

**MODIFIKASI KNALPOT MENGGUNAKAN ALAT *HEAT EXCHANGER*  
DENGAN VARIASI COOLANT UNTUK MENGURANGI KANDUNGAN  
EMISI GAS BUANG PADA SEPEDA MOTOR 4 LANGKAH  
(*MODIFICATION EXHAUST USING A HEAT EXCHANGER WITH COOLANT  
VARIATIONS TO REDUCE THE EXHAUST EMISSION CONTENT ON A 4-  
STROKE MOTORCYCLE*)**

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**ABSTRACT**

*This research aims to determine the difference between motorcycle exhaust modification and the addition of a heat exchanger using pertalite fuel with coolant variation and variations in air flow rates against exhaust emission pollutants and find out the value of the decrease in exhaust emission pollutants of motorcycle vehicles after motorcycle exhaust modification by adding a heat exchanger tool using pertalite fuel with coolant variations and air flow rates. The type of research used is a quantitative research method. The results of this research showed that when testing exhaust emissions before cooling and after cooling at variations in air flow rates of 20m/s, 40m/s, 60m/s. Before cooling the gas levels of CO, CO<sub>2</sub>, O<sub>2</sub>, HC and lambda values were, respectively, 4.22%Vol, 2.95%Vol, 12.50%Vol, 1913ppm, 1,666λ. After cooling coolant A and coolant B liquids with air flow rate speeds of 20m/s, 40m/s, 60m/s then, the best emission content reduction and the emission increase using coolant liquid cooling B with variations in air flow rates of 60m/s are as follows: The reduction in emission levels in CO gas was 37.86% compared to before cooling, CO<sub>2</sub> gas by 37.68% compared to before cooling, HC gas by 39.78% compared to before cooling, and the highest increase in O<sub>2</sub> gas content by 53.52% compared to before cooling. It can be concluded that exhaust modification with the addition of a heat exchanger can reduce exhaust emissions of CO, CO<sub>2</sub>, HC, and increase O<sub>2</sub> content and can affect the lambda value compared to without coolant liquid cooling treatment.*

**Keywords :** *CO, CO<sub>2</sub>, O<sub>2</sub>, HC, Lambda Value, Heat Exchanger, Cooling, Modification, Exhaust, Coolant, Exhaust Emission*