

Castrol India Limited
Patalganga Plant, Dist. Raigad, (Maharashtra).

Unit Profile

Patalganga Plant of Castrol India Limited, one of the flagship lubricants blending and filling unit is situated at Patalganga Industrial Area, in Raigad District, approx. 60 KMs from Mumbai in Maharashtra State. The plant manufactures Automotive and Marine lubricants, Brake Fluids and Coolants. This plant produces approx. 40% of the overall lubricants manufactured by Castrol India Ltd.

The Plant is ISO 9001-2000 and ISO 14001-1996 Certified.

Patalganga Plant is a part of the global Lubricants Supply Chain business of BP Group, with following unique Quality, HSE and Environmental Policies.

Quality Policy

Castrol has a high reputation worldwide for quality in the range of products and services. It is vital that we retain and actively enhance this reputation.

To achieve this there must be an unremitting and uncompromising quest for quality in products, service and all supporting activities throughout the organization. There must be a clear focus on the customer/supplier interface, whether internal or external. Every contact, written, spoken or visual, must convey the quality Castrol image.

Continued compliance with the ISO 9000/QS 9000 Quality Management Standard remains the cornerstone of this policy.

ISO 9000/QS 9000 should, however, be regarded only as a foundation on which to build and develop the principles of Total Quality Management, the main elements of which involve management commitment, staff participation, internal and external customer focus and appropriate measurement as a means of ensuring continuous improvement.

The quest for quality may be costly and must therefore always be justified in terms of its contribution to long run profitability.

Each business stream head is personally responsible for implementing this policy, guided and assisted by the Corporate Manager QA.

HSE Policy

Everybody who works for BP, anywhere, is responsible for getting HSE right. Good HSE performance and the health, safety and security of everyone who works for us are critical to the success of our business.

Our goals are simply stated - no accidents, no harm to people, and no damage to the environment.

We will continue to drive down the environmental and health impact of our operations by reducing waste, emissions and discharges, and using energy efficiently. We will produce quality products that can be used safely by our customers.

We will :

- Consult, listen and respond openly to our customers, employees, neighbours, public interest groups and those who work with us.
- work with others – our partners, suppliers, competitors and regulators – to raise the standards of our industry.
 - openly report our performance, good and bad.
- recognize those who contribute to improved HSE performance.

Our business plans include measurable HSE targets. We are all committed to meeting them.

Environmental Policy

Patalganga Plant of Castrol India Limited manufactures world class lubricants undertaking operations of blending, filling, packing and dispatch in a responsible manner so as to cause no unacceptable harm to environment.

Accordingly, we at Patalganga Plant are committed to :

- Comply with all relevant legal and other corporate requirements applicable to the environmental aspects of our activities, products and services.
- Continually improve our environmental performance by reducing leakage and spills, hazardous and non hazardous solid waste.
- Prevent pollution, encourage re-use/recycling and use energy and natural resources efficiently.
- Maintain an environmental management system for setting, reviewing and achieving measurable environmental objectives and targets.

