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CFD Analysis and study temperature dissipation from a hollow metallic fins heat pipe

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ABSTRACT

The aim of this paper is to identify the advantages of developed Heat Exchangers over Plain tube units. To use finned tubes to advantage in this application, several technical issues solve the problem of plant and large industries. This work is basically to solve the problem of industries and maintain the power consumption of plant. Many several investment of industries wastage and power saving is most important factor of the industries. There fins tube heat exchanger can be use for system cooling and increase the production and increase the working life of the furnace. There use the circular fins pipe of increase the efficiency of furnace. There is natural heat exchanger and play the very effective role in industries. There is cooling system of furnace in some change. The change of the simple heat pipes its replace of circular fins pipe. There physically checked the system so many problem like low production, leak efficiency, cooling problem, performance rate low some other problem was short out. There are basically all parameters can be solve of ansys fluent. We get the good result of hollow metallic fins pipe. The pipe simple and easy design but its more benefits of cooling. It can solve many problems and increase the production ratio and control the high temperature of water flow in pipe. There simple heat pipe outlet temperature is 58^0c and circular fins pipe outlet temperature is 36^0c. There are 22^0c temperature are reduce in system. This is all result are ansys fluent.

1. Introduction

This is system are a problem of industry. There are continually worked on the furnace. And proper cooling is varying important of the furnace. Industry sector we can see the furnace division should not proper cooling much problem face in industry. Rolling mill temperature is 90^0c. It's want proper cooling and cool water. Cooling tower is help of cooling but some time it's don't have proper cooling. In case we can study of circular heat exchanger. This device is construct of plant is circular Fins pipe and attach the system cycle. This pipe is should be do it proper cooling and Reduce the furnace surrounding temperature of outer body of furnace. This is all result we are solve it the ansys fluent. And all property according to temperature is get in result. Simple heat pipe inlet and outlet temperature is 335 k and 325 k is simple heat pipe temperature. 62^0c (inlet) temperature of simple heat pipe 52^0c (outlet) temperature of the simple heat pipe.

These temperature are the directly observation of the system. After all we were fitted the circular fins heat pipe. Circular fins heat pipe did the analysis of the ansys fluent and get the result of the

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circular fins heat pipe cfd analysis. We are working on rolling mills of is cooling cycle.

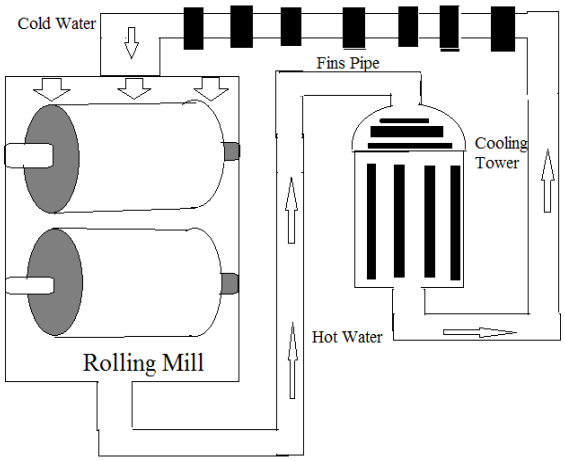


Fig.1 Rolling Mill Cooling System

Rolling mill cooling cycle we was study on the its cooling system and cycle increase the efficiency of the use of fins pipe. The tack the actual temperature of the simple heat pipe inlet and outlet temperature. This temperature is very high then fins pipe temperature in case we are use in this cycle are fins heat pipe and get the result of ansys fluent.

