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"Realistic case study of transmutation of coke dry quenching expulsion facility to lessen the maintenance work and augment the performance of Vibro feeder line pipe in the department of mechanical coke ovens"

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ABSTRACT

The common problems which are found while charging of coke into the chamber are failure of electrical cables and sensors. However due to paucity of discharging facility at Vibro feeder line pipe, causes the damage of Vibro feeder line as well as obstruction for smooth flowing of dust into the de dusting chamber. So, by increasing the angle of Vibro Feeder line pipe, causes smooth flowing of dust as well as enhance the performance of Vibro feeder line in a demure manner.

Keywords: *Coke Quenching; Vibro feeder line, CDQ Chambers*

I. INTRODUCTION

In view of mechanical engineering prospects, there are some inevitable problems which are commonly encountered while performing any manufacturing operations. Either it is related to Production sector or design sector or thermal sector. As far as metallurgical industry knowledge is concerned there are some unknown issues which encompass number of problems where finding the desired solution for the given problem may be easy or difficult. So, in steel industry several systems

to integrate the channels of different sections where product for raw material is existed. So, in this view we have been taken keen interest over coke dry quenching (CDQ) systems, where the inert gas likes nitrogen used as cooling media for the recovery of sensible heat for the power production, steel production. So, in this regard there are several components are considered for the production of power and steam for the various purposes. Therefore, the sub units of coke dry quenching plant have several sub units those are namely Loco and Bucket units, crane, dust collector, gas blowing pipe, conveyor system, primary dust catcher system, secondary dust catcher system, rotary seal valve unit and boiler units and Vibro feeder line pipe and many more. So, after considering all the sub unit parts eventually, one can say that for the smooth functioning of Coke Dry Quenching unit requires periodic inspection and maintenance and also it enhances the productivity of blast furnace an integrated steel industry. So as far as coke dry quenching knowledge is concerned, loco and bucket subunits play an imperative role to perform even function of quenching process. In a mechanical oven or coke oven plant, before the obtaining requisite amount of coke, it is necessary to meet coalification process, where coal is in the form powder which is to be crushed for a while to purify the coal, and then coal is to be charged into the coke oven plant by means locomotive handling systems. The coal is heated to a temperature of 7000C-8000C. As par with temperature the coal is subjected to under compressive action without applying any pressure or temperature. Later the heated or hot coke gets solidified which is ready to supply for several applications purposes. In this connection the employing different sub unit systems like continuous use of locomotive systems, Bucket systems for lifting the hot coke from bottom level to top level by means motor driven crane impacts more on productivity of a system. Great care must be taken for handling these systems, if not; there is a lot evils will get into the depiction and maintenance of loco and Bucket is mandatory for our day-to-day industrial activities. The principal reason for the collapse of locomotive is owing to falling off liner plates from the bucket and revamping of aforementioned subunit takes more time for freezing of bucket, Decorous alignment of liner plates, setting up of crane facility as in the orientation of bucket. So, there are several problems can be notified by making regular inspection and observation process. While discharging of hot coke into the chamber a great deal of evils principally existed at Vibro feeder line pipe, Thus, Vibro feeder line pipe plays an imperative role to move the dust in a pipe into the de dusting chamber. Due to paucity of Vibro feeder line pipe angle more quantity of dust may collect, results, damage of Vibro feeder line pipe as well as lessens the production rate. In order to overcome this tribulation, innovative techniques have espoused.

II. PRESENT WORK

As far the requirements, the Jindal Steel Work Ltd. (J.S.W) has four numbers of coke dry quenching units (CDQ), and the coke dry quenching in JSW it is more advanced, it is possessing reliable technology to obtain metallurgical coke.

Fig.1.1: JSW Coke ovens of CDQ3&4

a) Problems Identified

With respect to the coke oven systems, we have identified number of problems which are being associated with Vibro feeder line. Problems have been enlisted below.

- Due to Paucity of discharging facility in Vibro feeder line owing to
- Dust unruffled & weary in to de-dusting mains.
- Drain line gets suffocated due to angle of repose for dust flow.
- Choked lines manacle the performance of Vibro-feeder indirectly impede the coke discharge with heating up of coils.
- Stoppage of coke discharge leads to production loss.

Fig.1.2: JSW Coke ovens Vibro-Feeder line

Fig.1.3: JSW Coke ovens Vibro-Feeder line inner view

As per the coke dry quenching knowledge is concerned, due to paucity of discharging facility in Vibro feeder line the recurrent tribulations will be occurred, which leads to stoppage of production and reduces the productivity of the system. So, in this esteem, it is needed to modify the system in a decorous manner by keeping all the required constraints in a common platform. So, in a present existing Vibro feeder line, there are some innovative modifications have made to overcome such problem. These detailed modifications have expounded in impending section.

