

FCA-CRF Vehicle demonstrator

DEMONSTRATIONS
AREA

Wireless power transfer components integration, testing, main achievements and lessons learned

Introduction

The integration of the POLITO Wireless Power Transfer (WPT) components into the FCA-CRF demonstrator vehicle implemented on an Iveco electric Daily has been a complex task dealing with several aspects such as:

- New components integration: Mechanical adaptation and modification of the High Voltage/Low Voltage wiring harness;
- New developments: vehicle new ECU and logics/SW, additional HMI display and vehicle to road side communication;
- Safety and operational issues.

Objectives

- Define system specifications from FABRIC use cases;
- Verify POLITO and SAET WPT prototype systems performances using same secondary components (interoperability) and different primary topologies;
- Validate the complete system integration using the FABRIC methodology;
- Demonstrate the use cases in real driving conditions;
- Characterize system performances and find their limitations.

Developments/testing activities

- The dynamic use case was tested at the Italian test-site and system performances assessed in real test site conditions in terms of:
 - Power transfer performances (energy efficiency, average power) under different alignment conditions for three levels of speed (10km/h – 30km/h – 50km/h);
 - Current waveforms transferred into the battery;
 - Vehicle to road-side communication;
 - Electro-magnetic field (EMF) measurements;
 - Grid side impact.

