Coping up with Quality Demands of Industrial Customers While Using Recycled Fibres

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ABSTRACT

Acute shortage of conventional raw materials and the incentives given by the Government agencies leading to the increased utilisation of recycled fibres in the manufacture of quality papers are outlined. The original system, utilised in SPB, for producing the backliner pulp for the Duplex Boards is described. The quality complaints associated with the processing of the waste Paper with the exsiting system have been discussed. Recently installed plant, for systematic processing of the Waste Paper, to resolve the problems faced by the industrial customers is described. The implementation in two phases, with equipment like Hydrapulpers, Turboseparators, Deflakers, Screening and Cleaning systems is detailed. Present expansion of the Waste Paper pulp plant, utilising modern equipment like Continuous pulper, Turboseparator, Deflaker, Pressure Screens, Centricleaners and OD Thickeners is described. The effectiveness of using these systems for eliminating fhe quality complaints from the customers has been evaluated. Stringent quality specifications laid down on the Waste Paper suppliers and the rigorous inspections by reputed agencies are presented.

The limitations of even the modern systems to deal with certain contaminants are brought out. Suggestions from the experienced Process Technologists and Equipments Suppliers are invited.

The great amount of attention paid in the past ten years to the availability and supply of the raw materials for the Pulp and Paper Industry obviously highlights the scarcity and acute shortage of conventional forest grown fibrous materials, namely, wood and bamboo. In view of the existing situation of inadequate quantities available for manufacturing virgin pulp, the industry is forced to turn to the alternative of using recycled fibre for the paper manufacture to cope up with the demands of industry and market. Recognising the same fact, the Government agencies had also liberalised the imports of waste paper, as well as virgin pulp, and gave incentives in the Excise Duty on the products manufactured using unconventional raw materials. In addition to helping the conservation and optimum utilization of fibrous raw materials, the recycled fibre utilisation reduces the energy, and chemical consumptions and many a time brings down the pollution loads in the effluents. Therefore, the necessity to use the recycled fibre needs no further emphasis.

Along with the increasing demand of paper and boards, the quality specifications, by market in general and industrial customers in particular, are becoming more and more stringent. The values of the properties like ply bond, burst factor, stiffness, bulk, brightness, surface cleanliness (free from blemishes like specks and lumps) are continuously increased by the users. It is a challenging job to cope up with these demands while utilising the recycled fibre.

This article presents the experienee of a paper and board mill, in dealing with processing and utilisation of secondary fibres, with a particular reference to meeting the quality demands of industrial customers.

INITIAL EXPERIENCE

The first need to instal and operate the Waste Paper Processing System had arisen in the year 1969 when the MG machine was converted to a combination machine by adding three cylinder moulds for manufacturing Duplex Boards. The recycled fibre was used

*Seshasayee Paper & Boards Limited,
ERODE - 638 007

for the backliner of the Duplex Board whereas the frontliner was made with bleached chemical pulp. In this system, the mill had set up a hydrapulper, vibrating screen and a riffler for processing the indigenous waste paper. The flow sheet is given in Fig. 1. This equipment was expected to eliminate paper chips, polythene, rubber, plastic pieces and heavy contraries. The pulp was further processed through centricleaners and sand trap to remove the denser contaminants before the pulp is supplied to the cylinder moulds.

