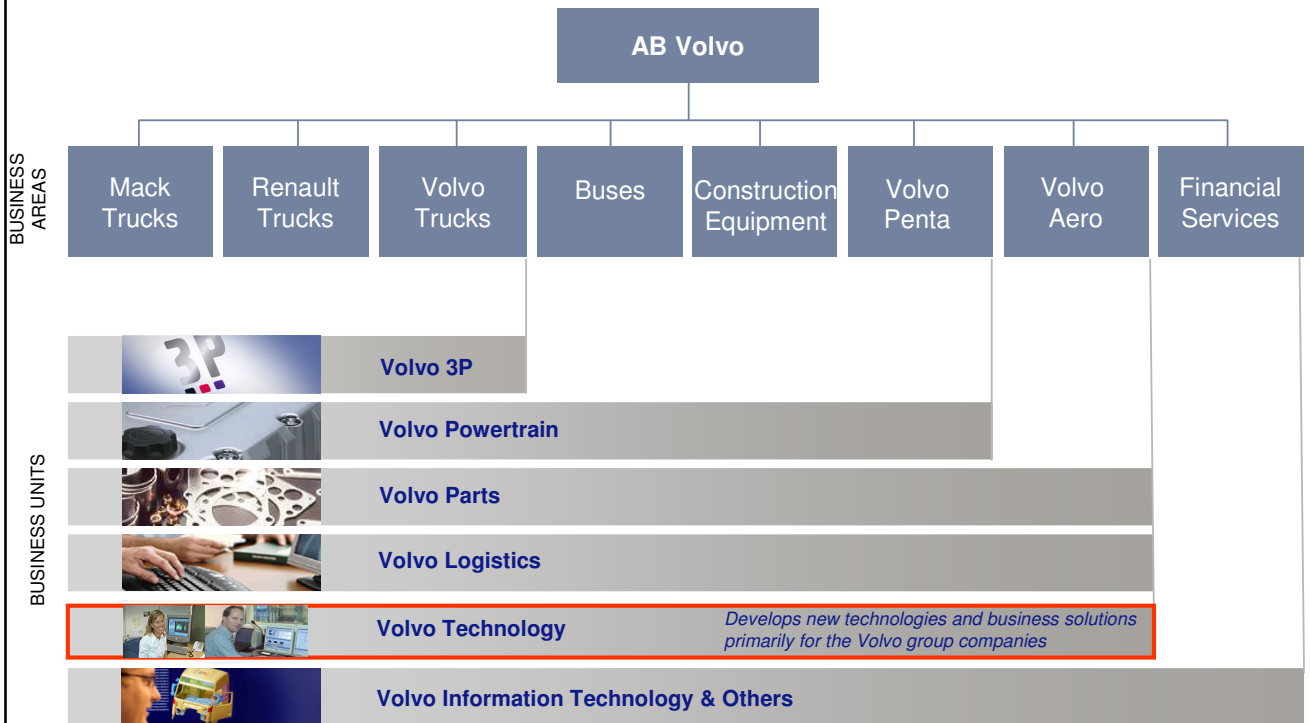


VOLVO

Experiences of RFID implementations

2007-04-25

The Volvo Group Organisation



Agenda

- Fuel Tank Racks
 - An RFID project with issues
- Successful RFID implementations
- Conclusions
- Future



Fuel Tank Racks project



Project description

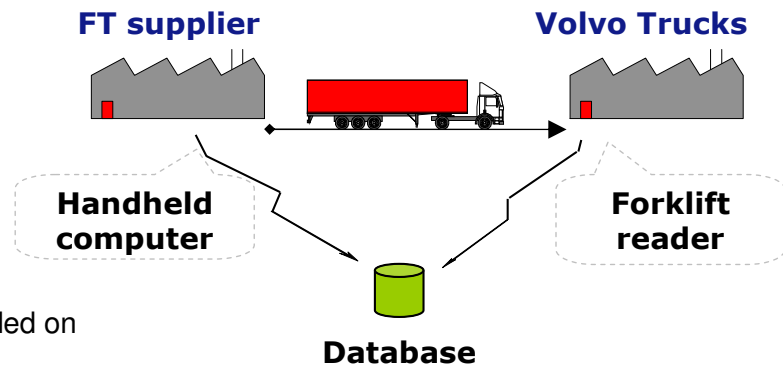
FTR

Project name:	Fuel Tank Racks
Definition:	Pilot project
Project start:	2004
Status:	Ongoing
Involved:	Volvo Trucks, Volvo Technology
Objectives:	Enhance Volvo's RFID competence How to use the new data Evaluate the benefits
Assignment:	Problem analysis for fuel tank rack-flow Concept Development Implementation Evaluation & proof-of-concept Report



