

# BIRLA SUPER CEMENT

(A unit of Grasim Ind. Ltd.)

Birla Super Cement is a grinding unit of 1.5 Million Tons capacity with a modern technology manufacturing process involves a level of sophistication & new to the Cement industry.

The technology was supplied by 'Krupp Polysis' of Germany such as Roller Press, Grinding Mill. Electronic Packer enables for automatic packing & weighing of Cement Bags. Unloading of raw material (Clinker), which is being received from railway, Wagons are unloaded by atomised 'Wagon Tippler'. All the process of manufacturing and packing are atomized & is controlled through electronic devices & PLC at Central Control Rooms Plant, Packing Plant & Wagon Tippler.

Three grades of Products i.e. OPC 43 Grade, OPC 53 & PPC are manufactured. The brand names of these qualities are 'Rajashree', 'Birla Super' & 'Birla Plus' respectively.

The plant power is connected to 132 KV Power supply of MSEB grid & having connected load of 12650 KW. All Electrical & Instruments equipment is of latest design & high efficiency.

The unit has won the National Award for the "Excellence in Energy conservation" from the CII for the 2000-'00 & 2001-'02 consecutively for the outstanding saving in energy.

## Energy Consumption

Year (April -March)	Annual Energy Consn.		Production in Million Tons	Specific Energy Consn.	Redn.in Specific Energy consn. Over 1997 - 98 in %	Power cost in % OF Manufacturin g cost
	* KWH Million	Rs in Million		KWH / Ton of Prod.		
1997-98	44.22	158.74	1.453	30.43	--	--
1998-99	28.18	110.02	0.972	28.99	4.73	--
1999-'00	25.17	103.00	1.030	24.48	19.55	6.36
2000-'01	30.22	113.80	1.250	24.11	20.77	6.86
* 2001-'02	30.8	103.90	1.186	24.36	19.94	8.08
* 2002-'03	38.43	116.34	1.388	25.47	16.38	8.33
* 2003-'04	39.1	135.80	1.427	24.26	20.28	7.54

\* Special brand of Cement ie., PCC grade is considered

## ENERGY CONSERVATION COMMITMENT, POLICY AND SET UP:

Birla super cement is committed to conserve the Energy, & it is evident in all its Policy like 'Environmental', 'Annual report' etc., the no. of activities in Energy conservation has crossed beyond 60 Nos. The staffs are motivated to take part in suggestion scheme & meetings of Energy Forum. The unit has bagged '**National Award**' for 'Energy Conservation & Energy Management' organised by CII for twice i.e., 2000-'00 & 2001-'02.

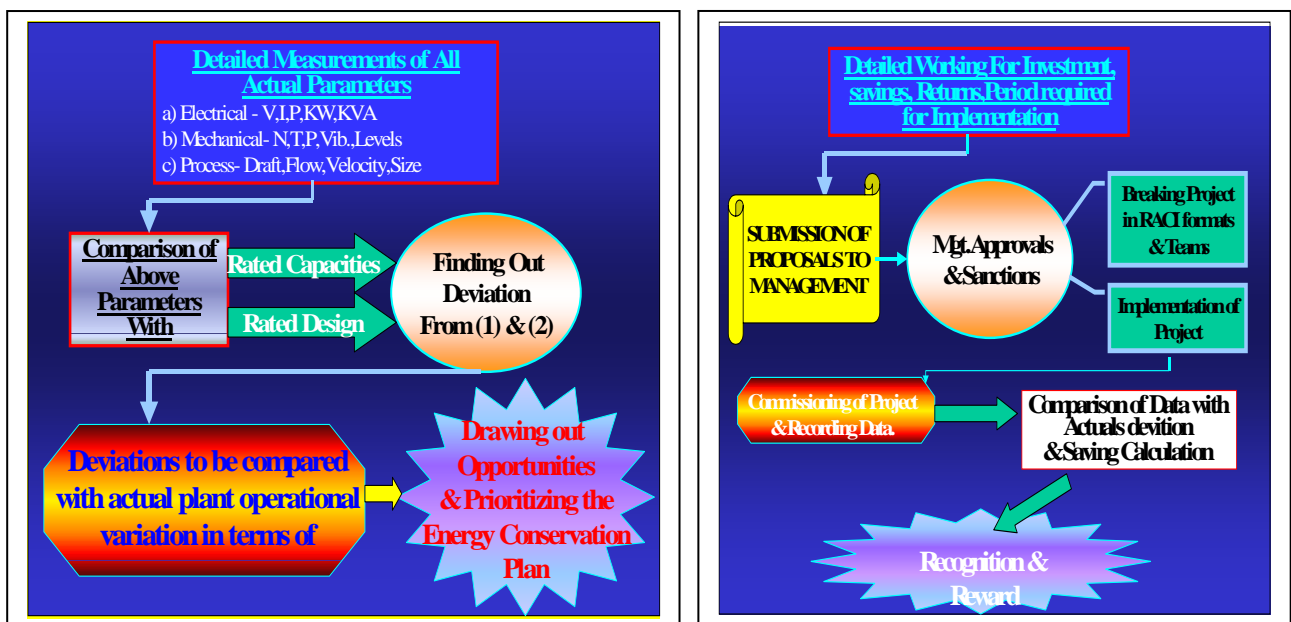
Management of 'Birla Super Cement' takes keen interest in reduction of 'energy cost' by implementing energy conservation activities and managing plant operating times to avail the maximum benefits from the State Electricity Board in 'Power factor', 'Night Consumption rebate' & 'Bulk discount'.

