

# **A few words on survival of paper industries in india (Renovation, Modernisation, Perish)**

**KESHRI P. D.\***

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## **SUMMARY**

Investment in Paper Industry is shy because of higher Investment return Ratio. Therefore it calls for renovation or modernisation of existing Paper Industries. Because the capital required for renovation will yield comparatively better returns without affecting the existing production rate. In the light of above view point a typical case study has been done by the author. In his case study author has calculated the savings involved in Rs./ton of Paper as well as Rs.in lakhs/month for a Paper Mill producing 4000 T, of finished paper per month. Author has highlighted the various areas to be selected for this, for example by adopting high yield pulping partially for his set up a saving of Rs. 105 per ton of Paper is possible. The changes required only are some of the balancing/corrective equipments. The total impact comes to be Rs. 869.08 P per ton of Paper. Hence the author emphasizes for renovation/modernisation of existing integrated Pulp & Paper Mills instead of perishing them.

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India is a tropical country by virtue of which it has to face several natural calamities like less rains, draughts floods, cyclones and rapid growth in population. Above factors and lack in developing agricultural output with our indigenous resources has led to short fall in agricultural output, to the tune of growth in population which has burdened our economy heavily. Apart from this several other factors summed up in figure (1) prevents private investors/entrepreneurs for investments in industrial field. These factors are responsible for higher breakeven point. As far as Paper industry is concerned investments for setting up an integrated Pulp & Paper Mill have gone up abnormally high i.e. 5 to 6 folds as compared to cost in 1960. Investment return ratio has also gone high which discourages investment for setting up new paper industries.

Therefore in the present circumstances modernisation renovation is the only salvation for the survival of existing large paper industries in India. Most of the large integrated Pulp & Paper Mill in India are older by 20-30 years and hence they have outlived their lives. And, unless we take up a feasible modernisation scheme for our mills, the industries are bound to suffer. The cost of renovation will not be more than 10% of total investment.

This will give them life for another 20-30 years. Moreover renovated mills will be able to provide better quality of paper at lower cost, higher efficiencies and with inferior raw materials. In the light of above brief, a typical case study is undertaken for a integrated Pulp and Paper Mill producing 4000 MT of finished paper per month.

The areas selected for modernisation, cost reduction, better quality and higher efficiencies alongwith savings, Rs./Tonne of Paper and equivalent Rs. in lacs/month are listed and described in Figure (2).

