



Century Rayon, Shahad

i) Unit Profile:

Our story begins in 1897 from Cotton Textile Mill. It belonged to a company called the Century Spinning and Manufacturing Co. Ltd. and it carried in itself the seeds of what would some day become the dynamic, far-ranging Century Group.

The Rayon division at Shahad commenced its operation in 1956 with an initial capacity of 5 tons of viscose filament yarn per day. Today, after successive capacity expansions, Century Rayon is not only the largest VFY producer in the country commanding 26% of the Indian VFY market, the quality of its yarn is acknowledged in many overseas markets as well.



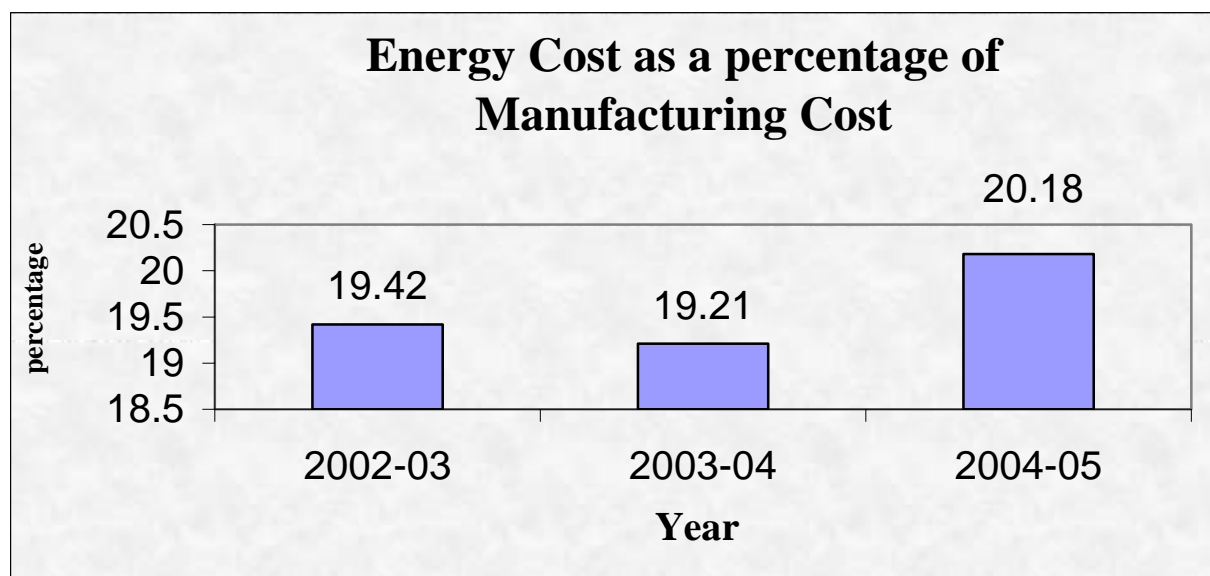
Products	Annual Capacity		Annual Production
	Licensed MT	Installed MT	Actual (2004-05) MT
Pot Spun Rayon Yarn			15082
Continuous Spun Rayon Yarn	23200	25000	1914
Tyre Yarn			6289
Caustic Soda	28426	20000	18285
Chlorine	10500	17000	14684
Hydrochloric Acid	47241	19241	4377
Carbon-di-sulphide	10500	18000	15666
Sulphuric Acid	58000	71000	61481
Hydrogen Gas (Compressed) M ³	4000000	5000000	4418104

ii). Energy Consumption

With the implementation of various energy conservation measures as ongoing practice, there is a steady decline in specific energy consumption.

Energy Cost as percentage of manufacturing cost

Year	Cost, Rs. Lakhs		Percentage
	Manufacturing	Energy	
2002 – 2003	29590.231	5745.45	19.42
2003 - 2004	31368.298	6025.06	19.21
2004 - 2005	33809.16	6820.98	20.18



