Powerful Advanced N-Level Digital Architecture
for models of electrified vehicles and their components

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Publishable Executive Summary

This deliverable presents a general method to perform a real battery test for an electrified vehicle (EV).

This contains two steps:

- First, the vehicle is simulated on the cloud with the model of the battery to be tested. The simulation is performed using the EMR-based library of Simcenter Amesim, developed by PANDA.
- Second, the EV model is converted and downloaded from the cloud. The battery to be tested is real and the traction part of the studied vehicle is simulated in real time. The inputs of the traction model are the measured battery voltage and the reference driving cycle.

The translation tool from the simulation in the Cloud (developed by SISW) to the real-time HIL testing ECU (developed by TY) has been validated in this report. The battery module (developed by Bluways) has then be secured for HIL testing (ensured by ULille) and connected to the real-tile HIL testing ECU. ULille has then realized the different test using the simulation of Renault Zoe (developed by RTR) and the simulation of the Valeo P-HEV (developed by ULille and VEEM).

As a part of the studied battery is tested (for example a module). The method to scale the test is presented so that the power constraints are the same than in the studied EV.

The battery experimental current, voltage and temperature are recorded. If the corresponding battery limits are not exceeded, the tested battery is considered adequate for the studied EV under the test conditions (i.e. the ambient temperature and the reference driving cycle).

For this deliverable a 5 kWh module from Bluways is tested as a part of batteries. Two electrified vehicles (the reference BEV and P-HEV) are studied. The reference driving cycle is a World Lightweight Transport Cycle. Any other driving cycle, battery or vehicle can be tested. The test conception is modular.

1 This method is a flexible seamless “upload, plug and play“ method to perform a real battery HIL test within any electrified vehicle. Different EV models are available from the cloud. This means a gain of time.

2 Thanks to the PANDA cloud of model organized using the Energetic Macroscopic Representation formalism, any part can be replaced by a real subsystem to test. This method is extendable to other subsystems to test (machines for example) or other vehicles to simulate in real-time (fuel-cell vehicle for example).

PANDA partners

The author(s) would like to thank the partners involved in PANDA for the different interactions.

Table 1: Project Partners

#	Type	Partner	Partner Full Name
1	UNIV	ULille	Université de Lille
2	IND	SISW	Siemens Industry Software SRL
3	UNIV	VUB	Vrije Universiteit Brussels
4	IND	VEEM	VALEO Equipement Electriques Moteur SAS
5	UNIV	UTCN	Universitatea Tehnica Cluj Napoca
6	SME	TY	Tajfun HIL (Typhoon HIL)
7			
8	UNIV	UBFC	Université Bourgogne Franche-Comté
9	SME	UNR	Uniresearch BV
10	IND	RTR	Renault Technologie Roumanie
11	SME	Bluways	Blueways International BV
12	IND	TUV-BT	TUV SUED Battery Testing GmbH

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