

Preparedness Of Indian Industry For The Decade- Steps Taken At Emami

Maheswari H. K., Rao Bhaskar A., Nair M.B.S.

ABSTRACT

Emami Paper Mills Limited is one of the largest waste paper based paper mills in India has the following vision for the preparedness.

1. **Raw material- Use of more of local waste paper**
2. **Self power- Own co-generation plant to meet full demand of Power & Steam**
3. **Automation for Process and Quality control.**
4. **Online condition monitoring system.**
5. **Fully automatic reel wrapping machine.**
6. **Energy conservation.**
7. **Water conservation.**
8. **Environmental Protection**
 - a) ETP with diffused aeration system meeting all parameters as prescribed by Pollution control board.
 - b) Recycling of treated effluent-30%
 - c) Zero water discharge from power plant
 - d) Water recharge wells installed-9 no's
 - e) Burning of 100% primary and de-inking sludge in boiler
 - f) Fly ash utilization for making bricks.
 - g) Air pollution control system- maintaining all parameters as prescribed by PCB.
 - h) Using secondary sludge as manure in cultivation.
9. **Fully equipped R&D facility.**
10. **Introduction of SAP**

Introduction

Emami is the largest News Print paper manufacturer in India and produces International quality News Print paper at Paper Machine#3 which is running at the highest speed (1120MPM) in India. Emami Paper Mill is certified for ISO 9001 : 2008, EMS 14001 : 2004 & OSHAS 18001 : 2007 and TPM. Emami is the 1st waste paper based paper mill in India which has been awarded **TPM EXCELLENCE FIRST CATEGORY in 2006 & EXCELLENCE IN CONSISTENT TPM COMMITMENT AWARD SECOND CATEGORY in 2008 BY JIPM, JAPAN.**

Our commitment to water conservation & energy conservation is taken up very seriously and we have significantly reduced specific steam, power, fresh water & discharge of treated effluent per ton of paper.

Important Activities required for improving productivity, quality and efficiencies of the Plant

Use of local waste paper:

Waste paper is an important fiber

Emami Paper Mills Ltd.,
Balgopalpur, P.O. Rasulpur
Dist- Balasore-756020 (Orissa)

resource. In India waste paper recovery is about 22% compared to 55 to 60% in developed countries. Waste paper based industry is mainly dependent upon imports. Imported waste paper cost is higher than indigenous waste paper. Hence encouragement is required to improve internal collection to ensure low cost and sustained resources to the paper industry. Improper collection i.e. higher contamination in waste paper will have adverse effect on the performance of the mill due to higher pulper rejects, increase in maintenance cost due to wear & tear of the equipments and lower quality of final product. Hence proper coordination with the waste paper suppliers is required for improving the quality of waste paper.

Self Power:

In view of power shortage/restriction in India, co-generation/captive power plant in paper industry is an essential requirement to run the industry with 100% capacity utilization. However efficiency improvement in co-generation/captive plant is more important to reduce energy cost to achieve long term sustainability.

Automation for Process and

Quality control:

QCS systems are traditionally based on product control (basis weight, moisture and caliper), but this has been expanded to include process control (flow, pressure and temperature). This is possible by the use of distributed control system (DCS) as the foundation for all QCS system. Process control is used to be primarily for steady state conditions in the plant. Process control is being used for efficient handling of process & equipments. Quality control system (QCS) and profile control continue to be critical part of paper machines. QCS systems have expanded their scope to include most process in the mill, from control of stock preparation, wet end, head box, forming section, press section, dryer, calendering & winding, making coordinated production rate & grade change possible. Paper sensors and scanners are the heart of QCS systems. Process control remains the most cost-effective way to improve process and product performance.

Online Condition Monitoring System:

At higher machine speed, failure of moving part can take place at faster rate compare to slow speed machine with out giving notice to maintenance team

and even before understanding the problems costly breakdown can occur.

Benefits of online condition monitoring system-

Round the clock surveillance of the machine
Close to zero breakdown
Control over inventory
High rate of return on investment

Reel Wrapping:

Wrapping is the only process providing the reel with protection & good look. Transportation of paper reels to customer end can take from few days to week depending upon the distance & logistic operation. Changes in weather resulting humidity changes inside the reel may cause product deformation. These quality defects can result breaks and other problems in subsequent processing in press. Hence good wrapping & packaging is most important to meet the international standards and avoid the losses at the customers end.