## **PLANNED CULTIVATION :**

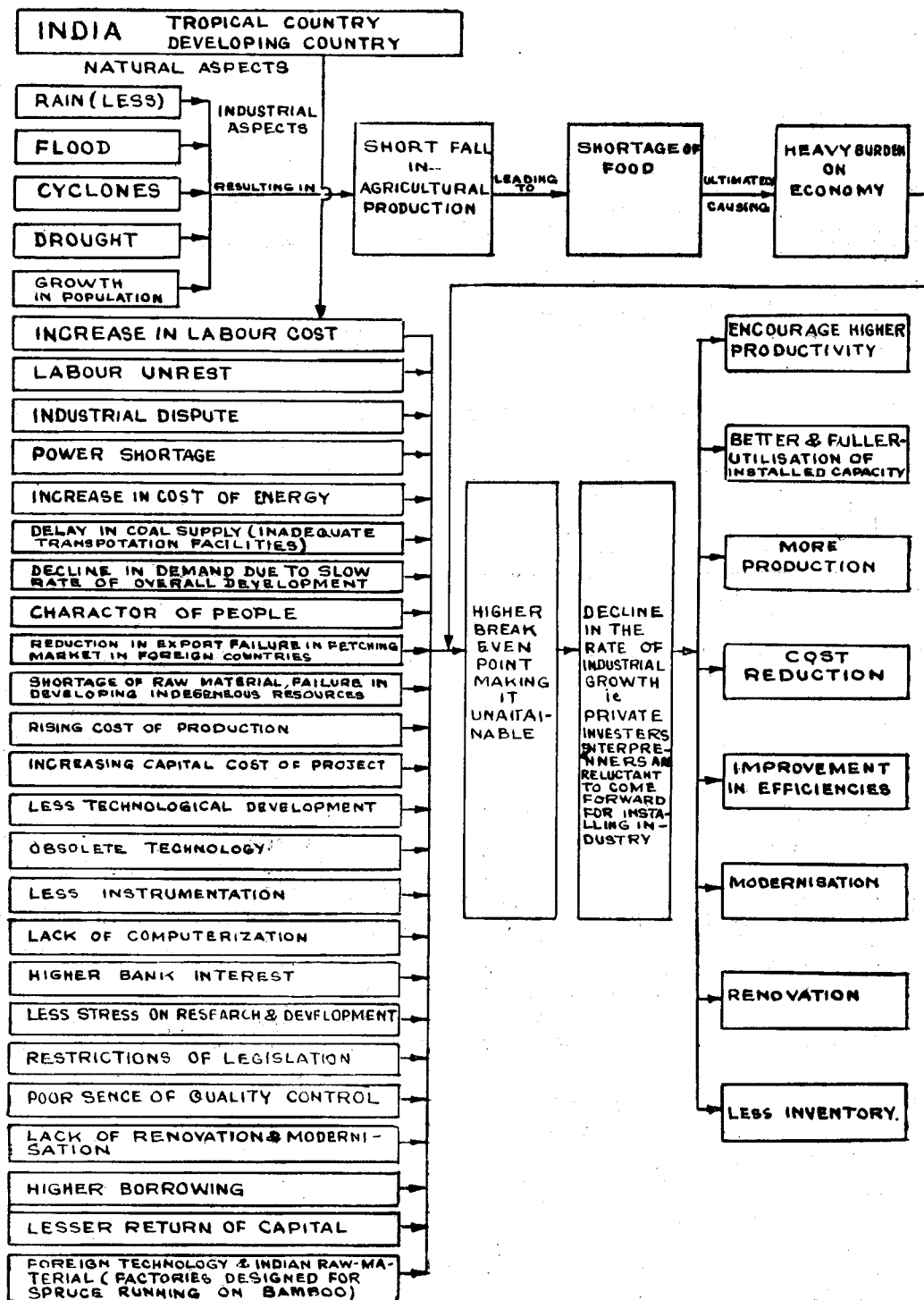
As the existing stock of raw material for integrated Pulp & Paper Mills is depleting fast. There is urgent need of planned plantation, cultivation of suitable raw materials, as an alternative to fulfil their demand. While considering this, fast growing species should be preferred. This will be of much relief for the paper industries.

## **FELLING OF MATURED BAMBOO :**

Felling of bamboo should be done only when it has attained certain level of maturity. Because the

\*Rohtas Industries Limited, Dalmianagar

## MODERNISATION & RENOVATION OF INDIAN PAPER INDUSTRIES



# SALIENT POINTS FOR RENOVATION AND MODERNISATION/

ITEM	SAVINGS AS RS./TON OF PAPER	SAVINGS IN RS.(LACS) PER MONTH
PLANNED CULTIVATION OF RAW-MATERIALS FOR PAPER INDUSTRY, QUICK GROWING, PLANTS PREFERRED		
FELLING OF MATURED BAMBOO		
CUTTING OF WOOD & DEBARKING		
INTER DEPOTT STACKING		
TRANSPORTATION COST BY RAIL, BY ROAD TRANSPORTATION BY RAIL PREFERRED	28.50	1.14
MILL SITE STACKING (SPRAYING OF MILL EFFLUENTS PESTICIDES INSECTICIDES ETC.)		
RENOVATION MODERNISATION OF CHIPPEAS USE OF DRUM CHIPPEAS		
LESS GENERATION OF SLIVERS	11.02	0.44
INCREASED USE OF HARDWOOD 35% TO 40%	19.00	0.76
REDUCTION DUST LOSSES USE OF 2 MM. SQUARE HOLES BOTTOM DECK OF SCREENS IN PLACE OF 4 MM. DECK.	11.00	0.44
BETTER CHIP WASHING BY MILL BACK WATER		
CONVEYING OF CHIPS BY BELT CONVEYOR	30.62	1.22
HIGH YIELD PULPING	105.00	4.20
INCREASE % OVERALL FIBER YIELD	28.80	1.15
REDUCTION IN COOKING CHEMICALS	76.00	3.04
REDUCTION IN SODA LOSS	50.00	2.00
REDUCTION IN BLEACHING CHEMICALS	10.83	0.43
OXIDATION OF BLACK LIQUOR	90.00	3.60
REDUCE FURNACE OIL CONSUMPTION	6.00	0.24
INCREASE % OVERALL RECOVERY	4.00	0.72
CONDENSATE RECOVERY	64.00	2.56
REDUCTION IN FRESH WATER BY MORE USE OF BACK WATER	3.78	0.15
REPLACEMENT OF BEATERS BY REFINERS	1.90	0.07
HIGHER REALISATION PAPER PRODUCTION	50.00	2.00
BETTER UTILISATION OF FIBER RECOVERY	14.50	0.58
MORE RETENTION OF SOAP STONE POWDER ON PAPER	0.75	0.03
USE OF MORE WASTE PAPER FOR BACK LINER ON MACHINE NO. 1 DUPLEX BOARD	6.00	0.24
OPTIMUM INVENTORY ( STORE )	30.00	1.19
PROCESS CONTROL INSTRUMENTATION		
IMPLEMENTATION OF PROCESS CONTROL LOG SHEET		
PROPER LUBRICATION	15.00	0.60
USE OF BALANCING EQUIPMENTS FOR MODERNISATION	110.00	4.50
PREVENTIVE MEASURE FOR CORROSION		
PROPER LAGGING AND INSULATION	30.00	1.20
POWER SAVING	45.00	1.80
USE OF COAL DUST IN POWER HOUSE	30.00	1.20
REDUCTION IN STEAM CONSUMPTION	28.00	1.15
TOTAL IMPACT	869.08	35.43

