 07T-003; August 29, 2007
[51] Letter to Freehold Tires; Foreign Tire Sales; Recall 07T-003; August 31, 2007
[52] LandCrusier Owner's Manual; Toyota; 1990
[53] Passat Owner's Manual; Volkswagen; 1990
[54] Technical Defects on Motor Vehicles 1986, DEKRA
[55] "Observations in the Field: Knowledge is Lying on the Pavement" *Natural Rubber + Rubber Plastics*, Vol 40, No. 8/87
[56] Aging Tires Spark New Safety Concerns; Scott Burgess; Detroit News, February 23, 2006
[57] IBID
[58] Bridgestone U.S. Unit Advises Tire Life-Span Limit; Timothy Aeppel; Wall Street Journal; November 10, 2005

The conclusion that age played a role in the catastrophic Firestone ATX tire failures also prompted safety advocates, NHTSA, the tire industry, and Ford Motor Company to research the issue and develop artificial tire aging protocols.[59] NHTSA is currently evaluating the feasibility of a tire aging standard and weighing the potential benefits and costs of a minimum tire performance requirement based on an aging method. In an August 2007 report to Congress, the agency confirmed the earlier findings and recommendations about safety of aged tires. The report, required by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005, cited insurance data showing the rate of tire failures rises sharply after six years – especially for tires driven in a hot ambient climates.[60] Claims reported from 2002 to 2006 to the hotline of a large, but unidentified, insurance company showed 84 percent of these were for tires more than 6 years old.

Crashes related to tire age are difficult to quantify because tire age data isn't noted in federal databases. But in December 2006, Safety Research & Strategies submitted 108 incidents of aged tire tread/belt separations, resulting in 85 fatalities and 115 injuries, to an agency rulemaking docket on tire and vehicle data collection. The small dataset, culled from lawsuits – one of the few public sources – provided a significant snapshot of real-world crashes resulting from tread separations in tires older than six years.[61] They also showed how aged tires find their way onto vehicles: little or unused spares are rotated into service, consumers purchase used tires or buy a "new" tire that may have been sitting in inventory for 10 years, or consumers keep an old tire on a little-used vehicle. In case after case, tires with acceptable tread and no significant visible signs of wear found their way into service, regardless of their age.

On May 29, 2006, 17-year-old Fertune Blanchard died in a rollover crash touched off when the tread on the right rear tire of her Ford Explorer separated. Blanchard was driving southbound on I-95 from her mother's house in Jacksonville, Florida, to her father's house in Tampa, where she lived and attended high school. Blanchard's father had recently bought her the SUV, fitted with a set of four matching Michelin XCLT4 tires. Three of the tires were made in the 35th week of 2001. The remaining tire, and the one that failed, was manufactured in the 29th week of 1994 – 12 years old at the time of the crash.

Classic car owners are also at risk. In 2003, Gregory Wilkenson bought a 1978 Ferrari from a Wyoming physician. The eight-year-old tires, which had 3,000 miles on them, appeared new. Nine days after he purchased the car, Wilkenson was driving on U.S. Highway 30 near Laramie, Wyoming, when the left rear tire experienced a tread separation causing the vehicle to spin out of control and crash, fatally injuring him.

In its 2001 tire age bulletin, the British Rubber Manufacturers Association (BRMA) identified the difficulty in assessing a tire's safety by its appearance:[62]

[59] NHTSA docket 21276-35
[60] "Research Report to Congress on Tire Aging," NHTSA, August 2007
[61] NHTSA Docket 21276, December 20, 2006
[62] Tyre - Ageing (passenger Cars, Light Vans and Trailers up to 3.5 tonne GVW), BRMA, 6/5/01

> Aging can be "identified by small cracks in the tire sidewall, however, 'Ageing' may not exhibit any external indications and, since there is no non destructive test to assess the serviceability of a tyre, even an inspection carried out by a tyre expert may not reveal the extent of any deterioration."

This lack of visual indicators accounts for the continuing hazard of aged tires to consumers and service personnel, regardless of industry "warnings" and recommendations. It also underscores the need for a quick and easy way to determine a tire's age. Consumers and service providers can't adhere to safety guidelines, unless the tire age is readily accessible and understandable. Instead they are left to decode the 11-symbol alphanumeric TIN.

