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**PRODUCTION OF NEWSPRINT FROM
NON WOODY MATERIALS AND THE USE OF
WASTE PAPER AS PART OF THE FIBER FURNISH**

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Introduction

Newsprint is traditionally made using woody materials. Wood is scarce to countries such as India and China as well as to other Asian and African countries that are highly populated. To these countries food and agricultural production come first ahead of tree farming and forestry, and therefore woody materials are either in short supply or suitable species of wood is not available for the production of newsprint. In this respect some of the developing countries such as Peru, Mexico, Indonesia, India etc., realizing this problem, have made headway in establishing commercially based newsprint manufacturing plants utilizing bagasse. There are other countries in a similar situation with shortage of woody materials either examining the use of bagasse or the use of kenaf as possible raw materials for the production of newsprint.

The production of newsprint from non woody material such as bagasse and kenaf, although appears to be acceptable to the domestic market conditions of these countries, under certain controlled conditions have still to overcome some limitations. These limitations are related to both quality as well as economics. In the opinion of the writer most of these limitations could be overcome by blending deinked waste paper pulp with non wood fiber pulp.

Bagasse Based Newsprint Manufacture

Newsprint production from bagasse, although not well established commercially, has been in existence in various parts of the world for some time now. The first newsprint mill went into production in Peru in the year 1978. There are mills now operating in Peru, Mexico, Argentina, India, Indonesia and Cuba. In Cuba a project known as Cuba 9 has been developed partly helped by UNIDO for the commercial production of newsprint from bagasse. It is also reported there could be another mill set up in India in Uttar Pradesh based on bagasse, and Pakistan is planning to set up a mill in Punjab also based on bagasse.

The operating results of these commercially established mills are somewhat mixed with some reporting of satisfactory results and some reporting marginal results. Some of the limitations experienced for the complete success of bagasse as a raw material for newsprint production appears to center on the following :

1. Relatively poor runnability on the machine at high speeds compared with wood based mills.
2. Poor brightness and the need to use hydrogen peroxide to get a brightness comparable to wood based newsprint.
3. Poor opacity.

To improve the quality and runnability on the machine the bagasse newsprint mills have tried out various types of Furnishes. According to published reports and information so far available some of the furnishes tried out are as follows :

Indu Peru Mills, Peru

This mill in Peru with a capacity of 400 TPO* was started somewhere in 1978 with the following furnish:

- 90 to 95% -bagasse pulp (semi chemical) based on the CUSI system
- 5 to 10% kraft pulp (long fiber)
- clay is used as a filler to improve opacity.

On account of opacity problems, the mill had to subsequently revise the furnish with addition of mechanical pulp (imported). The percentage of mechanical pulp is about 10% of the total fiber furnish given above.

✦
TPO - Tons Per Day

Paramonga Mill, Peru

This mill in Peru also started production somewhere in 1978 with a capacity of 400 TPO. The fiber furnish used in this mill is somewhat similar to the Induperu Mill.

Mexpape Mill, Mexico

This mill went into production in 1979 with a capacity of 400 TPO. The mill, besides producing newsprint also manufactures cheap printing paper for school textbooks. The furnish used in this mill is as follows:

- 70% Bagasse pulp based essentially on CUSI system with some aspects of PEADCO as well as KIMBERLY CLARK built into it.
- 10% kraft pulp (long fiber)
- 20% mechanical pulp (wood)
- CLay is used asd filler to improve opacity.

This mill is reported to have problems related to poor opacity as well as problems related to profitability in operation.

Tucuman Mill, Argentina

This mill with a capacity of 400 TPO went into Production in 1982 and the fiber furnish applied at the start of production was as follows:

- 70-75% bagasse pulp applying the CUSI system.
- 20% mechanical pulp (wood)
- 5% kraft pulp (long fiber)
- Clay as a filler is used to improve opacity.