Energy Conservation:

Energy conservation is one of the most priority issue due to depleting source of energy, reduction in carbon emission and higher cost of energy. Energy conservation is the practice of reducing the quantity of energy used. It may be achieved by efficient utilization and avoid unproductive & wasteful use of energy. Energy can be reduced by following practices:

- ▶ To minimize specific Steam, Power, Compressed Air & Water consumption.
- ▶ To install more energy efficient equipments.
- ▶ To minimize generation cost of steam & Power.
- ▶ To eliminate losses in process.

Water Conservation:

Over the years rising population, growing industrialization & expanding agriculture have pushed up the demand for water. Hence water conservation is the most cost and environmentally sound way to reduce our demand for water. India faces an increasingly urgent situation. Its finite & fragile water resources are stressed & depleting. Use of water efficient technologies should be adopted to minimize use of water. Waste water should be recycled and reused. Rain water recharging is becoming popular due to increasing ground water depletion. Ground water recharging by

harvesting rain water not only arrest ground water depletion, it also raises declining water table & can help augment water supply.

Environmental Protection:

Cleaner production technologies are required to minimize the waste generation. Indian paper industry is taking necessary action to meet Charter of Corporate Responsibility for Environment Protection (CREP) put in force by the Ministry of Environment & Forest (MOEF). In case of stack & air monitoring and waste water discharge, all parameters prescribed by State & Central Pollution Control Board are to be maintained strictly. To eliminate the disposal of paper mill sludge & fly ash, economical solutions are required like generation of bio-energy from sludge, use of secondary sludge as manure & utilization of fly ash for various purposes as given below.

▶ Burning of 100% primary and de-inking sludge in boiler

The utilization or disposal of solid waste has become crucial issue in the waste paper industries and for de-inking mills in particular. Open burning of bio mass residues lead to heavy emissions of smoke and air pollutants. Landfill disposal of solid waste accelerates landfill capacity depletion, and increases emissions of green house gases. Composting and spreading also lead to higher green house gas emissions than do's energy production. Paper mill sludge's are generally considered to be non toxic can therefor be utilized in some useful way than land filling. Fluidized bed combustion is the most suitable for thermal treatment of sludge & rejects. Combustion in the fluidized bed occurs quickly and completely. Neither fluctuation of heating value of the fuel nor changing proportions of non combustion components such as sand, metals or fillers have negative influence on the combustion efficiency. For fuels with a low heating value such as de-inking sludge's, the stationary fluidizing is probably a more suitable option.

For co-firing sludge in power plants operated with solid fuels, mixing mechanically dewatered sludge's into the fuels is usually sufficient. The mixing can use a spreading device or the existing fuel feed system.

Co- firing of de-inking sludge with coal altered the emission. The high alkaline content effectively suppresses the SO₂,

HCl and HF emissions. The cadmium and mercury contents of the untreated exhaust gas are also significantly lower since pollution of the de-inking sludge's with these heavy metals is low compared with hard coal. Hence hard coal power plant is to be most suitable for co-firing sludge's & rejects from waste paper processing mill.

▶ FlyAsh Utilization

Due to the different filler, coating pigment, residual chemical, and contaminant contents, ashes produced by the combustion of de-inking sludges have no consistent composition. The ash properties vary from paper mill to paper mill depending on the fuel mixture. The contents of different oxide present in the ashes that have special interest for the construction industries. The oxide composition indicates that the combustion ashes are often suitable for use in cement production. Other areas of use for the ashes are road construction and production of sand lime bricks and concrete.

▶ 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. Hence it can be utilized as manure in the cultivation.

Research & Development (R&D):

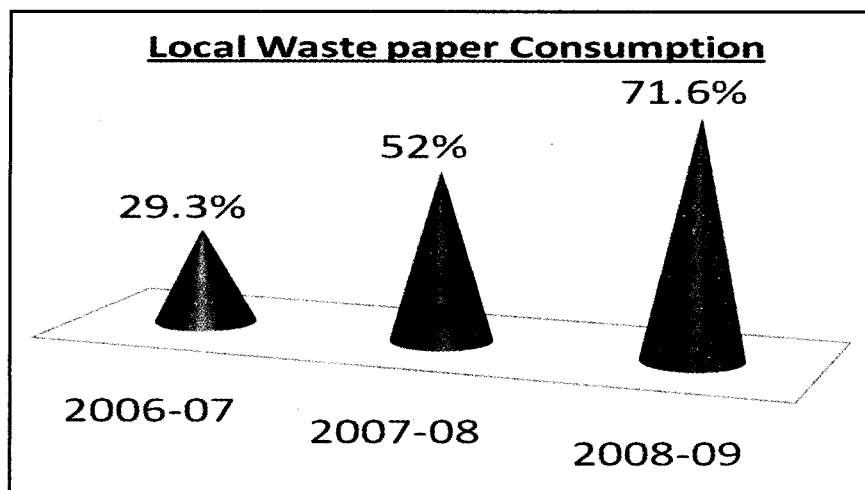
R&D expenditure of Indian paper industry is less than 0.1% of turnover as against of national R&D of 0.7% where as in developed countries 3 to 8% of turnover. R&D efforts are extremely low in Indian paper industry which needs to be increased & cutting edge R&D is required to tackle the challenges of the decade by new technological solutions. Importance to R&D is the need of hour and importance equal to production is to be given for attracting fresh talents from the Premier Institutions.

