

CENTURY CEMENT : BAIKUNTH

A BRIEF WRITE UP ON CENTURY CEMENT

Introduction

It was around 1969 , that the Management of M/s Century Textiles & Industries Ltd. thought of diversifying their activities towards other areas and decided to establish a Cement plant, 8 Km from Tilda. Subsequently, the place where the present Plant and the colony came into existence was christened as “Baikunth”. Baikunth is about 34 KM east of Raipur on Mumbai – Nagpur – Howrah S.E.C.Railway main line.



A view of the Plant

The 1st Kiln of the Plant was lighted up in December'1974 and the 2nd Kiln in May'1975. The first bag of Ordinary Portland Cement rolled out of the Plant and dispatched on 3rd March 1975. The licensed capacity of the plant originally was 6.00 Lac MT per annum. The present plant capacity has is 15.00 Lakh MT per annum.

Limestone :- Limestone requirement is mostly met from the captive mine situated 1.5 KM away from the Plant. Present requirement is about 6000 MT/day. Originally, reserves proved were to the tune of 220 Lakh tones. But, with the judicious use of available cement grade Limestone, blending it with more of sub grade limestone and use of purchased high grade limestone, we have not only conserved proved reserves but also almost doubled the mine's life.

Raw Mill :- There are four closed circuit Raw Mills. Initially the capacity of each Raw Mill was 65 TPH which has been increased to 75 TPH by various modifications. The ground raw meal is stored in blending / storage silos with a total capacity of 14000 MT.

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Rotary Kilns :- There are two dry process Kilns with a size of 64 m length and 4.11 m dia. The initial capacity of the kiln was 1000 TPD each, which has been optimized by installing a precalcinator (N-MFC) and additional stream of suspension preheater cyclones, increasing the capacity to 1750 TPD each.

Coal Mill :- There are four air-swept Coal Mills of the capacity of 10 MT per hour each.

Cement Mill :- There are five Cement Mills with open circuit. While Cement Mills no. 1, 2 & 3 have production capacity of 50 TPH each, the capacity of cement mill no. 4 & 5 is 80 TPH each. The plant is producing three types of cement i.e. Ordinary Portland Cement, Portland Pozzolana Cement & Portland Slag Cement. Cement produced is stored in six water-tight cement silos with total storage capacity of about 21,000 MT.

Packing :- There are four L & T Auto Rotary Packers of 80 TPH capacity with 12 spout and one 8 spout Electronic packer of 100 TPH capacity.

Wagon loaders & Truck loaders :- Presently there are 12 wagon loaders & 6 truck loaders in the plant.

Captive Power Generation :- Presently we have three Diesel Generating Sets of a total capacity of 10.3 MW. In the year 1997 a 15 MW capacity captive Thermal Power Plant was installed .

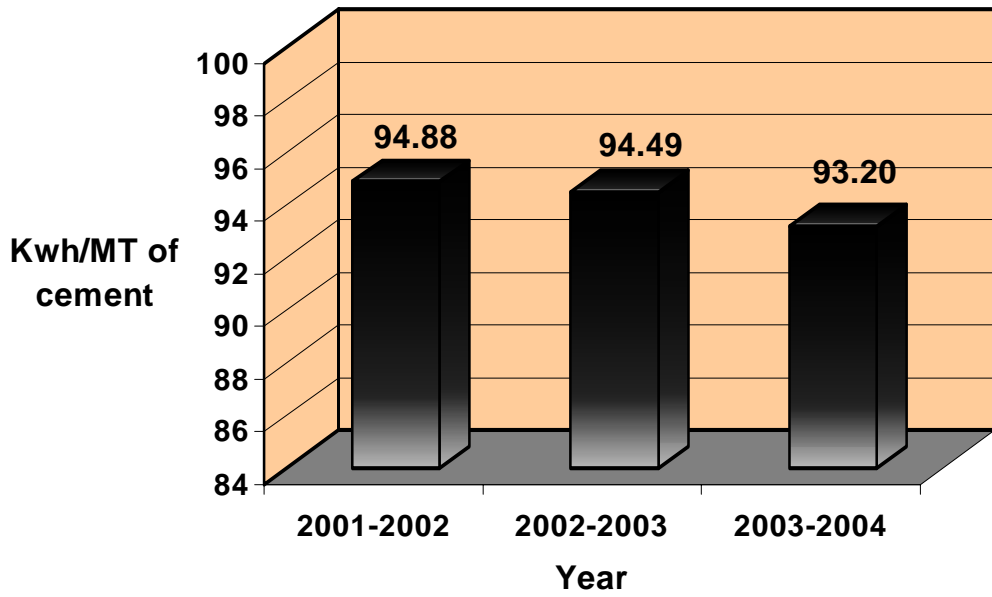
Energy Consumption

Cement manufacturing is an energy intensive industry. About 50% of the total production cost is that of energy (electrical & fuel). Therefore we are always trying to reduce the specific energy consumption. Total electrical energy, thermal energy consumed and specific electrical & thermal energy consumption figures are as under :-

