Department of Mechanical Engineering Technology
Faculty of Mechanical and Manufacturing Engineering Technology

DESIGN OF COOLING SYSTEM FOR TEG IN GENERATING ELECTRICAL ENERGY FROM WASTE HEAT AT NIGHT MARKET

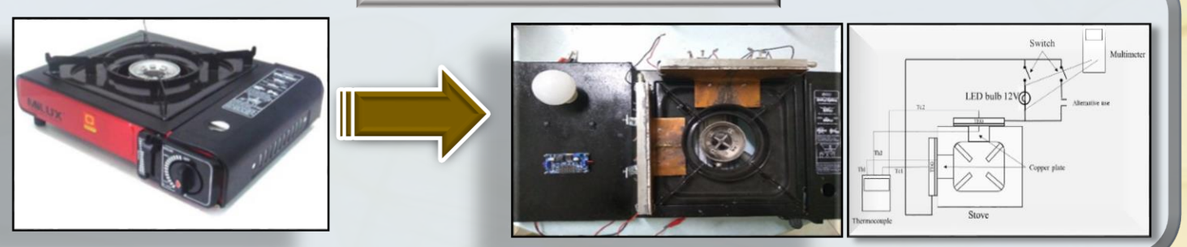
INTRODUCTION

- Energy harvesting is process of capturing and accumulating by product energy as the energy becomes available
- The increasing use of generators resulting in additional air and noise pollution
- Majority using gasoline generator as power supply to power up lights at night markets
- Releases excessive thermal energy as waste product from cooking activities at night market
- Thermoelectric generator applicable to recover waste heat energy and transformed into electrical energy

OBJECTIVE

- To design a cooling system for thermoelectric generator from waste heat at night market
- To analyse the parametric effect towards performance of the thermoelectric generator
- To construct a prototype of thermoelectric generator with cooling system to utilize at night market

METHODOLOGY

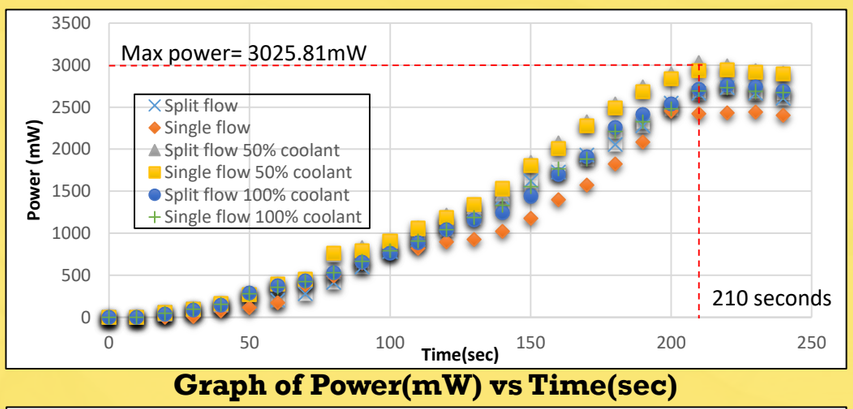


- Water temperature on LPG tank
- Temperature of pot and stand
- Prototype
- Cooling system

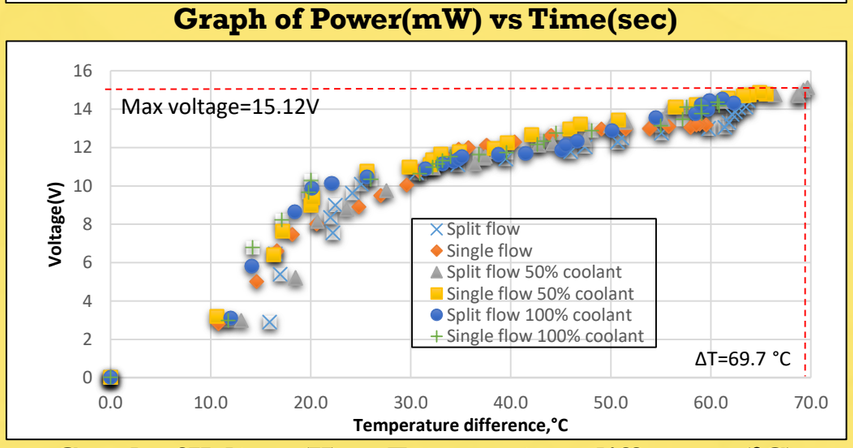
PRELIMINARY DATA → DESIGN SYSTEM → FABRICATION PROCESS → EXPERIMENTAL → ANALYSIS

