Energy Conservation Achievements' 2007 *(Nestle India ltd., Moga)*

Steam coil provided between HP fan & Air Heater inlet to preheat the inlet air.

We have 8 number of Air heaters for providing hot air to dryers in Egron deptt. for drying of milk into base powder. Out of 8 air heaters, we converted 6 numbers of air heaters from Furnace oil heating to steam heating last year.

The temp. of hot air is around 360°C. Furnace oil is used as fuel for its operation.
A high pressure (HP) fan forces ambient air into the heater which is eventually passed on to dryers through induced draft ID fans after heating.

As we came to know from our experience that the cost incurred for heating of air with steam is 5 times lower as compared to that of FO. So we decided to use steam for air heating for 2 numbers pending air heaters.

We opted to preheat the inlet air, which has ambient temperature with a help of steam heat exchangers. We installed a steam-heated coil in between HP fan & heater furnace to increase the temperature of inlet air to 100°C. This increases the efficiency of heater as already high temperature air is forced into the furnace. It also enhances the life of smoke tube as tubes are not exposed to comparatively cold air initially.

Before modification FO consumed / hour of Air Heater operation was 98 lts.
After modification oil consumed / hour is reduced to 88 lts per heater.

For one Air heater:
Oil cons. Without steam coil = 98 lt/hr
Oil consumption with coil = 88 lt/hr.
Steam reqd. to heat the coil = Heat energy in 10 lts. of oil / Enthalpy of Steam
= 10 * 0.94 * 9500 / 550 = 162 kg/hr

Further, Steam reqd. for deaeration in feed water tank corresponding to steam cons.
= 162 *(102-28) / 550 = 21.8 kg/hr.

Heat recovered from condensate = 162 * 70 / 550 = 20.36 kg/hr.
Cost of steam = Rs 0.85 / kg.
Cost of steam consumption = Rs 139 / hr. / air heater
Cost of oil saved = Rs 207 / hr/ air heater

Saving = Rs 68 / hr/air heater

As 2 number of air heaters are reqd. for one Egron. Therefore,

Total savings = Rs 68 * 2 air heaters * 20 hrs* 330 days.
= Rs 8.96 lacs / year / egron

Correct selection & replacement of faulty steam traps

An audit was done of all the steam traps, total 140 number of the factory to detect losses and take corrective actions. Following were the observations:

S.NO.	Description	Quantity
1	Total no. of traps audited	140
2	Number of traps working OK	77
3	Number of traps water logged	12
4	No. of traps leaking steam	14
5	No. of cold traps	37
6	Estimated steam leakage , kg/hr.	202

At some locations it was found that Inverted Bucket trap & Float traps were installed on line drain application. Also Thermodynamic traps were installed on heating applications.

S.No.	Tag.No.	Type/Make	Size	Pr. KG/cm2	Application	Steam leak, Kg/hr.
1	1	TD3/SPIRAX	20	17	Drain	Trap isolated (leaking trap)
2	3	TD3/SPIRAX	20	4.8	Drain	19
3	19	No Trap	15	3.5	Heating	15
4	53	IB	25	3.5	Drain	11
5	63	No Trap	20	0.3	Drain	5
6	64	No Trap	20	0.3	Drain	5
7	67	FT/SPIRAX	50	2	Drain	30
8	71	No Trap	20	2	Tracing	22
9	96	TD3/SPIRAX	20	16.5	Drain	20
10	112	TD3/SPIRAX	15	3	Heating	10
11	130	TD3/SPIRAX	15	17	Drain	20
12	132	TD3/SPIRAX	20	17	Drain	10
13	133	FT/SPIRAX	20	3	Heating	15
14	138	TD3/SPIRAX	15	15	Drain	20
					TOTAL	*202*

Recommendations :
Replacement of leaking steam traps with appropriate ones.
Replacement of inverted bucket traps on line drain application with Thermodynamic traps.
Replacement of Inverted bucket traps on heating applications with Ball Float traps.

Estimated investment = Rs 5.58 lacs.

Steam loss from traps = 202 kg/hr*23hrs*365days = 1695.8 tons / year

Savings achieved = Cost of steam = Rs 850* 1695.8 tons = Rs 14.41 lacs/year.

B). Electrical Energy Savings:

Installation of Energy Saver EN-25 for factory & CFL Bulbs for residential quarter lighting load

Normally the luminous efficiency of gas discharge lamp depends on the operating electrical conditions like discharge current & voltage in relation to the vapor pressure. In reality, the lighting control gear as a unit generally draws more current than the rated.

Keeping this in mind three number of energy savers EN-25 are installed for factory lighting load and its real effect was analyzed. This energy saver optimizes the electric load thus giving substantial savings.

Four stage effect of ES-25:

Stage 1 – Starting period of lamp ignition:

During this period no savings, no effect of starting voltage/current drawn by lamp etc.

Stage 2- Running period. maintenance of ionization of gas lamp:

Current drawn by lamp reduced to have optimum current level to maintain ionization.

Current drawn in the circuit reduced there by losses in the connecting cables, choke, & lamp wires.

Stage 3- I^2R losses in the choke reduced:

Marginal reduction of voltage reduces iron losses.

Direct reduction in energy consumption in the lamp.

Stage 4- Cumulative effect:

Total savings of 20 – 25 % can be achieved.

Following were the findings: -

Meter NO.	Average Power cons. before EN-25 / month	Average Power cons. after EN-25 / month	Units saved per month
PBB00342	75810 kwh	61200 kwh	14610 kwh
PBBB0340	51960 kwh	46020 kwh	5940 kwh
PBB00331	10950 kwh	9420 kwh	1530 kwh
		Total saved units	22080 kwh

Savings for one year = 22080*12months*Rs4.12 = 10.92 lacs/year

Power consumption reduction of residential quarter

40 no. of 70 watt Sodium Vapor lamps replaced with 23 watt CFL bulbs for street lighting.
Before: -

Average units consumed / year = 10080 kwh

Cost of power cons. = Rs 41530/-

After: -

Average units consumed per year = 3312 kwh

Cost of power cons. = Rs 13645/-

Savings: - Rs 27885/-
= Rs 0.278 lacs/year

Reduction in power consumption in AHU operation.

Air handling units are installed for comfort at workplace. An extensive study was done regarding usage of offices & workplaces. It was found that due to negligence some of the times AHUs run for extra time without any need. Moreover temperature maintained was too low than actually required.

Following measures were taken for optimum utilization of AHUs:

Real time switches installed for avoiding unnecessary running of AHU.
Room temperature for comfort increased from 24°C. to 27°C.

On comparing with the actual readings of previous months, units saved came around 3000 per year per AHU.

As these changes were done only on one AHU,

Cost of 3000 units saved = Rs 12360/-p.a.

Condensate Recovery from Evaporators:

Condensate recovered from Evaporators

= 48000 *(70-30)

= 1.92 Mkcal / day

Considering 300 Days of Operation

Total Energy saved = 1.92 * 300

= 576 Mkcal / Year.

Savings from De-super heaters

Due to installation of De-super heater savings achieved:

Thermal Energy Savings = 2000 * (80 – 30)

= 100, 000 Kcal / hr.

Considering 5500 Running Hours of Chiller Operation Per Year

Total Thermal Energy Saving = 550 Mkcal / Year.

Electrical Energy Savings = 12 Units / Hours

Total Electrical savings = 12 * 5500
= 66000 Units / Year
= 57 Mkcal / Year

Total Energy Savings = (550 + 57)

= 607 Mkcal / Year.