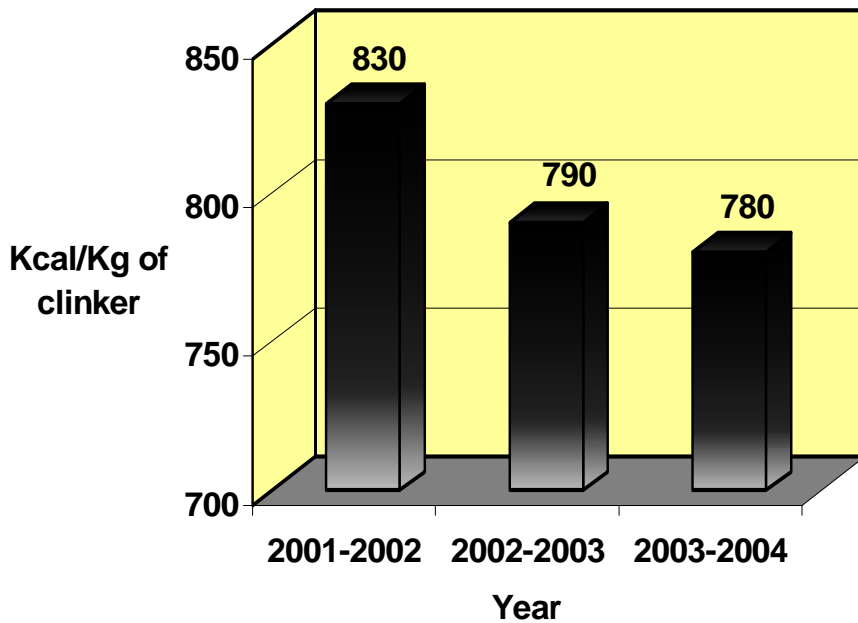
Year	Electrical Energy Consumption (Lakh Kwh)	Thermal Energy Consumption MKCal	Specific Electrical Energy Consumption Kwh/MT of Cement	Specific Thermal Energy Consumption Kcal/kg of clinker
2001-2002	1407.30	1006580	94.88	830
2002-2003	1463.72	961136	94.49	790
2003-2004	1509.83	972533	93.20	780

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Specific Power Consumption



Specific Thermal Energy Consumption



Energy Conservation Commitment, Policy and setup

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Energy conservation receives top priority at Century Cement. In view of increasing green house gas emission, fast depleting natural resources of energy and galloping price of energy, the commitment of the management towards energy saving programme is pretty high. Consistent efforts are made to identify the potential of energy conservation and implementation of remedial measures for reducing energy consumption in the plant.

Energy Conservation Cell is headed by Executive President (Plant). Head of Production, Mechanical & Electrical departments are executive members of the cell. Monitoring of electrical energy consumption is done by electrical department and monitoring of thermal energy consumption is done by process department. Monitoring of energy consumption trend is being monitored daily. Specific electrical energy consumption report is prepared daily and specific thermal energy consumption report is prepared monthly. A daily meeting of EC cell with concerned sectional heads is being held and energy consumption trend is discussed. Also progress of various projects is discussed in the meeting.

Energy Conservation Achievements

Major energy conservation projects implemented during the year 2003-2004 are as under :-

1. Dispersion plates at the discharge of preheater cyclones were replaced by Spreader Box for better heat exchange in preheater.

Hot gases generated in the kiln is sucked through suspension preheater tower by preheater fan. The suspension preheater consists of five cyclones in series. The cyclones are inter-connected by gas ducts. Cyclone discharge openings are connected with raw mix pipe which flow into gas duct located underneath.

In the gas duct (Riser Duct), dispersion plates are provided. The material from preheater cyclone is discharged on the dispersion plates. The raw mix gets dispersed and heat exchange between hot gases and raw mix takes place. The dispersion plates were creating resistance in the gas flow and also proper dispersion was not taking place. This affects the heat exchange between hot gas and raw mix. Due to this, the exit gas temperature from the preheater was very high which resulted in to heat loss.