Operational Excellence through SAP, an ERP package:

ERP is used for planning resources to get maximum profits with minimum Efforts. For this, all the business functions and processes need to be automised and integrated.

Table 1

Year	Imported Raw material in MT	Indigenous Raw material in MT	Total	% of Local (Indigenous) waste paper	Paper Production, MT
2008 - 09	40368	101532	141900	71.6	118825
2007 - 08	43576	47260	90836	52.0	66724
2006 - 07	35405	14639	50044	29.3	40393



There are five major reasons why companies undertake ERP.

1. Integrate financial Information
2. Integrate Customer Order Information
3. Standardize and speed up manufacturing processes
4. Reduce inventory cost
5. Standardize HR information.

Benefits of ERP:

Main benefit of ERP is to Serve the information need of Manufacturing Industry, Cost cutting i.e. reduction in cost at almost all fronts in organization.

Steps taken at Emami for improving productivity, Quality, Plant efficiency & Environmental Protection -

1. Use of more of local waste paper

Collection system through dealers improved and now we use about 70% local waste paper as given in Table no-1. We have increased our paper production from 40393MT in 2006-07 to 118000MT in 2008-09 but consumption of imported waste paper increased only 5000MT i.e. 35405MT to 40368MT. We are getting ONP mainly from metropolitan cities. We are working with the suppliers to improve the quality of ONP and office waste etc. to maintain the high news print and writing & printing quality standards respectively. Special care is taken to

sort-out out throw & prohibited materials for minimizing the negative impact on cost, quality, & the mill process.

1. Self power

Equipped with 20MW co-generation plant (5 MW & 15 MW) Emami is self sufficient in power and steam using the lowest grade of coal having 45-50% ash. Energy conservation measures helped us to reduce power consumption and now we are planning to sell the surplus power.

2. Automation for Process and Quality control

Distributed control system:

The Paper Machine#3 (250TPD) is being operated through DCS. All the dynamic points in any plant can be seen

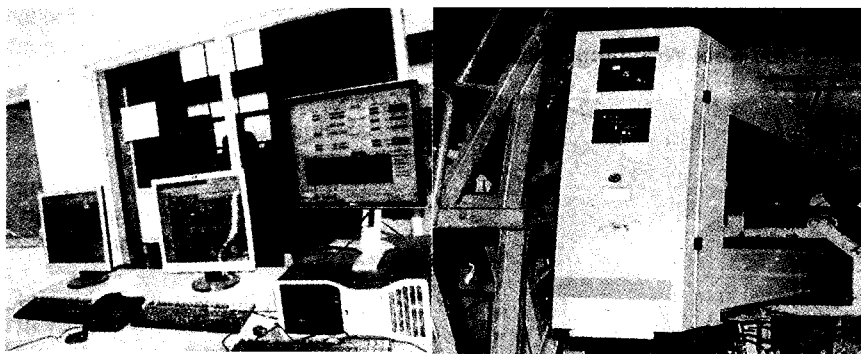
in any other node of system ensuring tight co-ordination and, at the same time security features ensure that only authorized people can operate relevant sections. It also features tight and seamless integration with paper machine electrical drive system. In similar way new environment friendly de-inking plant (300TPD) & 15MW power plant are being operated through DCS. In the rewinder section all the quality parameters are controlled by DCS to ensure perfect roll build up. Our 5MW power plant is also being operated through DCS separately.

Quality control system: The Paper Machine#3 is having QCS system for sensing GSM, Ash, Moisture and Caliper. The system is controlling machine direction ASH, GSM and Moisture as well cross direction Dry weight, moisture and caliper. Paper Machine # 3 Head Box equipped with cross direction dry wet control for better quality final product. Press section is equipped with steam profiler on suction roll to control cross direction moisture profile. In calendar section heated roll is equipped with Cal Coil for cross direction caliper profile. The Paper Machine#1 & 2 are having QCS system for sensing GSM and Moisture.

