Michelin Group & Intelligent Tires
Pat King, Michelin
Example of a Pie Chart

Michelin RFID Solution Space

Industry Leaders:
- Airbus/Boeing

Tire Industry
- Competitors

Customers
- Manufacturers
  - Automotive
  - Truck
  - Aircraft
- Wal*Mart, DoD

Internal Needs
- Manufacturing
- Distribution

Regulations
AIAG B11 – History Automotive Industry Action

- 20 Feb 2001 – First AIAG Tire and Wheel Identification task force meeting was convened.
- 15 Feb 2002 - B-11 standards for RFID Logistics established.
- 6 Jan 2003 Michelin announces commercial solution.
- 31 March 2004 Michelin petitions to reopen B11 and make it ePC compliant.
- 18 May 2004 AIAG and ePC work together to complete revised B11 that complies with EPC.
- Expected 2005 – Migration to ISO 18000-6c
Key Michelin Role: Rfid Standards Linked to Tires Migrating to Single Standard

  - B-11 (AIAG Tire and Wheel Standard)
  - ePC (Class 0 and Class 1) (Electronic Product Code for Retail)
  - ISO-18000-6 a,b (International Standard for Logistics)

  - ePC UHF Gen 2 / ISO 18000-6c

- Michelin Lobbied in 2004
  - Asia- JATMA, Korea, China Sparkice (Bridgestone, Yokohama, Toyo, Sumitoma, Sharp, Omron, Inter-Active, Taechu
  - Europe- VDA , ITA, Germany, Galia France (VW,BMW,Audi) Odette
  - US- AIAG, DoD , FAA (Boeing/Airbus) (Goodyear, Continental. Pirelli, Firestone)
  - International- ePC, UCC.EAN, AIM Global (REG)
If you have this:

You might not need this:

Or these:

**TODAY MICHELIN APPLIES UP TO 12 OPTICAL MARKS FOR OE’s**
When should you commission an RFID tag?

Value requires embedding early. 2005 early applications likely “slap and ship” driven by retail and supply chain

- **Embedded in Packaging**
- **Applied During Manufacturing**
- **Applied During Inbound Logistics**
- **Applied During Outbound Logistics**
- **Applied at Point of Sale**

Today “Slap and Ship” (Wal*Mart, DoD)

Michelin Solution

“Cost” per tag to commission
• Chemistry of tire and environmental conditions required development of a special label
  • Tire manufacturers worked with Intermec to produce this new label.
• Ultimate test
  • Tires packed tightly in truck or container
    • Heat
    • Vibration
  • Shipped across country
Integration - RFID Label

- Where should the tag be affixed?

Unreliable Reads

Uniform and Reliable

Works in Stack
• Tag during building process
Starting point is the Philips UCode RfID chip. Use at 915MHz
  • SOP Package adds robustness during curing
  • Requires Antenna
915 MHz Smart Label
• Several iterations attempted
  • Straight wire – extension forces transmitted directly to the chip
  • Serpentine wire – reduced extension forces transmitted directly to the chip
  • Helical wound antenna
Licensed Global Electronics Suppliers to insure availability

- 6 Jan 2003 Michelin announces commercial solution.
  - AWID - Part Number # APT-2024
  - Sharp Electronics (when Japan market starts)

- Waiting for customer pull
Permanent patch provided by Patch Rubber Inc.

- Part Number # 98270
Integration – Rfid Patch

- Rfid placed into a standard balance pad
- Leverage existing expertise - similar to patch used for tire repair
• RfID is cured in tag
Lessons Learned
RFiD Tags (cured-in, label, pallet)
<table>
<thead>
<tr>
<th></th>
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<th>Availability of Components</th>
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<tbody>
<tr>
<td>![Y]</td>
<td>![N]</td>
<td>Design for Tag and Industry Standard</td>
</tr>
<tr>
<td>![Y]</td>
<td>![N]</td>
<td>Worldwide Commercial Suppliers</td>
</tr>
<tr>
<td>![Y]</td>
<td>![N]</td>
<td>Repair Solution (patch, label)</td>
</tr>
<tr>
<td>![Y]</td>
<td>![N]</td>
<td>Variety of Handheld and Fixed Readers all Frequency Agile</td>
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<tr>
<td>![?]</td>
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<td>Customers</td>
</tr>
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Apply at right time for you and your customer

Benefit to customer
Internal Benefit
Technology Cost

Time
$
SUMMARY-(Characteristics for Leadership)

- Sense of Global Direction for Technology (Indication that Retail will drive global implementation to their benefit)
- Sense of End-to-End Potential (Synchronization begins with Item Serialization hence EPC codification)
- Strategic Corporate Orientation (No success stories are grass roots or skunk works)
- Sense of need for standards among supply base vendors (Win-Win requires broad implementation)
- Establish Multiple Pilots (trials and pilots required to complete understanding, studies are not enough)
We favor an RFID “single standard” solution including migration to EPC codification.

- We are aggressively working to condense these standards into a “single standard” likely ISO 18000-6c (ePC Gen 2).

- We are aggressively developing RFID capabilities both as a supply chain tool and as added value to our products.