ACC Ltd., Madukkarai

.

ASSOCIATED CEMENT COMPANIES LIMITED
UNIT- MADUKKARAI CEMENT WORKS (TAMILNADU)

Unit profile

Associated cement companies , the pioneer of cement industry produces and sales about 12 % of all varieties of cement sold in India. At Madukkarai cement works the installed capacity is 9.5 Lakh tonne /annum During 2003-04, 9.43 Lakh tonne of Cement was produced at a capacity Utilisation of 99 %.It is an IS 9000 and IS 14001 Company . The company has been awarded Indira Priyadarshini Vrikshamitra award and Golden Peacock Environment Management award in the year 2000.We also received the Best fuel efficiency improvement award for the year 2002-03 from NCBM,New Delhi.

Energy Consumption

The steady decline of specific energy consumption has been possible due to modernisation. The second phase of modernisation was started in the beginning of the year 2000 and now the upstream as well as down stream equipments have been operating at improved level of energy and Fuel consumption. The power as well as Fuel consumption has been continuously reducing since last three year. Further, for current year the energy consumption is still lower. The energy scenario for the past three year is given below.

Year	Specific Electrical Energy Consumption		Specific Thermal Energy Consumption	
	Kwh/tonne of Clinker	Kwh/tonne of Cement	Kcal/Kg of clinker	Kcal/Kg of Cement
2001-2002	72.90	104.96	875	708
2002-2003	68.80	99.88	864	700
2003-2004	68.50	98.8	860	688

This plant is unique in the Cement manufacturing .The raw material is ground wet and passed through a filteration unit for reduction in moisture from 35 % to 15 %.This additional process consumes about 7 KWH/Tn but the reduction in Fuel consumption is much lower than the conventional wet process.

Energy conservation commitment ,policy and set up
Energy conservation in ACC is away of life. In Madukkarai the commitment is total and from all employees. The se up is synergistic in nature as various QC and small group contribute towards the conservation activity.
The policy

> *"Involvement of employees in Energy conservation activity to enhance the awareness level of all employees. Manage our manufacturing activities in a manner to avoid unproductive run of equipment. The need for energy conservation is continuous and incremental."*

Energy conservation plan and targets

Energy targets are set for the entire manufacturing process and the non-process consumption.
The targets are set prior to commencement of a financial year when the budgetting process starts.

The targets are worked out on the basis of the power required by the machines to operate in most ideal condition at best possible output levels and projects planned to be undertaken for energy reduction.
By adopting the above measures ACC Madukkarai will be able to achieve a target of 95 KWH/Tn of Cement in the year 2005-06,and further it would reduce.

The conservation plan is propelled through the activities listed below

1) The energy audit is conducted to get the potential of the equipment to bring down the energy consumption .
1) Efforts are made for continous improvements in the target by bench marking with the best achieved in other units of the company or outside the company.
2) Training motivation and improvement projects taken through small group and Quality circle group activities are the measures taken by the organization meeting the improved targets .

4)Presentation of achievement made by each department and the action plan for improvement is done twice a month.

The management in order to bring awareness in workmen for energy conservation conducts seminars and also conducts competitions for the workers and officers by way of essays, slogans and posters.

In 1997 a 2 day workshop was conducted at Madukkarai Cement Works on energy conservation where leading personalities from educational institutions, industrial houses, Tamil Nadu Electricity Board , Indian Oil Corp. etc have given lectures on energy conservation in cement industry .All the cement units of Tamil Nadu participated in the above workmen.

Competition were conducted for workmen during the period . There was overwhelming response from the workmen.
A Competition on energy conservation on all works basis was conducted by corporate office in which all our works participated with a Quiz through V-sat. The quiz program created awareness among persons on potential areas of energy conservation.

Management has taken the energy conservation as a policy in the ISO-14001 Environment Management system of Madukkarai Cement Works. Action planes have been drawn by the department and targets are set for implementations with complete participation of workmen and management staff enclosed action plan

Management is on the lookout for improvements in areas where there is potential for energy saving .Management has installed a single energy efficient mill of 120 TPH cement grinding mill in place of 6 small energy inefficient mills. Dry fly ash consumption for PPC has gone up in this mill due to Quality improvement plan by which power consumption is expected to come down further.

Management has been encouraging cost reduction studies and measures .The recent thrust includes areas is scope and potential for reduction in energy consumption by changing practices and procedures and also by slight modification to the existing system .

To reduce the input power cost we have installed a Captive power plant of 15 MW capacity and saved about 7 crore in 2003-04.