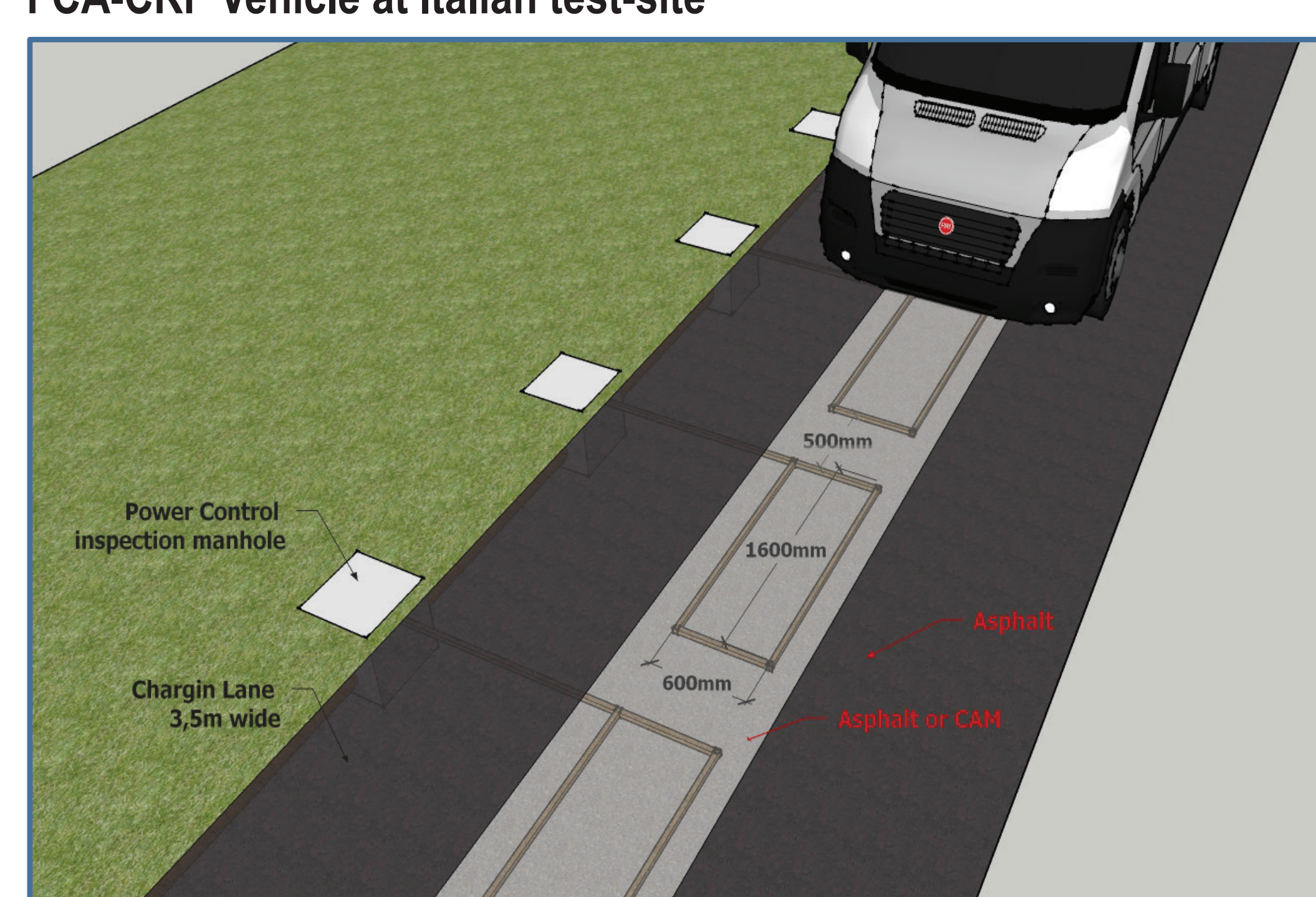
Main lessons learned

- Mechanical integration: design a secondary coil structure with good mechanical properties maintaining power transfer efficiency and sufficient ground clearance.
- Additional vehicle safety/EMF counter measures were needed;
 - HW over-voltage protection on HV DC bus in case WPT system active in case of HV battery disconnections .
 - Adequate secondary coil shielding to avoid EMC and human health issues inside the vehicle.
 - The BMS HV insulation monitoring system shall be redesigned due to new WPT components vehicle integration and their high frequency operation that may induce parasite circulation currents through the vehicle chassis.
- Functional integration/HMI: user interaction shall be enabled (authentication, charging management, alignment) and WPT process messages need to be handled.

Partners involved



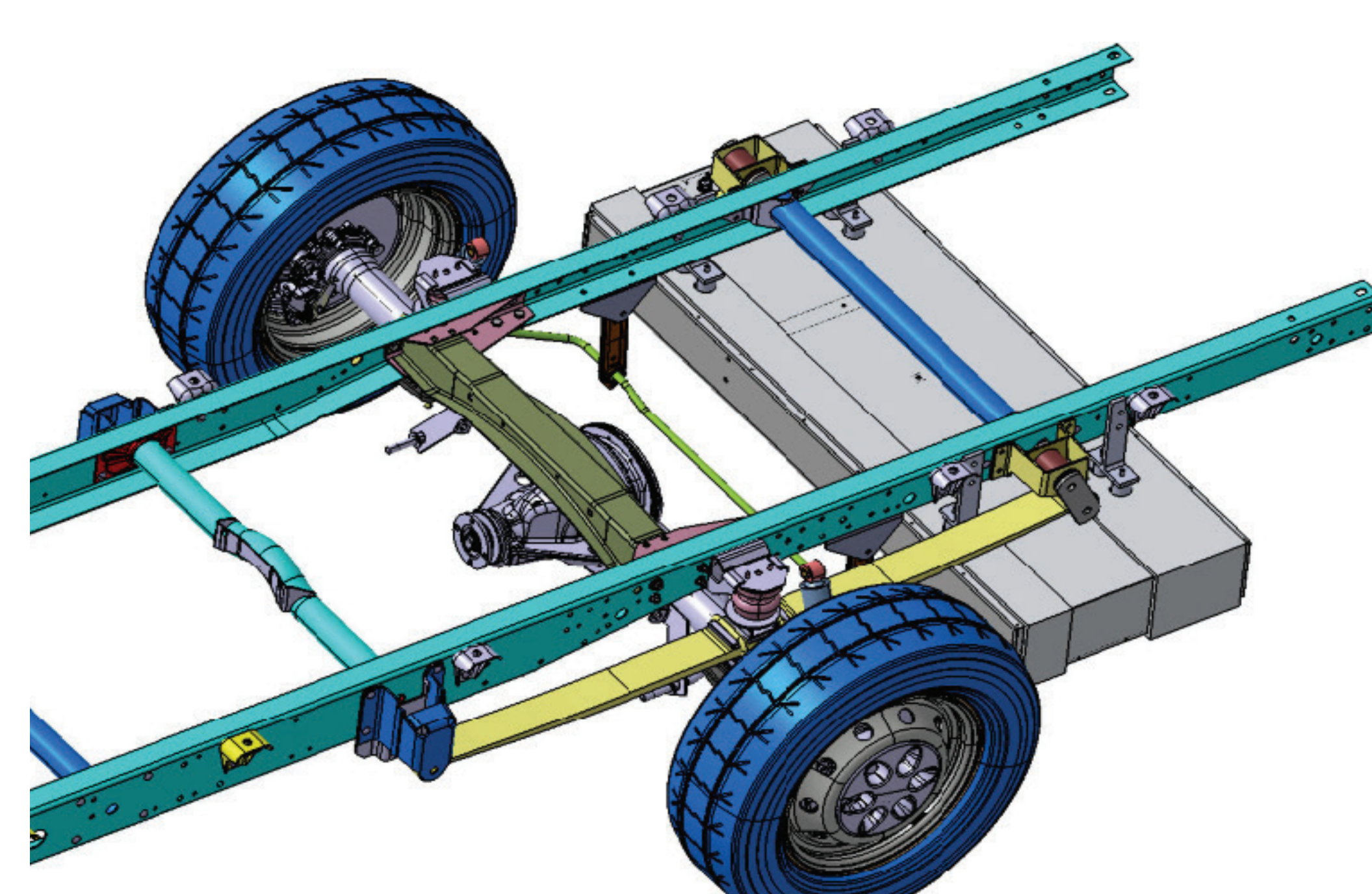
FCA-CRF Vehicle at Italian test-site



POLITO road track characteristics at Italian test-site



Installed secondary coil view



CAD view with secondary coil installation position



HMI display view

Final Event & Demonstration | 21-22 June 2018 Italy

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Consortium

Project facts

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