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Construction of Fuel Oil Pump House At 1x800MW North Chennai Thermal Power Plant - Stage III

N.Shifu jahan[1],L.Ashok[2], Gokul Sriram[3], D. Harsha[4], T.S. Hemanth[5]

[1]Assistant professor[2,3,4,5]U.G. students

[1,2,3,4,5]Department of Civil Engineering

[1,2,3,4,5]Prathyusha Engineering College, INDIA

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Abstract - *Study of fuel oil handling system (FOHS) in thermal power plants is intended towards achieving the goal of designing fuel oil handling system in thermal power plants. Designing & process parameters have been proposed in this study analysis. The overall system consists of three stages i.e. Fuel oil unloading, storage & forwarding. Three stages required heat tracing to make the heavy density fuel oil properties suitable to flow through pipes for process requirement in thermal power plants with the help of pumping media. Theoretically, it was found that the proposed Design of fuel oil handling system using electrical heat tracing shows better result as compared to steam heat tracing. The study was done to make existing system of FOHS more refined which is maintenance free and more reliable.*

Key Words**: FOHS (fuel oil handling system).**

1.INTRODUCTION

A Thermal power plant converts the heat energy of coal into electrical energy. Coal is burnt in a boiler which coverts water into steam. The expansion of steam in turbine produces mechanical power which drives the alternator coupled to the generation of power for any country. Thermal power plants constitute 75.43% of total installed captive and non-captive power generation in India. In Thermal generating stations coal, oil, natural gas etc. are employed as primary sources of energy.

The fuel oil handling and storage system in a thermal power station covers unloading of the fuel oil, its storage and transfer to the day oil tanks. Heavy Fuel oil (FO/LSHS/HPS) are generally used for the initial startup of the boiler and up to a load of 30% MCR. Fuel oil is also used for coal flame stabilization up to 40-50% MCR of the steam generator. In addition to above, light diesel oil (LDO) system, of 7.5% MCR capacity, is also provided to start the unit from cold condition when steam is not available for HFO heating.

The main function of the fuel oil handling and storage system in a thermal power station is to provide the engine(s) with fuel oil of correct flow, pressure, velocity and degree of purity.

The feeder unit feeds HFO and LFO from the fuel tanks to the fuel circulation system. The feeder unit has separate lines for HFO and LFO. The unit includes two normally in operation, while the other one is on standby. The feed pumps are electrically driven screw pumps equipped with a cooling fan. The pumps are controlled by frequency converters. The frequency converter regulates the speed of the feed pump to maintain the pressure in the outlet line. To prevent under pressure or overpressure in the system at sudden changes in the fuel consumption, the feeder unit is equipped with overflow valves.

The feeder unit includes equipment for monitoring the pressure in the system. A pressure switch at the outlet of the HFO pumps enables the standby pump to be started automatically when required.

Light Diesel Oil (LDO) is also used for auxiliary boiler (if envisaged). The fuel oil may be received in a power station by rail tankers or by road tankers or by ships for coastal plants depending on the logistics. Based on the kind of tankers received the unloading facilities are planned.

1.1 SCOPE

The main scope of this project is to design a Fuel oil Handling System in 1X800MW Thermal Power Plant with all the specifications required. The minimum grade of concrete used is M35, M40 based on the conditions provided in IS456 and IS10262. Provision of 2 HFO (HEAVY FUEL OIL) and HSD (HIGH SPEED DIESEL) tanks. The HSD tank are provided for the initial ignition of the boilers. The cement is replaced with fly ash about 25% for better economic purpose. The manufactured sand is used instead of river sand for greater availability and economically feasible.

1.2 OBJECTIVE

The objective of this project is to study the technical and economic feasibility of fuel oil pump house. Construction of Fuel Oil Pump House at 1X800 MW North Chennai Thermal Power Plant - Stage III for better handling of fuel loading to the boilers. To achieve better stability of the building under severe shore conditions using the Is code books. Check the safety of the fuel house to achieve good performance against the accidental conditions (fire, pump failure). The safety measures are provided according to Indian standards provision.

2. FUEL AND COMBUSTION

Sign and performance determination of boilers and the associated components. The fuel burner provides proper mixing of fuel and air to ensure complete Fuels are energy sources, classified as fossil fuel, nuclear fuel, and rocket fuel. Fossil fuels are hydrocarbons. There are three basic types of hydrocarbons, i.e., solid, liquid, and natural gas. The largest source of fossil-fuel energy is coal. In addition to fossil fuel, energy is available from renewable sources. Fossil fuels comprise complex compounds of five elements: carbon, hydrogen, oxygen, sulphur, and nitrogen along with mineral matter and energy moisture. Coal generates ~41% of the world's electricity and time. Combustion calculations facilitate the de combustion provides 30% of primary needs. Petroleum comprises a mixture of innumerable hydrocarbons in liquid form or natural gas. Combustion is a process where oxygen combines rapidly with fuels to release substantial amount of heat. Proper combustion of a fuel is assured by temperature, turbulence.

3. CONCLUSION

Energy analysis of a thermal power plant based on a second law analysis has been presented and a detailed parametric study considering the effects of various parameters on the system performance has been performed to identify and quantify the sites having largest energy and exergy losses. The power plant's energy and energy efficiency is determined to be 32.5% and 27.5% for the gross generator output. The maximum exergy loss is found to occur in the boiler and turbine and if the performance of a boiler and turbine are improved, plant performance will also be improved. Hence the largest improvement the power plant efficiency. The exergy analysis of the plant showed that lost energy in the condenser is thermodynamically insignificant due to its low quality.

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