Fig. 2

maturity is directly related with the fibre content of Bamboo & percentage fibre yield.

#### **CUTTING OF WOOD AND DEBARKING :**

Debarking of wood is suggested to be done immediately after cutting. Because at that time the moisture content is high and debarking is easier. Further the debarking should be perfect and complete.

#### **INTER DEPOT STACKING :**

Amongst the two modes of transportation mainly in practice, transportation by truck is too much costly as compared to Rail. Adequate arrangements and proper planning for transportation by Rails only, will definitely contribute a remarkable share to the economy of the mills.

In a typical case study, it has been observed that by switching over to transportation by Rail will contribute a saving of Rs. 28.50 per tonne of paper which will amount to Rs. 1.14 lacs per month.

#### **MILL SITE STACKING :**

At the mill site storage yards, a stock level equivalent to one month requirements of raw materials, for running the mills at full capacity is called for to enable smooth and trouble free performance.

A first come first serve (i.e. First in First out) basis for supply of raw materials to chippers must be followed strictly. Because frequent change in moisture content, maturity etc. causes too much disturbances in the process ahead.

To prevent the decaying of raw materials during storage, time to time pesticides/insecticides should be sprayed on stacks. Because the decayed raw materials have less fibre yield and strength properties of pulp produced by them are comparatively poor.

Water spray over the stacks helps a lot. For this effluents coming out from mills may be utilised because they are rich in chemical contents and they are partially soaked by the bamboos. It is advantageous in maintaining a constant level of moisture in the stocks and makes the chipping easier.

#### **RENOVATION MODERNISATION OF CHIPPERS :**

The Conventional disc type chippers, which were designed for wood in foreign countries are in use in most of the Indian Paper Mills, after some modi-

fication in them. But the performance of these chippers is not remarkable. It has too much maintenance cost, moreover the chips obtained are not much uniform.

For the bamboo which is a medium fibre raw material & tropical short fibre Hard wood, are in use in India. Drum type chippers are highly recommended. Drum type chippers give uniform quality of chips with comparatively less maintenance cost. Also the sliver generation is less in their case.

#### **LESS GENERATION OF SLIVERS**

If we stick to the existing disc type chippers then we will have to pay more maintenance cost. But to get better quality chips and less generation of slivers, some modifications are suggested. The projection of fly knives may be reduced for getting better quality of chips. This will reduce the load on screens as well as rechippers.

As per case study a saving of Rs. 11.0 per ton of Paper i.e. Rs. 0.44 lacs/month is feasible.

#### **INCREASED USE OF HARDWOOD**

In the present condition when stock of bamboo is depleting, we should come forward to increase, Hardwood consumption.

Hardwoods upto 40% of raw materials required may be used with the existing plant, machineries and conditions. No further modification is required for running 40% Hardwood.