Energy Conservation Drive

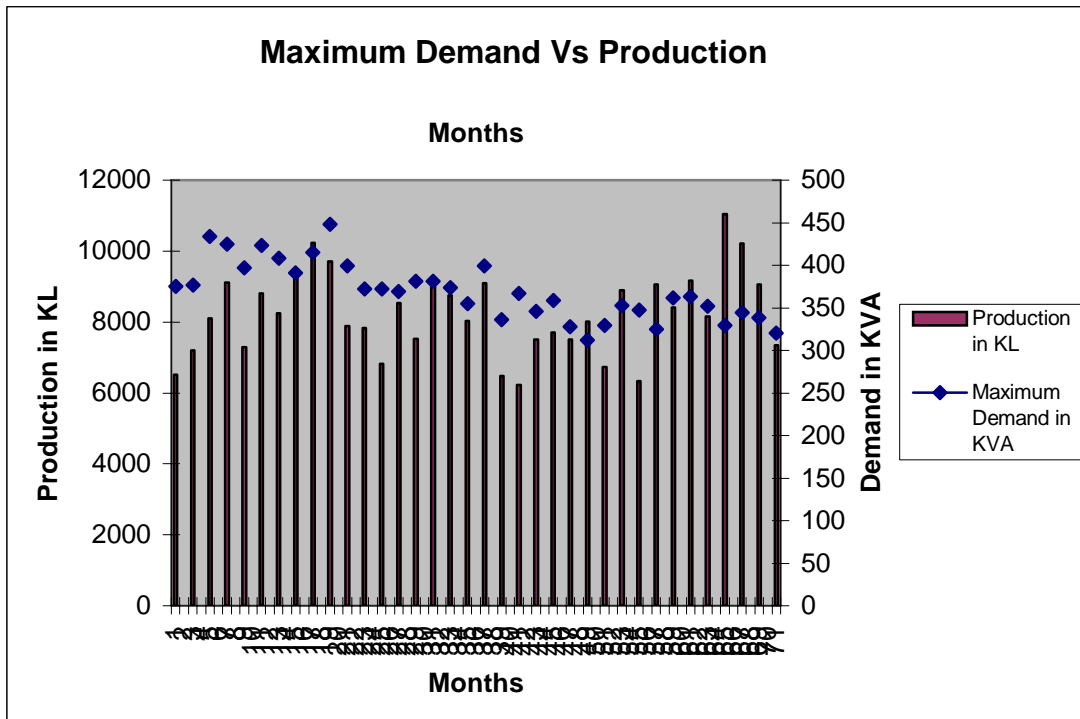
In order to look at ways and means to contain increasing energy cost, it was decided to initiate a Small Group Activity in the year 2001 with the following objectives :

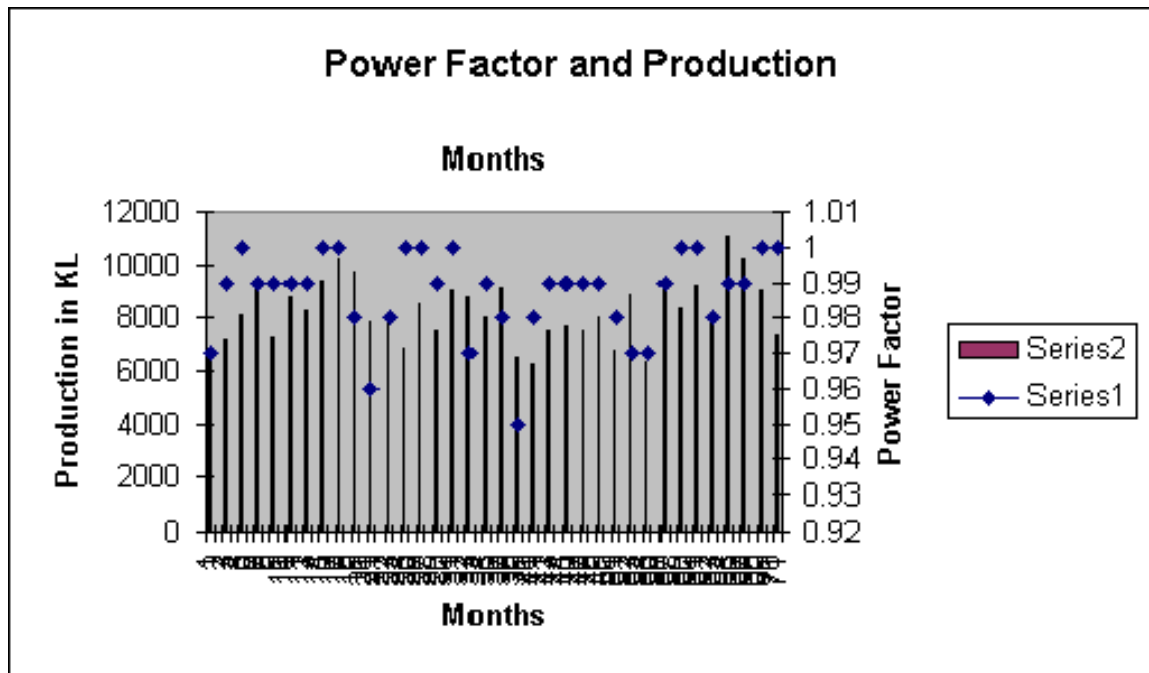
- Minimise energy cost through energy conservation measures.
- Comply with Environmental Management System requirements.
- Initiate continual improvement drive towards energy conservation.
- Improve awareness amongst employees towards energy conservation.

