

Maintaining High Efficiency from Extreme Downsized Gasoline Engines

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ABSTRACT

World-wide legislation for improved fuel consumption, fleet CO₂ targets and customer demand have introduced a global development focus on producing more efficient powertrain systems for the transport sector. With regards to gasoline engines, downsizing has become a widespread approach to reducing vehicle fuel consumption and CO₂ values, due to de-throttling and friction loss benefits through operating at higher load points.

The authors have pioneered the downsizing approach for over ten years, building up a wealth of experience on this topic. A bespoke 1.2 liter 3-cylinder engine was designed in 2006 to explore the concept of extreme downsizing. Prototype hardware proved that this concept could give a 24% reduction in vehicle CO₂ values due to efficient downsizing alone. Since this, further technologies have been investigated to evaluate other concepts that can improve the efficiency of highly downsized engines.

This paper describes the technologies investigated, and the effectiveness observed for these systems. In conclusion, the authors believe that further downsizing is still possible, and that it is quite feasible to develop engines for production that can operate with stoichiometric fuelling up to 100kW/liter if required.