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Designing 100TPH Pilot Coal Handling Plant

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Abstract— Many utility systems in the world have power plants operating with fossil fuel. In the thermal power plants maximum requirements of fuel is a coal. The handling of this fuel is a great job. To handle the fuel, i.e., coal, each power station is equipped with a coal handling plant. The fundamental goal for the design of a crushing plant is an installation that meets the required production requirements, operates at competitive cost, complies with today's tough environmental regulations, and can be built at a reasonable price despite the rising costs of equipment, energy and construction labor.
This paper represents Designing of such Coal Handling Plant having capacity of 100 tonnes per hour of Output material after Crushing and Screening i.e. crushed coal of high calorific value.

Index Terms— Coal handling plant, Designing, tonnes per hour, Crushing, Screening, power station.

I. INTRODUCTION

A. Purpose of Coal Preparation

Coal preparation serves several purposes. One important purpose is to increase the heating value of the coal by mechanical removal of impurities. This is often required in order to find a market for the product. Run-of-mine coal from a modern mine may incorporate as much as 60 percent reject materials.

Air pollution control often requires partial removal of pyrites with the ash to reduce the sulfur content of the coal. Ash content often must be controlled to conform to a prescribed quality stipulated in contractual agreements. Because of firing characteristics, it is often as important to retain the ash content at a given level as it is to reduce it. Freight savings are substantial when impurities are removed prior to loading. Finally, the rejected impurities are more easily disposed of at the mine site remote from cities than at the burning site, which is usually in a populated area.

B. Basic Coal Handling Plant layout

Coal is brought to power station by either of three means of coal transportation. This coal is first conveyed to primary crusher with the help of different combination of conveyor belts and its rate of feeding is controlled by Electro-magnetic vibrating feeders. Conveyor belt before the crusher is provided with hanging magnets to separate ferrous materials. Stones are picked up manually. In primary crusher, coal is first crushed to 100 mm size.

This coal is again conveyed to secondary/final crusher on belt system. Here vibrating screens are used to feed crushers, which bypasses coal of size more than 25 mm. In final crushers, coal is further crushed to required 25 mm size. This sized coal is then send to bunkering belt and with the help of coal trippers. This sized coal is finally fed to coal bunkers. This cycle is called coal bunkering. In case bunkers are full, then available coal is stored in stock yard with the help of stacking belts /automatic stacker cum reclaimer. This cycle is called stacking.

In many thermal power station, 2 nos. of ropeways are provided In emergency when coal is not available in plant by railways/ropeways, then this stacked coal is diverted to the coal bunkers by reclaiming conv. belts. This cycle is called reclaiming. The coal stored in bunkers is further send to coal mill for pulverization and combustion in boiler furnace. [2]

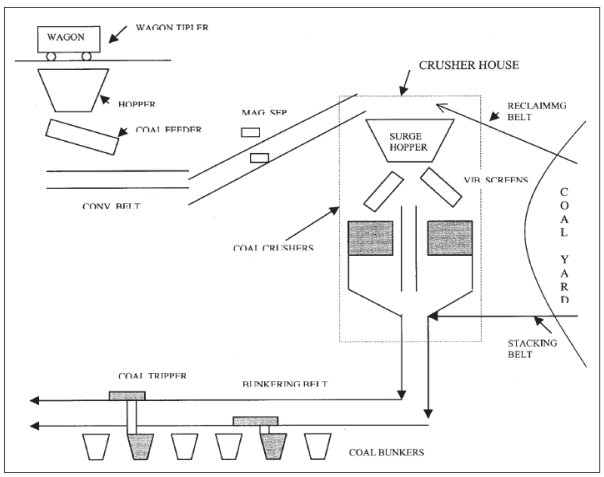

Figure 1: Coal Handling Plant Layout

II. PROPOSED DESIGN OF 100TPH COAL HANDLING PLANT PILOT PLANT

The Design of a Plant in which the overall process should lead to formation of 2 products, Product coal- the lighter material which will be obtained after processing, all three sizes coal i.e. 100-50 mm, 50-25mm, 25-13 mm, sized coal will be fed to chambers equipped with air blowers. Reject coal - It will consist of the high specific gravity materials of all size range.

