# Dandy Application in Fourdrinier Paper Machine

Hiramoy Sadhukhan,

Tribeni Tissues Estate, PSPD unit, Tribeni Training Centre Mill, P.O. Chandrahatti, Distt Hooghly-712 504, W.B.

## INTRODUCTION

A correct applied dandy can reduce paper break, improve quality for competitive selling price and also increase production through increasing speed and reducing downtime. Following are few important points to be considered for dandy selection and operation.

### Selection of dandy roll diameter

It is a function of machine speed and turning speed of the roll in revolution per minute. The path of water droplet is a projectile. It makes thin spot if it fell at longer distance and weak spot if it fell on edges, which may cause a break. Objective is to have the water drops land on the sheet surface while it is still fluid state. Bigger diameter dandy makes smaller angle of projection and the distance of projected path will be less.

Horizontal Component of velocity - V cos $\alpha$

Vertical component of felocity - V sin $\alpha$

Displacement of by the water particle R-

$$V \cos \alpha \times \frac{2V \sin \alpha}{g}$$

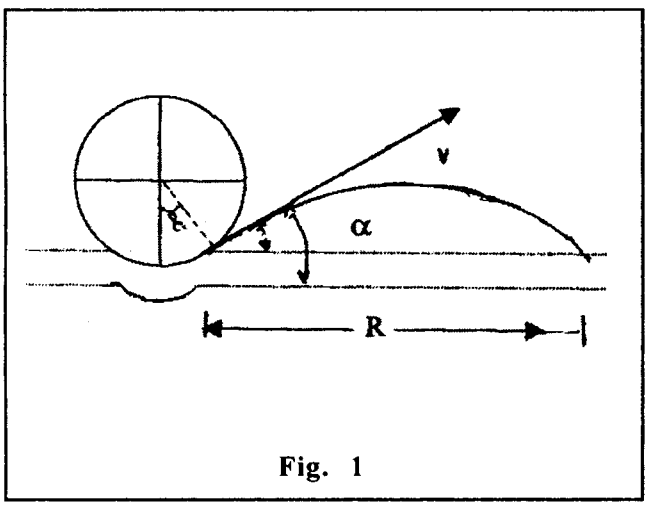


**Fig. 1**

Where R = distance projected

V = Velocity at circumference of the cylinder in mm/sec.

$\alpha$ = angle of projection.

g = Acceleration due to gravity.

Example:

Case-1 Diameter - 700mm, Speed-275m min. Dandy depression - 4 mm

Case -2 Diameter-1000mm, Speed-275m/min Dandy depression- 4mm.

$$\frac{275 \times 1000}{60} \times \frac{346}{350} \times \frac{2 \times 275 \times 1000 \times 53}{60 \times 350 \times 9800}$$

R=64.2 cm

$$\frac{275 \times 1000}{60} \times \frac{496}{500} \times \frac{2 \times 275 \times 1000 \times 63.1}{60 \times 500 \times 9800}$$

R=53.6 cm

Larger diameter dandy will reduce theoretical water throw with consequent reduction in white spot in the sheet. The water droplet at edges will make the sheet weaker and may break the web.

Normal practice is to run the velin dandy at 120 to 150 rpm. For water marking with electrotypes dandy rpm required 100 and for shadow embossed paper and fine paper like Cigarette Tissue the preferred rpm is 80. The action on the stock or partly formed mat is not as severe with large diameter as with smaller diameter roll. The body of dandy roll should be open and at the same time strong enough to withstand prolonged running. Dandy cover mesh should be coarser than the machine wire.

Favourable wire mesh of dandy outer cover is generally 35 to 40, which allow free passage of water and cleaning becomes easy.

### Dandy Drive

For slow speed machine up to 200 mtr with wove dandy no drive is required, but for water marking and fine paper dandy drive is essential. For undrive dandy speed is lower than the wire speed and top layer and bottom layer is at different speed, which effect the formation at higher speed caused by shear force within the mat and natural movement within the sheet in dandy roll region. If dandy is driven the speed of dandy is kept about 0.5% higher than the wire speed. This improves sheet formation and water marking quality by reducing the shear force within the sheet.

### Continual cleaning

The pitch of nozzles varies with the stroke of oscillation generally pneumatic oscillation shower of 0.33" needle nozzles, spaced 1.5 inch, 3" oscillation with internal water pressure of 140 to 250 psi at a temperature 60-70°C is used. Manufacturers have their specification with supporting bracket and selection is to be made according to the need. There are arrangements in the bracket for providing steam-spraying system at the out going side of the web which helps to reduce air bells and picking as vacuum at the outgoing nip has a tendency to lift the stock from the wire. A steam chamber is also provided which prevents in condensing the moist water just below the splashing guard. Dandy is cleaned with alkaline solution. Acid cleaning can cause corrosion of cover seaming alloy.

### Position of dandy

Unsupported area equivalent to the roll diameter provide a natural cushion and permits running the sheet wetter without crushing. One-third open area is up stream. Up stream location minimizes water throwing. Depressed ¼" to ¾" fabric which needs to be adjust with basis weight change.

### Sheet consistency

2.5 to 3.5% entering dandy generally after one or two vacuum augmented foil and first flat box. Vacuum augmented foil unit reduces the wire drag load. Some time a flat box with low vacuum is placed below the dandy which helps to reduce dandy pick up and water marking becomes distinct, because as the stock or fibre mat travel under the dandy, it exerts pressure of dandy roll. Water under the bottom of wire is removed by the low flat vacuum box and water in dandy roll will be thrown off centrifugally. Dandy roll suction box is two-compartment unit, first compartment being water chamber and other a vacuum chamber. Vacuum level varies from 0.1 to 0.15 MWC with grammage and in case of water marked paper, the nature of water mark. Back edge of last wet end box and front edge of 1st box dry box should be rounded off to reduce the possibility of fabric or wire wears. Additional dewatering is required to support higher machine speed, the existing wire table lengths often are adequate for higher machine speed; as a thumb rule multiplying the table length in feet by 60 provides an indication of maximum speed potential for a particular fourdrinier.

Emphasis on application of vacuum foils and reduces the number of flat suction box is apparent. By effective application of vacuum foils sheet consistency can be increased to 8% ahead of 1st suction box. The higher consistency permits the use of less number of suction boxes and thus reduced drug load.

Correct vacuum application in augmented vacuum box can improve sheet quality because low vacuum does not disturb the mat formed by draining the water through hydra-foils thus retaining the fines and fillers in the mat. As a result, paper strength as well as formation is improved. It also increase fabric life and flat box covers life and reduce the drive horsepower.

## REFERENCES


1. R.A. Reese, Presented in Tappi Meeting May (1983)."Fourdrinier rebuild guidelines"
2. E.M. Beach, Fourdrinier dewatering International conference May (1983).
3. O.J. Kallmesh & B.A. Throp. Tappi J.Paper makers conference, April (1983).
4. R.J.G. Piggot Marketing Manager, W. Green Son & Waite Limited. International conference May (1979) London.