

2014-01-0711

Plug-in Hybrid Cooling System Requirements

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ABSTRACT

In a typical plug-in hybrid electric vehicle (PHEV) installation, there exist multiple, potentially separate, cooling circuits. These circuits may have individual cooling/heating requirements or they may have common aspects. Opportunities exist for combining circuits for series applications for cost, weight and efficiency benefits. However, careful consideration must be paid to the compatibility of these circuits both in terms of temperature range requirements, but also in terms of the thermal loading of the systems on the cooling circuits.

This paper presents details of a cooling system for a PHEV demonstrator recently completed by MAHLE Powertrain. The opportunities for the integration of several cooling circuits, including the cabin heating, ventilation and air-conditioning (HVAC) system, to optimise the system from a cost, package-space and weight perspective are discussed. Furthermore, the opportunities for the pre-conditioning and operating strategies for the complete cooling/heating system, from a holistic vehicle efficiency perspective, are also briefly outlined.