Improved performances of evaporators and chemical recovery boiler with the increased utilisation of hard woods at ITC Bhadrachalam Paperboards Limited.

Satyanarayana G.*, Vaikuntam K.*, Raghuveer S.*

INTRODUCTION :

From time immemorial, paper has played a key role in the evolution of our civilisation. On the intellectual plane, it has been the vehicle for carrying words of wisdom, assuring a vital role in the impartation of education, spread of literacy and dissemination of information. On the material plane, through packaging, it has given consumer better value for money. Packing has helped improve hygiene and preserve purity of products,reduce wastages and cost and revolutionise transportation and handling system.

The availability of paper is generally taken for granted, but it is not so. The Indian pulp and paper industry is passing through a phase of non-availability of forest based raw materials. Mills originally started on bamboo have been already partly substituting it by mixed hardwoods to meet the paper demand. ITC Bhadrachalam has been the pioneer in the usage of maximum mixed hard wood in the fibrous raw material furnish from 30% to 50%.

The operational parameters and characteristics of black liquor obtained from bamboo and mixed hardwoods very widely.

Experience on utilisation of black liquor of bamboo and mixed hard wood pulping at 70 : 30 : Ratio :

Equipment and design conditions :

The black liquor evaporation unit consists of sextuple effect evaporators of long verticle tubes and the tubes are made up of ERW Carbon steel.

The designed working conditions are as follows :

i) Feed : : 13.0% Solids at 70 MT/Hr.

ii) Final conc. : : 52 % at 17.5 MT/Hr.

iii) Evaporation rating : : 52.5 T/Hr.

During the first year of operation, there was no problem in evaporation. In successive years the performance declined due to tube scaling and fouling. The outlet black liquor concentration reduced to 46-47% and feed inlet also reduced to 58-60 T/hr , inspite of increasing inlet conc. to 15-16% solids. One of the main reasons for decline in performance was due to the increase in acid insolubles in weak black liquor from 3.5% to 8.33%. This might be due to quality of lime and usage of 70% bamboo.

The first effect evaporator scale analysis is given in Table. I.

TABLE 1.

Inorganics	..	85%
Organics	..	15%
Acid insolubles	..	50 .5%
$CaCO_3$	..	33. 4%
Na_2CO_3	..	1.10%
Sulphate	..	Traces

Problems faced in the recovery boiler Operations :

Due to use of low concentrated black liquor (44—46%) from evaporators in Recovery Boiler, the problems faced were many.

* ITC BHADRACHALAM PAPERBOARDS LIMITED

Few of them are :

a. Frequent blocking of primary ports.
b. High oil consumption,
c. Corrosion due to low Flue gas inlet temperature,
d. Beehive formation in the boiler was very high,
e. Superheater plugging,
f. Low steam generation/T of solids,

Actions taken to Imporve the performance of evaporators & recovery boiler :

i) To reduce the scaling problems, surface active substances like CHEMOSPERSE. 39 was used in WBL_f feed. The performance of evaportors slightly improved. The concentration from evaporators outlet had gone up to 47-48% solids. The advantage was not upto desired level.

ii) High pressure water jet cleaning of evaporator tubes has hassened the cleaning rate and improved the performance of evaporation section as a whole.

iii) With the increase in pulp production in the year, 1988, the Recovery Boiler was overloaded to about 130%. Bamboo and hardwood ratio has changed to 50 : 50. To strengthen the evaporators, four bodies ERW carbon steel tubes were changed to S. S. 304 tubes and 4th & 5th bodies tubes were changed with new ERW carbon steel tubes. Since then, evaporators performance has improved. Black liquor concentration could be increased to at 51-52% solids consistantly. The capacity of the plant has increased to 68 MT. of WBL rating. Graph. I shows the Black liquor processing relationship between total solids Vs. viscosity for 50% bamboo+50% wood. Graph. 2 shows the ralation between Degree TW and total solids for Black liquor obtained with 50% bamboo and 50% mixed hardwood pulping Due to change in the bamboo and hardwood ratio, the acid insolubles in Black liquor has come down to 0.8-1.7% With this, the rate of fouling of evaporators has also come down to 1-2 times per month.

Presently solids in HBL could be maintained at 61-63% the inlet to the Boiler.

The Recovery boiler which was designed for burning 200 MT/day solids is presently firing 250-260 MT/day. Super heater blocking is cleaned once in 20-25 days by taking intermediate shut of boiler for about 16 hours.

iv) For improving the combustion, excess air to the boiler has been increased to 45% as against normal of 10% excess air. The advantage derived out of this is that steam generation per tonne of solids fired could be increased by 10%, i. e. By firing 51% solids HBL at 45% excess air, steam generation is 2.35 T/tonne of solids fired as against 2.14 T of steam per tonne of solids fired. This is exclusive of steam used for soot blowing.