ACC Ltd., Madukkarai

Project No :- 1

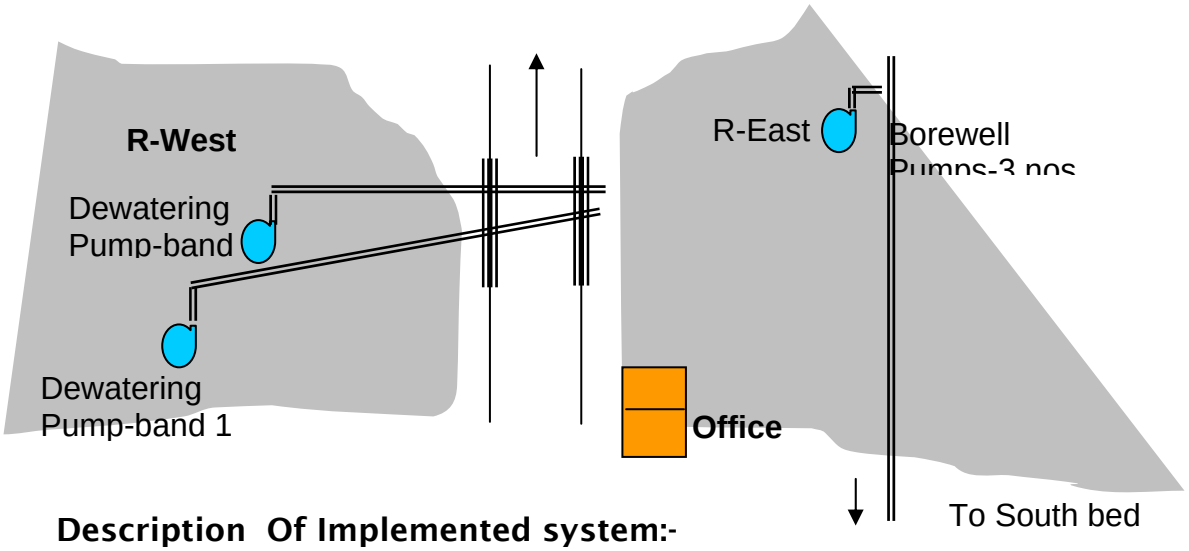
Optimisation of water pump operation in MDK Mines

Description of Project :-

Conservation of water at Madukkarai for Electrical energy savings

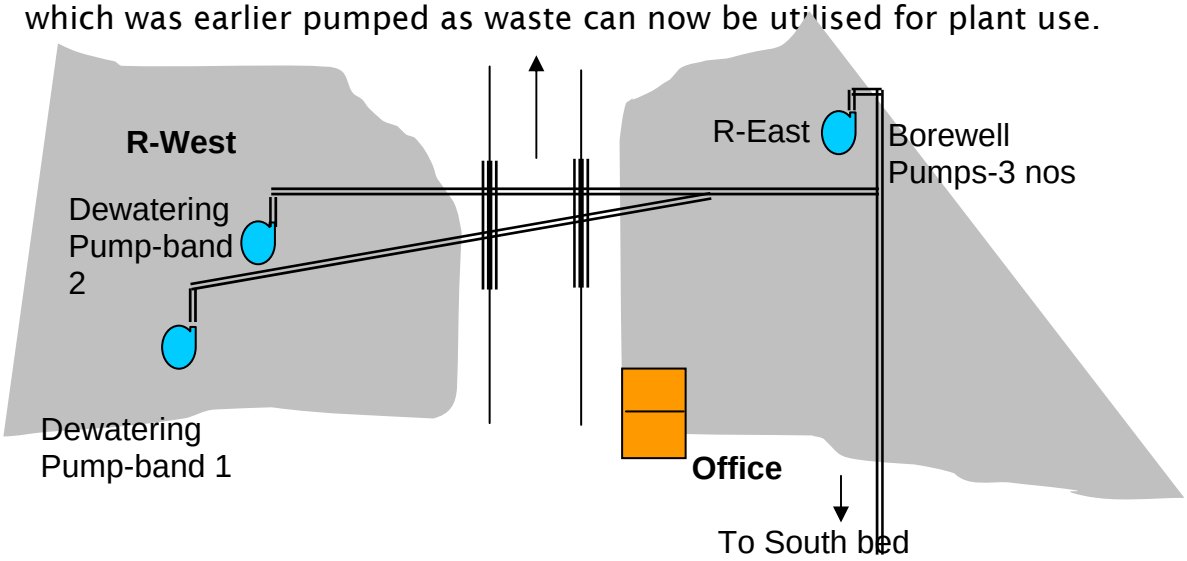
Background of System :-

The water from R-West section of Madukkarai mines was earlier being pumped out and this water was wasted.



Description Of Implemented system:-

The pipelines coming from dewatering pumps are connected to the pipeline coming from borewell pumps to the south bed. Hence the water which was earlier pumped as waste can now be utilised for plant use.