On-line condition monitoring system

On-line condition monitoring system installed at Emami PM # 3 is first of its kind in paper industry in India to monitor the health of rotating equipment/machinery round the clock and give alarm in advance to avoid break down. This on line system is very effective specially to monitor inaccessible bearings in Paper Machine, avoiding unplanned stoppage, safety of machine and man, The parameters that are monitored are

- **Shock Pulse Measurement:** It is unique technique which helps us to



DCS System at Paper Machine#3 QCS System at Paper Machine#3

understand the mechanical & the lubrication condition of rolling equipments bearings.

• **Vibration Monitoring:** Vibration signature from online condition monitoring system helps us to understand the machine condition like unbalance, misalignment, looseness, leveling of the rolls etc.

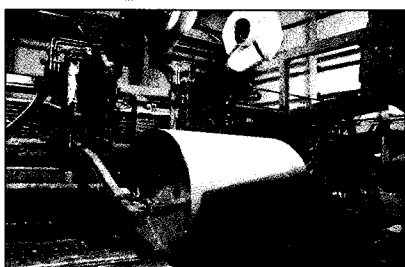
1. Fully automatic reel wrapping machine

Reel wrapping machine of Lamb make was imported from Germany. Reel wrapping is done automatically to provide optimum packing to the reels. On line Label printing, bar coding for better reel management at producer and customer end are the additional features of the system. Automation is done through Siemens S-7 PLC. Following modifications were carried out to meet the requirement of the customers.

- ❖ Machine modified to increase the maximum width from 1200mm to 1600mm width & 500mm to 300mm minimum width and maximum reel wrapping diameter increased. from 1200mm to 1270mm.
- ❖ Two line wrapper dispensers modified to single line for reducing installation space, reduce the wrapping time and increased the capacity to 60 reels/hour.
- ❖ Self adhesive disc end shielding replaced by indigenous Kraft with eco friendly modified starch resulting saving Rs.37lacs/annum.



Automatic Reel Wrapping Machine



Automatic Reel Wrapping Machine

Table 2
Energy Conservation measures 2008-09

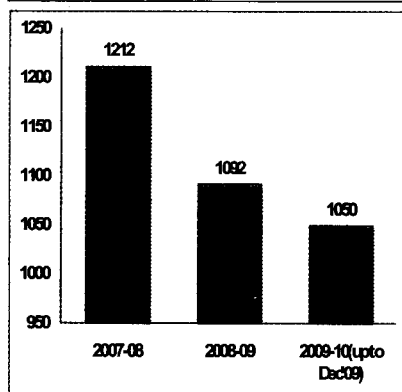
Sl No	Area	Month	Details	Savings	
				kW	kWh/day
1	Power Plant	Apr-08	In Power Plant, one Cooling tower circulation pump of 250kw stopped and 45kw pump started.	182	4368
2	PM 3	May-08	Stopping of one vacuum seal pit pump	23	552
3	PM 3	May-08	Stopping of HT vacuum pump#11(260kW) which was running in place of LT (160kW).	100	2400
4	PM 1	Jun-08	PM 1-VP 4 motor and pulley replacement for power saving	3	72
5	PM 3	Jun-08	FH pulper motor from delta to star	15	360
6	PM 3	Jun-08	PM 3, MCC 1,2,3 voltage optimization	60	1440
7	PM 2	Jun-08	Fresh water pump running for PM 2 stopped after giving supply from already running fresh water pump for PM 3.	20	480
8	DIP 1	Aug-08	DIP 1 Two nos 3A MAC cell pumps impeller trimmed	6	144
9	Power Plant	Aug-08	Frequency reduction of PP 2 to 49.0	240	5760
10	PM 3	Aug-08	Stopping 2 nos of Hydraulic pumps in PM 3 reel wrapping.	44	1056
11	PM 3	Aug-08	Running PM 3 knock off shower pump only during breaks for power saving.	110	2640
12	DIP 1	Aug-08	Interconnecting PM 2 & DIP 1 compressors and stopping DIP 1 compressor	8	192
13	PM 1	Sep-08	PM 1 TCC pump impeller trimming	3	72
14	PM 1	Nov-08	Fresh water pump running for PM 1 stopped after giving supply from already running fresh water pump for PM 3.	20	480
15	PM 1	Nov-08	In PM 1, pipe Line size of increased Potcher area pumps to reduce power loss due to friction.	2	48
16	Power Plant	Jan-09	De super heating pump stopped after giving supply from cooling water pump for SWAS panel.	5	120
17	Power Plant	Feb-09	Power plant 1 boiler make up water pump stopped after inter connecting with make up water pump for power plant 2.	7	168
18	PM 3	Mar-09	Power boss provided for process cooling tower fan, which automatically optimizes running voltage and thus saves power.	2	48
19	PM 3	Mar-09	Inefficient vacuum pump 9 stopped after serving the purpose by efficient vacuum pump 11 in PM 3.	70	1680
20	PM 3	Mar-09	Deculator vacuum pump sealing water recovery pump stopped after modification to supply water to super clear tank by gravity.	5	120
21	PM 3	Mar-09	Power boss provided for hydraulic loading pump in PM 3	3	72
22	PM 3	Mar-09	Auto star delta converter provided for disc filter re pulper motor	3	72

