Opportunities and Challenges for RFID-Integration in the automotive industry

RFID Seminar Odette, Lindholmen Science Center, Gothenburg

BIBA-IPS at the University of Bremen
Intelligent Production and Logistics Systems

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The University of Bremen was founded in 1971.

Research and teaching are characterised by interdisciplinary as well as practice-oriented project studies - known as the „Bremen Model“ - which enjoys a high degree of acceptance in the academic world as well as in business and industry.

As the centre of science for North West Germany, Bremen University is a place of research for 1,700 scientists, a place of study for nearly 22,000 students, a place of work for more than 1,100 employees.

The University has 12 Faculties representing various sciences, among them the Faculty for Production Engineering.
Bremen Research Cluster for Dynamics in Logistics

LogDynamics

Physics / Electrical Engineering
Mathematics / Computer Science
Production Engineering
Logistics
Business Economics

Research

Education

Application

SFB 637
Autonomous Logistics

LogDynamics
International Graduate School

LogDynamics Lab
SMEs

Enterprises

- Sole Proprietorships: 69.9%
- Limited liability companies (GmbH): 15.4%
- Partnerships (OHG-unlimited company, KG-limited partnership): 12.6%
- Other legal forms: 2.0%

Total number of all SMEs: 2,918,642
Survey about RFID Implementation in SME

- **Scope**
  - Interview with 150 SME
  - Replies from 35 Enterprises (online questionnaire)
  - Return rate 23%

- **Branch overview**
  - 43% logistics
  - 29% manufacturing
  - 11% retail
  - 3% package delivery service
  - 14% others

- **Opportunities**
  - 82% of the interviewed enterprises could imagine to implement RFID

- **Obstacles**
  - High costs
  - Lack of information
Expectations

- Internal process optimization: 85.7%
- New services/products: 22.9%
- Satisfy regulations: 17.1%
- Decrease of process costs: 57.1%
- Administration of machinery and equipment: 28.6%
Opportunities
Obstacles

- Technological obstacles: 28.6%
- Lack of standardisation: 22.9%
- High costs of transponder: 71.1%
- High costs of RFID hardware: 54.3%
- Lack of information: 37.1%
Possible fields of ICT usage in automobile logistics

**Automobile Manufacturer**
- vehicle localisation within own compound
- vehicle localisation outside own compound
  - elimination of search activities
  - high transparency of supply chain (T&T, QM)

**Automobile Logistics Provider**
- vehicle identification
- control of vehicle orders
- vehicle localisation
  - chaotic stock-keeping
  - elimination of search activities
  - high actuality of vehicle stock / permanent ability to provide information
  - high data quality
  - process acceleration because of automatic vehicle identification

**Automobile Trader**
- vehicle localisation
- vehicle tracking
  - high forecast accuracy of arrival date
  - high protection against theft
The Goal of RFID-Integration in Logistic Processes

Improvement of flow of information by RFID in logistic processes

Suppliers | Transport | Logistics | Production | Warehouse | Transport | Customers

Application of RFID-Technology
Cooperation project “Autonomous Control in Automobile Logistics” between E.H.Harms Automobile-Logistics and the University of Bremen.

Automobile logistics service provider for new and used vehicles in the range of transport, technical treatment, storage and handling of vehicles.


Europe-wide network with auto-terminals at strategically important traffic junctions.

Transport of vehicles between automobile manufacturer, auto-terminals and automobile dealer via vessel, rail and truck.

Investigation of several possible fields of application of RFID-Systems based on the processes of an idealised automobile terminal.
Every vehicle is fitted with a barcode label, that contains the Vehicle Identification No.

Documentation of vehicle movements via bar code scanner or keyboard.

Several weaknesses of manual data entry in the field of automobile logistics:
- Rain drops, condensate and snow on the windscreen makes scanning unreliable to impossible.
- Bar code labels bleach when exposed to direct sunlight.
- Incorrect or incomplete data acquisition and as a result high consequential costs.

