An Electric Road System solution based on the railways experience

Patrick DUPRAT
First ERS P.O.C.: Slide-in project in Sweden

- Strategic Vehicle Research and Innovation program launched by the Swedish Energy Agency (SEA) in 2011

- Criteria requested by the SEA:
  - Power loss data
  - Economical data
  - Maintenance related data
  - Vehicle power requirement data
Why use APS technology on the road?

APS in operation since 2003 in Bordeaux, more than 40 millions km run in the 7 network equipped with this technology

The safety has been approved by 5 different Independent Safety Assessors and is demonstrated all the days in operation
P.O.C. in Sweden with Volvo

- Return current
- Live polarity
- Voltage barrier

Segment n-2  Segment n-1  Segment n
Loop n-1  Loop n  Loop n+1

Top view
P.O.C. in Sweden with Volvo

- Construction on Volvo’s test tracks in 2 phases (2012 & 2014)

- Powered section = 308m

- Test results

<table>
<thead>
<tr>
<th>Current collection test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>126kWatts 180Amps 690VDC transfer</td>
<td>✔</td>
</tr>
<tr>
<td>Truck speed more than 80km/h</td>
<td>✔</td>
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<tr>
<td>20km of continuous power transfer</td>
<td>✔</td>
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<tr>
<td>Rainy conditions</td>
<td>✔</td>
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<tr>
<td>Short circuits tests</td>
<td>✔</td>
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<tr>
<td>Track adherence tests</td>
<td>✔</td>
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</tbody>
</table>
ERS Architecture

ERS Communication Network

Rectifier/Transformer

750VDC

Return current

VHSCB

Control Cabinet

MV Loop

ERS Feeding track

Supervision

Power Box

Buried Multitubular

Control Unit

RCCS/Safety Emitter

Smart Sensor

Emergency lane

ERS Feeding track

Slow lane

Fast lane

Fast lane
ERS Power Supply Architecture

- DC+
- Neutral (current return)
Conclusion

Strengths of this ERS solution:

- Experience from tramway application and System approach
- 100% safe
- High power transfer
- High efficiency (97% for the power transfer)
- Compatible with all type of vehicles (from HDV to LDV and cars)
- Aesthetic (no obstacle)
- No gauge limitation
- Easy integration in the road and in the vehicles
- Very low maintenance needs
- Standardization in progress (CENELEC)
Demonstration project in Sweden (Trafikverket)

Project Organization:
- Answer within a consortium via a Swedish legal entity called “VästSvenska Elvägar AB” equally shared by Alstom, Volvo and NCC

Other main Swedish Partners:
- RISE: Project evaluation
- Business Region Goteborg (Marketing/Communication)
- Azta Zero (Test Road Operation)
- Chalmers

Alstom’s subcontractors:
- IFSTTAR: Infrastructure
- FAAR Industry, Mersen: on-board equipment
- Doshin Rubber: ERS track
- CEREMA: Winter Maintenance
Demonstration project in Sweden (Trafikverket)

For the demonstration, we have chosen an authentic road environment for the road freight transport. It will be on an highway section with a significant volume of traffic and with a very visibility for the visitors:
Conclusion
Thank you very much for attention

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