ENERGY CONSERVATION MEASURES

1: Preheater Top Cyclone Water Spray system

Background of the Project

The top cyclone water spray system was installed to increase the clinker production from the existing kiln for the extra clinker requirement for the new 0.5 million ton cement grinding unit. The project was feasible as the hot air requirement for the raw material was low due to very less moisture content in our limestone. Further the pre heater fan was taking less load as compared to the installed power. The project was having low investment and execution can be done independently and final connection was done during window of opportunity of kiln stoppage.

Observations Made

Pre Heater fan vibration level was normal with no coating in the blades. Bag House DP was less even during kiln mode operation after implementation.

Technical and financial analysis made

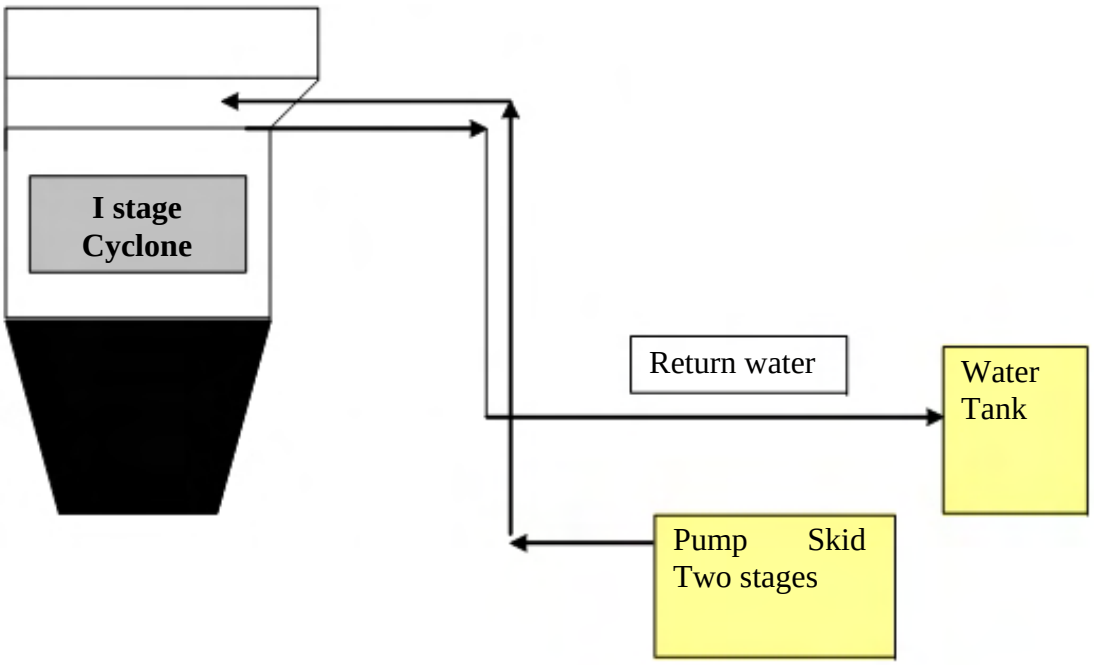
Sl. No	Parameters	Pre Implementation	Post-Implementation	Savings per annum (Rs. Lacs)
1	Preheater Temp. (°C)	342	290	
2	Pre Heater Fan (KW)	995	965	**10.7(+)**
3	Bag House Fan (KW)	650	450	**35.64(+)**
4	Reverse air fan Rhrs	8	5	
5	Reverse air fan (KW)	164	102.5	**21.9(+)**
6	Pumps power consumption(KW)	0	30	**10.7(-)**

