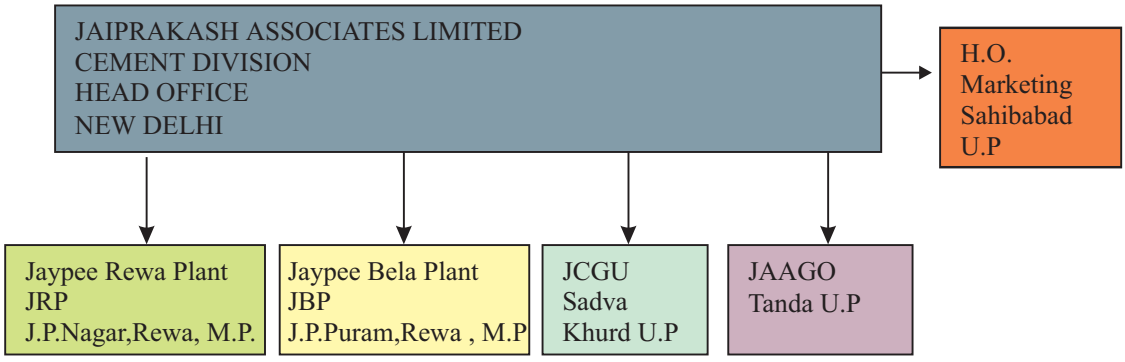
First Prize *Cement*

JAYPEE REWA PLANT- JAI PRAKASH ASSOCIATES LIMITED
Rewa (Madhya Pradesh)

Unit Profile

Jaiprakash Associates Ltd. (JAL) is the flagship company of the Jaypee Group; one of the largest business conglomerates of North India with annual revenue of over Rs. 3000 crores. JAL has two divisions :(1) Construction (2) Cement. JAL Cement division (Jaypee Cement) today is the market leader in central zone of India; and on all India basis, it is one of the largest player having around 5% share of the total cement market of the country. JAL -Cement division has 4 plants in operation. It has been certified for the internationally acclaimed ISO 9001 : 2000 certificate, which further shows its commitment towards achieving total customer satisfaction and overall excellence. Organizational overview of JAL-Cement division is as under.



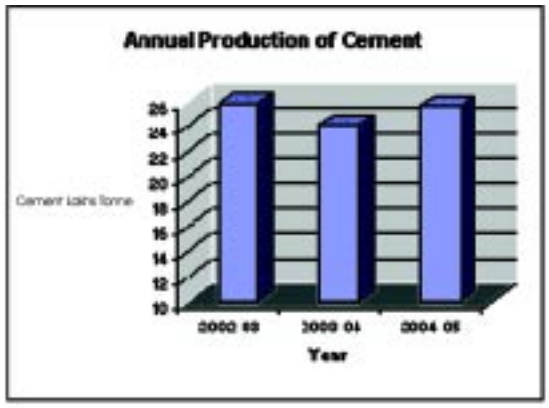
JRP is located at 14 km. from Rewa city of Madhya Pradesh at J.P. Nagar. The first line of production having capacity of 1 million tonne per anum (MTA) was commissioned in 1986 .The 1st line of production i.e U-I has been upgraded for better energy efficiency and enhanced production of 1.5 MTA clinker, and was started in 2004 after upgradation.The second line of production having a capacity of 1.5 MTA was commissioned in the year 1991.It was then the largest cement manufacturing facility in the country. In house improvements and further modernisation have raised the capacity to 5200 TPD and after the upgradation jobs planned in Nov'.05, with thus the capacity at JRP will be 3.5 MTA. J.P.Rewa Plant has set up own captive power plant (CPP) to support cement production process. The 1st CPP-25 MW thermal power plant was commissioned at JRP in Nov.2003 Another 38.5 MW thermal power plant is under proposal. Due to the thermal power plant energy cost per tonne of cement has reduced considerably.

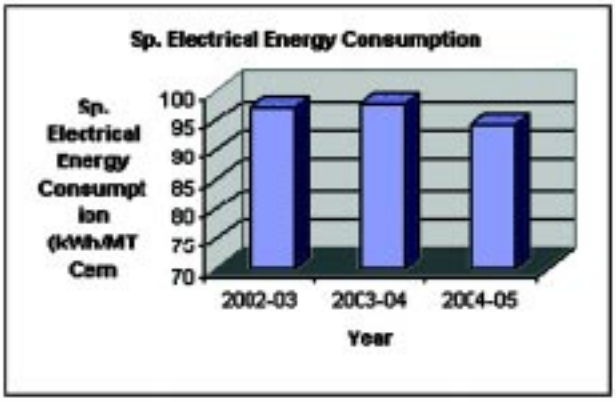
JRP has total mining lease of 470.94 sq. km. with the two captive limestone mines in the name and style of Naubasta Limestone mine and Bankuiyan Limestone mine situated at a distance of 4 to 5 km. apart from each other.

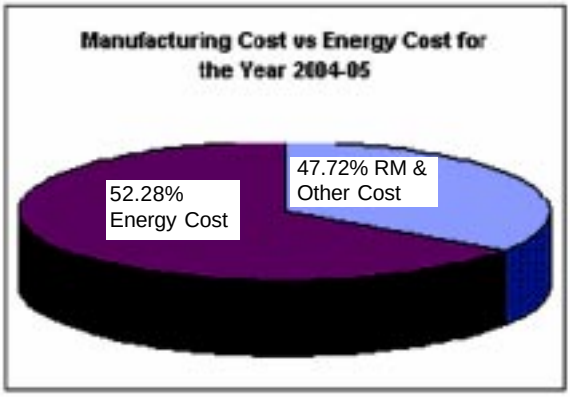
Cement manufacturing process is dry process and fully automated. The Plants are most modern using state-of-art technology in the country. With software enabled system like QSO,CADE,state of the art computer based analyzers, computerized process control system and CAMM. The product ranges are OPC-43,53,IRS-T40,Biniyad Buland cement. The company has set up a philanthropic trust "JAIPRAKASH SEWA SANSTHAN(JSS)" for social upliftment of poorest of the poor through the comprehensive Rural Development Plan (CRDP).

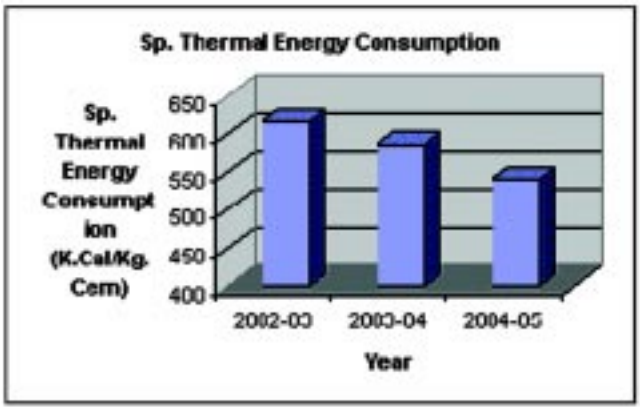
Energy Consumption

Specific Power Consumption Details	Units	2002-03	2003-04	2004-05
Annual production	LTPA	25.79	24.13	25.62
Total energy consumption per annum	Lakh KWH	2520.88	2365.67	2757.37
Total thermal energy consumption	Million K cal	1779775	1625919	1803265
Total manufacturing cost in Rs. Lakh	Rs. Lakh	32732.42	30049.06	34205.59
Total energy cost in Rs. Lakh	Rs. Lakh	18077.68	16514.52	17883.72
Energy cost as % of manufacturing cost	%	55.23	54.96	52.28
Specific Power Consumption	KWH/MT Cem	97.3	97.9	94.3









Enegy Conservation Cell Activites:

(A) Electrical energy for each unit and also each section/equipment is calculated on daily basis. This report also gives MTD power consumption for each section.