The case study reflects a saving of Rs. 19.0 per tonne of Paper i.e. Rs. 0.76 lacs per month if use of Hardwoods is increased to 40%.

#### **REDUCTION IN DUST LOSSES**

By reducing the diameter of perforations in the bottom deck of screens in the chipper House, dust losses will come down.

It has been observed that by replacing bottom deck having perforations of 4 mm with 2 mm size, a net saving to the tune of 1% of chipping is feasible. In terms of money it will save Rs. 11 per tonne of Paper i.e. Rs. 0.44 lacs per month.

#### **BETTER CHIPS WASHING**

For the better impregnation of liquor in the digesters and to reduce cooking liquor demand, better washing of chips is recommended. Washing may be done with the back water, in this process chemicals in the back water will be partially soaked by the chips.

## CONVEYING OF CHIPS BY BELT CONVEYOR

Pneumatic conveying of chips from chippers to silos or digesters has high power consumption, so replacements by Belt conveyor is recommended. Though initial investments for belt conveyor is high but ultimately it is economical. For example in a 100t/day Mill the initial investment for pneumatic transfer is only 1/3rd the installing a belt conveyor. But energy consumed for pneumatic system is more than five times the energy consumed by belt conveying system. The recurring cost of electrical energy in the case of pneumatic conveying system, amply justified the higher initial investment in the case of belt conveyor.

The typical case study undertaken reflects that a saving of Rs. 30/- per ton of paper amounting to the savings of Rs. 1.22 lacc/month is wanted by this replacement.

## HIGH YIELD PULPING

As the raw material stock is diminishing day by day due to the increased demand apart from Paper Industry also. For the survival of Paper Industry adoption of high yield pulping process techniques are essentially called for. This will enable us to have increased output per unit raw material and the availability will be prolonged. For this high yield Pulping processes such as Chemithermo Mechanical pulping See Fig. (3) and Fig. (4) may be utilised.

The Units having Rag Plant, Secondary Fibre Pulping Section, Hydrapulpers may adopt this process. Further modernisation is recommended in the above Section so that there is flexibility for