RESULT & DISCUSSION

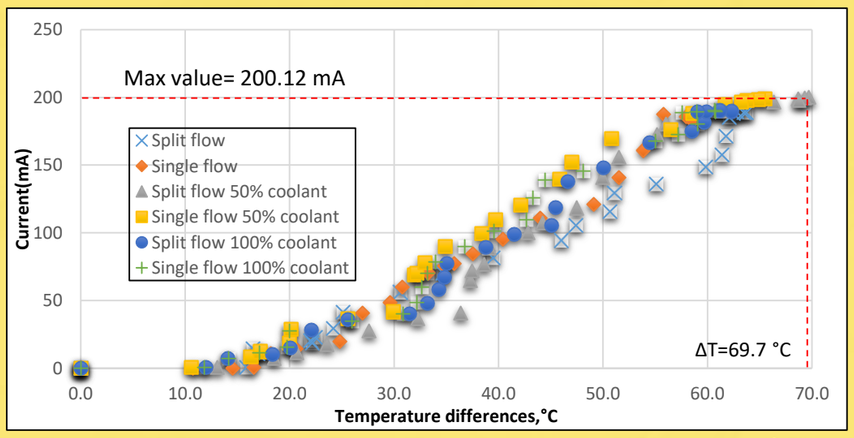
Test Outputs



Graph of Power(mW) vs Time(sec)

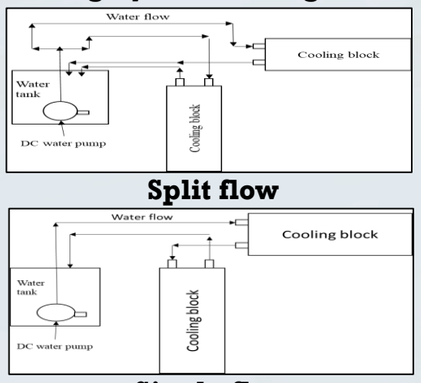


Graph of Voltage(V) vs Temperature difference(°C)



Graph of Current(mA) vs Temperature difference(°C)

Cooling system configuration



- 10 TEGs connected in series.
- Heat source from butane portable stove transferred using copper plate.
- Cooling block attached on T_{COLD} to remove heat
- T_{HOT} & T_{COLD} ➔ measured using 4-channel thermocouple.
- V_O & I_O ➔ measured using multimeter.
- Boost up voltage with step up module

- The output values (Vo, Io and Po) had increased uniformly.
- The highest output produced is 3025.18 mW power, 15.12V voltage ,200.12mA current and ΔT 69.7 °C at 210 seconds with configuration of split flow 50% coolant in cooling system.
- The addition of coolant and split flow increases the efficiency of output values of TEG.

CONCLUSION

The thermoelectric generator can produce sufficient electricity from waste heat energy from cooking activities at night market. The parameters in cooling system effects TEG performances, increases the efficiency of power output and temperature difference . This system can eliminate additional operating cost, noise and air pollution.

REFERENCES

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PUNETHEN A/L COOMERASAMY (B071610956) (punethen_28@yahoo.com)
MOHD ARIZAM BIN ABDUL WAHAP (arizam@utem.edu.my)

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
HANG TUAH JAYA, 76100 DURIAN TUNGGAL, MELAKA
Web: ftkmp.utem.edu.my