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Range Extender – Ladungswechselsysteme unter den Randbedingungen von geringem Bauraum, geringen Kosten und optimierter Akustik

Range Extender – Gas Exchange System within the Boundary Conditions of low package, low cost and optimized NVH

Mike Bassett, Ian Thatcher, Jonathan Hall, Neil Fraser, Andre Bisordi, Volker Korte
MAHLE Powertrain Ltd., Northampton

Andreas Enderich, Rainer Handel
MAHLE Filtersysteme GmbH, Stuttgart

Abstract

Current focus on techniques to reduce the tailpipe carbon dioxide (CO_2) emissions of road vehicles is increasing the interest in hybrid and electric vehicle technologies. Pure electric vehicles require bulky, heavy, and expensive battery packs to enable an acceptable driveable range to be achieved. Extended-range electric vehicles (E-REVs) partly overcome the limitations of current battery technology by using the combination of an internal combustion engine coupled to a generator to provide additional charge for the battery. Thus enabling the traction battery storage capacity to be reduced, whilst still maintaining an acceptable vehicle range.

Of particular importance in the design and optimisation of a Range Extender engine are: cost, packaging size and NVH. These requirements and the specific operating conditions for the engine, typically lower operating speed and number of cylinders, present particular challenges for the gas exchange system layout.

This paper presents the optimisation and layout of the gas exchange systems for the MAHLE 0,9 litre, 2-cylinder in-line range extender concept engine. It describes the process used to design the intake system that is capable of fitting within the tight package constraints, whilst providing acceptable levels of NVH, utilising 1D cycle simulation. The final design is presented showing the solution to the boundary conditions of low package space, low cost and optimized NVH.