***Analysis of the Impact of Dual Spark Plug Usage and Ignition Timing Advances of* 10°, 15°, *and* 20° *on Torque, Power, and Air-Fuel Ratio (AFR) in Energy-Efficient Vehicles at the Energy-Efficient Vehicle Contest* (KMHE)**

by

Muhammad Rafli

Automotive Machinery Study Program, Department of Engineering, Jember State Polytechnic

ABSTRACT

This study aims to analyze the effect of using dual spark plugs on torque, power, and the Air-Fuel Ratio (AFR) *in vehicles participating in the Energy-Efficient Vehicle Contest* (KMHE). *The primary focus of this research is to evaluate engine performance using ignition timing of 10°, 15°, and 20°, as well as their impact on combustion efficiency and fuel consumption. The research methodology employed was experimental, using a dynamometer to measure engine torque and power, and an* AFR *meter to assess the air-fuel mixture. The results of the study indicate that using dual spark plugs with a 10° ignition advance yields better fuel efficiency, although the power produced is lower. In contrast, a 20° ignition advance results in a significant increase in power but with higher fuel consumption at high engine speeds. A 15° ignition advance offers a good balance between torque, power, and fuel efficiency. Overall, the findings of this study can serve as a reference for the development of engine technologies for more efficient and environmentally friendly energy-efficient vehicles and contribute to the advancement of future automotive technologies.*

Keywords*: Dual Spark Plug, Torque, Power, Air-Fuel Ratio, Ignition Timing, Energy-Efficient Vehicle.*

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