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all types of electrified vehicles and components

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Written By	Mariam AHMED SANCHEZ TORRES (VEEM), Aurélien LIEVRE (VEEM) Walter LHOMME (ULille) Florian TOURNEZ (ULille) Alain BOUSCAYROL (ULille)	2021-09-23
Reviewed by	Claudia MARTIS (UTCN) Elena BREAZ (UBFC)	2022-02-09 2022-01-10
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Publishable Executive Summary

Leader: Dr. Aurélien LIEVRE (VEEM), Participants: ULille, TY

The PANDA project aims at using the W-model approach, which relies strongly on virtual design and test methods, to reduce the electrified vehicles time-to-market. The project proposes a standard efficient virtual and real testing method of electrified vehicles and will provide a Cloud library of functional models to be accessible by multiregional companies [PANDA 2020]. In this context, building multi-scale multi-physical models of the electrical drive (e-drive) components is an essential part of the project.

This deliverable reports the work done in WP5 on the real e-drive testing of the studied plug-in hybrid electric vehicle, which is composed of a permanent magnet synchronous machine, a voltage source inverter and its control. Two different real tests have been achieved using the power hardware-in-the-Loop (PHiL) method. The real-time simulation of the traction subsystem is realized from the Energetic macroscopic representation (EMR) model of the vehicle developed in WP4. The first test has been achieved at full power (full-scale) at Valeo using the real e-drive. A second test has been achieved on the versatile experimental platform of ULille, using a reduced power e-drive (reduced-scale test). Moreover, a dSPACE controller board has been used as real-time simulator and the simulation model are derived from MATLAB-Simulink©. All tests were realized in stand-alone controller board (i.e. all real-time models are simulated locally without cloud connection).

Both tests lead to similar results that demonstrate the portability of the method for different electric drives. Moreover, whereas Simcenter-AMESIM© and Typhoon ECU have been used for the real test of the battery, another software and another real-time ECU has been used to test this e-drive. This change demonstrates the flexibility of the method for different simulation packages and real-time simulators. It can be noted that the test of the complete electric subsystem will be achieved using the models developed in Simcenter AMESIN© and the TY ECU. Once again, this change demonstrates the flexibility of the method using the most adapted software and real-time tools from the considered set-up.

Contributions:

No	*Who*	*Description*	*Date*
1	VEEM	Leader	2021-09-23
2	VEEM	Writing of Section 1 and 3	2021-10-25
4	W. LHOMME (ULille)	Writing of Section 2 and 4	2020-12-07
5	F. TOURNEZ (ULille)	Experimental tests at VEEM and ULille Writing of Section 4	2020-12-09
6	A. BOUSCAYROL (ULille)	Revisions	2021-12-11
7	VEEM	Update Draft / Final version	2021-12-16

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Table 2: 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			(change of TUV by TUV-BT)
8	UNIV	UBFC	Université Bourgogne Franche-Comté
9	SME	UNR	Uniresearch BV
10	IND	RTR	Renault Technologie Roumanie
11	SME	Bluways	BlueWays International bva
12	IND	TUV-BT	TUV SUD Battery Testing Gmbh

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