# Short Fibred Paper Making Philosophy and Practice

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#### PHILOSOPHY

While all paper making pulpe have some percentage of short-fibre, predominantly short-fibred stock forces paper making to go to a finer degree of uniformity and centrol—of course, special design and operational modifications are also being done. Use of short-fibre has become necessary only of late and as it happens with every new problem there is need for more date and coherence in views.

All short-fibred stock does not constitute one happy family. While most short-stocks are slow, some short-stocks are free also. Another difference is in fibre diameter—thin walled fibres make smooth, and well formed sheets.<sup>1</sup> Factors such as these eliminate general prescriptions. However, there are common problems like the preponderance of fines, lower strength of papers etc. So, an attempt to discuss steps on meeting these problems on conventional machines and papers can be useful. Gone also are the days when mills used only one type of stock or wood. There are always mixtures of fibres requiring different types of treatment with attendant effects on freeness and formation.

Then there is the paper quality problem, which upto a point is the same as the paper making one, but often overlooked till there are customer complaints. This has to be tackled individually by each mill depending on the variety and substance of papers it intends to make and the quality it desires to maintain. Of course, there are common features like fuzz.

The use of additives to increase strength of paper is not likely to catch on for sometime atleast in India at their present costs. However, the use of chlorine dioxide is worthy of investigation for special papers and in bigger mills, particularly, due to its selective action on lignin without attacking cellulose like other bleaching agents.

This brings us to the final and most important problem namely of the cost involved in separate treatments for different pulps, closer controls and the making of "fragile" paper. These need to be made up by higher capacity (even as it is paper mills involve heavy investments) close-knit and standardised units with good heat and material balance and making of one grade of paper for long periods etc.

#### PRACTICE

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#### **Stock Preparation :**

Preparation of short-fibred stock consists primarily in preventing shortening of fibre no more than is necessary.

Firstly, the refining of screened stock instead of the whole stock is recommended. This results in leaving those fibres which pass through the screen untouched and then the screened rejects and lumps are refined. This needs less refining capacity and power besides obtaining uniform and the strongest pulp possible.

Another step is to minimise recirculation along stock return lines which slows down the stock by throttling oversize valves at the pump.

Storage of washed stock should be as far as

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possible at high consistency as degradation is likely to be less.

Short-stocks do not easily form a mat on screens thus impairing their efficiency. Adequate steps in the form of well positioned dams and provision of screens with smaller holes may be needed.

### Broke :

The loss in yield and strength in short-fibred broke on repulping is greater than in normal papers.

Broke should be submerged before beating, present beater designs incorporate one or two rotors for recirculation and one for defibering.

Steady and continuous addition of broke to machine chest is desirable.

#### Wet End:

Generally paper makers attempt to get a low moisture-high vacuum sheet. Normally the machine designer plays for safety in wire length and as the temperature in India is normally high causing faster drainage, special attention is necessary for the spacing of table rolls by providing sufficient space to drain well but not too quickly and to offset the wire length effect.

K.R. Suttie<sup>4</sup> gives a formula based on the assumption that the suction head created by table rolls is proportional to the square root of the wire speed and has also obtained wire length factors for a variety of papers for calculating their wire length from a number of paper machines.

L = C P	L=Wire length in feet
$N_2 \_ P_1$	P = Lb/hr./in. trim.
$\overline{N_1} = \overline{P_2}$	C = Constant.

Where  $N_1$ ,  $N_2$  are the number of table rolls and  $P_1$  and  $P_2$  the respective outputs.

Another means of increasing the vacuum and fines retention in the sheet is by going over to a finer fourdrinier wire weave. This normally results in lower wire pit consistency. The adjustment of flat box vacuums through air vents and properly sized piping for water draw out through a steady pull without fluctuations to prevent pin holes etc. are points worthy of attention.

#### Draw:

In an open draw from the couch, attempts to get as wide an angle of take-off as possible by adjusting the positions of the suction box and the paper receiving felt roll of the 1st Press need to be made. Light Aluminium draw rolls are in vague at this point. A draw recorder is very useful.

Vacuum pick up at high speeds is a necessity and more so for short fibre.

#### **Presses**:

The conventional press is being fast replaced by many new designs not only for removing more water by mechanical means but also for reducing the long stretch at this stage as in the design of UNIPRESS (KMW) etc.

I would like to see an indicating instrument which directly gives the pressure per lineal inch (PLI) applied on the press. A high PLI consistent with the loading the bottom roll can take, is desirable. Hard rubber though it decreases felt life and requires a correct crown is common. Low compressibility felts are also helpful in removing water. Nowadays, needled felts are fast replacing present designs. A stiff rubber doctor<sup>6</sup> on the bottom roll for keeping it dry is not common despite its utility.

Short-fibre produces more crumbs necessitating a proper positioning of doctors and crumb boards. Reverse presses should be incorporated only where paper quality demands it.

#### **Drying**:

The Drier section should be divided into two or three sections for obtaining a stepwise draw to compensate paper shrinkage, at the end.

Some mills prefer not to have the drier felt on the first few bottom driers alongwith fuzz removing doctors to reduce the fuzz nuisance. Dust exhausters near slitters and winders are useful in preventing the resettling of fuzz on the sheet which reduces the finish.

## White Water:

A rational white Water system should be so designed as to save fibre from rich W.W. and water through lean W.W. and isolate too fine a W.W. which can be troublesome in paper making.

The cumulative effect of fines in the wire pitfan pump—slice system can be counterbalanced by the addition of fresh water which can be metered for control. Steam can also be used if necessary. A thorough fraction test, that is the consistency of W.W. passing through the wire can be taken often.

Some mills separate the 1st and IInd flat box sections of the sealpit, the water from the first being connected to the wirepit and the water from the second for use at back stages. Two filters are also provided in these lines for cleaning alternatively every shift.

Many foreign mills particularly in colder areas, take a daily temperature survey of W.W. at all places.

#### **Testing & Control:**

As paper making from short stock requires finer control, meaningful tests at vantage points are desirable.

The Paterson Drainage Test of headbox stock is not only quicker than the freeness test but also it does not ignore like the freeness test the cumulative effect of fines in circulating W.W. it requires only a freeness tester and a stop watch and is very useful.

The through fraction test mentioned before, the estimation of fresh water percentage in slice input and

the intermediate fraction figure of Bauer Monett classifier are all useful guides and can possibly be correlated. Determination of sheet moisture at presses at least once a week is desirable. The testing of Wet Web strength of the machine furnish can also be done frequently to advantage.

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