

# Bagasse Utilisation For Pulp Making in MPM

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## ABSTRACT

*The salient features of the process of Bagasse Handling, Wet Bulk Storage and Pulping Plant have been high lighted in this article.*

*The Plant is first of its kind in the country integrating the Sugar Mill with Pulp and Paper Mill. Bagasse being available every year from the Sugar Mill will substitute a substantial quantity of Forest Raw Materials like Bamboo and Wood.*

*The Paper mentions the various advantages of using Bagasse over Wood and Bamboo including energy conservation and also discusses the various advantages in the system of Bagasse Handling, Wet Bulk Storage and Pulp Plant.*

## INTRODUCTION

With expansion of M.P.M. by 75,000 TPA of News Print and stepping up the production of Cultural Paper Mill to 30,000 TPA, it had become imperative to find out alternate raw material owing to limited and ever decreasing availability of Bamboo. Besides the captive plantations of selected fast growing species of wood like Eucalyptus, Acacia, Casuarina, etc., The Mysore Paper Mill took up the Sugar Mill Project of capacity 2,500 TCD and had gone into regular production in October' 84. The bagasse generated from Sugar Mill is used for making Chemical Pulp for producing Writing and Printing paper. The Bagasse handling, Storage and Pulping Plant is commissioned in September ; 87. Since Sugar mill started, 3.5 lakhs to 5.5 lakhs tonnes of sugar cane has been crushed during sugar season depending on Sugar Cane availability.

Following are the main features of bagasse pulping :-

### (A) Bagasse handling and Wet Bulk Storage

1. Pneumatic conveying of bagasse from Sugar Mill to Depithing Unit.
2. Moist Depithing of fresh bagasse.
3. Wet bulk Storage and bagasse reclaiming.
4. Washing & Cleaning of bagasse.

### B. Bagasse Pulping

1. Continuous cooking of bagasse.
2. Pulp Washing.
3. Pulp Screening and Cleaning
4. Pulp Bleaching.

The fresh mill wet bagasse produced in Sugar Mill during the season is pneumatically conveyed (38 T/Hr.) to a cyclone at top of the Depither house.

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## RAW MATERIAL

Pneumatic blower is supplied by Radar, Canada. The bagasse feed to the Blower is regulated by variable speed pin feeder. There is facility to bale the Sugar Mill bagasse, if any problem in blowing the bagasse.

The mill wet bagasse received from the Sugar Mill is depithed in moist vertical depithers supplied by FMW, Austria. There are three depithers in parallel, each having capacity of Handling 17 T/Hr. The depither consists of a motor driven rotor within a perforated (7 mm  $\phi$ ) metal basket having 31% open area. On the rotor there are 44 nos. mounted swing metal hammers. Hammers are replaced after every 500 Hrs. The pith removed during depithing of bagasse (30% by Wt.) is blown to Coal Fired/Pith Boilers by Radar Blower.

The depithed bagasse is mixed with recycled water in bagasse mixing tank and the bagasse slurry of 2% consistency is pumped to Wet Bulk Storage Yard (22,500 m<sup>2</sup> area) on sloping platform of hard asphalt flooring. The bagasse piled upto 15-20 mtrs. height with the help of extended pipe lines and Bulldozers. The maximum storage capacity of yard is approximately 25,000 BDT bagasse and storage pile density is 120 kg BD/m<sup>3</sup>.

The depithed bagasse is washed in wash beater (supplied by FMW) at consistency 1.5% to 2% and heavy materials like sand, grits etc. are removed. the washed bagasse is dewatered to 15% consistency in the dewatering screw conveyor having 5 mm  $\phi$  perforated trough. The recovered water is filtered through rotary screen and wet pith recovered is fed to Boilers. The details on fibre, pith content at various stages of bagasse handling are given in Table No. 1.

Before bagasse is fed to Pandia continuous Digester, the bagasse is squeezed from 15% consistency to 35% consistency by 18"  $\phi$  Plug Screw Feeder driven by 110 KW Variable speed motor. The cooked high temperature pulp is continuously diluted in digester discharger chamber with black liquor to low consistency 4% and to low temperature 110°C and blown to the Blow Tank. This cold blowing of cooked pulp will avoid damage to the fibres.

The Pulp washed in FOUR stages. The washed pulp is screened in single stage horizontal type Cowan Centrifugal Screen and Pulp is cleaned in Four stage Centri-cleaning system.