Actual Annual of Savings :- 40000 KL of water Equivalent to 48000 Units/Year= Rs 1.44 lakh/year. Project cost was 0.05 lakh

Project no. 2 -Optimisation of Crusher belt drives & improvement in productivity with modification in vibrating screen

i)Background of the project The capacity of the belt conveyor was lower than the Crusher.
ii)Observations made - There were spillage whenever primary crusher was operated at design output.

iii)Technical & financial analysis made
Increase in belt speed from 0.8 m/sec to 1.2 m/sec, and changing the screen from 30 mm size to 25 mm size to utilise full capacity of secondary Crusher.
Project cost =0.2 lakh

iv)Impact of implementation.

After implementation of this system 0.150 kwh/Tn of crushing was saved.
Savings for 1000000 Tn
Total savings = 0.15*1000000*3 = Rs 4.5 Lakh

3. Optimisation of Mixer Basin Blower air requirement

i)Background of the project - These blowers are required for aeration of mixer basin.
ii)Observations made -Whether it is one or two mixer basin same blower of 1500 m3/Hr and 8000 mmwG pressure was used**.**

iii)Technical & financial analysis made -
For one mixer basin the head required is 4000 mmWG,a suitable PD blower of 800 m3/Hr and 5000 mmwg pressure rating is optimum design.this blower was installed.
Cost of the project = 0.8 lakh
iv)Impact of implementation.
Savings = 20 KW x 4 Hrs x 260 days x 3 Rs/KWH = Rs 0.624 lakh/year

4.Installation of seal water pump in Raw Mill

i)Background of the project -The number of slurry pumps reduced, but the same slurry pump was operating.
ii)Observations made/ Technical & financial analysis made

Due to reduction in slurry pump,total seal water requirement reduced from 300 Litre/minute to 150 litre/minute. The location also required change. A new pump of lthe decided capacity was installed. The cost of seal pump was Rs 0. 1 Lakh and so the payback was about 4 months.

iii)Impact of implementation
Savings = 4 KW X 10 HRS X 224 Days x 3 Rs/unit =0.267 lakh/year

5.Replacement of 6" water pipe by 10" pipe from vibro bin to ball mill and thereby reducing recycled water pumping.

i)Background of the project - The vibrobin is the equipment which collects water from flotation rejects. This water is used in ball mill and excess,if any goes to recirculating pump. Due to increase in flotation plant Capacity th water collection increased,and pump running hours increased.

ii)Observations made
The flotation Capacity increase had resulted due to increase in Ball mill grinding volume.

iii)Technical & financial analysis made
The water requirement of ball mill also had gone up, but this was augmented by recirculating water pump.If the dia of water pipeline from Vibrobin is increased from 6 inch to 10 inch,the water will not go to recirculating pump and ball mill requirement can be met .
iv)Impact of implementation
Savings = 20 Hrs x 4 kw x 252 days x Rs 3 = 0.27 lakh

6.Installation of Warman slurry Pump for Ball mill

i)Background of the project- The wet ground limestone is conveyed by slurry pump .The efficiency was checked and found to be lower than 50 %.

ii)Observations made - The deterioration in efficiency was due to erosion of impeller. Warman pumps are known for their abrasion an erosion resistance. Installation of this type of pump would maintain the efficiency at optimum level ,hence energy saving also is possible.

iii)Technical & financial analysis made - The expected savings could be maximum 10 KW in power. The payback would be about 3 years,if energy savings are considered,but this pump would givea continuous run for 5000 Hrs, maintenance free.

iv)Impact of implementation
For 2503 hrs of operation the savings was Rs 0.6 lakh.

7.Optimisation of Cell House Blower air requirement

i)Background of the project -The new generation cell requires air for agitation.The air is supplied by PD blower.
ii)Observations made- There are 4 cells , 2 number 22 KW blower use to operate for old cells and one 90 KW blower was used for new generation cell . By the air requirement optimsation 19 m3 /minute air consumption could be reduced. Ii was suggested that one 22 KW blower can be removed, one 22 KW can be

kept as standby. and 90 KW blower would operate for 3 cells. In case of all 4 cells are operated, one 22 kw blower of 19.8 m3/min capacity would be operated.

iii)Technical & financial analysis made - Pipelines were rerouted.Overhauling of blowers were taken up. Pulleys were changed for a cost of Rs 1 lakh.

iv)Impact of implementation

Savings = 10 Hrs x 20 kw x 280 days x 3 Rs/KWH = 1.68 lakh

8.Fan less cooling tower for vaccum pump cooling water requirement in Kiln section.

i)Background of the project - Cooling towers with fan consume more power,whereas fanless cooling tower consumes nil power.

ii)Observations made

The analysis for the observation is given below.

iii)Technical & financial analysis made

Cost benefit of Cooling Tower

conversion to Fanless

Kiln cooling tower

Requirement		
Water Flow rate	m3/Hr	100
Input water temp	Deg C	50
Cool water temp.	Deg C	27
Wet bulb temp	Deg C	27

