

Utilization of Waste Heat Emitted by the Kiln

Vaishnavi Fulzele¹

Abstract:- Kiln is where dolomite, iron ore and coal are used as intake product for the formation of sponge iron. At high temperature raw materials are molded to get the desired product. Due to this high temperature lots of heat is emitted from the kiln. The temperature in the kiln is about 800-1100°C, and it emits heat, this emitted heat storage is the cause for the emergence of this research paper. In this paper simple way is used for the utilization of heat. A panel which will work as a heat exchanger is used. This panel consists of tubes attached parallel to each other. Working fluid flows from the tube. The working fluid temperature increases as the heat from the kiln flows through it. It works just as the working of flat plate collectors. The main intension is to do maximum utilization of the kiln and heat released from it. This helps to do maximum use of kiln. This will further help in the increase of efficiency with the help of heat recovery technology. This will further lead to the reduction of pollution.

Keywords:- Kiln, Panel, Working Fluid, Glass Tube.

I. INTRODUCTION

The waste heat which is released from the kiln is trapped. This reduces the emissions to the surrounding which will ultimately reduce the pollution. As pollution has become the cause of concern its reduction is major reason for the trapping of heat. And will further help in pollution control norm. And will somewhere help in the contribution towards Paris agreement. This will also help in the maximum utilization and use of the kiln. The coal, dolomite and iron ore are used and are burnt at very high temperature. Temperature is so high that heat is released to the surrounding. This heat which is released can be used to heat the working fluid in the panel. This will be further transferred by the pipe to the desired destination just as in the heat grid. This waste heat recovery depends largely on heat transfer by different modes of heat transfer. The process by which heat dissipated is trapped is by the principle on which heat exchanger works. In this research paper this problem of waste heat dissipation is explained by fish bone diagram.

II. PARTS AND DESIGN

➤ Panel

Panel consists of tubes which are arranged parallel to each other. Tubes are made up of copper material with the thermal conductivity 398 w/mk. This is because as copper absorbs heat, it will be able to heat the water more efficiently. Tubes absorb the heat emitted from the kiln. This absorbed heat helps the working fluid inside the kiln to get heated. It works just as flat plate collectors which has tubes made of metal along with the working fluid.

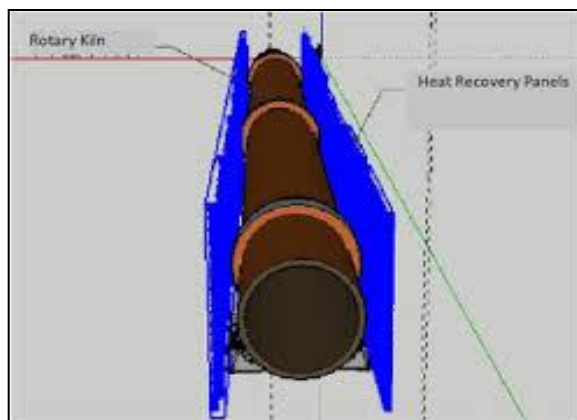


Fig 1 Kiln with Heat Exchanger Panel.

III. HEAT GRID

It is used to carry the hot working fluid which becomes hot because of the heat emitted from kiln. Heat grid is made by using the piping system. This heat grid will carry the hot water and will send it to the desired location for further utilization.

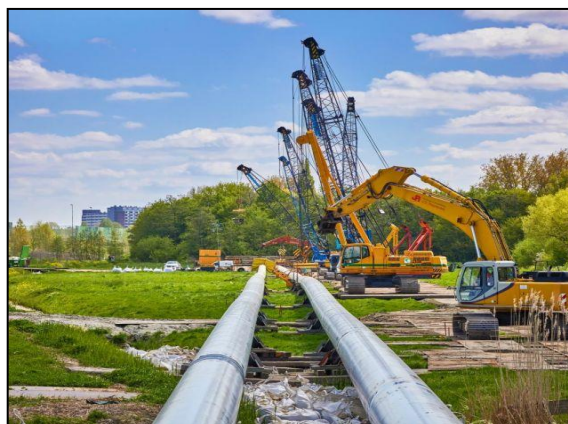


Fig 2 Heat grid



Fig 3 Water Which will Work as Working Fluid

➤ *Fluid*

Working fluid can be water, wax or ammonia here water is considered as a fluid because it is readily available and has multiple uses.

