

Case Study – 5

Low tension porcelain ware and industrial and technical ceramics manufacturing industry having tunnel kiln (Fuel: Natural Gas)

Implementing the technology

Flue gas exhaust at the tunnel kiln was monitored. %O<sub>2</sub> in flue gas was more than 12%. Flue gas temperature at exhaust of the kiln (at charging end) was also at 378°C.

%O<sub>2</sub> in flue gases should be between 2 – 6%. The same can be maintained by regular monitoring of flue gas sample with the help of a portable flue gas analyzer or by installing O<sub>2</sub> sensor at the furnace exhaust for flue gases and a modulating motorized damper or RPM of combustion air blower through VFD for combustion air control.

The sensor will provide constant feedback of O<sub>2</sub>% to the damper / VFD which will in turn regulate the flow of combustion air to maintain the combustion efficiency at optimum level of 80 - 90% (Achievable combustion efficiency).

Table: Flue Gas Monitoring Parameters at Kiln

Parameter	Unit	Firing Zone
O <sub>2</sub>	%	14.3
CO	ppm	0
Combustion Efficiency	%	45
CO <sub>2</sub>	%	3.9
Excess Air	%	124.8
Pressure	mbar	0.11

It is suggested to control the combustion air through reducing the RPM of combustion air blower by 1-2 Hertz at a time by monitoring required temperature within kiln and set the appropriate frequency and monitoring the required O<sub>2</sub> percentage in flue gas to optimize the air fuel ratio and thus combustion efficiency at the kiln.

	The proper control of air to fuel ratio can result in combustion efficiency more than 75 % with old burners as well. Thus increase in 30 % combustion efficiency will result in saving of approximately <b>1,03,543</b> SCM gas per annum.
Benefit	
Environmental	<ul style="list-style-type: none"> <li>• Per Day reduction in the gas consumption: <b>284 SCM.</b> Per Year reduction in gas consumption: <b>1,03,543 SCM.</b></li> <li>• Per Day reduction in Greenhouse Gas (CO<sub>2</sub>) emission: <b>594 Kg</b> Per Year Reduction in Greenhouse Gas (CO<sub>2</sub>) emission: <b>2,16,404 Kg</b></li> </ul>
Economical	<p>Investment: <b>Rs. 20,000/-</b> (For VFD)  Annual Savings: <b>Rs. 44,52,000/-</b> per annum  Payback Period: <b>Immediate</b></p>

