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Development of a Friction Optimized Engine

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ABSTRACT

Evolving emissions legislation and concerns for diminishing fuel reserves continue to prompt the automotive industry to seek improvements in engine operation. The application of advanced combustion and system-based concepts is being studied in detail. However, it is believed prudent to first consider the optimization of the friction of the engine, to allow a more cost effective CO₂ and fuel consumption reduction policy.

MAHLE has developed an optimised friction engine to demonstrate the potential fuel consumption gains available to engine manufacturers and designers. The baseline 2.0 litre turbocharged, direct injection gasoline engine was modified to suit the application of new friction optimized components. This included piston, ring pack, connecting rod, crankshaft bearings, lubrication system, valvetrain and cooling system.

A discussion of the design changes, including analysis results, is made. Motored rig and fired engine test results are presented to show the individual gains. Finally, measured, demonstrator vehicle drive cycle fuel economy results highlight the fuel consumption benefits.