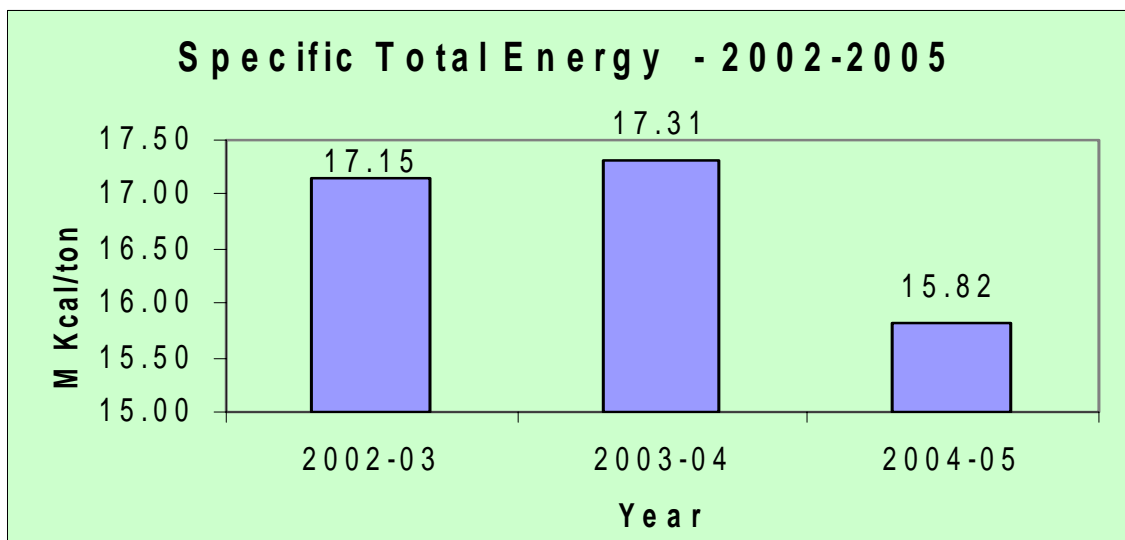
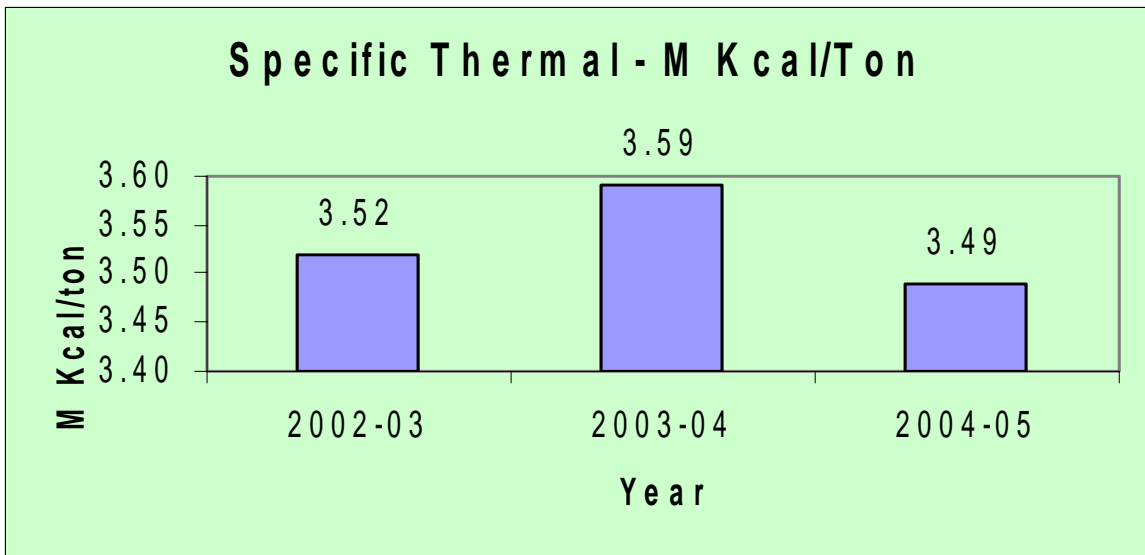
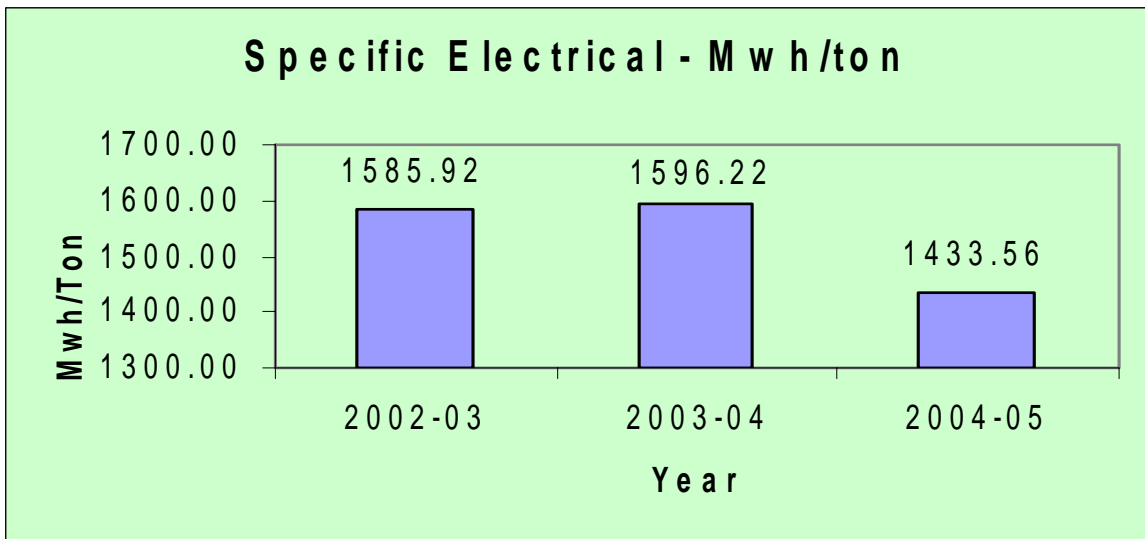
The percentage increase in energy cost is due to increase in total energy cost because of 32.43% rise in coal cost during 2004-05 with reference to 2003-04.

