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THERMO ELECTRICITY GENERATION THROUGH WASTE ENERGY

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Abstract

Method for generating power such as burning of wood, petrol, diesel, coal, is continuously depleting with nature, so that exceeded usage of electricity according to the consumer demand. Also considering global warming is the increase in the average measured temperature of the Earth's near surface air and Oceans since the mid-20th century, and its projected continuation. Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the summer. the temperature formed between two dissimilar conductors produces a voltage and current. At the heart of the thermoelectric generator effect is the fact that a temperature difference in a conducting material results in heat flow between one side to another side This section gives the brief description of each component used in designing the waste heat to generate electricity By using this thermoelectric power generation (TEPG) When ever heating of one surface (waste heat example refrigerator outer surface heat, laptop heat, ion box heat, solar radiation heat ,even human body heat) is also an input of thermo electric generator. If the temperature is increases the voltage is also increases vice verse in such a way that the other side of thermoelectric generator is cold because heat transform is uniform then only electron will flow and voltage is developed at the output side of the thermoelectric generator the TEG is regulated by required voltage for mobile charger

Index Terms:. *TEG- thermoelectric generator, °F- farren heat, TEPG- this thermoelectric power generation*

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1. INTRODUCTION

Dissimilar conductors can produce electricity. At the heart of the thermoelectric effect is the fact that a temperature gradient in a conducting material results in heat flow; this results in the diffusion of charge carriers. The flow of charge carriers between the hot and cold regions in turn creates a voltage difference running an electric current through the junction of two dissimilar conductors could, depending on the direction of the current, cause it to act as a heater or cooler. Now a days one of the major economic problems is the increasing energy consumption. This results in a rapid depletion of fossil fuel resources. To reduce the consumption level of these resources, a lot of investment in renewable energy and development investment in these sources. However, there is also the possibility of improving the efficiency of energy production from non-renewable sources. Energy production often involves the formation of by-product which is waste heat. However the waste heat is a certain volume of energy carrier which can still be utilized. One of the equipment processing heat into electricity is a thermoelectric generator. Its operation is based on the principle of thermoelectric phenomenon, which is known as a Seebeck phenomenon. The simplicity of thermoelectric phenomena allows its use in various industries, in which the main waste product is in the form of heat with the temperature of several hundred degrees.

2. CIRCUIT DIAGRAM AND WORKING BY USING TEG

The MAX756/MAX757 are CMOS step-up DC-DC switching regulators for small, low input voltage or battery-powered systems. The MAX756 accepts a positive input voltage down to 0.7V and converts it to a higher pin-selectable output voltage of 3.3V or 5V. The MAX757 is an adjustable version that accepts an input voltage down to 0.7V and generates a higher adjustable output voltage in the range from 2.7V to 5.5V. Typical full-load efficiencies for theMAX756/MAX757 are greater than 87%. Max756 combine a switch-mode regulator with an Nchannel MOSFET, precision voltage reference, and power-fail detector in a single monolithic device. The MOSFET is a “sense-FET” type for best efficiency, and has a very low gate threshold voltage to ensure start-up under low-battery voltage conditions (1.1Vtyp).The circuit can be easily wired on a very small rectangular common PCB. All connections should be kept as short as possible. If available, try to add a good quality 8 pin DIP socket for IC1. Note that the power inductor’s (L1) DC resistance significantly affects efficiency. For highest efficiency, limit L1’s DC resistance to 0.03 Ohm or less. A thru-hole type standard power inductor can be used. Similarly, the ESR of all capacitors (bypass and filter) affects circuit efficiency. Best performance is obtained by using specialized low-ESR capacitors.

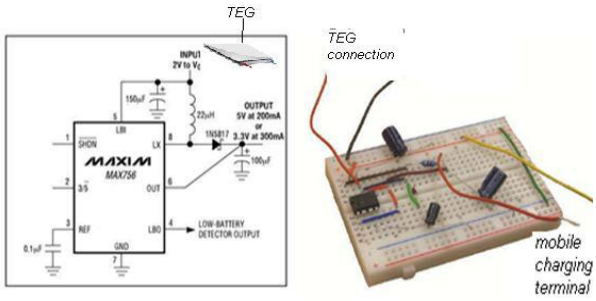

Fig-1: Circuit diagram 5 Volt From 1.5 Volt Circuit Schematic

3. COMPLETE SETUP TO CHARGE THE MOBILE BATTERY BY USING THERMOELECTRIC GENERATOR

Fig-2: Charging The Sample Mobile Battery Using TEG By Waste Heat

Complete setup to charge the mobile battery is shown in fig 4.5, When heat is applied to the hot side the TEG get absorb the heat from anybody (refrigerator heat, laptop heat, heat from the vehicle, solar heat, and even human body is also a waste heat source for TEG).

Under this when heat absorbs one side it rejected at the other side (cold side) heat transfer take place from hot surface to cold surface. So that the electron will flow to through copper conductor to the complete circuit so voltage will be regulated at the circuit. The required power for the mobile battery is 3.8 volt it isat the output terminal at the circuit is as shown in the fig a As it is heat transfer take place from heat applied side to cold side. These thermoelectric generators of two terminals are to connected i.e. positive terminal is connected to diode side and the other terminal is connected to ground Circuit elements consist of Diode (BY127), Potentiometer (10kpot), Capacitor (50micro farad), Zener diode (6v), LED (3.5v), Mobile battery (3.8v) When heat is applied to the hot side under certain temperature (30 to 300 degree C) electrical power from heat flow across a hot to cold side temperature gradient.. more thermoelectric generator need to be connected in cascade to make the maximum voltage. Thermoelectric device diode eliminates the reverse flow of electron to the thermo electric generator so that continuously electron will flow through diode when applied heat to the TEG.