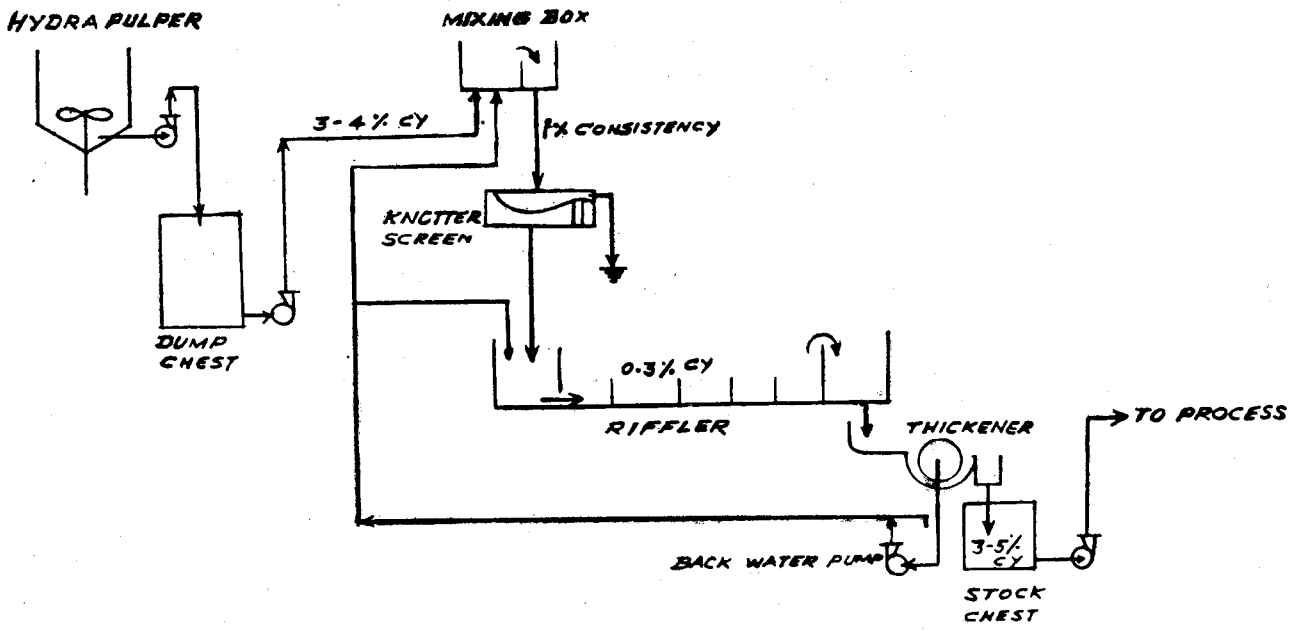

FIG. 1 INITIAL WASTE PAPER PROCESSING SYSTEM

Inspite of operating the full system to eliminate the contaminants, the mill was getting the quality complaints, particularly on pin holes and surface blemishes caused by lumps due to foreign materials. This was happening inspite of the manual sorting of the waste paper received at the mill to remove the contaminating materials. In view of this experience, the inadequacy of the first installed system was recognised and a modified practice was started for eliminating paper chips, etc. As per this, the waste paper was slushed in already existing beaters (for processing rags) instead of hydrapulpers, and passed through the vibrating screen, trimbey and centricleaners and finally thickened. This practice did help in reducing the contaminants but still could not eliminate them completely.

WASTE PAPER PROCESSING PLANT I

As Duplex Board production was steadily increasing and the indigenous supplies were not able to cope up with the demands of waste paper, the industry resorted to import the waste paper from foreign countries. This brought in a new element of non-uniformity in waste paper supplies on which no control could be exercised. However, it was decided to set up a plant to process the following varieties of waste paper for supplying the pulp for board backliner.

1. Mixed Colour Cuttings
2. Duplex Board Cuttings
3. Box Board Cuttings
4. No. 11 Office Records
5. Super Mixed paper
6. Mixed Waste

The contaminants, normally associated with the waste paper, can be classified into three categories as given below.

1.	Heavy Contraries :	Sand Pins, Clips, Metal pieces, and wires
2.	Light Contraries :	Polythene, Rubber pieces, Plastics, Thermocoal, etc.
3.	Hot melts :	Bitumen, Wax and Stickies

