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THERMOELECTRIC POWER GENERATION BY USING HEAT FROM WASTE WATER AT CO-GENERATION PLANT

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ABSTRACT

Generating electricity in present there is a shortage of fossil fuel, oil, gas, etc. Burning of these fuels causes environmental problems 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 pollution free and several advantages in production. Thermoelectric generator can convert direct thermal (heat) energy into electrical energy. In this TEG there are no moving parts and it doesn't produce any waste during power production hence it is consider as a green energy source. Thermoelectric power generator convert direct waste heat in to generate electricity.

Keywords:– FINS,PELTIER PLATE, SEEBACK EFFECT, TEG, VOLTAGE.

I.INTRODUCTION

Thermoelectric power generation offer a potential in the direct exchange of waste-heat energy into electrical power where it is unnecessary to believe the cost of the thermal energy input .This method will have a maximum outcome. The application of this green technology in converting waste-heat energy directly into electrical power can improve the overall efficiency of energy conversion system. Heat source which is need for this conversion is less when contrast to conventional methods.

1.1 PROBLEM IDENTIFICATION:-

In Rajarambapu Patil Sugar Industry, Sakhrale**.** There is a co-generation plant, in the co-generation plant the steam is come to sampling point from the boiler for sampling purpose. Then the sampling steam is directly drained to drainage point, so we decided to use this wastage of heat to generate energy.

Thermoelectric generators are all solid-state devices that convert heat into electricity. Unlike traditional dynamic heat engines, thermoelectric generators contain no moving parts and are completely silent. Such generators have been used reliably for over 30 years of maintenance-free operation in deep space probes such as the Voyager missions of NASA.1 Compared to large, traditional heat engines, thermoelectric generators have lower efficiency. But for small applications, thermo-electrics can become competitive because they are compact,

simple (inexpensive) and scalable. Thermoelectric systems can be easily designed to operate with small heat sources and small temperature differences. Such small generators could be mass produced for use in automotive waste heat recovery or home co-generation of heat and electricity. Thermo-electrics have even been miniaturized to harvest body heat for powering a wristwatch.

II.THEORY, PRINCIPLE AND TECHNOLOGY

The user will begin by installing the generator to their existing heat source. The device will not be permanent, but instead will be installed only when used. The actual generator will sit on the hearth outside of the fireplace. A device will extend into the fireplace to collect heat and transport it to the generator. Once a hot water in used and the chamber reaches a sufficient temperature the generator will begin to produce electricity and notify the user that they can plug in a device.

2.1. PRINCIPLE

Seebeck Effect

When two ends of a conductor are held at different temperatures electrons at the hot junction at higher thermal velocities diffuse to the cold junction. Seebeck discovered that making one end of a metal bar hotter or colder than the other produced an EMF between the two ends.

He experimented with junctions (simple mechanical connections) made between different conducting materials. He found that if he created temperature difference between two electrically connected junctions (e.g. heating one of the junctions and cooling the other) the wire connecting the two junctions would cause a compass needle to deflect. He thought that he had discovered a way to transform thermal energy into a magnetic field. Later it was shown that an electron diffusion current produced the magnetic field in the circuit a changing emf.

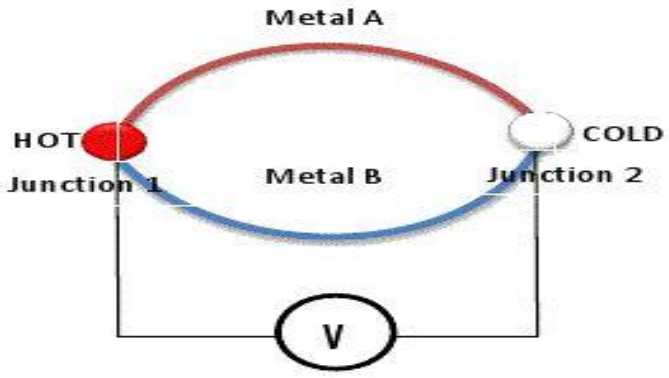

Fig.2.1:- Seebeck Effect Principle.

Thermal electric generators (TEGs) were used to convert the temperature differential provided by the hot water and the cooling system into electricity. This is done by utilizing the Seeback effect which consists of a current loop being created by two metals joined in two places with a temperature differential between the junctions. This current loop is then used to provide electrical power.

