

# Use of Secondary Fiber and its Selection

Saxena R.K.

## ABSTRACT

*Paper Mills in India use different type of various paper grades ranging from cultural to packaging. Recycling of waste paper for the manufacture of various grades of paper is increasing rapidly. Due to the scarcity of wood and environmental constraints many Mills are coming up or existing mills are planning to change their process for the use of secondary fiber. The quality of final product manufactured from waste paper and proper selection of waste paper and upgradation of the waste paper line.*

## INTRODUCTION

This paper is intended to serve as an introduction to selection of correct secondary fiber (Waste Paper) in production of recycled paper.

One of most important factor that we must always remember is that waste paper unlike other inputs like chemicals is not a manufactured product. It is collected after use from consumers of paper and paper converted products. Hence one should not expect same quality in every consignment and design flexibility in stock preparation system of recycling plant.

The cost of waste paper is determined by many factors :

- Fiber length
- Bleached or unbleached fiber
- Out-throw & Prohibitive
- Difficult to use materials

The fiber length in waste paper is classified into three groups.

- Long fiber

- Short fiber
- Fines & Fillers

The long fiber is used in manufacturing of high strength paper.

The short fiber is used alone (certain white grades) or in combination with long fiber to produce paper of required strength.

The fines & fillers have no fiber value and they are removed in form of sludge from the system or certain percentage may be recovered as desired by the product.

Out-throws & Prohibitive are all materials which are unsuitable for consumption as the grade specified. A material can be classified as out-throw in one grade as a prohibitive in another grade. Carbon paper, for instance, is "UNSUITABLE" in mixed paper and is therefore, classified as out-throw, where as it is "UNUSABLE" in white ledger and in this case classified as a prohibitive material.

**Brown Paper Technologies Ltd.,**  
**Survey No. 483, Shirwal-412 801**  
**Dist. : Satara (M.S.)**

**CERTAIN PHYSICAL PROPERTIES OF DIFFERENT RAW MATERIAL**

**TABLE NO. 1**

Sr. No.	Raw Material Unbleached Varieties	B.F.	T.F.	B.L. (Meters)	Objectionable
1.	NDLKC (USA) 35°SR	30-32	80-100	4800-5200	White liner & wet strength/hot melts
2.	NDLKC (Singapore) °SR	26-30	70-80	4500-5000	White liner & wet strength/hot melts
3.	NCC (UAE)	24-26	80-90	4400-4600	White liner, wet strength/hot melts
4.	NCC (European) °SR	21-22	70-75	3900-4100	White liner, wet strength, hot melts and mechanical flutting media
5.	OCC (USA) 35°SR	28-30	80-100	4200-4600	Wet strength & wax coated material thermocol
6.	Fruit Boxes (European) 35°SR	28-30	80-90	4600-4800	Wet strength, wax coated material, hot melts
7.	European OCC	24-25	70-80	4200-4500	Duplex, plastic, stickers, high printed material and other stickers.
8.	OCC (Gulf) 35°SR	22-24	70-80	4200-4500	Wet strength & wax coated material thermocol
9.	OCC (Singapore) 35°SR	20-23	70-80	3800-4200	Wet Strength & wax coated material thermocol
10.	Indian Kraft (Other suppliers) 35°SR	13-15	50-60	2800-3300	Vitamin, Straw board

Waste paper like poly coated, wax coated, wet strength, foil laminated, etc are difficult to use materials.

Higher the % of long fiber more is the cost of waste paper. Higher the % of difficult to use material lower is cost of waste paper. For instance, cost of NDLKC containing 10% waxed DLK is cheaper than regular NDLKC by 20 to 30%.

In order to take advantage of cheaper waste paper due to presence of difficult to use material, we need to have a comprehensive stock preparation system.

**FACTORS INFLUENCING DESIGN AND TECHNOLOGY SELECTION FOR WASTE PAPER RECYCLING SYSTEM**

There is no universal system for processing of

secondary fiber. Every system has to be designed to specific mill requirement. There are six primary factors that influence the design of the plant and type of technology selected.

1. What is the final targeted pulp quality?
2. Which grade of waste to be used?
3. Do you want to design plant with low capital cost and sacrifice on operating cost?
4. Do you want to design plant to run at low operating cost incurring high capital cost?
5. What degree of future risk does the mill want to incur?
6. What kind of flexibility to be incorporated in the design of the plant?

## CERTAIN PHYSICAL PROPERTIES OF DIFFERENT RAW MATERIAL

**TABLE NO. 2**

Sr. No.	Raw Material Bleached Varieties	B. F.	T. F.	B.L. (Meters)	Bright ness	Ash %	Objectionable
11	Manifold Colour Ledger	30-35	65-70	5000-6000	65-69	6-10	Dark colour, heavy print magazines, envelop with synthetic gum & cellophun windows.
12	Sorted Book Stock (SBS) 35° SR	24-25	60-65	4500-4800	75-78	4-5.0	Mixing of any other other grade
13	Sorted Colour Ledger European	20-25	50-60	4000-4500	60-65	11-15	Dark colour, heavy print magazines, envelope with synthetic gums and cellopin windows.
14	Supermix (Baharin)	22-25	53-57	4000-4500	65-70	16-16.5	Duplex, plastic, stickers, high printed material and other stickers.
15	Office Waste (Germany/Europe)	20-22	50-60	3200-3600	60-65	15-18	Plastic & other off grade material
16	POC (UAE)	18-20	50-70	3000-3500	65-70	18-20	Duplex, plastic, stickers, highly printed material and other stickies, carbon paper.
17	Magazine Trimming (USA)	18-20	60-70	3000-3500	62-65	12-14	Mixing of any other grade
18	Fly leaf shavings (FLS) (European) 35° SR	16-18	50-60	2700-3000	60-65	20-25	Mixing of any other grade
19	Imported Magazines (UAE) 35° SR	13-15	50-60	2600-2800	55-60	20-25	Polythene coated paper and hot melts
20	Note Books	15-17	40-45	3000-3200	65-70	10-12	
21	Indian White Record	12-13	30-35	2500-2800	65-70	14-16	Duplex, straw board, carbon paper, road sweep

REMARKS : Evaluation is done on 35° SR freeness with 60 GSM, substance of the Lab Sheet.