## PROPOSED PULPING OF CONVENTIONAL AND NONCONVENTIONAL RAW MATERIAL IN RAG PLANT

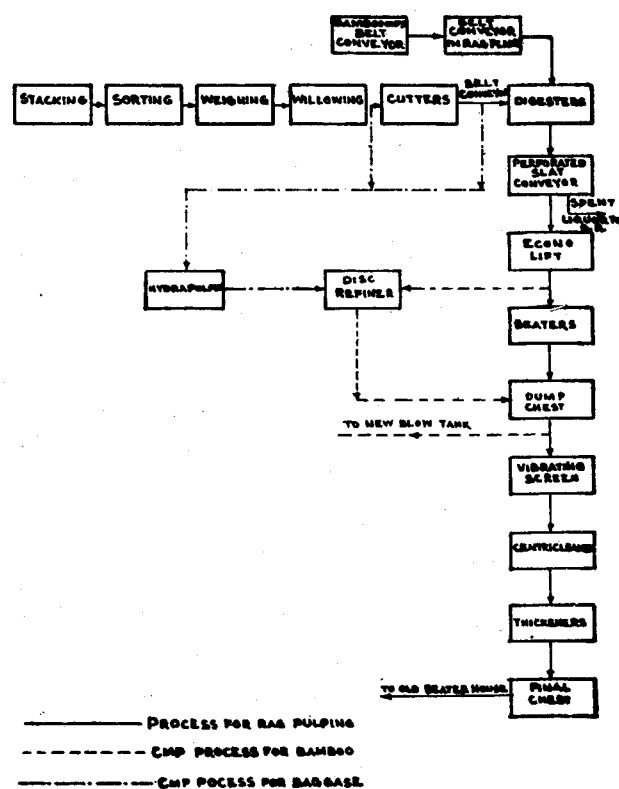


Fig 3

## PROPOSED FLOW DIAGRAM FOR CONVENTIONAL AND NONCONVENTIONAL RAW MATERIAL PULPING PROCESS

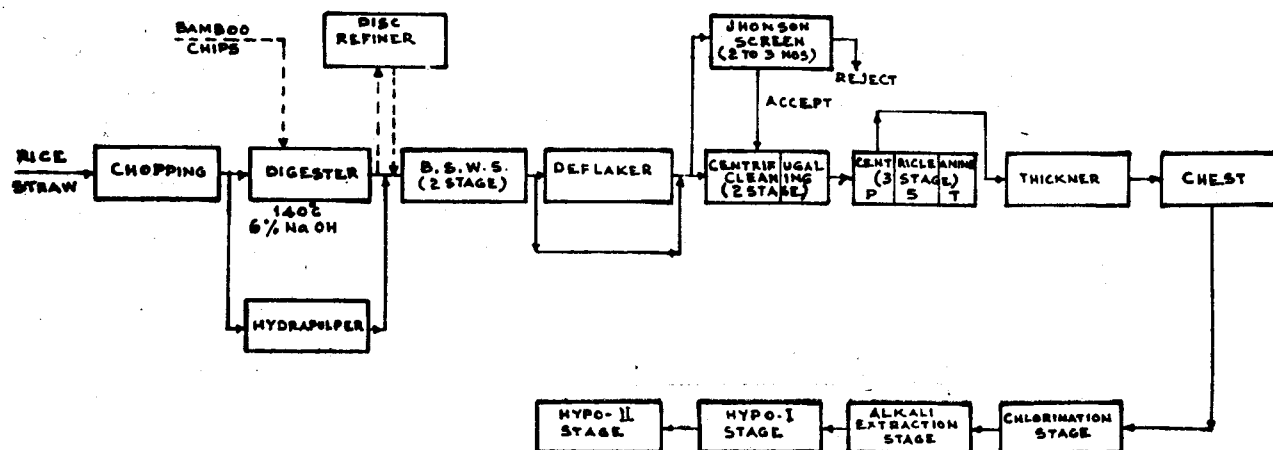


Fig. 4

processing multiple conventional/Non Conventional raw materials in the same unit. This will ensure their continuous runnability

Other High Yield Pulping processes such as NSSC, TMP, Chemi Mechanical pulping may be tried as per facilities/conditions in the Mill.

By virtue of increase in Fibre yield by adopting above mentioned process shown in figure 3 a saving of Rs. 105 per tonne of Paper i.e. Rs. 4.20 lacs/month is envisaged.

#### **INCREASE PERCENTAGE OVERALL FIBRE YIELD**

Strict control measures/checks are recommended, avoid any fibre loss from any source, to have increased fibre yield.

All the possible source of loss should be plugged, better fibre recovery arrangements are must and they must work to their full efficiency.

All the floor drains may be diverted to the system at suitable places. Brokes from Paper M/c's cuttings from cutters etc. should be recycled, totally handling losses etc. should be brought to the minimum.

An increase of 1% fibre yield will give a savings of Rs. 28.80 per tonne of Paper i.e. Rs. 1.15 lacs/month.

#### **REDUCTION IN COOKING CHEMICALS :**

This is one more area where cost reduction is possible in pulping. A reduction of 1% cooking chemicals on bone dry raw material will contribute savings of Rs. 76 per tonne of Paper produced that will amount Rs. 3.84 lacs/month.

This is possible by better chips washing or some changes in cycle etc.

#### **REDUCTION IN SODA LOSSES :**

This can be envisaged by better washing of pulp on Brown stock washers with minimum amount of water. Better washing is possible by maintaining proper vacuum in washers, proper placement and optimum utilization of washing showers, thorough mixing by repulpers in between. One more and most important aspect is utilization of hot water on final stage. The temperature recommended is 68-70°C.

If we can reduce soda losses from 32 kg.  $\text{Na}_2\text{SO}_4$  per ton of B.d. pulp to 20 kg.  $\text{Na}_2\text{SO}_4$  per ton of B.d. pulp then a saving of Rs. 50.00 per tonne of paper i.e. Rs. 2.00 lacs per month is obvious.

#### **REDUCTION IN BLEACHING CHEMICALS :**

Reduction in bleaching chemicals is one important aspect for cost reduction. By adopting flow-meters getting supply from constant head tanks, the measurement for dosing/addition at specific points becomes easier. This will also help to avoid wastages unknowingly. Strict checking of wastages/losses etc. and maintaining the operating parameters strictly will be also beneficial.

Reduction by 1% of bleaching chemicals on bleached pulp will contribute about Rs. 0.83 per tonne of paper amounting to a saving of Rs. 0.43 lacs per month.

