

Utilization of Engine Exhaust Waste Heat for Refrigeration Application

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Abstract: *In modern automotive systems, a large portion of energy from internal combustion engines is wasted as heat through exhaust gases and cooling systems, reducing overall efficiency. This project, titled "Utilization of Engine Exhaust Waste Heat for Refrigeration Application," aims to recover this waste heat using thermoelectric technology. The system employs Peltier (TEC1-12706) modules based on the Seebeck effect to convert exhaust heat into electrical energy. The generated power is stored in a 12V, 8Ah battery and later used to operate another set of Peltier modules for cooling. A thermally insulated box (250 mm × 250 mm) serves as the refrigeration chamber, maintaining temperatures between 5°C and 10°C. The setup includes the engine, silencer, heat sinks, fans, and battery mounted on a portable mild steel frame. This system provides cooling for medicines, beverages, and perishable items during travel or field operations. It eliminates the use of external electricity and harmful refrigerants, making it eco-friendly and energy-efficient. Overall, the project demonstrates a sustainable and innovative method of converting waste heat into useful refrigeration power.*

Keywords: Supporting frame, Ic engine, Thermoelectric Module, Battery, Refrigeration Chamber