It is now reported the mill has revised the furnish as indicated below :-

- 90% bagasse pulp (semi mechanical)
- 10% kraft pulp (long fiber)

Cuba 9 Project, Cuba

This project is partly assisted by UNIDO and was initiated in 1981. The objective of this project is to develop an optimum fiber furnish to produce bagasse newsprint as well as dissolving pulp. The pilot plant of this project is capable of producing 35 TPO of newsprint. It is reported, through the work done at this research facility and the pilot plant, it is possible to use 80% to 85% bagasse pulp for the production of newsprint with no addition of fillers.

Letjes (No. 4 Mill), Indonesia

This mill went into production in 1985 with a planned capacity of 300 TPO. The fiber furnish planned for production is as per details given below :

- 40-50% mechanical bagasse pulp based on the PEADCO system.
- 40% semi bleached chemical pulp from bagasse and rice straw
- 10-20% kraft pulp (long fiber)

The mill although officially went into production in 1985, had to be unfortunately closed for most of the time. The reason given is shortage of bagasse for operating the mills.

Tamil Nadu Mill, India

This mill, with a capacity of 300 TPO, went into production somewhere in 1985. The process adopted at this mill is known as the BELOIT-SPB process. It is claimed this mill is the first to produce a true mechanical type of bagasse pulp for the production of newsprint with the required characteristics for opacity and printability.

The furnish that was planned for use at this mill initially consisted of the following :

- 50% bagasse mechanical pulp (TMP + CMP by the BELOIT-SPB process)
- 35% bleached chemical bagasse pulp
- 15% kraft pulp (short fiber from locally grown eucalyptus)

(Note : No long fiber pulp is used in the furnish.)

For economic considerations the mill was planned as a two-grades mill with flexibility to manufacture both newsprint and printing grade on the same machine. Such a concept for the production of two grades makes the manufacture of newsprint from bagasse viable to some bagasse based newsprint mills.

Generally speaking most of the mills that produce bagasse newsprint have no difficulty in marketing their product in the domestic market under controlled conditions even though some aspects of quality are not in par with newsprint made from the traditional coniferous species. The problems mainly experienced with bagasse newsprint mills is related to profitability. It is here a compromise has to be reached by blending recycled newspapers with bagasse pulp to produce newsprint.

It should be also realized the price of bagasse is clearly tied up with the price of oil in the international market and the uncertainty of the rise and fall of oil prices. For this reason it is again advisable to plan projects with part of the furnish based on recycling of old newspapers to stabilize the cost of newsprint production from bagasse.

Kenaf Based Newsprint Manufacture

Kenaf (*Hibiscus cannibinus* L.) is an annual plant that could be grown easily in the tropical countries of Asia, Africa and Latin America. The United States Department of Agriculture has conducted an enormous amount of research in the growing and development of kenaf for use as raw material for the paper industry.

Kenaf can grow to a height of 12' to 18' resulting in a yield of 6 to 10 tons of dry fiber per acre, depending on conditions for growing. The growing period is generally 120 to 150 days. Since kenaf has shown promise as a potential raw material for the paper industry, the American Newsprint Paper Association and the International Paper Company (IP) decided to continue the work on development of kenaf. This resulted in various field tests and commercial runs to prove the feasibility of using kenaf for newsprint manufacture. Based on the success of all the work done on kenaf in the United States, the possibility of building a newsprint mill using kenaf as a raw material in South Texas is being now seriously considered.

The paper making trials conducted by IP has demonstrated that TMP pulp from 82% Kenaf and 18% belached kraft pulp produced newsprint with equal, or better, strength properties with comparable roughness, printability and brightness in comparison with standard newsprint. The test also indicated they were hopeful of increasing the kenaf TMP to about 90% belended with 10% bleached kenaf pulp. The press room runs showed that kenaf newsprint ran well on offset press.

Based on the work done in USA for the development and use of kenaf for newsprint, it could be said that kenaf is a promising raw material for most developing countries.