(B) We also generate monthly report highlighting the average consumption , deviation from the target , areas of potential saving.

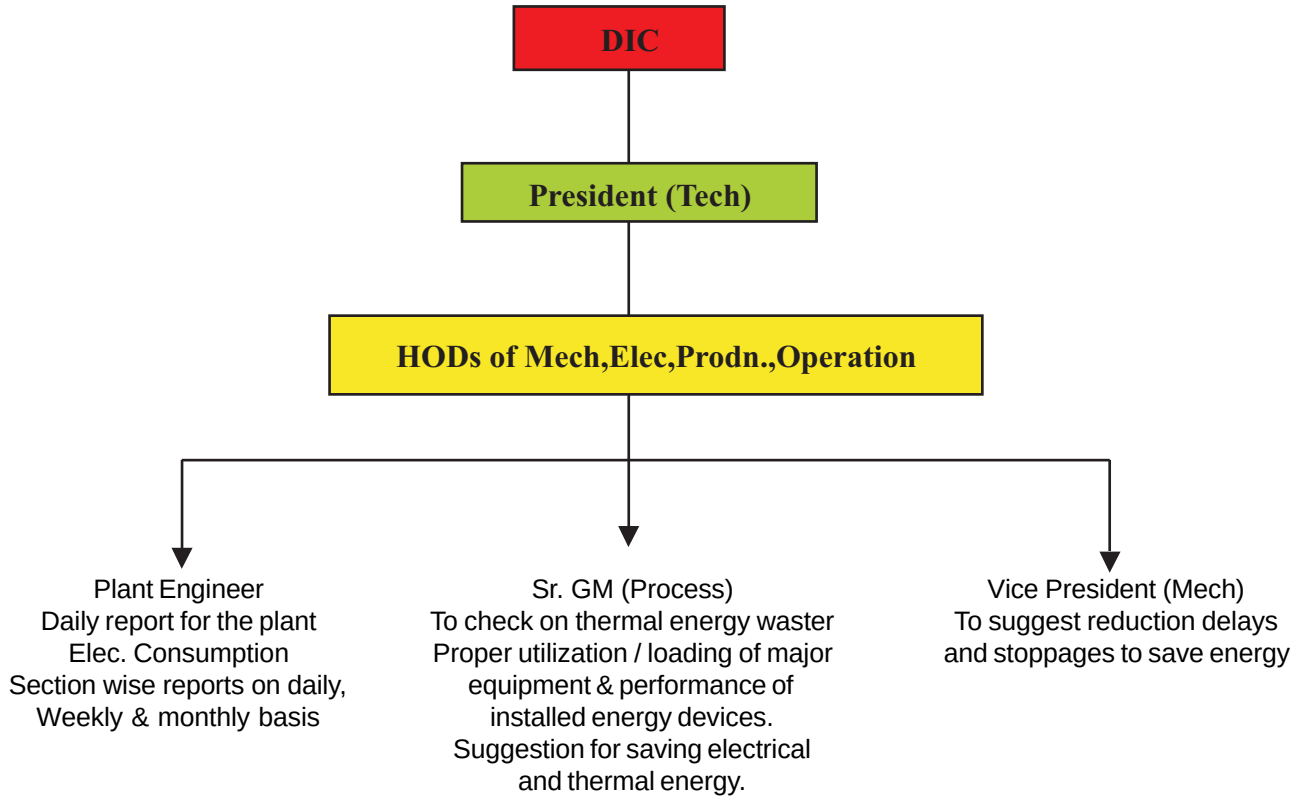
(C) Monthly electrical report is also generated and compared with previous and best month . This indicate the areas where increase has taken place so as to monitor the particular section minutely

(D) Weekly maintenance meeting is held to identify reasons for plant stoppages and means of eliminate them to improve plant availability. This helps in reduction of non-productive machine hours.

Energy Conservation Cell

A separate energy conservation cell is headed by the president(Tech) and has all HODs as member

This cell meets every month to consider plant performance and energy consumption for the previous months. The stratergy and decisions and accordingly taken to check on energy waste and increase production.



Energy Conservation Achievements

(A) Electrical energy consumption

1 Installation of 6 stage SLC preheater replacing existing four stage ILC preheater (Unit I).
New separate line calciner (SLC) with 6 stage of heat transfer replacing old inline calciner (ILC) with 4 stages.Additional 2 stages transfer additional heat to the kiln feed and reduces the preheater exhaust temp. to 290 -300 deg.C from 400- 420 deg.C in the old preheater. In the new SLC calciner better coal combustion takes place using hot tertiary air coming from kiln hood at approx. 850- 900 deg.C and having 20.9 % V/V oxygen content where as in the old ILC calciner coal combustion occured in a mixed environment of oxygen depeleted gases from kiln and tertiary air from the kiln hood. the reduced convective heat loss due to above reasons less fuel is required and hence less combustion air is needed. The consequent reduction in preheater gas volume (Nm3/ kg clk and less temp) reduces the fan power consumption. Project cost was about 4117.83 lakhs.

2 High efficency fans installed in grate cooler with V/F speed control (Unit I)
There is power saving due to higher efficency of fans and speed control instead of damper control.

3 Pneumatic kiln feed dozing system changed to a mechanical conveying system, belt bucket elevator and new coal dozing system

Besides saving in electrical energy consumption by changing over to mechanical transport from pneumatic transport. It also reduces the PH fan power due to reduction of gas flow handled by the preheater fan by an amount equivalent to the transport air.

From loss in weight coal dozing system (TVR) to twin-screw impact flow meter system. The old TVR system controlled coal dozing rates by computation of rate of loss in weight between 2 limiting bin levels. During filling there were disturbances in coal flow leading to CO generation requiring increased air flow for CO dilution thus increasing the PH fan power. The twin-screw impact flow meter arrangement gives smooth coal flow.

4 Dynamic seperator installed replacing static separator in raw mill section (U I)

Better particle size distribution (18- 19 % to 15 % on 90 micron) which will improve burnability in kiln Reduction in specific power consumption due to increase in mill output as no over grinding occurs.

(B) Thermal energy consumption

1 Installation of modern Duoflex burner
Modern Duoflex burner requiring 7-8 % primary air as againest 15- 16 % required in old burner. Air jet along with swirl action is issuing out of the burner tip section at near sonic velocity sucks in combustion air with reduced cold primary air for better combustion. Thermal energy is saved due to less cold primary air intake.