TOTAL ENERGY CONSUMPTION DETAILS							
Year	Electricity (Lakhs)		Coal (Lakhs)		Oil (Lakhs)		Total Cost (Rs./Lakhs)
	Kwh	Rs	Tons	Rs	KL	Rs	
2002-03	295.43	1241.28	0.84	1815.17	22669.14	2452.57	5509.02
2003-04	394.79	1429.13	0.83	1878.42	21800.87	2428.98	5736.53
2004-05	471.38	1602.88	0.88	2637.41	23952.18	2684.04	6924.33

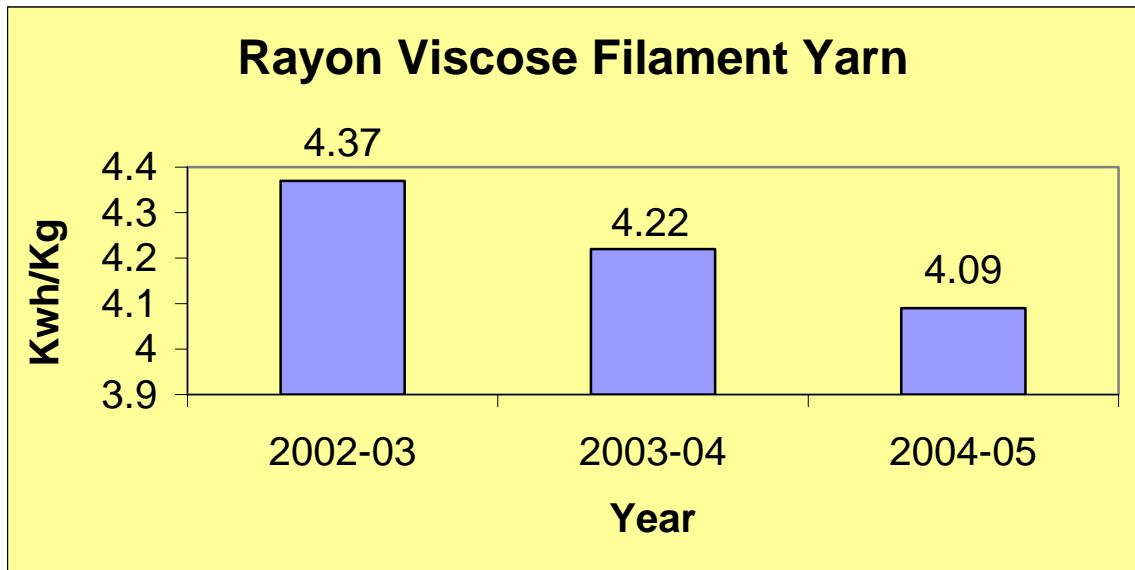
The increase in percentage of total energy cost during the period 2004-2005 with reference to 2003-2004 is due to steep rise in coal cost(32.43%) even though specific thermal consumption has decreased.