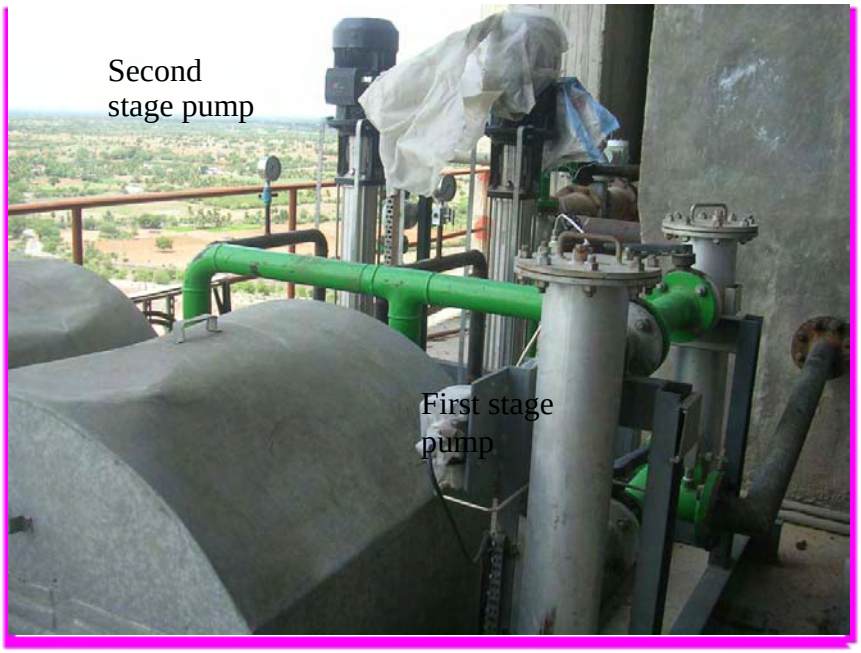
Investment for the Pre Heater water spray system	**Rs 22 Lacs**
Net Savings per annum	**Rs 57.5 Lacs**

Impact of Implementation

Savings in the pre heater fan and also bag House fan mainly because of lesser rpm of Pre heater fan for the same output from the kiln and no fresh air dilution for the bag house fan.

Further savings could be achieved at the reverse air fan as the cleaning cycle got substantially reduced.





Pump skid with two stages to reduce the power consumption in place of one pump for achieving the required pressure.

Seven nozzles located in the top circumference to have even distribution of water.

2 :Cooler Water Spray System

Background of the Project

Original design of the cooler water spray supplied by L & T was based on multiple full cone nozzles with low pressure water pump. The water droplets had a tendency to combine with the nearby nozzles leading to bigger droplets. With the above problem the water is not getting completely evaporated and this leads to clinker buildup in the ESP take off duct and also temperature fluctuation in the cooler water spray. The present water spray system was having more nozzles located closer to the clinker bed and also fine water spray. Each pair of nozzles was designed with different flow rates to maintain a constant temperature by fixing different temperature settings.

Observations made

Stable cooler outlet temperature could be achieved because of fine water droplet and also no build up in the ESP take off duct. Better collection efficiency could be achieved because of less resistivity of the particles and also no coating formation in the collecting and emitting electrodes.