2.2. CONCEPTUAL BLOCK DIAGRAM

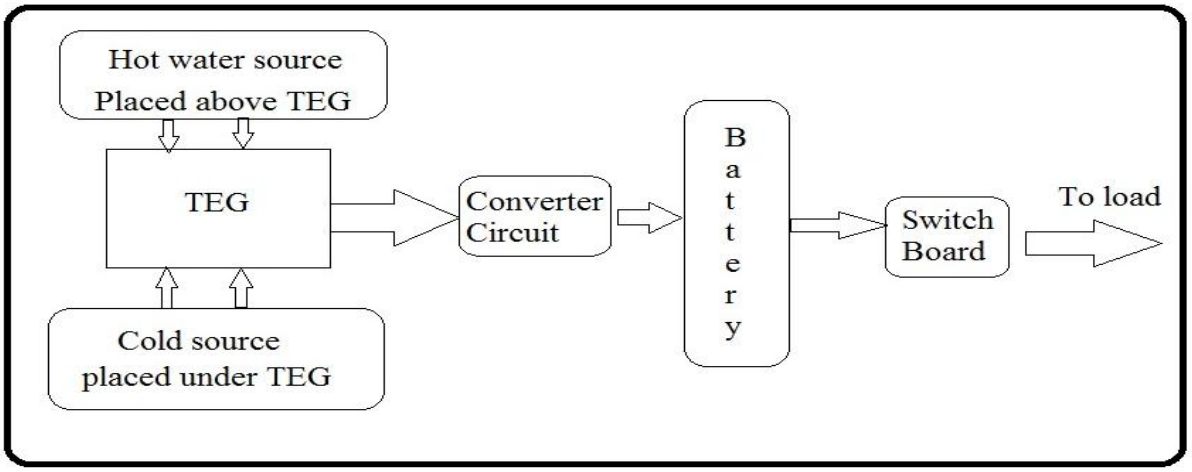

Fig.2.2.1:-Conceptual block diagram.

Thermoelectric generator construction and working principle:-

A thermoelectric generator is a solid state flexible device that consists of a P-type and N-type semiconductor particle arranged in series, When heat is applied to one surface of the thermoelectric generator (hot side), N-type (electrons) semiconductor and the holes in the p-type semiconductor will moves out. This movement of electrons and holes that forms charge. A thermoelectric generator can be connected in series, which increases the voltage, the current.

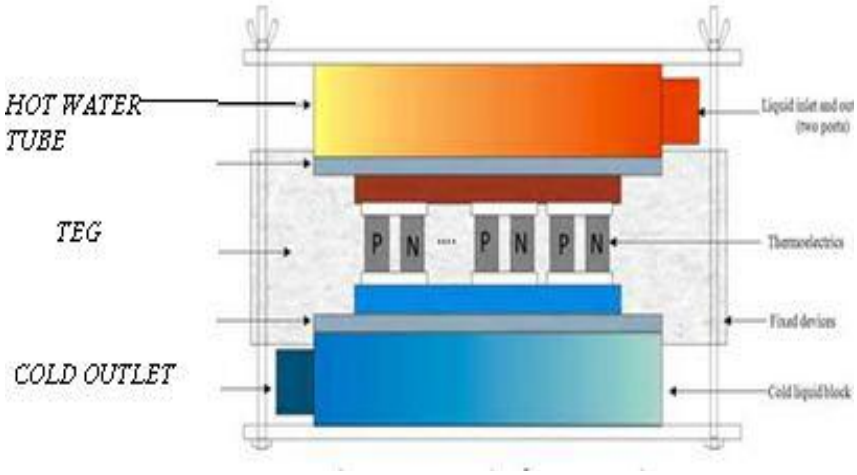

Fig.2.2.2:-Schematic diagram of a thermoelectric generator.

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2.3.PARTS

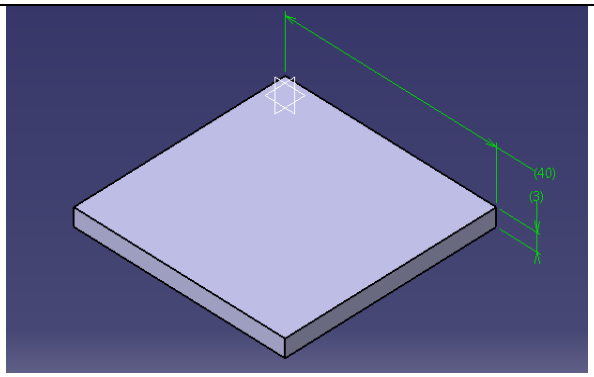
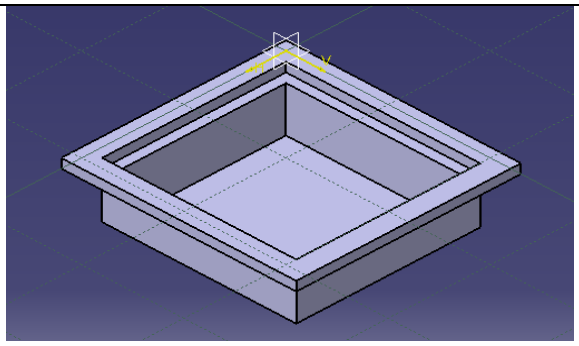
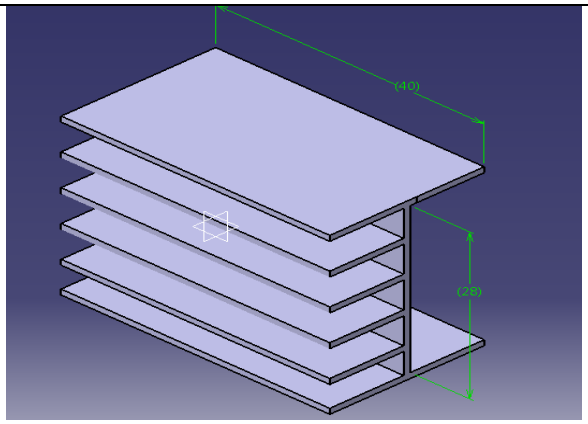
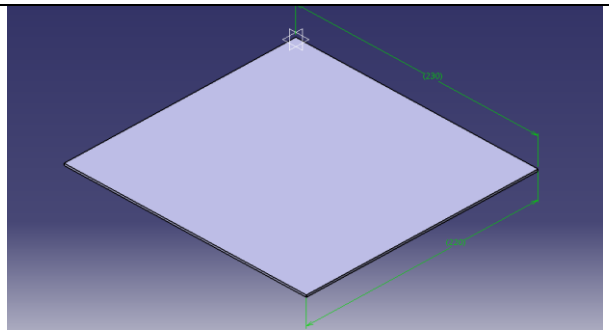
Part	Drawing
Thermoelectric Generator - Peltier plate • Size of plate – 40 x 40 x 5 mm. • No. of plates – 10 • Output : Max. 11.84 V (when 90 °C in the high-temperature side and 25 °C in the low-temperature side) Materials based on bismuth telluride are the best "low temperature" TEG.	
Tray • Material :- Aluminium • Size :- 230 x 220 x 50mm • Quantity :- 2	
Fins • Material :- Aluminium • Size :- 23 x 40 x 30 mm • Quantity :- 10	
Plate • Material :- Aluminium • Size :-250 x 250 x 1.5 mm • Quantity :-1	

