Adoption of New Concepts in Material Handling

Jai P Gupta and Rakesh Kalra of Holtec Consultancy write about concepts which could substantially reduce loading and unloading time, area for grinding units and reduce the quantity of material movement.

Indian cement industry has witnessed rapid growth in past 2-3 decades. The overall production capacity of the industry, which used to be approximately 60 million tonnes in early 90's, has more than quadrupled in about 20 years. Such rapid growth has posed several challenges in front of the industry, some of which are:

- Easy to access limestone deposits are no more available and industry is facing difficulties in land availability/ acquisition.
- Growing demands and need of fly-ash based PPC production, forcing the industry to go for grinding units close to thermal power plant.
- Unit sizes becoming larger to harness economies of scales.

Due to above issues, the needs of high capacity material movement at fast pace has substantially increased. As the road network in India is inadequate, majority of pressure goes on rail transportation. Therefore the paper covers majority of suggestion relating to the material movement through rail routes.

This paper covers certain concepts which could substantially reduce loading and unloading time, area for grinding units or reduce the quantity of material movement and have been successfully employed by the Holtec in cement as well as other industries.

New Concepts in Material Handling

The paper covers the following four concepts:

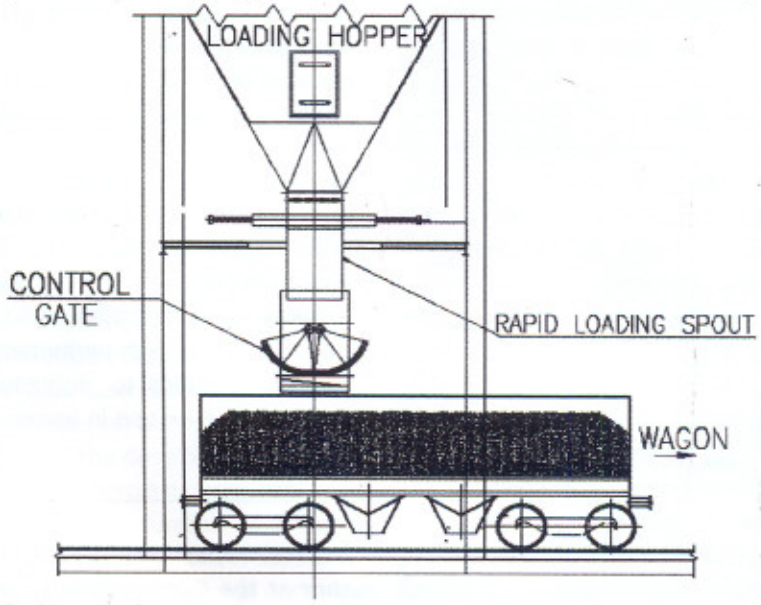
In Motion Loading of Clinker in Railway Rakes

For the clinkrization units, having split located grinding units and transport connectivity through railways, clinker loading is usually done through overland hoppers, constructed on top of the railway tracks and clinker is being loaded through telescopic chutes.

This paper suggest loading of rail rakes in motion (Rapid loading system). With Rapid loading system rake 0.6 to 0.7 km/ hr below loading hopper, that means a full rake of clinker (about 650 m in length) is likely to get loaded in about 1 hr of time as compared to conventional system of rail loading, required 3 to 6 hrs.

Lower investment cost, less number of operations and less drivers make this system more advategous as compared to the conventional systems.

For the hauling of railway rake at a constant speed of 0.6 to 0.7 km/hr, creep drive need to be installed in the locomotive as a prerequisite of this system.