The Head of Electrical & Instrument Dept heads the Energy Conservation activities. The Energy Conservation forum comprising of experts from Process, Electrical, Mechanical, Instrumentation and MIS fields. The member of Energy Forum meets regularly for reviewing the activities and implementation of new identified ideas.

The Energy cost share in the production cost is 8 %.

Monitoring & Reporting of Energy Conservation are effective in our organisation through:

- \* Online monitoring of Power Parameters
  - KW, P.F., Voltage, Current, Frequency. KVA etc.
- \* Shiftwise recording of Power Parameters.
- \* Daily calculation of Specific Energy per ton of production.
- \* Monitoring of Specific Energy Consumption on
  - Monthly basis
  - Quarterly basis
  - Annual basis
- \* Comparison of Actual specific energy to targets & benchmarked figures.



## **ENERGY CONSERVATION ACHIEVEMENTS:**

The unit had implemented lot of ideas to reduce the energy consumption and the cost of energy through Energy Forum using tools like Suggestion Scheme, Good work Award, Kaizens, Focused Improvement Projects, Six-sigma Projects, Identification of energy losses etc. The following are the major activities carried out in the year 2003-'04.

- Installation of Automatic Voltage Regulator.
- Expert FLS system for Mill Operation Optimisation.
- Installation of Energy saver for Main Cooling Tower Fan.
- Reduction in Power by diversion of ESP Product.
- Solar operated switch for lighting circuit automatic operation.
- Optimisation of operating voltage at packing plant MCC.
- Interlocking of 45 kW water pump with 5.5kw water pump.
- Removal of Apron Conveyor from Circuit.
- Delta to star operation of cement mill cooling fans- 4 Nos.
- Lighting load reduction by relocation of fittings & local switches.

## **ENERGY CONSERVATION PLANS AND TARGETS:**

The plant improving its energy conservation activities, which requires investments and the management, has behind the various projects, which will be implemented in the coming years. The lists of major investment based project are as listed below:

- Installation of VFD for Packing plant & Cement mill Dust Collectors.
- Installation of Power less bag diverter at packing plant.
- Installation of S circuit in Cement mill area.
- Installation of Low Pressure Cyclones for V separator.
- Replacement of packer machine impeller by higher diameter.
- Installation of Conserve air package for compressors.
- Installation of FRP fan blades for cooling tower fan.

The management is also working on the installation of Captive Power Plant to reduce the energy cost. The energy forum also looking for energy substitutions available for furthers improvement in this line.

## ENVIRONMENT AND SAFETY:

Following are the major Environmental & Safety Activities done at our plant.

- Inclusion of PPC grade Cement to utilize waste fly ash from power plant.
- Atomized handling of fly ash through air tight tankers to avoid fugitive natural escape of fly ash to environment.
- Pneumatic unloading systems for dust free unloading of fly ash from tankers.
- Installation of additional two dust collectors at W/T to avoid dust emission.
- Installation of gypsum shed of 2\*5000 MT to avoid land contamination.
- Development of rain water harvesting reservoir.
- Covering of belt conveyors to avoid dust emission during transportation.
- Construction of BT road inside plant area.
- Development of green plantation by 75%.
- Installations of sprinklers for flower garden & Lawn.
- Concrete flooring for Oil/HSD storage.
- Construction of concrete sewerage treatment plant.
- Installations of one number dust collector at packing plant area.
- Use of sweeping machine to clean the roads & ground floors.
- Charging of bore wells with rain water.
- Development of Flora & Faunas at plant.



