

Abstract

A comparative study of the particulate and gaseous emissions of a 2 cylinder Lister-Petter compression ignition engine when fuelled with diesel and dimethyl ether was undertaken. The investigation involved the commissioning of a Cambustion DMS500 Fast particulate Spectrometer, allowing the spectral densities and cumulative concentrations of particulates in the exhaust stream to be sampled. The investigation was performed for changing engine speeds at various engine loads, namely: 1300rpm to 1800rpm at 25Nm to 45Nm. Along with particulates, THC, NO_x, CO₂ and CO were measured using various Signal Gas Analysers. Various engine performance measures were also recorded, including maximum cylinder pressure and temperature, air/fuel ratio, exhaust temperature, shaft speed, torque and fuel conversion efficiency. The most notable finding was that particulate sizes were in the range of 150nm to 170nm under diesel fuelling whereas for dimethyl ether fuelling they were 5,5nm to 7nm. It was also found that increasing engine speed with dimethyl ether fuelling causes an increase in the particulate size, whereas with diesel fuelling increasing engine load resulted in an increase in size. The concentration of particulates was seen to increase with increasing engine speed. It was also found that under both fuelling methods there exists an indirectly proportional relationship between NO_x and particulates.