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



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

Chassis Nr	Needed in production at	Article Id	Loaded at	Unloaded at
611193	2005-10-05 06:47	20503514	2005-09-28 23:26	2005-10-01 16:59
611193	2005-10-03 06:51	20503503	2005-09-28 23:26	2005-10-01 16:59
611171	2005-10-03 06:52	20566795	2005-09-28 23:26	2005-10-02 23:57
611194	2005-10-03 07:05	20503514	2005-09-28 23:26	2005-10-01 17:01
611194	2005-10-03 08:01	20503503	2005-09-28 23:26	2005-10-01 17:01
611172	2005-10-03 07:06	20503510	2005-09-29 02:26	2005-10-01 17:02
611173	2005-10-03 07:20	20503516	2005-09-29 02:26	2005-10-01 17:04
611173	2005-10-03 07:20	20503506	2005-09-29 02:26	2005-10-01 17:05
611242	2005-10-03 10:32	20503505	2005-09-28 23:26	2005-10-01 17:07
611195	2005-10-03 10:47	20503505	2005-09-29 02:26	2005-10-01 17:08
611243	2005-10-03 10:51	20503505	2005-09-28 23:26	2005-10-01 17:10
611244	2005-10-03 11:05	20503516	2005-09-28 23:26	2005-10-01 17:13
611244	2005-10-03 11:05	20503517	2005-09-28 23:26	2005-10-01 19:11
611196	2005-10-03 11:06	20503517	2005-09-29 02:26	2005-10-01 19:15
611245	2005-10-03 11:49	20503508	2005-09-28 23:26	2005-10-01 19:16
611197	2005-10-03 11:50	20503510	2005-09-29 02:26	2005-10-01 19:18
611246	2005-10-03 12:03	20503508	2005-09-29 09:14	2005-10-01 19:19
611246	2005-10-03 12:03	20503516	2005-09-29 09:14	2005-10-01 19:21
611198	2005-10-03 12:04	20504000	2005-09-29 02:26	2005-10-01 19:22
611247	2005-10-03 12:17	20503508	2005-09-29 09:14	2005-10-01 19:24
611247	2005-10-03 12:17	20503516	2005-09-29 09:14	2005-10-01 19:24
611199	2005-10-03 12:18	20503505	2005-09-29 02:26	2005-10-01 19:26
611248	2005-10-03 12:31	20503514	2005-09-29 09:14	2005-10-01 19:27
611200	2005-10-03 12:32	20504495	2005-09-29 02:26	2005-10-01 19:29
611249	2005-10-03 12:45	20504489	2005-09-29 09:14	2005-10-01 19:30
611249	2005-10-03 12:45	20504494	2005-09-29 09:14	2005-10-01 19:31
611201	2005-10-03 12:46	20503505	2005-09-30 01:11	2005-10-01 19:32