Manual data entry via bar code scanner or keyboard is error-prone, time-consuming and concerning its quality dependent on the competence of the responsible employee.
Oppunities for improvement

Adoption of transponders provides many opportunities for improvement, for example:

- **Improvement of data quality** (complete and faultless date entry) -> automatically by transponder

- **Process acceleration** (immediate vehicle identification and passage documentation, bulk identification of entire truck loads)

- **Enhancement of process transparency** (correct vehicle identification, complete documentation of vehicle movements, up-to-date vehicle stock)

- **Cost savings** (decrease of costs resulting from faulty data entries, reduction of equipment cost through recycling of transponders)

- **Improvement of working conditions** (simplification of date entry tasks through more comprehensive and improved computer-aided support)

- Protection and improvement of the **market position** (development of competitive advantages due to early adoption of innovative ICT)
E.H. Harms

- Simplify inventory
- Locate cars
- Track treatment processes
Operation mode of the Hybrid-Solution

Vehicle locating (via GPS)

Vehicle identification (via passive transponder)

Data communication (via WLAN, GSM etc.)
Case Study 2 - ProLadung

Tracking & Tracing of Returnable Transport Items (RTI)

- Partners involved: Siemens Business Services, RedAnts, BIBA IPS
  - 3 project partners: Siemens Business Services, RedAnts, BIBA IPS
  - 2 pilot installations: DAIMLERCHRYSLER Bremen, LEAR Bremen.

- Scope:
  - 75 man-month,
  - Volume ca. 550,000 Euro.

- Public funding:
  - BIA – Bremer Innovations-Agentur
Task: Integration of RTI's and flow of material

Existing software for planning and control:
- Repair/Scrap
- Cleaning

Production Supply OEM:
- Delivery
- Buffer

Transport Supplier Logistics Center:
- • Component production
- • Loading of RTI's
- • Delivery
- • Buffer

Supplier:
- Dispatching loaded RTI's
- • Component production
- • Loading of RTI's

Assembly OEM:
- • Component dispatching
- • Withdrawal
- • Assembly

Transport:
- Dispatching Empty RTI's
- • Empty RTI's

Carrier External storage area:
- Empty RTI's

Loaded RTI's: Transport from Supplier Logistics Center to Assembly OEM

Dispatching loaded RTI's: From Supplier to Logistics Center

Empty RTI's: From Assembly OEM to Carrier External storage area

Transport Of RTI's: From Carrier External storage area to Production Supply OEM

Dismissing loaded RTI's: From Production Supply OEM to Supplier Logistics Center

Transport:
- Dispatching Empty RTI's
- • Empty RTI's
Seat supply cycle - schematic representation
Project goals

Improvement of process reliability
- Delivery of seats in sequence
- Loading of RTI's in sequence
- Delivery of RTI's to the right OEM
- Assembly of seats in correct order
- Reduction of costs and complexity

Real time accurate asset data (quantity, location, load) for RTI's
- Reduction of circulating assets
Seat and RTI tagging

RTI's are equipped with two transponders

Removable transponder for seat frame
Metal filled plastic boxes
Redundant layout

transversal

longitudinal

Returnable Transport Item

Transponder

Returnable Transport Item

Transponder
Metal filled plastic boxes

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Reader comparison RTI-tracking on a forklift
Reader comparison boxes on a forklift
Summary

• Avoid metal
• Keep your distance to metal
• Use air gaps
• Choose the right tags
• Choose the right reader
• Use onMetal tags (or active tags)
Static transponder tests

Transponder

Reader (Variable: Power)

Testing table made of Styrodur

1m distance
Overview of different on metal tags

- **EPC Gen2**
  - Confidex
  - Deister
  - Hitachi
  - Sokymat
- **ISO 18000-6B**
  - Caen
  - Deister
  - Sokymat
- **Atmel Tagidu**
  - Idesco
  - Harting
  - Stielow
Static transponder test results

Transponder reader rate vs. power [W ERP] for destination of reading 1m.
Planning Handbook

- Deduction of universal criterias which are relevant for the implementation of RFID in small and medium-sized enterprises

1. Demarcation of the application area
2. Problem description and definition of project aims
3. Type and specification of solution
4. Selection criteria for RFID-components
5. Integration into the IT-landscape
6. SWOT analysis
7. Stakeholder analysis
8. Cost benefit analysis

→ realization:
HTML/ web based planning handbook
Back to the survey – RFID implementation by when?
RFID Projects in Co-operation with Industries (SME)

- choose the right transponder
- every RFID project is special
- RFID is complex, that’s natural
- no plug `n` ident
- elaboration of case studies or realization of pilot projects meaningful
- knowledge and method competence as a result of complex planning and problems are necessary
Thank you for your attention!

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