# Fibre Recovery From The Back Water Of Raw Material Wet Washing System


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### ABSTRACT

For sustainability and growth of Indian Paper Industry, the technology has to be upgraded to adapt to Indian conditions in view of scale of paper production, raw material scenario and environmental concerns. Paper Industry is looking at innovative ways and means to reduce the production cost, improve quality of the Product, and improve ease of Maintenance. Indian pulp and paper industry is compelled to explore alternate options for Raw Material like Agro waste like Wheat Straw, Rice Straw, Bagasse and equivalent percentage of Secondary fiber due to shortage of Raw material.

In the process of Wet Washing of Agro Based Raw Material, raw material is processed through Wet Pulper to remove silica contents. It is then dewatered through Aqua Separator/Dewatering Screw to improve the Consistency of the Raw Material to be further processed to Digester area.

During this process, an appreciable quantity of raw material is carried over along with the back water. In order to recover the raw material lost along with the back water and to reduce the load on the water clarifier system, DSM Screens play a major role as a scavenger. The DSM Screens recover more than Fibers. It recovers the Cash. It lets Paper industry to put the fibers in the system rather than in Sewer. It increases yield and reduces water consumption. This paves way for enhanced profitability of the mill through better economies of operation.


**Introduction**

Paper is manufactured from three major kinds of raw material i.e. wood, agricultural residues and recycled fiber. Due to shrinking forest land, one has to search for the alternative sources of fiber. Agricultural residue and the recycled fiber offer a great opportunity to replace the wood fiber. In India, bagasse, wheat straw, rice straw, sarkanda and grasses are used in majority for paper manufacturing.

**RECOVERY System Description**

The water recovery system consists of following components:
DSM Screen
Water Clarifier System
Recovered Fibre Tank
Raw material Bagasse/ Wheat Straw with controlled processing rate shall be dumped in the Wet Pulper along with water for removal of foreign material and to wash the raw material. Washed raw material with 1 to 1.5 % consistency will be sent to Aqua Separator/Dewatering Screw to increase the consistency of the raw material to go to cooking section. Water removed from the Aqua Separator shall flow down to the Degree Slanting


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**Fig. 1 SET OF DSM SCREENS IN WORKING CONDITIONS**

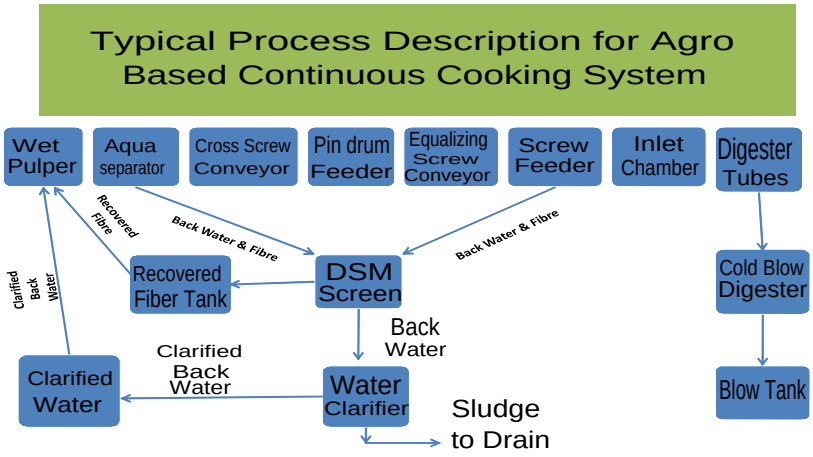

TABLE-1

| LAB RESULTS OF DSM INFEED | | | | | |
|---|---|---|---|---|---|
| DATE | SAMPLING TIME HRS | FLOW RATE (M3/HR) | INCOMING WATER % CY | FIBRE IN THE INCOMING T/HR | FREQUENCY OF MANUAL CLEANING |
| 20.11.2008 | 08.00 | 279 | 0.29 | 0.81 | ONCE IN A DAY |
| 20.11.2008 | 12.00 | 331 | 0.23 | 0.77 | |
| 26.11.2008 | 16.00 | 288 | 0.34 | 0.98 | |
| 26.11.2008 | 20.00 | 291 | 0.26 | 0.76 | |
| 26.11.2008 | 04.00 | 315 | 0.31 | 0.98 | |