Implementation issues

FTR

- 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



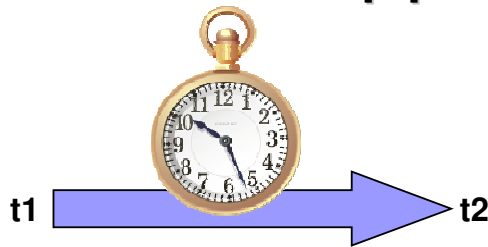
Successful RFID projects



REST - Time Stamp project



Volvo Terminal Arendal



$$t2 - t1 > \text{ETA} = \text{Alarm}$$

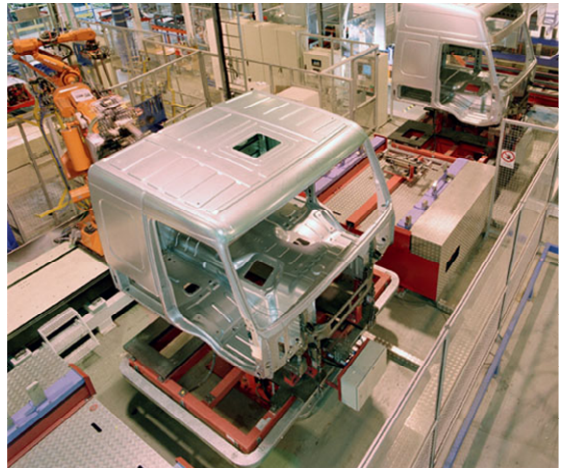


Port of Göteborg

- 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>

Conclusions

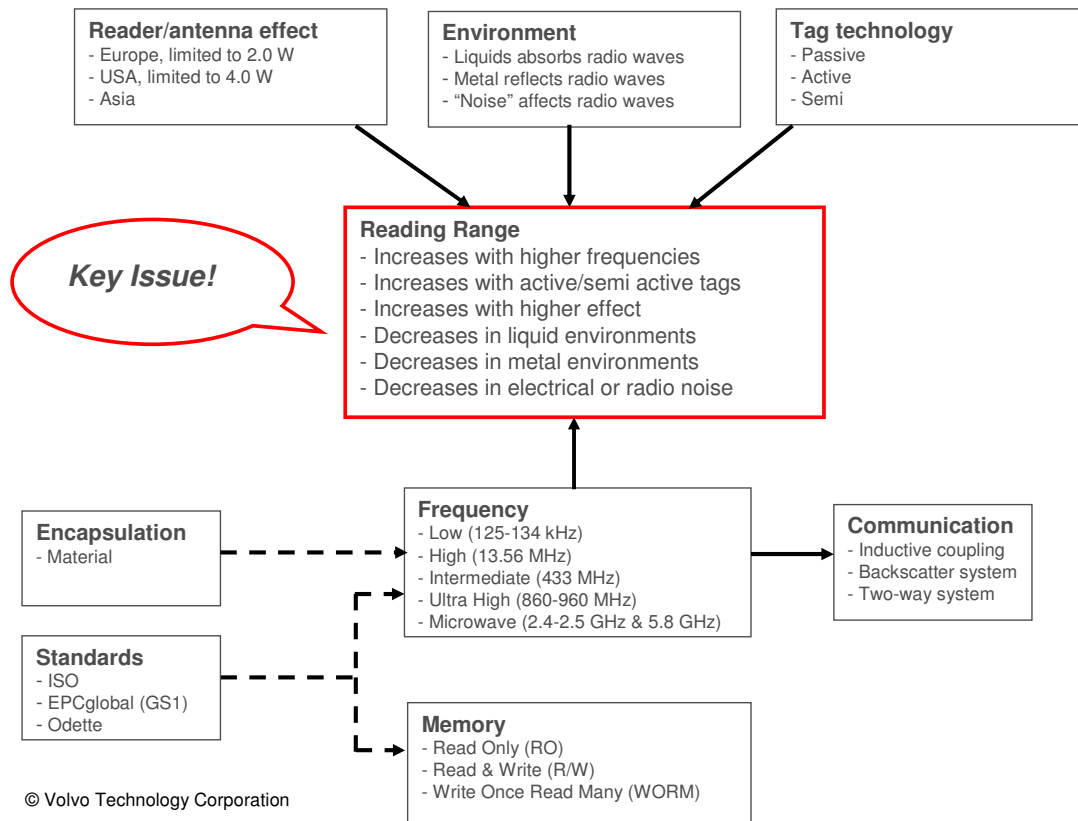




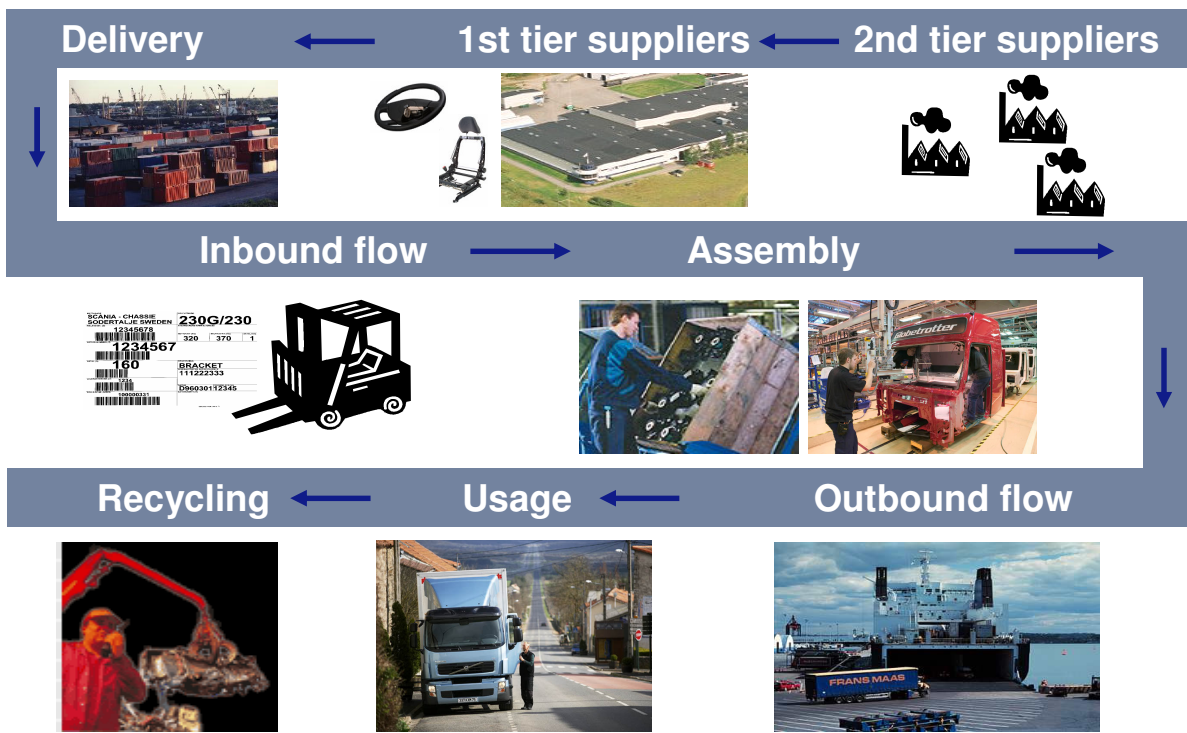
Wisdoms drawn from the projects

- 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 your 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

Experiences of RFID implementations



Experiences of RFID implementations



Thank You



For more information, contact:

Annika Strömdahl
Volvo Technology Corporation
annika.stromdahl@volvo.com

Stina Apel
Volvo Technology Corporation
stina.apel@volvo.com