2 Installation of 6 stage SLC preheater replacing existing four stage ILC preheater (Unit I)
New separate line calciner (SLC) with 6 stage of heat transfer replacing old inline calciner (ILC) with 4 stages. Additional 2 stages transfer additional heat to the kiln feed and reduces the preheater exhaust temp. to 290 -300 deg.C from 400- 420 deg.C in the old preheater. In the new SLC calciner better coal combustion takes place using hot tertiary air coming from kiln hood at approx. 850- 900 deg.C and having

20.9 % V/V oxygen content where as in the old ILC calciner coal combustion occured in a mixed environment of oxygen depeleted gases from kiln and tertiary air from the kiln hood. The reduced convective heat loss due to above reasons less fuel is required and hence less combustion air is needed. The consequent reduction in preheater gas volume (Nm3/kg clinker and less temp) reduces the fan power consumption and Convective heat loss is reduced. Project cost was about 4117.83 lakhs

3 Installation of IKN KIDs and CFG grate plates in first grate

New generation cooler plates initial static inlet (IKN) allow better heat recuperartion efficiency and require less specific cooling air quality (2.1 nm3/kg of Clk) from 2.16 Nm3/kg.Clk) and 20 Kcal /Kg of clinker saving. CFG plates in first grate (I.e. heat recuperation area) facilitate more uniform air distribution compared to old conventinal grate plate thus improving heat recuperation and more availability due to less moving parts. Project cost was 342 lakhs.

4 Insulation improved

Type and thickness of insulation has been improved using calcium silicate blocks of 100 and 150 THK replacing thinner calcium silicate blocks and castable insulation in kiln hood cooler, preheater and TA duct areas which have reduced the shell temperature and radiation losses

Energy Conservation Plans and Targets

1 Modification of existing top stage cyclones to high efficiency low pressure drop cyclones(U-II)., Target year 2005-2006

2 Installation of kiln and calciner string fans(U-II) Target year 2005-2006

3 Replacement of kiln drive(U-II) Target year 2005-2006
Expected total saving = 5-7 kCal/Kg clinker

Environment and Safety

Environment The Jaypee group in general and the cement plant in particular is very concerned for clean and green environment , and its total sustainable development. The group is committed to eco-friendly processing of cement manufacturing from mining to placement of product at users end. The entire manufacturing process is carried out by latest technology with controlled emission meeting the stringent national norms through application of the latest and advanced air pollution control equipments

Safety: Jaypee Rewa plant has a separate safety department maintains stringent safety standards and ensures that safety measures are being followed strictly. All the provisions enumerated in the factory act and factory rules also complied with. Unit has a central control room which functions round the clock with junior management level officers as in charge who will intimate top management, co- ordinate and organize necessary help required from outside agencies as well as in- house in case of emergency.

Second Prize *Cement*

MADRAS CEMENTS LIMITED
Alathiyur (Tamil Nadu)

Unit Profile

The manufacturing unit at Alathiyur near Trichy were set up in two phases. The Line I has the designed capacity of 2200 TPD commissioned in the year 1997. This was upgraded to 2950 TPD in the year 1999 and again upgraded to 3300 TPD in the year 2004. The Line II was designed for capacity of 3000 TPD, which comprises the South Asia's first SF Cross Bar cooler and largest Vertical Roller Mill for clinker grinding and commissioned in the year 2001 and upgraded to 3300 TPD in the year 2004.

This is one of the very few energy efficient plants in the world and it is very friendly to ecology and environment.

Plant has the State-of-the-Art Technology and equipment at every stage of production. Surface miners for mining, Energy efficient MMD crusher for limestone, Vertical roller mills for Raw materials and Clinker grinding.

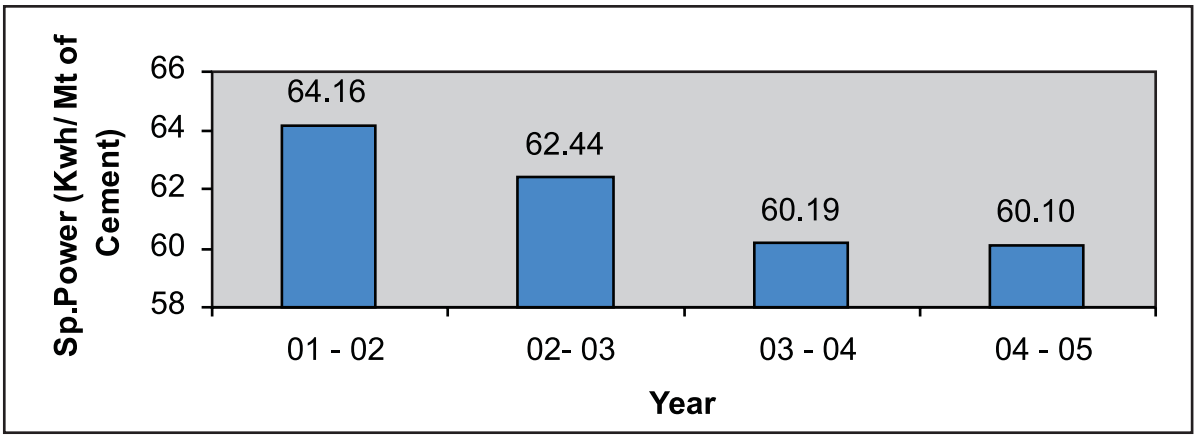
Madras Cements always believes in sustainable approaches for specific power and energy cost reduction. Already energy independent with largest wind mills with a capacity of 33 MW at 2 locations in Tamilnadu.Company has spent around Rs.96 Crores for installation of 2 X 18 MW Coal based Power plant to reduce the power cost.

Operating efficiency of the equipment in each section in the plant range from 100 to 115 % of installed capacity.
The plant is ISO 9001 ,ISO 14001 & OSHAS 18001 systems certified.

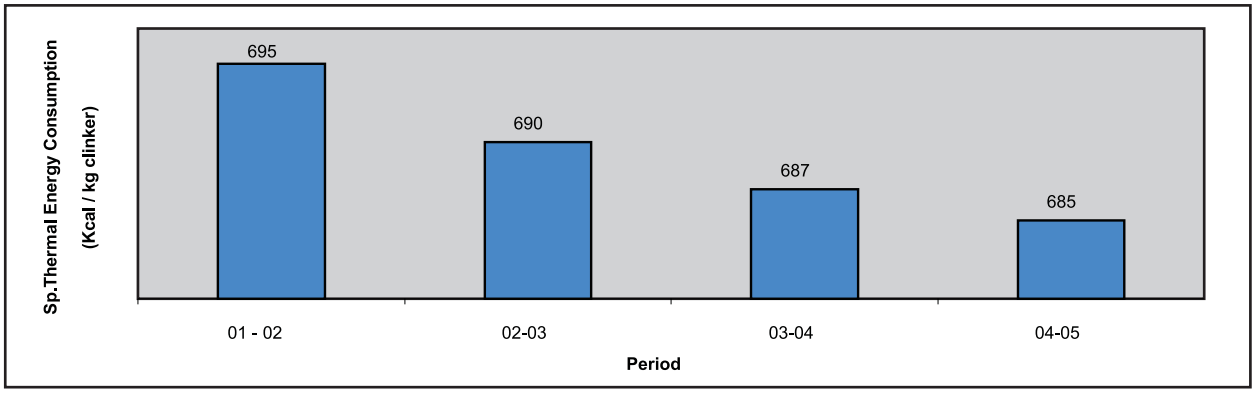
Energy Consumption

	2002-2003	2003-2004	2004-2005
Cement production (MT)	1702646	1761576	1814791
Specific Power consumption			
(Kwh/ Mt of Cement)	62.44	60.19	60.1
Specific Thermal Energy consumption (Kcal/Kg Clinker)	690	687	685
Energy Cost as % of manufacturing cost	34.51	30.43	29.29

Reduction in Sp. Power Consumption from 2001 - 2005



Reduction in Sp. Heat Consumption from the Year 2001- 2005



Energy Conservation Commitment Policy and Set up

Top most priority has been given for implementing energy conservation ideas and proposals to conserve energy not only for the benefit of the organization, but also to conserve natural resources for the betterment of future generations. This goal is achieved by the energy conservation team headed by energy manager with the support of top management and managers to identify, monitor, control, implement the proposals.