TABLE-2

| LAB RESULTS OF DSM OUTLET | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DATE | SAMPLING TIME HRS | PH | FILTRATE | | FIBRE | | RECOVERED FIBRE | |
| | | | PPM | QUANTITY IN M3/HR | LOST IN T/HR | RECOVERED IN T/HR | % CY | IN % |
| 20.11.2008 | 08.00 | 7.3 | 611 | 260.66 | 0.16 | 0.64 | 3.5 | 80.31 |
| 20.11.2008 | 12.00 | 7.5 | 490 | 315.48 | 0.15 | 0.62 | 4 | 79.95 |
| 26.11.2008 | 16.00 | 7.2 | 725 | 261.96 | 0.19 | 0.79 | 3 | 80.62 |
| 26.11.2008 | 20.00 | 7.5 | 710 | 273.19 | 0.19 | 0.56 | 3.25 | 74.32 |
| 26.11.2008 | 04.00 | 7.4 | 689 | 289.91 | 0.20 | 0.78 | 3.1 | 79.56 |

Machine (DSM) Screen for recovering raw material being lost along with the water and to reduce the load on the water clarifier system. There are Pulp and Paper Industries using Rotary Screen/ B2 Thickener to recover fibre.

**Advantages**

| Comparison between Rotary Screen & DSM Screen | |
|---|---|
| **Rotary Screen** | **DSM Screen** |
| Need huge Power to operate | No power requirement |
| Regular Maintenance is needed | No Maintenance is required |
| Space required is High | Less Space is required |
| Moving Parts are involved | No Moving parts are there |
| Needs Operator attention on regular basis. | No dedicated Operator is needed |
| Outdated Technology | State of Art Technology |
| Periodical change of wire mesh is required | Long life of screen as it is metallic, Having option to reverse screen hence long life. |
| Cost is high | Cost is low |
| Pay back period is high | Payback period is short |
| Higher Water Consumption | Lower Water Consumption. |
| Needs cleaning device external. | Self cleaning device can be optional. |

Recovered bagasse/ wheat straw collected in Recovered Fibre tank shall be processed back to the Pulper system and the screened back water shall be clarified in the clarifier to get clear water and used back in the Pulper. With this, fresh water consumption in this process shall be reduced drastically. Small quantity of the water shall be drained along with the sludge from the clarifier system which will be made up by fresh water.

The Screw Feeder dewaters the fibers by compression. The filtrate from the screw feeder will be discharged into the DSM Screen in the Raw Material Wet Cleaning Plant to recover the fibers from the filtrate. The recovered fibers are pumped back into the Pulper.

The filtrate of the DSM screen will be rich in silica. It passes to a filtrate tank where it is mixed with whitewater/back water from subsequent processing stages. This water is directed to a clarifier for removal of silica and the overflowing liquor is recycled back to the Pulper. Photograph of set of DSM Screen taken during operation is shown in Fig.1

**Experimental STUTDIES:**

HDOL with support from ABC Paper Limited conducted studies during regular plant operation at processing of rated production of 12- 14 T/ Hr based on bagasse. Table No 1 & 2 indicates the lab results of incoming, outgoing of DSM Screen and achieved performance of DSM Screen.

**Results**

While going through the above results from Table 1 & 2 following points are the highlights.

- An average of 6-8% of the raw material is being lost from the dewatering area of the main processing stream
- 80 % of reduction in load to the clarifier system
- Recovery of fibers that could have been otherwise lost was around 80%
- Ease of operation & maintenance of the system.
- Conservation of water in the system.
- Reduction in cost of production due to minimal fibre loss.

**Conclusion**

It is very clear that raw material quality and cooking of raw material are very important part in case of agriculture residue paper manufacturing process. We have to recover the fibers being lost along with the sewer to improve the profitability of the Pulp and Paper Industry and also to take care of the environmental problem. Our practical experience in Yaslik, ABC and Satia Paper Mills shows that excellent results were obtained by providing DSM Screen in circuit and able to conserve fiber / water increasing bottom line of the company significantly.

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