INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT (IJSREM)
VOLUME: 06 ISSUE: 04 | APRIL - 2022 IMPACT FACTOR: 7.185 ISSN: 2582-3930

# Analysis of the Boiler Losses which Affect the Performance Efficiency of the Production System in Mahananda Dairy

Dr. V. M. Sonde[1], V. J. Yede[2], S. S. Talkhande[3], S. A. Pimpalshende[4], S. H. Hirudkar[5], U. M. Rathod[6]

[1](*Assistant Professor, Mechanical Engineering, Priyadarshini College of Engineering, College, RTM Nagpur University, India.)*
[2,3,4,5,6](*Research Students, Mechanical Engineering, Priyadarshini College of Engineering, College, RTM Nagpur University, India)*

**Abstract :-** This paper deals with determination of the failures causes of boiler in Mahananda Dairy plant. Due to frequent fractures of supporting tubes occurring always at the same location in the furnace and the ensuing reduction of the plant availability as well as substation financial losses, there was an urgent need to resolve the problem. Standard investigation procedure was applied on samples removed from upward inclined section of supporting tubes system. Several literatures suggested that material characteristics affected the life of a material after receiving pressure repeatedly which lead to failure. The aim of this study is to find the best formula in anticipating the occurrence of repeated failures of a tube based on pressure aspect, mainly in steam power plant. Results show that Analysis of various papers mentions failure caused by several interrelated factors. Factors that causes a failure was discussed due to corrosion and overheating, while the pressure factor is not a main factor causing a failure. The best formula for determining the failure analysis in terms of stress are material selection, visual observation of the failure form, knowing the location of the failure.

**Key Words:** Boiler, Condensed Water, Corrosion, Steam, Temparature, Journals

## I. INTRODUCTION

A boiler is a closed vessel wherein fluid is heated . The fluid does now no longer always boil . The heated or vaporized fluid exits the boiler to be used in numerous tactics or heating applications , portable boiler , desk bound boiler together with water heating , imperative heating ,boiler-primiarily based totally electricity generation , cooking and sanitation .

The boiler is a nymber one a part of international heating gadget in electricity plant . The boiler gadget features with the warmth distribution gadget , heatemitting gadget & manipulate gadget . Boiler is the primary operating factor of thermal electricity plants.

To protect and preserve life and property in the national interest and the same time help in speeding up the national development by implementation of the following Boiler Acts :

- The Boiler Act ,1923
- Indian Boiler Regulations,1950
- The Maharashtra Boiler Rules 1962
- The Maharashtra Economiser Rules 1965
- The Boiler Attendants'Rules 1965
- The Boiler Attendants'Rules 2011
- The Boilers Operation Engineers'Rules 2011

The objective of this project where is to study and analysis various problems of working boiler at mahananda dairy. We identified the boiler regenerative dairy each working hours and then analyse the problem so as to suggest the remedies in order to enhance the efficiency of boiler.We identified the problems as

1. Temperature of exhaust gas is high.
2. Loss of heat with condensed water.
3. Consumption of fuel increases and gent in loss.
4. Corrosion of boiler

## II. TYPES OF BOILER FAILURE & LOSSES

1. Boiler is kittling

Kettling is extra not unusualplace in regions with tough water, however can have an effect on boilers in gentle water regions too. Not handiest does it reason your boiler to paintings more difficult and for that reason value extra to run, it may additionally shorten the device's life. If your boiler is kettling, it is recommended to name out a Gas Safe registered

engineer. The engineer will possibly flush out your device to get rid of the build-up of those deposits and make certain the device is operating nicely as soon as extra.

2. Boiler is leaking

A leak coming out of your boiler is in no way an awesome sign. And the motive of the leak will rely in which the water is coming from.It's critical to notice which you have to in no way try and restore a boiler leak yourself – constantly name out a Gas Safe registered engineer. The maximum not unusualplace motive of a leaking boiler is a damaged inner component, together with a pump seal or strain valve. If the leak is coming from the strain valve it is able to be the case that the boiler strain is just too high. Meanwhile, a leak from the pump seal is an indication that it is able to have wiped out and want replacing.

