HEAT REGENERATION

HEAT2POWER HAS DEVELOPED WASTE HEAT REGENERATION TECHNOLOGY FOR THE AUTOMOTIVE, TRUCK AND RACE ENGINES OF TOMORROW

heat2power, based in Paris, France – is convinced it has two technologies in hand that can save fuel and reduce the CO_2 emissions of tomorrow's cars, trucks and ships.

To achieve this, heat2power focuses on waste heat regeneration (WHR) for internal combustion engines. The fruit of this work has been compiled in a WHR benchmark study, the company's first commercially available product. The study covers over 10 thermodynamic cycles and associated devices, various types of thermo-electrics, thermo-acoustics and different types of thermo-chemical regeneration systems as well as latent heat recovery, heat buffering and quantum-mechanical phenomena.

The knowledge gained about so many technologies and concepts led heat2power to develop its own concepts to get the best performance out of heat that is normally lost.

Frédéric Thévenod, technical director at heat2power, says: "We have analyzed the power flows in and around the combustion engine. The power lost through the exhaust – consisting of thermal energy, kinetic energy, chemical energy and latent heat – is about 90 to 250% of the engine crankshaft output in driving cycles. This represents a major source for potential efficiency improvement."

Depending on operating conditions (low-to-medium torque and low-to-medium rpm), fuel savings can vary from 10 to 35%. Race car engines that run at high rpm and medium-to-high torque do not necessarily have the same optimal WHR solution.

Combining high specific power and a high level of efficiency is key to successful WHR implementation in vehicle applications. Industrial adaptability is, however, of secondary importance for race car engines. heat2power has two different concepts in development that are aiming for a combination of power density and efficiency better than that obtained with the technologies covered in the study.

The concept for mainstream applications uses a novel thermodynamic cycle running on the high-temperature heat in the exhaust. The system uses aspirated air as the working medium, and is simple in layout and maintenance. Keeping the system simple and using existing technology was considered as key to easy industrial adaptation. The system's moderate price tag and low weight allow for low barriers to market introduction.

For the company's first concept Randolph Toom, heat2power's commercial director, sees a major and immediate interest for truck diesel engines due to the rapid return on investment for the end client, and also for hybrid-electric powertrains: "Whereas electric drive excels in stop-and-go and low-speed driving, the heat2power concept brings advantages in medium to heavy loads as in extra-urban driving and in battery recharging mode. This WHR technology truly complements the electric drive for better fuel economy."

With the new Formula 1 regulations for 2009 and the expected spin-off in other categories, heat2power proposes both this and an additional (non-thermodynamic) WHR concept for motorsport applications. It will be up to the teams to choose. Toom further comments: "We believe that the success of WHR in motorsport could really give a push to efficiency improvement in mainstream vehicles, and that is how it ideally should be."

The company has now started development programs with OEMs and expects increasing interest from both transportation industries and racing teams.

CONTACT

More information from technical director, Frédéric Thévenod and commercial director, Randolph Toom via www.heat2power.net

Frédéric Thévenod (pictured left) has been investigating potential energy improvements in engines; Randolph Toom (right) says WHR in motorsport will benefit mainstream applications

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