## **ENERGY CONSRVATION FORUM**

**Our Organisation is bench marked in our entire “A.V. Birla Group” of units as “Best Team Work-Unit” (as per Group - OHS in 1999 & 2001). The Energy Conservation activities are the result of all Employees & implemented through Team works.**

**Energy conservation cell initiated from 2001. However the activities are started right from commissioning of our plant ie 1995. The cell consist of bottom and middle level employees from cross functional areas such as process, mechanical , Etc. The cell is headed by Energy Manager who inturn report to plant head.**

**The Energy Conservation Plans are discussed / Reviewed in shop floor meetings, Daily Production meeting, EMS plans, and WCM (World Class Manufacturing forums).**

**The potentials input for Energy Conservation from employees are the result of “Employee Suggestions Scheme”, “Employee Goodwork Award”, “Mgt. Appreciation Letter”. The efforts are linked with Employee’s “Appraisal System”.**

**The list of present & future energy conservation activities of our plant are displayed in the annual report.**

**The Forum will meet once in a month (tentatively on 8<sup>th</sup> of every month) and focus the discussions on following points:**

- Checks & measures for the Specific Energy consumption.
- Optimisation of Plant running hour with Targeted Production & Energy Tariff Zones.
- Evaluation of energy conservation activities.
- Initiation of energy conservation activities.
- Monitoring checks for plant & equipment switchings.
- Review of Suggestions Scheme's 'Energy Conservation activities'
- Out line the Scope of Forum in energy conservation.
- Formation of guide lines for processing of suggestions.
- Formation of Suggestion Scheme Committee for suggestions.
- Review of present energy conservation schemes effectiveness
- Scheme identification for Launching of Energy Cons.Activities.

## **ENERGY ACCOUNTING & MONITORING SYSTEM**

### **1 MONITORING OF SPECIFIC ENERGY CONSUMPTION PER TON OF OUTPUT**

- a) DAILY - (DPR) DAILY PRODUCTION REPORT  
DAILY POWER REPORT
- b) MONTHLY - MPR (MONTHLY PRODUCTION REPORT)  
EXCEPTIONAL REPORT  
MIS-REPORT
- c) HALF YEARLY - MIS-REPORT  
REPORT TO CTC
- d) ANNUALLY - ANNUAL MIS-REPORT  
ANNUAL BALANCE SHEET

