

Test Power Turbine Steam Electric Power Station and Effect of Steam Turbine in Electrical Distribution in North Sulawesi

Deitje Pongoh

Leony Wenno

Mirachle Rey

Felicia Katuuk

Daniel Takasihaeng

ABSTRACT

Electricity is an illumination in the industrial world plays a very important role. The type and shape of the lighting tool used is also very varied. In the needs of the community in electricity, need much electric supply. One of the power plants that utilizes kinetic energy is the steam power plant.

The steam power plant is a generation that rely on the kinetic energy of the steam to produce electrical energy. In the northern Sulawesi section, there are already some projected electrical projects to help the power supply to the community, one of them is Stream Electric Power Station Amurang.

In the operation by humans, of course still cannot be perfect, for that research, aimed at knowledgeable to know the large function and endurance of PLTU in the field of specialties especially in North Sulawesi. The type of research conducted is qualitative research based on observation results, case studies by news and interviews

Keywords

PLTU, steam turbine

1. INTRODUCTION

Electricity as an illumination in the industrial world plays a very important role. The type and shape of the lighting tool used is also very varied. Generally used is incandescent lamp and TL lamp. In addition to being an illumination, electricity is also used to move industrial machinery. One field of Engineering Science on Electrical Applications to meet the needs of the community. Electrical techniques involves the concepts, designing, development, and production of electrical and electronic equipment required by the community. Electrical techniques work with engineers from other areas such as chemical techniques, engineering machines, and civil engineering to design, develop, and help the production of various products and services such as energy distribution systems, personal computers, satellite systems, handheld radios, radar systems, electric cars, artificial hearts, etc. which involves electrical and electronic components. Bad lights arising as a result of electrical energy can cause danger of short circuits, fire and electric shock. The most important source of electricity hazards is commonly used electricity to home and industry.

2. DESTINATION

The purpose of making the Journal is a simulation of testing the resistance and impacts arising from the steam turbine in the PLTU.

2.1 Steam Electric Power Station

The steam power plant is a generation that rely on the kinetic energy of the steam to produce electrical energy. The main form of this type of power plant is the generator is a seal with a turbine that is kidding by the kinetic power of the heat / dry steam. Coal used as a boiler fuel to produce heat energy that then serves to change the fluid phase of work from liquid into steam. The kinetic energy contained in the steam is then used to rotate the turbine connected to the generator.

The advantage of Steam Electric Power Station from the other power plant it is operated by using various types of fuel (solid, liquid, and gas) and can be built with varying capacity.

PLTU(Steam Electric Power Station) has an important component of such as:

2.2 Boiler

Boiler is a major equipment on steam power plants. The main function is to change the water from the liquid phase into a steam phase. Steam with certain pressure and temperature is used to move the turbine. Simply put, the working principle of boiler is to heat water to reach the boiling point so water changed into steam (steam).The hot steam is used for various purposes such as for warmer crude oil to not freeze, for the process of oil palm oil production, and others.

2.3 Steam turbine

The steam turbine is a drain that converts the vapor potential energy into kinetic energy and is subsequently converted into mechanical energy in the form of a turbine axle round. Turbine axle, direct or with the help of reduction gear, is associated with the mechanism will removed. The turbine function to push and play the bolal replaced by the water to play the turbine. Next step, turbine will be convert potential energy caused by water falling style to kinetic. Without turbine, the steam power plant work will not be effective.

3. Condenser

The usefulness of condensers on the steam turbine in the PLTU serves to condense (condensation) steam turbine. Steam that has been used to play turbine will be flowing towards the condenser because the pressure in the condenser is lower than the pressure in the turbine room. Condenser consists of many parts of the tool / component working together. In order for condensers can work normally, then all condenser components should be working with maximum. Damage or problem on one of the condenser components will be lead the condenser interference can even lead to steam turbine trip. Part of the condenser;

3.1 Condenser Pipe

To absorb the heat of the tape of the turbine so that the temperature of the steam is down and turns the phase into water (liquid).

