VOLVO

Experiences of RFID implementations

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Experiences of RFID implementations

The Volvo Group Organisation

AB Volvo

Mack Trucks
Renault Trucks
Volvo Trucks
Buses
Construction Equipment
Volvo Penta
Volvo Aero
Financial Services

Volvo 3P
Volvo Powertrain
Volvo Parts
Volvo Logistics
Volvo Technology

Volvo Information Technology & Others

Develops new technologies and business solutions primarily for the Volvo group companies
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Agenda

• Fuel Tank Racks
  - An RFID project with issues
• Successful RFID implementations
• Conclusions
• Future
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Fuel Tank Racks project
### Project description

**FTR**

<table>
<thead>
<tr>
<th>Project name:</th>
<th>Fuel Tank Racks</th>
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<tbody>
<tr>
<td>Definition:</td>
<td>Pilot project</td>
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<tr>
<td>Project start:</td>
<td>2004</td>
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<tr>
<td>Status:</td>
<td>Ongoing</td>
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<tr>
<td>Involved:</td>
<td>Volvo Trucks, Volvo Technology</td>
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<tr>
<td>Objectives:</td>
<td>Enhance Volvo’s RFID competence</td>
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<td></td>
<td>How to use the new data</td>
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<td>Evaluate the benefits</td>
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<td>Assignment:</td>
<td>Problem analysis for fuel tank rack-flow</td>
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<td>Concept Development</td>
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<td>Implementation</td>
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<td>Evaluation &amp; proof-of-concept</td>
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<td>Report</td>
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Detailed project description

**FTR**

- Find a suitable closed flow
- Possible RFID technologies
  - Frequency to use:
    - 13.56MHz
    - UHF
- Information to be stored:
  - Centralized
  - Decentralized
- Memory size of tag
- Information to provide:
  - What fuel tanks are loaded on which rack?
  - Deviation report
  - Location of racks
  - Rack cycles
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Technical solution

**FTR**

- On forklift
  - Antenna
  - Reader
  - On-board computer
- On racks
  - One RFID tag
    - 868 MHz (UHF)
    - Passive
    - RO
    - 96 bits memory
- Read range
  - Max 2
  - Decreased read range due to moist and metal environment
- Software
  - Forklift, Web, PDA and server applications
Lack of experience and no established UHF standard at the time:
- PDA
  - Undeliverable
- Tags
  - Design of the tags
  - Mounting of the Tags
  - Broken Tags
  - Reading range
  - Decreased number of successful readings
Possible reasons and continuation

**FTR**

**Reasons**
- Timing of the UHF technology
- Maturity
  - Standards
  - Hardware
- Little Swedish experience of this technology

**Continuation**
- We will continue with a 6 week test
  - New hardware
  - Upgraded software
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Successful RFID projects
REST - Time Stamp project

- Time control of transports on a flow to the Port of Göteborg
- Security and Efficiency purpose
- Started and finished during 2006
Other examples

- Electronic Container Seal
  - Green Lane through customs
  - RFID container security device
- Cab factory in Umeå, Trim Shop
  - Track cabs along assembly line
  - Hands on experience

Source: http://www.volvo.com
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Conclusions
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Wisdoms drawn from the projects

- Analyze your case and your needs carefully
  - Do not use RFID if there is a less complex alternative
- Process analysis and improvement
  - Technology can not solve a process issue
- Choice of technology
  - Choose technology according to your problem, not a hype
  - Mature RFID technology
    - UHF on-metal tags
  - Access to hardware
- Beware of what environmental issues you are facing
  - Properly encapsulated tags
- Expect readers to be ‘plug and pay’ as you will need to maintain and/or upgrade them
- No two sites are the same so you need to test and refine RFID application at every site
- Thorough choice of RFID supplier
  - Prior experience of a similar solution
- Standards
  - Development
  - Open or closed flow
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**Reader/antenna effect**
- Europe, limited to 2.0 W
- USA, limited to 4.0 W
- Asia

**Environment**
- Liquids absorb radio waves
- Metal reflects radio waves
- "Noise" affects radio waves

**Tag technology**
- Passive
- Active
- Semi

**Reading Range**
- Increases with higher frequencies
- Increases with active/semi active tags
- Increases with higher effect
- Decreases in liquid environments
- Decreases in metal environments
- Decreases in electrical or radio noise

**Frequency**
- Low (125-134 kHz)
- High (13.56 MHz)
- Intermediate (433 MHz)
- Ultra High (860-960 MHz)
- Microwave (2.4-2.5 GHz & 5.8 GHz)

**Communication**
- Inductive coupling
- Backscatter system
- Two-way system

**Encapsulation**
- Material

**Standards**
- ISO
- EPCglobal (GS1)
- Odette

**Memory**
- Read Only (RO)
- Read & Write (R/W)
- Write Once Read Many (WORM)
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Delivery 1st tier suppliers 2nd tier suppliers

Inbound flow Assembly

Recycling Usage Outbound flow
Thank You

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