Structure and operation of fins heat Pipes

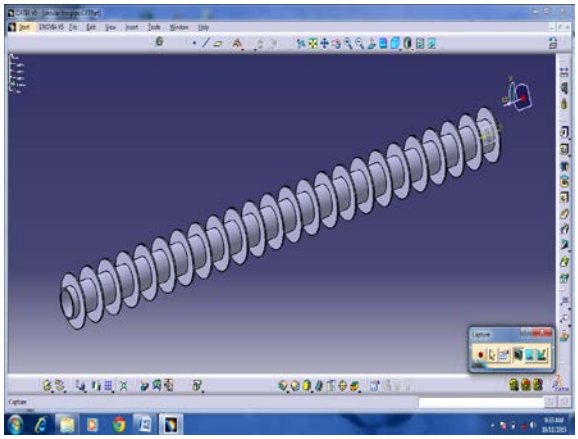


Fig.2 Cross Section Fins pipe model

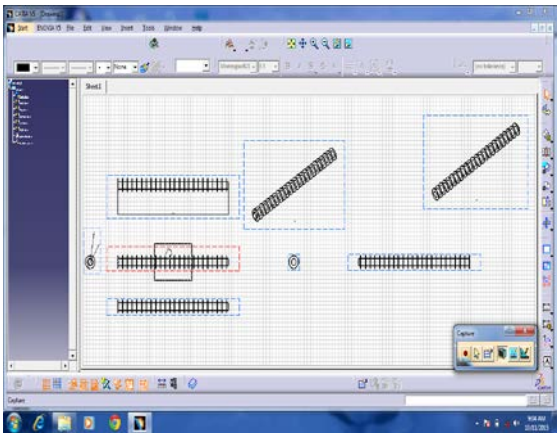
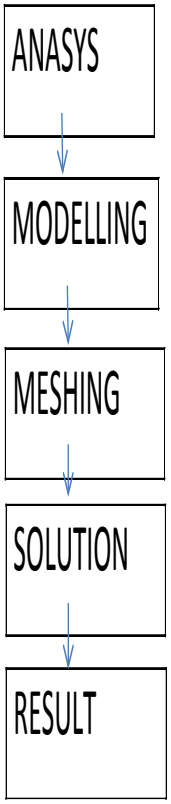


Fig3 Cross Section Fins pipe graphical

Fins heat pipe structure is common of simple heat pipe. But, it is outer surface area is large of the circular fins. All circular fins are increase is the surface area and distribute the internal temperature of this extra surface area is fins. We are design the fins pipe is catia. Fins pipe analysis the is ansys fluent soft ware work.

CFD modelling



CFD modelling of a best fundamental of the analysis of the according of system. This fundamental is a system of layout to

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the finding of result. Ansys have many workbench, modelling, meshing, solution, result. These are all workbench are a system of result work. Meshing is the solid part modelling workbench. Solution is the discuss the data work of result. And, finally last is result work is the value of solution finds the result analysis report work.

Fins pipe CFD Analysis

Fins pipe CFD is the ansys fluent working process is very easy and simple. Modelling it was made a specific geometry work and meshing work of the project work. Fluent is the help of the fluid flowing and result see the very convenient methodology its colouring. There fins pipe is all temperature and its condition of fluid flowing is see the ansys fluent result.

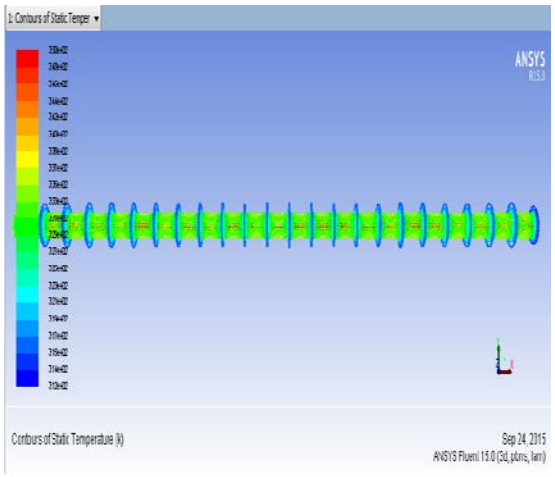

Fig.4 Heat Dissipation Fins Pipe

This figure show the circular fins heat pipe velocity contour which is generated through the ANSYS Fluent in 3-D view there 3.50e+02 show the minimum temperature of the velocity contour. And 3.12e+02 show the maximum temperature of the velocity contour.

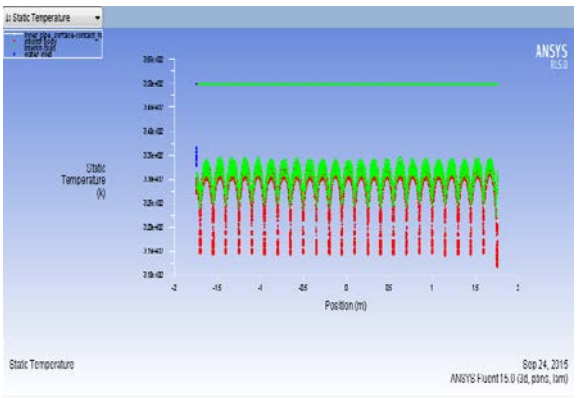

Fig.5 Temperature contour heat dissipation fins pipe

This figure show the circular fins heat pipe velocity contour which is generated through the ANSYS Fluent in 3-D view there 3.116e+002 show the minimum temperature (outlet) of the temperature contour. And 3.500e+002 show the maximum temperature (inlet) of the temperature contour. There range of 3.423e+002 to 3.193e+002 show the best result of fins pipe is temperature control the fins technology and temperature drop is this order of fins pipe.

