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GREEN AND CLEAN BEST PRACTICES IN PAPER & BOARD MANUFACTURING AT EMAMI


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Abstract :

Today, when environment is being polluted so rigorously, everyone has only one question on his / her mind that is how to save environment from being polluted. How to protect earth from disaster? The strongest way to protect environment is to save trees. Trees are one of the main creations of God that play an important role to keep air clean. If there will be no fresh air available then how human beings, animal, and birds survive; therefore, a clean environment is the need for every living object on this earth. Eco friendly activities are required to balance the ecosystem and protect from global warming. Paper industry is the only industry which plant trees at least 5/6 times more than they cut trees.

Emami paper Mills Ltd, Unit – Balasore is the largest News Print manufacturing unit along with Writing printing and Paper Board produced with 100% Recycled fiber. Growth and development in harmony with environment has always been the approach of this Mill. The Mill has already implemented the latest cleaner technologies in pulp bleaching and fiber recovery ,closed water loop for water saving, Massive plantation and online monitoring system for green and clean the Environment. Today it has also achieved the status of Zero Solid Waste by adopting the principle of Reduce, Reuse, Recycle and Recover. Waste water generation is also minimized by effective recycling & treating them better than the norms and utilizing it for paddy cultivation, plantation, gardening and plant use.

Key Words : Closed Loop of White water circuit, LP Steam in Pulper, Spot Cooling System, PAC-dosing control system, Hill Screen, Centralized compressed air system-for Energy Savings, pollution control measures, clariflouculator, diffused aeration system, decanter, green belt, hill screen, online monitoring system, greenhouse gas emission, LP steam, Virgin pulp refining, spot cooling system.

INTRODUCTION :

➢ Emami Paper Mills Limited (EPML), located at Balasore was established in 1983, primarily as an agro based unit for manufacturing Writing & Printing Paper, with an installed capacity of about 15 tons per day. Now it has been expanded gradually to produce 1,25,000TPA Newsprint, 17,500 TPA Writing printing & 1,32,000 TPA Paper Board along with co-generation power plant having capacity of 30.5 MW.

Initiation taken for Green & Clean Environment:

Environmental Protection & Control measures.

a. Only high solid deinking cell rejection is pretreated in the clariflouculator to improve the ETP performance.

b. State of art.- Waste water treatment plant comprising of :

- Mechanical Bar screens in the individual plant drains.

- Flash mixture for the combined effluent.
- Chemical preparation & dozing system
- Primary clarifier for the individual units (3 nos.)
- State of art latest technology Diffused Aeration System with Activated Sludge Process.
- Secondary clarifiers (2 nos.)
- Belt press / Decanter for the secondary sludge.
- Sludge dewatering plant having drum thickener & screw press to improve the dryness of entire primary sludge to 50% - 55%.

c. Recycling of treated Effluent

30% of the treated effluent is being used in various processes like sludge dewatering system, fly ash conditioning after passing through 100µ advanced automated filter & tertiary treatment plant (compressing of Multimedia filter & Activated carbon filter). Besides this it is also used for coal yard dust suppression, ash quenching, floor cleaning & foam killing/suppression in the main drain of PM#I & PM#II and PM#III. In addition to recycle discharge treated effluent is also being used by local farmers as per their requirement. Besides this industry has engaged local farmers to use 40 acres of own land for paddy cultivation by using final treated effluent.

Environmental Benefits

- Reduction in fresh water consumption
- Reduction in final discharge quantity of treated effluent to the river.

d. Zero water discharge from power plant

Rejects from RO plant and cooling tower blow down are being used in the process. Dual media filter and Mixed bed back wash water is being used in coal handling dust suppression system.

Environmental Benefits

- Reduction in fresh water consumption

e. Water Recharge Wells installed-17 no's

In view of maintaining ground water table, 17 numbers of recharge structures have been constructed & all are in operation, resulting no depletion in water table in the nearby areas.

Environmental Benefits:

- Improvement in ground water level and no adverse impact on peripheral community/society.

Recharge Well Monitoring Unit

Recharge Wells

f. Air pollution control system-maintaining all parameters as prescribed by Pollution control board.