SPECIFIC ELECTRICAL + THERMAL ENERGY CONSUMPTION								
Year	Prod	Electrical Cons.	Equivalent Thermal	Thermal Cons.	Total Energy	Specific Electrical	Specific Thermal	Specific Total
	MT	Lakhs Kwh	M. Kcal	M. Kcal	M. Kcal	Mwh / Ton	M Kcal /Ton	M Kcal /Ton
2002-03	105254	1669.25	1435555	370570	1806125	1585.92	3.52	17.15
2003-04	105060	1676.99	1442211	377406	1819617	1596.22	3.59	17.31
2004-05	118717	1701.88	1463617	415352	1878969	1433.56	3.49	15.82

Trend of Specific Energy Consumption per Ton of Total Production
Period: 2002 – 2005



Trend of Specific *Electrical* Energy Consumption per Kg of Rayon Yarn Production
Period: 2002 - 2005



iii) Energy Conservation Commitment, Policy & Set Up

COMMITMENT

Century Rayon is committed to total energy management & prevention of energy wastage. Energy conservation means use of lesser energy for same level of industrial activity. Conservation of energy is the choice option – as the results are immediate and non-expensive. It is vitally important for the company that measures of energy efficiency by its up-gradation and conservation are undertaken on a faster rate than what has been done before to avoid wastage of energy. Energy saved is energy produced. This dictum is effectively applied for realization of the objective of energy management in our organization. Century Rayon accords high priority to energy conservation and the same has reflected in steady decline in terms of specific energy consumption for our main products as mentioned in the forthcoming pages. This decreasing trend is the outcome of our concerted and well-planned efforts at energy conservation and energy efficiency up gradation.

SET UP

Energy Conservation Cell is headed by Vice President (Dev. & Engg). He is supported by a designated Energy Manager under whom Task Force Units are created one each for:

Rayon Plant, Tyrecord & Cont. Spun Yarn Plant, Chemicals, Auxiliaries, Boiler House & Power House

This internally created Energy Conservation Cell is responsible for

- (a). Identification of energy conservation areas on a continuous basis around the year
- (b). Implementation of approved energy conservation schemes
- (c). Time to time auditing from external agencies.
- (d). Monitoring of schemes under progress.
- (e). Interaction with equipment suppliers.
- (f). Getting abreast with technological developments in the field of energy conservation.

The overall set up for Energy Management & Conservation is illustrated in next sheet:

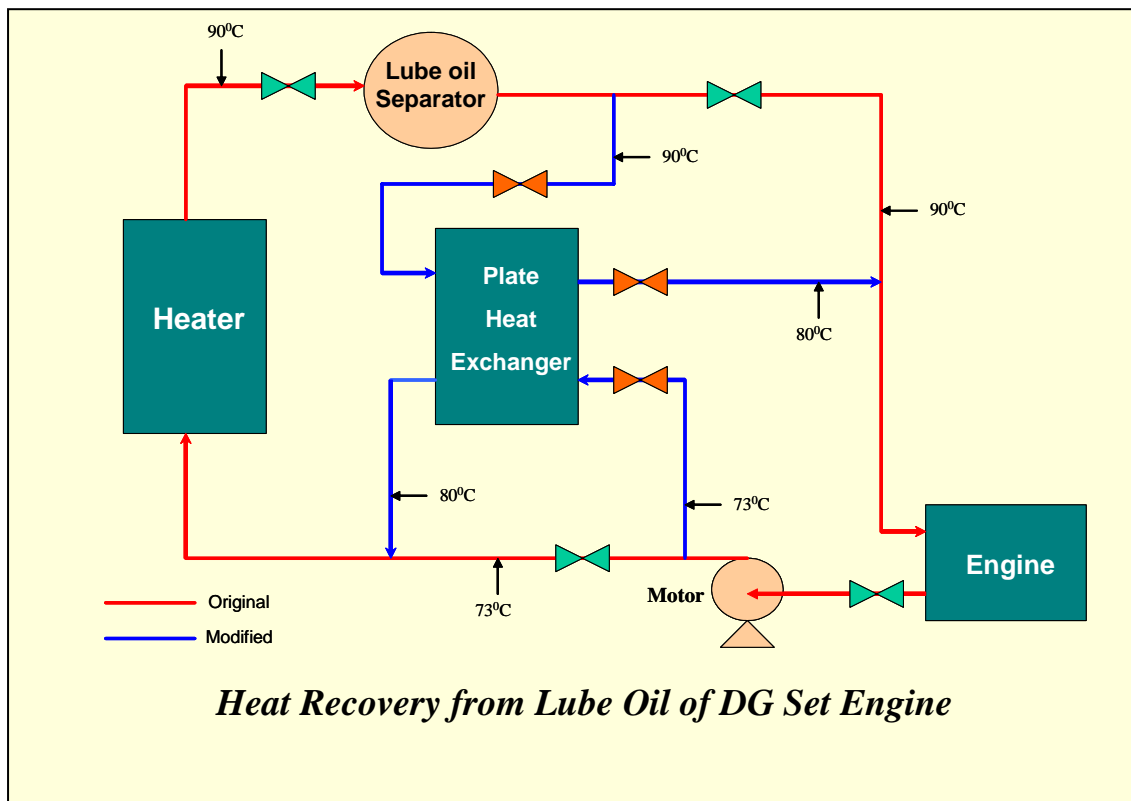
iv) Energy Conservation and Achievement.

