

The Brief Review on the Thermal Power Plant

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ABSTRACT: In a power systems fault that's any situation due to that electric procedure got totally troubled, fault could be due to high levels current that flows this happens because the having broken of insulating material of the system that also fails at more than once point or even an able to conduct object coming into contact with live juncture then fault current situation occur as well as open circuit fault happens due to the inability of the operation. This article provide the analysis of fault situation, kinds of the fault in power system, treatments of problem and modeling of the short circuit fault by using MATLAB program. This article present the full research of the voltage drop in short circuit situation and its impact on the appliance linked with power system. this same relay is a just beyond that is used to sense the overcurrent or unusual current flowing and goes a trip travel signal to signal path buzzer after that breaker tear the faulty boundary from healthy line but also for the correct functioning of all element again scheme necessitate delay of quite a while and also that postponement in time might end up causing severe issue in the electricity network in the presence of voltage drop so in this article shows causation and remedies of that problem.

KEYWORDS: Boiler, Electrical Energy, Heat Energy, Mechanical Power, Thermal.

1. INTRODUCTION

A thermal power or heat production point is a location in which heat energy is transformed into electric energy or power. In most stations, steam or heat is the source which transforms heat energy into mechanical energy and mechanical energy utilized for production of electricity. Firstly there is a large area called coal bunker where coal kept after that coal is crushed into tiny bits which get stored in a coal bunker for 14 days [1].

Water is kept in a lake reservoir water used for this procedure should be clean so that it functions more efficient. There is another facility called hydro power plant utilized for water treatment. Water is heated beyond a threshold temperature after heating of water it transforms into steam or vapor and powers a steam turbine which drives an electrical generator by putting force on it, generator is an electrical device used to convert mechanical energy into electricity [2].

After steam is passed through the turbine the steam is cool down in a condenser and recycled to the container where it was heated. This is known as a Rankine cycle which is typical for every power producing plant. There is different kinds of electricity producing station such as hydro power plant, wind power plant, thermal power plant etc. they all are vary or differ each other because of the variance in the design, like different thermal power producing station varies from each other because of efficiency, height of boiler, nuclear power, renewable power, size of coal bunker, availability of water, heat source[3].