### **2 REVIEW OF TARGETS**

- a) ANNUAL - ANNUAL PURTA (BUDGET) MEETING  
ANNUAL MAINTENANCE CONFERENCE

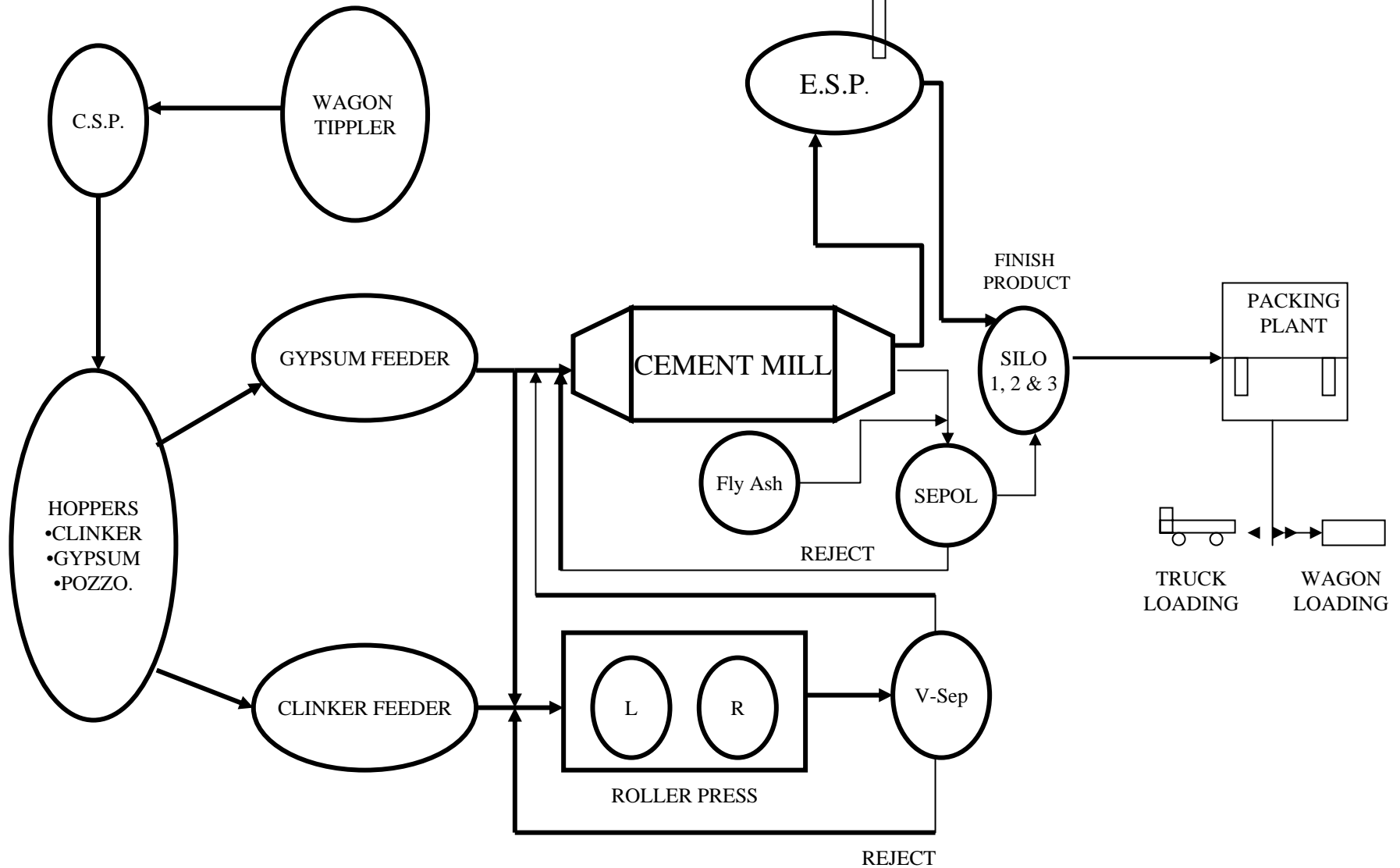
## **ENERGY MANAGEMENT POLICY**

**Birla Super Cement is committed to reduce its Energy cost by**

- Optimising Process.**
- Implementing Energy Conservation Activities.**
- Adopting Technology Innovations.**
- Identifying potentials Areas through audits**
- Maintaining Highest System Power Factor.**

**Birla Super Cement in its endeavour to fulfill above tasks, also commits to meet safety and environmental needs by awareness and effective involvement of all employees.**

# PROCESS FLOW SCHEMATIC DIAGRAM



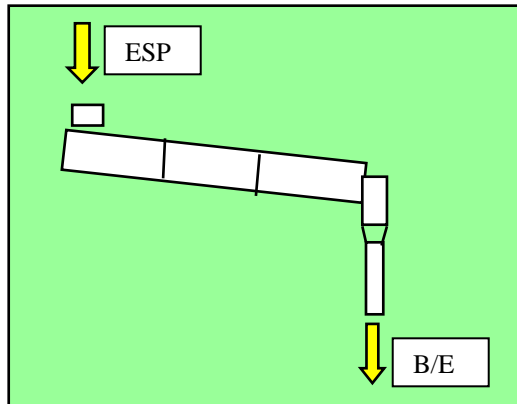
# 1) REDUCTION IN POWER BY DIVERSION OF ESP PRODUCT TREND SETTER PROJECT

## i) Back Ground of the project -

The function of ESP's in our Plant is installed to de dust the Cement from grinding process. It contains highly negatively charged electrodes, which attracts dust in the system. An auto cyclic operation of hammering is initiated as per set time to dislodge the attracted cement particles. Thus the cement from ESP is collected and re-routed into process, which led scope for conservation of Energy.

## ii) Observation Made -

It was observed that Product outlet from ESP having characteristic similar to the final product, which was sent for packing. The material was circulated in cement mill through bucket elevator. The matter was brain stormed in energy forum to take alternate arrangement for avoiding recirculation of material. It was decided to install new air slide with diverter gate to connect the ESP outlet product directly into the finished product silos.