- Dust suppression system consists of water mist spraying in coal conveyer/crushing zone/ transfer point.
- ESP's with 3 fields in operation for all the Co-generation units in flue gas path. Each is having a standby field for future expansion.
- Closed Pneumatic Ash Handling System, Fly Ash & Bed Ash Silos with vent filter arrangement and ash conditioner with spray arrangement. The recycled water from the ETP/Water treatment Plant is used for conditioning the fly ash.
- The sprinkler & water spraying device in the coal yard. The recycled water from the ETP/Water treatment Plant is used for dust control.
- Stack (chimney) with 64mt height (5MW), 70mt height (15MW.& 10.5MW)
- Plantation in & around the plant.
- One mobile water tanker moves in & around the plant to spray water on the road to minimize the fugitive dust emission due to vehicular movement.

g. Fly Ash Utilization

The entire fly ash generated is utilized for manufacturing fly ash bricks, We are also exploring to reclaim the waste land/ excavated morrum pit by filling fly ash soil and subsequently green belt development will be done.

Environmental Benefits

- Reclamation of excavated abandoned stone quarry & green belt development.
- To use fly ash as a resource material.

h. Using secondary sludge as a manure in cultivation

Activated sludge process involves addition of nutrient like Urea & DAP in the aeration system for the growth of microorganisms. Thereby BOD & COD is consumed as food by the biomass and the effluent quality improves. It contains Potassium, Nitrogen, Phosphorous, fine cellulose & other minerals. It has enough nutrient value.

i. On line Ambient Air Monitoring

Industry is highly concerned with environmental protection & abides by the all legal compliances. There are 3 numbers of ambient air quality monitoring system located at 1200 angle from the Central emission point & covers the entire plant area to monitor the quality of air. All three stack emission is also being monitored continuously by online monitoring system. Similarly final treated water is also continuously monitored. All the real data quality parameters are being transmitted to main gate of the industry for public view and to the CPCB & SPCB, continuously.

J. Sludge Burning as co-fuel

Emami is the only waste paper mill in India which is burning 100% primary sludge of ETP in power boiler to avoid land disposal and ground water contamination. Co- firing of de-inking sludge with coal has no adverse impact on environment.

Environmental Benefits

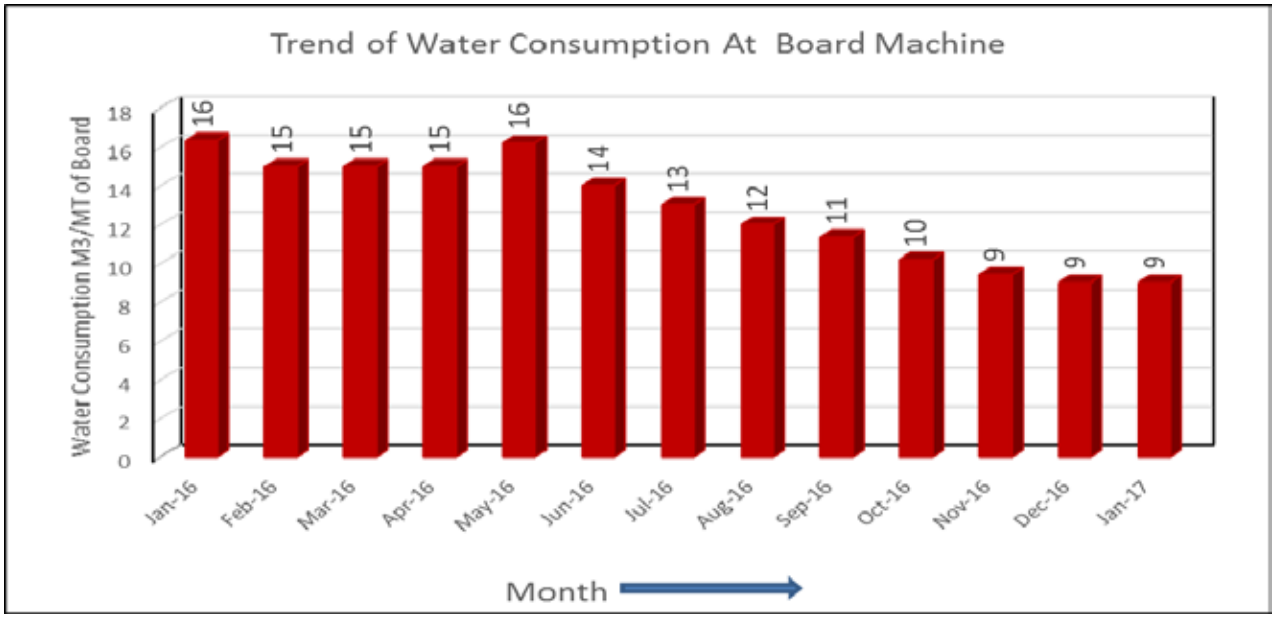
1. Reduced coal consumption in the boiler also leads to less emission of air pollutants (like SO2, CO2, NOx and SPM) thereby improving the local environment as well.
2. No land & ground water contamination.
3. Reduction in local air pollutants in greenhouse gases emission.
4. Reduction in coal consumption 40MT/Day

Innovative approach made in process to reduce water, energy:

1. Modification of White water circuit, by change in the loop without affecting the final quality of board, resulting in Energy as well as water saving.