Major Actions Implemented since year 2001

- i) Motor Load survey carried out and connected load reduced by 150 HP.
- ii) Monitoring Combustion Efficiency through Stack Gas Analyser on daily basis.
- iii) 100 Nos. Conventional tube lights replaced by energy efficient tube lights.
- iv) Low Pressure steam provided in place of high pressure steam through PRV station to reduce the heating time by making use of higher latent heat of steam at low pressure.
- v) Gravity feed arrangement provided wherever possible.
- vi) Condensate Recovery Pumps with Ball Float Steam Traps.

- vii) Bifurcation of steam lines.
- viii) Air vents at the farthest end of the steam lines.
- ix) PRV with moisture separator to maintain furnace oil in-feed temperature at 110 deg. C.
- x) Automatic Blow down control System installed.
- xi) Flash Vessel installed to recover the flash steam for heating additives and insulation of additive storage tanks carried out to prevent heat loss.
- xii) Energy Savers for Air-conditioners and Water Coolers.
- xiii) Temperature Controllers for two nos. each to blenders and additive storage tanks.
- xiv) Capacitors across motors above 30 HP to reduce distribution losses.
- xv) Higher recovery of condensate by installing Ball Float stem trap modules to recover the condensate from additive tankers, fabrication of condensate lines to recover condensate from tank farm area.
- xvi) Revamping of lighting System to minimize connected load.
- xvii) Rationalization of headers, oil transfer lines and tanker loading lines.
- xix) Modification of Induction Sealing Machines
- xx) Maximum Demand & Power Factor well maintained in spite of increase in production and reduction in shifts through the following initiatives undertaken.
 - a. Installation of Automatic Power Factor Control Relay with 5, 10 & 20 KVAR capacitors for better selection of capacitors.
 - b. PLC system for two nos. of blenders which are connected with 60 HP motors for auto cut off and prevent simultaneous running of two 60 HP motors.
 - c. Frequent On-Off of pumps reduced by installing right capacity pumps.
 - d. Star Delta Starters in place of DOL Starters.





Note :

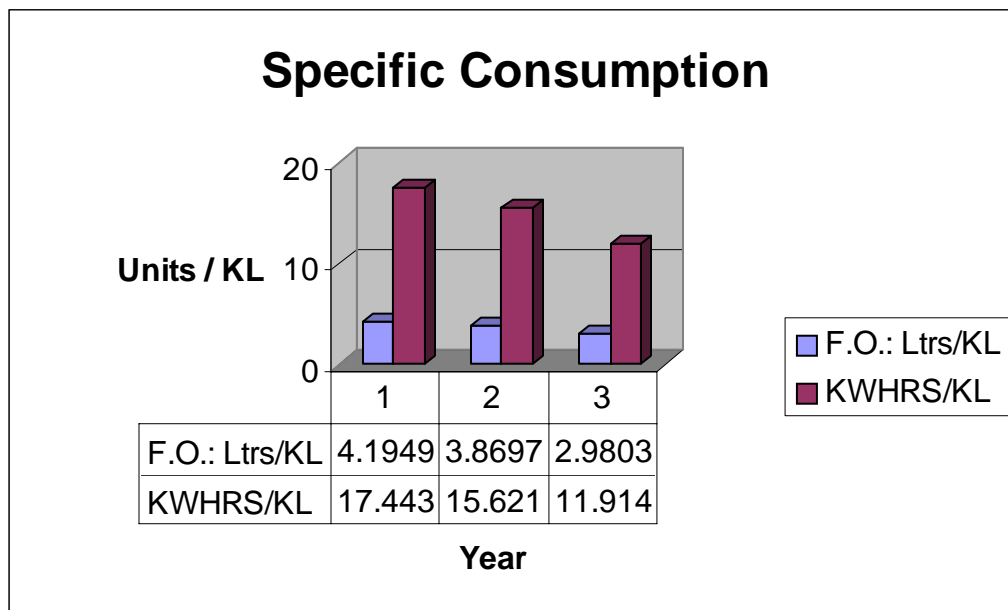
1. Demand shows a decrease in trend with increase in production. This is in spite of reduction in shifts.
2. Even though the P.F. was maintained between 0.95 to 1 by before the installation of APFC Relay by manual operation, APFC relay helped us in better sequencing of capacitor banks, reduction of losses and better regulation of voltage.