Used Tires

According to the Rubber Manufacturers Association an estimated 30 million used tires are sold to motorists each year.[63] That represents nearly 10 percent of the 300 million-plus new tires sold in the U.S. annually. More often than not, the provenance of a used tire is unknown. Used tires enter the market from many points ranging from tire service center scrap heaps to salvage yards to Craigslist. However, the bulk of the used tire market is supported by large multi-state recyclers who pick up scrap tires and "recycle" many of those tires back into the market after little more than a visual inspection to determine that tread depth is adequate. If a tire has at least 2/32nds of an inch of tread left and no glaring visual defect it's resold—and often cleaned and even painted black to make it appear newer.

Lack of records tracking the tires back to wholesalers—or in many cases even retailers—is the norm. Individual tires are not tracked by sellers, and many used tire sales are cash and carry. Federal crash datasets don't capture critical information on tires like make, model size, and tire ID numbers, let alone whether they were purchased used. However, the aged tire crashes documented by Safety Research & Strategies indicate that in many instances the tires were found to have been purchased used. When such tires fail, there are often no records of the sale, and the tire maker whose name is on the sidewall bears the brunt of any liability – which can be significant if there are deaths and injuries.

The scope and magnitude of the used tire problem is an unknown because the business operates with no oversight into the way used tires are collected, processed, stored, and selected for sale.

In January 2004, Mustafa Howeedy purchased four used Firestone tires from a local tire dealer who offered him a less expensive alternative to new tires. The Firestone tires appeared almost new, with only a small fraction of the tread worn. Two months later, on a trip from South Florida to Longwood, Florida, the right rear tire separated causing the vehicle to roll. The tires were eight years old. Four-year-old Kareem and 14-year-old Lila Howeedy were killed, and their mother, Amany, was paralyzed.

[63] RMA

In May, the Rubber Manufacturers Association issued a Tire Information Service Bulletin to address used tires that come with a used vehicle or are bought in the aftermarket.[64] "Used tires may have been exposed to improper service, maintenance or storage conditions and may have been damaged, which could eventually lead to tire failure," the advisory said. The bulletin listed 17 conditions that should give the buyer and seller pause.

Some of this negative publicity[65] [66] has prompted the Tire Industry Association to improve the image of used tires by promoting a tire safety program that offers Automotive Tire Service certification. [67]

> "A major component of the concept is centered on a consumer education campaign to encourage motorists to have their tires serviced by TIA members that employ certified personnel. By putting the emphasis on safety and proper procedures, the goal is to help retail and commercial tire dealers put a premium on service and differentiate themselves from the competition. Since tires are becoming a commodity in the eyes of the consumer, the industry needs to raise the bar, so the criteria for a TIA "certified store" will send a message that there are companies willing to make an investment in the necessary equipment and training to reach an elite level." [68]

If the TIA's program doesn't include a component by which its certified personnel can determine if a used tire was recalled, a critical safety check goes undone. A unique tire ID, coupled with a tire tracking system, would rehabilitate more than the used tire's image. It would bring legitimacy to the TIA's efforts.

Counterfeit Tires

On March 16, 2006, the President signed in to the law the "Stop Counterfeiting in Manufactured Goods' Act," which strengthened the law by making it a crime to ship falsified labels and implemented tougher penalties for counterfeiters.[69] The measure drew praise from the Specialty Equipment Market Association (SEMA), which expressed its hope that the new law would stanch the flow of counterfeit components used by trucking fleets, including tires.[70]

Counterfeiting is increasingly an issue of concern in the automotive parts industry. According to the Motor & Equipment Manufacturers Association: "The magnitude of counterfeit parts in the aftermarket and other automotive market segments continues to grow. It has been estimated that counterfeiting costs the automotive industry $12 billion annually. This correlates to a loss of 200,000 jobs." [71]

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[64] Technical Service Bulletin; Rubber Manufacturers Association
[65] Are Used Tires A Safety Hazard? Detroit News, June 11, 2007
[66] Will saving a few dollars cost your family's life? KHOU Houston, February 27, 2007
[67] Certified ATS Kicks Off; Press release; Kevin Rohlwing; Tire Industry Association; April 2004
[68] Certified ATS Kicks Off; Press release; Kevin Rohlwing; Tire Industry Association; April 2004
[69] President Signs 'Stop Counterfeiting in Manufactured Goods' Act; Press release; Office of the Press Secretary; March 16, 2006
[70] Anti-counterfeiting efforts heat up; Fleet Owner; March 22, 2006
[71] Automotive Aftermarket RFID; MEMA Information Services Council White Paper; Chris Gardner; 2004