Potentiometer is used to control the voltage. Zener diode helps to eliminate the excess voltage flow to the battery because battery required to charge. LED (light emitting diode) is shows the battery is charging or not and it ill glow when the output voltage is above 3.5 volt.

By Waste Heat From Boiler Tube

The exhaust of flue gasses sounds very interesting. We believe the efficiency of such a system would be in the range of 10.6% for QW of Si/SiGe. This takes into account 10 C temperature loss on both the hot and cold end of the thermoelectric for heat transfer We tested five different modules with different semi-conduct materials in order to find the TEG with the maximum output at a specifictemperature difference. Fig. 6 shows the schematic of the module tests. The TEG module was clamped tightly in between two containers, one was the hot side with a high temperature and another was the cold side with a low temperature

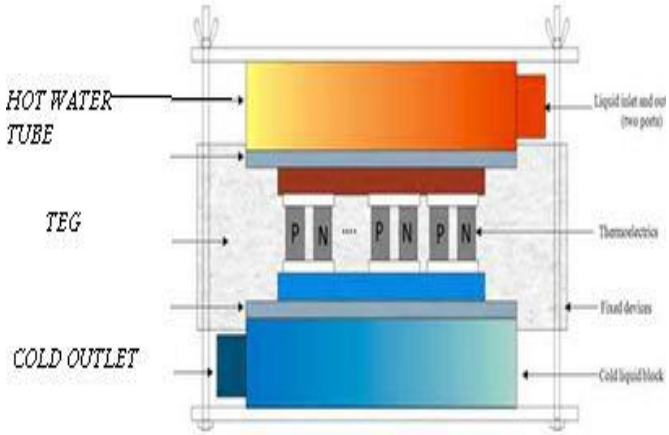

Fig.3: Shows The Schematic Of The Module Tests.

We kept the temperature on the hot side at about200°C by using a digital thermostat oil bath and used the tap water as the cooling liquid on the cold side with a temperature of about 20°C. The temperatures of both hot and cold sides were measured and the results are shown in graph. The temperature was measured using two micro-thermocouples with very thin tips. The temperature on the hot side of the modules was stabilized at about 180°C and that on the cold side atabout 40°C. The increase in the temperature on the cold side from 20 to 40°C was because of the heat conduction from the hot side through the TEG modules. The temperature difference was stabilized at around 140°C. The results illustrate t

4. TEST ANALYSIS FROM BURNER

Fundamentally, there are four basic components in a te-powered generator: a heat source, a te, a ‘cold-side’ heat sink, and an electrical load. the system may also include a voltage regulation circuit or a fan for the heat sink.

fig.(8)shows one example of such a system.

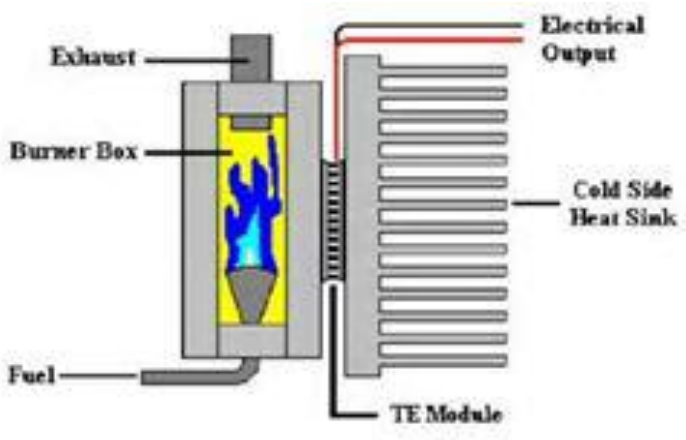

Fig.4 Shows One Example Of Such A System.

5. APPLICATIONS

Thermoelectric Generators are basically used in where the power production is less. In automobile vehicle produce heat that can be used for generating electricity by using TEG. Recharge the battery where ever waste heat is obtained.

Self charging battery by fixing the TEG at radiator or two wheeler silencers pipe

6. ADVANTAGES & DISADVANTAGES

Advantages

1. Clean, Noise less
2. Cost is less
3. This is a Non-conventional system
4. No fuel is require
5. Easy maintenance
6. Portable
7. Charging time is less (maximum temp)
8. Promising technology for solving power crisis toan affordable extent.
9. Simple in construction.
10. Pollution free.

Disadvantages

1. Improper variation of temperature gradient difference may damage the TEG, Complex design

7. CONCLUSION

The aim of the study was to analyze the possibility of the thermo elements use to convert waste heat into electricity.

Simulations were performed using the IPSEpro software. It allows simulating all kinds of thermal cycles, power units and cooling cycles. Using the thermoelectric chips on the efficiency of 7% can be obtained the power of 30 kW, and the temperature was reduced to 130℃ even at the level of 40 kW.

Increased value of the flue gas stream would result in higher values obtained power. They are not too high value as compared with the losses in the boiler, due to the relatively low values of thermoelectric generators, but the resulting power may be useful as a partial meet the needs of their own power.

8. SCOPE OF THE FUTURE WORK

1. By using proper heat sink material help to increase the output voltage.
2. Using long proper heat sink material is to avoid the heat in between the gap of fins.
3. By addition of the more TEG in SERIES is to increase the voltage

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