The characteristics of bagasse black liquor are given in Table No. 2.

**Table No. 2 -**

**Bagasse Weak black Liquor Analysis**

Twaddle = 9 - 11

Total solids = 9 - 10%

Free alkali as Na<sub>2</sub>O g/kg = 4 - 5

Organics % on TS = 54 - 56

Sulphated ash as Na<sub>2</sub>O g/kg = 28-30

Silica as SiO<sub>2</sub> on TS = 1.6%

Calorific value = 3150 Cal/g.

**Table No. 1**

Sl. No.	Particulars	Moist	Fibre %	Pith %	Ash
1.	Whole Bagasse	51-53	58-60	26-28	3.0
2.	Depithed Bagasse	50-51	64-68	18-20	2.7
3.	Pith	50-51	30-35	65-70	-
4.	Bagasse after plug screw feeder (Feed to Digester)	65-67	72-74	15-18	-

The bleaching sequence is C E/pH. The characteristics of pulp are given in Table No. 3.

1. In many occasions, the bagasse slurry pipe lines got jammed in bends and T-joints. To avoid pipe line jamming, we have proposed higher head pumps.
2. Due to Silica Scaling below the wire cloth of BS Washer I & II, we are forced to change the wire cloth within a year. Scaling of wire cloth of BSW - III & IV is very less compared to BSW-I & II. We have proposed separate high pressure pumps for wire cleaning as existing wire cleaning pipe is connected to washer spray pump. The analysis of scale accumulated below the washer wire cloth is given in Table No. 4.

3. To improve the pulp quality, we have introduced Hydrogen Peroxide bleaching on trial basis from April '98.

4. In many occasions, during cleaning of Digester discharger, we have found hard mass accumulation in discharger, which caused choking of discharger drain pipe and blow valves. This accumulation is mainly due to carry over of sand/grit from bagasse storage yard. To avoid carry over of sand/grits along with bagasse from yard, we have proposed to construct a upward flow tower where in heavy sand/grits and bagasse fibres are get separated.

The analysis of Hard mass accumulation in digester discharger is given Table - 5.

**Table No. 3 Bagasse Pulp Characteristics The Practical Problems Faced**

Sl. No.	Particulars	Unbleached Pulp	Bleached Pulp
1.	Brightness ISO%	38-45	82-84
2.	Initial freeness ml CSF	500-550	450-480
3.	Viscosity CED	12-14	7-8
4.	Burst Factor	35-40	30-35
5.	Breaking length mts.	6500-7000	5500-6500
6.	Tear Factor	40-45	32-37

**Table No. 4**

Sl. No.	Particulars	6-4-95	7-5-96	17-7-97
1.	Acid insolubles % (as SiO <sub>2</sub> )	49.2	63.2	49.1
2.	Loss on ignition %	21.9	30.9	28.6
3.	Combined Oxides % (as R <sub>2</sub> O <sub>3</sub> )	20.8	-	19.8
4.	Calcium (as CaO)	3.3	1.1	1.2
5.	Magnesium (as Mgo)	2.4	Traces	Traces

**Table No. 5**

Sl. No.	Particulars	01-08-96	03-09-97
1.	Combustible matter %	53	38.2
2.	Inorganics %	47	61.8
3.	T T A (as Na <sub>2</sub> O)	0.8	1.3
4.	Acid insolubles% (as SiO <sub>2</sub> )	36.8	49.6
5.	Mixed Oxides % (as R <sub>2</sub> O <sub>3</sub> )	7.2	6.5
6.	Calcium (as CaO) %	2.1	3.3

**CONCLUSIONS**

- There is a reduction in Raw Material i.e. Bamboo, Wood and Eucalyptus to the extent of 50,000 T/Annum.
- As Sugar factory and Paper Mill are located in the same complex, no additional power, effluent treatment facility and transport is required.
- Burning of pith in the Boilers for generating steam, there by reducing the requirement of coal to the extent of about 12,000 T/Annum.
- Being integration of sugar, Pulp and Paper Mill,

more power is generated from out of the steam fed into turbine because of higher extraction or low pressure steam during sugar season.

- The paper manufactured by using minimum of 75% of bagasse pulp furnish is charged with only 5% Excise Duty by the Govt. of India.

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# FLOWSHEET OF BAGASSE HANDLING & PULPING