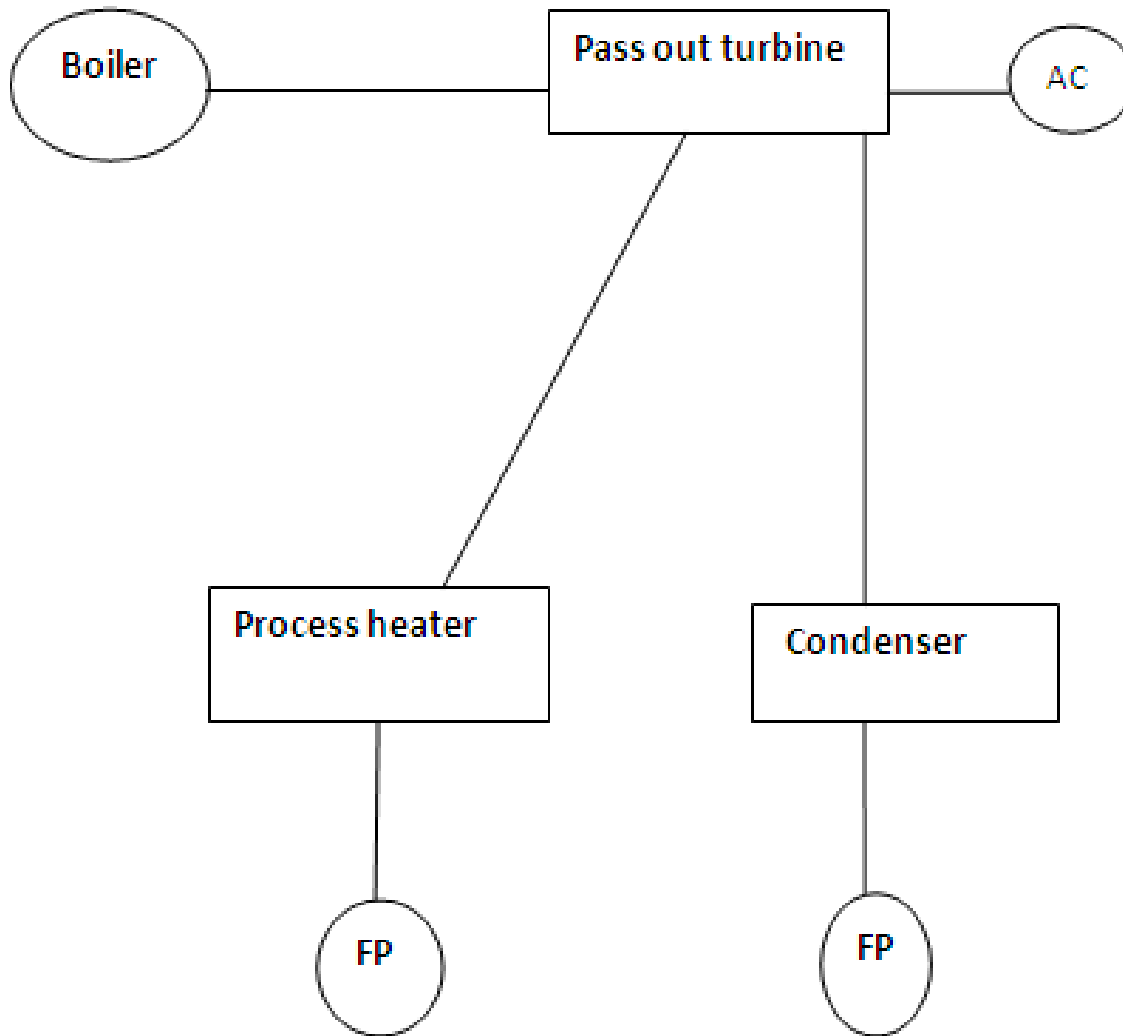


Fig. 1: Thermal Power Plant Cycle for Generation of Electricity.

Generation of electricity from heat or steam or coal is kept at a location called thermal Power Plant station, this is essentially a place where conversion of energy from one form to another form, it acts as a converter which transforms fossil fuels into electrical energy or power[4].

Fig 1 illustrates the conversion cycle of the thermal power plant energy. Boiler which boils the coal steam into high temperature steam is linked to the pass out turbine which will transfer its heat to the generator and generator accepts steam as input mechanical energy and provides electrical energy. Process heater is linked with a turbine which will heat steam further and deliver it to the pass out turbine. Condenser is linked with the pass out turbine so that it will condense the heat or collect condensed heat. The condenser in a thermal power plant is a heat transfer device used to condense or cool down heat or gaseous material from its gaseous to liquid form solely by cooling it[7].

There is significant requirement of coolant either water or some other item however most basic coolant is water or surrounding air. The primary function of a condenser in thermal power plant is to accept exhausted or dissipated steam from a steam engine or turbine to condense or cool down the steam or cool steam. Many issue which was created in the thermal power plant was global warming owing to exhausted heat from the boiler which is in large quantity and extremely heated thus in this research use of waste heat has been demonstrated[8].

