Particle Reduced, Efficient Gasoline Engines

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Summary

The Particle Reduced Efficient Gasoline Engine (PaREGEn) project is a European Horizon 2020 project that has been created with a view to demonstrating a new generation of Gasoline Direct Injection (GDI) engines, achieving a reduction in CO_2 emissions of 15% compared to the baseline product available in 2016, and control of particle size down to 10 nm in size through the adoption of new technologies. Jaguar Land Rover (JLR), in conjunction with Bosch (BOSCH), Johnson Matthey (JM), Ricardo (RIC), Honeywell (HON) and the University of Brighton (UOB) are to deliver a Jaguar XE vehicle in 2019 that will adopt dilute combustion (excess air, external Exhaust Gas Recirculation (EGR), internal exhaust residuals or a combination of all three) in order to achieve the targeted 15% CO_2 improvement, as well as meeting EU6d levels of tailpipe emissions, including particulates measured down to 10 nm.

Deliverable 4.4 sets out the work completed in the development of the combustion system by Jaguar Land Rover. To meet the PaREGEn targets of increased thermal efficiency and thereby reduce fuel consumption, the PaREGEn combustion system has been designed by Jaguar Land Rover to operate with an increased compression ratio as well as dilute combustion.

The combustion system is confirmed to deliver the expected fuel consumption savings from a combination of homogeneous lean combustion and exhaust gas recirculation (EGR). When combustion stability allows, lean combustion offers the potential for more fuel saving than EGR, but when a lack of combustion stability inhibits the amount of dilution possible, EGR may offer a better route to manage both fuel economy and oxides of nitrogen emissions.

Test results highlight a risk that the combustion process may not provide sufficient levels of nitrogen dioxide for optimal efficiency from the aftertreatment system when operating within the combustion stability constraints, and single cylinder testing cannot confirm if interaction with the multi-cylinder boosting system will lead to difficulties with achieving the required boost pressures or exhaust temperatures; these concerns will be the subject of further investigation during the multi-cylinder engine development activity to be reported in Deliverable D4.5.

Appendix A – Acknowledgement

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Project partners:

#	Partner	Partner Full Name
1	RIC	RICARDO UK LIMITED
2	DAI	DAIMLER AG
3	JLR	JAGUAR LAND ROVER LIMITED
4	BOSCH	ROBERT BOSCH GMBH
5	FEV	FEV EUROPE GMBH
6	JM	JOHNSON MATTHEY PLC
7	HON	HONEYWELL, SPOL. S.R.O
8	JRC	JOINT RESEARCH CENTRE – EUROPEAN COMMISSION
9	UNR	UNIRESEARCH BV
10	IDIADA	IDIADA AUTOMOTIVE TECHNOLOGY SA
11	SIEMENS	SIEMENS INDUSTRY SOFTWARE SAS
12	LOGE	LUND COMBUSTION ENGINEERING LOGE AB
13	ETH	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH
14	UDE	UNIVERSITAET DUISBURG-ESSEN
15	RWTH	RWTH AACHEN UNIVERSITY
16	UFI	UFI FILTERS SPA
17	UOB	UNIVERSITY OF BRIGHTON

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