

Impact of biofuel on engine performance

Using biofuels as a transport fuel can help contribute to reducing carbon dioxide emissions in the atmosphere and providing fuel security for the future. As part of a wider EU commitment to reduce carbon emissions, the Renewable Transport Fuel Obligation (RTFO) commenced in the UK in 2008 and requires 5 per cent by volume of all fuel sold on forecourts to come from renewable sources by 2010.

2,5-Dimethylfuran (DMF) has been considered a promising candidate of sustainable biofuels since the advent of novel and efficient methods recently developed in the US for making it from biomass derived materials. There is, however, very limited knowledge about its impact on the environment. For the engine community, little is known about DMF's combustion and emission characteristics, especially about the speciation of non-regulated emissions from its combustion in engines.

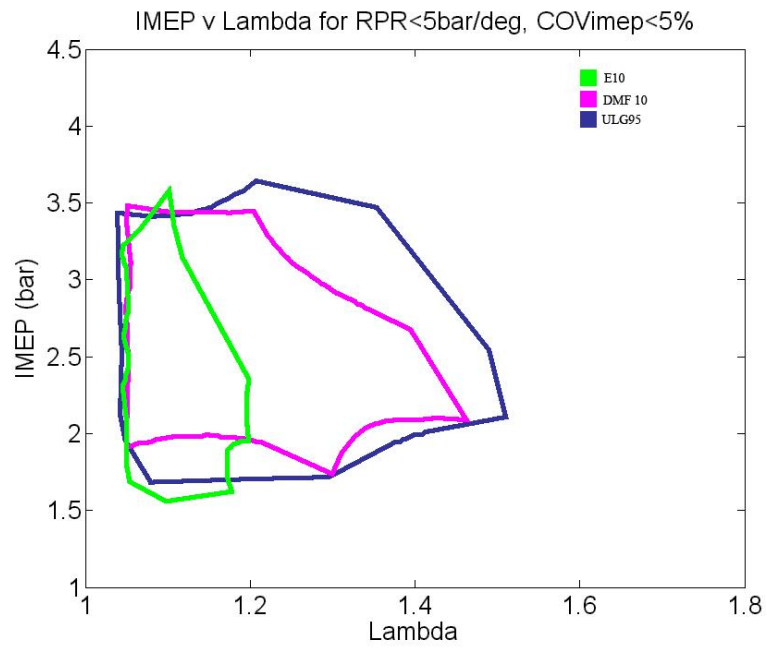
A team from the University of Birmingham led by Professor Hongming Xu aims to investigate the outstanding issues of DMF as base fuel, by developing and validating the mixture preparation, combustion, emissions and engine models and by conducting systematic experiments using advanced methodologies including optical diagnostics and exhaust gas speciation using Fourier Transform Infrared Spectroscopy (FTIR) alongside the on-line Gas Chromatography-Mass Spectrometry (GCMS).

As a collaborative research project with several leading universities in China, the know-how acquired in this project will be of direct benefit to the UK and Chinese fuel and motor industries and academia. The project outcome will help to boost British and China's biofuel industrial activities and will thus have impact on the development of the UK and China economy by increasing the opportunities for employment and profitability of agriculture and obviously will contribute to the reduction of carbon footprint of fuels for transportation. To conduct this project the University of Birmingham is working with Jaguar and Land Rover, Green Fuels and Innospec Inc.

So far the preliminary results of the project which have been reported in 2 world-first publications of DMF as an engine fuel show that DMF can be used in spark-ignition engines without any modifications and it has demonstrated very similar characteristics of combustion and emissions. Its higher energy density compared with Ethanol enables the engine to run with lower fuel consumption despite that its emission levels do not show benefits as much as Ethanol. Its higher anti-knock tenancy will allow the possibility of the engine to operate at higher compression ratios so as to increase the thermal efficiency. More detailed research is underway.

For further information about this project please contact Prof Hongming Xu E: H.M.Xu@bham.ac.uk

For further information about the Midlands Energy Consortium please contact Dr Helen Turner E: H.Turner@lboro.ac.uk



Comparison of operating window sizes of the HCCI engine using DMF and Ethanol blending with gasoline