Levels of Management	Responsibility
Sr.General Manager - Works Sr.General Manager - Admn.	Long term plans Targets setting Objects & Support, Review of Results, Cost control, Budget and Reward / Appreciate the achievements.
Sr.Managers - Maintenance Managers - Maintenance Dy.Managers - Maintenance	Plan, Do, Check, Act, Brain Storming, Quality circles, Energy management report, Payback analysis
Sr.Engineers - Maintenance Engineers - Maintenance Supervisors- Maintenance Workman - Maintenance	Implementation of Energy Products, Reporting, Brain storming, Quality circles, Suggestion schemes.
Sr.Engineers - Production Officers - Production Workman - Production	Execution, Production Optimal production, Maintaining optimal Paramete

Major Projects Implemented

1. **Optimisation of Raw Mill**
   It is a Vertical Roller Mill with high efficiency separator supplied by M/s.Loesche, Germany.

Modifications

1. Classifier blades where changed to Curved from Flat surface
2. Gap between static blades were adjusted.

Result :

Increase in Mill Output by 5 TPH and Power reduced by 0.75 Kwh/ Mt of Raw Meal

Power Savings = 0.75 KWh/T of Material

Total Savings = 0.75 X 24 hours X 240 MT X 300 Days X Rs.3.5
= Rs.4.54 Million / Annum

2. Rerouting of Raw Mill Inlet Duct

Modifications
Mill inlet duct was directed towards the Mill.

Result : Increase in Mill Inlet temperature from 295degC to 304 degC.

Thermal Savings = 0.176 MTs of Coal / Hour
Total Savings = 0.176 Mt X 24 hours X 185 Days X Rs.3700
= Rs.2.89 Million / Annum

3. Modification of Inlet box of I.D.Fan

Induced draft Fan inlet duct was modified to reduce the power.

Result : Power reduced by 25 K.W per hour

Power Savings = 25 KW/Hour
Total Savings = 25 X 24 hours X 300 Days X Rs.3.5
= Rs.0.63 Million / Annum

Energy Conservation Plans and Targets

The company always believes in continuous up date of technology to improve the productivity and hence reduction in power and fuel consumption. The target being

Electrical Energy : 55 Kwh / T of Cement
Thermal Energy : 660 Kcal / Kg of Clinker

Energy Conservation Measures taken up

1. Preheater cyclone modifications (in Line- I) to enhance higher productivity.

2. Classifier modification in Raw Mill - I & II to improve productivity by 5 TPH and hence power savings by 0.75 Kwh / Mt of Raw Meal

3. Modification of inlet box of I.D.Fan- II and reduced power by 0.11 KWh/Mt of Clinker.

4. Modification of grit cone and Nozzle ring at Coal Mill - I and reduced power by 8 KWh/Mt of Coal.

5. Coal Conveying line Optimization for secondary firing at Kiln - II and reduced power by 0.08 KWh/Mt of Clinker.

6. External Auditors like Godrej & Boyce were engaged to analyse the Energy Management at Compressors and Blowers for further possible savings.

7. 2 X 18 M.W Coal based Power plant was installed to reduce the power cost and to save Rs.1.5 / Kwh.

To achieve the Desired targets

The following energy conservation projects under progress to achieve the desired targets and for sustenance

1. Line-1 preheater fan modification with high efficiency impeller to save power by 1.09 KWH/ MT of Clinker.
2. Bag house fan impeller modification to save power by 0.29 KWH/ MT of Clinker.
3. Cooler vent fan modification to save power by 0.11 KWH/ MT of Clinker.
4. Classifier modification in Coal Mill - I to improve productivity and to save power by 10.0 KWH/ MT of Coal.
5. SPRS for cement mill fan Line - II to save power by 0.70 KWH/ MT of Cement.

Resource Utilization

The plant has taken various initiatives for Resources Conservation ,minimizations and Effective utilizations at various levels.
Some of salient features are :

1. Implemented the powerful ERP(Entrepreneurs Resource Planning) system,which helps us in planning at each levels.

2. Pet coke a refinery waste enables us to use our low grade limestone (SiO2 - 16 to 20 %) about 1.5 Lac tones / Annum,which indeed extends the life of our mines.

3. Power plant waste Fly ash is being used for blended cements.

4. Waste oil generated from our heavy equipments at Mines is being reused in our conveying equipments (Drag Chains) at our LSS (Limestone storage shed,Coal storage shed and Additive storage shed)

5. The colony generated Sewage is treated in the STP(Sewage treatment plant) and recycled to our colony for gardening purposes.

6. Bio waste fuels such as cashew shell,Ground nut shell is being used as alternative fuels.

Safety and Environment

Clean environment is one of the major objectives of the organization. The plant is an ISO - 14001 Company and is in the process of getting certified for OSHAS 18001. The emission levels speaks of the eco &

enviro-friendly environment in the plant, the following measures were taken to prevent and control pollution. The dust let - off in the stacks are well below the prescribed limits. The results of test conducted by the TNPCB on August 28, 2004 is given below:

Stack	TNPCB Norms (Mg/N Cu.m)	Actual results (Mg/N Cu.m)	Equipment (24.8.2004)
Kiln	100	39	Baghouse
Coal mill	100	43	Bag filter
Cooler	100	48	ESP
DG Set	100	46	DG
Packing House - I	100	40	Bag filter
Packing House - II	100	41	Bag filter

Madras Cements has the following arrangements for achieving zero accident in plant.

a. Employees should wear safety shoes and helmets in the plant.

b. The plant has safety & fire protection equipments.

c. Safety audits are conducted by (Internal) safety committee members.

d. An external auditor inspects the plant for safety measures implemented in the plant and report for improvements.

e. A hospital is arranged in colony to meet any emergencies.

f. Safety interlocks provided for each equipment in the computerized plant operating system. Which ensures accident free operation in the plant.

SHREE CEMENT LIMITED
Unit - II, Beawar (Rajasthan)

Unit Profile

Shree Cement Limited (SCL) is located at Beawar, 185 Kms. from Jaipur off the Delhi-Ahmedabad highway. SCL is an energy conscious and environment friendly sustainable business origination. The company is managed by qualified professionals with broad vision.

Starting its Second plant (KHD, Humboldt wedage(3700 TPD) with installed capacity of 1.24 million tones per annum was commissioned in 1997, in record time of 18 months. By cost optimization and unmatched efficiency levels through technical innovation and bold decisions, it has become the most energy efficient Plant.