IV. WORKING

In this heat recovery and reutilization system, the working fluid inside the tube captures the heat as the excess

heat is emitted from the kiln. This capture of heat helps to trap the heat from the kiln. The panel is attached to the sides of the kiln. As the waste heat emitted from the kiln is bombarded on the panel. The panel becomes hot and this makes the working fluid inside the tube hot. This working fluid is further carried to the grid and is send where it can be used.

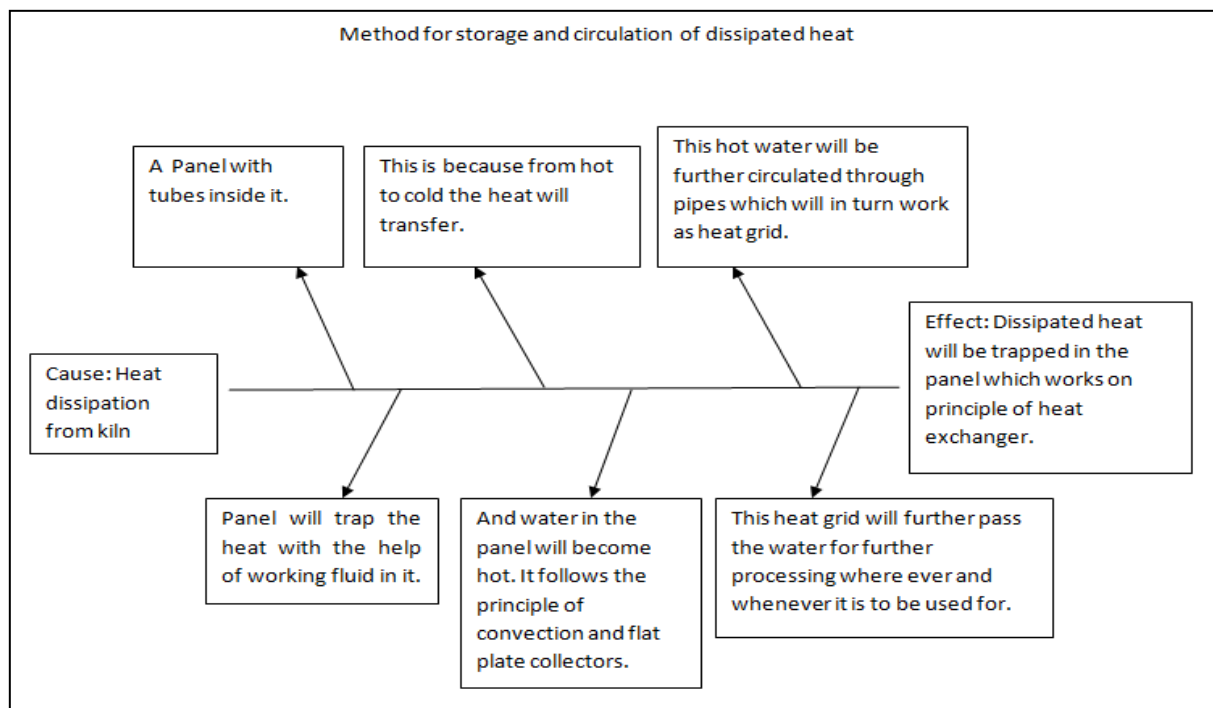


Fig 4 Fish Bone Diagram for Waste Heat Utilization

V. CONCLUSION

The research paper is focused on the utilization of heat liberated from the kiln when sponge iron is formed inside the kiln, this is done by trapping the waste heat with the help of water and by using this heat in the water where ever it is possible. The waste heat releasing from the kiln is flown on the tubes of the panel. These tubes are made up of the copper, as its heat conduction capacity that is thermal conductivity is more as compared to other material. This tubes which consists of water conducts heat. Water is further carried by the grid. Ultimately, this research paper gives theoretical idea which can be applied practically to use the waste heat emitted by the kiln. The waste heat utilization depends on the working of flat plate collectors. Hence, the waste heat from kiln can be utilized and it should be done for betterment of environment.

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