**BEFORE**



**AFTER**



**ESP AIR SLIDE**

## **ESP Discharge Air slide**

- INSTALLED "Y" TYPE AIRSLIDE.
- INSTALLED PNEUMATIC DIVERTOR.
- REPLACED 350mm AIRSLIDE BY 450mm

**iii) Technical & Financial Analysis Made -**

The quality of product from ESP outlet having similar characteristics finished product hence quality of product will remain same. The power saving will be there as material recirculation has avoided. The financial investment for the project was Rs. 2.5 Lacs.

**iv) Implementation -**

Implementation made departmentally in Oct 2003.

**v) Saving -**

INCREASED IN PRODUCTION (TPH)

INCREASED PRODUCTION = 5 TPH.

R.HRS IN Close Circuit @ DAY = 12 HRS.

ENHANCE TPD @ DAY=5X12 =72MT.

INCREASED PRODUCTION = **25200 MT @ ANNUM**

REDUCTION IN POWER CONSUMPTION.

POWER CON. @ MT = 21 UNITS.

COST OF POWER @ UNIT = RS.3.50

INCREASED PRODUCTION @ ANNUM =25200 MT

**TOTAL SAVING = 21 X 3.50 X 25200**  
**= Rs 18.52 Lacs/Annum**

## **2) REMOVAL OF APRON CONVEYOR FROM CIRCUIT** **TREND SETTER PROJECT**

### **i) Back Ground of the project -**

The clinker is the main raw material of plant was coming by rails. The loaded wagon was unloaded through atomized Wagon Tippler. The material then shifted to stock pile. The Apron conveyor was used for uniform flow of material on the transportation belt from wagon tippler area.

### **ii) Observation Made -**

It was observed that, quality of material received was in granule form and having sliding characteristics. The point was discussed in the Energy forum for minimization of energy used and decided to take trial at Clinker extraction area. The sliding of material will reduce the working of apron conveyor.

### **iii) Technical & Financial Analysis Made -**

The elimination of operation of the Apron conveyor will reduce the energy consumption at wagon tippler and also reduce the dust emission.

No major financial investment is required except preparation of chute & installation of diverter gate.

### **iv) Implementation -**

Implementation made departmentally in Oct'03



### 3) EXPERT FLS SYSTEM FOR MILL OPERATION OPTIMISATION

#### i) Back Ground of the project -

The Cement mill operation was through Central Controlled Room where DCS system is utilized to Automatic sequential operation of the Plant drives as the plant is process plant. The Output product quality and quantity is monitored through controlling process parameters by the operators. The process parameter controlling is under human control.

#### ii) Observation Made -

It was observed the fine control of process parameters largely affect the output and power consumption by the Cement mill operation. The fine tuning of the process parameters is very difficult to control manually as it having multiple choices & Impacts. The matter was discussed in Daily Production Review meeting chaired by unit Head. The automatic controlling of process parameters with set programs was considered as effective solution. On the basis of decision the installation FLS make Mill Operation optimisation system installation was planned.

#### iii) Technical & Financial Analysis Made -

The automatic controlling of the process parameters will use the optimum loading of the drives & increase the plant output hence it is technically acceptable.

The financial requirement for installation of the system is Rs. 8 Lacs Which was approved by management as the same system was working in group units with consistent benefits.

#### iv) Implementation -

The system installed in July'03 by the OEM Engineers



## 4) AUTOMATIC VOLTAGE REGULATOR FOR LIGHTING

### **i) Back Ground of the project -**

The Plant Lighting circuit was connected with the power Control center along with the Motor Control center panels. The operating voltage of the lighting circuit was same as motor control center. The focus on energy conservation activities diverted to lighting system to find out any reduction in lighting energy.

### **ii) Observation Made -**

It was came to know from technical magazines that the lighting energy reduction up to 25% was possible with reduce in lighting voltage without much effect on lumens. The voltage reduction of individual circuit was not possible and separate equipment for lighting circuit was required to be procured.

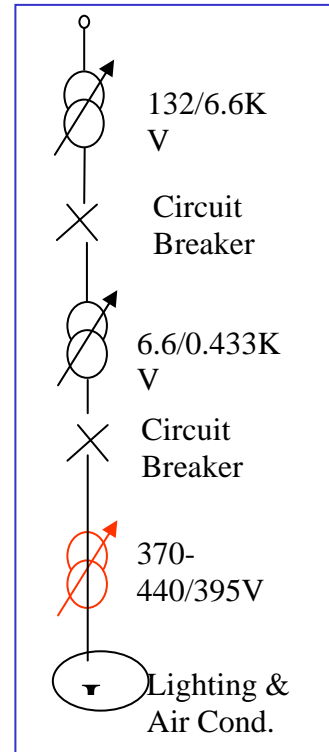
### **iii) Technical & Financial Analysis Made -**

The reduction in voltage will reduce the energy consumption by 10 to 25% depending upon the type of lighting fitting.