Pursuant to the above and other actions implementation, the tabulation below provides summary data on savings accrued on account of energy conservation :

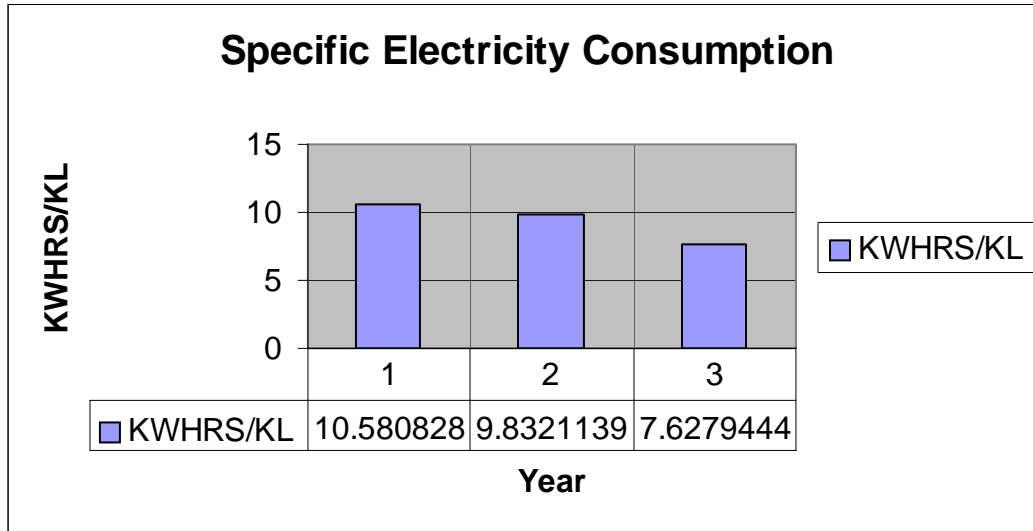
Sr. No.	Description	Jan-Dec. 2001	Jan-Dec. 2002	Jan-Dec. 2003
1	Blending (FG + Int.) – KL	60821	58669	65585
2	% Increase (Decrease) in blending		(3.54) (2152 KL)	11.79 6916 KL
3	Filling in KL	39448	34543	36854
4	% Increase (Decrease) in filling		(12.43) 4905 KL	6.69 2311
5	Units KWHRS	10,59,117	9,04,360	7,67,179
6	Units Generated KWHRS	1812	12111	14220
7	Total Units consumed	10,60,929	9,16,471	7,81,399
8	Savings (%) Units Saved		13.26 1,44,458	14.74 1,35,072

9	Furnace Oil Consump. Ltrs.	2,55,141	2,27,034	1,95,460
10	Savings (%)		11.02	13.91
	Ltrs. Saved		28,107	31,571
	Million KCal. Saved		270.22	303.52
11	Demand KVA Year Total	4864	367	4074
12	Furnace Oil/KL	4.24	3.92	3.00
13	Units/KL (Blending)	17.54	15.60	11.94
14	Units/KL (Blending+Filling)	10.56	9.70	7.49