- ❖ To avoid wrapper bursting due to entrapped air the crimping station is modified by overlapping of additional wrapper during end shielding stage.
- ❖ Edge gluing system is added in the crimping stage of reel wrapping machine to keep the layers intact by gluing in between the wrapper layers.
- ❖ It is suitable for pair packing of two small size reels & our small size reel order has significantly increased from 50MT to 1000MT in a month.

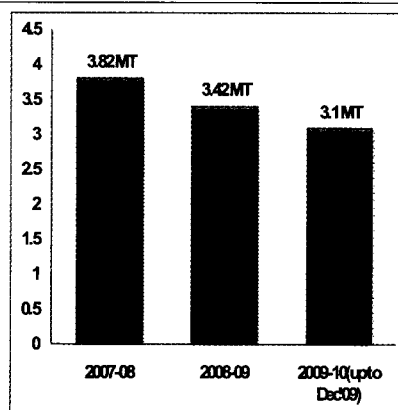
Energy Conservation measures successfully implemented during the Year 2008-09 as shown in Table - 2 & year 2009 -10 in Table 3 and we are able to reduce the specific electrical power consumption from 1212 kWh/Ton in 2007-08 to 1092 kWh/Ton in 2008-09 and further to 1050 kWh/Ton of paper in 2009-10(up to Dec'2009) and specific steam consumption from 3.82MT/T in 2007-08 to 3.42 MT/T in 2008-09 and further to 3.1 MT/Ton of paper in 2009-10(up to Dec'2009)respectively.

Table 3
Energy Conservation measures 2009-10 (Up to December'09)

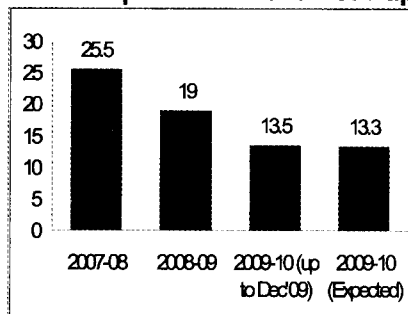
Sl No	Area	Month	Details	Savings	
				kW	kWh/day
1	DIP 3	May-09	Pump 31EP 71 stopped after interconnection	30	720
2	DIP 3	May-09	Pump 31KP 31 stopped after interconnection	11	264
3	DIP 3	May-09	Pump 31LP 41 stopped after interconnection	45	1080
4	ETP	May-09	Correct capacity pump for PC 1 overflow	11	264
5	PM 3	May-09	Disc Filter Recirculation pump which was running for vibrating screen shower stopped after modification	10	240
6	PM 2	Jun-09	TCC pump impeller trimmed	3	72
7	PM 1	Jul-09	56kW vacuum pump taken in line in place of 90kW vacuum pump after modification	25	600
8	PM 1	Jul-09	Flat box separator pump stopped after modification	4	96
9	Power Plant	Jul-09	Spreader motors which was running continuously are now operated for 5 min in an hour	5	120
10	PM 3	Aug-09	VFD provided for Vacuum sealing water C T Fan	10	240
11	PM 3	Aug-09	VFD provided for final tower pump	30	720
12	Power Plant	Sep-09	Compressed air pressure for ash conveying reduced from 5.8 kg/cm ² to 5.5 kg/cm ²	1.2	29
13	PM 1	Sep-09	Wire HP shower pump stopped after interconnecting with press HP shower pump	4.8	115
14	PM 3	Oct-09	Chiller & related equipments stopped	65	1560
15	DIP 3	Oct-09	Stopping of pump no LD 31 after interconnecting with LD 33.	13	310
16	PM 3	Nov-09	VFD for final tower pump	30	720
17	PM 3	Nov-09	Vacuum pump no 8 stopped	66	1584
18	PM 3	Dec-09	Sweetener stock pump stopped after interconnecting with refiner feed pump	7	168
19	PM 2	Dec-09	VFD for M/c chest pump	6	144
20	ETP	Dec-09	Sludge Transfer pump to screw press replaced with correct capacity pump	15	360
21	PM 3	Dec-09	Reel pulper running optimization	42	1000
Total from April 2008 to Till date				1385.5	33252