Advantages of Kenaf

Technically speaking, as discussed above, pulp of acceptable quality is not a problem. In fact the advantages of using kenaf compared with wood can be summed up as follows:

- Lower energy requirements for mechanical processing
- Relatively simpler bleaching requirements
- Fast growing raw material with growing cycle of 3 to 4 months compared with wood

Limitations of Kenaf

The disadvantages of the raw material however are related to the following:

- Low density and high cost of transport, handling and storage
- Higher losses on storage and difficulty in storage compared to wood
- Sufficient incentives to farmers to grow kenaf in competition with other cash crops

Based on the evaluation of the advantages and disadvantages the limitations are mostly related to economic factors of producing pulp rather than technological factors.

Considering these economic limitations and the price at which kenaf pulp could be produced, the way out seems to be a blended stock of kenaf pulp and waste paper pulp to produce newsprint to satisfy the domestic market.

An Appropriate Technology For Deinking of Waste Paper to Produce Newsprint

The technology for producing newsprint from old newspapers has been well developed and has been in practice in USA for quite a length of time. This technology was first initiated at Garden State Paper Co. in Garfield, New Jersey. Based on Garden State Technology of processing old newspapers to make newsprint, additional mills have been set up in different parts of USA, such as the mills in Pomona, California, FAC Mill in Chicago, Illinois; and Southeast Paper Company in Dublin Georgia, etc. All these mills use about 100% recycled paper to produce newsprint. Applying this technology, mills have also been set up outside USA in Mexico, Japan etc.

The technology used for the processing of old newspapers based on Garden State technology is simple, and it is worked on the basis of using deinking chemicals in the pulper followed by further processing and removal of ink by the washing process. This technology is quite appropriate for application in developing countries since most of the equipment needed for processing can be built and maintained using local resources. Please refer to flow diagrams 1, 2, 3 and 4. Another major factor which can help recycling of old newspapers in developing countries is the availability of relatively cheap labor for preliminary sorting and handling of waste paper prior to processing.

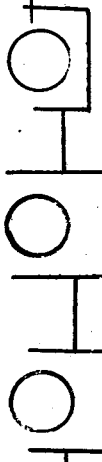
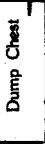
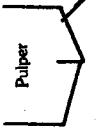
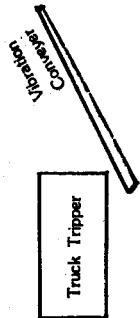
However, on the other hand developing countries are short of old waste paper to be recycled for producing newsprint.

Mostly newspaper is used as wrapping paper in grocery shops and by the time it reaches the consumer it is no longer in a condition for recycling to be produced as newsprint. For this reason the production of newsprint in developing countries, based on old newspaper can be only planned on the basis of imported old newspapers from developed countries.

TYPICAL DEINKING SYSTEMS IN U. S. A.

