

**ANALYSIS OF THE USE OF SHELL AND TUBE HEAT EXCHANGER
FUEL PREHEATER ON VISCOSITY AND FUEL CONSUMPTION**

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ABSTRACT

This study aims to evaluate fuel consumption efficiency and engine performance improvement in motor vehicles through the use of a fuel mixture consisting of pertalite and 5% ethanol, with and without the use of a shell-and-tube type heat exchanger. Ethanol, as an alternative fuel derived from plant sources such as corn and wheat, is known to enhance combustion quality. Motor vehicles, especially those using carburetor systems, tend to have high fuel consumption due to incomplete combustion. The use of a heat exchanger serves to preheat the fuel, allowing it to vaporize more easily and mix better with air, thereby improving combustion efficiency. The results show that the combination of pertalite + 5% ethanol with heat exchanger at 50°C is the most efficient variation. At engine speeds of 4000 rpm and 5000 rpm, this variation achieved the lowest fuel consumption. At lower engine speeds (2000 rpm), the heat exchanger significantly increased engine torque. Although the increases in torque and power at 4000–7000 rpm were not very significant, performance improvements were still observed compared to other variations.

Keywords: *ethanol, pertalite, heat exchanger, fuel efficiency, engine performance.*