"DESIGN A GUARD TO AVOID THE TEMPERATURE LOSS DURING MANIPULATION"

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ABSTRACT

As Conventional process in manufacturing of pipe, in middle stages hot pipe losses its temperature; such as after de-oxidation hot pipe is lifted by a manipulator and travel towards the PQF stations for rolling at a speed of 5m/s. During this manipulation hot pipe losses its temperature up to 50-70 ^{0}c.
At the stage between HBM and PQF mill there is a temperature loss at this stage. To avoid these temperature losses we designed a guard of mild steel which fitted over the lifter. Also to protect this guard from heat exchange we covered the guard with insulating material i.e. Glass wool.

Keyword : - *Guard, Fixed, Glass wool etc.*

1. INTRODUCTION

Steel pipes are long hollow tubes that are used for variety of purposes. They are produce by two distingue method which results in either a welded or seamless pipe. In both methods raw steel is first cast into a more workable staring form. It's then made into a pipe by stretching the pipe out into a seamless tube or forcing the edges together and sealing them with a weld. The first method for producing steel pipe where introduced in the earlier 1800 decade and steadily involve into the modern process we use today. Each year million and tons of pipes are produce. Its versatility makes it the most often used product produce by steel industry.

Steel pipe are found in the variety of places. Since they are strong, they are used underground for transporting water and gas throughout cities and towns they are also employed in construction to protect electrical wire. While steel pipes are strong they can also be light weighted. This make them perfect for use

in bicycle frame manufacture other places they find utility in automobiles, refrigeration unit, heating and plumbing systems, flags poles, street lamps, and medicine to name a few.

The way to improve heat transfer performance is referred to as heat transfer enhancement. Nowadays, a significant number of thermal engineering researchers are seeking for new enhancing heat transfer methods between surfaces and the surrounding fluid. Due to this fact, the mechanisms of enhancing heat transfer system classified as active or passive methods. Those which require external power to maintain the enhancement mechanism are named active methods. Examples of active enhancement methods are well stirring the fluid or vibrating the surface .Hagge and Junkhan described various active mechanical enhancing methods that can be used to enhance heat transfer. On the other hand, the passive enhancement methods are those which do not require external power to sustain the enhancements characteristics. In the manufacturing of seamless pipes heat is transferred due to the transportation of pipe from one place to another. Heat transfer combines the principle of both thermal conductivity and phase transition to efficiently manage the transfer of heat b/w two solid interfaces. Heat transfer in pipe is the temperature difference b/w evaporating and condensing phase operating temperature of heat pipe is determined by working of fluid and vacuum achieved during production.

1.1 LITERATURE REVIEW

People have used pipes for thousands of year. Perhaps the first use was by ancient agriculturalist who diverted water from stream and rivers into their fields. Archeological evidence suggests that the Chinese used reed pipes for transporting water to desired location as earlier 2000 BC. Clay that were used by other ancient civilization have being discovered. During the first century A.D, the first lead pipes where constructed in the Europe. In tropical countries where bamboo tube where use to transport waters colonial Americans used wood for similar purpose. In 1652, the first water works was made in boostan using hollow logs.Development of modern day welded steel pipes can be traced back to the earlier 1800s. In 1815, William murdok invented a cool burning lamp system. To fit the entire city of London with this light, Murdock joined together the barrels form discarded muskets. He use this continuous pipeline to transfer the coal gas. When his lighting system proved successful the greater demand was created for long metal tubes. To produce enough tubes to meet this demand, a variety of inventor set to work on developing new pipes and making process.

An earlier notable method for producing metal tubes quickly and inexpensively was patented by James Russell. In 1824 in his method, the pipe was finished by passing it through a groove or rolling mill. While welded tube process where being developed, the need for seamless metal pipes arouse. Seamless pipes are those which do not have a welded seam.

In 1895, the first plant to produce seamless tube was built. As earlier 1840, iron workers could already produce seamless tube in one method; a hole is drilled through a solid metal, round billet. The billet was then heated and drawn through a series of dies which elongated it to from a pipe. This method was inefficient because it was difficult to drill the hole in the center. This resulted in an uneven pipe with one side being thicker than the other. In 1888, an improved method was awarded a patent. In this process the solid billed was cat around a fireproof brick core. When it was cooled, the brick was removed leaving the hole in the middle. Since then new roller techniques have replace this methods.

