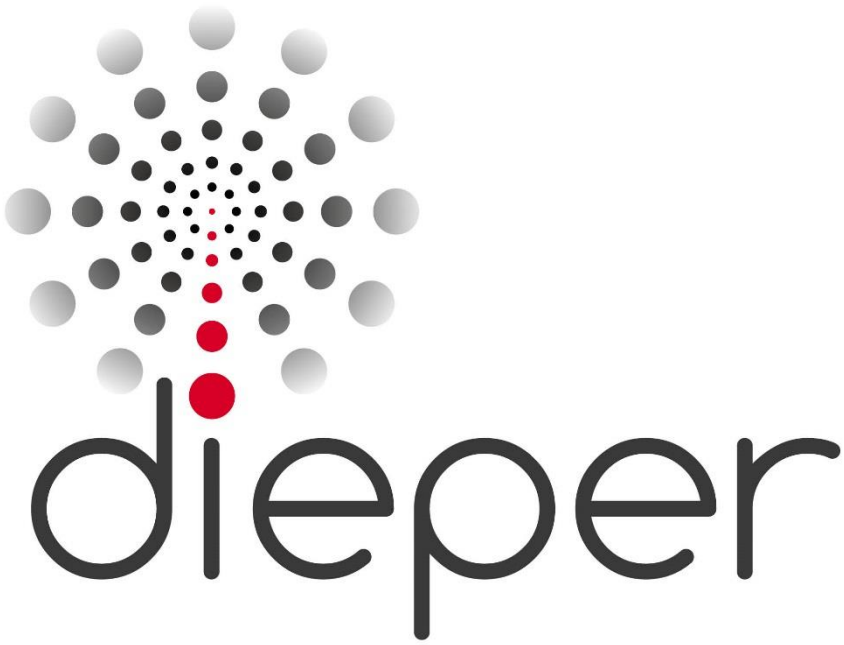

Diesel efficiency improvement with Particulates and emission Reduction

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Project partners:
1 – AVL – AVL List GmbH – AT
2 – REN – Renault SAS – FR
3 – IFP – Energies nouvelles – IFPEN – FR
4 – CMT – Universitat Politecnica de Valencia – ES
5 – JM – Johnson Matthey Plc – UK
6 – CONTI – Continental Automotive France SAS – FR
7 – BOSCH – Robert Bosch GmbH – DE
8 – CNR – Consiglio Nazionale delle Ricerche – IT
9 – FMF – FPT Motorenforschung AG – CH
10 – IVECO – IVECO S.p.A. – IT
11 – RCD – Ricardo Plc – UK
12 – ECN – ECOLE CENTRALE DE NANTES – FR
13 – SIE – SIEMENS INDUSTEY SOFTWARE SAS – FR
14 – VIF – Kompetenzzentrum – Das Virtuelle Fahrzeug, Forschungsgesellschaft mbH – AT
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Publishable Executive Summary

Starting from the Euro6 version of the 2,0 litre Diesel engine currently in development at Renault, we have integrated in the Dieper demonstrator engine several new techno-bricks in order to improve both the engine out emissions level and the fuel efficiency to reach the targets of the project. In parallel a precise optimization of the fuel and air systems was carried in accordance with the full load performances requirement of the project: 120 kW and 360Nm to take maximum benefit in the part load range of the engine map.

The fuel injection and the combustion systems have been specified in collaboration between AVL, Continental and Renault starting from state of the art low swirl intake ports, nine holes low flow injector, and dedicated bowl geometry. The turbocharger has been precisely matched by MHI according to the maximum power and the high EGR rates requirements obtained using both cooled high-pressure and low-pressure circuits.

Moving to the new techno-bricks integrated on the base engine, at first, we have implemented with MHI a cooled compressor housing to allow high EGR rates without exceeding the maximum temperature limit of this component.

In addition, thermal coatings of pistons, cylinder head, intake valves and exhaust manifold will improve both engine fuel efficiency with reduced heat losses and higher exhaust temperature for the after-treatment system performance.

Finally, a twin stage intake air cooling with continuous flow repartition management designed in cooperation with Mahle will give the possibility to adjust the intake temperature of the engine depending on the operating point. For cold start and low ambient temperature, an additional electrical heater is also integrated in the intake system.

In conclusion, we have produced a very refined demonstrator engine, with advanced thermal management features,

which will contribute to improve the thermal efficiency, to reduce NOx production and to optimize the after-treatment system function.

Two of these engines will be assembled, one for the test bench activities, and the second one for the demo-car.