It was decided to replace the dispersion plates with Fuller design Spreader Boxes. These spreader boxes help to reduce the resistance in the riser duct and also proper dispersion of raw mix takes place. This helps in optimum heat exchange between the hot gases from the kiln travelling upwards and raw mix travelling down wards in the preheater.

Total 5 nos. of Spreader Boxes were installed replacing existing dispersion plates in the preheater as detailed under :-

Kiln no.1 – Cyclone 4 of K-line
Cyclone 1 of C-line
Cyclone 5 of C-line

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Kiln no.2 - Cyclone 4 of K-line
Cyclone 1 of C-line

Total cost of all 5 spreader boxes was Rs. 5.00 lacs.

After installation of 5 nos. of spreader boxes, exit gas temperature is reduced to 365 deg.C from 380 deg.C. This 15 deg.C reduction in exit gas temp. has resulted into reduction in specific heat consumption by 4 Kcal/kg of clinker. Which ultimately resulted in to saving of 1000 tonnes of coal per year.

2. Small capacity burners were installed in Hot Air Generators of Cement Mill no. 3, 4 & 5 for saving of furnace oil.

Hot air generators have been installed for cement mill no.3, 4 & 5 to provide hot air to mills for drying fly ash and slag fed to the mills.

The burners originally fitted in the HAG were having a maximum capacity of 250 litres per hour. During normal operation, the furnace oil feeding rate in to HAG was maintained at 80 – 75 litres per hours which was minimum operable rate of feeding with the burners. Though the requirement for process was less but the feeding rate could not be decreased, as below 80 – 75 litre/hr no flame was formed in the HAG. Hence due to this limitation of the burners, unnecessary extra fuel used to be consumed.

To overcome the above problem, it was decided to install the lower capacity burners in the furnace. Supplier of the HAG was also consulted in the matter and finally it was decided to procure 100 Ltr/hr capacity burners for the HAG in place of 250 Ltr/hr. New lower capacity burners were installed in all the three HAGs. The cost of lower capacity burner was Rs. 2.00 lac for all three burners.

After installation of lower capacity burners, the HAGs were normally run at oil feeding rate of 65 – 60 L/hr. In this way there was a saving of 15 litre/hr per HAG of furnace oil was observed.

As the HAGs are run only when production of blended cement is being done in the mills, the annual saving of furnace oil will be 167.65 KL

3. Start up burner of kiln was modified to use furnace oil in place of HSD.

When the kiln is started after fresh brick lining, 24 hrs heating of the kiln is a must. During this heating, moisture of bricks is expelled other wise the bricks get damaged. Also to achieve ignition temperature of coal inside the kiln, heating of the kiln is required to be done.

In our kilns, heating was earlier done by burning of HSD/LDO through start up burners. Annual consumption of HSD/LDO for heating of the kiln was around 140 – 145 KL/year. It was decided to reduce the cost on this account and decided to use Furnace oil in place of HSD/LDO. The start up burner was modified for furnace oil by M/s Thermax make Heat Tracer System. Cost of the system was Rs. 7.00 lakhs. After installation of the modified system 100% furnace oil is used for light up operation of the kilns.

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Difference in the cost of HSD/LDO and Furnace oil is around Rs. 6995/ per KL. In this way a saving of Rs.9.90 lakh was achieved.

4. Dynamic separator was installed in place of conventional grit separator in coal mill.

Pulverized coal is fired into the kiln as source of heat. Fineness of the pulverized coal is very important and fuel efficiency of the kiln is dependent on proper combustion of the fine coal. The coal is ground in coal mills.

Originally coal mills were supplied with Static Grit Separator. The efficiency of the grit separator was not up to the mark and desired fineness of coal could not be maintained. Higher residue in fine coal is responsible for lower combustion efficiency and higher CO generation in the kiln inlet. This resulted in to higher coal consumption.

To overcome this problem, the grit separator was replaced by high efficiency Dynamic Separator supplied by M/s LNV Technologies in one coal mill. Cost of the installation was Rs 40.00 lacs.

After installation of the Dynamic separator in coal mill, we are able to maintain desired fineness of coal. This resulted into reduction in formation of CO at kiln inlet and thus reduction in coal consumption. A saving of 1000 tonnes of coal per annum is achieved.

5. 5 nos. of VVVF panels were installed. Four nos. for FK pumps of RABH dust and one for hot air fan of Raw Mill no.1.

Variable Voltage - Variable Frequency drive (also called VVVF inverter) is a power electronic controller used to control the speed of 3 phase AC motors (synchronous or induction) by varying the frequency and voltage applied to the motor terminals. Voltage and frequency relationship is decided based on the motor name plate data and the load characteristics.

