



Queensland University of Technology
Brisbane Australia

Developments in pulp and paper manufacture from sugarcane bagasse Symposium and Workshop

May 3 - 4, 2007 QUT, Gardens Point Campus, Brisbane

Introduction to Bagasse Products

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Bagasse Pulps

- Short fiber pulp similar to hardwoods - generally considered a hardwood substitute.
- Typically, mixed with a portion of long fiber softwood pulp.
- Amount of bagasse pulp used depends on availability and cost of woodpulp, and paper or board properties desired.



Straw Pulps

- Bleached straw market pulp mills common in Europe up to the late 1960's.
- Used as a specialty pulp added in amounts of 10 - 20% to printing and writing papers, offset papers, banknote papers, drawing papers, waxing papers, bristol board and greaseproof papers.
- Used to improve formation, see-through and smoothness, and to impart stiffness and rattle.



Bagasse Pulps

- Also can be used as an additive to woodpulp papers to impart certain properties to the paper.
- But, virtually all bagasse pulp mills are integrated with paper mills and are located in regions where wood is either unavailable or woodpulp is expensive.



Bagasse Pulps

- Objective is not to improve certain paper properties but to use as little woodpulp as possible.
- Often sacrifice quality where necessary.
- Adjusting paper quality to suit regional requirements and the limitations of the raw materials available is a sound approach.



Regional Market Requirements

- Very strong linerboard, sack kraft and wrapping papers have an advantage if these papers are to package goods for:
 - long-distance shipping
 - shipping heavy goods
 - where considerable rehandling is involved

- But often, such papers are much stronger than required for regional markets, for packaging goods for
 - short-distance shipping
 - shipping lighter goods
 - where rehandling is limited



Bagasse Pulps

- Papers and paperboards of high strength (especially high tear) cannot be produced with a high bagasse content
- Wrapping papers and linerboard made with a high bagasse content furnish are frequently quite satisfactory for many applications, especially in regional markets.



Bagasse versus Straw

- Compared to straw pulp, bagasse pulp has:
 - higher strength
 - better stretch
 - runnability
- Allows for the production of a wide range of papers using a high proportion of bagasse pulp



Possible Bagasse Pulp Content of Various Papers (maximizing the bagasse pulp content)			
Paper Type	Bagasse (%)	Long Fiber (%)	Quality
Bristol board	100	0	Excellent
Bond paper	80 – 90	10 - 20	Excellent
Corrugating medium	90	10	Excellent
Greaseproof	75 – 85	15 – 25	Excellent



This table was developed based on maximizing the bagasse content of the various paper and board grades, grades suited to regional markets.

In comparison to wood-based papers and boards, the strength of the high bagasse content papers and boards will be lower. If increased strength is required, then decreasing the bagasse content and increasing the woodpulp content can provide similar strength properties.

Nevertheless, in general, it can be said that where strength, especially tear, is not the prime consideration, high quality paper can be produced with a very high percentage of bagasse pulp.

Possible Bagasse Pulp Content of Various Papers (maximizing the bagasse pulp content)

Paper Type	Bagasse (%)	Long Fiber (%)	Quality
Glassine	80 – 90	10 – 20	Very good
Sanitary tissue & toweling	80 – 85	15 – 20	Very good
Woodfree printing paper	0 – 100	0 – 10	Very good
Woodfree writing paper	0 – 100	0 – 10	Very good
Wood content printing paper	80 – 85 ⁽¹⁾	15 – 20	Very good
Wood content writing papers	80 – 85 ⁽¹⁾	15 - 20	Very good

(1) Using bleached chemimechanical or high-yield chemical pulps for part of the bagasse furnish



Nevertheless, in general, it can be said that where strength, especially tear, is not the prime consideration, high quality paper can be produced with a very high percentage of bagasse pulp.

Possible Bagasse Pulp Content of Various Papers (maximizing the bagasse pulp content)

Paper Type	Bagasse (%)	Long Fiber (%)	Quality
Lightweight MG wrapping ⁽²⁾	65 – 75	25 – 35	Good
Newsprint ⁽¹⁾	80 – 100	0 – 20	Good
Test liner	75 – 85	15 – 25 ⁽³⁾	Good
Waxing papers	50 – 60	40 – 50	Good

(1) Using bleached chemimechanical or high-yield chemical pulps for part of the bagasse furnish
(2) Bleached or unbleached
(3) Select waste kraft could replace a portion of the woodpulp



Bagasse newsprint is being produced commercially in several mills such as the Tamil Nadu Newsprint and Papers Limited (TNPL) in India. TNPL uses the Beloit-SPB process, a modification of the Cusi process, which involves the combination of CMP bagasse pulp for the production of the "mechanical" pulp fraction of the newsprint combined with chemical bagasse pulp and woodpulp. They have the added advantage of also producing printing/writing papers at the mill.

Possible Bagasse Pulp Content of Various Papers (maximizing the bagasse pulp content)

Paper Type	Bagasse (%)	Long Fiber (%)	Quality
"B" grade wrapping	60 – 70	30 – 40	Acceptable
Linerboard	60 – 70	30 – 40	Acceptable
Sack "kraft" paper ⁽⁴⁾	50 - 60	40 - 50	Acceptable

(4) Clupak unit required on paper machine



Where strength requirements are a problem, as in the case of sack kraft paper or linerboard, the percentage of bagasse pulp that can be used is lower, and the paper quality drops below "standard" as the bagasse proportion increases.

For example, up to 30% bagasse pulp can be used in a sack kraft paper furnish and 40% in a kraft liner furnish without any appreciable effect on quality. However, above these amounts, the quality declines.

Sack kraft paper with 50 - 65% bagasse pulp content was used for the production of multi-wall cement sacks in Peru. The production unit included a Clupak unit in the dryer section of the paper machine, and the basis weight of the sheet was higher than usual.

Kraft linerboard containing 70% bagasse pulp also was used in Peru for the production of beer cartons and, again, the basis weight was somewhat higher than normal.