French tire maker Michelin has also identified counterfeit tires as a problem in the truck and specialty tire market. In December 2005, Michelin's truck tire division found Asian fakes with a Michelin tread pattern, prompting the company to issue an advisory to 5,000 European distributors, warning them about the counterfeits.[72] In September 2006, *Modern Tire Dealer* published a story about Carefree Tire LLC, a maker of lawn and garden tires. It included an anecdote from Bill Hory, Carefree's general manager:[73]

"Hory first visited China after Carefree began supplying lawn and garden and wheelbarrow tires to Home Depot and Lowe's seven years ago. 'I heard about people copying our tire. By the time I made my first trip to China, they showed me a counterfeit of the tire. They knew what they were doing, but (in China) it's not looked down upon.'" [74]

MEMA's 2004 white paper noted that RFID is a possible solution to authenticate brands and preserve their image: "It has been suggested at automotive industry events on counterfeiting that RFID, applied properly to imported aftermarket parts, has the potential to significantly curtail the problem."[75]

RFID in Tires

Tire manufacturers have been developing RFID technology in tires since 1994. In the last 14 years, RFID technology has matured, the costs are dropping, standards are in place and the applications are spreading. For example, commercial fleet managers like Lee McGraw, equipment maintenance manager for the regional carrier LTI, uses tires embedded with RFID tags to track mileage, tread depth, tirewear, tire pressure, tire temperature, inventory and specific tires on specific wheel positions.[76] Michelin is embedding RFID tags into truck tires to discourage counterfeiters, and in aircraft tires to lengthen their life[77]. Goodyear is embedding RFID tags in race tires for NASCAR, to keep race teams from cheating.[78] Radio Frequency Identification can make tire identification transparent, accessible and it is in use today – under high-stress conditions.

Background and History

[72] Michelin Takes Action Against Counterfeit Tires; Press Release; Michelin; December 15, 2005
[73] China goes for the green: Imported lawn and garden tires are built with U.S. influences; Lori L. Mavrigian; Modern Tire Dealer; September 2006
[74] IBID
[75] Automotive Aftermarket RFID; MEMA Information Services Council White Paper; Chris Gardner; 2004
[76] Inside Information: RFID Technology Bolsters Tire Management; Steve LaFerre; Fleet & Tire; June 2004
[77] The B-11 Tire and Wheel Label and RFID Standard: Dr. Pat King's Cooperative Community; John C. Havens; Association for Automatic Identification and Mobility (AIM Global); May 4, 2006
[78] NASCAR Asks Goodyear and Psion Teklogix to Develop an RFID Solution for Tire Tracking; RFID Product News; July 2006

For more than a decade, the tire industry has been following and, in some cases, actively working on developing advances in RFID technology. In the mid 1990s, Texas Instruments was developing a glass capsule transponder hermetically sealed in a repair- patch-like molded "pocket." The electronics supplier was also testing transponders molded into a tire to NHTSA endurance specifications.[79] Tire giants Bridgestone Firestone and Goodyear were developing their own RFID tire tags. BFS announced the development of a prototype "active" computer chip capable of providing "real-time information" on tire temperature and inflation pressure.[80] Goodyear used a $2 million grant from the U.S. Department of Defense to expand the uses of its smart chip to read air pressure, internal temperature and revolutions per mile.[81] Industry segments such as commercial fleet tire dealers were anticipating RFID as a boon to their sales staff, allowing them to quickly determine the life left in a fleet and make recommendations to fleet buyers.[82]

The effort to apply RFID to passenger tires surged in 2000, but sputtered after the project lost Ford as a major sponsor. According to Pat King, Michelin's global electronics strategist, Michelin and other tire makers were working to develop an RFID standard to support Ford – then a leader and a funding source.[83] The automaker was "responding to a public commitment made by then CEO Jacques Nasser to the American Congress in an 'up' economy." King said in a 2006 interview. "What changed everything was that, just as feasibility was in hand, the tragedy of September 11 hit all of us. The economy sank, Jacques Nasser was replaced and the American Congress went to war. The advancement of RFID within the tire and automotive industry went leaderless from 2002-2003."[84]