Advantages :

- a) Step less speed can be achieved which is required in process control.
- b) Energy saving
- c) Improvement in productivity
- d) Process improvement and better quality of product

Fan Application :

Fans are variable torque loads, following are the relationship with fan speed:

- a) Torque is proportional to square of fan speed
- b) Fan power is proportional to cube of fan speed.

We have installed 5 nos. of VVVF panels in the year 2003-2004 at various drives as under:

4 nos. VVVF panels for the FK pumps of RABH dust

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1 no. VVVF panel for hot air fan for Raw mill no.1
Approximate cost of the 5 nos. VVVF panels is Rs. 8.00 lac.

After installation of the panels total power saving achieved is 15 Kw.

6. Grinding media load pattern was modified in Coal mill no. 2 & 3.

There are four nos. of coal mills in our plant to provide pulverized coal to kilns. All coal mills are air swept ball mill. The grinding media load pattern of the mills was as under:

<u>Grinding Media Ball Size in mm</u>	<u>Quantity in tonnes</u>
80	3.0
70	3.0
60	3.0
50	4.0
30	6.0
25	8.0

Total	27.0

The power consumption of mill motor was 300 – 305 KW.

It was observed that the size of crushed coal was reduced considerably. Therefore , it was decided to reshuffle the load pattern of coal mill, removing bigger size balls. The coal mill no. 2 & 3 were charged with following grinding media:

<u>Grinding Media Ball Size in mm</u>	<u>Quantity in tonnes</u>
60	2.0
50	7.0
40	8.0
30	4.0
20	4.0

Total	25.0

After change in load pattern of grinding media the production level of the mills remain unchanged but the power consumption of mill motor was reduced to 285 KW. Thus a saving of 15-20 KW was achieved.

7. Halogen lamps were replaced by Aska fitting lights in Mines area for better illumination and power saving.

For illumination of mining area, halogen lamps have been provided. Rating of these Halogen lamps is 1000 W. It was decided to replace few of these halogen lamps with ASKA fitting lamps. Rating of these ASKA fitting lamps is 400 W only.

Total 6 nos. of halogen lamps were replaced with ASKA fitting lamps. It was

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felt that the illumination of the area has improved with ASKA fitting lamps.
Also power saving of 3.6 KW was observed.

Energy Conservation Plans & Targets

Energy Conservation Measures (Planned)	Anticipated savings in		Approx. investment (Rs. lakhs)	Project commencement & completion year
	Energy Value (Lakhs Kwh)	Rs. in lakhs		
Optimisation of cement mills no. 4 & 5 by installation of pregrinder & Dynamic separator (Close Circuiting)	16.20	72.90	1880.00	2004
Installation of modified outlet seal in kiln no. 1 .	336 MT Coal	5.38	12.50	2004
Dynamic separator for coal mills.	Fuel saving	-	80.00	2004-05
Dry flyash handling & transportation system.	Power saving in PPC grinding	-	150.00	2004-05
Modification of coal mill no. 3 by installation of outlet diaphragm (ALSTOM)	Power saving	-	10.00	2004
Additional Tertiary crusher by installation of Hazemag crusher at secondary crushing circuit.	Crushing capacity increase	-	65.00	2004
Upgradation of solid flow feeders, weigh feeders of kilns & mills.	Better process control	-	90.00	2004-05
Centralized control room for Kilns & mills	For plant optimization	-	260.00	2004-05
Vibrating Screen before coal crusher	Power saving running of coal crusher will be reduced	-	15.00	2004-05
VVVF drives for various process fans.	Power	-	100.00	2004-05

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	saving			
Captive thermal Power Plant of 10 MW capacity.	Saving in power cost	-	4400.00	2006

Energy Conservation Measures (Planned)	Anticipated savings in		Approx. investment (Rs. lakhs)	Project commencement & completion year
	Energy Value (Lakhs Kwh)	Rs. in lakhs		
Modification of Raw mill separators	Production of Raw mill will increase	-	600.00	2006
Modification of Cyclones and Riser ducts of preheater of kilns.	Power saving	-	500.00	2005
Third line of Mechanical Transport System from Cement mills to Cement Silo.	Power saving	-	170.00	2005
Installation of Electronic Packers in place of existing mechanical packer.	Loading capacity will increase	-	160.00	2005

Environment & Safety

For environmental protection and abatement of pollution, we have taken following steps to maintain clean and healthy environment in Plant and colony:

1. Four nos. of Reverse Air Bag House have been installed for both the Kilns and their Precalculator. Emission from the stacks of Bag Houses are practically nil.

