DEVELOPMENT OF ELECTRICAL SUPPLY BASED ON STEAMING PROCESS

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This report is submitted following the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

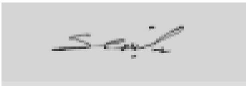
Faculty of Electrical Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2020

DECLARATION

I declare that this project entitled “Development of Electrical Supply Based on The Steaming Process” is the result of my research except as cited in the references.

Signature : 

Name : MUHAMMAD SAIFULLAH BIN CHE AZIZ

Date : 19 FEBRUARY 2021

APPROVAL

This report is submitted to the Faculty of Electrical Technology Engineering and Electronic Technology of Universiti Teknikal Malaysia Melaka (UTeM) as partial fulfillment of the requirements for the degree of Bachelor of Electrical Technology (Industrial Power) Engineering with Honours. The member of the supervisory is as follow:

Signature : ....

Supervisor Name : DR SAHAZATI BINTI MD ROZALI

....

Date : ....

DEDICATION

This project and thesis are wholeheartedly dedicated to my beloved parent who has been my source of inspiration and gave me strength also continually provide their moral, spiritual, emotional and financial support

To our brother, sister, relatives, supervisor, lecturer and who shared their words of advice and encouragement to finish this study and to all my friend thanks for your helping out through the completion of this project

Lastly, we dedication to ALLAH S.W.T, thanks for the guidance, strength, power of the mind, protection, and skill and for giving us a healthy life.

ABSTRACT

Electricity is an energy that can be generated in an area or flow from one place to another, Steam continuously creates steam at the selected operating pressure and temperature and leaves steam at the required operating pressure and temperature. Determine the isentropic performance of the turbine and the mass flow rate of the flux flowing through the turbine based on the power output of the selected steam turbine. In the first and second analyses of the rule for the cycle and thermal and exergy optimization for this cycle, exergy analysis is performed to guide the thermodynamic change. Exergy and irreversibility analyses are determined for each portion of the loop. The effects of turbine inlet pressure, boiler outlet steam temperature, and condenser pressure on the efficiencies of the first and second laws are studied. The best turbine extraction pressure on the performance of the first law is also obtained. The findings reveal that the boiler accompanied by the turbine causes the largest energy loss. The results also show that as the condenser pressure rises for any fixed outlet boiler temperature, the total thermal performance and second law efficiency decrease, but they increase as the boiler temperature increases for any condenser pressure. The rotation of the turbine will rotate on maximum depend on steam power. The turbine will generate electricity by using a DC motor where have to receive the steam power from boiling. Based on the necessary heat load corresponding to each exit boiler temperature, the best extraction pressure values from high, intermediate, and low-pressure turbines which offer the maximum first law efficiencies are obtained.

ABSTRAK

Tenaga elektrik adalah tenaga yang dapat dihasilkan di suatu kawasan atau mengalir dari satu tempat ke tempat yang lain, Steam secara berterusan menghasilkan wap pada tekanan dan suhu operasi yang dipilih dan meninggalkan wap pada tekanan dan suhu operasi yang diperlukan. Tentukan prestasi isentropik turbin dan kadar aliran jisim fluks yang mengalir melalui turbin berdasarkan output kuasa turbin stim yang dipilih. Dalam analisis pertama dan kedua peraturan untuk kitaran dan pengoptimuman termal dan eksergi untuk kitaran ini, analisis eksergi dilakukan untuk memandu perubahan termodinamik. Analisis tenaga dan tidak dapat dipulihkan ditentukan untuk setiap bahagian gelung. Kesan tekanan masuk turbin, suhu stim saluran keluar dandang, dan tekanan kondensor terhadap kecekapan undang-undang pertama dan kedua dikaji. Tekanan pengekstrakan turbin terbaik pada prestasi undang-undang pertama juga diperoleh. Hasil kajian mendapati bahawa dandang yang disertakan dengan turbin menyebabkan kehilangan tenaga terbesar. Hasilnya juga menunjukkan bahawa ketika tekanan kondensor meningkat untuk setiap suhu dandang outlet tetap, total kinerja termal dan efisiensi hukum kedua menurun, tetapi mereka meningkat ketika suhu dandang meningkat untuk tekanan kondensor. Putaran turbin akan berputar secara maksimum bergantung pada kuasa wap. Turbin akan menjana elektrik dengan menggunakan motor DC di mana harus menerima kuasa wap dari mendidih. Sebenarnya, berdasarkan beban panas yang diperlukan yang sesuai dengan setiap suhu dandang keluar, nilai tekanan pengekstrakan terbaik dari turbin tekanan tinggi, menengah dan rendah yang menawarkan kecekapan undang-undang pertama maksimum diperoleh.

