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Waste Heat Recovery from Internal Combustion Engine Using Thermoelectric Power Generator

P.Srinivasan ¹, P.V.Elumalai ²

U.G. Student, Department of Mechanical Engineering, Dhanalakshmi College of Engineering, Chennai, INDIA. ¹

Associate Professor, Department of Mechanical Engineering, Dhanalakshmi College of Engineering, Chennai, INDIA.

Abstract - Thermoelectric generators (TEGs) are currently a topic of interest in the field of energy harvesting for automobiles. In applying TEGs to the outside of the exhaust tailpipe of a vehicle, the difference in temperature between the hot exhaust gases and the automobile coolant can be used to generate a small amount of electrical power to be used in the vehicle. The amount of power is anticipated to be a few hundred watts based on the temperatures expected and the properties of the materials for the TEG. A major part of the heat supplied in an internal combustion engine is not realized as work output, but dumped into the atmosphere as waste heat. If this waste heat energy is tapped and converted into usable energy, the overall efficiency of an engine can be improved. The percentage of energy rejected to the environment through exhaust gas which can be potentially recovered is approximately 30-40% of the energy supplied by the fuel depending on engine load. Thermoelectric modules which are used as thermoelectric generators are solid state devices that are used to convert thermal energy from a temperature gradient to electrical energy and it works on basic principle of Seebeck effect.