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Reverse Air Bag House

2. Two nos. of ESP have been installed for dedusting the clinker cooler vent gases of kiln no.1 & kiln no. 2 in place of multiclone dust collectors originally installed.



Electro Static Precipitator installed at clinker cooler

3. High efficiency pulse jet dust collectors have been installed in all sections of the plant i.e. Crusher, raw Mills, Cement Mills, Packing Plant etc. All the dust collectors are working at almost 100% efficiency.

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4. Insertible type dust collectors have been provided at the transfer points of all limestone belt conveyor and coal belt conveyors to arrest dust emission generated by transfer of material from one belt to another.
5. Chem jet spray arrangements have been provided over the hoppers of primary and secondary crusher, limestone belts to control fugitive emission generated locally.
6. Water sprinklers have been provided on the roads inside the plant to minimize the fugitive emission generated due to movement of vehicles.
7. To maintain cleanliness, vacuum cleaners have been provided in packing Plant and Cement Mills sections.
8. High capacity exhaust fans have been provided in different sections like Crusher, raw Mills, Cement Mills, Packing Plant etc. for good ventilation.
9. A covered crane gantry of 350 mtrs. length has been provided to store all raw materials viz. Limestone, Clinker, Gypsum, Fly Ash & Slag. Another covered crane gantry is provided for storing coal only. Storage of all raw materials in the covered shed helps in the prevention of dust pollution during handling and in stormy weather.
10. Priority is given to production of blended cement over Ordinary or High Grade Portland Cement using maximum quantities of Fly ash and Slag, thus resulting in to power saving, mineral conservation, coal saving and helping the other industries (Thermal Power plants & Steel Plants) to reduce the environmental pollution. The consumption figures & the percentage of blended cement produced during last 5 years are given below :-

Year	Waste Material Consumed (M.T.)		Cement Production		
	Fly Ash	Slag	% OPC	% PPC	% PSC
1999-2000	214479	52941	22	68	10
2000-2001	203384	54201	30	63	7
2001-2002	203009	198108	19	51	30
2002-03	198162	305618	21	43	36
2003-04	207660	187977	18	57	25

Production of blended cement has been around 70 to 85% on average of the total cement produced in our plant which not only resulted into saving of limestone, coal and power but also helped in the reduction of generation of Green House Gases. In the current year 2004-05, the production of OPC so far is about 6% only and now it

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has been decided to totally stop production of OPC and manufacture blended cement only.

PLANTATION

Originally the natural land when leased to us was almost a barren land with hardly any vegetation. The soil, climatic and arid conditions appeared to be unfriendly to afforestation efforts. After soil correction, a massive plantation has been done in almost all sections of the plant, colony and mines area and total plantation done up to 31.07.2004 is 4,03,867 nos. The survival rate is more than 85%.

Particulars	Colony	Factory	Mines	Total
Area Available (H)	216.64	39.660	311.85	568.15
Area Under Plantation (H)	84.342	14.868	92.39	191.60

Total area acquired by Century Cement = 568.15 H
Total Area under Plantation = 191.60 H
% Area under plantation = 33.72



Massive plantation around the plant

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Road side plantation

REHABILITATION

As early as in 1974 an old mined out pit measuring 6.2 hectare had been converted into a reservoir of 10 meters depth having water storage capacity of 74 million gallons. Now its capacity has been further enhanced to about 200 million gallons by deepening and increasing the height of bunds. Green belt has been developed all around. Also the surrounding area has been developed as a picnic spot by beautiful garden and swimming pool attracting picnickers from as far as Raipur, Bilaspur and other distant places.



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Abondand mines pit converted in to a beautiful lake.

1. Mine water from present two quarries is pumped into this reservoir from where it is pumped to water filtration plant and then used for domestic and industrial requirement.
2. Initially this area was totally devoid of any dependable source of water and even the requirement for domestic consumption could not be met, leave aside the large requirement for major plant. It is this reservoir now which has proved to be the life line for plant and colony people through out the year.
3. Also, due to massive plantation and creation of huge reservoir a lot of migratory fauna are seen in this area providing additional attraction to the resident and visitors.

ENVIRONMENTAL MANAGEMENT SYSTEM – ISO : 14001

For better pollution control & continual improvement in our environmental performance, Environmental Management System ISO 14001 has been implemented in the plant & mines. The certification was granted in Nov'1999 for a period of 3 years and is further renewed up to Nov'2005