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FBC	-	Fluidized Bed Combustion
ICG	-	Internal Combustion Generation
OCGT	-	Open Gas Cycle Turbine Generator

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides a general overview of steam turbine generators. The steam turbine generator is the primary power conversion component of the steam power and will state in the problem statement, scope, and objective. The defined of this project are related to the realissue, then the objective will reduce and explain the problem is the mission of this project.

Unfortunately, there is some limitation that will become out during the journey of this project that possibly happens in several aspects such as equipment, information, cost, etc. A steam power plant is a plant station in which the prime mover is the steam driver. Water is heated, turns into steam, and spins a steam turbine which either drives an electrical generator or does some work, like ship propulsion. After it passes through the turbine, it is then condensed in a condenser and recycled to where it was heated, this known as the Rankine cycle. The greatest variation in the design of the steam power station is due to the difference in fuel sources. Some prefer to use the term energy center because such facilities convert forms to heat energy into electrical energy.

1.2 Background

Electricity is the major need of human daily activities nowadays. Almost every equipment and facility in people's daily life are powered by electricity. However, steam power ushered in the industrial revolution. James watt (1769) brought a major increase in power the efficiency with his development. Watt designs the engine so that condensation occurred outside of the cylinder. This meant that the cylinder did not lose heat during the up-stroke as well as the down-stroke. The beam engine gave way to the reciprocating steam engine which was refined to a high degree. Double and triple-expansion steam engines were common and there was scarcely a demand for mechanical energy which steam could not meet. However, reciprocating steam engines were complicated and hence not always reliable.

In 1884 Charles parsons produced the first steam turbine. With Michael faraday's earlier discovery of electromagnetic introduction (1831) the widespread use of electricity had begun. The two technologies and the national grid progressively eliminated the need for factories to have their steam plant.

Today, steam used in electric power plants and the production of shaft power in the industry are based on the familiar Rankine cycle. The mechanical power of production using steam is almost wholly confined to electricity generation

1.3 Problem statement

Steam power steadily at the chosen operating pressure and temperature and leaves at the corresponding operating pressure and temperature. Based on the power output of the chosen steam turbine, determine the isentropic efficiency of the turbine and the mass flow rate of the stream flowing through the turbine. The guidelines of steam power selection and theoretical studies are listed as below;

a) The existing system develop steaming power system in large scale application and can be applied on the commercial industry only thus, the proposed project is to develop steaming power system in small scale application and can be used in various area and benefits more people

b) The existing system in industrial also prefer to use iron in the inner and outer part of the turbine and it will contribute to the rusting process. the proposed system will use stainless steel and aluminum to overcome the rust problem

1.4 Objective

This project embarks into the following objectives:

- To design the prototype of a steam turbine power system
- To analyze the performance of the design in small scale application in term of the output power produce

1.5 Scope

This project focuses on steam power to generate electricity through the turbine. The purpose of the boiling water will be to send the efficiency of the turbine. Thus, there will be a hardware part of this project. This project is part of the boiling water to make steam power and will generate the electrical

1.6 Methodology

Monitoring steam proses and spherical turbine shape with an external path for the generator have been proposed for this project. The voltage and current depend on the speed of the turbine to generate electricity. Other than detecting the speed of the rotation turbine, boiling of water must reach on maximum temperature to give a maximum of steam on a turbine. The rotation of the turbine will rotate on maximum depend on steam power. The turbine will generate electricity by using a DC motor where have to receive the steam power from boiling.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents research related to the project. It consists of a review of the steam power and power electricity depend on the steam process.

2.2 Steam turbine system

There are many ways of steam including an in-pipe steam turbine system. The steam flowing vertically through a pipe in a household. This system uses the concept of heat energy to steam and mechanical energy. The working system of the in-pipe steam turbine system occupies a large amount of cross-sectional area in a pipe. When the area reduces, it converts pressure energy into mechanical energy which increases velocity. The velocity of the water, utilized in the in-pipe steam and used for generating electricity.