Technical and financial analysis made

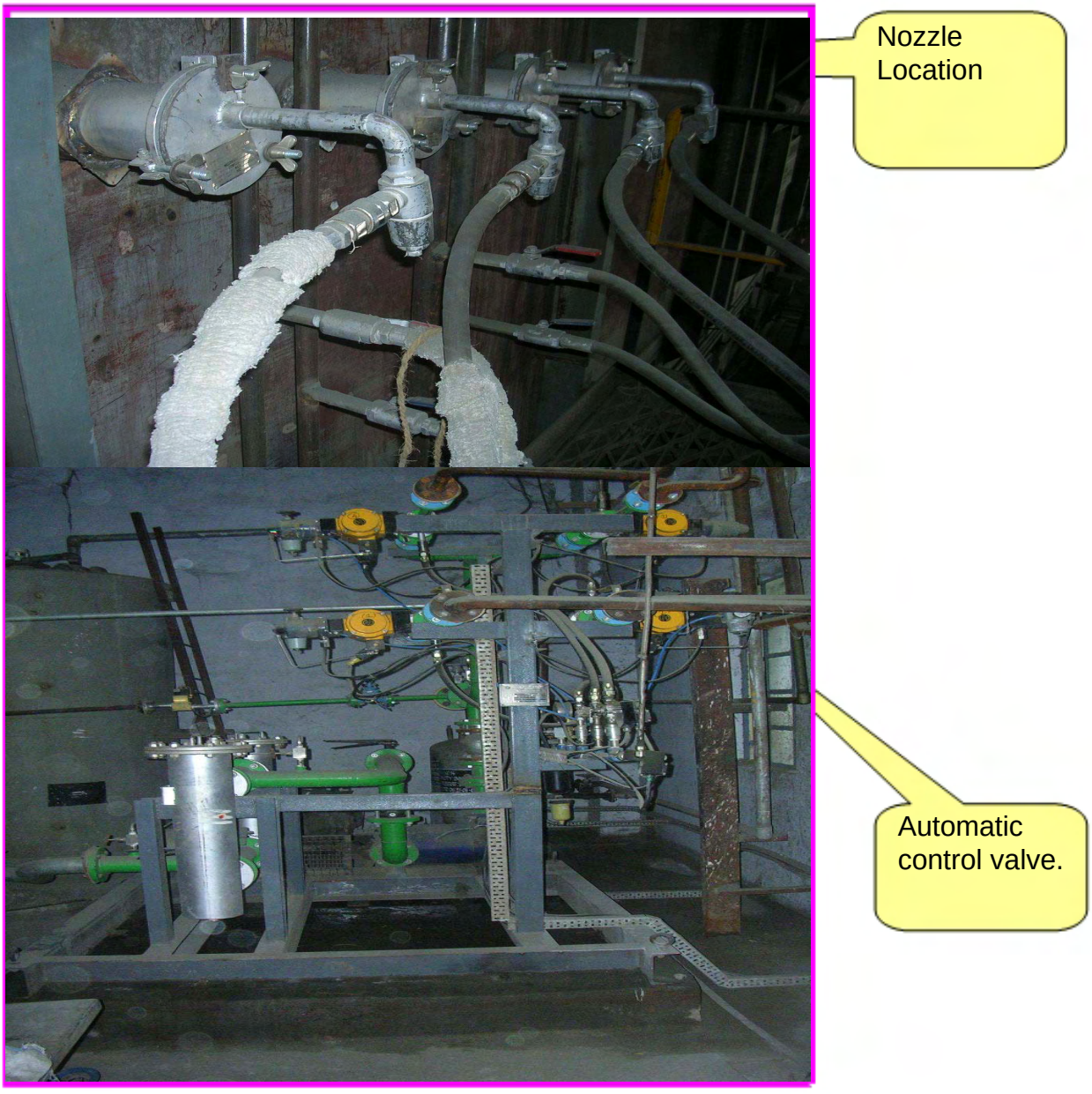
Sl. No	Parameters	Pre Implementation	Post-Implementation	Savings per annum (Lacs)
1	Cooler vent Temperature	290	250	
2	Cooler vent Fan (KW)	56	36	7.13(+)
3	Water pump power(KW)	15	16	**0.35(-)**

Investment for the Cooler water spray system	**Rs 11.64 Lacs**
Net Savings per annum	**Rs 6.78 Lacs**

Impact of Implementation

Savings in the cooler vent fan power because of stable temperature. Savings in terms of cleaning the build up in the cooler vent duct. Savings in scaffolding and maintenance cost for repairing the cooler vent duct. Emission reduction from 35 mg/Nm3 to 25 mg/Nm3 in the cooler vent chimney after installation of new water spray system.

Cooler water spray system



3 :Primary air Fan

Back Ground of the project

Primary air fan supplied at the time of the project was having a constant speed motor with damper control. During throttling of the damper we experienced unstable flame formation leading to less refractory life. Flame momentum requirement was varying with the different kind of fuels leading frequent change in the primary air volume. To offset the loss of power during throttling and also to have a stable flame, VFD drive was installed for one of the primary air fan. Generally it was observed that the Motor control cubicle connected with Primary air fan was tripping due to high starting current before VFD installation.

Observations made

Stable flame formation could be achieved for different primary air fan flow and also substantial increase in the refractory life.

Technical and financial analysis made

Sl. No	Parameters	Pre Implementation	Post-Implementation	Savings per annum (Rs. Lacs)
1	Primary air fan Damper	70%	100%	
2	Primary air fan RPM	2950	2700	
3	Refractory Life(Burning Zone)-days	280	330	
4	Primary air fan(KW)	82	69	4.63(+)
Investment for the VFD			**Rs 8.4 Lacs**	
Savings per annum			**Rs 4.63 Lacs**	

Impact of Implementation

Power system stability could be achieved after Variable Frequency Drive [VFD] installation with substantial savings in power.
Stable flame formation could be achieved by running the fan at lower rpm and improved refractory life.