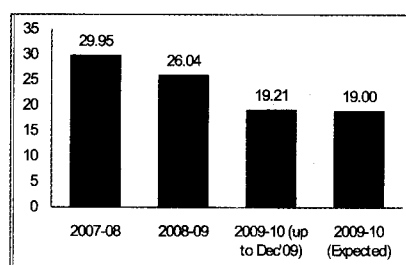
Specific Electrical Power Consumption - kWh/Ton of Paper



Specific Steam Consumption - MT/Ton of Paper



Final Discharge of the Treated Effluent - M³/Ton of Paper



Water Consumption - M³/Ton of Paper

6. Water conservation

Various water conservation measures as given in Table 4 including using 30% treated effluent & zero water discharge from power plant helped to reduce specific water consumption from 30M³ in 2007-08 to 19M³/Ton of paper in 2009-10 and final treated effluent discharge from 25.5M³ to 13.3M³/Ton of paper as shown in Table - 5.

1. ENVIRONMENTAL PROTECTION:

a) ETP with diffused aeration system maintaining all parameters as prescribed by Pollution control board (Shown in Table no-6)

- ❖ Mechanical Bar screens in the individual plant drains.
- ❖ Flash mixture for the combined effluent.
- ❖ Chemical preparation & dosing 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.)
- ❖ Sludge drying bed / Belt press for the secondary sludge.

836 diffusers are installed in 4 compartments in our aeration system. Activated sludge process with highly efficient aeration system results better quality of treated effluent.

Environmental Benefits

Consistent quality of treated effluent.

b) Recycling of treated effluent

30% of the treated effluent is being used in various processes like sludge dewatering system, fly ash conditioning, floor washing and for Paper Machine 1 after passing through 100µ advanced automated filter . In addition to recycle discharge treated effluent is also being used by local farmers as per their requirement.

Environmental Benefits

- ❖ Reduction in fresh water consumption
- ❖ Reduction in final discharge of treated effluent.

c) 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

Table 4

Sl No	Area	Details	Savings in m3 per Hour
1	PP	RO reject, cooling tower blow down, dense phase cooling & feed pump gland sealing water from power plant re-circulated	30
2	PM 1	PM 1 re winder cooling water diverted to pulper	3
3	PM 2	Gland seal water of PM2 ground floor equipments recovery.	2
4	PP	Filter back wash & MB regeneration water usage for dust suppression in ash plant and Coal handling plant.	2.5
5	DIP 1	DIP 1 all equipments gland sealing water recovery	5
6	PM 2	PM 2 edge cutter overflow water recovery	2
7	PM 2	PM 2 hydraulic cooling water recovery	10
8	PM 2	PM 2 vacuum pump sealing water recovery	25
9	DIP 1	Fresh water for TCC dilution replaced with back water in DIP 1	5
10	PM 3	Replacing fresh water with super clear filtrate in PM 3 for wire showers	50
11	PM 3	PM 3 & DIP 3 Gland sealing water recovery	5
12	PP-ETP	Use of treated effluent water in screw press, ash handling & Floor washing.	35
13	PM 3	Taking ulhe box separator drain to cloudy filtrate tank	10
14	PM 1	PM 1 refiner cooling water to sealing water booster pump tank	1
TOTAL			185.5

Table 5

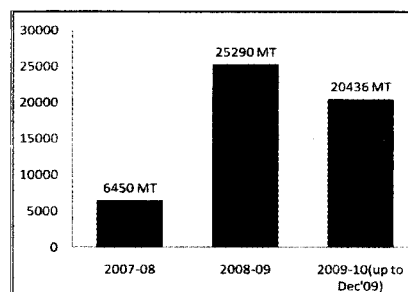
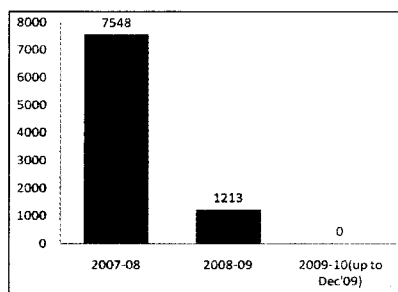
Year	Total Water Consumption, M ³	Final Production, MT	Water consumption, M ³ /MT	Final discharge of Treated Effluent, M ³ /MT of f paper
2007 - 08	1997615.0	66699.0	29.95	25.5
2008 - 09	3094708.0	118826.0	26.04	19.0
2009 -10 (Up to Dec'09)	1824844.0	94997.0	19.21	13.5
2009-10(Expected)	2405670.0	126500.0	19.0	13.3

