UNIVERSITI TEKNOLOGI MARA

DESIGN AND FABRICATION OF MINI COOLING FRIDGE USING PELTIER

MUHAMMAD ADAM BIN ABDULLAH

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ABSTRACT

This project aims to improve energy efficiency by using a Peltier instead of a compressor. The utilization of compressors contributes to higher power consumption thus increasing the electric cost. The cost of the compressor itself is relatively higher compared to a Peltier. For example, the usage of a compressor in the fridge. This study aims to tackle the above problems by introducing the utilization of Peltier as the cooling agent in the Fridge. The cold side of the Peltier will be attached to the inner aluminum plate inside the fridge and the hot part will be attached to an aluminum plate, heat sink and fans performed as the radiator. The power will be supplied by a 12V AC adapter and extruded polystyrene will act as thermal insulator. By applying the above method, the electricity bills and production cost of a fridge will be reduced.

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CHAPTER ONE
INTRODUCTION

1.1 Background of Study

Compressors are the main agent used for cooling, we can find it almost in every single refrigerator and freezers. The use of compressor dominates the sales against a Peltier, but Peltier system will always be ideal in certain situations especially for a mid-age consumer that is looking for such a low-price cooling fridge.[1] Compressors are a source of pollution and danger where it uses non-environmentally friendly flammable chemical materials such as Acetylene (C2H2), Ethylene (C2H4), Hydrogen (H2), Butane (C4H10), Vinyl Chloride (C2H3Cl) and Methylamine (CH5N). The compressor also used a lot of power to make it function.[2] Since compressors come in a large size, the consumers will also need a bigger space to put the refrigerator. These factors pose a risk of injury to consumers, consume a lot of money either in electricity bills or buying the refrigerator alone and it's not suitable for some people especially those who are living in a small house. Those factors are the reason why the compressor needed a replacement.

Jean Peltier is the one who discovered the thermoelectricity based on Peltier Effect in 1834, where the direct current (DC) applied along the two dissimilar materials that will cause a temperature difference. It was found that when the current flows along the intersection between two different wires, the heat will need to be consistently subtracted or added to maintain the Peltier temperature. In order to provide the heat, transfer the modules will use variations in the energy levels of electrons. The energy will be carried by the current across the low energy level of P-type semiconductors and high energy level N-type semiconductors from cold surface to the hot surface of the module.[3] The Peltier will produce the moment the electric current flows into the two different types of semiconductor metals. The current will start to transfer the heat from the other side to another. They are two sides of the module which is the cold side that can be used as a cooler and the other side will be heating up. It is recommended to cool the hot part to avoid it malfunctioning. Because of that, we are required to combine the Peltier with a heat sink and a cooler.[4]