25% Reduction in Electrical Energy Consumption By installation of VFD on ID Fan

Success Story in Solapur Textile Cluster: Case Study

Background:

Solapur textile cluster is one of the largest textile clusters in India; where application of VFD was demonstrated in a Textile Industry, so as to facilitate maximum replication in other textile clusters in India.

The main energy forms used in the cluster units are electricity and fuel such as wood and other biomass product. Cluster units have boilers and thermic fluid heaters for hot water generation and are equipped with either forced draft system or induced draft system for supply of combustion and removal of hot flue gases. Fans are driven by electrical motors and the flow & pressure are controlled by mechanical dampers.

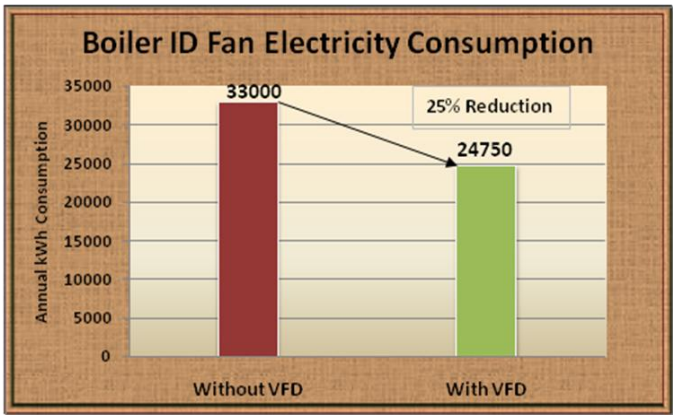
Baseline parameters & diagnosis:

The boiler is used for hot water generation having ID fan for supply of combustion air to boiler and removal of hot flue gas from the boiler. The flow of ID fan is manually controlled by mechanical damper with respect to variation in boiler load to maintain desired air to fuel ratio. The mechanical damper for control of the flow may reduce the load on the motor, but the constriction itself is an energy loss, which is obviously an inefficient technique. Energy consumption in ID fan would depend on following:

- Load on boiler
- Percentage opening of mechanical damper
- Operational & maintenance practices

If the flow can be controlled by reducing the speed of motor, this would offer a more efficient means of achieving flow control. Considering the above facts and for reducing electricity consumption in the present boiler, it was suggested to install VFD for ID fan.

The ID fan motor was consuming 9 kW of electrical power with yearly electrical unit consumption of 33,000 kWh at 40 to 50% damper openings. The ID fan operates for around 12 hr/day and 305 day/year



By installation of VFD on ID Fan of Boiler reduces 25% of Electrical Energy consumption

Life cycle:

VFD has an operating life of more than 15 years. Actual capacity and suitable location are two important points must be considered before installation of VFD.

Overall Impact after Implementation:

- Reduction in ID fan power consumption

- Accurate control of excess air level leading to improved combustion and reduction on flue gas losses

Brief details of Variable Speed Drives:

A Variable-Frequency Drive (VFD) is a type of adjustable-speed drive used in electro-mechanical drive systems to control AC motor speed and torque by varying motor input frequency and voltage. Frequency (or hertz) is directly related to the motor's speed (RPMs). In other words, the faster the frequency, the faster the RPMs go. If an application does not require an electric motor to run at full speed, the VFD can be used to ramp down the frequency and voltage to meet the requirements of the electric motor's load. As the application's motor speed requirements change, the VFD can simply turn up or down the motor speed to meet the speed requirement. Induction motor rotates near synchronous speed, the most effective and energy-efficient way to change the motor speed is to change the frequency of the applied voltage. Variable-frequency drives provide continuous control, matching motor speed to the specific demands of the work being performed. Variable frequency drives are an excellent choice for adjustable-speed drive users because they allow operators to fine-tune processes while reducing costs for energy and equipment maintenance.

Applications of VFD: VFD can be used in wide range of applications i.e. Induced Draft Fans, Force Draft Fan, Primary Air fan, Blowers, pumps, Air compressors, conveyors, extruders, lifts etc.

Benefits:

Monetary Benefits: Reduction in maintenance & operating cost & Reduction in breakages and motor burning,

Quality Benefits: Increase life of the motor and reduced inrush current & Eliminates mechanical shock and stress on power train (couplings, belts, drive shafts, gear boxes, etc.),

Environmental Benefits: Reduction in CO_2 emissions by saving of Electrical Energy,

Social Benefits: Improvement in working environment in plant & Improvement in Skill set of Workers

Limitations:

The waveforms delivered by a VFD to the motor are not perfectly sinusoidal and generate Harmonics (wave form with are multiple of fundamental frequency). Harmonic level above acceptable range may have adverse effect on other operating equipments performance. However, harmonic filters can be installed to remove the distorted wave forms from the system.

Skills Requirements:

Few hours training provided on various function of VFD, operating mechanism etc to the operator.

About the Project

The World Bank (WB), with support from the Global Environmental Facility (GEF), is executing a project titled "FINANCING ENERGY EFFICIENCY AT MSMEs". The project aims to identify, design & implement Energy Efficiency (EE) solutions in 500 MSMEs in 5 clusters with potential of EE investment of more than Rs. 100 crore and reduction in GHG emissions equivalent to 1.2 million tonne CO2. Majority of the MSME units completing implementation have reported significant energy and cost savings. This project is being co-implemented by Small Industries Development Bank of India (SIDBI) and Bureau of Energy Efficiency (BEE)

For Further Information please contact –

Energy Efficiency Centre, Small Industries Development Bank of India (SIDBI), Ground Floor, E-1, Videocon Tower, Jhandewalan Extension, Rani Jhansi Road, New Delhi-110055, India, Ph. 011 23682473-77, www.sidbi.in