



HA BAC NITROGEN FERTILIZERS AND CHEMICALS

Maintenance of Coal Mill and Fine Coal Feeding System

SUMMARY OF THE OPTION

Ha Bac Nitrogen, fertilizers and chemicals, a state-owned company, was established in 1960 with the assistance of China government and located in Bac Giang province, 70 km north of Hanoi. It is a large-size company with 2434 employees and a member of Vietnam National Chemical Corporation (Vinachem) under the Ministry of Industry. The company has three main products namely urea, liquid ammonia (NH₃) and CO₂ (in both solid and liquid form). The total annual throughput of Habac company are 150,000 tons urea, 7200 tons CO₂ and 98,000 tons NH₃. At present, to meet the in-situ demand for heat and electricity, the company is equipped with seven pulverized coal-fired boilers to produce superheated steam at pressure of 39 at (g) and temperature of 450°C. The company is using a common steam pipe line and header to distribute the superheated steam to five steam turbines of extracting and condensing type for power generation and heat process. Of the seven existing boilers, the Team has chosen boiler no. 5 as focus area for a fact that it has a very low overall thermal efficiency and thus causing a lot of operating difficulties.

KEY WORDS

Chemicals, Vietnam, Boilers and Thermic Fluid Heaters, Coal Mill

OBSERVATIONS

The boiler station is running on coal with an hourly consumption of approximately 4,300 kg. Capacity of boiler no.5 is 35 TPH. The boiler was initially designed to use Hon Gai fine coal (no. 4 a as VN classification) with a low heat value (LHV) of 26 MJ/kg. However, it has been seen that during the past ten years, the coal quality has not been maintained as desired, in particular the as-received moisture content (MC) and ash content (AC): MS and AC go down 10% and 24.1% from the designed values of 8% and 17%, respectively. In terms of heating value of coal, a figure of 23.4 MJ/kg is now commonly accepted at the company. It has been observed that the combustion of coal in the boiler is not properly handled. Large clinkers have been found in the bottom ash conveying screw. On the other hand, high temperature of the flue gas before the wet dust scrubbers has been recorded which is in the range of 190-200°C. A sample of the fly ash was collected and analyzed that gave a value of unburnt carbon in ash of approx. 51.6% much higher than the normal figure of 35-38%. The fine coal fed to the boiler was supplied from a coal mill with a maximum throughput of 4-5 tons/hr that could not match the actual coal consumption of the boiler (6-8 tons/hr) due to the degradation of coal quality in terms of heating value as mentioned earlier. An extra working load for the existing coal mill resulted in a rise in coal fines coefficient R90 from 6% to as high as 14-16%.

OPTIONS

Having carried out energy audit for estimate of the combustion efficiency of the boiler and looking at the current operation of the coal mill, the Team recommended to regular checking, sieving the iron balls which are worn out during operation and changing wear-resistant liners of the ball mill, in order to bring the coal fines coefficient back to the designed figure.



RESULTS

As reported by in-plant Team, cost of sieving and changing the worn-out iron balls was approx. US\$ 5,300 /yr whilst cost for changing the wear-resistant liners of the inner surface of the ball mill was in the range of US\$ 6,440 /yr. The total operating cost for this option was US\$ 11,740 /yr. With these expenses, the coal fines coefficient was found in the order of 10.0 – 11.3%. Further more, recent ash analysis at the company has indicated the unburnt carbon in carried-over ash sharply reduced down to 42%. Based upon only this reduction, coal saving was roughly estimated of about 1,200 tons/yr which resulted in cost saving of US\$ 26,400. The net saving was thus about US\$ 14,660. The project is therefore technically successful and economically feasible.

Financial benefits

- Investment: Negligible
- Annual operating cost: US\$11,740
- Annual cost savings: US\$ 14,660
- Payback period: 10 months

Environmental benefits

- Annual coal savings: 1200 tons
- Annual GHG emissions reduction: 3,012 tons CO₂ (emission factor: 2.51 kg CO₂/kg coal burned)

FOR MORE INFORMATION

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