Present power consumption 13 KW

Cost of implementation - RS 3 LAKH

iv)Impact of implementation

For 5500 hours of operation the savings calculated is Rs 2.145 Lakh

9.Reducing of bends in suction line of Raw Mill Pump No.4

i)Background of the project
The Raw mill slurry pump no. 4 used to be operated for about 300 /month.
ii)Observations made
The line layout was such that one bend could be reduced.
iii)Technical & financial analysis made
1 kw saving was possible at a cost of Rs 0.1 lakh for changing the layout and reducing the head.
iv)Impact of implementation
For 2100 hous the calculated savings = 0.63 lakh

10.Optimisation of operating seal cooling pump for slurry pumps in ball mill and cell house

i)Background of the project -The number of slurry pumps reduced, but the same slurry pump was operating.
ii)Observations made/ Technical & financial analysis made
Due to reduction in slurry pump,total seal water requirement reduced from 300 Litre/minute to 150 litre/minute. The location also required change. A new pump of lthe decided capacity was installed. The cost of seal pump was Rs 0. 01 Lakh and so the payback was about 4 months.

iii)Impact of implementation
Savings = 2 KW X 20 HRS X 330 Days x 3 Rs/unit =0.42 lakh/year

11.Installation of Separate dust collector for Air lift ventilation for Kiln ESP and

i)Background of the project
The air lift is the equipment which is conveying ESP collection to the surge bin.Air quantity required is 2300 m3/hr at 5000 mmWG
ii)Observations made
This air was vented out in the Preheater gases at almost ambient temperature, whereas the preheater gas temp. is more than 580 deg C. The preheater gases are used for cake drying as the process is semi wet.
iii)Technical & financial analysis made
If a separate gas venting for air lift is provided the fuel savings could be 2 K cal/KG clinker.This would require reduction in Kiln Coal firing and hence the Cooler also can be optimised due to reduction in hood draft.So total reduction in fuel consumption was 5 Kcal/Kg clinker
In addition to this the difference of the Preheater fan and dust collector fan power will be about 4 KW
Cost of the project -25 lakh
iv)Impact of implementation
Savings =13.1 lakh

12. Installation of gantry cross belt

i)Background of the project - Reduction in Crane handling and dust emmission is possible.

ii)Observations made

The potential

If the belt is extended across gantry the use of cranes for filling up the uncovered areas can be elliminated.

iii)Technical & financial analysis made

The belt was installed at a cost of Rs 0.15 lakh

iv)Impact of implementation

The benefit for one month = 0.38 lakh

13.Shifting the tail pulley of belt in Crusher

i)Background of the project - The belt length is more than required due to upstream modifications.

ii)Observations made

The running load is reduced by 6%(0.92KW) if the tail pulley is shifted.

iii)Technical & financial analysis made

iv)Impact of implementation

14.Elimination of Trufflo feeder feeding to secondary crusher

Trufllo feeder guides the material for falling from belt conveyor to secondary crusher.It is possible to provide the guideof static type,instead of rotating type.

The running load is reduced by 8.78 KW as per running hour of secondary Crusher.

Savings = 0.4977 lakh at an implementation cost of Rs 0.1 lakh

15.Operation of lower capacity compressor in cell house during kiln stoppage

i)Background of the project - The compresed air requirement of ball Mill is met with kiln section Instrument compressor. Whenever kiln stops Cell house also has to be stopped**.**

ii)Observations made

If a compressor of required capacity is provided to Cell house there is a potential of saving 20 KWH/Hr during Kiln shut down

iii)Technical & financial analysis made

The kiln section compressor need not run during Kiln shutdown

iv)Impact of implementation

Savings of 0.62 lakh at an implementation cost of 0.15 lakh

16.Operating energy efficient water pump in place of LP pump no. 3

i)Background of the project - There are three low pressure water pumps.The efficiency of all three pump is different.One of them can be standby.
ii)Observations made
Till the time pump is low efficiency pump is not changed,most efficient pump are to be given priority.
iii)Technical & financial analysis made
The difference in power consumption of the two least efficient pump is 1.3 KW.
iv)Impact of implementation
Savings of 0.156 lakh at zero investment

17. Replacement of underloaded motor of middling pump

The pump was loaded at 30 %.The difference of power at the motor loaded at 70 % was 1.3 KW. Savings of 0.0078 was realised at a cost of Rs 0.05 lakh.

