

# Technology of Marble Effect on Paper and Board

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## SUMMARY

In this article, written exclusively for "Four P News", the author explains the technology of achieving Marble effect on paper and board now catching on in India.

Till 1985-86 quality Marble-designed paper and board used to be imported. Such paper and board do not have a large market demand because of very specific areas of application and more so because of non-availability of such qualities in the country. The situation has become different after 1985-1986, when the author of this article introduced, for the first time in India, the technology of Marble effect in some paper mills.

These items, now arriving in the market, are obviously import substitutes.

Only a few paper mills in West Germany and England make these papers and boards in the paper world and they do not like to give away the secrets even today when paper-making is done by employing computers and robots.

Paper sheets formation is no more a function of the capillary forces generated at the out going nip of a table roll or on a foil edge, it is no more a function of particular pattern of fibre cuttings, its exposed area. Nor does it any more depend on the colloidal functional behaviour of the stock slurry. It is now a function of the physical compression factors induced by two moving wires/or through the falerik tension. This process of sheet formation under compression in the latest third dimension (independent of the gravitational force and Horizontal plane) and under this third dimension effect sheets can be made at any speed-2000 m/m and even more.

The art of incorporating the Marble effect or the 3-D effect on paper and board is a great experience and can be done on the Fourdrinier paper machine wire part only (that is, on Horizontal plane to the earth, in the old conventional method of paper making).

This article deals in detail with the technology of

Marble effect on paper and the various, uses also, of one versatile equipment that serves many purposes of paper making.

A sketch of this equipment is given for a better understanding of the subject.

This equipment has been named by the author the Camel's Back Head Box, because of the particular way the stock at 0.3 per cent consistency floats upwards, and then falls on the wire through an aluminium or S.S. applicator on the wire, joining with the already formed sheet just after the Fourdrinier-head Box.

The Marble stock at 0.3 per cent (this is called the female) consistency has to join with the Fourdrinier stock layer (male) where it has already attained 1.5 per cent consistency.

At the point of unification of these two stocks (0.3 per cent falling over 1.5 per cent on the wire)—the female Marble Stock penetrates through the 1.5 per cent consistency-filter bed stock of the Fourdrinier, and while doing so, the female-coloured stock gets entangled with particular geometrical patterns, thus giving a Marble effect on the surface.

### How various Marble design are obtained

Various geometrical designs and patterns of Marble effect can be had by adopting the following methods. They are as follows :

(1) By increasing/decreasing the Marble Stock Volume (Velocity) on the wire, to deposit coloured fibre closely or at random.

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(2) By increasing or decreasing the Marble Stock consistency  $\neq \neq$  from 0.3 per cent or less than 0.3 per cent consistency.

(3) By increasing or reducing the jet velocity of the Base Stock (male) from the Head Box, etc.

**Depth of the Marble effect**

The tone and depth of Marble effect is obtained by the correct selection of the base colour and the Marble colour. For example, very good Marble effect will come when the base fibre is tinted light pink; against this set the superimposed black marble fibre. The impact of the entire surface as a whole on human eyes will be fantastic.