III. MODIFICATIONS

At the zone of Vibro feeder line part, by means of increasing the angle of connecting pipe, the dust which is flowing inside the Vibro feeder line pipe will move smoothly as well as directly it reaches the dedusting chamber. As a result of this, damages across the Vibro feeder line pipe and enhances the efficiency of a system.

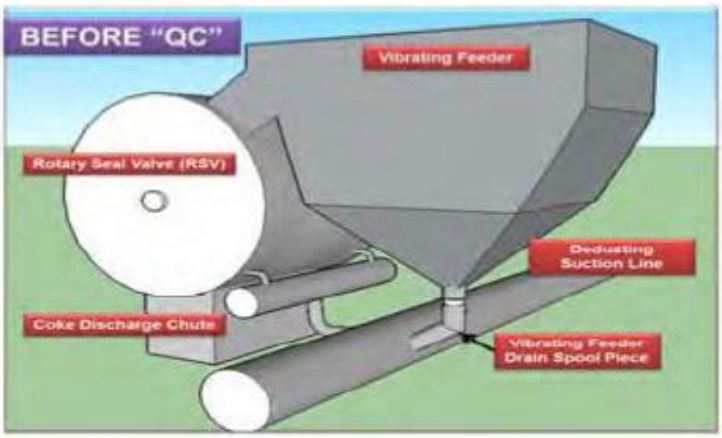

Fig.1.4: Vibro-Feeder line modified view

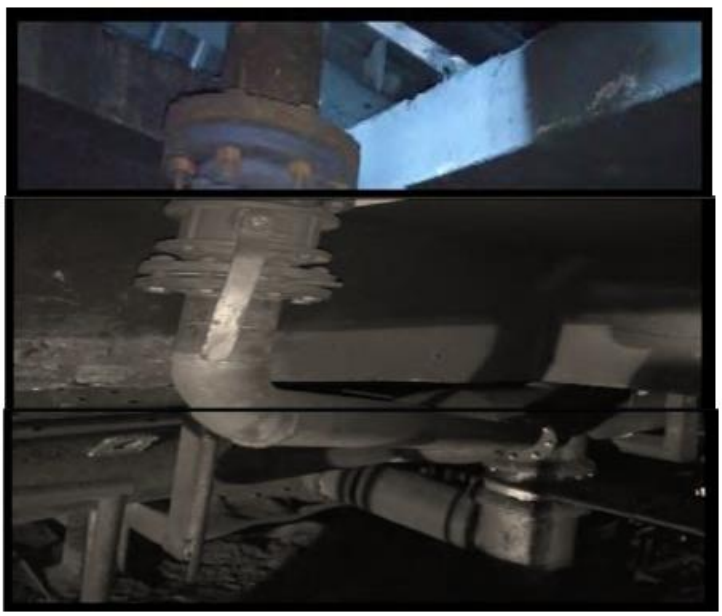

Fig.1.5: Physical Setup of Vibro feeder line

Fig.1.5 shows the physical setup of Vibro feeder line, in which angle of connecting pipe has wholly increased thereby reducing the damage of feeder line pipe as well as enhanced the smooth flow of dust into the de dusting chamber.

CONCLUSIONS

Based on scrutiny following conclusions were drawn:

1 It greatly enhanced the performance of Vibro Feeder.

2 Greatly reduced the coil temperature.

3 The suction pressure has greatly enhanced.

4 Greatly reduced the recurrent damages across the Vibro feeder line.

5 Conveyor stoppage has wholly reduced.

6 Enhanced the production rate of a tailored system.

REFERENCES:

[1] Hofei Liu et.al "Computational and Experimental Study of Cooling Processing Coke Dry Quenching Experimental Shaft" J. of Thermal Science Vol. 11, No.2.

[2] Jasjeet Singh Kohli, Jatin Kumar, Shalom Akhai "Boost to Blast Furnace Performance: A Perspective of Coke Cooling Practice" IJRT Vol.2, No.4, April 2014 E-ISSN: 2321-9637.

[3] Aravinda.P.A & S.Kumarappa "Computational Fluid Dynamics Analysis of Double flue Technology in Coke Dry Quenching" Volume III, Issue X, October 2014 IJLTEMAS ISSN 2278 – 2540.

[4] Lan-yi sun et.al. "PROCESS SIMULATION OF AN INTEGRATED COKE DRY QUENCHING COMBINED GASIFICATION" Petroleum & Coal 54 (1) 34-41, 2012.

[5] Marcelo RissoErrera et.al. "A thermodynamic analysis (first and second laws) was performed for a coke dry quenching (CDQ) unit"