AND CANADA
FLOW ARRANGEMENT

TYPICAL DEINKING PLANT



Counter Current washer
Decker washer 3 Stages

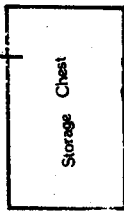
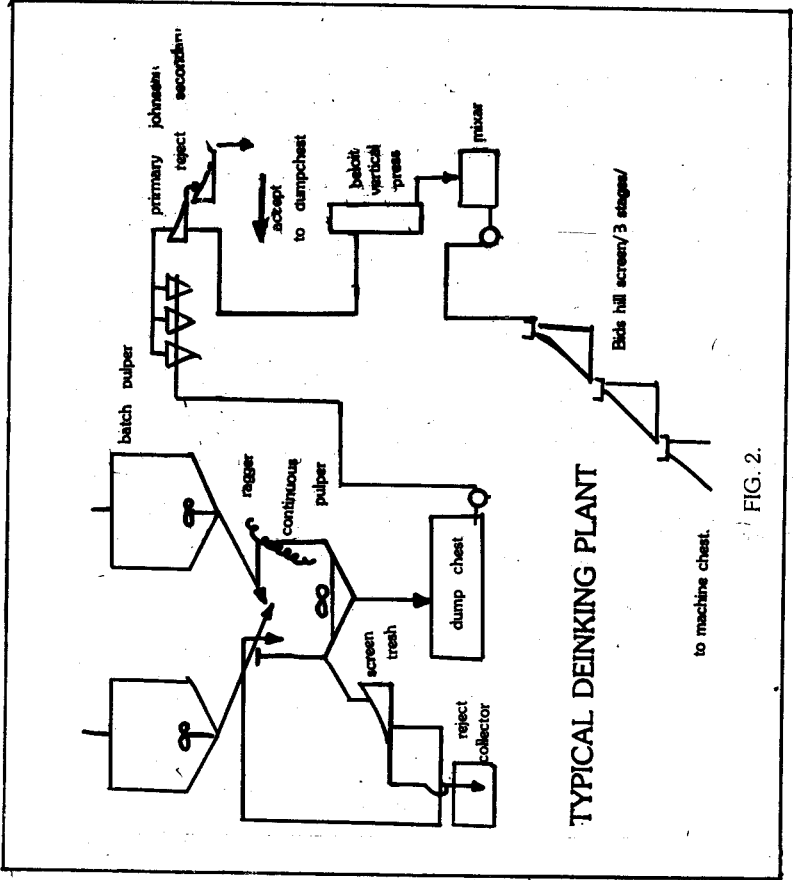


FIG. 1.



TYPICAL DEINKING PLANT

FIG. 2.

TYPICAL DEINKING PLANT

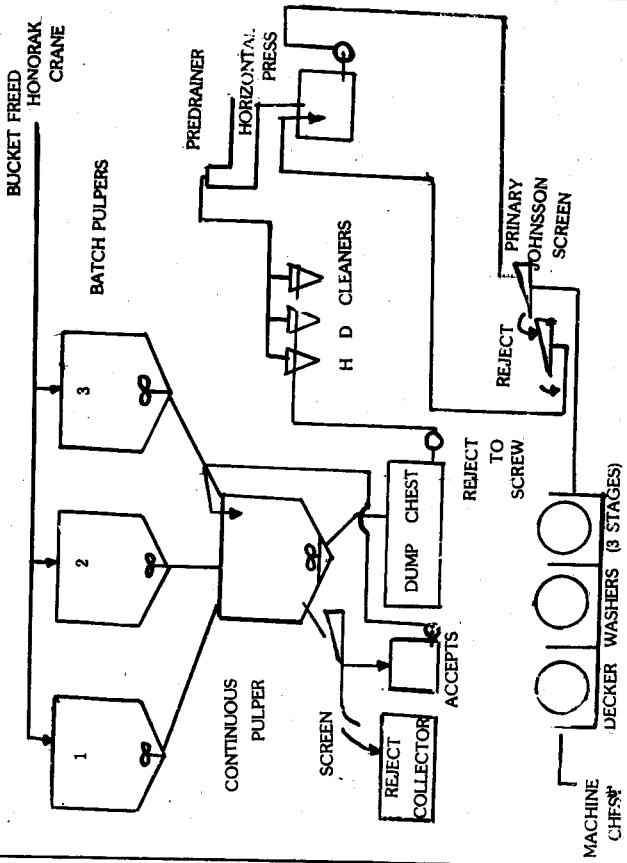


FIG. 3.