18. Installation of flat belt in mixer basin compr. no. 4

i)Background of the project
V - belts add to slippage whereas falt belt reduce the slippage.
ii)Observations made
Mixer basin compressor was choosen for the trial.
iii)Technical & financial analysis made
Savings of 2.5 KW is possible, a trial was conducted for monitoring the power consumption and the savings were confirmed.
iv)Impact of implementation
Rs 0.018 lakh was saved at a cost of Rs 0.75 Lakh

19. Installation of higher capacity pump in cell house

i)Background of the project
For four rows of cell four reject pumps were operating. The loading of pump was less than 70 %.A trial with 50 m3 /hr pump was conducted at 95 % load to reduce power consumption. It was observed that 1 KW can be saved if one pump of 50 m3/hr is operated
Impact of implementation
Rs 0.018 lakh was saved at a cost of Rs 0.15 Lakh

20.Changes in Cement mill no.7 D -Pump line layout for compressed air optimisation

i)Background of the project - The line losses appeared to be more.
ii)Observations made
Two number of bends could be reduced ,the loss reduction observed was of 5 KW.
iii)Technical & financial analysis made
The bends were removed,and the power was measured.
iv)Impact of implementation
Savings of 5 KW/per hour of operation

21.Replacement of 8 nos. 16 cb.mt. Fly ash Bulkers by 25 cb.mt.

i)Background of the project
The Fly ash is transported through bulkers from Mettur and unloaded in Fly ash by mechanical conveying.
ii)Observations made
The bulker design and capacity was inefficient at lower capacities.
Power saving was 60 KW/day. For the period of 2003-04 the total savings was 1.68 lakh .The investment was Rs 3.11 Lkah.

22. Maximising Cement filling in Silo no. 5

i)Background of the project Conveying Cement to Silo no. 6 and 7 is power intensive when compared to Silo no. 5 .
ii)Observations made
The distance of Silo 6 and 7 is more by 100 meter and the additional power consumption is 100 KW. Depending on market requirement the Silo no. 5 was given preference for storage and filling.

Impact of implementation
The savings realised was 3.42 lakh for 2003-04

23. Improvement in Cement mill output(about 1.5 TPH) due to higher fly ash usage by 0.3 % compared to 2002-03.

The Mill grinding media was optimised to suit the feed size which resulted in increase of Mill output. This was possible because the mill feed size became finer due to increase in Fly ash.The increase in output was 1.5 TPH.The savings on this was Rs 11.62 lakh.

24. Optimisation of operation of bags cleaning blower

After the bags are dislodged from packer machine, bag cleaning blowers are provided to clean the bag surface. At higher velocity this adds to pollution**.** The venting and blowe speed were adjusted **.**

This added to clean environment and power saving of Rs 0.63 lakh at zero investment.

25. Fly ash unloading compressed air line provided with dessicant type air drier

The Fly ash compressor is used for unloading of flyash.The venting of this compressor is connected to Fly ash silo dust collector.Due to moisture trapped in the compressed air the dust collector airslide was getting jammed and there were stoppage in flyash system and hence power loss**.**

A desicator was provided to avoid stoppage and save power of Rs 0.039 Lakh in the year 2003-04.

26. Fly ash unloading compressor air lines separated for use of two compressors for simultaneous unloading of two bulkers

The Fly ash bulkers are received from Mettur. Only one bulker could be unloaded in the Flyash silo. A provision was made to unload two bulkers simultaneously .A savings of Rs 0.0975 lakh was realised at a cost of Rs 2.5 lakh for raising the infrastructure.

27 Improvement in Kiln output by reducing pressure drop in preheater system

i)Background of the project
There was production interruption due to coating at kiln inlet
ii)Observations made
Kiln raiser duct with the ref drg no: ACC/MDK-463/PH-06/040 (Old)
Size of the duct: 1500mm x 1600 mm
Refractory thickness: 214
Both sides: 214 x 2: 428mm
Effective size of the duct: 1072mm x 1172mm

Kiln raiser duct with the ref drg no: ACC/ A1/MDK-463-PH-06/131 (Modified)

Size of the duct: 1920mm x 2430mm
Refractory thickness: 215mm
Both side: 215 x2: 430mm
Effective size of the duct: 2000mm x 1490mm
iii)Technical & financial analysis made
The pressure drop reduced by 80 mm,which gave way to increased production
iv)Impact of implementation
After the modifiaction the kiln output increased,the power savings was 9.231 lakh unit.which is 27.8 lakh

28.Providing VVFD in cooler ID and PA fans

i)Background of the project -The CPP ID fan and PA fans were operating with dampers,and having losses.

ii)Observations made
It was possible to reduce losses by providing VVFD. The ID fan was running between 30 -65 % damper and having 10 % damper loss.The PA fan was running at 25 -40 % damper and having 20 % loss.
iii)Technical & financial analysis made
The cost of installation was 10 lakh.
iv)Impact of implementation
After installtion 50 KW was saved which is 11.88 lakh.