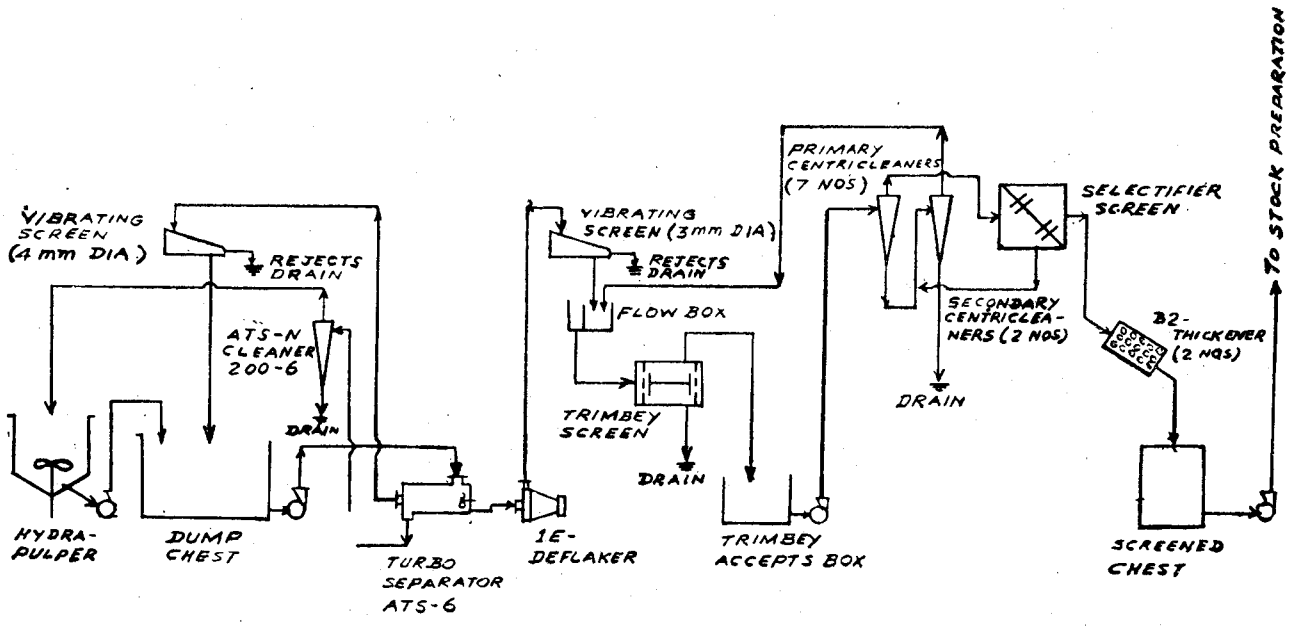

FIG-2 WASTE PAPER PROCESSING PLANT-1 (WPPP-I)

It is necessary to remove these contaminants before the pulp is drawn into Stock Preparation section to avoid the quality complaints from the customers.

In view of this need, the mill had decided to go in for a regular waste paper processing plant in 1978. The flow sheet of this plant is given in fig. 2. The capacity of this plant is to supply 30 tpd of waste paper pulp. This consisted of two hydrapulpers (batch type, home made), a turboseparator, a deflaker, trimbey screen and a centricleaning system. At the end, the pulp was thickened using B2 thickeners (home made). The details of functions to be carried out by each equipment are given in Table 1. This system could effectively remove the rejects like sand, pins, chips but could not deal successfully with polythene pieces which found their way in the outlet pulp and contaminated the paper. This could be dealt with by introducing a vibrating screen before stock entered the fine screening (Trimbey) system. A selectifier screen was also introduced to avoid lumps. The size of perforations in these screens had to be altered to suit the long fibre used in the imported paper. This system obviated the difficulties of the contaminants, excepting bitumen and wax, to a satisfactory level.

TABLE—I

FUNCTIONS OF EQUIPMENT IN WPPP - I

Sl. No.	Equipment	Function
1.	Hydrapulpers-2 Nos.	Slushing
2.	Turboseparator (ATS 6) with high density cleaner and vibrating screen	Removal of both light and heavy contraries any further slushing
3.	Deflaker (1E)	Deflaking all flakes
4.	Vibrating Screen 3 mm*	Removal of light contraries
5,	Trimbey sereens	Removal of rejects and paper chips
6.	Centricleaners	Removal of heavy contraries like sand
7.	Selectifier screeen*	Passes homogeneous pulp and breaks lumps

*later addition

WASTE PAPER PROCESSING PLANT–II

In 1984, there was again a need to instal new plant with a capacity of 70 tpd, as the existing forest supplies started dwindling due to continued failure of monsoon. Also, the available pulp wood had to be shared by pulp and rayon grade mills in the state. WPPP II differed from the previous one in processing waste paper to supplement the captive pulp requirements for making quality papers, whereas WPPP I pulp was for board backliner, In addition to supplementing the pulp supplies the objective was also to eliminate, if possible, the manual sorting entirely. The consideration was to use the following varieties of imported waste paper to be mixed in furnish for quality papers such as plain kraft, white printing, cream wove, colour wove, poster, and pulp board.

