How RFID changes the Processes
67 location’s in 10 brands and region’s
67 location´s in 10 brands and region´s
# Key economic figures - Volkswagen Group
## January - December 2009

<table>
<thead>
<tr>
<th>Volkswagen Group</th>
<th>2009</th>
<th>Changes last year in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery to customers</td>
<td>6,310 Mio. car´s</td>
<td>+ 0,6</td>
</tr>
<tr>
<td>Workforce (31.12.)</td>
<td>368,5 Tsd. employees</td>
<td>- 0,4</td>
</tr>
<tr>
<td>Annual turnover</td>
<td>105.187 Mio. €</td>
<td>- 7,6</td>
</tr>
<tr>
<td>Operational result</td>
<td>1.855 Mio. €</td>
<td>- 70,7</td>
</tr>
<tr>
<td>Result after tax</td>
<td>911 Mio. €</td>
<td>- 80,6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Global market (passenger car´s)</th>
<th>Mio. car´s. approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

- 10,0%
The Volkswagen Group - new Production Plants

- Kaluga
- Chattanooga
- Chengdu
- Nanjing
- Pune
RFID - Radio Frequency Identification

A radio-based object identification with chip technology (Transponder, mobile Datamemory...)

Volkswagen expects the following:

• optimized part handling
• more efficient logistic
• decentralized production control
• support of the new VW- Production System
• therefore we worked at:
  • Standards,
    and tested the technology with two pilot projects
• LeoPARD, LAENDmarKS
RFID – advantages

Technology for reading/writing and storage of information

Datenträger in unterschiedlichen Formen und Abmessungen verfügbar

Datenübertragung erfolgt drahtlos über Funk

Wiederbeschreibbar - keine Sichtverbindung erforderlich

Gleichzeitige Erfassung von max. 500 Teilen

Volkswagen Konzernlogistik
Ware registration until 1981
Ware registration since 1981
Ware registration in future
### Potential of RFID

<table>
<thead>
<tr>
<th>assembly control</th>
<th>logistic</th>
<th>quality</th>
<th>authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>scopes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• body shop</td>
<td>• container</td>
<td>• incorrect installation</td>
<td>• worker</td>
</tr>
<tr>
<td>• paint shop</td>
<td>• material flow</td>
<td>• installation documentation</td>
<td>• facility</td>
</tr>
<tr>
<td>• assembly</td>
<td>• parts</td>
<td>• quality risks</td>
<td>• ...</td>
</tr>
<tr>
<td>• production control</td>
<td>• CKD container</td>
<td>• prevention of plagiarism</td>
<td></td>
</tr>
<tr>
<td>• Finish-Centre</td>
<td>• truck tracking</td>
<td>• ...</td>
<td></td>
</tr>
<tr>
<td>• service process</td>
<td>• vehicle distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ...</td>
<td>• ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>potentials</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>assembly control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• automatic registration of bodies</td>
<td>• reduction of container inventory</td>
<td>• automatic control of quality</td>
<td>• increase of utilised capacity</td>
</tr>
<tr>
<td>• reduction of failures</td>
<td>• reduction of manual scanning</td>
<td>• reduction of failure consequential costs</td>
<td>• automatic documentation</td>
</tr>
<tr>
<td>• automatic registration of vehicles</td>
<td>• prevention of fixing new labels</td>
<td>• red. of recall-costs</td>
<td>• ...</td>
</tr>
<tr>
<td>• more efficiency in processes</td>
<td>• reduction of material stocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ...</td>
<td>• ...</td>
<td></td>
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</tr>
</tbody>
</table>

### Volkswagen Konzernlogistik

K-P | KONZERN-PRODUKTION | Logistics

K-PLL/R | M. Sprafke | October 2010 | Seite 11
RFID for Production, Distribution and Car Lifecycle

Vision: 1. Step
Integrated, automatic central production control
passive RFID Tags, only ID-number (1 KBit)

Production

Distribution

Aftersales

Supplier > Body shop > Paint > Assembly > Yard > Distribution > Dealers garage

Inbound - Logistic
Container level
PassiveTag
EPC Class1 Gen2

Inhouse - Logistic
Part level / BZD
Passive Tag
EPC Class1 Gen2

Outbound - Logistic
Car handling/RTL
Passive Tag
EPC Class1 Gen2

Plagiarism protection
Part recognition

I am VW RNS 510 and I can prove it!

Volkswagen Konzernlogistik

K-P KONZERN-PRODUKTION
RFID for Production, Distribution and Car Lifecycle

**Vision: 2. Step**

*Integrated, automatic decentral production control*

Passive RFID Tags, ID-number plus process data (4-8 Kbyte)

- **Production**
  - Supplier
  - Body shop
  - Paint
  - Assembly
  - Yard
  - Distribution
  - Dealers garage

- **Inbound - Logistic**
  - Container level
  - PassiveTag EPC Class1 Gen2

- **Inhouse - Logistic**
  - Part level / BZD
  - Passive Tag EPC Class1 Gen2

- **Outbound - Logistic**
  - Car handling/RTL
  - Passive Tag EPC Class1 Gen2

**Plagiarism protection**

I am VW RNS 510 and I can prove it!

Volkswagen Konzernlogistik

K-P KONZERN-PRODUKTION
RFID Standards
How automotive RFID standards are made?
Organization scenario

**Internal**
- Volkswagen
- AIAG organized by ODETTE
- JAMA-JAPIA by ODETTE
- ODETTE
- EPC Global
- ISO/IEC

**International**
- ODETTE
- EPC Global

**National**
- RFID Info e.V.
- LAENDmarkKS
- AK JIT
- Fraunhofer
- DIN NIA 31

**VDA**
- Project Parts/components
- Project Container
- Project Car distribution

**RFID committees internal / external**

Volkswagen Konzernlogistik
### RFID Application Areas - Standardisation

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Description</th>
<th>Standardisation</th>
</tr>
</thead>
</table>
| **Parts**        | Parts assembly documentation  
                 | Safety part, expensive parts  
                 | - track and trace | VDA/Odette 5510/B11 |
| **Car Distribution** | Distribution CP 8 until dealer  
                           | - common label for OEM  
                           | comprehensive data | VDA/Odette 5520 |
| **Container Management** | Container optimisation  
                           | - Automatic recognition | VDA/Odette 5501/JAIF |
| **Car Localisation** | Car localisation (RTL)  
                           | - Assembly  
                           | yard | Group internal standards necessary |
| **Production Control** | Production control  
                           | bodyshop, paint, assembly | Decentralized Production control |
| **Aftersales** | Part/Assembly/Drive documentation  
                  | - original part recognition | Group internal standards necessary |
Pilot project LeoPARD

The future in the automotive industry
Strategic objectives of the Project LeoPARD

RFID- Supply Chain

- RFID-test within the supply-chain together with 2 supplier

Process changes

Investigation:
- Widely elimination of manual handling
- Increase of transparency

Technical feasability

Check up of:
- Valuation of suitability
- Reliability

Best-Practices

- To design Best-Practices for the Group
RFID- forklift / RFID- Gate

Antenna’s

Terminal

RFID-Reader