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A Study of Gasoline-Alcohol Blended Fuels in an Advanced Turbocharged DISI Engine

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ABSTRACT

This work was concerned with evaluation of the performance and emissions of potential future biofuels during advanced spark ignition engine operation. The fuels prepared included three variants of gasoline, three gasoline-ethanol blends and a gasoline-butanol fuel altogether covering a range of oxygen mass concentrations and octane numbers to identify key influencing parameters.

The combustion of the fuels was evaluated in a turbocharged multi-cylinder direct fuel injection research engine equipped with a standard three-way catalyst and an external EGR circuit that allowed use of either cooled or non-cooled EGR. The engine operating effects studied at both part and boosted high load conditions included fuel injection timing and pressure, excess air tolerance, EGR tolerance and spark retard limits. A number of blends were also mapped at suitable sites across the European drive cycle under downsized engine conditions. Relative in-vehicle fuel economies were then determined via drive cycle simulation and compared to a naturally aspirated gasoline PFI engine.