

**ANALYSIS WARMUP MATERIAL BURN HEAT EXCHANGER COIL TYPE ON
EXHAUST GAS EMISSIONS AND VOLUMETRIC FLOW RATE OF FUEL IN
4-STROKE MOTORCYCLE EXHAUSTS**

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ABSTRACT

The increasing number of motorcycles in Indonesia has led to increased fuel consumption and exhaust emissions. One effort to improve combustion quality is by utilizing exhaust gas heat through a coil-type heat exchanger as a fuel preheater. This study aims to analyze the effect of fuel heating on exhaust gas emissions and fuel volumetric flow rate in a 2005 Honda Mega Pro 4-stroke motorcycle using Pertalite fuel. The method used is an experiment by comparing standard conditions and the use of a heat exchanger at temperatures of 35°C, 40°C, and 45°C. The parameters analyzed include CO, HC, CO₂, O₂, λ (lambda), and volumetric flow rate at 1,500, 2,000, and 3,000 rpm. The results showed that fuel heating reduced CO and HC emissions, increased CO₂, improved O₂ and λ values, and decreased fuel volumetric flow rate. The best condition was obtained at a temperature of 45°C. Thus, the use of coil-type heat exchangers effectively increases combustion efficiency, reduces exhaust emissions, and saves fuel consumption.

Keywords: *coil-type heat exchanger, exhaust emissions, volumetric flow rate, fuel heating, four-stroke motorcycles.*