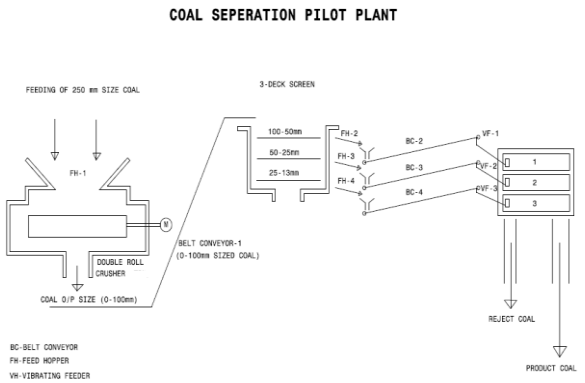

Figure 2: Proposed 100TPH Coal Handling Plant

A. Initial Circuit to Convey Raw Coal to the Crusher

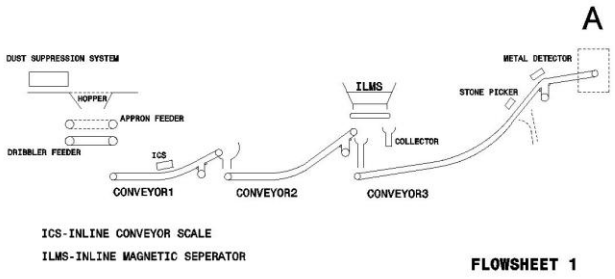

Figure 3: Coal Flow Circuit 1

The raw material which is 250 mm sized coal will be first fed into Hopper, Then Appron Feeder will feed this coal to the first conveyor belt which will be equipped with Inline Conveyor Scale to monitor the amount of Coal flowing on the belt. The Chute/Hopper will transfer this coal on the second conveyor, the end point of second conveyor and starting point third conveyor will be subjected Inline Magnetic Separator to remove Metal Impurities from coal, and that metal constituents will be dumped into Collector. As the raw coal moves ahead on third conveyor, stones will be picked manually by the worker and remaining metallic impurities will be picked up by Metal detector. The third conveyor will end into section A, which is input area of raw coal to the crusher. [1]

B. Final Circuit for Crushing the raw coal, Screening, Conveying and separating the material to obtain required Products

The raw coal will be fed into Hopper connected to Crusher, The raw material which is 250 mm sized coal will be crushed to minimum size of 13 mm, via Chute it will be fed to Screen 1 which will separate the crushed material to 13 mm sized output and will be transferred to separation Chamber via conveyor belt 4 equipped with Feed Hopper.

The Vibrating Feeder will feed the coal into the Separation Chamber which will separate the Light material and High Specific Gravity material with the help of Blowers to fall on Separate areas to push forward to the respective conveyors. Similarly all 4 products i.e. 100mm, 50mm, 25mm and 13mm sized coal will be fed to Separation Chamber via 4 conveyor belts and with the help of Vibrating Feeder. The Separation Chamber equipped with Air Blowers will separate the High Specific Gravity Materials of all size range as Reject Coal and Remaining would be Product Coal which is lighter material which will be obtained after processing, all three sized coal ie 100-50 mm,50-25mm,25-13 mm & -13mm. [4]

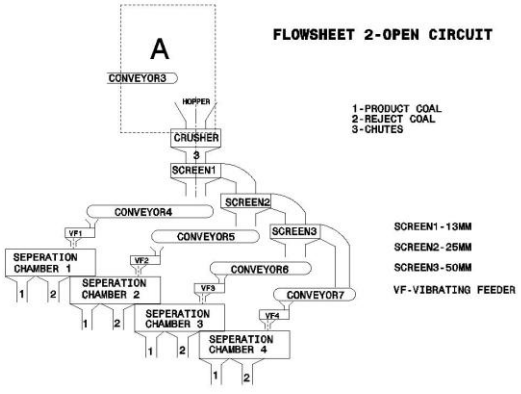

Figure 4: Coal Flow Circuit 2

III. CONCLUSIONS

The scope of work for this Paper has been achieved, as well as all the individual tasks. Taking into account all the Considerations and Parameters we have designed a 100TPH Pilot Coal Handling Plant.

The journey of Coal from mine to its final phase has been studied in this project as per need to understand the whole scenario. The basics of general Plant Design such as Process Flow/Cycles, Layouts, PLC's electronic control over the plant etc. have been also studied to give shape to the project.

During the Project Study of the bulk material system the understanding of the material that can be used in the bulk handling system was achieved. Furthermore, the basics of conveyor design and equipment selection was achieved in this process.

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