Some important energy conservation schemes implemented during year 2003-04 at Century Rayon are:

Heat Recovery from Lube Oil of DG Set Engine:

DG Set is high rpm reciprocating machine which needs continuous lubrication. During the process of lubrication, lubricating oil is getting contaminated by water vapour, sulphur, vanadium etc. To remove this contamination, oil is sent to the lube oil separator and is heated upto 90°C by electric heater before separator. It is proposed to heat this oil by utilizing its own heat by providing a Plate Heat Exchanger in the lube oil circuit to minimize the use of electric heater.

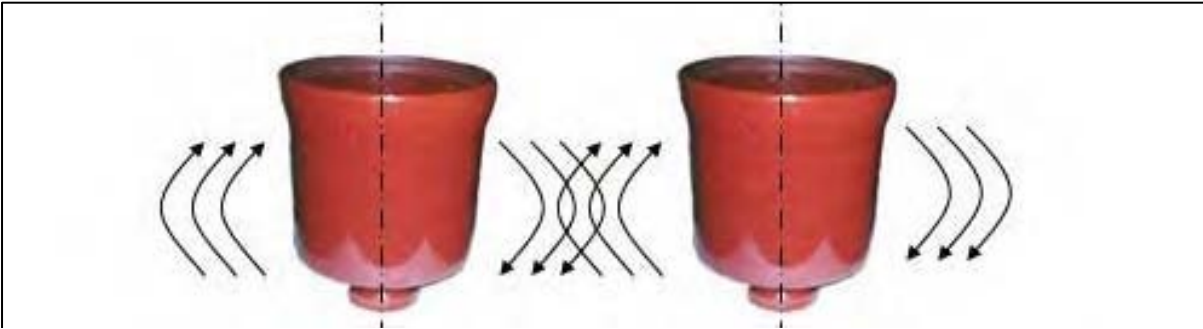
This has resulted in a saving of 96 units per day and monetary saving of 1.06 lakhs per annum.



Electrical Energy saving by providing lead compartment plates between pots of 63 Spinning Machines.

In spinning machines, Spinning pots are rotating at 7800 RPM. This is producing cross current of air between the adjacent pots. This cross current of air increases the electrical load of machines. Lead compartment plates are installed between the each spinning pots to overcome the cross current of air between the pots. This has resulted in net saving of Rs. 14.56 Lakhs (4.41 Lakhs Unit).

SPINNING M/C. POTS WITH OUT LEAD COMPARTMENT



SPINNING M/C. POTS WITH LEAD COMPARTMENT

Charcoal saving by minimizing charcoal consumption to produce CS2:

Earlier the charcoal was roasted in open mouth Calciner as batch process, hence there was a loss of charcoal due to excess burning. To minimize the charcoal loss, **close and continuous type charcoal Calciner** was installed by which excessive charcoal consumption was reduced by 387 tons/year. This has resulted to a net saving of 34.8 lakhs per annum.



Close and continuous type charcoal Calciner



v) Energy Conservation Plans & Target

With quest for excellence, the company is marching ahead to achieve the lower energy consumption in the plant. Some major future plans for this are:

1. Replace spinning (SPG) exhaust Fan No.2, 3 & 12 in Rayon Plant with energy efficient fan, expected saving Rs. 12.17 Lakhs per year
2. Installation of VFD in various plants, expected saving Rs. 49.86 Lakhs per year.
3. Replace identified spinning air washer fans with new efficient fan, expected saving Rs. 15.4 Lakhs per year.



SCHEME: I: *Modification of air washer no 1 of spinning hall in Rayon Plant.*

Preamble

Presently Atira type air washers with cloth are used for maintaining required level of 70% RH in spinning halls. Spray nozzles of these air washers are designed for low pressure and do not provide fine spray, resulting in requirement of higher flow from spray water pumps. Two spray pumps (36 M³/hr, 27 M head) are installed for each air washers, out of which 1 is run in summer and monsoon and both are run in winter. Total annual power consumption for actual usage of spray pumps is 40752 units.

