

# CHAPTER I

## INTRODUCTION

### 1.1 Background

In the present time, the need of human for the cooling systems is growing up. Many applications have already been applied in various aspects of life, such as household needs, offices, transportation and so on. One of applied systems for cooling is using a vapor compression refrigeration cycle system or in others words a vapor compression refrigeration system.

The vapor compression refrigeration system has several main components such as a compressor, a condenser, an expansion valve, and an evaporator. The components are assembled in order to function the system. The vapor compression refrigeration system using working fluid called refrigerant. Now, the current of the vapor compression refrigeration system has a weakness, which is the operation of the system is still manual. This affects the performance of the system. The higher performance of the system exists, the faster the cooling is produced by the system. <sup>[1]</sup>

The evaporator is a component that can establish the speed of cooling. The working principle of the evaporator is that refrigerant will absorb heat from the surrounding environment, so the surrounding environment temperatures become low. The heat absorbed by the refrigerant in the evaporator is then used to change the phase of the refrigerant into a liquid state before entering the compressor. The existing vapor compression refrigeration system of the evaporator motor has a certain rotational speed or constant speed. It could be an effect of the performance of the system. <sup>[2]</sup>

In this project is designing the vapor compression refrigeration system by controlling the evaporator motor. The application of the control system will be using 2 methods. The first method of controlling using ON/OFF system, or also called the conventional method. In this method, the motor will turn OFF if temperature on evaporator reached, and it will turn ON when the temperature rises. The second method is motor control which is based on motor rotation speed. In this method, the motor evaporator will be given Variable Speed Drive (VSD) to

reach the desired temperature. The purpose of the control process is to know the effect by controlling motor fan on the evaporator of the vapor compression refrigeration system and to obtain the characteristic of the system. <sup>[3]</sup>

## 1.2 Purpose

The purposes of this final project are:

1. To obtain a conventional control system (ON/OFF) and VSD control (Variable Speed Drive) to control the evaporator output.
2. To compare the characteristics of conventional and VSD control Methods.

## 1.3 Objective

The objectives of the final project are:

1. To provides knowledge of the vapor compression refrigeration system.
2. To increase COP (Coefficient of Performance) from a vapor compression refrigeration system.
3. To reduce the consumption of electrical power consumption during the operation of the vapor compression refrigeration system.

## 1.4 Problem Scope

The problem scopes of the final project are:

1. Designing equipment of vapor compression refrigeration system in the scale of laboratory.
2. Testing based on the desired airflow temperature of the evaporator.

## 1.5 Writing Systematic

The final project consist of 5 chapter:

1. Chapter I Introduction  
This chapter describes background, purpose, objectives, problem scope, and writing systematic.
2. Chapter II Literature Review  
This chapter describes literature of vapor compression refrigeration system and control.
3. Chapter III Methodology  
This chapter describes methodology or the procedures of testing the control system.

4. Chapter IV Data and Discussion

This chapter describes the result of the final project and discussion with comparison literature.

5. Chapter V Conclusion and Recommendation

Summary of the research.

REFERENCES

APPENDIX