1. Old Corrugated Cartons
2. New Corrugated Cartons
3. Sack Kraft
4. New Double Liner Kraft Cuttings
5. White Shavings
6. Medium White Shavings
7. Computer Print Out (both chemical and groundwood)
8. Second Cuttings

The laboratory evaluation of some of these varieties is given in Table 2. The flow sheet of WPPP-II is given in fig. 3.

Table—2. LABORATORY EVALUATION OF IMPORTED WASTE PAPERS

Sl. No.	Material	Freeness (°SR)	Burst Factor	Tear Factor	Breaking Length in metres	Double Folds	Ash %
1.	Old Corrugated Cartons	32 6	32.0	75.0	5240	155	—
2.	Sack Kraft	24 0	39.2	38 2	5806	>1000	—
3.	New Double Liner Kraft	39.0	44.8	71.0	6662	268	—
4.	Hard White Shavings	42 4	31 3	63.7	4753	38	—
5.	Computer waste paper (CPO)	32 0	41.5	73.3	5899	360	11.0

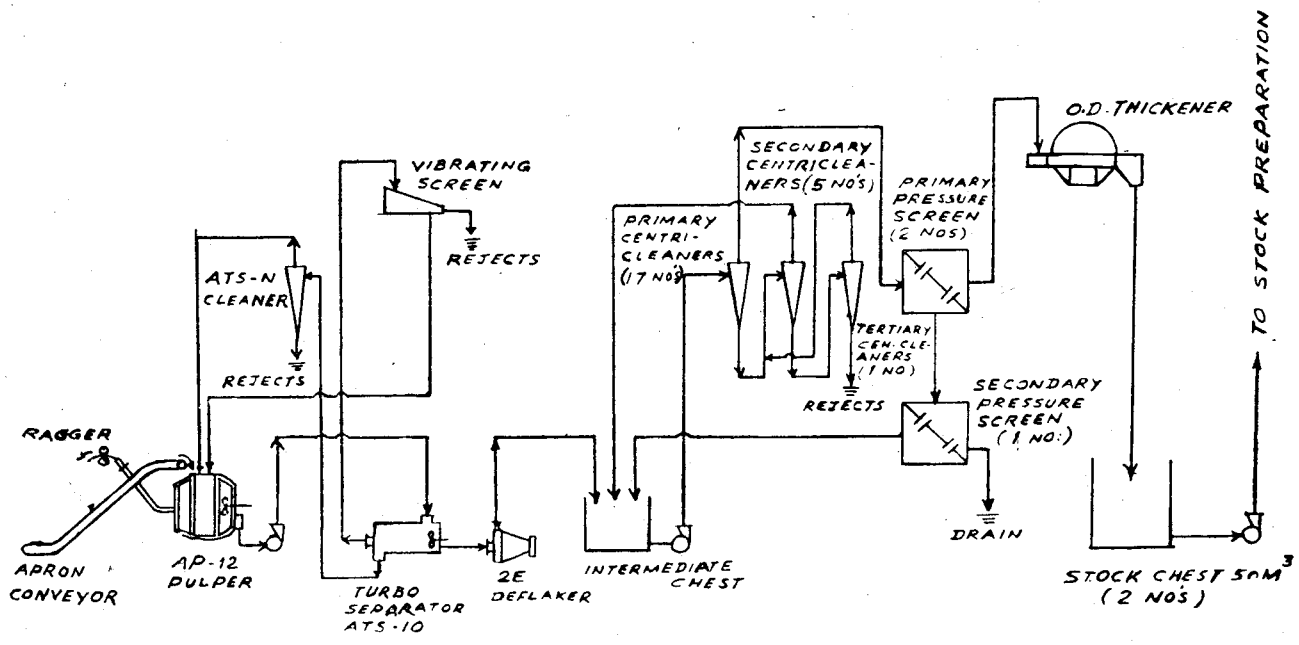

FIG. 3. WASTE PAPER PROCESSING PLANT-2 (WPPP-II)