Action

High pressure nozzles with approximately 100% atomization efficiency are fitted in air washer no. 8 of spinning hall no. 5 on trial basis. These nozzles require very low flow at high head, which shall be supplied by using two positive displacement pumps of 600 LPH at 150 M head. If the trial is found successful, the logic shall be extended to other air washers also.

Benefit

This has resulted in net saving of 79 Kwh per day.

Economics

Investment	: Rs. 2.15 Lacs
Savings (79 Kwh/day x 365 days x Rs. 3.29/ Kwh)	: Rs. 0.95 Lacs
Payback Period	: 27 months

Modification of air washer no 1 of spinning hall in Rayon Plant.



Old Air Washer



New Air Washer



SCHEME: II: *Provided VFD for chilled water pump no 1 in Rayon Plant.*

Preamble

Refrigeration load of Rayon plant is maximum 900 TR in summer and 600 TR in winter. Accordingly the chilled water requirement is 690 m³/hr in summer and 525 m³/hr in winter. 4 nos. of chilled water pumps of capacity 463 m³/hr are installed, out of which, 2 pumps are operating at total capacity of 926 m³/hr. Thus pumps are operating at higher capacity and head than required. Since the individual equipment in the chilled water system has got separate automatic temperature control, the excess capacity of pumps is lost as pressure drop across control valves.

Action

Installed VFD on pumps which are now operating at lower speed whenever chilled water requirement is reduced. The VFD control is based on the discharge pressure of pumps.

Benefit

This has resulted in a net saving of 140 Kwh per day.

Economics

Investment	: Rs. 5.00 Lacs
Savings (140 Kwh/day x 365 days x Rs.3.29/Kwh)	: Rs.1.67 Lacs
Payback Period	: 36 months



B K BIRLA GROUP OF COMPANIES

SCHEME III: The Light weight Reinforced Carbon backelite pots for spinning machines.

Preamble

There are 118 spinning machines, each spinning machines has 132 spinning pots. These pots rotate at about 7000 rpm. Material of construction of spinning pot is steel reinforced backelite. The weight of the pot is 2.8 Kg and the power consumption with these spinning pots is 581 Kwh per machines per day.

Action

Lightweight Carbon Fiber Reinforced backelite spinning pot are being used in place of Steel Reinforced backelite spinning pots.

Benefit

The power consumption in spinning machines with lightweight carbon fiber reinforced spinning pot are reduced by 32 Kwh/Day/machine.

Economics

Investment : Rs. 0.00 Lakhs

Saving: (32 Kwh x 26 m/c x 365 days x Rs.3.29/Kwh): Rs. 9.99 Lakhs

Payback Period: : Immediate



SCHEME: IV: *Providing lead compartment plates between pots in 19 spinning machines*

Preamble

In spinning machines, Spinning pots are rotating at 7800 RPM. This is producing cross current of air between the adjacent pots. This cross current of air increases the electrical load of machines.

Action

Lead compartment plates are installed between the each spinning pots to overcome the cross current of air between the pots.

Benefit

Power saving of 20 Kwh / day / machine

Economics

Investment (This is done during overhauling of these m/cs) : Rs. 00.00 Lakhs

Saving (20 Kwh x 350 days x Rs. 3.29 x 19 M/c): : Rs.4.37 Lakhs

Payback Period: : Immediate

SCHEME: V – Heat Recovery from Lube Oil of DG Set Engine:

Preamble

DG Set is high rpm reciprocating machine which needs continuous lubrication. During the process of lubrication, lubricating oil is getting contaminated by water vapour, sulphur, vanadium etc. To remove this contamination, oil is sent to the lube oil separator and is heated upto 90°C by electric heater before separator.