Under the influence of the above factors one can see that each processing system for waste paper is unique. There is immense challenges designing a system that will process the available stream of recovered paper and produce benchmark quality, in a given available capital.

### SELECTION OF SECONDARY FIBER

The quality of final product depends extensively on the correct grade of waste paper used. The selection of correct grade of waste paper involves evaluation of requirement of final product quality with respect to pulp characteristics like :

- Wood free of mechanical
- Bleached or Unbleached
- Dirt count
- Shade
- Physical properties
- Chemical properties
- Fiber fraction

These properties can be predicted to a large

extent in final product, if a systematic study of waste paper is done in the laboratory. Majority of mills in India producing paper, using secondary fiber are in the small sector, typically producing 30-70 M.T. paper per day. These mills are equipped with very primitive testing equipment primarily to test finished paper. Most of these mills do not possess comprehensive laboratory facility to check the characteristics of the waste paper. Most of the waste paper identified and used waste on the basis of perceptive and visual observation, which are highly subjective in nature. This method of buying and consumption of waste paper results in the mills either not buying the correct grades of waste papers for specified product or lying too much emphasis on word by mouth analysis done by the production people, which are not truly scientific in nature. This also results in supply sources being influenced by vested interest giving rest to unhealthy practices. This problem arises due to nonscientific analysis of secondary fiber. It is very important to evaluate the properties of secondary fiber before using them in final product. This can be done in the laboratory by preparing hand sheet of the secondary fiber and testing its properties.

We at Brown paper Technologies Limited have done analyses of fiber quality of various grades of waste papers over the years and have tabulated their

## WASTE PAPER UTILISATION

### FIBER CLASSIFICATION RESULTS FOR THE DIFFERENT IMPORTED/INDIGENOUS WASTE PAPERS

**TABLE NO. 3**

Sr. No.	Name of the Waste Paper	Fractionation Results				
		+ 30	(-30) to (+50)	(-50) to (+100)	(-100) to (+200)	-200
1.	Shredded Office Waste at 40°SR	17.0	10.2	26.8	8.7	37.3
2.	Manifold Colour Ledger at 40°SR	28.4	16.0	12.0	10.7	32.9
3.	Indian Note Book at 40°SR	7.9	19.0	13.4	20.2	39.5
4.	Indian C.P.O. at 40°SR	20.9	16.0	16.4	16.9	29.8
5.	L.C.C. at 40°SR	9.1	11.6	33.0	12.6	33.7
6.	P.O.C. at 40°SR	11.8	28.1	4.6	13.6	41.9
7.	O.C.C. (Bear Box Cartoons) at 40°SR	37.8	7.9	17.5	5.5	31.3
8.	American O.C.C. at 40°SR	44.8	7.5	19.7	7.9	20.1
9.	N.D.L.K.C., U.S.A. at 40°SR	43.4	8.1	18.9	6.4	23.2

### COMPARISON OF RAW MATERIAL RECEIVED EVALUATION RESULTS WITH ACCEPTANCE STANDARD.

**TABLE NO. 4**

Sr.	Parameters	Shredded office waste		DS OCC	
		Evaluation Results	Acceptance Standard	Evaluation Results	Acceptance Standard
1.	Freeness °SR	40	40	35	35
2.	Substance, g/m <sup>2</sup>	61	60	60	60
3.	Burst factor	23.48	20-22	30.4	28.30
4.	Tear factor	52	50-60	73	80-100
5.	Breaking length, m	3706	3200-3600	4352	4200-4600
6.	Stretch, %	--	--	2.55	1.8-2.0
7.	Brightness, %	63-64	60-65	--	--
8.	Ash, %	11	15-18	--	--
9.	T.E.A. J/m <sup>2</sup>	--	--	45.96	40-45
10.	Porosity, Sec/100ml	--	--	23-25	10-12

properties. We have used this table extensively:-

- To predict the end properties of finished product.
- To write our Purchase Acceptance Standards.
- To interact with suppliers and inform them on quality deviation so that necessary quality correction is done in the next supply.
- To fix furnish percentages to achieve the required final product properties.

● To optimize the chemical requirements, slushing time, refining load etc.

### **EXPERIMENTAL:**

The various waste paper received, are tested regularly. The test results are from in-house evaluation for physical properties. Typical evaluations of physical properties are given comparing with our acceptance standard in Table No.4.

### **CONCLUSION:**

An understanding of the different types of contaminants, their sources and appropriate removal methods is essential to the successful use of recovered paper as a raw material for papermaking. Recent developments in equipment, chemistry, and treatment processes have resulted in continuous improvements in both contaminant removal efficiencies and the quality of the end product.

It is generally observed that in India prerogative purchase of waste paper is vested with the top management of the mill in case of the large paper mills and with owners in case of small paper mills. Although most of the people who are responsible for the purchase do travel to different countries to study the methodology of collection, sorting and export of waste paper, many of them are non-technical people and are unable to arrive at right conclusion regarding identification of proper sources and grades. Ironically the technical team who use this waste paper are neither exposed to the source nor consulted while purchase decisions are being made. Most of the contradiction between expectations and reality arises because of this. It is very important that the actual user of the waste paper should know the reality of the secondary fiber

business and strengthen the perception about what to accept and what not to accept in waste paper consignment

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