The advancement of RFID in tires faced other challenges. Michelin outlined the technological and financial issues in a 2005 presentation,[85] noting that the tire is an unfriendly environment for RFID because of its flexibility, high curing pressure and temperature, and because the tire materials disturb RF transmissions.[86] It also pointed out that electronics would have to be low-cost for passenger tires and that standards would have to be worldwide.[87]

In 2003, Michelin stepped forward as a champion of RFID technology. The French firm moved to the forefront of an effort to create a technological standard for RFID chips.[88] The manufacturer also began an 18-month fleet test of RFID tags in taxis and rental cars with the first chips to meet the Automotive Industry Action Group's B-11 standard for North America, which

[79] Tire Talk Becoming Sophisticated; Sigmund J. Mikolajczyk; Tire Business; May 30, 1994
[80] The Computer Tracking Age: 'Active' Chips to Revolutionize Tire Marketplace; Chuck Slaybaugh; Tire Business; May 29, 1995
[81] IBID
[82] IBID
[83] Interview: D. Pat King 2006 Percival Award Honoree; AIM Global Inc.; March 14, 2006
[84] IBID
[85] Michelin and Interactive Tires; Powerpoint presentation; Michelin; November 2005
[86] IBID
[87] IBID
[88] Michelin seeks chip standard; Edmund Chew; Automotive News; January 27, 2003

calls for a read distance of 24 inches.[89] In 2007, it released an automatic tire-pressure sensing system that uses an RFID tag for limited production and market acceptance testing.[90]

On the retail side, Wal-Mart emerged as a catalyst to RFID adoption in all of its products – including tires. In June 2003, the retailer announced that by January 2005, it would require its top 100 suppliers to tag each pallet and case with an RFID tag.[91] The company said it hoped to have the system in use on pallets and cases at 13 distribution centers and in 600 Wal-Mart stores and Sam's Clubs by October 2005.[92] In 2004, Goodyear voluntarily joined Wal-Mart's pilot program. In this application, Goodyear affixed the RFID Tags to the tire exterior for inventory purposes only; the tag would be deactivated at the time of sale to avoid privacy concerns.[93]

Wal-Mart failed to meet its ambitious timeline. By 2007, Wal-Mart had an RFID system in place at only six distribution centers, but it used RFID technology in 1,000 stores. Out of more than 20,000 suppliers, only about 600 were using the technology, according to *Information Week*.[94]

Nonetheless, the RFID industry has surmounted these early obstacles in tires.

In the past five years, RFID manufacturers have been able to reduce costs significantly. In 2004, bar code tags cost less than a penny each while the readers cost $500 to $1,500. RFID tags were then priced at 20 cents to more than $1 each, with the readers starting at $3,000 each.[95] In 2004, Goodyear's Technical Marketing Manager for Commercial Tires put it thus: "We've tested RFID technology and it works. My only question is: are fleets willing to pay the extra $3 to $4 dollars per tire it takes to have the system?"[96] Industry sources say the current cost of a tire RFID tag has dropped to $0.89, and scanners are in the $250 to $650 range. The costs of implementing RFID into an assembly line vary depending on the level of automation in the tire factory, with costs growing if the existing process is highly automated, industry sources say.

Today, several companies are touting their RFID tire products. For example, AdvancedID Corporation has developed the RFID tags for NASCAR and is providing RFID patches for fleet users based on a Michelin design. Siemens is offering its TireIQ product. Developed with Goodyear and applicable to all tires, its capabilities include RFID for tire traceability and a read/write function to store tire data, like mileage. Schrader Electronics offers a tire pressure monitoring systems that employs RFID technology.

