

# Use of Short Fibred Pulp for High Speed Machines

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In foreign countries, paper machines are designed and run at a maximum speed of 1000 metres per minute, but such a high speed is meant for newsprint. We are however (I presume) concerned without problems and these are regarding high speed machines for producing writing and printing papers. For us, upto now, machines which are designed and run at speeds of 300 m/min. and above are called high speed machines.

As regards the short fibred pulps, upto now, bamboo has been used as the main fibrous raw material for manufacture of writing and printing papers. Bagasse and Eucalyptus are also used and these two fibrous raw materials also yield short fibred pulps.

Avoiding the arguments regarding the definition of short fibred pulp and high speed machine, we may say plainly that we are to discuss about use of short fibred pulps generally obtained from Bamboo, Bagasse, Eucalyptus etc. for Fourdrinier machines run at a speed of about 300 metres per minute.

Upto now, all the paper machines, specially the high speed ones have been designed and manufactured by foreign countries where long fibred pulps are generally used for manufacture of writing and printing papers. It is quite likely therefore that our paper machines were also designed on the basis of using long fibred pulps instead of short fibred pulps. Incidentally it may be mentioned that the above remarks are applicable in case of machinery for stock preparation as well.

So far as I know, upto now, not a single high speed machine installed in our country was put on trial run to fulfil the guaranteed production. In all cases of agreement, it is mentioned that the

guaranteed production can only be achieved if the fibrous raw material is satisfactory and the stock beating corresponds to the grade of paper to be manufactured. The conditions which are satisfactory and the degree of beating are not specified. Machinery Manufacturers who know that their machines are suitable for long fibred pulps, wilfully avoid to give the specifications. Since sometime back hard woods are being used and this produces short fibred pulps. We may therefore expect to get correct type of stock preparatory plant as well as paper machines from the western countries now onwards.

Pulp, as everybody knows, contains cellulose fibres extracted from fibrous raw materials and paper is made by dispersing the fibres and to lay these in forms of sheets. How the fibres will be dispersed, how the fibres in the sheets will be made to adhere to each other, how the sheet of paper will be made smooth and uniform in thickness, etc. are the main problems.

The first problem is how to disperse the fibres. Upto now, fibres are mixed with large quantity of water and the flow of water is passed through a passage in such a way that the flow of the mixture with fibres dispersed in it is uniform throughout the entire cross section of the passage. To ensure this uniformity, flow box and slices of various designs have been manufactured. Elimination of froth, removal of air etc. are taken care of, but the design do not differ very much for use of short fibred and for use of long fibred pulps dispersed in a large quantity of water.

The next problem is how to remove the water and to lay the fibres in web and at the same time to

make these to adhere to each other. Major portion of the water is removed by draining it out but at the same time preventing the fibres from escaping with the water. This is achieved by passing the mixture of pulp and water over a wire cloth. Short fibred pulp contains larger number of fines than the long fibred pulp. These fines tend to fill up the pores of the wire cloth and thereby retard the drainage of water. Moreover the loss of fibres is also higher in the former case. As the drainage of water continues the fibres get together more slowly in case of short fibred pulps than in case of long fibred pulps. Thus the design of the shake must be such for the former case that the oscillating motion reaches a longer distance of the wire. For this reason, the life of wire will be affected. The table given below shows the design factors of the wet-end of Fourdrinier machine to manufacture 50 tons of writing and printing paper per day. It is needless to say all these are designed by foreign firms of the western countries:

Out of the seven cases only one is working and the rest are only quotations, but the design features are more or less similar in all cases. The one installed does not produce first class paper from short

fibred pulps. We know also that almost all machines installed in India so far, do not produce first class paper from short fibred pulps. For first class paper, long fibred pulps have to be used. I am of opinion that a machine suitably designed will be able to manufacture first class papers from short fibred pulp as well. I am inclined to try with at least four dandy rolls instead of only one. All dandys must, of course, be driven. Longer wire may be helpful but this will be costly.

Once the web is properly formed on the wet part, it is passed through several presses for squeezing out further amount of water and at the same time to compress and to make the thickness of the web uniform all through. For short fibred pulp and for long fibred pulps the design features may be same, except the quality of the felt and its cleaning equipment. Closer knit felt may be of better advantage for short fibred pulps. In all the seven cases mentioned above, there are one suction press, one plain press, one reverse press and one smoothing press. We may need a little higher nip pressure in case of short fibred pulps. The cambers on the rolls must also be maintained in good shape. Very few mills take any care about this.

	No. 1	2	3	4	5	6	7
Substance weight	43-90 gms	43-90	43-90	40-150	43-90	not known	43-90
Speed Range	50-300/ m/min	100-300	300	50-300	60-300	30-300	300
Wire width	3500 mm	3500	3500	3600	3200	3200	3500
Wire length	28000 mm	28000	28000	25000	25500	25500	27500
Dia. of table rolls	208 mm	157	180	not known	not known	not known	180
Number of „ „	25	26	22	21	22	22	25
Number of suction boxes	8	7	7	7	8	8	8
Dia. of suction couch roll	800 mm	685	800	800	800	800	800
Dia. of top roll	nil	nil	450	350	nil	nil	nil

After the presses the dryer section vapourises the remaining moisture from the web. Here again almost in all cases about 32 drier cylinders of 1500 mm dia. have been specified. These are grouped in 4 to 6 sections. In some cases provision has been made for hood with exhaust and hot air blowing arrangements. Felt dryers are provided in all cases, but inter calenders and cooling cylinders are provided in few cases only. The percentage of stretch and shrinkage in case of short fibred pulps are less, therefore the draws on different sections to be adjusted accordingly.

The dried web is then passed through calenders and in all the seven cases provision has been made for 2 stacks of calenders each having 8 bowls. In some cases damping units and air blowing equipment are also provided. For calenders and final reeling machines there are no separate designs for short fibred and long fibred pulps.

Preparation of short fibred pulps by the Stock Preparation section for manufacture of paper is more important than actual manufacture of paper

by the machine. It is true that for all the present machines, the longer (to a certain extent fibres longer than stipulated are to be cut down) the fibres, the better the formation of paper. Therefore it should be our aim to avoid as much as possible the cutting of short fibres by the Stock Preparatory section. Blunt beater or refiner bars made of suitable metal give the highest ratio of wetting to shortening, whereas sharp tackle gives the highest ratio of shortening to wetting. As already mentioned, the existing stock preparatory plants in our country have also been designed and supplied by western countries. Thus the unsuitability of the equipment which are (I am convinced) meant for long fibred pulp, gives a more adverse effect than the unsuitability of the paper making machine. I hope this subject may also be put for discussion in near future.

I am of opinion that sort fibred pulp treated properly by suitable stock Preparatory Plant and formed to web by suitable wet-end of a paper machine will give paper of much better formation than that to be obtained from long fibred pulps.