

2010-01-0618

A Study of Alcohol Blended Fuels in an Unthrottled Single Cylinder Spark Ignition Engine

Neil Fraser, Alasdair Cairns, Alan Todd
MAHLE Powertrain Ltd.

Pavlos Aleiferis, John Malcolm
Univ. College London

ABSTRACT

This work involved study of the effects of alcohol blends on combustion, fuel economy and emissions in a single cylinder research engine equipped with a mechanical fully variable valvetrain on the inlet and variable valve timing on the exhaust. A number of splash blends of gasoline, iso-octane, ethanol and butanol were examined during port fuel injected early inlet valve closing operation, both with and without variable valve timing. Under low valve overlap conditions, it was apparent that the inlet valve durations/lifts required for full unthrottled operation were remarkably similar for the wide range of blends studied. However, with high valve overlap differences in burning velocities and internal EGR tolerances warranted changes in these valve settings. In turn, it was concluded that high ethanol content blends facilitated minimum throttling at the inlet valve itself and the largest relative savings in terms of fuel consumption, engine-out emissions of NO_x and (corrected) unburned hydrocarbons.