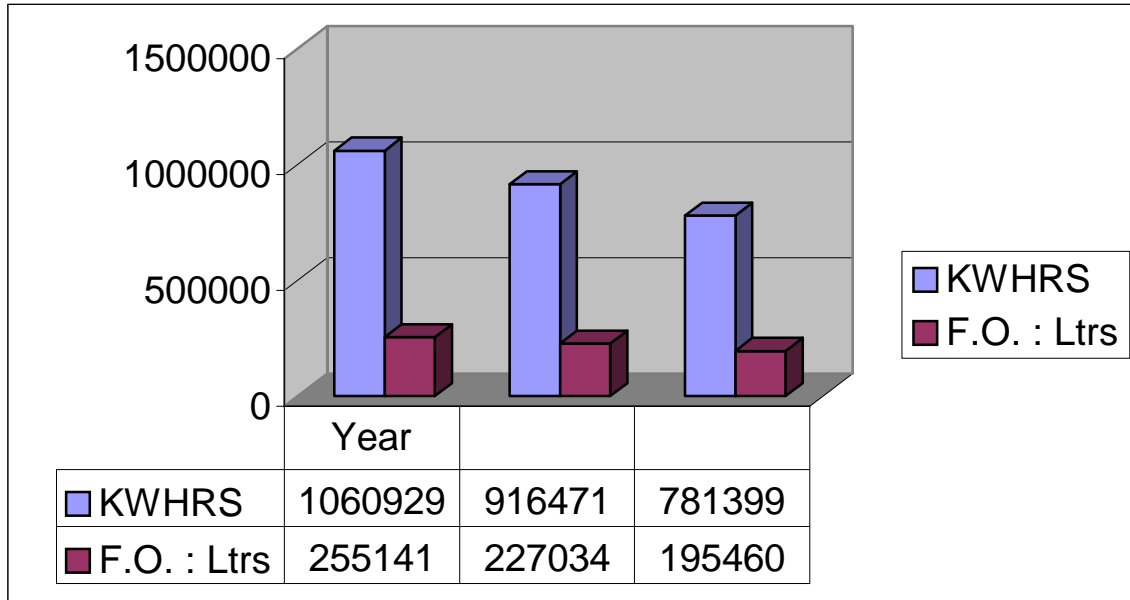
1. Specific Energy Consumption (Per KL of Blending)



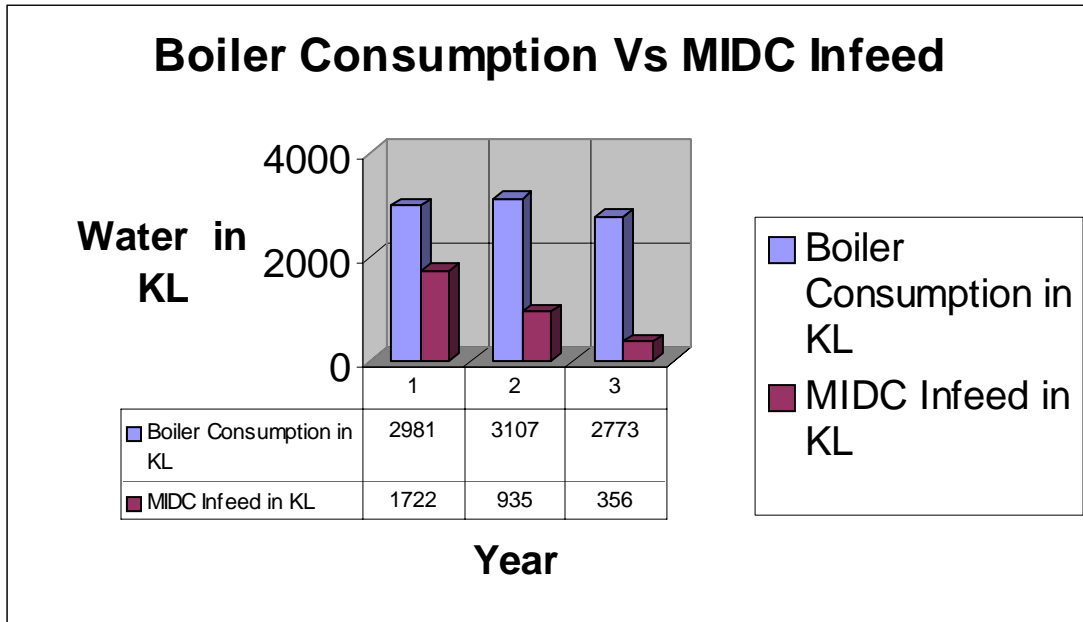
2. Specific Electricity Consumption (Blending + Filling)