Action

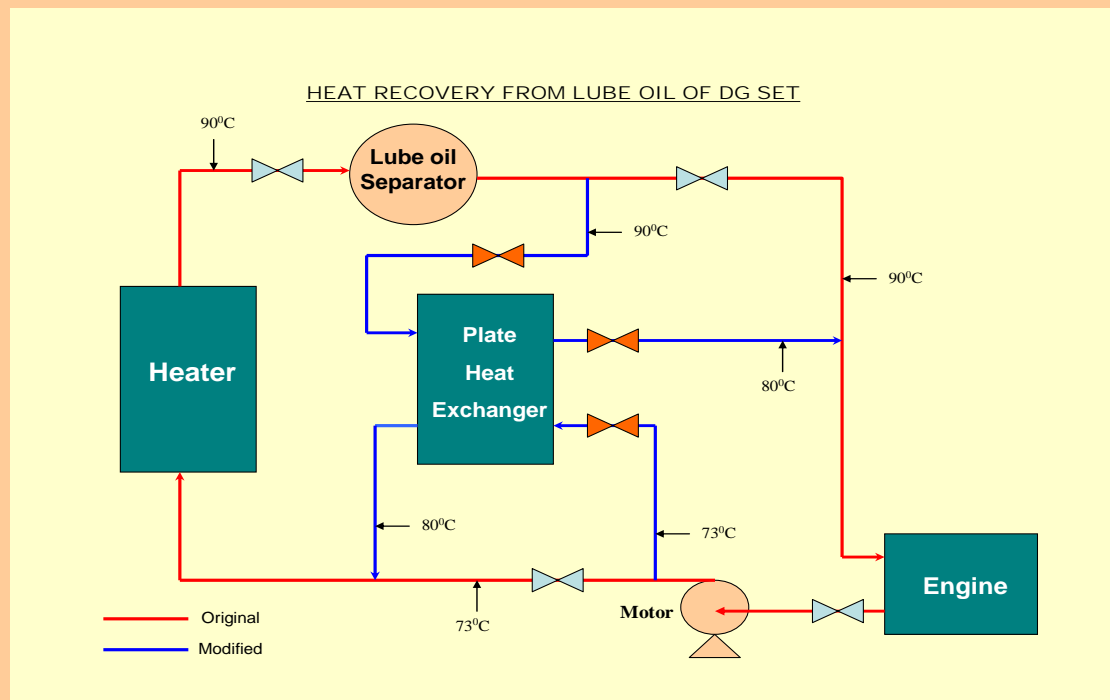
Heating of lube oil is done by engine lube oil itself by providing a Plate Heat Exchanger in the lube oil circuit to minimize the use of electric heater.

Benefit

The power consumption of electric heater is reduced by 96 Kwh per day.

Economics

Investment	: Rs.1.0 lacs
(Includes PHE, pipe line, valves etc)	
Saving (96 Kwh x 330 days x Rs.3.35/Kwh)	: Rs. 1.06 lacs
Payback Period	: 12 Months





SCHEME: VI – *Modification of air washer Spray Pump for optimized performance in Tyre-Cord Plant.*

Preamble

Three spinning air washers in the plant are using water spray to maintain the ambient condition. Pumps are used for spraying the water. These pumps have head of 27 M, which is more than actually required head of 20 M. Therefore discharge valves are kept throttled, which results in loss of power.

Action

Reduced by trimming the pump impeller size, in 3 air washers, in steps to achieve correct head and flow so that discharge valve is kept full open.

Benefit

This has resulted in net saving of 58 units per day.

Economics

Investment for sizing 3 impellers : Rs. 0.15 Lacs

Savings (58 Kwh/day x 365 days x Rs. 3.29/ Kwh) : Rs. 0.70 Lacs

Payback Period : 3 months



B K BIRLA GROUP OF COMPANIES

SCHEME: VII – Variable Frequency Drive for filter water pump 1,2 with auto control in Tyre-Cord Plant

Preamble

In T.C Plant we have two filters water Pumps in Spin Bath area. One pump is continuously running with DOL starter & other pump is kept as stand by.

Action

We have installed VFD in both the pumps with a closed loop pressure feed back system with a set point at 3.0 Kg/cm². This has resulted in reduced loading on the motor with respect to pressure.

Benefit

The power consumption of the motor is reduced by 78 units per day.

Economics

Investment : Rs. 2.70 Lakhs

Saving: (78 Kwh x 365 days x Rs.3.29/Kwh) : Rs. 0.94 Lakhs

Payback Period: : 34 months



B. K. BIRLA GROUP OF COMPANIES

SCHEME: XIII: *To minimize the running hours of continuous Alum circulation Pump in W.T Plant.*

Preamble

In water treatment plant, alum solution is continuously dosed for coagulation of suspended impurities in the raw water, which helps for purification of water.

Earlier, Alum solution batch was prepared by diluting alum with water and circulating the solution round the clock, with the help of pump for intimate mixing.

Action

During 3 months long experiment, it was found that round the clock running of the pump was not necessary. A few hours running of pump during initial period of batch preparation was more than sufficient. Hence it was resolved that the pump would be running only for 2 to 3 hours during batch preparation and shall be kept switched off for rest of the time.

Benefit

This has resulted to a net electrical saving of 23 Kwh per day.

