

A Review Paper On Performance, Evaluation and Analysis of Energy in Chemical Plant

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Abstract - Now a day the boiler is producing a steam but it is utilized in most efficient way. This is a big task for everyone. We have chosen “PANOLI INTERMEDIATE INDIA PRIVATE LIMITED” which is located at Nandesary. It is a chemical plant which producing PNCB, ONCB and MNCB with the use of steam. It is essential to keep steam at high pressure and temperature. Thus, our aim is To evaluate and Analyze that how much energy are used in the form of exergy and maximum utilization of heat and reduce the loss in the form of anergy and some losses are occur in generation and transforming the steam in plant. It is analyze with help of software base and increase its efficiency and optimizing the whole system with its effective ways.

Keyword-Energy, Exergy, Analysis, Evaluation, Chemical Plant

“I. INTRODUCTION”

The Thermal analysis is the combination of the First and Second laws of thermodynamics. This analysis provides a quantitative measure of the quality of the energy in terms of its ability to perform work and leads to a more rational use of energy. The aim of the exergy analysis is to identify the magnitudes and the locations of exergy losses, in order to improve the existing systems, processes or components, or to develop new processes or systems. Based on the Second law of thermodynamics, the exergy analysis represents the third step in the plant systems analysis, following the mass and the enthalpy balances.

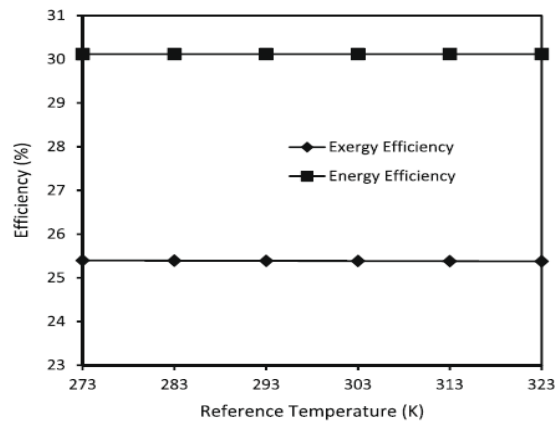
“II. LITERATURE REVIEW”

Raviprakash kurkiya, Sharad chaudhary [1] Energy analysis helps designers to find ways to improve the performance of a system in a many way. Most of the conventional energy losses optimization method are iterative in nature and require the interpretation of the designer at each iteration. Typical steady state plant operation conditions were determined based on available trending data and the resulting condition of the operation hours. The energy losses from individual components in the plant is calculated based on these operating conditions to determine the true system losses. In this, first law of thermodynamics analysis was performed to evaluate efficiencies and various energy losses. In addition, variation in the percentage of carbon in coal content increases the overall efficiency of plant that shows the economic optimization of plant.

Description	Unit	Variation in Coal sample composition
C	%	45.0-72.0
H	%	3.00-.300
N	%	2.75-.500
O	%	19.0-10.0
S	%	2.00-0.20
Ash	%	7.25-5.25
Moisture	%	21.0-12.0

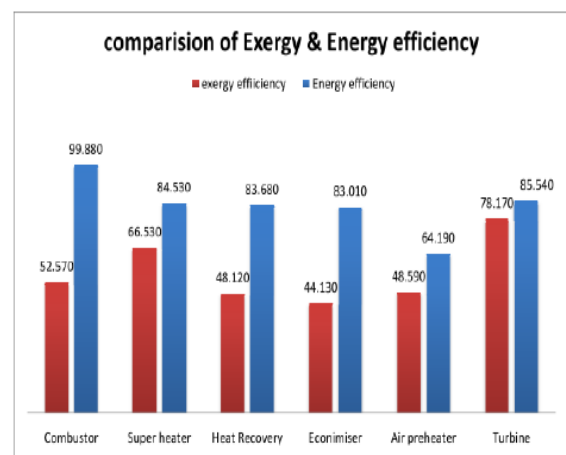
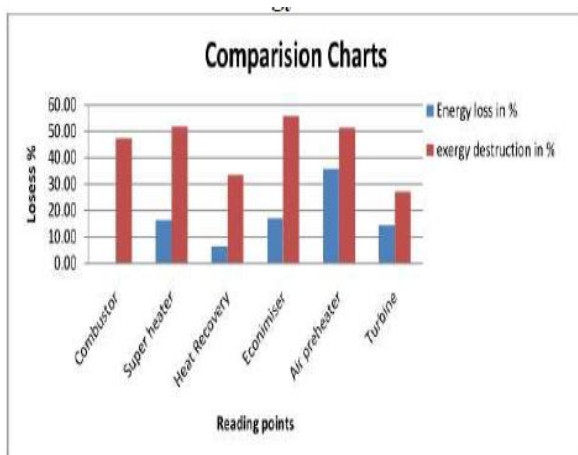
Table 1.1 Variation in coal composition

Vatsal P Patel, I.J.Patel [2] The energy supply to demand narrowing down day by day around the world, the growing demand of the power made the power plant scientific interest, but the most of power plant designed by the energetic performance criteria based on the first law of thermodynamics. The real energy losses of the power plant cannot be justified by the first law of thermodynamics, because it does not differentiate between quality and quantity of energy. Based on the several activity and power plant experience some key observation has made and is presented in this paper. The aim of the paper is to be find out causes of energy destruction that can be helpful help designer to re-design the system component.