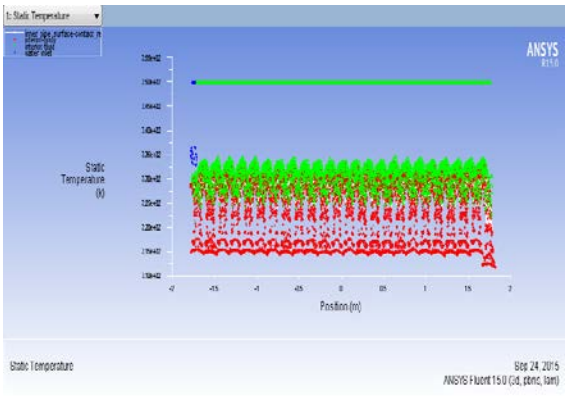

Fig.6 Temperature contour heat dissipation fins pipe

This figure show the circular fins heat pipe temperature contour which is generated through the ANSYS Fluent in 3-D view there 3.55e+002 show the maximum temperature (inlet) of the temperature contour. And 3.10e+002 show the minimum temperature (outlet) of the temperature contour. There range of

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3.45e+002 to 3.25e+002 show the best result of fins pipe is temperature control the fins technology and temperature drop is this order of fins pipe.

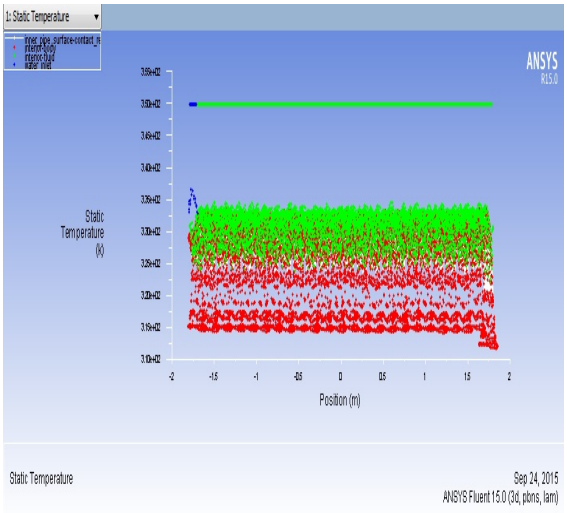

Fig.7 Temperature contour heat dissipation fins pipe

This figure show the circular fins heat pipe temperature contour which is generated through the ANSYS Fluent in 3-D view there 3.55e+002 show the maximum temperature (inlet) of the temperature contour. And 3.10e+002 show the minimum temperature (outlet) of the temperature contour. There range of 3.45e+002 to 3.25e+002 show the best result of fins pipe is temperature control the fins technology and temperature drop is this order of fins pipe. this graph is generated maximum heat distributed in fins area.

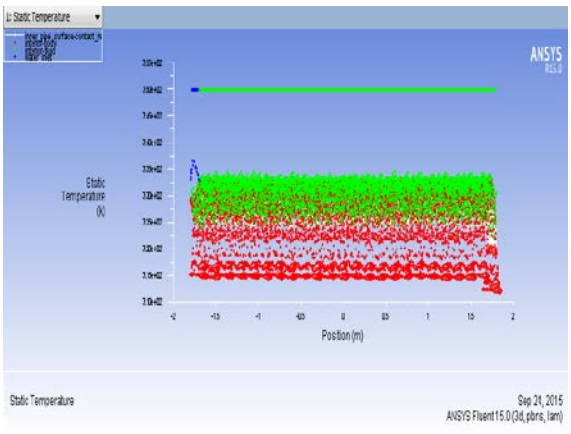

Fig.8 Temperature contour heat dissipation fins pipe

This figure show the circular fins heat pipe temperature contour which is generated through the ANSYS Fluent in 3-D view there 3.55e+002 show the maximum temperature (inlet) of the temperature contour. And 3.10e+002 show the minimum temperature (outlet) of the temperature contour. There range of 3.45e+002 to 3.25e+002 show the best result of fins pipe is temperature control the fins technology and temperature drop is this order of fins pipe. This graph is generated maximum heat distributed in fins area of fins located is green colour is show is clear in figure.