Serious thought must be given for the maximum reuse of Back water in multistage bleaching as far as possible. Though this is closely associated with the increased corrosion, but keeping in view the material of construction of plant machineries, pipings etc. Steps may be taken, countries like U.S.A., Canada are favouring closure of bleaching plant with cent percent reuse of back water and they have done remarkable jobs.

#### **OXIDATION OF BLACK LIQUOR**

By reducing the sulphur losses from black liquor sulphate addition as make up may be reduced. Air Oxidation of black liquor is suggested for this.

This may contribute a saving of Rs. 90/- Tonne of Paper i.e. approximately Rs. 3.6 lacs/month.

#### **REDUCE FURNACE OIL CONSUMPTION**

In the existing energy crisis, higher consumption of furnace oil is like a crime. Therefore its use should be brought to the minimum. Here I would like to mention one thing i.e. S.R. Boiler, if possible, should be used as waste heat boiler only and not as a steam generating boiler.

#### **INCREASE PERCENTAGE OVERALL RECOVERY :**

Soda Recovery is the most important unit of an integrated Pulp and Paper Mill. Hence percentage overall recovery becomes most important feature and plays vital role in the economy of the Mill. This can be increased by plugging all source of losses and efficient running of the unit.

A 1% increase in overall recovery will contribute Rs. 4/tonne of Paper and will save Rs. 0.72 lacs per month.

#### **CONDENSATE RECOVERY :**

Condensate recovery should be maximum because it reduces the load on water softening as well as

saves heat energy. It should be recovered and recycled to power plant from all the units where indirect heating is in practice.

An increase of 10% in condensate recovery may be calculated to give a saving of Rs. 64/- per tonne of Paper, amounting to Rs. 2.56 lacs/month.

#### **REDUCTION IN FRESH WATER CONSUMPTION :**

In the present days when foreign countries are trying hard to reduce fresh water consumption in zero level. We must put our efforts together to bring fresh water consumption to the machine level. For this counter current system may be useful.

In a typical case study if we reduce fresh water consumption by 700M<sup>3</sup>/day (say) a saving of Rs. 3.78 per Tonne of Paper i.e. Rs. 0.15 lacs per month is envisaged.

#### **REPLACEMENT OF BEATERS WITH REFINERS :**

In the stock preparation the old conventional beaters or conical refiners may be replaced by more suitable disc refiners. This will enable us to save huge amount of power as well as maintenance cost.

The conical refiners which are in use in most of the Paper Mills or refining of Pulp for Paper making do more of cutting than fibrillating, and these equipments consume a very high percentage of energy in pumping the stock across the refiners and a very small percentage of energy is actually used for fibre development.

The Bamboo fibre is very short fibre as compared to softwoods like spruce or pine. In case of tropical Hardwoods the fibres further become short. Hence it is important that we change refining equipment which will help in fibrillating short fibre instead of cutting them and creating debris.

Ravindranathan<sup>1</sup> pointed out that Disc Refiners are ideally suited for processing bamboo and tropical Hardwoods pulps, because they need very little cutting and more of fibrillation to form good sheet. The energy consumed in stock preparation section for a furnish of 50% Bamboo and 50% tropical Hardwoods is about 4 hpdt for disc refiners as compared to 9 hpdt for conical refiners.

Hence it is clear that considerable amount of energy as well as good formation of sheet are the advantages of replacing the conventional beaters by refiners preferably Disc refiners.

The savings on the above basis for one case study comes out to be Rs. 1.9 per tonne of Paper i.e. Rs. 0.076 lacs per month.

#### **HIGHER REALISATION :**

For a given target of production the product mix should be selected in such a way so that the highest possible realisation per tonne of Paper is possible. This is just an exercise of permutation combination method as per plant conditions, market orders and sales position etc.

If we increase realisation by Rs. 50/T of Paper a net saving of Rs. 2.0 lacs per month is nowhere.

#### **BETTER UTILISATION OF FIBRE RECOVERY :**

Fibre recovery units must be utilised fully so that the losses are avoided and fibre yield is not suffered.

A contribution of 0.5% to the fibre yield by better fibre recovery will save Rs. 14.50 per tonne of Paper i.e. Rs. 0.58 lacs/month.

#### **MORE RETENTION OF SOAP STONE POWDER**

Possible steps must be taken for more retention of soap stone powder.