In this study, the energy and exergy analysis of Al-Hussein power plant in Jordan is presented. The performance of the plant was estimated by a component wise modelling and a detailed break-up of energy and exergy losses for the considered plant has been presented. Energy losses mainly occurred in the condenser where 134MW is lost to the environment while only 13 MW was lost from the boiler system. The percentage ratio of the exergy destruction to the total exergy destruction was found to be maximum in the boiler system (77%) followed by the turbine (13%), and then the forced draft fan condenser (9%). In addition, the calculated thermal efficiency based on the lower heating value of fuel was 26% while the exergy efficiency of the power cycle was 25%. For a moderate change in the reference environment state temperature, no drastic change was noticed in the performance of major components and the main conclusion remained the same; the boiler is the major source of irreversibilities in the power plant.

Mali Sanjay , Dr. Mehta N S [3] In this paper presents energy and exergy analysis method for thermal power plant and analysis carried out on 125MW coal base thermal power plant. The increasing demand of power has made the power plants of scientific interest, but most of the powerplants are designed by the energetic performance criteria based on first law of thermodynamics only. The real useful energy loss cannot be justified by the first law of thermodynamics, because it does not differentiate between the quality and quantity of energy. Energy analysis presents only quantities results while exergy analysis presents qualitative results about actual energy consumption. In this analysis shows exergy efficiency is less at each and every point of unit equipments. Also presents major losses of available energy at combustor, super heater, economizer and air-pre heater section. In this article also shown energy exergy efficiency, exergy destruction and energy losses comparison charts.



Acharya Chirag, Prof. Nirvesh Mehta, Prof. Jaspal Dabhi[4] In the existing scenario, most of the electricity produced throughout the world is from steam power plants. Therefore, it is very important to ensure that the plants are working with maximum efficiency. Thermodynamic analysis of the thermal power plant has been undertaken to enhance the efficiency and reliability of steam power plants. Generally, it is predicted that even a small improvement in any part of the plant will result in a significant improvement in the plant efficiency.

Boilers are considered to be as the key part in any generation station as it is the place where the fuel is used for producing the needed amount of heat. A boiler is an enclosed vessel that provides a means for combustion heat to be transferred to convert water into steam. A boiler is a complex integration of evaporator, reheater, super heater, economizer, air pre heater along with various auxiliaries such as pulveriser, fans, etc., [1]. The purpose of the performance test of boiler is to determine actual performance and efficiency of the boiler and compare it with design values. It is an indicator for tracking day to day and season to season variation in boiler efficiency and energy efficiency improvements to control unit heat rate.

Sr No.	Losses(%)	Design Value(%)	Actual Value(%)
1	Dry Flue Gas	4.663	6.166
2	Wet flue gas	6.103	10.603
3	Moisture in Combustion Air	0.051	0.146
4	Unburnt Gas	0	0.004
5	Combustible loss	0.228	0.532
6	Radiation	0.22	0.22
7	Manufacturing margin and uncounted loss	1.5	1.5
8	Total loss	12.76	19.17
9	Gross Boiler Efficiency	87.24	80.83

Table 4.1 Result and conclusion

B. Yeswanth Kumar Reddy, G. Venkata Subbaiah Yadav, S. Pavan Kumar, M. Ashok Kumar [5] The energy supply to the demand narrowing down day by day around the world, the growing demand of the power has made the power plants of scientific interest, but most of the power plants are designed by the energetic performance criteria based on the first law of thermodynamics only. The real useful energy loss cannot be identified by the first law of thermodynamics, because it does not differentiate between the quality and quantity of energy. The project on Exergy Analysis was undertaken on Rayalaseema Thermal Power Project located in Kadapa, Andhra Pradesh. The capacity of the plant is 5×210 MW. Energy analysis presents only quantities results while Exergy analysis presents qualitative results about actual energy consumption.

The main objective is to analyze the system components separately and to identify and quantify sites having largest energy and exergy efficiency losses. It also presents major losses of available energy at super-heater, boiler and turbine section. Exergy destruction and energy loss comparison charts are drawn for different components. The results are tabulated and graphs are plotted to show correlation between various parameters. This project would also throw light on the scope for further research and recommendations for improvement in the further existing plant.