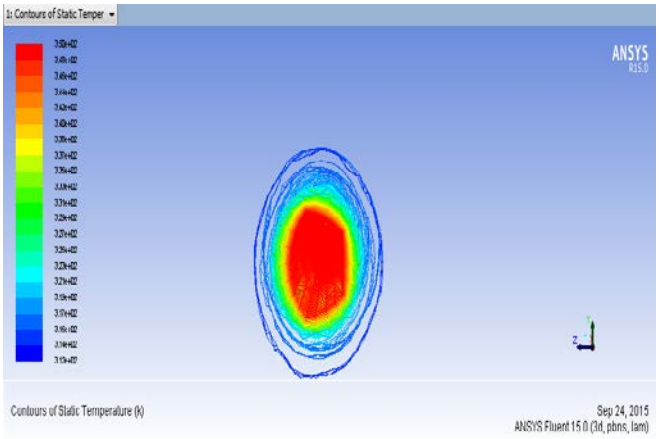

Fig.9 temperature contour heat dissipation fins pipe (cross section)

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Show this figure is front view of the fins pipe there are result of fins pipe the outer temperature is minimum is 3.50e+02 is and face of fins is internally is 3.12e+02 is high temperature. And middle of pipe is red colour is higher temperature of flow water. There fins is distributed the temperature of interface and internally drop the temperature

Result and analysis

Analysis Process on Ansys Fluent Part Ansys R16.0

Table.1 File Information for FFF

Domain	Boundaries
body	**Boundary - inner_pipe_surface contact region src**
Type	INTERFACE
Boundary - wall body	
Type	WALL
fluid	**Boundary - contact region trg**
Type	INTERFACE
Boundary - water inlet	
Type	VELOCITY-INLET
Boundary - water outlet	
Type	PRESSURE-OUTLET

Table.2 Mesh Information for FFF

Domain	Nodes	Elements
body	16364	49315
fluid	15844	12513
All Domains	32212	61811

Table.3 Domain Physics for FFF

Domain - body	
Type	solid
Domain - fluid	
Type	cell

Table.4 Boundary Physics for FFF

Case	FFF
File Path	F:\fined pipe_files\dp0\FFF\Fluent\FFF.1-2-00083.dat.gz
File Date	28 September 2015
File Time	01:09:34 PM
File Type	FLUENT
File Version	15.0.7

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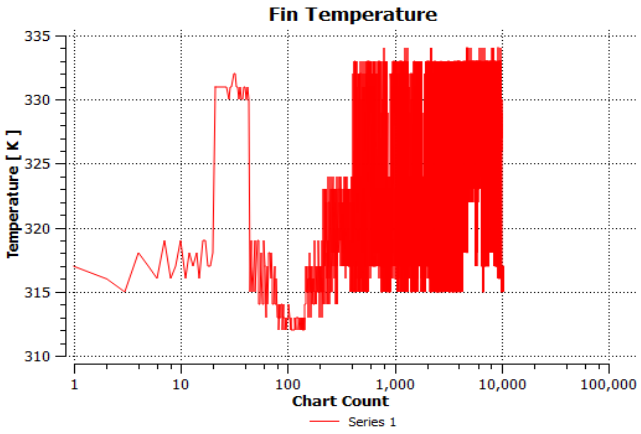
Fins Temperature Contour of Graphical Presentation and Boundary Condition



There inlet temperature of fins pipe is 334 k and outlet temperature is 312 k. There are so more difference is simple heat pipe outlet and fins heat pipe outlet temperature. There 13^0c temperature was reduce is help of circular fins heat pipe. System surrounding fins pipe are temperature distributed of the fins and temperature surface area is increase and get the best result is 13^0c are reduce of fins pipe.

CONCLUSION

This paper is research work is closely related on the system. The system is the rolling mill layout. Rolling mill working time roll are very high temperature. In case cooling is vary important roll play the working time rolling mill. we are use the water in cooling. Water continuously flow the rolling. And, control the rolling temperature and coupling temperature. In case water very high temperature is about 50^0c to 75^0c. Water continuously flow and its cooling compulsory. Cooling tower cool is the water. But some time it's not control the temperature of the hot water. So I can change its fundamental and use circular fins heat pipe and get to extra cooling effect of cooling cycle of rolling mills. We was use the ansys fluent and getting the result is fins pipe. Simple heat pipe inlet and outlet temperature is 335 k and 325 k is simple heat pipe temperature. 62^0c (inlet) temperature of simple heat pipe 52^0c (outlet) temperature of the simple heat pipe. And, fluent result of circular fins heat pipe is 334 k and outlet temperature is 312 k. There are so more difference is simple heat pipe outlet and fins heat pipe outlet temperature. There 13^0c temperature was reduce is help of circular fins heat pipe.

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