

Slide-in Sweden: Conductive ERS

ASSOCIATED PROJECT

The Slide-in test track in Sweden is a conductive Electric Road System (ERS) prototype that have been used as a FABRIC benchmark

Overview /introduction

Volvo Group Trucks Technology together with Volvo Cars jointly operates a test facility (Hällered) outside Gothenburg, Sweden. Here a conductive on-road charging prototype have been built as part of the Slide-in project partly sponsored by the Swedish Energy Agency. The results of the technology evaluation from the Slide-in project have been provided to FABRIC.

Objectives /methodology

- The Swedish tests site was an already existing test site dedicated to heavy trucks and no modification have been made within FABRIC.
- The tests planned in this test site gave input to design and testing activities in the FABRIC project.
- To be able to support cars, potential adaptations of the system have been identified in a theoretical feasibility study.
- Additionally it allows to benchmark the conductive technology implemented by Volvo and Alstom.

Testing and Evaluation activities

In Slide-in phase1, the overall project evaluated costs and implementation potential of introduction of an electrical road for the distance Gothenburg to Stockholm. Included in the Phase 1 was also the development work of road components, conduction of vehicle tests with dump load, i.e. no hybridization. The goal was to provide a proof of concept of the road to vehicle power supply and to evaluate and document the energy efficiency of the transfer of power between road and vehicle. In phase 2 of the Slide-in project new roads was analyzed and a new pickup design was integrated in a hybrid truck. More knowledge was gained about energy efficiencies, installation costs, maintenance costs and safety.

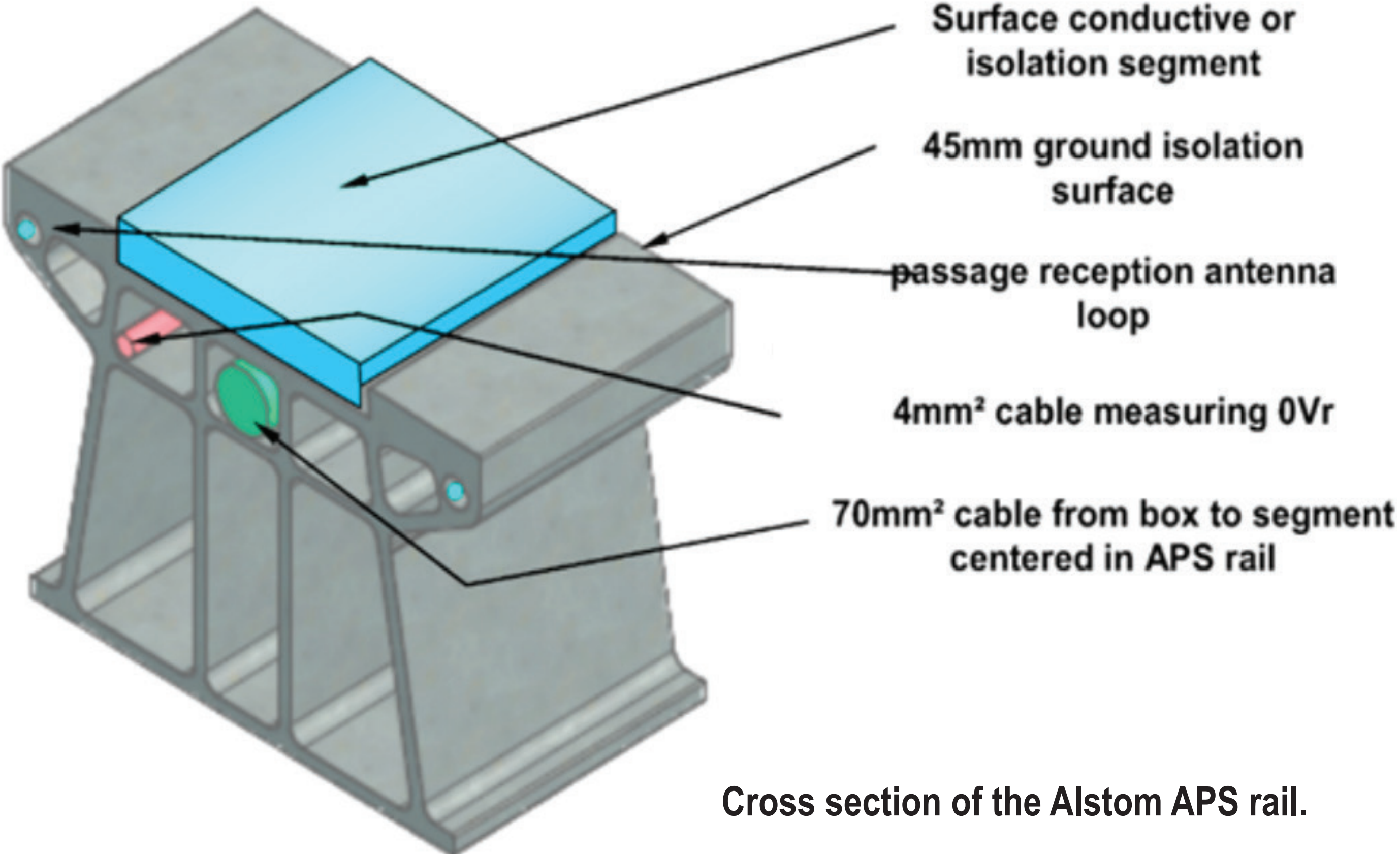
Partners involved



Volvo hybrid truck and Alstom ERS



Volvo hybrid truck with pickup on Alstom ERS



Cross section of the Alstom APS rail.

Parameter	Value
TRL Level	3-4
Costs	800000 €/km (single track), this does not include installation and commissioning costs.
Foreign object detection	No
Voltage	690V (limitation of the substation)
Current	180A
Power rating and Power Range	126kW
Power Factor	Not measured (expected to meet minimum grid requirements)
Quality Factor	N/A
Overall System Efficiency	97%
Note: Contact friction use case not included	
Operating Frequency	N/A
Effective misalignment tolerance (x,y,z)	0.5 metre
Communication protocol (ISO 12118, IEC 61851 etc)	Not yet approved
EMC, EMF	Expected to be within the limits of specified standards. There could possibly be a problem with arcs.
EM Exposure	expected to be within the limits of specified standards
Harmonics (THD % V & I)	Not measured (expected to meet IEC 61000-3-4
On-vehicle equipment Dimensions	0.5 x 1,5 x 0,5m
On-vehicle equipment weight	Estimated for first prototype: <ul style="list-style-type: none">• Pickup (+80kg)• Power converter (+40kg)
Distance between feeder points	Grid connection every 968 m, Power boxes (switches) in manhole every 88 m
Maximum operation temperature	85 °C

Alstom ERS specifications for Slide-in prototype

Main outcomes

- In a FABRIC theoretical feasibility study it was advocated that:
- There are no fundamental impediments to using conductive on-road charging in all FABRIC use cases.
 - All defined power requirements (3 – 200 kW) could be fulfilled with the same conductive ERS solution, and total efficiency for dynamic power transfer is typically > 93 %
 - With adaptations e.g. shorter track segments, Static, Stationary en-route and Dynamic charging could be supported.

Final Event & Demonstration | 21-22 June 2018 Italy

Contact
Roy Johansson, VOLVO, Sweden
Email: roy.johansson.2@volvo.com
Project Coordinator
Ove Hjortsberg, VOLVO, Sweden
Email: ove.hjortberg@volvo.com
Funding: Swedish Energy Agency

