CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Electricity is an important need to human live nowadays. It is a form of energy that easy to produce, to use, to transport and to control. To produce electricity, a terminal or power plant need to build. There are many type of power plant such as thermal, hydraulic, gas turbine and nuclear power plant. Steam power plant is among of the commonly used terminal to produce electricity and it is becoming increasingly used as electrical or energy generators for mass electrical production for industry around the world. For this particular purpose power plant have been and are being used for case study to improve and maximize the produced energy of electricity.

Reciprocating steam engines have been used for mechanical power sources since the 18th Century, with notable improvements being made by James Watt. As generator sizes increased, eventually turbines took over due to higher efficiency and lower cost of construction. By the 1920s any central station larger than a few thousand kilowatts would use a turbine or prime mover. The theory and design of power plant have advanced significantly during the past 89 years. Today’s power plants are very easy to be operated and to be analyzing in term of energy study because of the size and technologically control. The power plant unit used for this project is Cussons P7690/SP Steam Power Plant. It is designed as a comprehensive self-contained unit with all relevant items of equipment factory mounted on a common steel bedplate.
1.2 PROBLEM STATEMENT

In case of energy study, steam power plant is the best unit to be used as an experiment apparatus. Practically subject to be determine are principle plant component efficiencies, energy balance for cooling tower, analysis on losses and boiler efficiency to find optimum cooling water flow rate, and whole energy balance for 1 kW steam power plant. Energy balance is practically be analyzed and calculated from the power plant to know how efficient the unit working to convert steam into electric energy and to determine the uses of the energy supplied. Many parameters need to be consider to get the best result of energy balance. Faculty of Mechanical Engineering has a 1 kW steam power plant. An intensive study on the steam power plant is needed especially to analyze energy balance on the system. Besides that, it is very useful and important for mechanical engineering student to analyze and adapt the basic concept of first and second law of thermodynamics on the actual practice.

1.3 PROJECT OBJECTIVE

The objective of this project is to study detail and analyze the whole energy balance of the 1 kW steam power plant and to determine the plant efficiency and losses.

1.4 PROJECT SCOPES

In order to perform an experiment for analyzing the whole energy balance for the 1kW steam power plant, a detail theoretical background studies about steam power plant is do. The thoeritical aspect that being study are Rankine cycle, how steam power plant works and energy balance principle. It is very important to know what process are involved during one complete Rankine Cycle and basic working principle of every component that involve in steam power plant such as pump, boiler, turbine and condenser. Detail studies and method on how to analyze every parameter involved in each component of the plant is being study using ‘manual operating book’ and ‘theoirtical background of steam power plant’. The first law of thermodynamics is the best example equation for energy balance and a detail study about this terms is study to perform the analysis and for the calculation of energy that involved in each component
of the plant. Experiment is carry out to archive the objective of the thesis using Cussions P7790/SP Steam Power Plant. Data is collect and a calculation is make to get a result of whole energy balance of the plant.

1.5 PROCESS FLOW CHART

The Figure shows the separation of information or processes in a step-by-step flow and easy to understand diagrams showing how steps in a process fit together. This makes useful tools for communicating how processes work and for clarity due to time limitation how a particular job is done in Final Year Project 1. The detail of the project gantt chart can be refer in Figure 1.1.