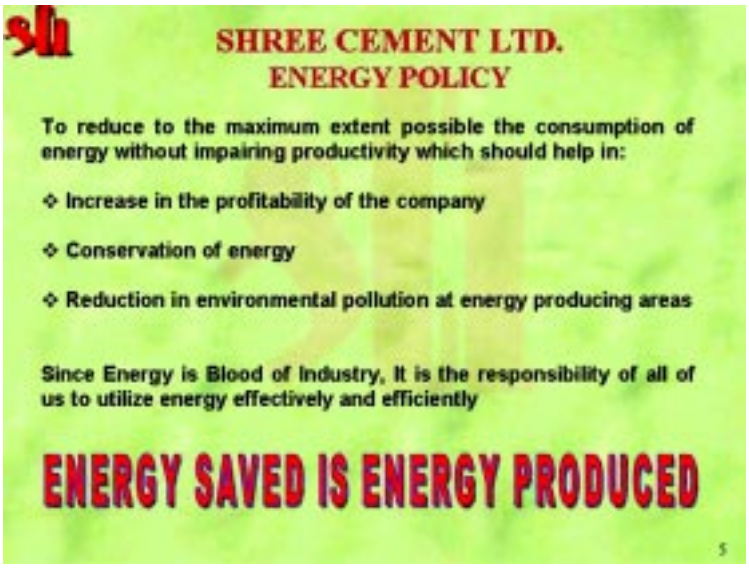
SCL's Unit-II has a track record of over 100% capacity utilization in the eighth year of its existence. In 2004-2005 it registered its highest ever production of 18.99 Lakh tones with 107 % capacity utilization against industry average of 82 %.

Energy Consumption

Shree R&D centre efforts and manpower training have helped in achieving new heights in reducing energy consumption and use of alternate fuel which is considered to be a difficult task for cement industry. These efforts have resulted in reduced power consumption. Efforts have been recognized by various National & International agencies.

Particulars	2002-03	2003-04	2004-05
Energy Cost as % of manufacturing cost: (Combined for Unit- I&II)	33.06	24.68	30.32
Power consumption per tonne of Cement	74.99	73.07	69.17
Heat consumption Kcal per kg of clinker	667.27	729.39	715.10

Energy Conservation, Commitment, Policy and Organization Set up



A clear-cut energy policy has also been formulated by the company in order to give more inputs on energy conservation. The statement of the policy is written on hard boards and displayed at various locations of the company Shree firmly believes that its employees are its most important, vital & valuable asset. The potential of Human Capital is optimally utilized by providing cohesive & creative work environment. Due attention is paid for development of this resource & sharpening of the skill through continuous Training & Development for developing competencies as well as providing avenues for self & organizational development. Shree provides ample opportunity of growth both vertically & horizontally to self-drivers & gives freedom for taking initiatives for modification in plant, machinery, equipments & work procedures.

Energy Conservation Achievements

The increasing consciousness for energy conservation and steps taken towards effective monitoring, better operational control and process optimization in addition to various modifications/retrofitting of energy efficient equipments have contributed greatly in energy conservation. The abstract of various project executed during the reference year are given below:

Project-1

Installation of triplet cyclone

To improve the efficiency of Kiln-II, 3rd parallel cyclone was installed in the top stage of both strings. Before installing triplet cyclone, the pressure across top stages of both string were 130 and 135 mm WG (Kiln string & Pyro string respectively).

BENEFITS:

	Kiln string	Pyro string
⇨ Pressure drop saving (mm WG)	35	35
⇨ Flow at fan inlet (m3/sec)	66.44	100.28
⇨ Power saving (KWh)	32	45

Total power saving = 77*24*310= 5.74 Lakh KWh

Cost of Modification : Rs. 57.50 Lakh

Project-2

Optimization of blended cement production

Fly ash unloading system

There were no of obstructions in unloading system of fly ash and it was very difficult to unload the required quantity of fly ash. To optimize the blended cement production plant modified its fly ash unloading system as given below.

Observation

1. RCC hopper restricts free flow of fly ash as fly ash stick with hopper walls.
2. Rotary air locks most of the time runs idle due to bridging of material.
3. Average feeding rate was 35 to 40 tph

Modification

1. RCC hopper has been modified by fixing 6m.m. thick m.s. plate inside complete hopper to avoid restriction in flow of fly ash
2. Air aeration system has been installed to fluidize the complete flyash in hopper so bridging of material can be restricted.
3. Air slide conveyor installed with higher capacity of 150-210 TPH and fitted with pneumatic shutoff & dossing gate

Benefits

1. Extraction increased with smooth & consistent flow of material
2. Easy to control flow of material by elevator load
3. Unloading capacity has been increased from 800 to1200 tpd

Cost incurred: 0.30 Lakhs

Project -3

Optimization of Start/stop timings

To avoid idle running of plant's equipment we optimized the start/stop timings of various drives in the following manner:-

Step-1: Find out running kw of each drives
Step-2: Recording time interval between starting / stopping of consecutive drives
Step-3: Calculation of kwh
Step-4: Reduction of time interval in PLC programming among starting /stopping of various drives

BENEFITS:

Group-A	Before modification		After modification	
	Total time (Second)	Idle running (kwh)	Total time (Second)	Idle running (kwh)
Starting	**269**	**109.04**	**178**	**71.09**
Net saving= 37.95 kwh for each starting				

Group-B	Before modification		After modification	
	Total time (Second)	Idle running (kwh)	Total time (Second)	Idle running (kwh)
Stopping	**829**	**133.93**	**640**	**84.46**
Net saving= 49.47 kwh for each stopping				

COST Incurred: : Normal

Energy Conservation Plans and Targets

The company is consistently engaged in marching ahead for further reduction of electrical as well as thermal energy consumption in plant because we believe the key of the success in cement business is minimum input of energy (electrical, thermal and human) with maximisation production of good quality. With quest for excellence the company is marching ahead to achieve lower energy consumption in the plant. The energy conservation plans and targets for achieving lower energy consumption are:

Energy Conservation Measures (Planned)	Anticipated savings in (Rs.lakhs)		Approx. investment	Project commencement & completion year
	Energy Value (specify units)	Rs. lakhs		
Reduction of suction side pressure drop of cooler fans	4.68 Lakh Kwh	9.36	4.00	2005-06
Installation of new cooler vent fan with VFD	9.82 Lakh Kwh	19.65	14.00	2005-06
Installation of coal conveying blowers	1.15 Lakh Kwh	2.29	1.00	2005-06
Optimization of GCT pumps.	3.12 Lakh Kwh	6.24	8.00	2005-06
Optimization of cement mills	1.06 Lakh Kwh	29.64	25.00	2005-06
Installation of high efficiency separators in coal mills	4.45 Lakh Kwh	8.89	20.00	2005-06
Installation of new blower in calciner coal conveying system	2.08 Lakh Kwh	4.16	12.00	2005-06
Installation of new filler transport system	9.05 Lakh Kwh	18.10	30.00	2006-07
Installation of lower disperson Box in riser duct and increase heat transfer	6900 Million Kcal	26.2	10.00	2006-07

Environment and Safety

Plant is continuously working to find out the alternative material / waste product to help in improving the global environment. Adoption of environment management system ISO 14001 and quality management system ISO 9001, have reduced wastes, spills, leakages and emissions resulting in reduced costs, increased profits, preserved natural resources and reduced global warming. Improved working condition and smooth operation have helped to maintain clean, safe and healthy environment.

Utilization of pet coke a refinery waste (first of its kind) resulted in reduced energy cost & increased profitability to the company. Now research is in progress to use waste derived fuels. Similarly use of flyash in cement manufacture has increased over the years. Eco friendly rock breakers are in use in mines.