Applications

RFID has myriad uses in tires. The technology can be used to "relay information on the tire's internal air pressure, its operating temperature and, ultimately, how many miles it has run, what

[89] Michelin Embeds RFID Tags in Tires; RFID Journal; January 17, 2003
[90] eTire II; Michelin tire maintenance system evolves; Don Husat; Tire Business; January 29, 2007
[91] Case Study: Wal-Mart's Race for RFID; Mark Roberti; eweek Enterprise News & Reviews; September 15, 2003
[92] WalMart Rethinks RFID; Mary Hayes Weier; InformationWeek; March 26, 2007
[93] Goodyear joins Wal-Mart RFID pilot program; Justin Boyd; Rubber & Plastics News; April 19, 2004
[94] WalMart Rethinks RFID; Mary Hayes Weier; InformationWeek; March 26, 2007
[95] Future frequency; Despite hurdles, many companies look to profit from RFID tags; Andrew Dietderich; Crain's Detroit Business; June 28, 2004
[96] Inside Information RFID Technology Bolsters Tire Management; Steve LaFerre; Fleet & Tire; June 2004

repairs were made to it and how many times it was retreaded." [97] It can also be used to track tires as they move from manufacturer to wholesaler to dealer to consumer, to aid in launching a successful recall. More than five years ago, automakers were sizing up RFID's potential for identifying defective tires in a recall. In 2001, Dave Wood, engineering group manager for tire engineering in General Motor Corp.'s Tire-Wheel Systems Group, noted that their use was evolving from setting tire/wheel assembly equipment like balancers and inflators to the proper specifications, to identifying specific defective tires for recall purposes.[98] Ford was among the first major automakers considering using RFID for their "customer satisfaction programs."[99]

RFID tags can either be applied to the sidewall or embedded in the tire. The latter required tiremakers to develop a method of molding RFID tags into the tires in a way that would not interfere with the functioning of the tire, with a signal that could be read through rubber. In 2003, Michelin began field-testing the efficacy of its process of embedding an RFID transponder in tires.[100] Meanwhile, Goodyear was working on matching tag and compatible rubber composition to get the read range into the 12" to 15" range for the handheld reader, because tires often have to be read when stacked vertically 10 or 12 tires high. The carbon black formulation and metal radial layer of the tires tends to impede RFID transmission, and any excessive noise would cause inaccuracies or slow down tag reading. Goodyear's current tag has a proprietary chip and two antennas, and reading the tags is a very fast process.[101]

With mature technology in hand and lower product costs, RFID is filtering slowly into the tire population. Commercial truck and aircraft fleets are now using RFID tire tags to manage their inventories. For three years, NASCAR has provided a proof of concept, with RFID-embedded Goodyear tires providing tire-tracking capabilities under punishing race conditions.[102]

Standards

In 2000, the Automotive Industry Action Group began work on a Tire and Wheel RFID standard at the request of Ford Motor Company. The Explorer/Firestone tire recalls had exposed the need to develop a better means of tracking individual tires. The group included representatives from the Department of Defense, DaimlerChrysler, Goodyear, General Motors, Ford Motor Company, Michelin, and Honda. In a Powerpoint presentation on the development of what became the B-11 standard, Bill Hoffman, chairman of the AIAG B-11 RFID Workgroup noted that the current system only allowed the tracking of lots by the week-of-production date code in the TIN and outlined the basic need as "some way of tracking *individual* tires" because current practices "did not provide sufficient resolution needed to solve a critical tracking and traceability problem." [103]

[97] The Computer Tracking Age: 'Active' Chips to Revolutionize Tire Marketplace; Chuck Slaybaugh; Tire Business; May 29, 1995
[98] Automakers Eye Tags in Car Tires; Computer Chips Would Aid Tracking for Recalls
[99] Ford Mulls Tire ID Tags; Sherri Begin; Crain News Service; December 3, 2001
[100] Michelin Embeds RFID Tags in Tires; RFID Journal; January 17, 2003
[101] NASCAR Asks Goodyear and Psion Teklogix to Develop an RFID Solution for Tire Tracking; RFID Product News; July 2006
[102] Advanced ID Gets Contract for NASCAR RFID Tire Tags for 2008; RFID News; October 3, 2007
[103] The B-11 What Is It? Powerpoint presentation; Bill Hoffman; AIAG B-11 RFID Workgroup; August 23, 2007

In February 2002, the working group produced the first B-11 unveiled a tire- and wheel-tracking standard that included a protocol for RFID.[104] Under the new standard, B-11, the RFID would include the Department of Transportation's Tire Identification Number. The standard did not specify how the tag would be molded or mounted into the tire. By October of that year, the working group had produced an RFID wheel standard. Since them, 25 million B-11 tags have been affixed to OEM tires annually. In the meantime, the group released a revision in May 2005[105] that supported the 96-bit numeric EPC global data format preferred by Wal-Mart Stores Inc., the Defense Department, and others. [106] By October 2006, a second revision provided the first item-level RFID identification standard usable by both industrial and retail sectors. Using hardware upgrades and new data/syntax standards, new standard allowed one tag to handle different data streams for retail and industrial use. In 2007, the AIAG began a seventh revision to make B-11 a global standard.[107]

