

# Bagasse as a Raw Material for Paper Industry

# **FEK SINGH**

## INTRODUCTION

The papers to be read and discussed in this Seminar on the above subject are likely to cover almost everything in so far as theoretical considerations for the utilisation of this material as a fibrous raw material for paper industry in India is concerned. In my opinion, stage has now reached when Indian technicians working in the paper industry should come out of what sometimes is erroneously called 'ivory tower' and come

Tek Singh, Chief Technical Superintendent, Tribeni Tissues Ltd. In this write-up, personal views have been expressed about suitability of bagasse as a fibrous raw material for paper industry. It has been suggested that research/development work should be carried out to optimise conditions for the use of this material along with hard woods for the manufacture of news print and cheap type writing/printing papers; guidelines have been put forward for such an approach.

down from the domain of theoretical considerations regarding use of this material to the practical realities.

It may be added that the papers to be discussed in this Seminar are likely to deal with data such as composition of bagasse, its availability, pulping processes, characteristics of paper made from this material, economical considerations etc., etc. It may be added that these data/information are already known and have been discussed on more than one occasion; steps should now be taken to make use of them and they should be

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given a practical shape. If at the end of this seminar it is felt that we have only repeated what is already known about this raw material and we are where we were at the start, this Seminar will be serving a limited purpose only. IPPTA has already devoted one full Seminar on this raw material without any contribution to the industry in so far as practical utilisation of this material in India is concerned.

# **MY VIEWS**

I have voiced my views on this subject in some of IPPTA meetings. Briefly these are as follows :

Use of bagasse as a raw material for the paper industry has been engaging the attention of this industry for a long time and a lot of work has been done with a view to optimising conditions for pulping/bleaching so that this material could profitably be used. The work done so far (mostly outside India) has resulted in pulping processes such as Celdecor, Cusi etc. which have been put to industrial use. Some of the mills in South America, Philippines, etc. are making use of these processes and in India only for Mandya bagasse is the main raw material for making printing papers. Rohtas Industries Ltd. were making use of this material (by Celdecor pulping process) but have stopped to do so for various reasons. Both these Indian mills have been able to use this raw material with know-how from outside.

I have ventured in this write-up to put forward my views and some suggestions, which if given practical shape are likely to result in a know-how which in turn should enable the Indian paper industry (may he the industry abroad) to make use of this raw material on a much larger scale than it has been able to do hitherto. Details have been left out and as such, these suggestions should serve as guidelines and food for thought to carry out much needed research development work on this raw material to the logical conclusion.

Before the guidelines are put forward, some observations about this raw material are made below; these are considered necessary as the same have bearing on the guidelines.

# **1. NATURE OF BAGASSE**

This raw material is inherently heterogeneous in nature (soft pith and hard skin). Its quality is influenced by the type of sugarcane and since this varies the quality of bagasse also varies from place to place. In other words, sugarcane could be soft and hard and so will be bagasse. Some varieties of sugarcane are more pithy than others and, therefore, bagasse from them will vary so far as its pith content is concerned. Bagasse of variable quality from different types of sugarcane will affect ultimate quality of the pulp prepared by the same process.

## 2. COLLECTION AND STORAGE

Bagasse is available during the crushing season which generally lasts for 4-5 months. As such baling of this material and its storage during this period is necessary if it is to be used as a raw material for a paper mill. For storage of this material large space (open or covered) will be needed to meet raw material requirements of even a small size mill which has to depend mainly on this material. All this i.e., baling, transportation of bales from sugar mill to godowns, handling at the godowns and transportation of bales from the godowns to the preparatory plant in the pulp mill will add up to the cost of this material considerably.

#### **3. FIRE RISKS TO STORED BAGASSE**

Due to —

(i) Heat Generation: Bagasse is baled and stored when it is still fresh and contains high percentage of moisture content. There is an appreciable heat generation within the individual bales as well as between the bales within certain period after storage, due to high moisture content and various reactions which take place. If ventilation is not enough this heat generation could cause fire.

(ii) **Exposure:** Dry bagasse can catch fire easily. If this material is stored in the open, fire risks are quite serious. In case, however, godowns are constructed for storage of this raw material (this will add up to the cost considerably), a good deal of ventilation will be necessary and as such, fire risks will remain even if this material is stored in such godowns. 4. HANDLING OF BAGASSE FROM GODOWNS TO AND AT THE PREPA-RATORY PLANT (DISINTEGRATION OF BALES, SEPARATION OF PITH AND ITS DISPOSAL ETC.)

All these add up to the cost of this raw material in addition to hazards involved in handling and disposal of pith which will be in a sizeable quantity as about 30% of the original material will have to be discarded.

#### 5. PULP YIELD

Comparatively low yield of chemical pulp (about 33% on the whole bagasse) and its inherent characteristics are factors which also adversely affect the suitability of this material for writing/prinling papers.

# 6. SODA RECOVERY

Becomes difficult due to various reasons including high silica content in this raw material.

Inspite of the above factors which put a premium on the suitability of this raw material, the fact remains that pulp industry in India is much handicapped due to shortage of raw materials not only for future expansion but even for its present requirements. As such, we should not only discuss the suitability of this raw material for the paper industry but take practical and concrete steps at an early date (may be just after this Seminar) so that this material could be used on a large scale.

