

Effect of Al₂O₃, SiO₂ and CNT Nanoparticles Blend Fuels on Diesel Engine Performances and Emission Characteristics

Anes G. Mrwan¹, Ang F. Chen¹, M. Akmal Adzmi¹, M. Hafiz¹,
K. Kamal¹, M. F. Othman¹, Abdullah Adam^{1*}

¹Universiti Malaysia Pahang, Pahang, Malaysia

²Tarbiat Modares University, Tehran, Iran

anasov2002@yahoo.com , rydec92@hotmail.com , akmal7791@gmail.com ,
hafiz83ump@gmail.com , kamalkz@hotmail.com , fahmiothman1001@gmail.com ,
najafi14@gmail.com

*Corresponding author email: adam@ump.edu.my

Abstract

This paper investigates the effect of three different types and concentration of nanoparticles on the performance and emission of diesel engine. The nanoparticles used in this research include aluminium oxide (Al₂O₃) nanoparticles, silicon oxide (SiO₂) nanoparticles and carbon nanotubes (CNT) at 25, 50 and 100 ppm. The nanoparticles-diesel blend fuels were tested on YANMAR TF120M at engine speed of 1200 - 2400 rpm. CNT at 50 ppm (DC50) and CNT at 100 ppm (DC100) demonstrated highest BSFC improvement of 6.03% and 5.13%, respectively. Meanwhile, SiO₂ at 100 ppm (DS100) demonstrated lower brake specific fuel consumption (BSFC) and brake thermal efficiency (BTE) of 7.97% and 7.49 % at 1200 rpm. Nonetheless, SiO₂ at 25 ppm (DS25) had highest BTE of 8.77 % at 2400 rpm. All nanoparticles demonstrated CO reduction as its concentration increased. DA100 had maximum reduction CO of 41.2% at 2400 rpm. Furthermore, low amount of CNT of 25 ppm (DC25) reduced NO_x average of 5.8 % across the tested engine speed. SiO₂-diesel blend fuels had steady reduction of NO_x at 7.64 % per ppm.

Keywords: diesel combustion; nanoparticles; dispersion stability; exhaust emission.

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