



**THE WASTE HEAT RECOVERY FOR POWER
GENERATION FROM AUTOMOTIVE EXHAUST
USING THERMAL ELECTRIC CELL (TEC)**

**WAN AHMAD SHAHRIL BIN ZULKIFLI
(2014819254)**

**BACHELOR OF MECHANICAL ENGINEERING
(MANUFACTURING) (HONOURS)**

UNIVERSITI TEKNOLOGI MARA (UiTM)

JULY 2017

“I hereby declare that this thesis represents my own work which has been done at Universiti Teknologi MARA (UiTM) unless stated otherwise. The thesis has not been previously submitted for any other degree or other qualifications.”

Sign :

Date :

Wan Ahmad Shahril Bin Zulkifli

UiTM No: 2014819254

ACKNOWLEDGEMENT

‘In the name of Allah the Most Gracious, the Most Merciful’

First and foremost, thanks to ALLAH the Almighty for His blessing for giving me a still functioning body and mind in order to stay life and learn, also particularly to work on my project, hereby enables me to complete the project after all the difficulties and challenges.

I would like to take this opportunity to express my profound gratitude and deep regards to my respected supervisor, Dr. Yusli bin Yaakob of the Faculty of Mechanical Engineering for his sincere guidance, supervision, understanding, and help throughout this project. I am full indebted for his prompt inspirations that always listening, giving constant encouragement and continuous support have enabled me to complete my thesis. My endless thanks to Encik Muhammad Arif bin Ab Hamid Pahmi for his dedication and overwhelming attitude to help me to a very great extent to accomplish this project.

I would like to express my respectful and eternal appreciation towards my parents for being so understanding and always support me in order to improve myself to become a better person. Lastly, I humbly extend my thanks to all my friends and colleagues for their kind help in supporting my moral, sharing important knowledge and co-operation during my study years of study.

ABSTRACT

Road vehicle has a good potential for producing renewable energy from waste heat. The internal combustion process to move the vehicles had indirectly releasing waste heat into the environment which contributed to global warming. Thermal-electric Cell (TEC) is a device that able to convert thermal energy to electrical energy. The TECs system work when it is sandwiched between the hot side and cold side. The objective of this study is to investigate the possibility of generating power from waste heat using thermoelectric cell (TEC) with the effect of temperature difference experimentally. The experiment has been carried out in stagnation condition in the laboratory using 1500 cc petrol engine DOHC (4G91). Four TECs (SP1848-27145) were laid and connected in series on the top of exhaust muffler. The Arduino data tracking and 1750 Fluke Power Recorder has been employed to record the data. The experiment was run in two stages of cooling using air flow from standing fan and by attaching the cold water channel block on top of the TEC. Experimental results show that the highest voltage able to produce by the TEC was 2.42V in the range of temperature difference between 80°C and 85°C. By proving the electricity produced by the TEC, the result on the LED connected with the TEC start to light during output voltage was 1.80V. The performance of TEC is increased when the temperature difference between two sides is increased. Lastly, the conclusion has been made where the objectives of this project were achieved and the generated power could be utilized to extend the lifespan of the battery in the vehicle itself.

TABLE OF CONTENTS

CONTENTS	PAGE
ACKNOWLEDGEMENT	i
ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATION	x
CHAPTER 1 INTRODUCTION	
1.1 Background of Project	1
1.2 Research Problem Statement	3
1.3 Significant of Research	4
1.4 Research Objectives	5
1.5 Research Scope of Work	5