Table 2.3:- Parts of Project.

III. PROJECT MODEL

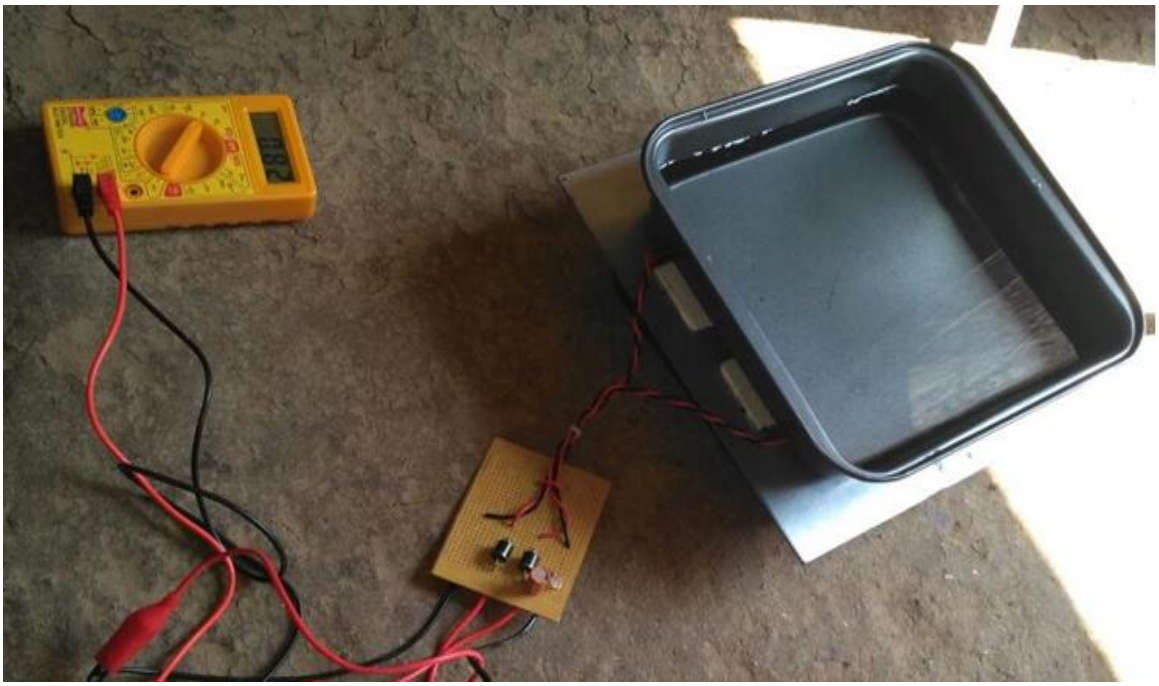


Fig.3:-Project Model.

IV.CONCLUSION

Present method for electricity generation is converting thermal energy into mechanical energy by turbine then into electricity by using generator. Burning of these fuels causes environmental problem like radio activity pollution, global warming. Hence (coal, oil, gas) are the limiting resources resulting new technology is needed. The project is tested and implemented. This system will give the best economical pollution free, required energy solution to the people .This work can be used for many applications in urban and rural areas where power availability is less or totally absence.

- Plate Name- TECI- 12706
- Output:- Max. 11.84 V (when 90 °C in the high-temperature side and 25°C in the low-temperature side)
- Raw material: BiTe family.

V.ACKNOWLEDGEMENT

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