ADAPTING WASTE HEAT RECOVERY TECHNOLOGIES FOR LOW CARBON OFF-HIGHWAY VEHICLES

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ABSTRACT

Waste Heat Recovery (WHR) technologies aim at recovering part of the otherwise wasted heat in the exhaust gases of a combustion engine and convert it to useful power, resulting in lower fuel consumption and pollutant emissions. Brunel University London, Entropea Labs and Mahle Powertrain have jointly optimised Waste heat Recovery technologies based on the Rankine cycle for other applications in the past. Experience gained in the design and manufacturing of the components for Organic Rankine Cycle (ORC) WHR systems for large displacement diesel engines is applied to increase the Off-Highway Vehicle (OHV) diesel engine fuel economy by 10% or higher. The project is funded by Innovate UK for a two-year period ending in May 2017. The proposed technology is modular, non-invasive and reversible, enabling it to be scaled across the range of new engine production irrespective of manufacturer while also being retrofitable to the large number of OHV engines already in service. Moreover, the technology and expertise has the potential to be further exploited by adapting it and scaling it to other transport and stationery power generation applications. The specific objectives of the project are: (1) ORC Model Development for ORC WHR applications, (2) Engine Simulation Development, (3) ORC WHR Component Development, (4) ORC WHR system performance demonstration and validation On-Engine, and (5) Validate retrofit capability in preparation for On-Vehicle demonstration. The potential impact from the realization of the project makes the technology highly competitive. The OHVs account for approximately 15% of all UK surface transportation emissions [1], achieving a retrofitable and scalable ORC-WHR technology, with 10% fuel efficiency increase, can account to a potential £1 billion (€1.4 billion) in fuel savings for fleet operators in the UK alone. In addition, the reduction in emissions will enable OEMs to meet the requirements outlined in pollution reduction legislation.

REFERENCES

[1] ARCADIS, RPA, "Study in view of the revision of directives 97/68/EC on non-road mobile machinery (NRMM)", December 2010.