Safety of Employees is never compromised at Shree. Every step is taken to ensure safety of employees & all employees are given Personal Protective Equipment. Training programmes, demonstration, workshops & mock drills are organized to make people conscious of safety aspects, use of PPEs, use of fire fighting equipment, responding during emergency etc. Shree has been certified with OHSAS-18001 the management system for Health & safety.

SHREE DIGVIJAY CEMENT CO. LTD.

Digvijaygram, Jamnagar (Gujarat)

Unit Profile

Shree Digvijay Cement Company Limited (SDCCL), an Aditya Birla group company, established in the year 1946 is one of the pioneering companies in Cement Business in India. The Dry Process Plant of the company is having production capacity of 11 Lac MT clinker per annum. The plant is equipped with latest 18 MW Diesel Generating Sets commissioned in the year 1999.

SDCCL is producing seven different types of cement. This includes special purpose Cement like Oil Well Cement as Import substitution resulting in saving of valuable Foreign Currency. The other specific purpose products like Sleeper grade Cement, Sulphate Resistant Cement have premier share in the markets.

SDCCL also owns Jetty with a prestigious status of Two Star Export House. Company's Clinker and Cement has earned reputation in International Markets also. The company is proud recipient of various awards of international repute for its outstanding performance in Exports, productivity and Quality.

Energy Management Policy

At SDCCL, our aim is

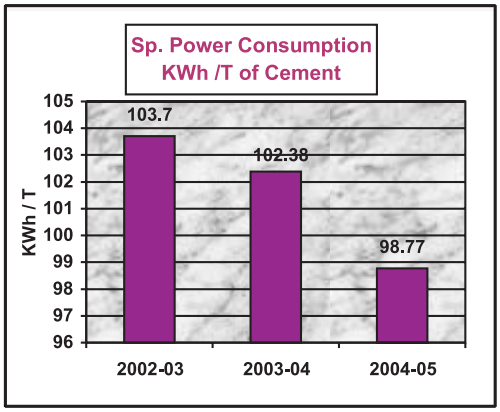
To optimally utilize various forms of Energy (Fuel & Power) in a cost effective manner, to ensure conservation of energy resources.

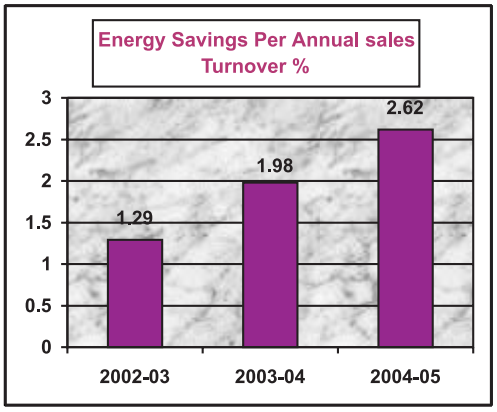
By Committed efforts to

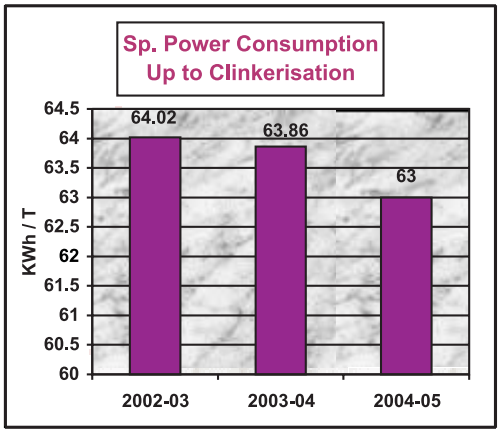
1. Reduce specific energy consumption by identifying potential areas of energy saving in the process.
2. Set energy consumption targets and monitor continuously.
3. Involve all the employees to work towards progressive improvement of targets of energy consumption.
4. Promote culture of awareness towards energy conservation in the organisation.
5. Implement innovative ideas for modification, improvement and up gradation of the equipment & process for optimizing energy consumption.

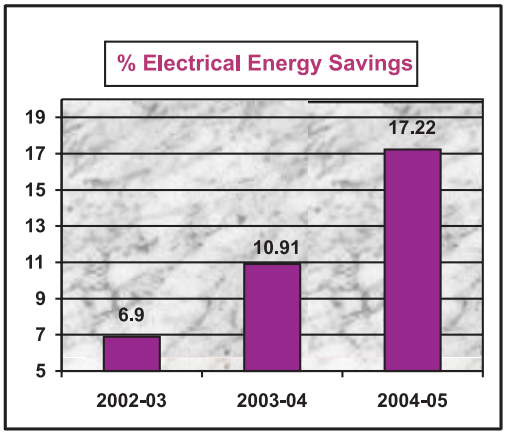
Energy Consumption

S.No	Description	Measurement	2002-03	2003-04	2004-05
1	Annual Cement Production	MTs	721444	747607	765909
2	Total Electrical Energy Consumption	Lacs KWh	1033.87	930.24	922.94
3	Total Thermal Energy Consumption	Million Kcal	792111.82	678013.28	773553.29
4	Specific Electrical Energy Consumption	Kwh / T of Cement	103.7	102.38	98.77
5	Specific Thermal Energy Consumption	Kcal / kg of clinker	780.4	797.16	800.41
6	Total Sales turnover of the unit	Rs. Lacs	19722	16668	19862.2
7	Total Energy Cost	Rs. Lacs	6024.38	5674.64	7588.26
8	Energy as % of Total Manufacturing cost	%	50.28	52.69	57.45









Energy Conservation Organizational Set-Up

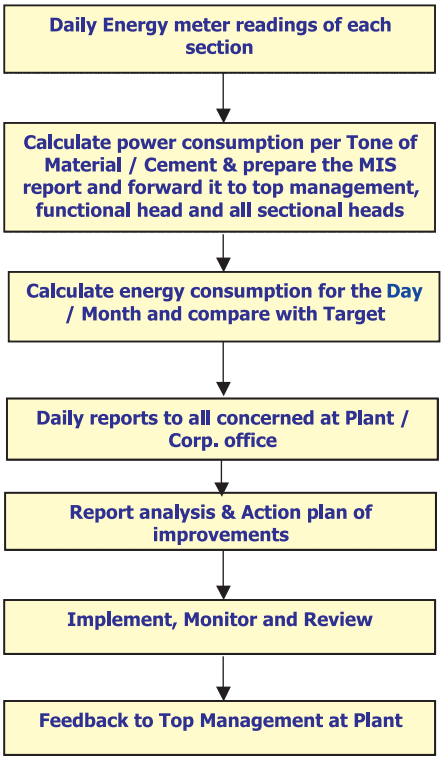
Macro Level Efforts:

Due to high cost of Energy in manufacturing process of Cement, high priority is laid by Management to conserve energy. Energy consumption parameters are daily analyzed and deliberated with floor level operating & supervisory staff by managerial staff. Daily, Monthly reports are prepared with emphasis on Energy by MIS Cell. Energy consumption is also compared with other Group Companies in the manufacture of same product at Plant management and corporate level. Development in any of Group Company or World over in the field of Energy conservation is relayed to each other. Also, suggestion scheme is implemented to get good suggestions from all levels.