For the typical case under taken saving of 7 tonne of S.S. Powder will give a saving of Rs. 0.75 per tonne of Paper i.e. Rs. 0.03 lacs/month.

#### **USE OF MORE WASTE PAPER PULP AS BACK LINER IN DUPLEX BOARD :**

Use of back liner pulp in duplex board may be increased to reduce its cost. Various types of formers in the market may be used as per condition and end product requirements to achieve them and conventional cylinder moulds may be replaced by one of them. This will give better quality of board with better formation, lower cost, higher bulk and will reduce chances of two sidedness.

In the case study if consumption of front liner is reduced by 5 GSM then savings will amount Rs. 6.0 per tonne of paper i.e. Rs. 0.24 lacs/month.

#### **PROCESS CONTROL INSTRUMENTS :**

As a step to modernisation process control Instruments may be selected for specific points as per need.

#### **OPTIMUM INVENTORY :**

A level of optimum inventory should be maintained to maintain economy only necessary items/spares/material should be kept in stock consulting the previous consumption figures and production target.

In case study by reducing the inventories a saving of Rs. 30 per tonne of Paper i.e. Rs. 1.19 lacs/month is possible.

## IMPLEMENTATION OF PROCESS CONTROL LOG SHEETS :

For better control and firm grip in process control log sheets, in standard form covering all the points should be introduced at every stage.

## PROPER LUBRICATION :

Proper lubrication of all the moving points reduces maintenance cost as well as down time considerably. A schedule for lubrication and daily/weekly checking may be useful in this.

By proper lubrication if down time may be reduced by 1% it will save Rs. 15/- per tonne of Paper i.e. Rs. 0.60 lacs/month.

## USE OF BALANCING EQUIPMENTS :

Considering the modernisation, renovation of Mills balancing equipments required to step up production or to upgrade the quality as per condition of the Mills to update the old mills.

Let us take the example of Pulp Mill :

- i) Installation of one more digester having capacities of 80 M<sup>3</sup> will be advantageous in stepping up the production of pulp.
- ii) In multistage bleaching installation one no washer will increase the capacity as well as help in sparing old washers for maintenance also.

In the case study if the bleached pulp production is increased by 30 tonnes by above two installation the savings will be of Rs. 110 per tonne of paper i.e. Rs. 4.5 lacs/month.

## PREVENTION OF CORROSION :

- i) To avoid corrosion losses proper material should be selected for corrosion wherever needed.
- ii) Equipments/machineries and pipings etc. may be painted with corrosion resistant paints to enhance the life of installation. A painting schedule with proper code may be prepared for up keeping the plant.

## PROPER LAGGING & INSULATION :

As the energy costs are getting high day by day so proper steps in the direction of conservation of energy is must for our survival. All the hot liquor, Hot water, steam, condensate pipe lines, tanks, vessels etc. must have proper lagging to avoid bare surface heat losses.

For the case study under taken if black liquor system is lagged properly a saving of Rs. 30/- per tonne of Paper i.e. Rs. 1.2 lac/month is possible.

## POWER SAVING :

The cost of electrical energy whether it is self generated or purchased has increased enormously due to the increased price of coal, phenomenal rise in the cost of fuel oil and increase in electricity tariff charged by the State Electricity Boards. Hence conservation of energy must be considered of energy must be considered as a vital point. Few measures where energy may be conserved are listed below :

- i) Conservation of electrical energy by switching off the plant/Mill lightings, wherever not required in day time. Separate on-off switches may be provided for the lighting required at specific points in day time.
- ii) By avoiding the idle running hours of plant machineries. Whenever the plant is not running on stock equipments should be stopped to conserve electrical energy.
- iii) Scope of reducing installed Horse Power :  
Extensive studies by collecting data and observations must be done to find out any scope of reducing installed Horse Power.

A 1% reduction will save Rs. 45/- per tonne of Paper i.e. Rs. 1.8 lacs per month.

## USE OF COAL DUST IN PLACE OF COAL IN POWER PLANT

About 19 million tonnes of coal dust is lying with Coal India Ltd. and they are in search of possible areas for its use.

If possible necessary modifications may be done in existing boilers to replace coal by dust partially. This will be too much economical because cost of coal dust is less by Rs. 100 per tonne as compared to the cost of coal.