The financial investment for the project was 1.8 Lacks.

### **iv) Implementation -**

The project commissioning was done on 20.8.03 (80300 U)





## **6) OPTIMISATION OF OPERATING VOLTAGE AT PACKING PLANT MCC**

### **i) Back Ground of the project -**

The Packing plant was operating at the voltage of 415 volts which was feed from Distribution transformer installed at main substation.

### **ii) Observation Made -**

It was observed that reduction in operating voltage level of the motors will reduce the power consumption. The point was discussed in electrical team meetings and further put up in suggestion scheme. The permission was given on trial basis to reduce the voltage from 415v to 400 volts to see the impact on the loading of motors.

### **iii) Technical & Financial Analysis Made -**

The reduction in operating voltage will definitely reduce loading on the motor for the drives which are loaded below 75% hence there is saving in power.

No financial implications of the project, as there was no investment in the project.

### **iv) Implementation -**

Implementation made departmentally in Sep'03



## **7) COOLING TOWER ENERGY SAVER**

### **i) Back Ground of the project -**

The Cooling tower installed in cement plant for cooling of water which is circulated through the gearboxes of the main equipment. The cooling tower was provided with the cooling tower fan, which extracts the heat from the water, and reduces water temperature. The fan was running continuously for cooling of the water.

### **ii) Observation Made -**

It was observed the Cooling tower fan efficiency was getting reduced as water temperature reduces. After achieving a steady state condition the water temperature reduction is negligible for further running of cooling tower fan. This phenomenon occurs in late night hours. The matter was discussed in the energy forum and the controlling of water-cooling fan with temperature idea was taken for implementation. While going through the technical magazines the special designed energy saver for cooling tower was found.

### **iii) Technical & Financial Analysis Made -**

The stoppage of cooling fan will definitely reduce the power consumption. The initial investment of 0.07 lacs was required for the project.

### **iv) Implementation -**

Implementation made departmentally on 15.06.03. Approx.40 units per day ( ie Rs. 15000/- per year) saving was obtained from the project.



## **8) OPTIMISATION OF INDOOR LIGHTING**

<b>Belt Conveyor -1&amp;2</b>	<b>8 Nos</b>	<b>80 w HPSV</b>
<b>Gypsum Shed</b>	<b>6 Nos</b>	<b>80w HPMV</b>
<b>Wagon Loader</b>	<b>12 Nos</b>	<b>80 w HPMV</b>
<b>P/Plant Tank</b>	<b>1 No</b>	<b>80w HPMV</b>
<b>P/Plant Floors</b>	<b>24 Nos</b>	<b>80w HPMV</b>
<b>ESP Platform</b>	<b>6 Nos</b>	<b>80w HPMV</b>
<b>W/T Apron conv.</b>	<b>6 Nos</b>	<b>70 w HPMV</b>

### **i) Back Ground of the project -**

The 80 watt HPMV type light fittings was installed in plant area is for general inspection during routine visit / round at the site. The lighting arrangement was remains on throughout night hours even if no man was working at site.

### **ii) Observation Made -**

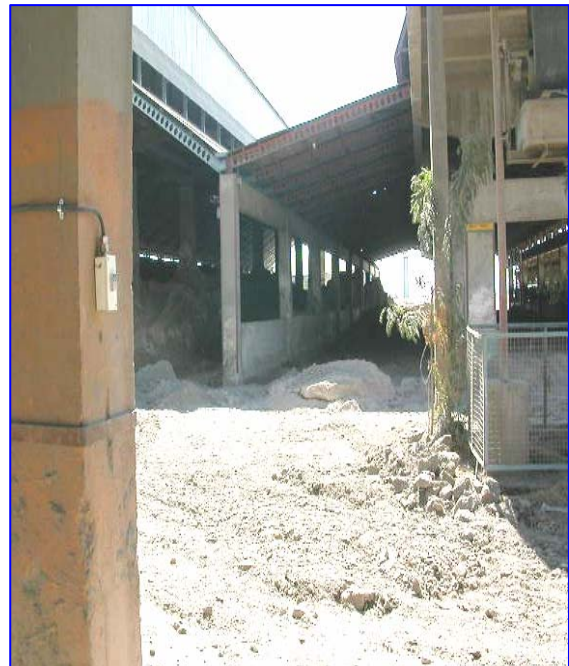
It was observed that lighting available is at higher level and can be cut down to minimum. The point was discussed in the energy forum and suggested that the light fitting to be kept available at site and will be switched On - Off depending upon the site requirement.