This scheme is being implemented in two phases. The first phase consists of the installation of continuous pulper with an auto ragger, a turboseparator, a high density cleaner, a vibrating screen and a deflaker. In the second phase, centricleaners, pressure screens and two Nos. of OD thickeners, are included. The first phase is already under operation since August 1985. The second phase is scheduled to be commissioned before the end of December 1985.

In contrast to the handling of waste paper in WPPP I, wherein the manual sorting was done and the paper packed in gunny bags was loaded manually on belt conveyor to be fed to the batch pulper, in WPPP II, it is planned to use the waste paper bales loading with forklift on the Apron conveyor to be fed to the hydrapulper, This mechanical handling reduces the time and labour involved in manual feeding and helps in maintaining uniform rate of pulping at the full capacity. To repeat, the objective was once again to avoid the manual sorting of waste paper completely. To meet this requirement, it is desired to have a cleaning system in the pulper itself. Therefore, a continuous pulper with an auto ragger, to remove all light spinning contraries and thereby reduce the load on Turboseparator, is installed. An automatic dirt trap, to drain all heavy contraries collected in the pulper at fixed intervals, is also incorporated. This equipment is followed by a Turboseparator, containing a 3 mm perforated plate. The accepts from the turboseparator are led to the Deflaker which breaks down the paper chips and fibre bundles and supplies uniform pulp to intermediate chest. In the prescreening section, space is provided to introduce, if necessary at later date, a Turbosorter with slotted holes, in between the turboseparator and deflaker to trap cubical impurities like thermocoal, etc. escaping from the turboseparator. One of the rejects lines, emanating from the turboseparator, is led to the high density cleaners to remove heavy contraries and accepts from this cleaner are fed back to the pulper. The second rejects line is taken to the vibrating screen to trap all the light contraries and the accepts are again fed back to the pulper. The prescreening section ends with this arrangement. With this first stage, the mill is using waste paper such as New Double Liner Kraft (NDLK) and New Corrugated Cuttings (NCC) to the tune of 30% in the MF Plain Kraft. After completing the second phase, the mill hopes to use old Corrugated Cuttings (OCC) and other cheaper varieties.

The implementation of second phase with centricleaners, pressure screens will further help the cleaning of the pulp to enable to handle even inferior varieties of paper containing more contraries. Two OD thickeners will be utilised to improve the consistency of the pulp to 6%.

The processing of the indigenous waste paper and imported waste paper utilising the same plant poses new problems with respect to perforations to be used in the pressure screens, in view of the differences in morphological characteristics of the base fibres. Depending upon the varieties processed, the baskets of the pressure screen need to be changed thereby taking away the flexibility of using the system without downtime, for both the waste papers.

In the Stock Preparation section, the use of waste paper pulp demands a separate line for treatment as the combined refining would not yield the desired results in view of the differences in freeness of the incoming pulps. Flexibility to maintain difference in freeness levels also enables the mill to meet the stringent specifications of industrial customers particularly with respect to ply bond, stiffness, bulk and flatness of Duplex Boards.

To restrict the contaminants entering along with the waste paper into the plant, care has been taken to place the stringent specifications in addition to the stipulations mentioned in PS-83 circular of Paper Stock Institute of America, on the suppliers, while issuing the Purchase Orders. A model of the special instructions mentioned for Computer Print Out and Box Board Cuttings is given in Tables 3 and 4. In addition to these specifications, inspection clauses are also added, to be carried out by reputed inspection agencies/ surveyors like. M/s. SGS Limited. Inspite of these efforts, it is observed that the incoming waste paper contains higher percentage of contaminants which are to be avoided as per the purchase specifications. As the industries already pay the money by the time they receive the consignments, little can be done with the purchaser. The confidence level with most of the suppliers being the same, no option is available to choose a particular party, who can supply contaminant free material. Also labour being very costly in countries from which these varieties of waste paper are imported, the suppliers never indulge in complete sorting This experience is not allowing the mills to get rid of the manual sorting completely.