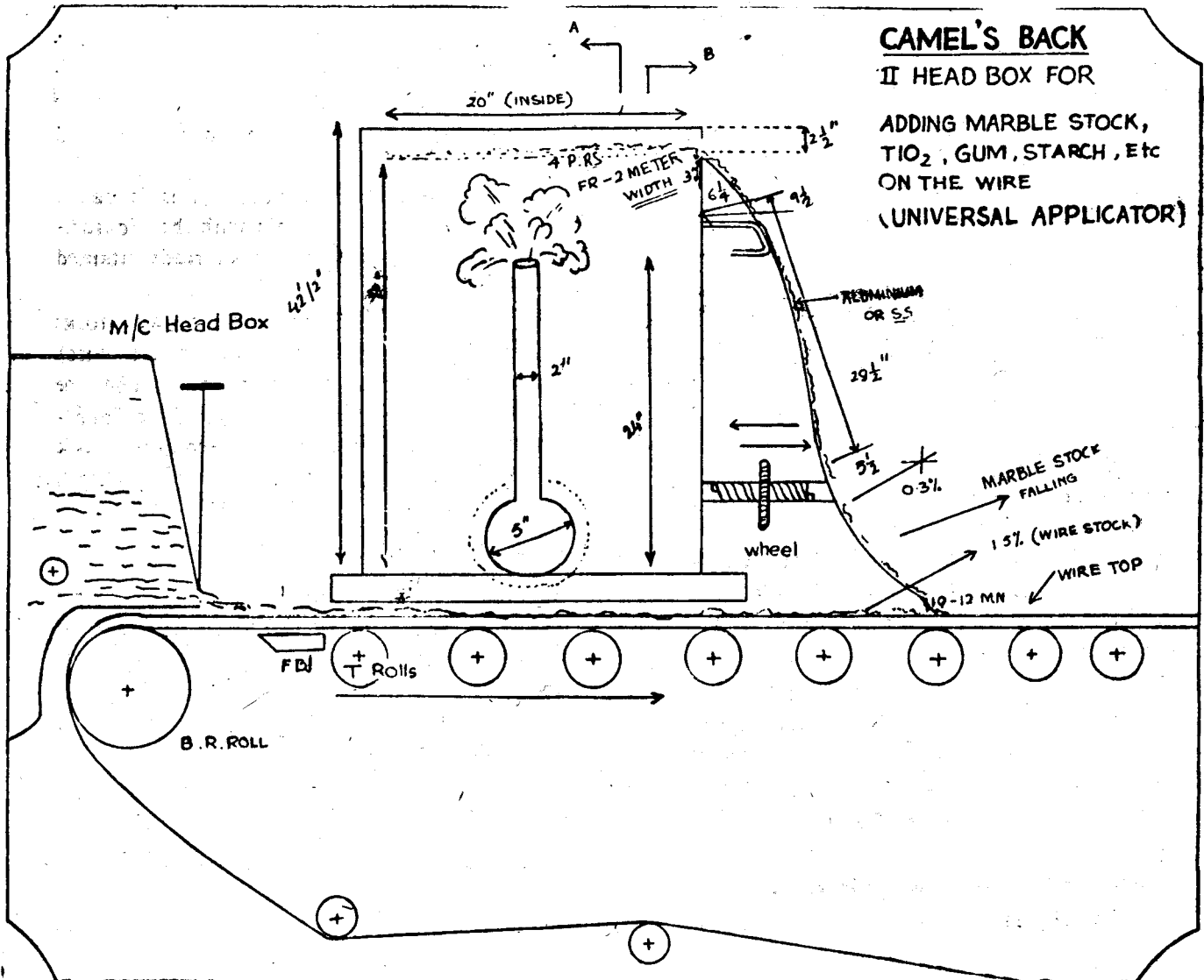
**Point of Caution**

The installation place of applicator Head Box (Camel's Back Head Box) on the wire will vary from paper mill to paper machine, as it is to work within the specific limits. Lower limit of Grammage is

80 GSM paper, higher speed is 200 m/m. One has to examine the Fourdrinier wire—and judging by the eye, determine the area where the Box is to be installed. the area or position on the wire where stock attains minimum 1.5 per cent consistency.

If one installs the Box nearer to the Dandy Roll the effect will not be so appealing. Of course, Marble effect will come. In an ideal situation there should be some quantity of surface water on which the Marble stock will land and, penetrate while floating and sinking into the top layer simultaneously. The application is explained in the sketch.

It is to be remembered that the bottom position of the applicator lip should end up with at least 5° angle and not remain parallel to the wire. and the distance of the lip from the wire should not be more than 12 mm. (the ideal distance is 10-12 mm).



### Marble stock preparation

For Brown marble on natural base coloured marble stock is prepared in the following manner :

(a) 300 kgs of beaten stock (same from the base) in a chest say at 30 M<sup>3</sup> chest may be taken (30-40° SR — Marble stock).

(b) Add 2 kgs of B- Brown.

(c) Add 500 gms of N. Black.

(d) Then add 50 kgs of alum and allow the agitator to run for 1/2 hour.

(e) Then fill the 30 M<sup>3</sup> chest to the brim, with Back Water.

The Marble stock brownish black is ready at 1 per cent consistency.

Now, this coloured fibre of 1 per cent consistency is to be fed to the Camel's Back II Head Box, through a valve and extra dilution is to be given to this Head Box through one 2" Back water line joined tangentially to the line through another 2" valve.

With 300 kgs of Marble stock (with normal marbelling design) one can make 20 tonnes of Marble paper. (The consumption of Marble Stock depends on the design depth and on the Tonnage-draw/Hr of the paper machine). Beautiful designs are obtained, on natural base pulp board-brown marbelling. Next, on light pink base, black marbelling. These two marble colour effects are common.

### Wall Paper

Wall paper can also be made adopting the same technology excluding some chemicals like Copper Sulphate and anti-fungal agents to be added in the base pulp stock. The same Marble paper will work like printed Marble paper (wall paper) and profit margin will be quite high.

In a Kraft paper machine, with M.G. installed for glazing, normally the wire side gets the glazing (in most of the normal installations). In such design the Marble effect will not come on the glaze surface, hence it is not fit for such installations. But in a

plant where M.G. is installed in such a way that the top side (paper side) comes in contact with the glazing (there is one plant in Maharashtra), the Marble design should be adopted to give beautiful patterns on the glazing side of a Kraft paper which will be more attractive wrapper as well as better in strength. So far as strength is concerned — in case long Marble stock is superimposed (even 0.5 per cent of the total) — you are positive to gain extra strength on your Kraft paper. In such cases, this method can be adopted for all M.G. Kraft paper machines. This Head Box must be utilized as an equipment to add secondary layer on Fibre on the wire to increase the strength properties to the M.G. Kraft.

### M.G. Poster with Titanium-dioxide loadings.

To those qualities, TiO<sub>2</sub> (Titanium-dioxide) may be added through this equipment on the wire, where retention of TiO<sub>2</sub> is very much increased. Using any type of gum (Glactomanan group of binders) to increase the paper strength, (burst, tensile, and fold) one can install this equipment on the Fourdrinier and add those chemicals through this box.

The author has observed that Tamarind seed powder cooked at 20 GPL, used at 1 per cent, through this Box, on the stock on the wire, gives excellent Waxpick, and smoothness on both sides. Hence, paper plants which do not have size press facilities may go in for the substitute advantage of S.S. effect (say 80 per cent guaranteed) through this application of Camel's Back Head Box as described. Any paper mill can install this equipmant with the help of their own plant engineer and fitters, and with discarded materials from the paper mill scrap yard.

In conclusion, the author humbly aims at initiating his fellow paper-makers of the country into exploring their own great creative potential to achieve innovations suiting Indian conditions. It is to be remembered that it is the same path that our European and American co-workers have followed to attain their goal. So why not we ?