ABSTRACT

This study is aimed to investigate the effect of blending different types of nanoparticles with biodiesel B10 produced from waste cooking oil on engine performance. Specifically, we compared the engine performance of biodiesel B10 blended with five different nanoparticles, including Calcium oxide, Titanium dioxide, Aluminum oxide, Zinc oxide, and Magnesium oxide.

The test engine bed is equipped with an eddy current dynamometer and a load regulator with a torque controller. The performance parameters such as brake power, brake thermal efficiency, specific fuel consumption, mechanical efficiency and BMEP are measured using computerized engine test express software 8.5. The AVL smoke meter is used to measure the emission characteristics such as smoke, carbon monoxide, hydrocarbon and oxides of Nitrogen emission.

The results showed that blending of nanoparticles with waste cooking oil biodiesel blend B10 improved engine performance in various ways, including increased brake power and torque, reduced specific fuel consumption, and reduced emissions of smoke, carbon monoxide, and hydrocarbons. In our project, we selected Calcium oxide, Zinc oxide, Titanium oxide; Magnesium oxide and Aluminum oxide blended waste cooking oil biodiesel blend B10. The performance and emission characteristics of above nanoparticles are tested in VCR engine to improve the engine performance and emission.

The study was conducted using a single-cylinder, water-cooled, direct injection diesel engine with a rated power output of 4.4 kW at 1500 rpm. The

engine was run on biodiesel B10 blended with different types of nanoparticles at a concentration of 25 parts per million (ppm) by weight.

The nanoparticles used in the study were chosen based on their potential to improve the combustion characteristics of the biodiesel, reduce emissions, and improve engine performance. Calcium oxide and magnesium oxide were chosen for their ability to improve combustion efficiency, while titanium dioxide, aluminum oxide, and zinc oxide were chosen for their ability to reduce emissions.

Overall, our findings suggest that blending nanoparticles with biodiesel B10 produced from waste oil can be an effective way to improve engine performance and reduce emissions. However, more research is needed to fully understand the potential benefits and drawbacks of this technology and to determine the optimal blend of nanoparticles for different types of engine and applications.

The engine was tested under different load conditions, ranging from 0 to 100% of the rated power output, and various engine parameters were measured and analyzed. The results showed that blending nanoparticles with biodiesel B10 improved engine performance, with the most significant improvements observed when using magnesium oxide nanoparticle.