Particle Reduced, Efficient Gasoline Engines

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Summary

The initial objective of this Work Package 2 (WP2) is to improve the design of gasoline particulate filters (GPF) to address sub 23nm emissions. Using current vehicle technology and test bench equipment, improved filters will be devised. As part of this process, the substrate material, characteristics and geometry will be considered alongside the catalyst coating properties. In parallel with the filter development, there will be an interactive collaboration with WP's 3 and 4 to determine the aftertreatment system for the respective demonstrator vehicles. This is particularly the case for WP4, where a lean NOx system is required, and the engine exhaust temperature and composition characteristics will be critical for its design. Ultimately, for both applications, the particulate filter improvements will be integrated into the final exhaust systems supplied.

Deliverable 2.3, 'Final TWC/GPF low emissions/low PN aftertreatment system', is aimed at identifying the proposed combination of upstream catalyst and downstream gasoline particulate filter technology to suit the stoichiometric application in Work Package 3. Most of the work in this report is associated with the GPF, since the upstream catalyst is closely associated with the engine technology used and needs to be verified by testing within Work Package 3. Therefore, the upstream catalyst supplied for the first iteration of testing is only briefly discussed at this stage.

A combination of test rig and chassis dynamometer vehicle data is reported. For the latter, a harsh 'Random Aggressive' and WLTC tests have been employed.

GPF substrates supplied by NGK and coated by Johnson Matthey have been used in this study. Two substrate wall thicknesses and two coating technologies are compared. One of the coating technologies is a reference ('Ref.') and the other ('Dev. 2') has been suggested as optimal in Deliverables 2.1 and 2.2. The 'Ref.' formulation showed increased backpressure and potentially better filtration efficiency when the thicker walled substrate was used. The 'Dev. 2' coating gave less sensitivity in terms of PN filtration efficiency to wall thickness. Overall, the 'Dev. 2' formulation of a 300/8 substrate remained the best compromise of PN filtration efficiency and backpressure.

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
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15	RWTH	RWTH AACHEN UNIVERSITY
16	UFI	UFI FILTERS SPA
17	UOB	UNIVERSITY OF BRIGHTON

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