WASTE WATER**Table 6**

Pollutants	Norms	Quality of discharge Waste Water in Nov'2009 as per report of Regional Pollution Control Board, Balasore, Orssa	Control Measures
pH	7.0 - 8.5	7.4	Activated sludge process with diffused aeration system.
Suspended Solids, mg/l	50 (Max)	34	
COD, mg/l	350 (Max)	146	
BOD, mg/l	30 (Max)	16	

Table 7

Year	Total Sludge Generation in MT		Total Sludge Utilization in MT	
	Paper Production in MT	Total Sludge in MT	Land Filling & Board Mfg.	Sludge Burning as fuel in Boiler
2007 - 08	66724	13998	7548	6450
2008 - 09	118825	26503	1213	25290
2009-10(up to Dec'09)	94997.0	20436	-----	20436

**Sludge Burning as a Fuel in the Boiler****Use of Sludge as Land Filling & Board Manufacturing****d) Water recharge wells installed-9 no's**

In view of maintaining ground water table, 9 numbers of recharge structures have been made & all are in operation.

Environmental Benefits:

Improvement in ground water level.

e) Burning of 100% de-inking & primary sludge in boiler.

Earlier the sludge from the primary clarifier used to be dumped for land filling or some quantity used to go for mill board (sundry) manufacturing. With the Environmental impact-ness of dumping the sludge in land, Emami decided to have a specially designed Power Boiler to accommodate the sludge to fire at dryness level above 50 %. The dewatering system consists of Drum thickener & Screw Press; it brings down the moisture content of the waste sludge from 96% to below 50% by using suitable polymers thereby making it suitable for utilization as a fuel in the boiler.

Presently, we are successfully firing 100 % de-inking & primary sludge of ETP in the Power Boiler economically as shown in Table no-7

Environmental Benefits:

- ❖ Avoided land fills which eliminates land pollution & fouling of near by areas.
- ❖ Reduction in local air pollutants and green house gases emission.
- ❖ Reduction in coal consumption 900MT coal/month (approx) resulting saving of Rs.6 lacs/month (in Dec'09 coal saved 899MT & cost of 'F' grade coal Rs. 2114/MT i.e. Total cost of coal saved = Rs.19 lacs and operational cost of chemical & power = Rs.13 lacs. Hence net saving = Rs.6 lacs)

f) Uses of 100% fly ash utilization.

Three numbers of brick manufacturing plant have been installed & running successfully and using our fly ash to make bricks for our own use & as well as supplied to others. Presently the entire fly ash generated is utilized 100% by manufacturing fly ash bricks, in road construction and filling low lying areas and in asbestos sheet manufacturing. We are also exploring to reclaim the waste land/excavated morrum pit by filling fly ash and soil and then green belt development will be made as shown in Table no - 8

Table 8

Year	Fly Ash Generation in MT		Fly Ash utilization in MT		
	Paper Production in MT	Fly Ash (conditioned with the spray water) in MT	Road Construction & filling low line area	Brick manufacturing	House construction & Asbestos sheet Mfg.
2007 – 08	66724	57495	32687	24808	----
2008 – 09	118825	97020	69355	25145	2520

Ambient Air**Table 9**

Particulars	SPM (μg^3)	RPM (μg^3)	SO ₂ (μg^3)	NO _x (μg^3)
Norms (24 hours)	500	150	120	120
Avg. Result, Nov'2009 as per report given by Regional Pollution Control Board, Balasore Orissa.	368	111	10.5	24.6

Stack Emission**Table 10**

Particulars		No.-1 (5MW Power Plant)	No.-2 (15MW Power Plant)
Particulate matters (mg/Nm ³)	Norms	100	
	Avg. Result, as per report given by Regional Pollution Control Board, Balasore Orissa.	57 (Oct'09)	44 (Nov'09)

Environmental Benefits:

To minimize the land pollution.

g) Air pollution control system-maintaining all parameters as prescribed by Pollution control board (Shown in the Table 9 & 10)

- ❖ Dust suppression system consists of water mist spraying in coal conveyer / crushing zone / transfer point.
- ❖ ESP's with 3 fields in operation for both 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 treated effluent 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) and 70mt height (15MW).
- ❖ Plantation around the plant

h) Using secondary sludge as a manure in cultivation

The excess biomass is removed from the ETP system to run the process uniformly. It is collected either from

drying bed or belt press & it is being used as manure in the cultivation by the local farmers and in our own plantation.

