

Practical Problems and Their Solutions in Handling and Use of Waste Paper to Produce Duplex and Triplex Boards

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INTRODUCTION

The recycling of waste paper, though in practice since many years, is being considered as an important necessity of late. The reasons are many but two reasons are very important (i) it helps in reducing virgin fibre consumption (ii) it helps in better environmental management.

To produce good quality paper from waste paper, we have good technology available and also it is being improved. The technology available today are concentrating on three important aspects namely (i) removal of contraries (ii) deinking (iii) bleaching.

For production of pulp suitable for filler layers of Duplex and Triplex Boards, the main emphasis is on removal of contraries. Here the cleanliness of pulp is the most important criterion and not its shade, brightness and presence of ink particles.

This paper deals with practical aspects of obtaining clean pulp for filler layers of Duplex and Triplex Boards. The salient features of the upgradation work carried out in our waste paper plant are:

- (a) Design and installation of high density pulpers.
- (b) A specially designed clarifier to remove floating materials from the pulp.
- (c) Use of perforated pressure screens to remove small contraries.

With the above, we are in position to produce very clean waste paper pulp for production of Duplex and Triplex Board.

USE OF WASTE PAPER TO PRODUCE DUPLEX & TRIPLEX BOARD

For production of Duplex and Triplex Board,

nearly 75 to 80% of the filler layers are from pulp obtained from waste paper. This pulp need not be bleached and it can be a blend of wide varieties of waste papers. However, to get a clean pulp, the pulp has to be processed properly.

FILLER PULP CIRCUIT

The types of waste paper varieties used in SPM for production of filler pulp are:

1. Super Mixed Paper (Imported quality No. 3 of paper stock institute, USA).
2. Broke from different machines - Mixed broke of coloured papers, coloured and other duplex and triplex boards.
3. Books and Magazines
4. Old Newspaper
5. Kraft Carton Box
6. Kraft
7. Office Records
8. B.B. Grey
9. Unsorted Waste Paper
10. Reel Core
11. Lottery Tickets

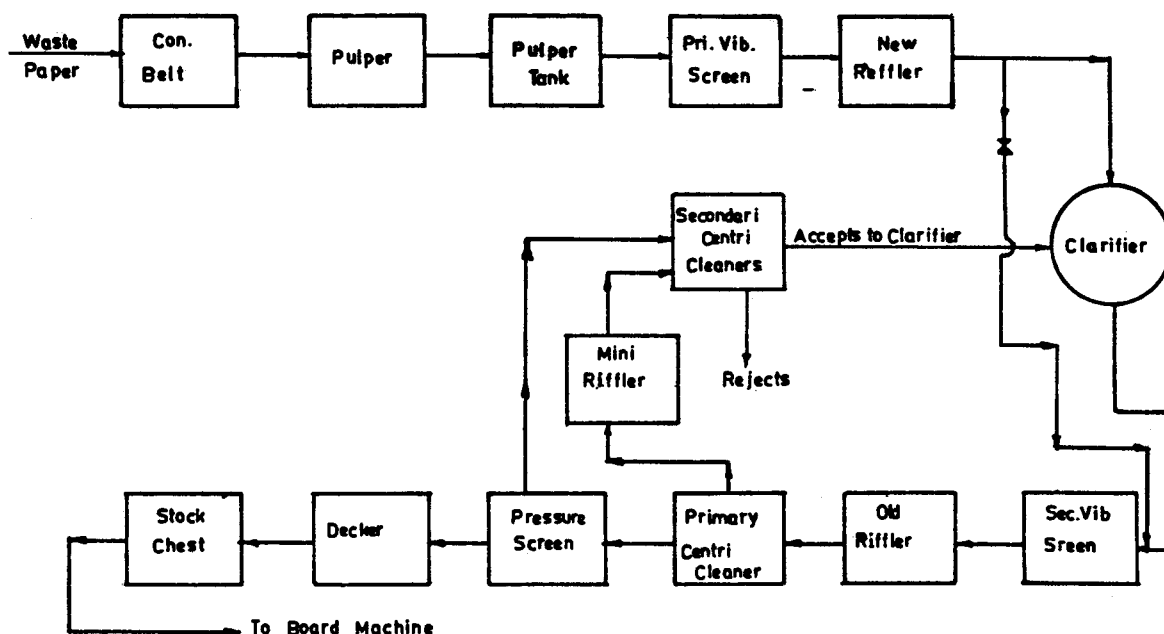
The nature of these varieties has been defined in an earlier publication (1)

The indigenous waste paper needs proper processing to make it acceptable to board making.

The procurement and processing is given in

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FIG.-1 FLOW DIAGRAM FOR WASTE PAPER PULPING (FILLER CIRCUIT)



detail in the following paragraphs.

Hawkers collect different varieties from various sources and it is collected by suppliers and stored in their godowns. Different varieties are segregated by manual labour at the suppliers godowns. These segregated varieties are sold to the paper mills.

One major problem faced by the paper mills is regarding the **moisture content**. Normally all waste paper should contain less than 10% moisture but when the consignments (Truck loads) are received at the mills, moisture can vary from 5% to 50% Higher moisture is almost always disputed by the supplier. However, when sampling and analysis is carried out in their presence, they grudgingly accept it but still say that it cannot be so high. The suppliers reason for presence of higher moisture is that they give a fine spray of water to compact the bales (manual baling in most cases) as otherwise, the truck load would be too less. Many times, they over do it.

