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The effect of added ethanol to diesel fuel on performance and combustion of a Diesel engine

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Abstract

Diesel, as a fossil fuel, is widely used in industrial and agricultural fields. Added biofuels to fossil fuels affect the performance and combustion characteristics in the internal combustion engines. Ethanol is a renewable fuel, which is produced from plant, sugary and starchy biomass. Ethanol as an important additive to gasoline and diesel fuel can improve engine performance and reduce emissions. In this study, ethanol was added to pure diesel fuel with concentrations of 5, 8, 10, and 15%. The produced torque and power, brake thermal efficiency (BTE), and combustion were evaluated. The tests were made on a four cylinders CI engine at the six rotational speeds of 1200, 1700, 2200, 2700, 3200, and 3700 rpm, under full load mode. The results showed that the torque and power increase on average by 4.2% at fuel blend with a concentration of 8% ethanol (D92E8) as compared with those of pure diesel fuel. Although the power increases for the D92E8 fuel mixture, some irregularities are observed in the engine performance, and the engine runs more unevenly. Increasing the ethanol concentration by more than 8% in diesel increases the ignition delay and the engine runs erratically.

Keywords: ethanol, gasoline, diesel fuel, engines

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