

## **Set-up of the experiment and improve the performance and emissions of diesel fuel with fusel oil additive from waste products**

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### **ABSTRACT**

Response surface methodology (RSM) has been widely implemented to improve the pollutant emission characteristics and performance of a compression ignition engine. The fusel oil-biodiesel blend and pure diesel under varied engine loads and speeds with the use of Models of RSM were found to be statistically significant. This research study has aimed to statistically investigate how a fusel oil-diesel blend impacts compression ignition engine performance and the exhaust pollutants by comparing it to pure diesel fuel. The optimum parameter for reducing ISFC, NO<sub>x</sub> and CO<sub>2</sub> emissions while boosting power was chosen. The blended fuel (F20) showed insignificant effects on the indicated power thereby 20% of fusel oil with diesel may be an acceptable ratio using CI engines in terms of power as well as the lowest NO<sub>x</sub> emissions with F20. Meanwhile, the highest values of ISFC and CO<sub>2</sub> emissions were with F20. When comparing diesel to F20, the optimal load was 29.4 % and the engine speed was 2399 rpm. The predicted values for power, ISFC, NO<sub>x</sub> and CO<sub>2</sub> emissions were 4.06 kW, 220.07 g/kWh, 55.56 ppm and 1.93% respectively.

### **KEYWORDS**

Response surface methodology (RSM); Characteristics; Reducing ISFC; CO<sub>2</sub> emissions

**ACKNOWLEDGEMENT**

The authors are grateful to the Public Authority for Applied Education and Training (PAAET) in Kuwait for supporting the Sabbatical Leave at the University Malaysia Pahang (UMP).