3. Noisy boiler

From banging and clanging to whistles and gurgles, a heating gadget could make some of noises prompted for some of reasons. If you pay attention a noise coming from the boiler or heating gadget. do not forget about it as there may be probable a fault.We've indexed a few not unusualplace boiler noises underneath that will help you discover the cause. D.Boiler keeps switching itself off

4. Boiler keeps switching itself off

A boiler will be continuously switching itself off for some of reasons. Some of the important thing culprits are: Low boiler strain Thermostat issues Lack of water waft because of a closed valve or the pump now no longer circulating the water across the gadget properly Too a lot air in the gadget A building up of sludge or different particles in the gadget If the thermostat is running because it ought to and the boiler strain is consistent with the manufacturer's commands then it is time to name a Gas Safe registered engineer.

Types of Heat losses in boilers:

- Loss due to dry flue gas.
- Loss due to hydrogen in fuel.
- Loss due to moisture in fuel.
- Loss due to moisture in air.
- Loss due to carbon monoxide.
- Loss due to surface radiation.
- Unburnt losses in fly ash.
- Unburnt losses in bottom ash.

## III. ANALYSIS OF FACTOR AFFECTING FOR BOILER LOSSES

1. Exhaust Gas Temperature Leaving The Boiler Is High.

We observed that flue gases temperature that leaves from the chimney is very high as compared to the government rules. It should be in between 40 to 50. Sensible heat losses in flue gases, while leaving the chimney, carry 35% to 55% of heat input to the furnace.

Solution: - The sensible heat in flue gases can be generally recovered by following method

1) Charge pre-heating
2) Pre heating of combustion air

2. Corrosion Occurs In Boiler

We observed that they are using a fire tube boiler and we have seen that water inside the boiler has brown colour. Also we observed that RO water supply to the boiler and improper & unscheduled maintenance.

Solution:-

Corrosion can be minimized through proper design (to minimize erosion), periodic cleaning, control of oxygen, proper pH control, and the use of highquality feed water.

3. Waste of Condensed Water after Processing.

We observed that, the steam produce by the boiler after processing (heating the milk) it convert into hot condensed water is getting waste there is not any recycling process.

Solution:-

Steam can be converted into condensed water for various purposes, Condensate water can be reused as a boiler feed water in steam generation system. Also the condensed hot water can be used for cleaning the equipment's in company.

## IV. FIGURES AND TABLES

The following figures and table are shows the Boiler, losses and its specification.

**Actual Daigram Of Boiler**

**Condensed Water**

**Boiler Corrosion**

**SPECIFICATION OF BOILER**

| | |
|---|---|
| Type of boiler | smoke tube |
| Maximum pressure | 10.54 kg/cm² |
| Fuel requirement | 700-800 kg in working hour (8hr) |
| Water supply | 3000 litter in working hour (8hr) |
| Steam temperature | 240-250°c |
| Flue gas temperature | 250°c |
| Water temperature enters in boiler | 70-80°c |
| Temperature of furnace | 1200-1300°c |
| Temperature of exhaust flue gas | 70-80°c |

## V. CONCLUSION

Conclusions drawn from the analysis found that the paper discusses the causes of failure caused by several factors that are mutually sustainable. Factors that are often the main cause of damage in the form of corrosion and overheating, while the material capacity factor in receiving pressure is still not reviewed in detail. If we want to do research on boiler tube analysis the things that need to be added as inputs are:

1. Material selection.

2. Perform visual observation, tube failure parts and tube failure location.

3. Perform dimension measurements.

4. Calculate the material's ability to receive pressure.

## VI. ACKNOWLEDGEMENTS

This word of acknowledgement is to express our deep sense of gratitude to all those luminaries and unseen hands without whose support the completion of this detailed discourse would not have been materialized.

We shall never be able to describe the spirit of co-operation with which we worked together, nor shall ever be able to express our feelings towards our guide **Prof.Dr.V.M.Sonde**, who has provided us latest knowledge and techniques especially for our project work.

## VII. REFERENCES

**Journal Papers:**

1. G. Ma, Y. Zhang, M. Yue, Y. Shi, Thermal Economy Study on the Waste Heat Utilization of a Double Reheat Unit under coupled Steam Turbine and Boiler, Applied Thermal Engineering.

2. J Barroso, H Amaveda, Antonio Lozano, "Waste Heat Recovery To Increase Boiler Efficiency Using Bagasse As Fuel",(2014)

3. Nirmal Sajan , Ruben Philip , Vinayak Suresh , Vishnu M , Vinay MathewJohn," Flue Gas Low Temperature Heat Recovery System For Air-Conditioning",(2015)

**Books:**

Thermal Engineering book by R. K. Rajput and J. K. Gupta.