29.Disconnecting underloaded transformers

i)Background of the project - Kiln lighting load was connected to Two transformers .

ii)Observations made

It was possible to disconnect one of the transformer ,and load one transformer optimally.

iii)Technical & financial analysis made

The no load loss of the transformer was 1 KW

iv)Impact of implementation

For 303 days the savings is 0.275 lakh

Abstract Ref. No. CHM-668

A Case Study On Characterisation Of Physico - Chemical Parameters, Influencing Semi-Wet Process Of Cement Manufacturing

Dr.A.K.Saxena, Mgr. Prod./ M.K.Jha, Dy. Mgr. / P.K.Kaku, Sr. Vice President
ACC Madukkarai Cement Works, Madukkarai – 641 105, Coimbatore (Tamilnadu)

INTRODUCTION

ACC Madukkarai Cement Works, located at Dist. Coimbatore in Tamilnadu state adopted a unique technology of Semi-Wet Process of cement manufacturing in the year 1989 by installing a kiln with 2 stage Pre-heater and a Pre-Calciner with rated capacity 1600 TPD. The kiln operated up to an output level of 1800 TPD. The Semi-Wet Process, included 5 nos. of Rotary Drum type slurry filters for filtration of slurry. The limestone rich slurry containing 34.5-35.0% moisture is filtered through these filters and the cake so obtained from the filters containing around 15% moisture is fed into Crusher-cum-Drier unit for drying and disintegration of material before it is fed into the pre-heater which is similar to a dry process kilns. The heat from pre-heater gases is used for material drying purpose. In the year 2000, kiln capacity enhanced from 1800 TPD to 2350 TPD by adding second stream of pre-heater with installation of one more slurry filter. It was the time when realization of increased kiln capacity was not getting materialised, either due to shortage of cake or the issues related to burning of clinker i.e. Pyro-processing. The coarser ground slurry facilitates the filters output but at the same time makes burning difficult. This needed a systematic approach to make balance between the two and to achieve the full benefit of capacity increase. The present case study deals with the approach made at ACC Madukkarai Cement Works for not only achieving the increased rated Kiln capacity but to get even more out of it.

SLURRY FILTRATION

The filtration of Kiln Feed slurry which is basically a suspension of finely ground limestone (94-95%), Bauxite (3.5-4.0%) and Mill Scale (0.7-1.0%) in water (34.5-35.0%) is influenced by several factors. The testing of filtration characteristics for industrial application is, in general, is carried out to either;

- To design a unit where it does not exists,
- To outline specifications for a new unit for changed capacity where the units are already in operation ,
- To determine changes in operating conditions for units already in operation.

The best specifications cannot ordinarily be attained by considering the filters operations alone, as wide variations in physico-chemical properties of slurry affects performance of slurry filters substantially. To understand this aspect a systematic study was conducted for filtration process with changes in slurry properties. The factors, which affect the slurry filters efficiency are many and some of them are listed below;

- Chemical Nature of Slurry
- Particle Size of Solids
- Feed Solids Concentration
- pH of Slurry
- Flocculation or Dispersion of Fine Solids
- Viscosity of Liquor
- Filter Cloth Condition
- Surface Tension
- Applied Vacuum
- Temperature of Slurry or Cake
- Cycle Time (Speed of Rotation)
- Agitator Speed
- Cake Compression/Permeability
- Type of Filter Cloth

Though many of the above factors are considered while designing the equipment and they become system constant, until & unless changed based on permanent changes in operating conditions. The factors, which are variable in nature and have significant affect on efficiencies of filter and pyro-processing as well are identified as given below;

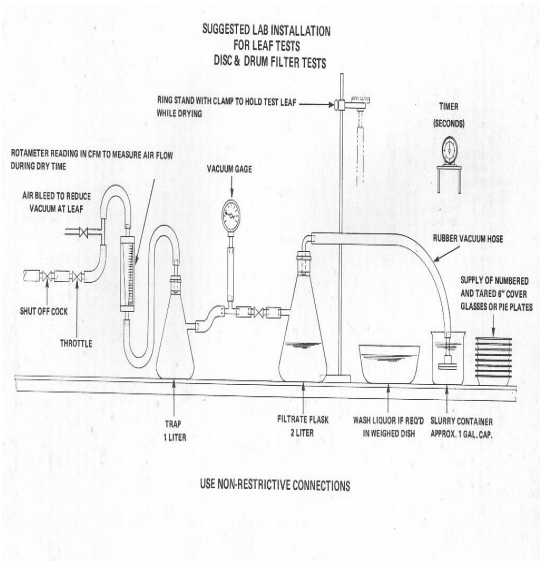
- Moisture content in slurry
- Particle size distribution of solids
- Mineralogy of material
- Nature of Flocculant (Filter Aids)
- Dosage of Flocculant
- Washing of filter media
- Quality of wash water

- Filter cloth condition

The present study is confined to understand the impact of these parameters and to optimise the same to achieve best performance out of it. While the affect of slurry moisture, particle size distribution and different type of Flocculants are studied in Laboratory, the affect of other parameters evaluated on plant scale. For the purpose of evaluating affect of particle size on Pyro-processing, the free lime content in clinker is taken as a base.