The paper received at the mills contains all sorts of **contraries and contaminants**. It is really astonishing that, nevertheless, we do make boards using it. The contraries and contaminants present are gunny bags, plastic bags, plastic pieces, thermocole, metallic pins and clips, Wax, Bitumen, Wooden pieces, threads, plastic strings. It is essential to eliminate all these in the final pulp.

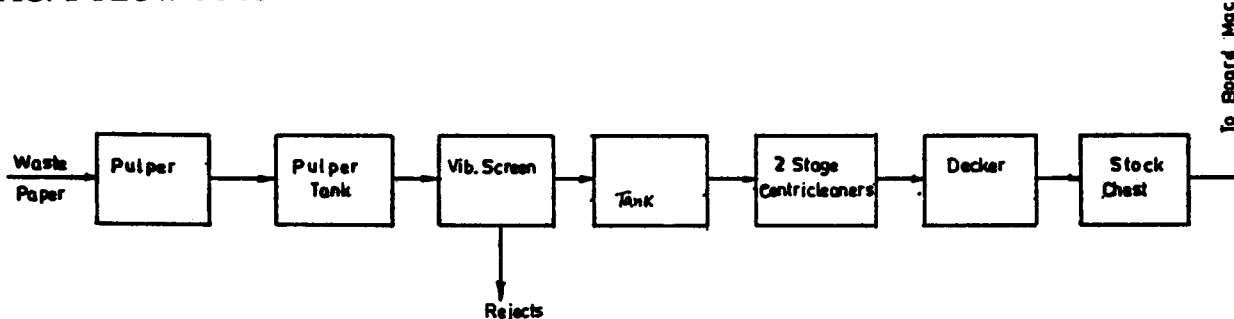
Processing :- The process flow sheet is given in Fig.-1 and the working is explained in the following paragraphs.

Feeding :- The waste paper which is received in the form of bales, is opened and the loose paper is fed manually to belt conveyors feeding to pulpers. However, in the case of waste paper containing high proportion of contraries, the paper is subjected to manual sorting, before feeding to pulpers.

Pulpers :- Earlier we used to repulp the waste paper in low consistency pulpers (3-4% consistency). However, after developing high consistency pulpers in-house, we are presently in a position to repulp at 7-8% consistency. The deragger provided helps in removing all big size contaminants such as gunny bags, plastic bags, strings, threads, big plastic pieces etc. The repulping is carried out the batches. The repulping is complete in 10 to 15 minutes. For repulping, underflow of 1st grade effluent is used (which contains settled fibre, fines, and filler of paper machine back water). Then the pulp is diluted and discharged to a chest.

Primary Screening :- From the chest, the pulp is fed continuously to vibratory screens with 4 mm perforations. Here smaller contaminants such as plastic pieces, metal chips, string pieces etc. are

FIG.-2 FLOW DIAGRAM FOR WASTE PAPER PULPING (BOTTOM LINER CIRCUIT)



removed. The accepts of screens is fed to a floatation clarifier.

Floatation clarifier :- This is a unique system developed in-house to remove small plastic pieces, thermocole pieces, Wax, Bitumen bottom which is kept in fluidized condition by the rotating rake mechanism and by continuous uniform withdrawal. The contaminated pulp is fed continuously to the Central well and the under flow (pulp free from contaminants) is pumped out continuously.

Secondary Screening :- The pulp from the clarifier under flow at a consistency of 1.5-2.0% is continuously fed to secondary vibratory screens with screen perforations of 3 mm. Here very small size contaminants are removed.

Rifflers :- The accepts of Secondary Screens at a consistency of 1% are fed to gravity rifflers where the pulp slurry moves slowly and allow heavy particles such as sand to settled to the bottom.

Centricleaning :- The pulp slurry from rifflers at a consistency of 0.8% is fed to primary centricleaners, of a two stage centricleaner system. The accepts of primary centricleaners is fed to pressure screens (perforated screen basket of 2.5 mm perforation), the accepts of which is fed to inclined deckers where the pulp gets thickened to around 4% consistency. This pulp is fed to storage chests from where it is pumped to the stock preparation of Board Machine. The rejects of pressure screen is taken to Secondary Centricleaner feed.

BOTTOM LINER PULP CIRCUIT

The types of waste paper used for bottom liner are:

1. NDLKC (Imported Quality, No. 13 of paper Stock Institute, USA).

2. Duplex Board Broke.
3. Books and Magazines.
4. Absorbent Kraft side-reels and broke.
5. Old Newsprint.

The contaminants in the above are substantially lower than the filler pulp and hence needs less processing.

The flow sheet is given in Fig.-2

From the figure it can be seen that after pulping in the pulper, the pulp is pumped to pulper tank from where it is pumped to vibratory screens. The vibratory screens accepts fall into a tank from where it is pumped to a 2 stage centricleaning system. The accepts of primary centricleaners are thickened to around 4% consistency by inclined deckers and falls into the storage chest. From this chest, the pulp is pumped to Stock Preparation of Board Machine.

CONCLUSIONS

By installing efficient system namely, high density pulper, floatation type floating material removing clarifier and final stage pressure screen, the quality of waste paper pulp has been upgraded. The system has helped us to produce good quality waste paper pulp for use in Duplex and Triplex boards by using very poor quality waste paper.

ACKNOWLEDGEMENT

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