Micro Level Efforts:

With a view to create awareness & involve the people up to grass root level in Energy Conservation process, SDCCL has set-up a Task Force for Energy Conservation. These task forces are formed for each functional sections of the plant & they have Engineers, supervisors & workers as their members. A core team made of senior plant executives led by Energy Manager guides the task forces. The Task Forces identify, explore, plan, execute & monitor energy conservation efforts among their sections. All the teams carry out monthly meeting with the Unit Head to discuss the progress, ideas, problems, action plan & performance.

Energy Management System – Flow Chart:



Major Energy Conservation Initiatives during 2004-05:

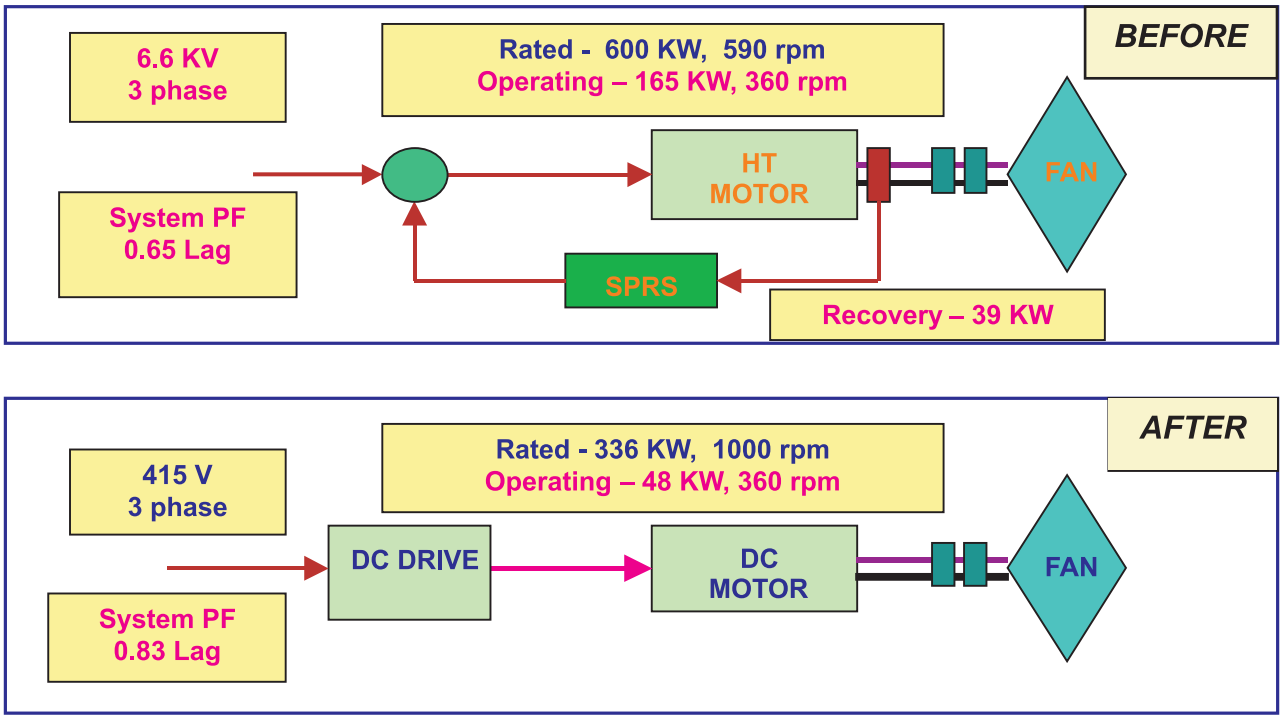
1. Efficiency improvement of cooler ID fan by replacing slip ring AC motor with DC drive:

Problem Faced:

- High T & D losses due to poor power factor
- Minimum achievable speed – 60 %
- Flow control with damper resulting in power loss
- Liquid Rotor Resistance used for starting HT motor is maintenance prone
- Installed SPRS system is highly maintenance prone
- Poor overall system efficiency

Improvement Actions:

- Replaced 600 KW HT slip ring motor with a 336 KW DC motor
- Overhauled & Re-utilized the spare DC motor and drive of Wet Process Kiln
- Removed LRS & SPRS systems from circuit
- Eliminated the need of fan inlet damper



Benefits Achieved:

- Operating KVA reduced by 55 KVA / Hr; PF improved from 0.65 to 0.83 Lag
- Motor operating load reduced by 73 KW / Hr
- Speed control from 0% to 100 % speed achievable
- Power Saving by removing Fan inlet damper – 5 KW / Hr

Annual Saving – Rs. 32.63 Lakhs

2. Re-engineering of SPRS System of Raw Mill Ex. Fan – 2270 KW:

Problem Faced:

- Power loss at fan as SPRS system not operative.
- System is obsolete & OEM unable to help in rectification.
- Ex. OEM expert failed to set right the system.
- Spares for SPRS too expensive & mostly not available.

Improvement Actions:

- Converted Digital control system into Analogue system to operate through PLC.
- Total design & modification done by in-house expertise.

Benefits Achieved:

- Fan is now possible to run up to 830 rpm with SPRS.
- Power recovery / saving of approx. 175 kW/Hr

Annual saving: Rs. 92 Lakhs

3. Removal of Swirl damper from Pre Heater Cyclone String to stop false air ingress:

Problem Faced:

- Heavy false air ingress through swirl damper, diverting feed of kiln and Calciner strings.

Improvement Actions:

- Removed the swirl damper and packed the ducts air tight.

Benefits Achieved:

- False air ingress reduced by 1.5%
- Gain in specific power consumption & specific heat energy consumption.

Annual saving: Rs. 27.28 Lakhs

4. Replacement of Liquid Rotor Resistance (LRR) of PC & PH Fan motors with Grid Rotor Resistance (GRR):

Problem Faced:

- Higher power consumption during plant restart and while operating at low output levels.
- Pressure loss and power loss through fan inlet dampers
- No control of fan rpm above 90 % fan speed
- High electrolyte temperature when speed is below 75 %

Improvement Actions:

- LRR replaced with GRR
- Removed fan inlet dampers of PC & PH Fans

Benefits Achieved:

- Achieved fan speeds of 35 % during start-ups
- Finer control of motor rpm
- Increased Kiln production by 30 TPD
- Reduced maintenance cost

Annual Saving – Rs. 25.60 Lakhs

5. Replacement of old & inefficient reciprocating compressors with screw compressors:

Problem Faced:

- Poor reliability & low efficiency of reciprocating compressors
- Higher lubricant & spares consumption
- High temperature of compressed air with high percentage of moisture
- Manual controls & no automation
- Problematic water cooling system

Improvement Actions:

- Installed 4 nos. air cooled Screw compressors in place of Reciprocating compressors

Benefits Achieved:

- High efficiency, highly reliable, auto control, low maintenance-prone compressors