1.2 EXPERIMENTAL SETUP

Bracket
Lever
Chanel
Guard

2. OBSERVATIONS

Comparisons of a temperature differences of a pipe Before and After implementation of Guard at Hot Bloom Manipulator (HBM)

- Before implementation

Final size	Grade	Zone 6/7/8 temperature	SRM inlet Avg. Temp.
114.3×8.39	JSL-15	1210/1220/1220	834
38.1×4.12	JSL-2	1210/1220/1220	756
38.1×4.25	JSL-36	1090/1120/1140	803
50.8×5.75	JSL-69A	1210/1220/1220	768
38.1×4.5	JSL-4	1210/1220/1220	761
50.8×6.75	JSL-22	1200/1220/1230	815

Above mentioned data is of before implementation of guard .In this case we found major drawbacks as follows :

- Temperature loss of pipe during transfer
- Mandrel bar life
- More preheating
- Loads on motor during rolling
- To overcome this drawbacks we implement a heat protecting guard . after implementing, We observed readings as follows:

- After implementation

Final size	Grade	Zone 6/7/8 temperature	SRM inlet Avg. Temp.	Difference	Set Point Remark
114.3×8.39	JSL15	1210/1220/1220	848	14	20^0c Less
38.1×4.12	JSL-2	1210/1220/1220	776	21	20^0c Less
38.1×4.25	JSL-36	1090/1120/1140	827	24	Same
50.8×5.75	JSL-69A	1210/1220/1220	778	10	20^0c Less
38.1×4.5	JSL-4	1210/1220/1220	766	5	20^0cLess
50.8×6.75	JSL-22	1200/1220/1230	832	17	Same

- Thus this loss is prevented after implementation of a guard, leads to prevent excess preheating after the PQF mill.
- 1Also this tends to prevent excess loads on the motors, thus there is a prevention of power consumption.

- Observations of average mandrel bar life before and after implementation of guardWe considered observations of two sizes of mandrel bar life as follows

Mandrel size	**Before (No. of rolls)**	**After (No. of rolls)**	**Difference**
137.6	955	1001	46
180.9	529	631	102
140.8	540	626	86
143.3	735	943	208

Thus by considering the life of a mandrel bar per pieces is improved after implementation of a guard

- Cost of a mandrel bar is about up to 5 lack- 6 lack
- Thus improvement in a mandrel bar life per pieces is beneficial for the company.

2.1 SELECTION CRITERION FOR DESIGN

- Space Availability
  Keeping into view space restriction, the guard should be designed that every possible space is utilized by the guard.
- Chances of Failure
  The losses incurred by company in case of any failure areimportant criteria of design. Factor safety while doing design is kept high so that there are less chances of failure. Moreover periodic maintenance is required to keep unit healthy.
- Weight of guard
  A total weight depends upon selection of material as well as dimensions of material. A higher weighted guard is difficult in transportation and in case of major breakdown it is difficult to take it to workshop because of more weight.
- Visibility of operation
  During the working the hot shell be observed by operator , whether the shell is fully covered by the guard or not.
- Loads on motors
  Increase in weight of the guard directly effects on the load on the motors. So while designing of guard kept in mind that weight should be minimum as possible.
- Heat losses due to convection
  Heat transfer from solid media to free environment is to be minimized by designing of guard to avoid this losses.
- Scope of future Improvement
  Design should be such that, it prevents losses during shell transfer after the mounting of guard. So that better results can be achieved in future.

