# ABSTRAK

Pada sistem pembakaran *spark-ignition engine* menghasilkan emisi gas buang yang berbahaya bagi lingkungan berupa $NO_x$. Penambahan *additive fuel* etanol pada pertamax menyebabkan proses oksidasi meningkat, dengan menggunakan Exhaust Gas Reciculating pada *spark-ignition* engine akan mengakibatkan gas buang memiliki konsentrasi kandungan gas $NO_x$ yang lebih rendah.

Tujuan penelitian ini untuk mengetahui pengaruh penggunaan EGR *hot* dan *cold* terhadap performa *internal combustion engine* menggunakan bahan bakar pertamax dengan penambahan *additive fuel* etanol. Penelitian dilakukan variasi pembebanan 25%, 50%, 75%, dan 100%, dengan menggunakan variasi pembukaan EGR *valve hot* dan *cold* 0%, 25%, 50%, 75%, dan 100%, pada presentase terhadap 1 liter *mixing fuel* pertamax dengan etanol 0%, 5%, 10%, 15%, pengujian dilakukan pada putaran mesin 5000 rpm.

Hasil pengujian menunjukkan adanya peningkatan *brake torque* dan *brake power* tertinggi sebesar 30% pada EGR *hot* 100% dengan pertamax etanol 15%, penurunan *brake specific fuel consumption* terendah sebesar 22% pada EGR *hot* 100% dengan pertamax etanol 10%, dan peningkatan *brake thermal efficiency* tertinggi sebesar 23% pada EGR *cold* 25% dengan pertamax etanol 5%.

Kata kunci : *exhaust gas reciculating*, *additive fuel*, performa.

## ABSTRACT

The exhaust emissions of nitrogen oxides produced in spark ignition engines are harmful to the environment. The addition of ethanol fuel additive inside *Pertamax* causes the oxidation process to increase, using Exhaust Gas Reciculating on spark-ignition engines thereby reducing the NOx gas in exhaust gas emissions.

The purpose of this study was to determine the effect of using hot and cold EGR on internal combustion engines when using *Pertamax* fuel and ethanol additive fuel. The study carrying out with variations in the loading of 25%, 50%, 75%, and 100%, using variations of the EGR valve opening hot and cold 0%, 25%, 50%, 75%, and 100%, at a percentage of 1 liter of mixing fuel *Pertamax* with ethanol 0%, 5%, 10%, 15%, the test carrying out at an engine speed of 5000 rpm.

The test results show that when 100% hot EGR containing 15% ethanol added on *Pertamax*, brake torque and brake power increase by up to 30%, In the case of *Pertamax* mixed with 10% ethanol, when the hot EGR at 100%, the lowest brake specific fuel consumption reduction is 22%, and the highest increase of brake thermal efficiency was 23% in EGR cold 25% with Pertamax mixed with 5% ethanol.


Keywords : exhaust gas reciculatin , additive fuel, performance.