Annual Saving – Rs. 35-40 Lakhs

6. Modifications in Bag House Fan Inlet Duct & SPRS system for Bag House Fan Motor – 600 KW:

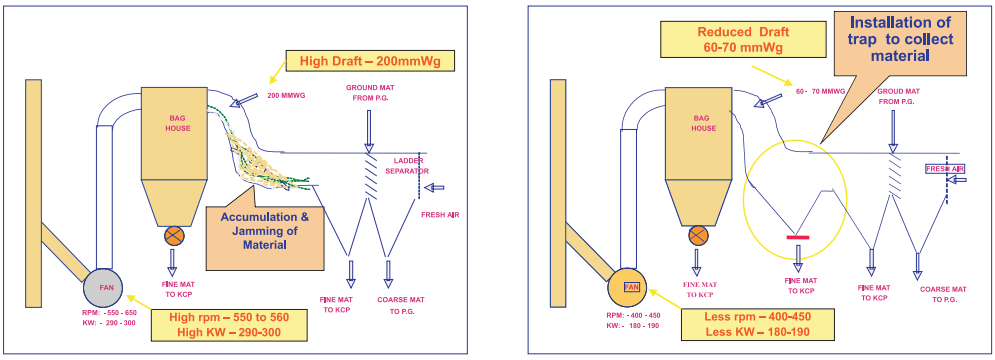
Problem Faced:

- Accumulation & jamming of material in inlet duct of bag house fan
- Due to partially blocked duct, fan operating at higher speed to create required draft
- High power consumption of Bag House fan Motor

Improvement Action:

- Installation of Hopper along with material discharge chute below ladder separator outlet duct to bag house

- Spare SPRS system of Cooler ID Fan incorporated successfully to control speed of Bag House Fan Motor



Benefits Achieved:

- Power consumption reduced from 300 KW/Hr to 157 KW/Hr
- Recovery of SPRS system – 50-60 KW / Hr

Annual Saving – Rs. 30.90 Lakhs

6. Energy conservation in cooling fan motors PC & PH fan GRR:

Problems Faced:

- When motors runs on SPRS system, GRR cooling blower running idle
- Wasting of Power by 9 KW / Hr
- The cooling fans are operated by local PLC mounted on GRR for operational control Improvement Actions:
- The cooling blower control was removed from local PLC
- Designed hardware logic to control operation of fans
- Designed interlock with SPRS system to stop cooling fans when HT motor runs on SPRS system

Benefits Achieved:

- The cooling blower stops when motor run in SPRS
- Power Saving – 9 KW / Hr
- Increase in life of cooling blower
- Reduction in maintenance of blowers

Annual Saving – Rs. 1.24 Lakhs

8. Replacement of old & obsolete DC drive of Raw Material Belt 4A by VVVF drive:

Problems Faced:

- Frequent failure of DC motor interpole winding & Field rectifier
- Prolonged stoppage hours for replacement affecting production
- Inefficient speed control of the drive with PLC system
- Frequent start-stop of the motor resulting in stressful operation of motor

- Commutator of motor getting frequently carbonized; Very frequent maintenance needs & high maintenance cost

Improvement Actions:

- Replaced 75 KW, 1500 rpm DC drive with 75 KW, 1440 rpm VVVF drive
- The motor & VVVF panel available in spare is used – No fresh investment

Benefits Achieved:

- Production saving achieved by eliminating breakdown stoppage – Rs. 10 Lakhs per annum
- Reduction in power consumption due to smooth control of motor speed – 4-5 KW
- Eliminated rewinding & maintenance cost of DC drive - Rs. 0.70 Lakhs per annum

Annual Saving – Rs. 1.5 Lakhs

Other Energy Conservation projects during 2004-05:

- High Efficiency Seperator for Vertical raw Mill
- Gearbox internals replacements for increasing Kiln rpm from 4.2 to 5.0
- Replacement of Kiln inlet seal with pneumatic seal; replacement of Kiln Outlet seal
- Replacement of Precollector cyclone of Coal Mill with high efficiency cyclone.
- Controller for maintaing DG Generation frequency at 49.2 Hz.
- Fuzzy Logic software system for optimized operation of Kiln, Cooler & Coal Mill
- Installation of VVVF drive for Cooler Fan No. 5 alongwith removal of fan damper.
- Incorporate Vortex breakers at bottom of Pre Heater cyclones.

The unit has achieved saving of Rs. 521.25 Lacs by implementing various energy conservation Projects / implementations during the year 2004-05.

Energy Conservation Plan & Targets:

Sr. No.	Energy Conservation Measures (Planned)	Anticipated savings in			Approx. investment (Rs.lakhs)	Project Commencement & Completion year
		Power U/T of Cem.	Heat Kcal/kg of cl.	Rs. Lakhs Per Annum		
1	Mechanized Fly-ash feeding system for KCP Cement Mill	2.0	—	65.00	60.00	2005-06
2	Replacement of Pre collector cyclone of Cement Mill with high efficiency cyclone.	0.3	—	10.00	10.00	2005-06
3	Deep bucket conveyor for clinker transport	1.0	—	34.00	200.00	2005-06
4	Cooler up-gradation with Pendulum cooler	—	20.0	0.37	200.00	2005-06
5	Replacement of PH, PC, ESP & R/M Ex Fan along with down comer duct enlargement.	0.5	—	17.00	150.00	2005-06
6	Vertical Raw Mill Reject Re-circulation	1.0	—	30.00	25.00	2005-06
7	Trimming of Coal Mill Exhaust Fan Impeller and subsequently operate at increased speed.	0.1	—	3.0	—	2005-06
8	Trimming of ESP Fan Impeller and modification in fan casing.	0.3	—	9.5	—	2005-06
9	Replacement of Worn out table liners of Raw mill Sealing of Separator	1.8	—	55.0	7.5	2005-06
10	Installation of permanent magnet at Raw Mill feeding circuit	0.1	—	3.0	3.0	2005-06
11	Reduction of false air ingress in Raw Mill circuit by 2% & in Kiln circuit by 1%	0.6	—	19.00	—	2005-06
12	Modification of TA duct at take off point at Cooler	0.3	—	9.00	—	2005-06
13	Up-gradation of drive & chain of elevator at Pregrinder outlet	1.6	—	50.00	30.00	2005-06
14	Replacement of grinding tyres at Pregrinder	1.1	—	32.00	25.00	2005-06
15	Modification of cooling water pipelines, replacement of obsolete & inefficient pumps & maintenance of old water pumps	0.2	—	6.0	3.00	2005-06
16	Reduction in miscellaneous power by continuous monitoring and optimize use	0.7	—	22.00	1.00	2005-06
17	Arresting leakage at various points and attending minor changes in Atlas Copco Screw Compressor in Cement Mill area.	0.2	—	6.00	—	2005-06
18	Up-gradation of Kiln Main Drive motor & panel	0.15	—	5.00	38.00	2005-06
19	Incorporate 400 KW DC motor & drive in Coal Mill Ex. Fan to eliminate slip losses of induction motor	0.18	—	5.5	—	2005-06

The unit has targeted to achieve sp. Power consumption of 90 KWh / T of cement & Sp. Heat consumption of 775 Kcal /kg of clinker by the end of the year 2006-07.

Environment & Safety

Safety

Safety is an important aspect of working culture at SDCC. The unit has announced its Safety Policy, which is implemented by Safety Department across the plant. The culture of safety is promoted by conducting various awareness programs, on-site trainings, competitions & rewards etc. The company has also prepared its Disaster Management Plan to handle any accidental circumstances. The unit also runs an Occupational Health Center in the campus for the health & welfare of employees & their families.

The company has successfully achieved OHSAS 18001 certification in the year 2005 & is committed to maintain it.

Environment

The unit has an ISO 14001 certification for Environment Management System. The stack emissions & fugitive dust emissions are constantly monitored & controlled. The Horticulture section of the unit has carried out an area wise drive by developing more than 10,000 plantations in the entire campus to make the surrounding areas clean & green.