



VISAKHAPATNAM STEEL PLANT – RASHTRIYA ISPAT NIGAM LIMITED

Reduction of Running Cone Crushers at Raw Material Handling Plant

SUMMARY OF THE OPTION

Rashtriya Ispat Nigam Limited (RINL) is the corporate entity of Visakhapatnam Steel Plant. The steel plant is located 26 km south of Visakhapatnam city. The plant has capacity to produce 2.656 MT (million tones) annually of saleable steel of which 2.410 MT is finished steel.

Iron ore is brought in by dumpers and loaded into two large bunkers which keep getting filled simultaneously. Iron ore lumps are obtained in odd shapes and sizes and need to be prepared to suit the requirements of the blast furnace. Hence the ore needs to be crushed to size. The two bunkers feed ore lumps to three cone crushers for necessary size reduction. Of the three cone crushers, normally two need to be in operation and one on stand-by. However it was a practice to keep all three cone crushers in operation, mainly because, bunker filling is a random process and their filled condition is also unpredictable. It very often happens that while one bunker is full the other may be only half full or even empty. Given this unpredictable feature, all three unmanned cone crushers are kept operational, to ensure that crushing of raw material is taken care, of even in situations when one bunker may be empty. However in this scenario, operation of one (1) cone crusher is in excess. For the given load, two cone crushers are more than sufficient (each is loaded less than 50 percent). Thus for the entire crushing period an extra (the 3rd) cone crusher is running idle and consuming electricity.

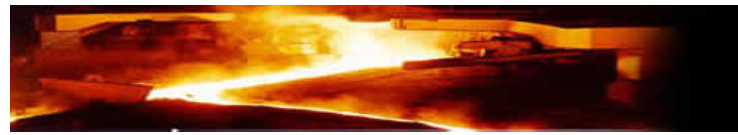
The Team decided to put a stop to this. Thus by incorporating a simple modification to the logic in the programmable logic controller (already part of the package) and by adding peripheral low cost relays, only two cone crushers (of the three) were allowed to operate. The third crusher was kept as a stand by. As a result of this novel and low cost intervention, 100 kW was reduced (one cone crushers contribution) equivalent to an annual reduction of 720,000 kWh of electricity worth Rs. 14.4 lakhs (US\$ 33,488). The investment towards relays was negligible and these relays were indented from the factory stores.

KEY WORDS

India, Iron and Steel, Electric motors, Cone crushers

OBSERVATIONS

- No. of cone crushers available : 3
- No. of cone crushers in operation: 3
- Loaded cone crushers: 2 (any 2 of the three)
- Idle running crushers: 1
- Loading of loaded crushers: about 50 percent each
- Rated motor power of each cone crusher: 200 kW
- Actual motor input power of each cone crusher (average): 100 kW
- Operating hours of the raw material crushing plant: 16 hrs/day



OPTIONS

A simple modification was incorporated to the logic in the programmable logic controller (already part of the package) by adding peripheral low cost relays. By this, only two cone crushers (of the three) were allowed to operate and the third one kept as standby, thus saving electrical energy.

RESULTS

Financial benefits

- Investment: negligible
- Annual cost savings : Rs. 14.4 lakhs or US \$ 33,488 (= 720000 kWh X Rs. 2 lakh @ Rs43/US\$)
- Payback period: immediate

Environmental benefits

- Annual electricity savings: 720,000 kWh (2400 kWh/day X 300 days/yr)
 - By interfacing with the PLC and shutting off one cone crusher reduction in power consumption by cone crusher: 100 kW
 - Energy savings per day: 2400 kWh/day (100 kW X 24 hr)
 - Annual operating days : 300 days/yr
- Annual GHG emission reduction: 643 tons CO₂ (=720,000 kWh X 0.000893 tCO₂/kWh) [1]

Other benefits :

- Longer life of motors and crushers, reduced noise pollution, Reduced fugitive dust emissions

[1] – UNEP GHG Calculator. Value specific to India

FOR MORE INFORMATION

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