Below are the details of the various schemes that were implanted after brain storming sessions by the Water Saving Committee.

S.N	Actions identifed	Expected Water saving
1	Sealing water to be replaced with Filler layer clarifier Tower except mechanical seal, Top & Back layer pump. Flow of sealing water to be measured with ultrasonic flow meter	500 M3/day
2	Back water to be used in all area for floor cleaning. Area in charges will provide the details	20 M3/day
3	Top, Under top, Back layer vacuum pump separator to be modified to avoid the make-up water in Top layer clarifier Tower. Desgin and developemt part completed with help of SPBC advise.	300 M3/day
4	Monitoring and arresting the leakages of sealing water of pumps and avoidng the excess flow of water In sealing.	10 M3/day
5	1st floor all screen water to be collect in sealing water tank through filter	50M3/day
6	Steam vacuum pump & ground floor pump sealing water to be collect in a pit & then pumping to sealing water tank	50M3/day
7	Garden Fresh water to be replaced with tertiary water	20 M3/day
8	Push button to be provided in all urinals	5M3/day



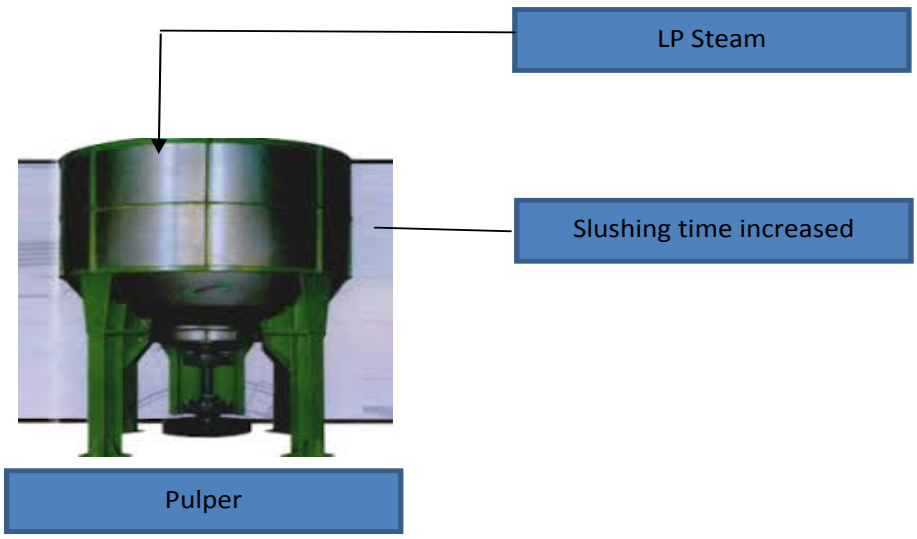
2. **LP Steam used in Pulper to increase the stock temperature of Virgin Pulp, thus improving the pulp disintegration resulting in the reduction of Refining Energy of the Virgin Pulp with improved formation and overall improvement in the quality of board.**

   Energy conservation is one of the most vital issues due to depleting source of energy, reduction in carbon emission and higher cost of energy.

   Two Refiners were used in series to get the desired freeness levels and the refining energy was quite high when pulping done in ambient temperature.

Steps taken for refining energy conservation at Emami

Brain storming sessions to review the process changes to be made to reduce the refining energy, without deteriorating the quality of pulp were held. The Virgin pulp is flash dried and in the process the pulp fibers are entangled to form a hard floc of fiber bundles. Adding steam to the Pulper helps in removing the latency of the pulp and making the fibers free. A Low Pressure steam line was given in the Pulper to increase the stock temperature. The slushing time was increased by 1-2 minutes. The pulp stock temperature was monitored on hourly basis, and the results of pulp properties were checked.



