

## **Design and Development of the MAHLE Range Extender Engine**

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### **Summary**

Current focus on the reduction of tailpipe CO<sub>2</sub> emissions of road vehicles is increasing the interest in hybrid and electric vehicle technologies. Pure electric vehicles, however, require bulky, heavy and expensive battery packs to enable an acceptable driveable range to be achieved. Extended-range electric vehicles (E-REV) partly overcome the limitations of current battery technologies by having a „range extender“ unit, which consists of an onboard fuel converter that converts a liquid fuel, such as gasoline, into electrical energy whilst the vehicle is driving. This enables the traction battery storage capacity to be reduced, though still maintaining an acceptable vehicle driving range.

This paper presents an overview of the design and development of an engine specifically for the use as a range extender. Key attributes for the engine have been identified, these being minimum package volume, low weight, low cost and good NVH. A brief description of the selection process for identifying the appropriate engine technology to satisfy these attributes is given. The resulting design highlights are presented and the development and optimisation of the engine to meet its performance targets is described, along with the resulting performance achieved. Finally, an assessment is made of the performance of the engine when applied to a vehicle.