CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 General Project Background

Air-conditioning is a process that simultaneously conditions air; distributes it combined with the outdoor air to the conditioned space; and at the same time controls and maintains the required space’s temperature, humidity, air movement, air cleanliness, sound level, and pressure differential within predetermined limits for the health and comfort of the occupants, for product processing, or both (Shan K. W & Zalman L. 1999). Human comfort which related to air conditioning, heating and ventilating has become one of the most serious issues in the past several decades. These energy consumption issues generally closely related to either in industrial application, residential or transportation. Thus, many research and work have been done in this field to minimize the energy consumption by predicting the humidity and cooling load along with size of the system.

There are many types of air condition system such as central air, hydronics water and air, split, and packages system. All this system is work based on basic vapor compression refrigeration cycle that contains compressor, condenser, metering device and evaporator. Central type air condition usually use for a large cooled area while split and packages system is widely use for residential or for a small office operation. These two major types of air conditioning system have their own advantages and disadvantages based on its power, capacity install, performance factor and working system.
1.1.2 Specific Project Background

This project is carrying out the overview about Faculty of Mechanical Engineering (FKM) building in Pekan. The main purpose is to evaluate the performance of chiller plant at FKM. Generally, Faculty of Mechanical Engineering (FKM) consist of 5 blocks which consists admin block, block 1, block 2, block 3 and block 4. The admin block is fully central air conditioned where are block 1 and block 2 are 80 percent have air condition. While in block 3 and 4, only rooms occupied by staff, preparation room and selected laboratory have the air conditioning. Almost all of rooms, lecture hall, office and laboratory that have air conditioner are supplied by central unit air conditioning system. All the central unit air conditioning system circulated in FKM building has 13 number of system (nos.) of air handling units serving areas like laboratories, lectures hall and administration area. The lectures room, student affair room, labs room are served by 86 nos. of chilled water fan coil units.

In FKM building, an air condition working by using central air conditioning plants which involving the chiller water system and cooling tower. A cooled air is flow regarding to the vapor compression refrigeration cycle which is involve four main components such as compressor, condenser, metering device and evaporator. Chilled water system for FKM building consists of 4 no. of chiller, 4 nos. of cooling towers, 4 nos. of chilled water pumps and 4 nos. of condenser water pumps. The chillers and pumps are located at ground floor chiller plant room and cooling tower is located on top of chiller water plant room.

FKM has started its operation since July 2009; however the system that serves all building in the faculty is not consistent. These problem is occurs by the unstable supply cooled air to the system. As a result, an occupant in the building can’t feel uncomfortable with the performance of air conditioning system. Generally, performance of air conditioning system is depending on the chiller plant capacity supply to the whole space. The air conditioning performance will affect the human comfortable air in the location.
1.2 PROBLEM STATEMENT

The energy consumed in air conditioning and refrigeration systems is sensitive to load changes, ambient condition and etc. The major purpose of air conditioning is to make occupants comfortable with the cooled air in the room. However, the system of air conditioning in FKM building running inconsistent due to the several factor. These problem is occurs by the unstable supply cooled air to the system. As a consequence, the occupants and some location are not receiving a necessary capacity of cooled air.

An interview had been done with the Jabatan Pembangunan dan Pengurusan Harta (JPPH) who involve in the operation of air conditioning system in Pekan campus. As been explained by the person in charge, air conditioning system at Faculty of Mechanical Engineering (FKM) is not operating at optimum condition. Sometime the system was unstable to run according to the design specification. Based on design specification, the chiller requires running at 2 chillers in the same time. However, sometimes the systems are unable running with 2 chillers cause of several factors. From the interview, the conclusion can be made that a research is required to do for analyzing the performance of air conditioning system. The result will be significant to all FKM’s to know the level of performance necessary to the system.

1.3 PROJECT OBJECTIVE

The main objectives in this project is to analyze the performance of FKM central unit air condition/chilled water system. This study will be focused on 3 parts:

(i) Required heat gain of particular rooms.
(ii) Performance of chiller plant.
(iii) Room load capacity.