Results

Adding L.P. steam in the Pulper has reduced the refining energy from 54 Kwh/T to 38 Kwh/T. The quality of final board in terms of formation index has improved considerably, thus the surface appearance, bulk and stiffness of board was better.

Benefits

a. With increase in the Stock temperature, the latency of the pulp was reduced, thus the slushing quality of Virgin pulp has improved

b. Saving in the refining energy is direct cost saving as well as better quality of board, Approx. Savings of: -1.90 Lakhs/month.

EMAMI PAPER MILLS Limited.

BOARD MACHINE:- 4

Formation Index Report

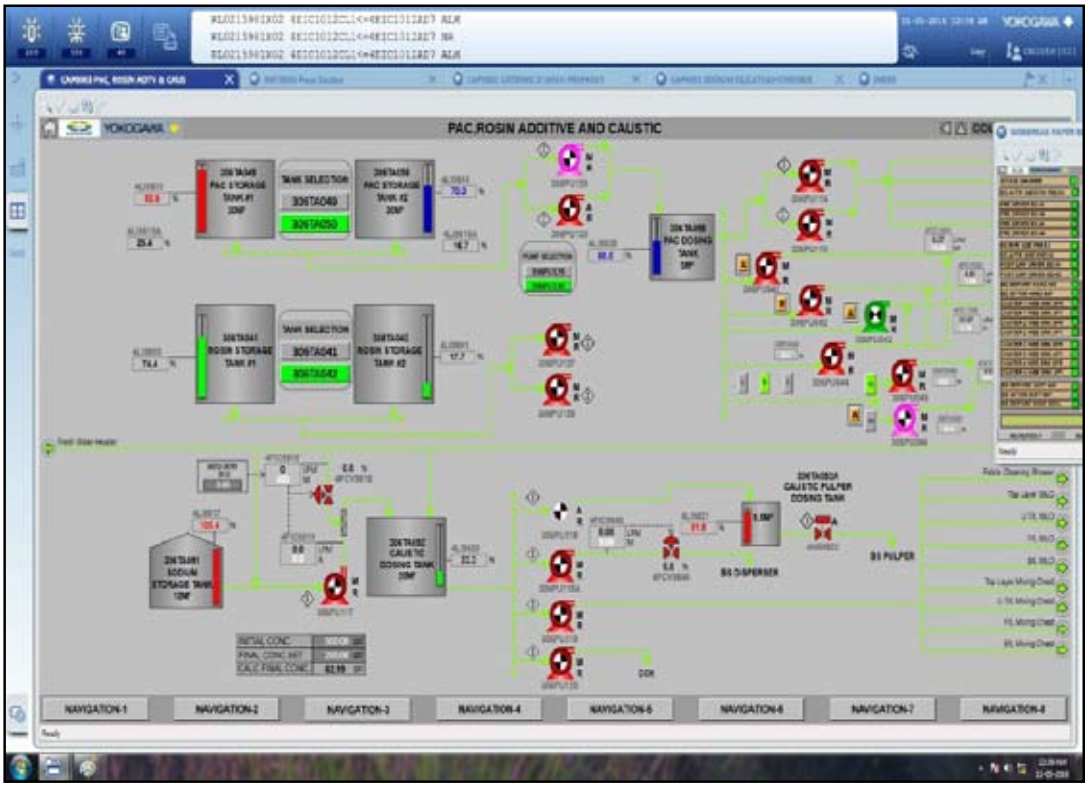
	July 2nd Run		AUG 1st Run		Aug 2nd Run	
Sr. No	EMF	FI	EMF	FI	EMF	FI
2	230	84	230	99	230	102
3	250	82	250	90	250	94
4	270	77	270	84	270	107
5	290	81	290	91	290	95
6	300	76	300	92	300	98
7	320	79	320	87	320	107
8	350	78	350	85	350	90
9	390	69	390	71	390	75
10	400	65	400	70	400	74

Note: Steam Started in Filler Layer Pulper From Aug-2016 1st run .

3. Spot cooling system was installed in the converting section to reduce the ambient temperature for better working conditions for all the working staff in the converting section.
   a. Balasore district is located in the northeast of the state of Odisha and lies between 21° 3' to 21° 59' north latitude and 86° 20' to 87° 29' east longitude. The average altitude of the district is 19.08 meter
   b. In Peak summer the temperature of Balasore goes up to 450C and humidity around 90% the working conditions is very hot and humid.
   c. A scheme was grafted to make the ambient temperature in the Converting section favourable for workmen.
   d. The heat load in the converting section is very high.
   e. Spot cooling system installed considering the entire head load calculation, a complete system to blow out the hot air and provide cooled air spot blowers in the area where the workmen are working has brought down the temperature by 10 0C.