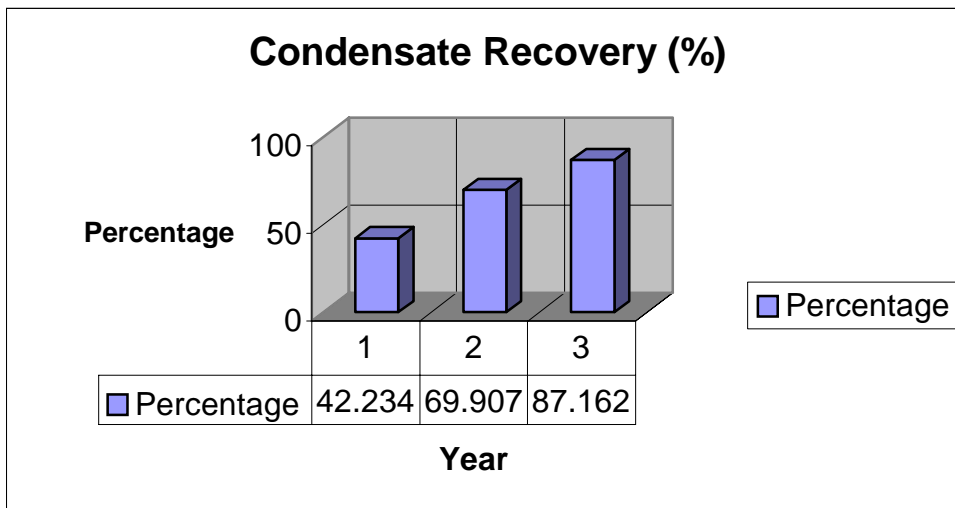
3. Energy Consumption (Electricity & Furnace Oil) Absolute.



4. Total Boiler Consumption Vs MIDC In-feed :-



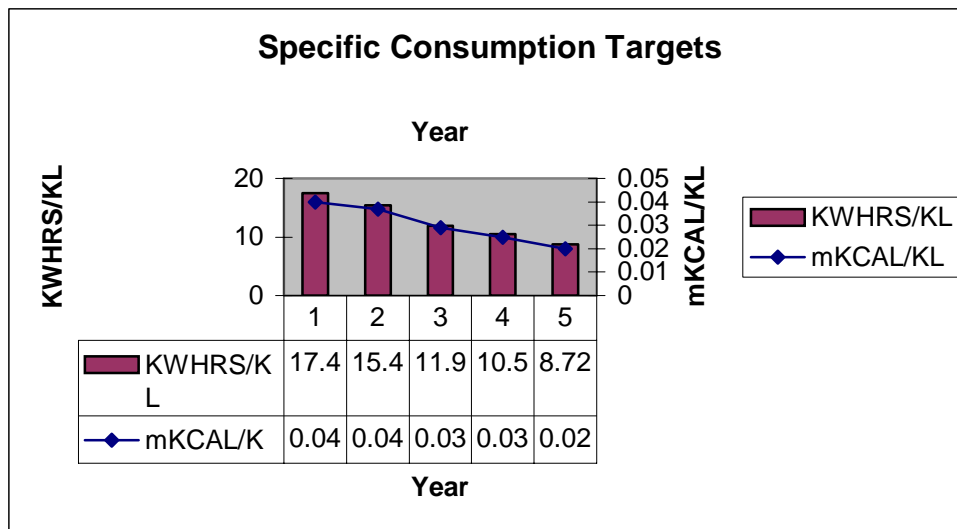
5. Condensate Recovery (%)



Energy Conservation Plans & Targets

The following major Energy Conservation Projects are streamlined for the year 2004.

1. Two Nos. of Power Packed Condensate Pumps.
2. Solar Whot Water Heating System.
3. Replacement of conventional tube lights by Energy Efficient tube lights.
4. Replacement of old inefficient pumps by efficient pumps.



Castrol:Patalganga Plant.

Major Projects Implemented in the Year 2003

Automatic Blow Down Controller

In order to prevent corrosion and scaling on the boiler tubes and down stream requirements due to total dissolved solids (TDS), we used to give blow down to the boiler every shift. This results in around 2 KL of steam every day. In order to reduce the same, we installed the automatic blow down controller for the following benefits.