VFD Panel for Primary Air Fan

Primary Air Fan motor

4 : Insulating Bricks for pre Burning Zone

Background of the Project

Recommendation of refractory schedule given by supplier was to use HA 40% bricks near the girth gear and III tire. General observation reveals that insulating property was low after one year of installation the radiation level was high with shell temperature ranging between 270-320 deg C.
To reduce radiation losses from the kiln insulating bricks for a length of 14 meters, ACC-Refratherm was installed from inlet up to girth gear and from the shell temperature savings of 5 Kcal/kg of clinker could be derived.

Observations Made

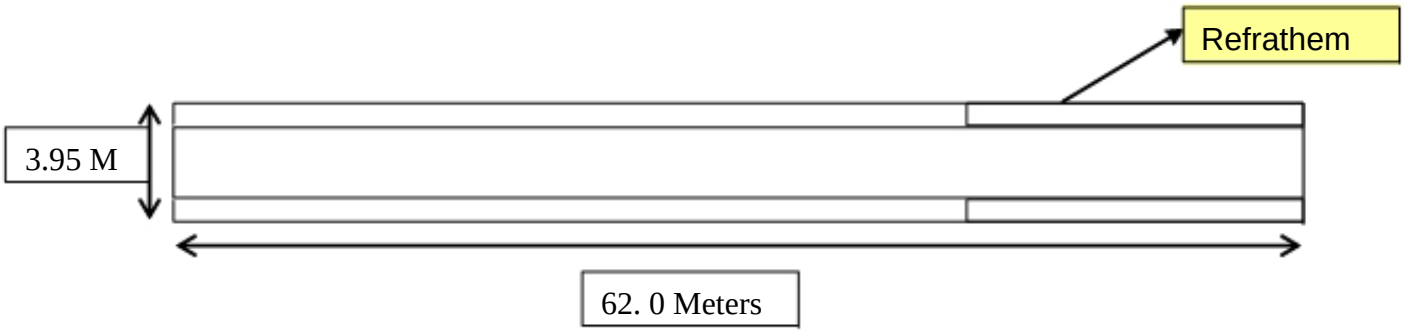
Substantial shell temperature reduction could be achieved with less radiation loss and the inspection of rebricked area reveals no spalling.

Technical and financial analysis made

Sl. No	Parameters	Pre Implementation	Post-Implementation	Savings per annum (Rs. Lacs)
1	Shell temperature between kiln inlet to Girth Gear(Deg C)	270-320	160-180	
2	Reduction in shell radiation losses(Kcal/Kg of Clinker)	32.9	27.6	
3	Refractory Life(Burning Zone)-days	280	330	
4	Thermal energy savings	-		**38.93**
Investment for the VFD			**Rs 13.55 Lacs**	
Savings per annum			Rs 38.93 Lacs	

Impact of Implementation

Thermal energy saving followed with improved life of kiln shell, III tier and girth Gear and also better environment could be achieved after installation.



RENEWABLE ENERGY PROJECT

Renewable Energy Project

5 : Solar Water Heaters

Background of the Project

To promote the use of renewable energy, we have installed solar water heaters in colony houses to reduce the power consumption by avoiding the use of electrical water heaters. Top level executive quarters were fixed with solar water heaters.

Observations Made

The hot water up to a maximum of 80 deg C was available all throughout the day.

Technical and financial analysis made

Installation cost of solar water heater per unit : Rs 22,000

Approximate energy saving per house per month: 200 Units

Savings per annum per house : Rs 8400

Impact of Implementation

Solar Water Heater has several advantages over conventional water heating systems. For consumers, they save electrical energy, save interior space (because they are usually located on rooftops,)and eliminate the risk of accidents in bathrooms due to electrical water heating equipment, They require little or no care and attention by providing hot water for about 300 days in a year. They reduce the need for fossil fuels for electrical generation and thereby, they also reduce degradation of the environment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