Spot Cooling Unit

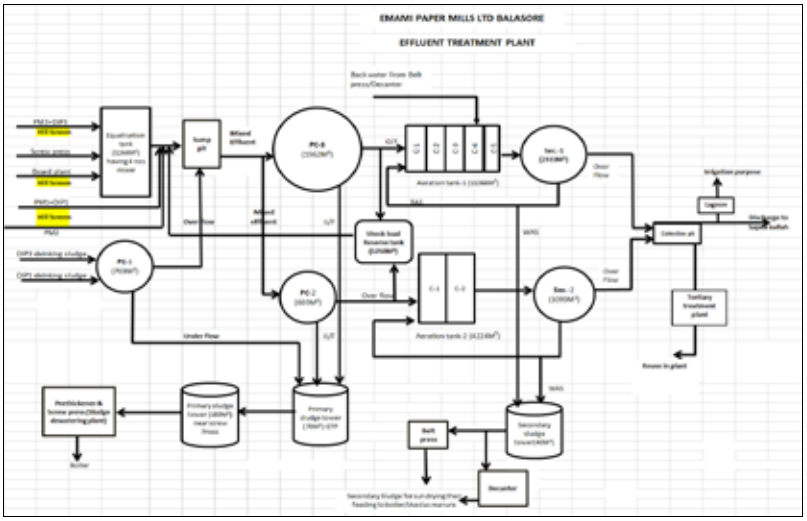
4. **In house modification in the dilution and control system the PAC** consumption has been reduced by 50%, thus reducing the chemical load on ETP as well as cost reduction.
   a. Poly Aluminium Chlorite is used for internal sizing in all variety of board.
   b. PAC-18 is very corrosive in nature and requires the correct selection of automation and filed equipment's was a challenge.
   c. With help of leading Indian vendor in PAC-18, proper set up of instrumentation, logic, pumps. valves and FRP tanks system was modified.
   d. The dilution system was modified and monitored in laboratory, earlier the strength of PAC-18 was fluctuating from 300-400 gpl, resulting in PH- variation of machine chest stock as well as back water PH.
   e. This fluctuation lead to system charge imbalance and thus the consumption of PAC as well as Rosin was high.
   f. Proper dilution with logic control enhanced to control the strength of PAC-18 from 120-150 g/lit, PH of head Box and back water was much stable, the system charge was balanced, thus the overall consumption of PAC-18 dropped down by 50%. Similarly, Rosin Consumption dropped down by 35-40%.



5. **Installation of hill screen,** before the equalisation pond has helped in recovering the valuable fibres going to ETP, resulting in cost reduction as well as reduction in the Load of ETP.

   a. An innovative idea to design and develop a screen to arrest the fibre loss going to ETP was designed and developed with the Design and Development Team of Emami.
   b. Fiber recovery from Board machine & PM-1, PM-2, PM-3 hill screens is approx. 8MT/Day
   c. Considering 40% ash content in the recovered fibers, approx. 4.t MT/Day is saved, Approx.: -0.96 Lakhs/day.
   d. The ETP load has been reduced by 10-15%.
   e. Below is the snaps of Hill screen and flow diagram of effluent going to ETP.

6. **Pollution Control Measure**



7. Energy Conservation Measure

Scheme: 1

CENTRIFUGAL AIR COMPRESSOR for the whole Mill	
Description of the energy conservation measure: Before: Individual Screw Compressors of various capacities are in operation for all the three paper machines and deinking plants to meet Process and Instrument Air requirement. In addition to this there was a requirement of compressed air for our New Board Machine. The total power consumption for all the Air compressors is 750 KW (139+260+341). After: The project activity involved installation of a Centrifugal Compressor for the whole mill to meet the compressed process air requirement in all the sections instead of individual compressor. This compressor rating is 650 KW and operating power consumption is 600 KW with a power saving is 150KW.	
Total investment, Rs. 235 Lacs	Year of implementation: 2014-15
First year energy cost savings, 150 kW x 8000 Hrs x Rs 3.90 = Rs. 46.8 lacs per year	

Energy Conservation Measure implemented in 2014-2015

Scheme: 2

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