If 10% of coal is used as coal dust then savings will be to the tune of Rs. 30/tonne of Paper amounting to Rs. 1.2 lacs/month.

## REDUCTION IN STEAM CONSUMPTION :

Proper steps are required to reduce steam consumption. If we can reduce the steam consumption in process more steam will be available for power generation.

For example let us take the case of digester House in Pulp Mill.

40 psig bleed steam available from turbo alternator may be utilised in digesters for heating purpose, partially. Thereafter 120 psig steam may be used for getting final temperature and pressure.



TABLE—I TOTAL IMPACT

Sl. No.	Name	TOTAL IMPACT	
		Rs. per TDF paper	Rs. in lacs per month.
1.	Mode of Transportation	28.50	1.14
2.	Less generation of slivers	11.02	0.44
3.	Increased use of hardwood	19.00	0.76
4.	Reduction in dust losses	11.00	0.44
5.	Chips conveying through Belt conveyor	30.62*	1.22*
6.	High Yield Pulping	105.00	4 20
7.	Increase of overall yield	28.80	1.15
8.	Reduction in cooking chemicals	76.00	3.04
9.	Reduction in Soda losses	50.00	2.00
10.	Reduction in bleaching chemicals	10 83	0.43
11.	Oxidation of Black liquor	90.00	3.60
12.	Reduction in furnace oil consumption	6.00	0.24
13.	Increase over old recovery	4 00	0.72
14.	Condensate Recovery	64.00	2.56
15.	More reuse of back water	3 78	0.15
16.	Replacement of Beaters by Refiners	1.90	0.07
17.	Higher realisation by better product mix.	50.00	2.00
18.	Better utilisation of Fibre Recovery	14.50	0.58
19.	Retention of Soap Stone Powder	0.75	0.03
20.	Use of more back liner pulp on Paper M/c. no. 1	6.00	0.24
21.	Optimum Inventory to store	30.00	1.19
22.	Proper lubrication	15.00	0.60
23.	Use of Balancing equipment for modernisation.	1.00	4.50
24.	Lagging and insulation	30.00	1.20
25.	Energy saving	45.00	1.80
26.	Use of coal dust in power house	30.00	1.20
27.	Reduction in steam consumption	28.00	1.15
TOTAL		869.08	35.43

\*Not included

(For assumptions in above calculation see Annexure I)

## ANNEXURE—I

### ASSUMPTIONS MADE FOR CALCULATION

1. Basis for month	=4000 T finished Paper
2. Consumption of R. M. per ton of paper.	=1.9 T
3. Ratio of Bamboo and Hardwood	=65:35
4. % Yield	=38.0 %
5. Pulp requirement for one ton of paper.	=0.84 T
6. Raw Material required	=7600 T
7. Cost of Items in Rs.	
(a) Bamboo	=650/T
(b) Hardwood	=450/T
(c) Power	=0.63/Unit
(d) Bleach liquor	=3800/T
(e) Cl <sub>2</sub> Gas	=1700/T
(f) Sodium Sulphate	=3500/T
(g) Water	=0.70/T
(h) Furnace Oil	=1 20/Litre
(i) Coal	=250/T
(j) Coal dust	=150/T
(k) Steam	=120/T
(l) Condensate	=80/T
(m) Bleached Pulp	=4000/T
(n) Back liner Pulp	=2800/T
(o) Sodium Hydroxide	=4000/T

Hence increased use of low pressure steam and reduced use of 120 psig steam will have two fold advantages for power generation in power plant.

The case study ensures a saving of Rs. 28 per tonne of Paper i.e Rs. 1.15 lacs/month.

A typical case study undertaken above reveals that there is too much scope of renovation, modernisation and cost reduction in existing old integrated pulp and Paper Mills. The case study replaces that by implementation of above points in few areas only we may save Rs. 869 per tonne of Paper approximately.

### CONCLUSION :

Therefore as an experienced Paper Technical I will strongly plead for the renovation/modernisation of old integrated Pulp and Paper Mills. In no case we should go for perishing these industries. Further, there is no need of going for the new integrated Pulp and Paper Mills by scrapping the old Mills. Particularly due to the financial advantage of maintaining our present production without huge investment and the possible saving in energy. No doubt, for the aid of old mills Government has to come up, by making available loans on soft terms and conditions.

### ACKNOWLEDGEMENT

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