Productivity of evaporators and S.R. Boiler :

With the improvement in evaporator operation, the Weak Black Liquor processed over the years has been increasing. Form Graph. 3, it can be seen that increase is from 1144 Cu. M_L/day in 1988 to 1314 Cu. MT/day as on today.

In the Recovery boiler, the HBL firing is also on the increase. From the Graph. 4, it can be seen that HBL firing has been increased to 255 MT/day from 216 MT/day. The overall Recovery efficiency is being maintained steadily which can be seen from Graph. 5. Inspite of gradual fall in lime purity, the efficiency of chemical recovery is being maintained. The decrease in lime purity over years is shown in Graph No 6. Most lime procured from ancillary nearby is compensating to some extent lower purity.

Conclusion :

It is well known that it is difficult to evaporate and burn Black liquor obtained from mixed hard wood. At ITC-Bhadrachalam, the problem was solved by timely action in replacing Carbon steel tubes with S. S. tubes in evaporators and increasing excess air for better combustion. By this, the Recovery Boiler is being operated very efficiently even at 130% loading.

Acknowledgement :

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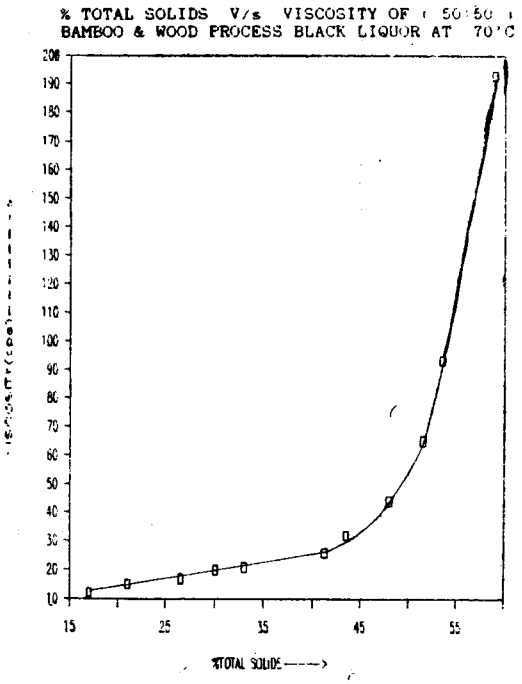
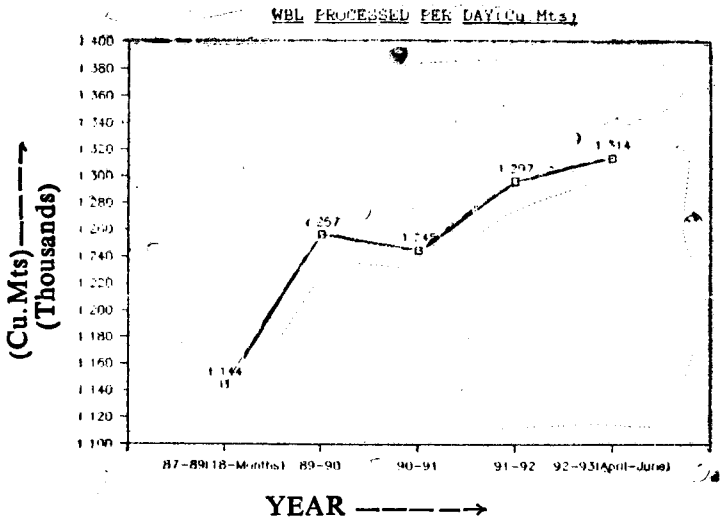


(GRAPH 1)



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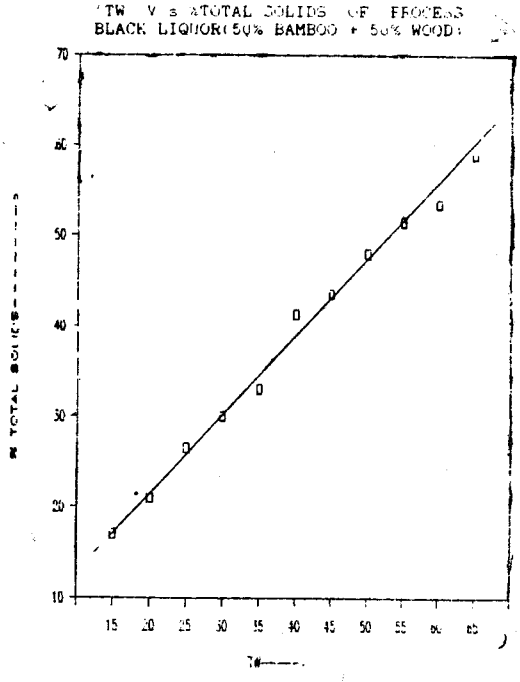