As already pointed out this material is being used to a limited extent by some mills for writing/printing papers, board etc. Efforts have been made to use it for the manufacture of newsprint, but so far the results in this respect have not been encouraging for various reasons.

7. Conversion of boilers at Sugar Mills is another problem which needs a careful thought.

## 8. BAGASSE

Large scale use of bagasse is likely to give rise to this disease and it is necessary to devise suitable measure to prevent it.

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# 9. USE OF BAGASSE FOR NEWS-PRINT

In my opinion, use of bagasse for the manufacture of newsprint has not met with success because of wrong impressions about the nature of this material and consequently wrong approach to process it for this purpose. For instance, it is felt that this material is cheap and is available in large quantities and as such should be suitable for the manufacture of newsprint, for which the above two considerations are generally taken into account along with others. The fact, however, remains that firstly this material does not work out to be cheap if it is processed to get pulp yields 50% of and below and secondly its collection and storage are difficult and involve a formidable task as pointed out above. Also quality of pulps made so far (chemical, semi-chemical) from this raw material for use in the furnish for newsprint is vastly different from the characteristic of conventional newsprint furnish. It is due to all these factors that bagasse has not established itself as a suitable raw material for newsprint. In other words. chemical/semi-chemical pulps from this material, which have so far been tried to make newsprint cannot replace 85% ground wood pulp + 15% chemical pulp (approximately) for obvious reason, both from the angle of charcateristics of paper made as well as running of paper machines at high speeds a which newsprint from the conventional furnish is being manufactured.

# 10. NEW APPROACH — TO MAKE NEWSPRINT WITH BAGASSE PULP IN THE FURNISH.

A new approach to make newsprint from a furnish consisting of chemimechanical bagasse pulp and groundwood pu'p and/or chemi-mechanical hard-wood pulp is advocated. This approach takes into consideration the characteristics of both types of pulp, their blending with each other as well as the characteristics of the mixed furnish. Since there is a good deal of flexibility in the qualities in which these two types of pulp can be made, it is possible to get a mixed furnish in which the constituents vary from 20 to 80% or so, and characteristics of the mixture are very much akin to those of the conventional newsprint furnish; this ap-

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pears to be possible both with depithed and whole bagasse.

The above idea was mooted by the writer in the IPPTA meeting in Madras last year and my article on the subject of "High Yield From Indian Raw Materials" incorporating this idea has been published in IPPTA magazine, which was printed after the meeting. During the course of the current article, I met Shri Mon Mohan Singh, Senior Research Officer, Dehra Dun Research Institute when he paid an official visit to Tribeni Tissues. I was pleased to learn from him that his Institute has been carrying on research work on the above lines and the results obtained so far are encouraging. It is hoped that this work will be brought to its logical conclusions in the near future and for this, paper industry will be waiting anxiously. It is hoped that the work so far carried out under the guidance of Dr. Guha and Sri M. M. Singh will be put before the gathering at the Seminar for information and discussion.

#### 11. FUTURE ACTION

In the first instance we should wait for the work which is being carried out at Dehra Dun. Alternately this project work may be raised to a high level due to its importance and is carried out on a war footing; special funds are allocated by the Government and/ or the industry. At the same time, if considered necessary, more technicians are attached for research/development work, which could be carried out under the guidance of a committee of experts (technicians, engineers) drawn from the paper industry, Government, Dehra Dun Research Institute and machinery manufacturers. Work can be carried out at Dehra Dun, because the Rsearch Institute is well-equipped for this purpose.

When optimum conditions have been established on a lab-scale and then on the pilot plant, these could be translated for mill scale trials, which in my opinion, could be carried out at Rohtas Industries Ltd., which have both the grinders and bagasse pulping plant, which it is hoped is still in operational conditions. In case, however, bagasse pulping plant at Rohtas is not available, mill scale trials could be arranged at another mill considered suitable for the purpose. It is confidently hoped that if this project work is carried out scientifically and systematically, it is bound to succeed. Benefits to the paper industry will be immense and money spent on this project as well as hard work which will go into research/development will be fully justified. Once conditions have been optimised for making newsprint from the above furnish, there will be no difficulty to do so for cheap writing/printing papers.

#### 10. OTHER SUGGESTIONS

These suggestions are being put forward with a view to enhancing the utility of this material for paper industry. These could also be included in the research/development work.

Bagasse should be depithed to the maximum possible extent just after crushing and before baling. In case the sugar mill is near the paper mill, bagasse depithed after crushing (optimum conditions to be established) could directly be blown to the pulp mill and used there as much as needed during the period for which crushing sesson lasts and the balance baled. Depithing at this stage can be carried out by passing bagasse first through some disintegrating/shredding equipment, which dislodges the pith and then through a screening device. Advantages of pith separation at this stage are obvious and are as follows :

(i) Disposal of pith thus separated will pose no problem as the same can be burnt in boilers of the sugar mill. This will not only offer an easy way for disposal of pith but will also be the most economical as compared to other means.

(ii) Removal of pith at this stage will mean handling of about 25/30% less material for bundling, transportation, of the stacking and subsequently transportation of the stacked material to the preparatory plant, separation of the pith there and its disposal in the form of a waste material.

(iii) Bagasse depithed at this stage will be considerably cheaper as compared to the one which is depithed at the preparatory plant before pulping.

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