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2.2 DESIGN OF GUARD

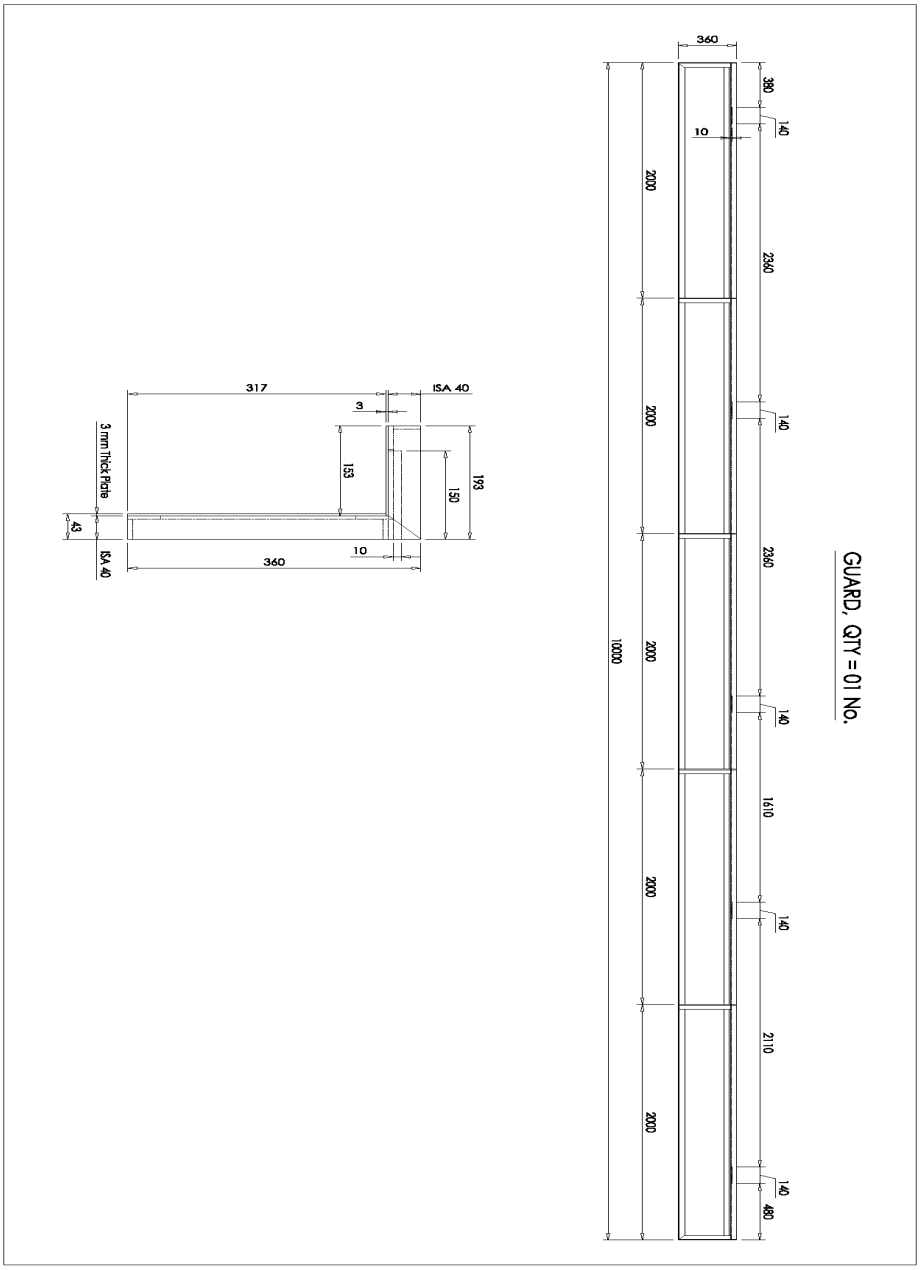

Fig. V.1 Design of guard

4. CONCLUSIONS

From the given modifications in design of guard, we have concluded following points which are explained below as;

- Mandrel bar life- Thus by considering the life of a mandrel bar per pieces is improved after implementation of a guard. Cost of a mandrel bar is about up to 5 lack- 6 lacks. Thus improvement in a mandrel bar life per pieces is beneficial for the company.

- Reduce in power consumption- After implementation of guard temperature loss is prevented, These leads to prevent excess preheating after the PQF mill.Also this tends to prevent excess loads on the motors, thus there is a prevention of power consumption.
- Reduce mandrel force- Due to the prevention of temp loss at PQF mill there is less mandrel force required to pierce the billet.
- Reduce load on roller motors- Due to the less force required for mandrel for piercing the pipe there is reduction of loads on roller motors ,thus prevent power consumption

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