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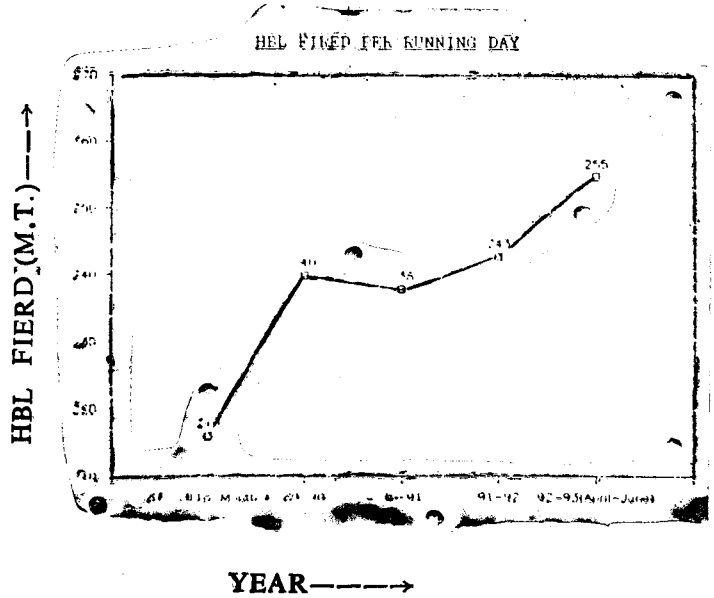

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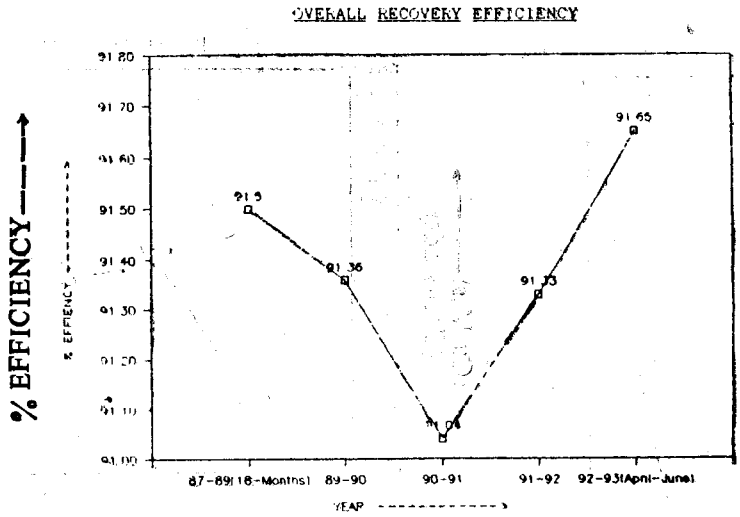

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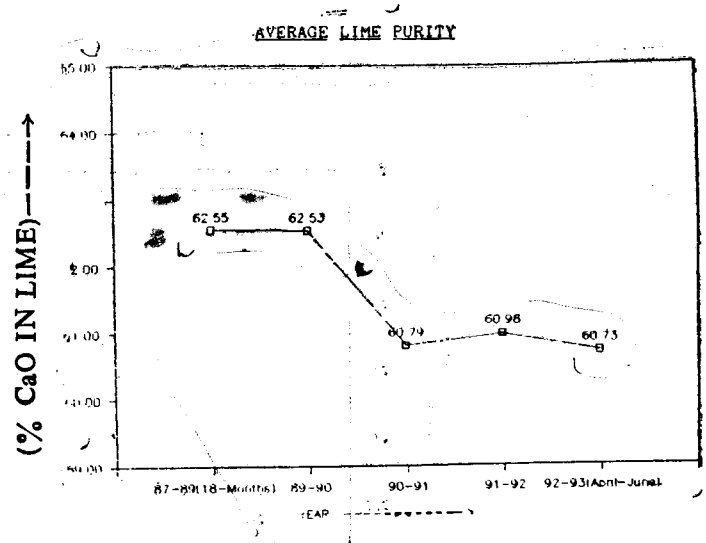

(GRAPH 6)