ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh penggunaan sistem *Exhaust Gas Recirculation* (EGR) terhadap performa mesin bensin 1 silinder 155 cc berbahan bakar RON 90 berdasarkan parameter *brake power*, *brake torque*, *brake specific fuel consumption* (BSFC), dan *brake thermal efficiency* (BTE). Penelitian dilakukan secara eksperimental menggunakan *roller dynamometer* dengan variasi bukaan katup EGR sebesar 0%, 25%, dan 50% pada rentang putaran mesin 4000–8000 RPM.Hasil penelitian menunjukkan bahwa semakin besar bukaan katup EGR, maka *brake power*, *brake torque*, dan *brake thermal efficiency* cenderung menurun, sedangkan *brake specific fuel consumption* meningkat. Kondisi EGR 0% menghasilkan performa terbaik dengan *brake power* maksimum sekitar 8,0 kW, *brake torque* maksimum sekitar 6,5 N·m, BSFC terendah sekitar 0,15 kg/kW·jam, dan *brake thermal efficiency* tertinggi sekitar 45%. Sebaliknya, EGR 50% menghasilkan *brake power* sekitar 7,0 kW, *brake torque* sekitar 5,5 N·m, BSFC tertinggi sekitar 2,1 kg/kW·jam pada putaran rendah, serta *brake thermal efficiency* sekitar 20–27%. Hasil ini menunjukkan bahwa peningkatan bukaan EGR berpotensi menurunkan emisi gas buang, namun diikuti dengan penurunan performa dan efisiensi mesin.

Kata Kunci : *brake power*, *brake torque*, *brake spesific fuel consumption*, brake thermal efficiency, *Exhaust Gas Recirculation* , RON 90.

ABSTRACT

This study aims to analyze the effect of using an Exhaust Gas Recirculation (EGR) system on the performance of a 155 cc single-cylinder gasoline engine fueled by RON 90, based on parameters such as brake power, brake torque, brake specific fuel consumption (BSFC), and brake thermal efficiency (BTE). The research was conducted experimentally using a roller dynamometer with EGR valve opening variations of 0%, 25%, and 50% across an engine speed range of 4000–8000 rpm. The results indicate that as the EGR valve opening increases, brake power, brake torque, and brake thermal efficiency tend to decrease, while brake specific fuel consumption increases. The 0% EGR condition yielded the best performance, with a maximum brake power of approximately 8.0 kW, maximum brake torque of about 6.5 N·m, lowest BSFC of around 0.15 kg/kW·h, and highest brake thermal efficiency of approximately 45%. Conversely, the 50% EGR condition resulted in a brake power of approximately 7.0 kW, brake torque of about 5.5 N·m, highest BSFC of around 2.1 kg/kW·h at low speeds, and brake thermal efficiency of approximately 20–27%. These results demonstrate that increasing the EGR opening has the potential to reduce exhaust emissions, but this comes at the cost of reduced engine performance and efficiency.

Keywords: brake power, brake torque, brake specific fuel consumption, brake thermal efficiency, *Exhaust Gas Recirculation*, RON 90