8. Fully equipped R&D facility.

Emami has setup a well equipped Research & Development laboratory for conducting the studies on the following areas:

- ❖ Product Improvement / Development
- ❖ Process Improvement / Optimization
- ❖ New chemical/alternate chemicals for cost reduction
- ❖ Environmental protection

Extensive R & D studies were carried out to optimize various chemicals used at both De-inking plant i.e. for Writing & Printing, and News Print paper and Paper Machines. Based on these studies, successful plant trials were taken and considerable cost of production reduced (Reduction of de-inking & bleaching chemicals Rs.350/MT of de-inked news print pulp). Plant trials also were taken for improvement in existing product and new developed product based on R&D studies. These new developed and improved products have been commercialized successfully. In similar way sludge dewatering chemical cost reduced from Rs.800/T BD sludge to Rs.550/T of BD sludge.

This has resulted in sludge burning for power & steam generation become economical. All incoming chemicals, packing materials, coal & waste paper quality is being monitored. In addition to R&D laboratory we have four other dedicated laboratories working round the clock. Two laboratories are engaged in monitoring of process parameters & final product quality. One laboratory is engaged in boiler feed water monitoring and one laboratory engaged in waste water, ambient air & stack, noise and screw press monitoring. We have 40 qualified graduate/Post graduate Chemists & Senior Chemists. Technical library is also attached with R&D laboratory for up gradation of knowledge for R&D & plant personnel.

9. INTRODUCTION OF SAP

Sap attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments' particular needs. The implementation process in progress and will go on line from 1st April 2010

Conclusion:

- 1) Use of local waste paper increased from 30% to 70% for manufacturing of superior quality de-inking pulp.
- 2) Self sufficient in power & steam & using lowest quality of coal having 45% - 50% ash in our 20MW co-generation plant.
- 3) Online condition monitoring system at Paper Machine#3 is effective and avoiding unplanned stoppage, safety of the man & machine.
- 4) Automation for process & quality control helped to improve the efficiency of the plant and quality of final product.
- 5) Modifications in automatic reel wrapping machine carried out to meet customer requirements of width and diameter of reels, improved productivity, and reduced cost of packing and meet International standards.
- 6) Energy conservation measures helped to reduce specific steam & power consumption from 3.82MT to 3.1MT and 1212 kwh to 1050 Kwh/Ton of paper respectively.
- 7) Water conservation measures including zero discharge from power plant helped to reduce specific water consumption from 30m³ to 19m³/Ton of paper.
- 8) 30% recycling of treated effluent

reduced the final discharge from 19.0m³ to 13.3m³ per ton of paper.

- 9) Three numbers of brick manufacturing plant using Fly ash are running successfully.
- 10) Nine number recharge water wells are in operation for improvement the ground water table.
- 11) Secondary sludge is being utilized for cultivation.
- 12) 100% de-inking & primary sludge is being burnt in the boiler for generating bio-energy economically and presently we are saving Rs.6.0 lacs/Month
- 13) Fully equipped R&D facility along with technical library & 40 qualified graduates, post graduates chemists & Sr. chemists.
- 14) The implementation process of SAP is in progress & goes on line from 1st April 2010.

Acknowledgement:

The authors are very much grateful to Emami Management for according permission to publish / present this technical paper.

Reference

- 1 Paper making science & technology - Recycled fiber & De-inking. Published in cooperation with the Finish Paper Engineers Association and TAPPI.
- 2 Paper making science & technology Paper making, part-3 finishing. Published in cooperation with the Finish Paper Engineers Association and TAPPI.
- 3 Ole Fadum- Quality Control Systems for Paper Mills

Paper360, 2009 (15)

- 4 Internal reports of Plant and R&D.
- 5 Brief report on Indian paper industry Annual Report of CPPRI 2006-07
- 6 Ramesh. Khuntia, Maheshwari H K, Kajol Roy Choudhary, MBS Nair. - Technological advancement in environment friendly de-inking process for quality improvement and cost optimization IPPTA July-Sept.'2009
- 7 Chowdhury Bikramjit, Reddy S V - The demand for installing on line bearing condition monitoring system on high speed paper machine IPPTA Jan March'2009
- 8 William K. Sacia, Jay Simmons The effects of changing ONP quality on a newsprint mill, Vol. 5: No.1 TAPPI Journal (13)