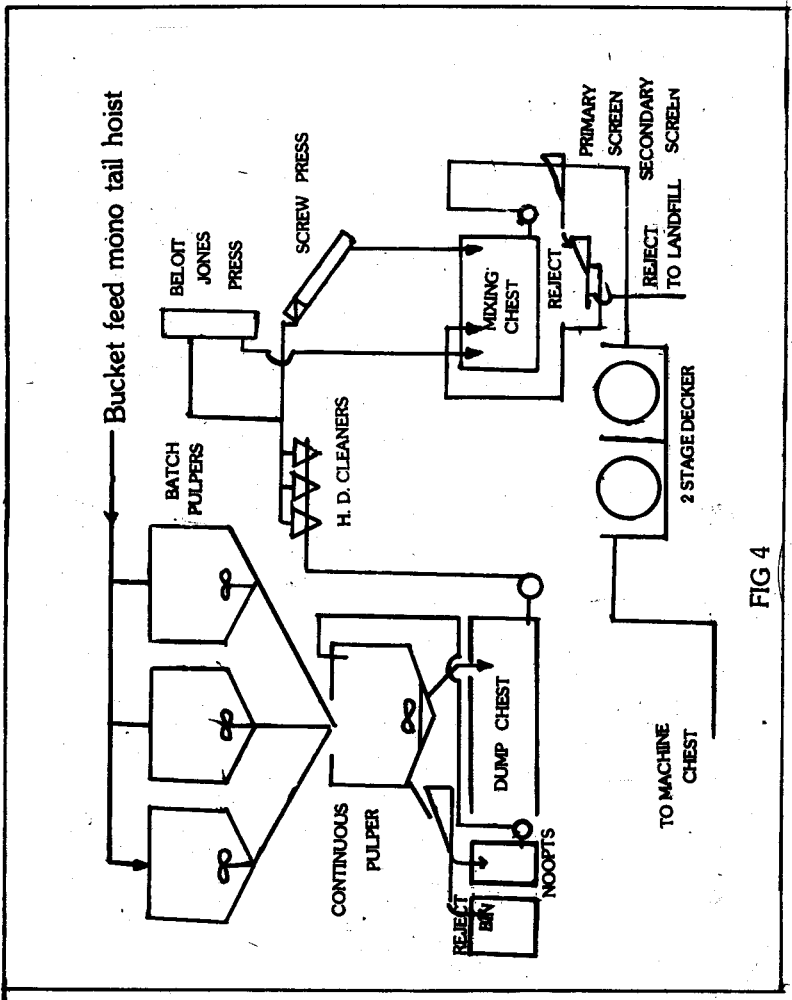


FIG 4

Recycling - An Answer to Several Problems

Recycling, to produce newsprint from deinked waste news is an answer to several problems connected with the paper industry.

- Protection of environment by recycling waste
- Conservation of forestry, and this in particular is of importance to countries which are short of woody materials
- Reduction of electric energy usage, since virgin mechanical pulp mills require 4 times the energy.
- Reduction in water usage; since deinked pulp mills require less water for processing.
- Reduction in capital costs since deinked pulp mills require less capital than virgin mechanical pulp mills.
- Processing equipment is simple and could be manufactured mostly in developing countries.

Blending of Bagasse, Kenaf And Waste Paper To Produce Newsprint

In the preceding pages, the feasibility of producing newsprint from bagasse, kenaf and from waste paper was discussed. The commercial application of these raw materials is currently in practice as was pointed out in the earlier pages. What is of most interest to the countries that are short of woody material is production of newsprint using a blending of non woody fibers with secondary fiber produced from waste paper by deinking. For both quality reasons as well as economic factors, this application would be helpful to most countries.

The bagasse based mills which are currently operating have some problems related to quality and profitability in operation compared with newsprint produced from wood based materials. The blending of deinked newsprint waste to the extent of about 50% will make these mills based on bagasse to be more competitive with newsprint production from wood.

In the case of kenaf the relative properties of Kenaf CTMP pulp compared with bagasse CTMP pulp indicates kenaf is a better material for newsprint than bagasse. The limitations in the use of kenaf, as discussed in the earlier paragraphs could be for economic reasons rather than technical reasons. The compromise therefore seems to be in the blending of deinked newsprint waste paper pulp to make kenaf newsprint mills competitive with wood based mills.

Conclusion

It is true bagasse and kenaf have certain limitations, but these limitations technically could be overcome in various phases of development by application of research and development to this field.

At this state in the phase of newsprint production from non woody material, the blending of deinked waste paper stock seems to hold promise both to satisfy quality as well as for economic reasons.

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