The in-pipe steam generator is an electrical power generating pipeline which can produce renewable energy completely clean, reliable low-cost electricity. The in-pipe steam is set up in the pipe, the flowing stream strikes the blades of the turbine and leads to the rotation of it. The vertical shaft of the turbine is coupled to the generator which generates electricity through steam in the pipe.

However, the amount of electricity generated from the in-pipe steam system is less than the conventional reservoir hydroelectric generator. This is because of the in-pipe steam system only for reducing the usage of conventional electrical for one house.

Other than the in-pipe steam system, the seawater in the boiler system is a system that generates electrical power from steam through in pipe to the generator. By properly positioning steam turbine wheels concerning the steam flow in a pipe after boiler release steam, and in some cases by providing means for diverting the course to water flow, the steam turbine wheels are caused to rotate to drive associated generators and thereby to generate electricity [James Watt, 1784]

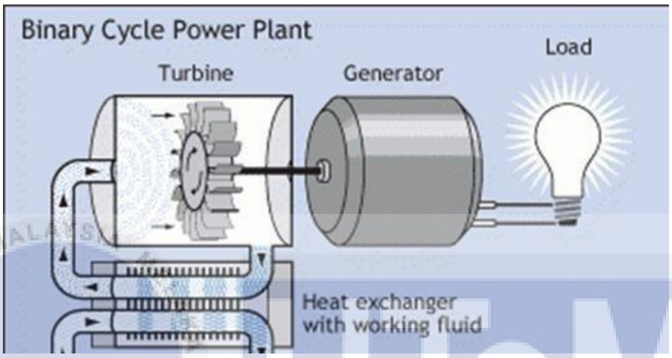

Figure 2.1: steam turbine system

Besides the in-pipe steam turbine system and the boiler make a release, there are impulse steam turbine manipulate the generator to generate electricity.

The steam turbine uses water velocity to move the runner at atmospheric pressure from the boiler and rotate the turbine to drive associated generators to generate electricity. In the open environment, the flow attacks the turbine as a jet to produce steam into mechanical energy that produces power. This type of turbine is usually a simple and inexpensive design.

Figure 2.2 shows the turbine used the curved blades where curved blades are easier to make rotating after got some pulled of steam where the water makes a boiler and order to drive associated generators to generate electricity.

Figure 2.2: Turbine rotor with curved blades

The pump-turbine system is in pumping mode, which is rotated by some external means, leaving the case at a high-pressure steam turbine system to make a rotation. Figure 2.3, the pump rotates in opposite direction, water enters the pump from the enclosure at very high pressure and moves through the impeller blades and releases its pressure as mechanical energy then releases to the generator to generate electricity.

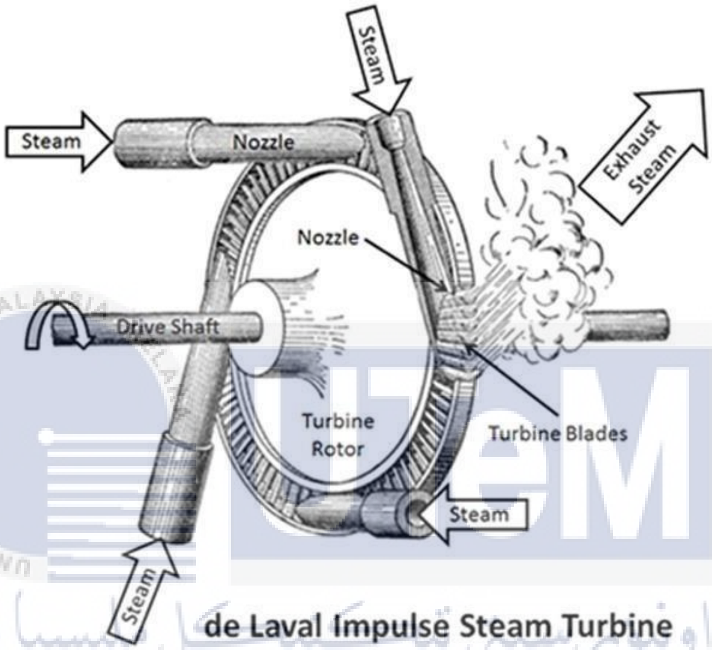

Figure 2.3: Radial flow steam turbine system