TABLE—3

SPECIAL INSTRUCTIONS PLACED ON SUPPLIER FOR COMPUTER PRINT OUT

1. The item Computer Print Out (item 42 of PS 83) on order pertains to one or more of the items specified in Customs Notification No. 219/84 dated 10-8-1984 vide Sl. No. 1 to 10 shall be absolutely free from the following contaminants :—
   a) Bitumen
   b) Polythene and polythene layers
   c) Wax coatings
   d) Pins
   e) Twines
   f) Straw Boards
   g) Any other foreign materials unsuitable for paper/paper board making
   h) Printed waste paper containing pages of or material from holy books
   i) Ground wood CPO, Black & white cuttings
2. No uncut books, sheets, religious books, periodicals and magazines should be present.
3. Obscene matters as per Indian Customs Regulations is strictly prohibited.
4. Moisture content of the item on order should not exceed 10%.
5. Contaminants/out-throws should not exceed 2%.
6. Laser printing should not exceed 15%.

TABLE—4

SPECIAL INSTRUCTIONS PLACED ON SUPPLIER FOR BOX BOARD CUTTINGS

1. The item on order pertains to one or more of the iteme specified in Customs Notification No. 219/84 dated 10-8-84 vide Sl. Nos. 1 to 10, Shall be asbolutely free from the following contaminants :—
   a) Bitumen
   b) Polythene and polythene layers
   c) Wax coatings
   d) Pins
   e) Twines
   f) Straw Boards
   g) Any other foreign material unsuitable in paper/paper board making
   h) Printed waste paper containing pages of or material from holy books
2. The item on order shall be only in shredded form. No uncut books, sheets, religious books, periodicals and magazines should be present.
3. Obscene matters as per the Indian Customs Regulations is strictly prohibited.
4. Moisture content of all the items on order should not exceed 10%.
5. Contaminants/out-throws should not exceed 2%.

With all the abovementioned measures and systems, it is still found that the bitumen and wax, if present in the original waste paper, will find their way to the final product. This calls for the installation of a hot dispersion plant, which definitely demands a much higher investment which the industry cannot afford in the present financial situation. The slushing of some kraft cuttings is bringing down the capacity of the plant considerably. High ash content (16-18%) in the white shavings creates a new problem of affecting the glaze in poster paper and leaves coating on MG Cylinder and pressure rolls, thus restricting the proportion of waste paper. The Computer prints out, excepting the laser printed ones, are used in the posters, without posing much problems, in view of the smaller printed area and easily removable inks. However, with the help of the WPPP II, the local white cuttings are being used in the quality papers like cream wove, colour wove and azure laid.

It may be of interest to note that the fibre recovered from the paper machine effluents is recycled to be used in the backliner. The combined effluent from all the machines is led to clarifier (which was earlier used for water clarification). The fibre recovered, constitutes the underflow of the clarifier and is mixed with waste paper pulp used for backliner of Duplex Boards. The overflow of the clarifier is used back in the plant at different places. This arrangement has enabled the recovery of five to six tonnes of valuable fibre (a saving of approximately Rs. 3.0 lakhs per month) as well as reduced the water consumption per

tonne of the product due to utilisation of back water at various places.

A point worthy of a special mention is the use of back water in the waste paper processing plants totally avoiding use of fresh water.

Using the waste paper processing systeme mentioned above, it was possible to bring down the complaints from prestigious industrial customers to a considerable level. However, the problems created by the wax and bitumen do raise their uglyhead now and then. We do seek the expertise and advice of the stalwarts in the industry in seeking the economical means of eliminating these contaminants from the waste paper Pulp.