Many regard the development of a global standard as a significant step toward reducing RFID costs, which remains the biggest impediment for widespread adoption, by increasing the volume demand.[108]

Privacy Concerns

Amid enthusiasm for RFID's potential to accurately track t-shirts and beef cattle or allow EZ-Pass holders to skirt the lines at tollbooths, are growing concerns for individual privacy rights.

Groups such as the Electronic Privacy Information Center (EPIC), the American Civil Liberties Union, Consumers Against Supermarket Privacy Invasion and Numbering (CASPIAN) and Ralph Nader's Consumer Project on Technology are lobbying for privacy protections. They fear that RFID technology is coursing through the commerical sector, without much thought to the privacy implications. In comments to the Federal Trade Commission, EPIC raised questions about who should be allowed to collect data and to what extent; the standards and guidelines for sharing the data and consumers' right to either challenge the collection of data or to correct erroneous data and the security of the data.[109]

"RFID technology significantly expands the range and function of global, electronic databases of all kinds. Because both the tag and the reading process can be virtually silent and invisible, RFID, if left unregulated, would permit a wide range of public and private covert, database-linked surveillance, tracking and profiling applications whose operation will be invisible and remain unknown to the person under observation. The significance of RFID lies in the expansion of the global electronic network from a web of computers to a global web of physical objects and computers,"[110] EPIC noted in written comments.

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[104] On track ; AIAG unveils tire identification standard; Sherri Begin; Rubber & Plastics News; March 4, 2002
[105] The B-11 What Is It? Powerpoint presentation; Bill Hoffman; AIAG B-11 RFID Workgroup; August 23, 2007
[106] Michelin Expands RFID Tests; Information Week; Laurie Sullivan; October 12, 2004
[107] The B-11 What Is It? Powerpoint presentation; Bill Hoffman; AIAG B-11 RFID Workgroup; August 23, 2007
[108] Challenges to global RFID adoption; Technovation; N.C. Wu; M.A. Nystrom; T.R. Lin; H.C. Yu; December 2006
[109] Comments of the Electronic Privacy Information Center to the Federal Trade Commission Workshop on RFID: Applications and Implications for Consumers; June 21, 2004
[110] IBID

In 2003, for example, CASPIAN promoted federal legislation calling for mandatory disclosures on consumer products containing RFID chips in the US. The RFID Right to Know Act of 2003 would require companies to label all products that contain RFID tags, and it would make it illegal for companies to link the chips with personally identifying information.[111] While CASPIAN's proposal didn't find much traction, the issue has attracted the attention of federal and state lawmakers, who, in the past three years, have introduced other legislation to restrict the use of RFID.

Most of the activity has occurred in state legislatures. At least 17 states have debated bills restricting RFID – or an a few cases, promoting the technology – or formed task forces to study it. The privacy rights bills typically try to bar the use of RFID in certain contexts, such as government-issued documents, like drivers' licenses and library cards.[112] The most successful measures have been aimed at the extreme end of RFID uses. At least three states – Wisconsin, North Dakota and California – have banned employers from forcing employees to be implanted with an RFID device.[113]

A recent unsuccessful bill in Washington State is more typical. The Electronic Bill of Rights, which would restrict how RFID could be used to protect consumer privacy. The bills requires a person to first obtain consent from a consumer before it can "collect, maintain and disclose information gathered by an electronic communication device."[114] (This bill died in committee last session.)

Legislative activity on the national level has been a little quieter. In September, Congress passed a Food and Drug Administration bill requiring that various industry segments and government departments ensure effective tracking standards for pharmaceutical products. Last year, Sen. John Cornyn (R-TX) and Sen. Byron Dorgan (D-ND) formed the U.S. Senate RFID Caucus to work with government agencies, research institutions, non-profits and corporations to examine the national security and industrial applications, international and state perspectives, standards, and privacy and security issues.[115] In 2004, Senator Patrick Leahy (D-Vermont) held Congressional hearings on the issue, followed by a Federal Trade Commission workshop in June on the applications and implications of RFID technology. To date, the caucus, working with the RFID Technology Council, has convened quarterly meetings to discuss and share information on various RFID applications. Its aim, says a representative from Senator Dorgan's office, is to help the industry to develop without government interference.