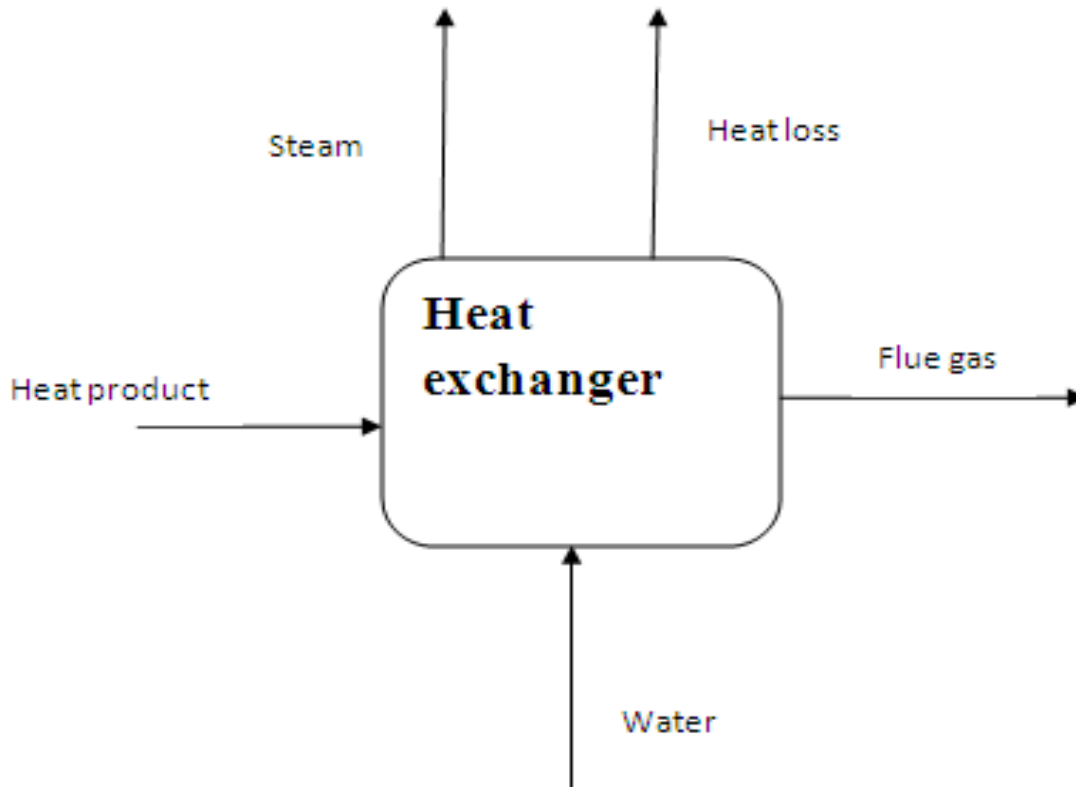


Fig. 2: Schematic Diagram of the Heat Exchanger in Various Applications as in Fridge.

Fig 2 illustrates Heat exchange method utilized in various applications as in fridge, AC. Heat exchanger is a chamber which will act as an intermediate which receives heat as input and provides flue gas as output, Flue gas is waste gas or gas which may be reused[9]. Heat exchanger send away the waste steam and heat loss, it take water to boil. In thermal power plant generation of electricity in which during the production, steam is utilized to spin the turbine which further powers the electrical generator to generate electricity. The first thermal power plant was constructed by Sigmund Schocet in Ettal 1878 [10]. In the power plant which was initially developed can able to drive 24 dynamo generators. A steam condenser or condenser essentially cools down the steam or heated vapor below the atmospheric pressure.

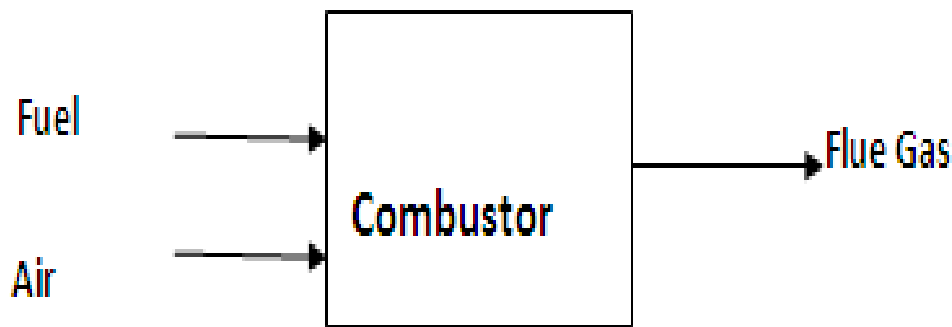


Fig. 3: Diagram of the Combustion Chamber in which Combustor is a Chamber or a Region of a Gas Turbine.

Fig. 3 illustrates a combustor is a chamber or a region of a gas turbine in a thermal power station, ramjet, or scramjet engines where combustion takes place. It is also referred as a burner, combustion chamber. In a gas turbine engine, the combustor or combustion chamber is supplied pressurized air by the compressor and fuel with high air pressure begins burning and waste gases will fly out via the combustion chamber.