EXPERIMENTAL DESIGN AND METHOD

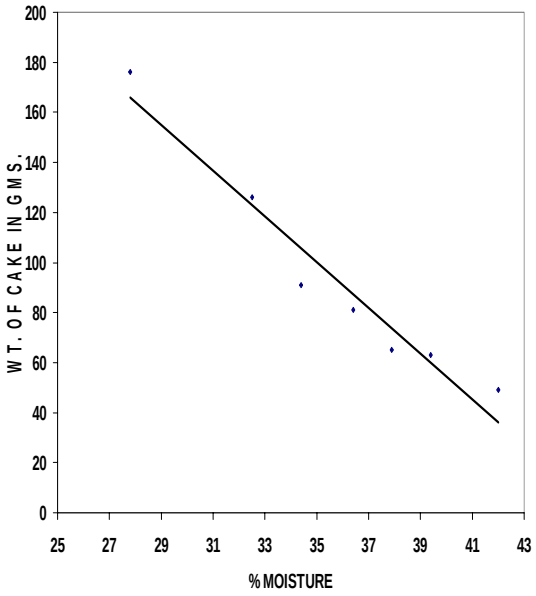
Leaf test is the most simple and practiced method for the study of the filtration characteristics. The suggested model consisted of vacuum supply with a vacuum gauge. The leaf was connected to vacuum through tube. The test was conducted with slurry of known fineness kept as a variable. Similarly moisture/Flocculant kept as a variable in another set of experiments. The particle size selected for this purpose are 212, 90 and 45 micron, which are used for control of quality of cement manufacturing process. The different type of Flocculants received from various suppliers tried for identifying the most suitable one for this specific application. The entire process water, which include process of limestone beneficiation by froth flotation process, is recycled and hence the effect of pH of water is not experimented in this study. The experimental arrangement is shown in Diagram below.



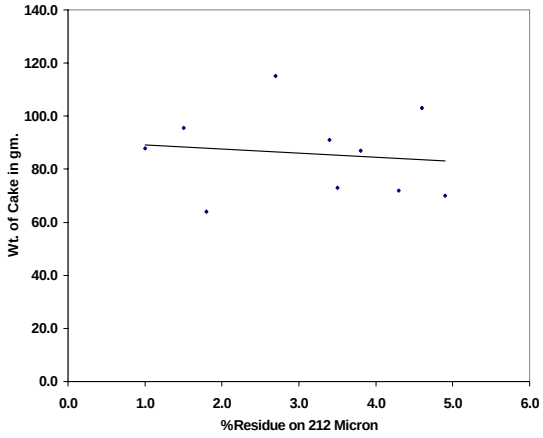
The affect of moisture content in slurry vis-à-vis the cake out put is shown in the graph. The affect of different particle size selected for this study vis-à-vis the cake output is shown in the graphs. Similarly the affect of these particle sizes on pyro-processing in terms of free lime content in clinker is also shown in the graphs.

For optimising the dosage of most suitable Flocculant, the plant scale trial conducted with dosage level varying from 1.0g to 8.0g per tonne of solids.

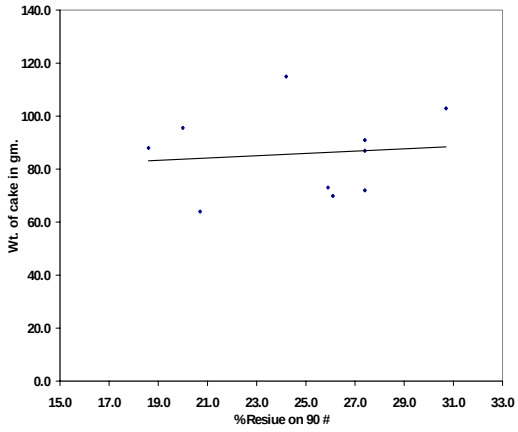
Slurry Moisture content v/s Cake Output



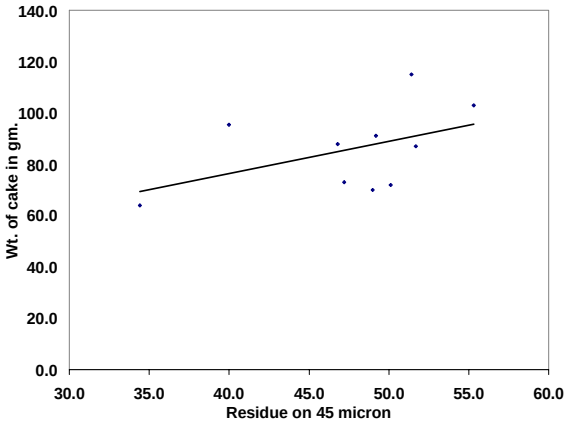
212 micron Slurry Residue v/s Cake output