This project has presented the results of an exergy analysis performed on 210 MW power plant. The analysis was applied on the unit with running load of 210 MW. Exergy destruction on the plant components are also presented and energy losses are discussed. The results of the exergy indicate that boiler produces highest exergy destruction of 72 MW. Comparing the 3 turbine stages, the results of the analysis indicate that HPT produces highest exergy destruction than IPT and LPT with further developments, graphs are plotted.

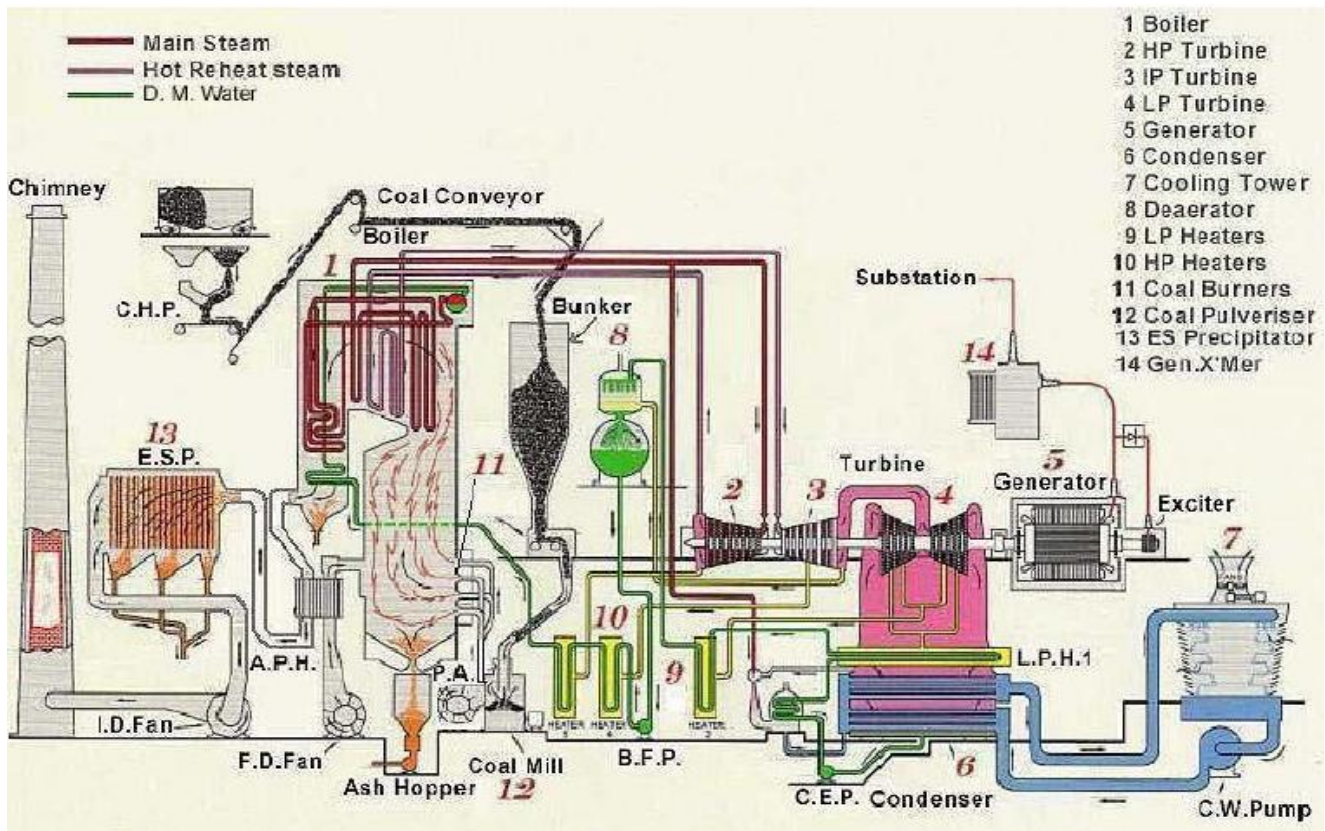


fig .4.1 Lay Out Of Thermal Power plant

“III.CONCLUSION”

From above research papers we can conclude that,

- The coal type affects the first law efficiency of the sys-tem considerably.
- It has been also analysed that a part of energy loss oc-curs through flue gases.
- The carbon content in the coal has to be proper.
- The presence of moisture has a detrimental effect on overall efficiency.
- If we use the heat recovery system to recover the heat losses through flue gases then it will be more useful for us.
- Exergy analysis is depends on 2nd law of thermodynamics, allows us to locate and quantify the irreversibilites in the production process and to identify which part of the system and what reasons they affect the overall inefficiency. The exergy analysis combines the 1st and 2nd law of thermodynamic and from a prospective of quantity and quality to revel the law of conservation.

“IV. REFERENCE”

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