2. LITERATURE REVIEW

There's been many scientific article papers in the field of heat energy and transition of converted from one object to other among the research paper a research article titled Energy Audit of Thermal Power Station by G. Kumar Gaurav reveals the various portions of thermal power station, types of thermal power station, efficiency of thermal power stations and how electricity from heat can be feasible with regard to the nature. Different article has been released which talked about the effectiveness of thermal power station and how the generated energy move to the various place. This article provides the impact of thermal heat on the energy security and environmental analysis formula of thermal power plant. This article covers energy analysis of combustion chamber, thermal power plant operate on the concept of conversion of heat energy into electrical energy. Combustion of burning of coal inside the presence of oxygen. In combustion chamber quantity of heat develop from the chamber utilized to power the turbine thus there is various mathematical method used to figure out all the value for heat evolving from the combustion process. For any power plant its energy analysis implies quantity of input fuel need to provide for the production of needed amount of power or electricity. Discussed several kinds of condenser and its use at various location, and provide short introduction about energy analysis of feed pump[5].

In research article titled An study of a thermal power plant operating on a Rankine Cycle: A theoretical study by RK vatoria, S kumar, KS kasana they reveal the knowledge about the Rankine cycle, building of various chamber like combustor, turbine, boiler and coal bunker, information about the Carnot cycle and Rankine cycle and heat exchange process [6] . Today, most of the energy generated around the globe comes from steam power plants. However, energy is being generated by several alternative power production sources such as hydropower, gas power, bio-gas power, solar cells, etc. One recently discovered technique of energy production is the Magneto hydro dynamic power plant. This study deals with steam cycles used in power plants. Thermodynamic study of the Rankine cycle has been conducted to improve the efficiency and reliability of steam power plants. The thermodynamic errors resulting from non or irreversible operation of different steam power phytoconstituents have been discovered. A comparison research between the Carnot cycle and Rankine cycle efficiency has been studied leading in the inclusion of regeneration in the Rankine

cycle. Factors influencing effectiveness of a Rankine cycle have been discovered and studied for better functioning of thermal power plants [6].

3. DISCUSSIONS

A thermal power or heat production point is a location in which heat energy is transformed into electric energy or power. In most stations, steam or heat is the source which transforms heat energy into mechanical energy and mechanical energy utilized for production of electricity. Generation of electricity from heat or steam or coal is kept at a location called thermal Power Plant station, this is essentially a place where conversion of energy from one form to another form, it acts as a converter which transforms fossil fuels into electrical energy or power. Production of energy by using warm air nowadays is very in use, heat manufacturing by using petroleum which would be a source of renewable energy and there should be a fixed amount of coal present for the production of heat as well as so that it can fully fill the need of electricity in some town or community, to overcome problems of electricity production there is calculation of heat production in an every power station. Thermal electricity is dependent upon the quantity of coal feeded into the combustion chamber. Inclusion of an FWH also adds an extra pressure level into to the Rankine cycle as shown in the T-s diagram. Hence, the extraction pressure level is another element within the control of the designer. The management of steam condensation temperature i.e. condenser vacuum and supply of condenser tube cooling water is another element which influences the steam thermal power plant efficiency.

4. CONCLUSION

Analysis of thermal power plants and production of electricity by utilizing heat which is generated during burning of coal. Heat energy calculation and efficiency of thermal power plant calculation is also covered in this article, thus requirement of heat energy so that it will transformed into electricity. It offers the fundamental knowledge about the components of a thermal power plant and specific usage and construction in the power plant, information about the Rankine cycle, Carnot cycle and heat exchange process. The technical studies and analysis of many key characteristics influencing the thermal power plant's overall efficiency and other associated variables accountable for departure from optimum functioning of the Rankine cycle have been addressed. The efficiency of a basic Rankine cycle is enhanced by utilizing intermediate reheat cycle, allowing better thermal conditions of the working fluid. However, it cannot achieve the thermal conditions as in the case of the Carnot cycle where heat addition and heat rejection happens within a defined temperature range. The regeneration is essential to increase the efficiency since it utilizes the sensible heat of exhaust steam for the preheating of feed water.

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