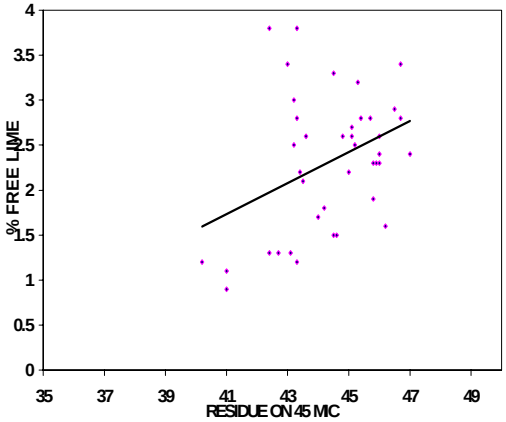
90-micron Slurry Residue v/s Cake Output



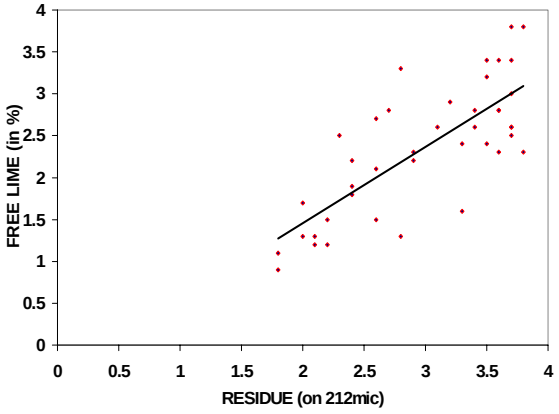
45 micron Slurry Residue v/s Cake Output. Free Lime



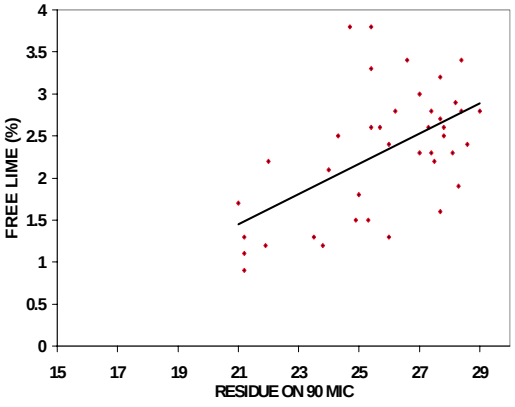
45-micron Slurry Residue v/s



212 micron Slurry Residue v/s Free Lime v/s Free Lime



90 micron Slurry Residue



CONCLUSIONS DRAWN

- The affect of moisture reduction is significant on cake output.
- No correlation between residues on 212 and 90 micron with cake output, but high impact on clinkerisation.
- Residue on 45 micron shows some correlation with cake output with low impact on clinkerisation.
- The presence of free clay in limestone adversely affect the quality of filtrate and thus damages the quality of wash water. This substantially reduces cake output and upsets entire operation.
- The most appropriate type of Flocculant selected as a Filter Aid.
- The addition of Flocculant increases cake output up to a certain dose level, beyond which the output reduces due to choking of the cloth.
- Effective washing of filter cloth and the filter drum grills increases the cake output significantly.
- The wash water is re-cycled in the process. Quality of wash water affects the effectiveness of washing due to choking of nozzles and thereby reduces the cake output.
- The condition of filter cloth directly affects the cake output. The affect of life of cloth on cake output also evaluated to achieve optimum life with optimum filter efficiency.

IMPLEMENTATION

The actions taken based on the above conclusions are listed below

- The moisture content in slurry reduced by about 1%. This achieved by installing on line density measurement in thickener underflow line and water flow meters in Raw mill.
- The first chamber length of Raw mill increased with change in loading pattern to reduce residue on 212 and 90 micron
- Wobbler plant installed in mines to remove free clay from lime stone.
- Anionic type most suitable flocculant selected and its solution of concentration 450-500 ppm is used. The optimum dosage level maintained is about 3.5g per tonne of solids.
- The original wash water spray nozzles replaced by modified one, which improved effectiveness of the washing. Modification also carried out in wash water line arrangement for washing of filter grills during weekly maintenance schedule.
- The quality of wash water is maintained by periodic release of system water into main flotation thickener.
- The optimum life of filter cloth is found to be between 2000-2500 hours and it is replaced accordingly.

ACHIEVEMENTS / BENEFITS

The benefits derived out of above study is substantial increase in filter drum output level which can be seen from the graph. This has resulted in achieving average output of kiln beyond 2400 TPD on consistent basis.