Conclusion

[111] Consumer Group Unveils RFID Labeling Legislation; Press release; CASPIAN; June 11, 2003
[112] 2006 Privacy Legislation Related to Radio Frequency Identification; National Conference on State Legislatures; November 29, 2006
[113] N.D. bans forced RFID chipping; Marc L. Songini; Computer World, April 7, 2007
[114] Washington State Representative Introduces RFID Legislation; Mary Catherine O'Connor; RFID Journal; February 27, 2007
[115] RFID Technology Council to Support Senate RFID Caucus; Press Release; RFID Technology Council; January 18, 2007

Improving tire safety requires an identification system that works wherever tires are purchased, installed, and serviced. The Tire Identification Number (TIN) has proved to be an inadequate tool on many levels. As the linchpin of the tire recall system, the TIN is a failure, as the many problems of tire retrieval, registration, and identification at the service level attest. The TIN is also unsuccessful as the only indicator of tire age. Consumers and service providers can't adhere to tire age and service life recommendations unless a tire's date of manufacture is readily accessible and understandable. Embedding it within the TIN's 11-symbol alphanumeric code impedes these safety goals. In the case of used tires, the TIN is a meaningless measure and the controversies surrounding their safety will continue unless there is accountability and transparency in the business.

The industry has already recognized – in one form or another – the inadequacies of the current TIN-based system. Automakers have called for individual tire identification to aid in recalls. Auto and tire manufacturers have acknowledged the safety issues surrounding aged tires, and the Rubber Manufacturers Association has taken a position by identifying the hazards posed by used tires. Used tire sellers have responded by conceding a need to "raise the bar." These discrete steps toward improved tire safety amount to an industry consensus that a solution is needed.

Tire manufacturers have been experimenting with RFID tags since the mid 1990s, and from the outset, proponents have touted their potential to provide individual tire identification and tire tracking for a host of purposes, from tire safety to fleet management:

- RFID tags can close the gaps in the tire recall system. By providing a quick and easy way to identify recalled tires, RFID tags can save lives and reduce the recall costs and liability for tire manufacturers.

- RFID can provide a means to determine a tire's age. A check of the date of manufacture can become part of an auto service technician's automated diagnostic routine.

- RFID brings transparency to the used tire business. With individual tire tracking capability, tire sellers can do a more credible job of truly certifying a tire's soundness for re-use.

- RFID improves inventory control. RFID tags can eliminate the need for multiple bar codes and labels, improve inventory management by providing the complete history of tires and for ensuring safer re-treading for truck tires.

- RFID tags can prevent counterfeiting and tire theft by providing each tire with an individual identification and provide fleet managers with a tool to improve maintenance.

In the last decade, RFID technology has matured. Mainstream retailers and the Department of Defense are using RFID everyday to maintain inventory control. But implementation in tires has faltered. Leadership is required by both government and industry to adopt RFID – a known, low-risk technology.

- Tire makers should commit to a near-term phase-in of RFID tags into truck and passenger car / light truck tire lines and adherence to the B-11 standard.

- The Department of Defense, an early adopter of the technology and a leader in tire aging safety (and shelf-life), should establish a MIL-spec for RFID in tires.

- Government regulators and policymakers must encourage and support a rapid transition to RFID in tires. Congress should set a timeline for rulemaking that would ensure that this issue remains among the agency's highest priorities. The National Highway Traffic Safety Administration should likewise be preparing to set a new course for recall regulations with the preliminary goal of bringing the tire recall completion rate – at the very least – on par with vehicle recalls. Then, the agency should aim higher.

Carolyne Thorne, Michael Enriquez, William Moreno, Fertune Blanchard, Gregory Wilkerson, Mustafa Howeedy, and Carolina Garcia are the casualties of a failed tire recall system and the industry's inconsistent approach to tire safety. Perhaps in the past tire- and automakers could claim ignorance of the dangers of aged and used tires. Thirty years ago, the tire recall system might have been adequate. But we can no longer maintain that either is the case. RFID creates the strong link that can't be broken – no matter how far and wide a tire might travel from the factory into the marketplace.