### **iii) Technical & Financial Analysis Made -**

The reduction in light will automatically reduce the light consumption and the requirement of the site will be maintained by provision of individual switches. A small amount of approx. Rs.0.05 Lac will be required for additional switches.

### **iv) Implementation -**

Implementation made departmentally between June'03 to Dec'03. (8000 U)



## 9) DELTA TO STAR OPERATION OF CEMENT MILL COOLING FANS – 4 NOS.

### i) Back Ground of the project -

The Cement mill is the main drive of the cement plant which was used for grinding the clinker. The drive was run with the help of 2\*2200 KW motors. The cooling fan installed on the motor is running with mill operation.

### ii) Observation Made -

It was observed that the loading of the cooling fans was below 50% loading & are operating in Delta mode. It was discussion in Energy forum for change in connection of motor from delta to star mode. The idea was accepted and clearance was given for implementation as the loading of the drives was below 50%.

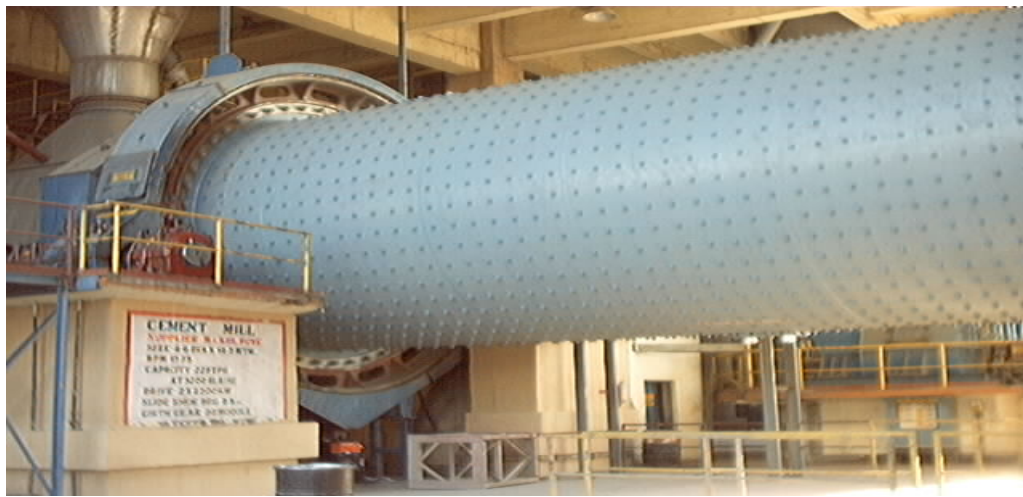
### iii) Technical & Financial Analysis Made -

The change in operation from Delta to Star mode will decrease the phase current which will reduce the losses and will also improve the power factor of the motor. There will be saving on account of reduction in losses.

No financial implications of the project, as there were no investment in the project.

### iv) Implementation -

Implementation made departmentally in Nov'03



## **10) SOLAR OPERATED SWITCH FOR TOWER LIGHT**

### **i) Back Ground of the project -**

The lighting towers are installed in the plant areas for providing general lighting in plant area. The tower lights operation was controlled with electrical timers installed in the panels near to the tower.

### **ii) Observation Made -**

It was observed that the lights of tower are operating either early glowing or late glowing. The general day light availability was seasonal which not matches with the setting of the timer. Employee through suggestion scheme suggested the fine controlling of operation of tower light as per actual requirement. The matter was discussed in the committee for implementation. It was decided to install a timer who is seasonal and changes the time as per actual requirement. The idea of installation of solar operated switch was came into picture and accepted.

### **iii) Technical & Financial Analysis Made -**

The solar operated controller will operate the lighting circuit as per requirement which lead to avoid idle running of the lighting system and save electrical energy

The cost of procurement of solar operated switch is 0.03 lacs.

### **iv) Implementation -**

Implementation made departmentally in 29.06.03 (600 U)