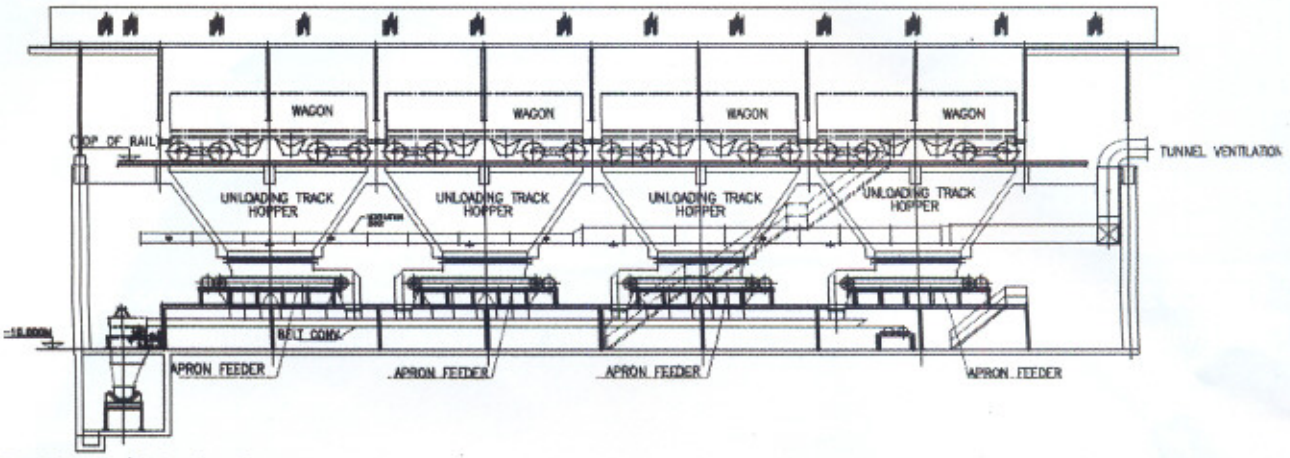


Rapid Loading System

Use of Bottom Discharge Wagons for Coal and Clinker Transport and its Easy Unloading

Traditionally, cement industry has been using normal BOX/BOXN type of wagons for the transportation of coal and clinker. For the unloading of these wagons, wagon tipplers are installed, through which these wagons are unloaded. A full rake of 58 wagons need 3-4 hrs of time (i.e. 15-18 wagons unloading per hour) for unloading.

Holtec designed a simple but ef-



Track Hopper Unloading System

fective system for lignite unloading, which is running successfully since last 10 years. One more system is under execution for other materials such as coal, copper concentrated and rock phosphate.

If the industry insists for bottom discharge wagons from railways, similar systems could be used in the industry, for coal and clinker unloading. The system proposed is quite simple, effective, fast and economical more reliable and less prone to dust nuisance as compared to the conventional systems.

Initially could be difficult for the industry to switch over to bottom discharge wagons, as railways have limited quantity of such wagons, but gradually they need to switch over.

Use of Wagon Traverser

Nowadays the trend is to go for large capacity clinkrization units, located close to the limestone deposit and construct split located grinding units near to the source if flyash (Thermal Power Plants). These grinding units receive clinker through railway rakes and need to install wagon tipplers. For the effective utilisation of wagon tipplers it becomes must to have sufficient space (equivalent to one rake length) on either side of wagon tippler. Therefore, railway facilities need much bigger area as compared to grinding unit. The plot size for the railway shall be approx. 50 m wide x 1500 m long.

Keeping in mind the limitations of land, wagon traverse is being considered for one of the project of Holter.

After the wagon is unloaded on wagon tippler, side arm charger places empty wagon on traverser table, wagon is shifted to another rail track (Exit track) through a wagon traverse where pusher ejects out empty wagon from traverse to exit track.

This way the space requirement for the rail tracks reduces to almost half. However, one parallel rail track needs to be constructed besides the track for removal of wagons.

Benefits of wagon traverse are usually case specific and in some of the cases, its inclusion could help the grinding greatly.

Fly-Ash Blending

In last 2 decades of economic growth, shortage of electrical energy government policies, have pushed private companies to enter into mega thermal power plants. These thermal power plants, along with existing ones are generating huge quantity of flyash.

As the biggest user of Flyash (PPCproduction), cement producers are finding it lucrative to maximise use of Flyash. Some clients are setting grinding units, whereas in one case Holtec designed one Flyash blending unit. This concept drastically reduced the material and improved the consistency of PPC produced.

The concept of Flyash blending unit is dependent in the fact, that Flyash generated by power plant is usually of approximate 2,000 blaines That mean if the Flyash is separated between coarse and fine fraction, which needs grinding with the cement.

This concept is paricluary useful for the cement producers, who bring in Flyash from long distance (for example cement producer, who bring in Flyash from a distance of approximately 1500 km of distance). If their Flyash movement could be reduced to half (only coarse fraction) and on the other side of bulker movement, they carry out OP, the can substantially gain on cost of transportation.

Conclusion

The primary purpose of this paper is to make people aware about new material handling concepts available and help the industry in adoption of the same. Such adoption of new material handling concept, could reduce the investment cost, handling time, number of equipment, dust generation and make the system more reliable. However such adoptions are usually case specific and vary with project requirement. ICR

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