

FINAL PROJECT

OPTIMIZING THE PERFORMANCE OF VAPOR COMPRESSION REFRIGERATION SYSTEM (VCRS) BY CONTROLLING THE EVAPORATOR



By:

HAMAD SAID HANAFI

Reg. No. 1210913041

SUPERVISOR: ISKANDAR R, M.T

CO – SUPERVISOR: ZULKIFLI AMIN, Ph.D

BACHELOR PROGRAM

MECHANICAL ENGINEERING DEPARTMENT

FACULTY OF ENGINEERING - ANDALAS UNIVERSITY

PADANG, 2017

ABSTRACT

Refrigeration and air conditioning is an active and a rapidly developing technology. Refrigeration is the process of removing heat from low temperature reservoir to high temperature one. Meanwhile air conditioning is the process of removing heat from the interior of an occupied space to improve the comfort of occupants. There are many systems in refrigeration and air conditioning. The most popular and widely used is vapor compression refrigeration system for daily applications. The working fluids used in the vapor compression refrigeration system are called refrigerants. One of components refrigeration system is evaporator. The evaporator removes heat of the area to be cool.

The current of the vapor compression refrigeration system has a constant speed of motor fan on the evaporator. The effects of the constant speed of the motor, system are on the stable. In this project, design of system is combined with Arduino Atmega 2560. The motor fan of evaporator will be controlled by using Arduino Atmega 2560. The controlling uses two methods, Conventional (On-Off) and Variable Speed Drive (VSD) based on temperature setting. This affects the electrical consumption, cooling time, and coefficient of performance (COP) of the system.

The results shows that the variable speed drive (VSD) for the cooling time has 3.9 minutes for temperature setting 22°C and 2 minutes for 24°C, those values are better than the conventional control. The power consumption of the variable speed drive (VSD) is 1.430 kWh and 1.248 kWh which is better than that of the conventional control.

(Keyword: vapor compression refrigeration system, evaporator, conventional control system, variable speed drive control system, electrical consumption, cooling time, coefficient of performance)