3.2 Cooling Water Pump

Pump water that drains cooling water to the inside of the condenser pipe. Water cooling can come from fresh water (well, river, lake, swamp etc.) or salt water (sea water). Depending on the capacity of steam turbines, the larger the capacity then will be requires water in large numbers and usually uses abundant marine water.

3.3 Vacuum pump

Vacuum pump works to attract unnecessary gases out of the condenser. Failure in throwing the gas will be creating pressure in the down/ugly/positive (Drop) condenser that will cause power steam difficulties to flow into the condenser and can cause to have downturn the turbine load or even make a steam turbine trip. Vacuum pump will be run diaries from the ejector tank passes a high-speed nozzle and passed into a narrow pipe channel connected into the condenser. Consequently gases in the condenser will be extracted and discarded with the water of the ejector into the outside air (atmosphere).

3.4 Hotwell

Hotwell is one part of the condenser. Hotwell is located at the bottom of the condenser but still becomes one with condenser and serves to accommodate condensate water before being divided into deaerators.

3.5 Condensate pump

Works to pore condensate water in Hotwell to the deaerator tank (deaerator tank) through deaerator.

3.6 Steam system

Serves to provide steam database on the turbine maze so that the outside air does not enter into the condenser. Low pressurized steam will be filled the labyrinth that serves as a plate so that only the steam will be suction in the condenser vacuum.

3.7 Control and Instrument parameters

Serves to know / read pressure and temperature in the condense space

4. Research Objectives

In order to compensate for the growth of high power supply demands must be followed by the addition of power platform. For that government has launching a breakthrough program called the “Masterplan acceleration and expansion of Indonesia's economic development (MP3EI)”. Given the above, the electricity sector has contributed in the provision of electrical power infrastructure in particular in the Sulawesi corridor.

PLTU (Steam Electric Power Station) 2 SULUT - AMURANG with capacity of 2x25 MW, will be contribute to reduce the fuel consumption in the northern Sulawesi system.

5. Research Methods

Method of research will be used is a qualitative research method.

5.1 Test Resistance Test

This unit of this PLTU has been operating commercial (COD) since January 22, 2018 while Unit 2 Dated April 19, 2018. The

ratio of Electrification in North Sulawesi until June 2018 has reached 96.45%. Since 5 years of operation, PLTU Amurang has excellently supporting the supply of electricity for the northern Sulawesi section. Even in 2021 January, PLTU Amurang officially became the best PLTU on the best generating unit assessment in the Regional Sulawesi, Maluku, Papua and Nusa Tenggara (SULMAPANA). This achievement is certainly one of the evidence that the PLTU Amurang is able to provide the best performance though in pandemic. This is indicated through the criteria of achievement of EAF, CF and SFC performance best, with EAF achievement score = 80, 63%, CF = 73.23% and SFC = 0.85 kg / kwh. The predicate is achieved by PLTU Amurang for the Period Performance in 1 year.

This proves that the PLTU Amurang is really worth it to be operated so that the power of the power can be said to be safe. Even in the Ministry of data ESDM (2013), PLTU Amurang provides a fuel cost savings of approximately Rp.854 billion per year.

5.2 Impact of PLTU in the field of electricity in North Sulawesi

For the impact of the air environment there in the PLTU Amurang, the study followed by procedure Water Nusantara (WLN).According to laboratory analysis refers to the analysis procedure from Water Laboratory Nusantara (WLN) can be concluded that air quality in PLTU Amurang is still below the quality standard ambient air according to PP. No. 41 of 1999. So this ensures the health of the community's environment around the PLTU.

6. CONCLUSION

Based on the results of this study, we can draw the following conclusions.

1. The resistance of the Amurang Pltu is proven safe and can be guaranteed electric supply to consumers deliver.
2. Due to the eco-friendly kinetic energy produced from the Ampuran Pltu, then the influence of air in the environment around the Ampuran Pltu is still at quality and healthy guards.

7. SUGGESTION

Suggestions that can be given to PT PLN Pers Pertu Pltu Amurang, is a socialization that needs to be broadly conveyed to the community for the community moreKnowing the function of the Ampuran Pltu because is based on the results of the observation, there are still many people who do not understand about this Ampurant Pltu.

8. REFERENCES

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