



SAI SON CEMENT

Installation of Variable Speed Drive (VSD) to Control Speed of the Existing Forced Draft (FD) Blower

SUMMARY OF THE OPTION

Sai Son Cement, a joint stock company, was established in 1958 and located in Hatay province, west of Hanoi. At present, the company employs 515 staff and has an annual turnover of approximately US\$ 5.4 million. The company has two identical semi dry vertical kilns with a total annual throughput of 165000 tons cement. The audit focus area chosen by the Team is kiln no. 1 based upon the fact that its overall energy efficiency was found lower in comparison with the other kiln. The combustion air was provided to the kiln by a forced draft roots blower without any capacity control mechanism. Having observed the part-load working condition in most of the operating time of the air supplying system, the Team felt that there were good electricity saving potential if an efficient capacity control was incorporated into the existing system.

KEY WORDS

Cement, Vietnam, Electric motors, Fans and Blowers, Kiln, Variable speed drive (VSD)

OBSERVATIONS

The vertical semi-dry kiln no. 1 is used to burn a mixture of ground coal, clay, sand, limestone in the form of tiny round pellets which are fed from the top of the kiln. Combustion air was originally supplied to the kiln from a forced draft blower with rated speed of 740 rpm and discharge pressure of 29.4 kPa. It was then observed that cement production from the kiln was of 8.5 tons per hour (TPH) on average at 80% of the time (6624 hours/year) and of 10.2 TPH at only 20% of the time (1656 hours/year). However, the FD fan had no efficient capacity control and always run at 284 Nm³/min. So the plant operated at maximum load by by-passing 20% of the total air generated by the FD fan into the ambient resulting in unavoidable energy losses.

OPTIONS



Having carried out energy audit for the existing air supplying system, the Team recommended to control the FD fan capacity by installing a variable speed drive (VSD) to control motor speed and thus the fan speed in order to match the desired air quantity.

However, before deciding to install the VSD, calculation of new working conditions for the FD fan was made to ascertain that the kiln would operate without any problem at a lower FD air pressure. The reduced speed desired was then estimated as of 592 rpm and corresponding reduced FD fan discharge pressure of 18.8 kPa. Under this working condition, designed quantity of FD air required at normal operation would be of 227 Nm³/min.

Figure.1 The VSD installed on motor of FD Blower of Kiln 1



RESULTS

Table 1: Parameter Description of FD fan

Parameter	Before installation of VSD	After installation of VSD
Quantity of FD air	284 m ³ /min	227 m ³ /min
Power input	172 kw	157 kw
Speed of FD fan	740 rpm	592 rpm
Discharge pressure	29.4 Kpa	18.8 Kpa

The investment for the VSD is approx. US\$ 20,000 (around 315.3 million VNDT. This option saves approximately 124,200 kWh/yr (8% power saving for the FD fan). In terms of monetary value, it would be of US\$ 7,611. This option is then characterized by a good simple payback period of 32 months. The project is therefore technically successful and economically feasible.

Financial benefits

- Investment: US\$ 20,000
- Operating cost: Negligible
- Annual cost savings: US\$ 7,611
- Payback period: 32 months

Environmental benefits

- Annual electricity savings: 124,200 kWh
- Annual GHG emissions reduction: 84 tons CO₂

FOR MORE INFORMATION

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