DESIGN AND FABRICATION OF THERMOELECTRIC GENERATOR

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ABSTRACT

The current worldwide trend of increasing transportation is responsible for increasing the use of internal combustion engines. I.C engines, the devices with a high energy usage and low efficiency because roughly 75 % of the energy produced during combustion is lost in the exhaust and in the coolant of the engine in the form of heat. As a huge amount of energy is lost, there is urgent need to design a advice to trap this loss. This paper proposes and implements a waste heat recovery system using a thermoelectric generator (TEG) designed for four strokes I.C. engine. The system converts the waste heat from the exhaust manifold into electrical energy using a TEG. The output is then boosted by a Joule Thief converter to run the required load or to charge a battery. The experimental results demonstrate that the proposed system recovers considerable amount of waste heat which can be used to power some auxiliary automobile devices.

Keywords-: IC engine, Heat energy recovery, Silencer bend pipe, TEG, Electric load.

INTRODUCTION

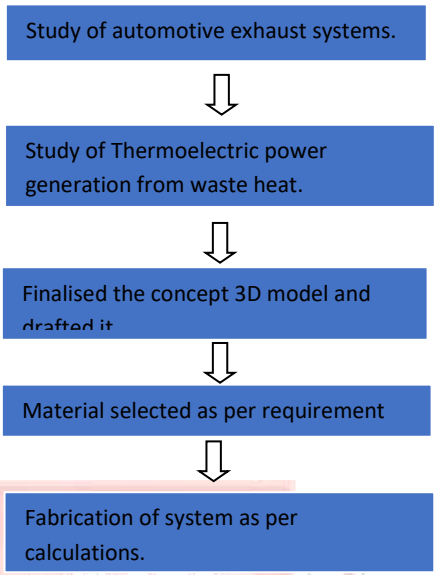
There is no system which converts total input energy into output energy practically, there are some losses. In the universe there is no system which is 100% proficient, due to losses system effectiveness decreases in real practices. Automobile sector are an example of high energy usage with low competence. It has 30% efficiency and roughly 75% of the energy produced during combustion and roughly 75% of the energy produced during combustion is lost in the exhaust or engine coolant in the form of heat. If this energy is tapped and transformed into functional energy, the overall efficiency of an engine can be improved. Thermoelectric technology can be used to generate electrical power from waste heat. Thermoelectric generator utilizes the See beck effect which was first observed in 1821. Thermoelectric generator practically came into existence in 1960 which were developed appreciably and since then number of manufacturers are now marketing thermoelectric modules for power generation, heating and cooling applications. Constant research and advances in thermoelectric materials and manufacturing techniques, enables the technology to make an increasing effort to address the growing low power energy sources typically used in energy harvesting and scavenging systems. Thermoelectric generator can be used to generate a small amount of electrical power, typically in the microwatt (μW) range, if a temperature difference is maintained between two terminals of a thermoelectric generator.

The hotness of exhaust gas pipe of an engine is very high when exhaust gases are flowing through it and that is around 200oC to 300oC. Thermoelectric generator is model for such applications as they are small, with no moving parts and relatively efficient at this temperature. Thermoelectric generator is basically solid-state devices that are used to convert thermal energy from temperature gradient to electrical energy. By using waste thermal energy through IC engines exhaust to charge the battery instead of using an alternator the overall fuel economy can be increased by 10%.

AIM & OBJECTIVES

The main focus of this experimental setup for conversion of waste heat energy (from silencer of two-wheeler) into electricity using thermoelectric generator (teg). in this the conversion of waste heat is done directly into electricity by using thermoelectric generator.

METHODOLOGY



LITERATURE REVIEW

1) Lia Kamelia, Adam Faroqi, Ahmad Ariz Muajianisan -THE CONVERSION OF WASTE HEAT FROM MOTORCYCLE INTO SMALL POWER PLANT

The law of conservation of energy states that energy can be transformed from one form to another but cannot be created nor destroyed. Since energy is also gone every time it transferred between organisms, that missing heat must go someplace. That missing energy becomes waste heat in the atmosphere. The heat which generated from the motorcycle is able to reach 579.8oC. To utilize this thermal energy, we propose to design power plants from thermoelectric.

2) Prashantha.k, Sonam wango- SMART POWER GENRATION FROM WASTE HEAT BY THERMOELECTRIC GENERATOR

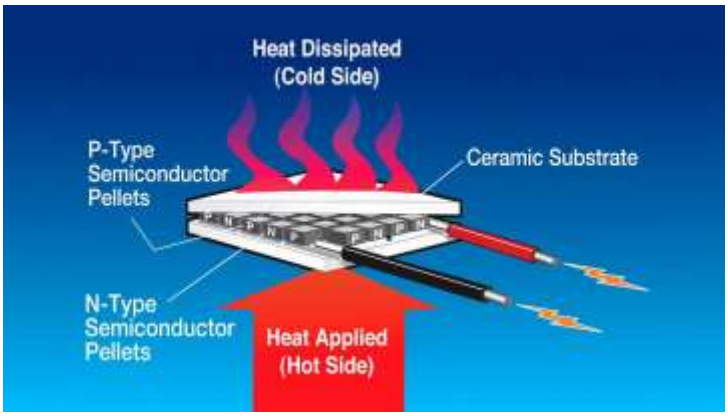
Generating electricity in present when there is a shortage of fossil fuel, oil, gas, etc. burning of these fuels causes environmental problem like radio activity pollution, global warming etc. So that these (coal, oil, gas) are the limiting resources hence resulting new technology is needed for electricity generation, by using thermoelectric generators to generate power as a most promising technology and environmental free and several advantages in production. Thermoelectric generator can convert directly thermal (heat) energy into electrical energy.

3) M G Jadhav and J S Sidhu - DESIGN AND FABRICATION OF SILENCER WASTE HEAT POWER GENERATION SYSTEM USING THERMO-ELECTRIC GENERATOR

The current worldwide trend of increasing transportation is responsible for increasing the use of internal combustion engines. I.C engines, the devices with a high energy usage and low efficiency because roughly 75 % of the energy produced during combustion is lost in the exhaust and in the coolant of the engine in the form of

heat. As a huge amount of energy is lost, there is urgent need to design a advice to trap this loss. This paper proposes and implements a waste heat recovery system using a thermoelectric generator (TEG) designed for four strokes I.C. engine.

THERMOELECTRIC GENERATOR



SCOPE OF PROJECT

- Military and Aerospace applications.
- A recent study estimated that TEG global market is expected to reach $750 million with growth rate of 14.5%.
- Reduced total cost of ownership due to improved energy efficiency
- A study found that Asia-Pacific Market would grow at a Compound Annual Growth Rate (CAGR) of 18.3% due to the high demand of thermoelectric generators by the automobile industries to increase overall fuel efficiency.
- Small scale thermoelectric generators are also in early stages of investigation in wearable technologies to reduce or replace the charging and boost charge duration.
- One of the key advantages of thermoelectric generators outside of such specialized application is that they can be potentially integrated into existing technologies to boost efficiency and reduce the environmental impact by producing usable power from waste heat.

RESULT & CONLUSION

- Thermoelectric generator is utilised to produce electrical power from heat.
- It has no moving part a long lifetime and quite operation within TEMs utilising different sectors.
- We take Bi2Te3 thermopiles with dimensionless figure out of benefits.
- The conclusion has proven that with the utilisation of this representation we get a competent result. By connecting the peltier plates to the generation section.
- Therefore, with the help of ammeter we calculate the current and voltage with voltmeter.

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