Economics

Investment : Rs. Nil

Saving (23 Kwh x 365 days x Rs.3.29/Kwh): Rs. 0.27 Lakhs

Payback Period: : Immediate



B K BIRLA GROUP OF COMPANIES

SCHEME: XIV: *Reduction of charcoal consumption for CS₂ manufacturing.*

Preamble

Earlier the charcoal was roasted in open mouth Calciner as batch process, hence there was a loss of charcoal due to excess burning.

Action

To minimize the charcoal loss, **close and continuous type charcoal Calciner** was installed by which excessive charcoal consumption was reduced by 387 tons/year.

Benefit

This has resulted to a net saving of 25 kg of charcoal per ton of CS₂ production.

Economics

Investment : Rs. 29.5 Lakhs

Saving : Rs. 34.8 Lakhs
(25 kg/ton x 42.5 tons /day x 365 days x Rs.9000)

Payback Period: : 10 Months



SCHEME: XV: Replacement of Old Motor with Energy Efficient motor in Chemical Plant

Preamble

We have a liquid chlorine Plant, where chlorine gas on high pressure is converted to liquid chlorine at -10°C . The chlorine compressor was fitted with a 120 HP old re-winded motor which was drawing 125 Amps continuously.

Action

120 HP re-winded motor was replaced with 150 HP energy efficient motor which now draws 100 Amps.

Benefit

This has resulted in saving of 356 Kwh per day.

Economics

Investment : Rs3.00 Lakhs

Saving (356 Kwh x 365days x Rs. 3.29/Kwh): : Rs. 4.27 Lakhs

Payback Period: : 9 Months.



SCHEME: XVI: Optimization of HCL Tail Gas Fan.

Preamble

We have 2 nos of Karbate furnaces, where chlorine gas and Hydrogen gas are burnt and HCL gas is produced. This gas is absorbed in the water and HCL liquid is produced. The whole is under vacuum. To create vacuum we have installed a 10 HP, 2900 r.p.m motor.

Action

We have modified the tail gas fan with a 5 HP, 1440 r.p.m motor.

Benefit

This has resulted in saving of 27.5 Kwh per day

Economics

Investment : Rs. 0.80 Lakhs

Saving (27.5 Kwh x 365days x Rs. 3.29/Kwh): : Rs. 0.33 Lakhs

Payback Period: : 1 month



B K BIRLA GROUP OF COMPANIES

SCHEME: XVII: *Trimming of Impeller of barium carbonate Pump.*

Preamble

We have Barium carbonate solution for the purification of brine and remove the sulphur present in the raw salt. We had a higher capacity pump for dosing of Barium carbonate solution.

Action

We have trimmed the impeller of the pump to a required size.

Benefit

This has resulted in saving of 7 Kwh per day.

Economics

Investment : Nil

Saving (7 Kwh/day x 365 days x Rs. 3.29/Kwh): Rs.0.08 Lakhs

Payback Period: Immediate

SCHEME: XVIII: *Recovery of steam condensate from various sources in Chemical Plant.*

Preamble

We have Brine caustic heaters installed heat the brine caustic at different location to obtain the required temperature as per the process need with the steam. The condensate from these heaters was going to drain. There are 10 L.P steam traps which were going to drain.

Action

Condensate from the tanks was taken with the system.

Benefit

This has resulted in net steam saving of 42 ton/Year.

Economics

Investment : Rs1.00 Lakhs

Saving (3.22 tons of oil x Rs. 16411 per ton) : Rs. 0.53 Lakhs

Payback Period:

: 24 Months.





Collection of Steam Condensate

SCHEME: XIX: *Installation of VFD on Chlorine Blower in Chemical Plant.*

Preamble

Chlorine at a pressure of 2000 mm wc from Udhenora Plant, which was commissioned in March 2004, is mixed in a pipe line where chlorine is flowing at -50 mm wc. This was creating heavy imbalances, whenever either of the rectifier trips. This imbalances in chlorine pressure resulted into tripping of another rectifier. There were 30 nos of such stoppages in last six months causing production loss of 75 tons of caustic soda.

Action

This problem was solved by installing a VFD on chlorine blower in chlorine Plant.

Benefit

This has not only avoided unnecessary tripping of complete plant but also resulted in saving of 96 Kwh per day and smooth working of the Plant.

Economics

Investment : Rs. 6.50 Lakhs

Saving (96 Kwh x365 days x Rs. 3.29) : Rs. 1.16Lakhs

Payback Period: : 67 Months

Installation of VFD on Chlorine Blower in Chemical Plant.



V.F.D for Chlorine Blowers



Chlorine Blowers