- It gives boiler's current TDS levels and optimizes the blow down. As a result, it prevents loss of water.
- TDS is controlled accurately nearly to maximum level, minimizing blow down, yet avoiding carry over and foaming caused by high TDS level.
- Approximate monetary saving is around Rs.0.94 lakhs.

$$\text{Required Blow Down, } R = F \text{ XL} / B - F = 100 \times 15 / 3500 - 100 = 0.441 \text{ TPD.}$$

Where F = Feed Water TDS = 100 PPM.

L = Steam Load = 15 TPD.

B = Boiler Water TDS = 3500 PPM

F = Boiler Efficiency = 84%.

Existing Blow Down, $E = F_1 \times t \times 60 \times 16/8$

$$\text{Savings} = E - R = 2160 - 522 = 1638 \text{ KG/Day.}$$

Possible Heat Savings =

$$= \frac{\text{Savings in blow down} \times \text{sensible heat loss} \times \text{cost of fuel}}{\text{NCV of FO} \times \text{Efficiency of Boiler} \times \text{Sp. Gr. of FO}}$$

$$= \frac{(E - R) \times (160 - 25) \times 10.00}{9650 \times 0.84 \times 0.95}$$

$$= \frac{(2160 - 522) \times (160 - 25) \times 10.00}{9650 \times 0.84 \times 0.95}$$

$$= \text{Rs. } 287.15 / \text{Per Day}$$

$$\text{Savings in Water Treatment} \times (E - R) \times W = 1638 \times 0.025$$

$$= \text{Rs. } 40.95 / \text{Per Day}$$

$$\text{Total Savings} = \text{Rs. } 328.10 \text{ Per Day}$$

$$\text{Annual Savings} = \text{Rs. } 328.10 \times 250 \text{ days} = \text{Rs. } 82,026 / -$$

Investment = Rs. 1.90 Lakhs.

Payback Period = ~ 2.5 Years.

Flash Vessel and Insulation of Additive storage tanks

The condensate during discharge from steam traps result in pressure drop which makes some of the condensate to re-evaporate. This is referred as flash steam. The flash steam contains around 50% of total KCAL in condensate and flash steam is around 15% of the condensate generated . Since, the condensate pump installed at Lube Oil Blending Plant is without connected with flash vessel, flash steam generated gets exhausted to atmosphere. In order to recover this flash steam and make use of the same for heating viscous additives, we installed flash vessel.

Data

P1 – Condensate Pressure	-	3.5 bar g
P2 – LP Flash steam pressure	-	1.0bar g
Q - Qty. of condensate	-	7000 kg/day
C – Cost of steam	-	Rs. 1000/- per ton
T - Plant operation	-	20 hrs./day

$$\text{Possible flash steam qty.} = F = \frac{(h_1 - h_2)}{L_2} \times Q \text{ kg/day}$$

Where,

H1 – Sensible heat in condensate at P1	-	148 kcal/kg
H2 - Sensible heat in condensate at P2	-	120 kcal/kg
L2 - Latent heat at P2	-	521 kcal/kg

$$= \frac{(148 - 120)}{521} \times 7000 \text{ kg/day}$$

$$= 376 \text{ kg/day}$$

$$\text{Savings in fuel per day} = \frac{376}{14} = 26.85 \text{ Ltrs./Day}$$

$$\text{Annual Savings} = 26.85 \times 250 \text{ days} \times \text{Rs. } 10/\text{Ltr.}$$

$$= \text{Rs. } 67,125/-$$

$$\text{Investment} = \text{Rs. } 1.35 \text{ Lakhs}$$

$$\text{Payback Period} = 2 \text{ years}$$

Capacitors for Motors

In order to reduce the line losses, reduced loading of cables, improved voltage regulation and increased system efficiency, we installed capacitors across the one nos. 40 HP and two nos. 60 HP motors with . The table below shows the current drawn by the motors with and without capacitors. The capacitor is connected with a timer and capacitor gets connected to the motor with a time delay of two seconds after starter reaches delta.

	40 HP Motor	60 HP Motor
No. of Motors	1	2
Capacitor KVAR	10	15
No. of Motors	1	2
Line Current (without capacitor)	55	70
Line Current (With Capacitor)	47	64
Run Time per day	8 Hrs	2 Hrs.
KWHRS without Capacitor per day	312	198
KWHRS with Capacitor per day	266	181
Savings per day (KWHRS)	46	17
Savins per Year (KWHRS)	11500	4250
Savings in Rs.	57500	21250

Total Savings per annum = Rs. 78,750/-

Investment = Rs. 25,000/-

Payback Period = 3 Months.

Reduction in Connected Load by Lower size motors

Reduced the connected load by 30 HP by conducting motor load survey, replacing old inefficient pumps by new pumps with right capacity motors, gravity feed arrangement to filling machines.

Reduction in Units = 22.5 KW X 8 Hrs X 250 Working days
= 45,000 Units.

22.5 KW is the net reduction , which is the difference between replacement motor KW minus avg. input power of existing motor. In case of gravity feed arrangement, it is the avg. input power of existing motor.

Total Annual Savings = 45,000 X Rs. 5/-
= Rs. 2,25,000/-

Investment Made = Rs. 3.25 lacs/-

Pay Back Period = 1.5 years (approx.).

Heat Exchanger

The presently the type of heat exchanger in the 133 KL blender is immersed coil type. The new heat exchanger is installed in line with base oil inlet line to the blender so that the base oil gets heated upto 60 deg.cent.in single pass before gets charged into the blender. Previously, it was taking around 3 hrs to heat the base oil, which now got reduced to 1.5 Hrs. As a result there is reduction of 1.5 hrs. in circulation time as well as reduction in approx, 300 Kgs. Of steam per batch.

Annual Savings due to Circulation time = $15 \text{ KW} \times 1.5 \text{ Hrs} \times 250 \text{ days} \times \text{Rs. } 5/-$
= Rs. 56,250 /-

Annual Savings in fuel due to reduction in steam consumption = $300 / 14 \times \text{Rs.}10/- \times 250 \text{ days}$
= Rs. 53,571

Total Savings per annun = Rs. 56,250 + Rs. 53,571 = Rs. 1,09,821

Investment = Rs. 4 lacs

Payback Period = Approx. 4 years.

Reduction in Lighting Load

This is done by revamping the lighting load by re-arrangement of light fittings, replacement of conventional tube lights by PL Lamps in areas where illumination required is less. The total reduction in lighting load is 10 KW.

Annual Savings = $10 \text{ KW} \times 16 \text{ hrs} \times 250 \text{ days} \times \text{Rs. } 5/-$
= Rs. 2,00,000/-

Investment Made = Rs. 0.75 lacs/-

Payback Period = 0.5 years.

Energy Efficient Compressor

The 15 years old two nos. 105 CFM reciprocating compressors were replaced by one no. 200 CFM Screw compressor to reduce ecurring repair costs and better efficiency. The total CFM requirement of the plant is around 150 CFM.

Line Current drawn by two nos. reciprocating compressors = 66 Amps.
Line current drawn by the screw compressor = 55 Amps

Savings per day for 8 hrs = $(1.73 \times 410 \text{ Volts} \times 11 \text{ Amps} \times 8 \text{ Hrs}) / 1000$

= 62 KWHRS.

Annual Savings = 62 KWHRS X 250 days X Rs.5/-

= **Rs. 77,500/-**

Investment = Rs. 8.5 lacs

Energy Saver for Water Coolers and Air Conditioners

This is a micro-controller technology based intelligent, user friendly electrical Energy Saving System. The power savers protect the equipment from under voltage / over voltage and ensures smooth operation. The system optimize comfort related power saving due to intelligent switching operation of equipment. We installed 25 such units in the plant for window air conditioners and water coolers and deep freezers.

The approx. electrical saving observed by these units is around 8%.

Average Cut- off time in a day (Average 12 Hrs) = 1 Hr.

Total Load = 50 KW

Total savings in a day due to reduced running time = 50 Kwhrs.

Annual Savings = 50 KWHRS X 250 days X Rs. 5/-

= Rs. 62,500/-

Investment = Rs. 0.75 lacs

Pay Back Period = 1.25 years.

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