10.0 BALANCING OF SPINNING MACHINES

In a textile mill, often the problem is passed to the supervisors to adjust the machines according to the production requirements. This production schedule is often governed by the yarn requirements in weaving department. From time to time, these change and hence spinning staff has to adjust its allotment of different available machinery to cope up with the demands of weaving. The following example shows how the machine requirements can be calculated for only one count; however the actual adjustment is left to the discretion of staff in-charge, when several counts are running in the mill.

Example No.1 : If it is proposed to produce 2000 kgs. of 60s combed cotton warp per shift, find the number of machines required from Ring frame to blow room.

Production of different machines are assumed. Ring frame spindle production is 1.5 ozs/spindle/shift of 8 hours.

1.5 ozs = 0.1042 kg./spindle/shift of 8 hours ... (1)

If 2% waste is assumed in ring frame, the back stuff required will be → $2000 + \frac{2}{100} \times 2000 = 2040$ kgs...(2)

No. of spindles required, therefore, are

$$\frac{\text{Required production}}{\text{Production per spindle}} = \frac{2040}{0.042} = 48572$$

No. of ring frames with 440 spindles (N.M.M.Frames) will be

$\frac{48572}{440}$ = 110 ring frames (approx.)

Ring frame particulars = 11000 spindle rpm and 3.8 T.M.

Can fed roving → 1057 spindle speed, hank produced is 40 hank;

T.P.I. = 2.5, waste produced = 1%.

Production required at speed frame = 2040 kgs.

With 1% waste at roving frame, material produced should be

2040 + 20.4 = 2060.4 kgs.

NOTE : Normally in the mills such aswaste is excluded. However, this may be also treated as a safety margin.

With the particulars of roving frame as mentioned above, the production of roving spindle = 1.57 lbs/shift of 8 hrs.

Hence, the number of spindles $= \frac{2060.4 \times 2.2}{1.57}$

$= 2886$

With 180 spindles/frame, total frames will be -

$\frac{\text{Total spindles}}{\text{Spindles/frame}} = \frac{2886}{180} = 16$ (approx.)

Post-comb Drawing :

Hank fed = 0.185, F.R. dia = 1 1/8",

6 del., F.R. = 400 rpm.

Production/del./8 hours = 127 lbs.

Production/frame with 6 deliveries $= \frac{127 \times 6}{2.2}$

$= 346$ kgs.

No. of post comb drawing frames required

$= \frac{2060.4}{346} = 6$ (approx.)

Comber :

Rieters machines = 180 nips/mint

Lap weight = 75 k. tex, Waste % = 12

Production per shift of 8 hours = 280kgs/machine

with 12% waste back material required will be -

$2060.4 \times \frac{100}{(100 - \text{Waste \%})} = 2350$ kgs.

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No. of machines required $= \frac{2350}{200}$

$= 8$ machines (approx.)

Superlap Former :

Production/madine = 1200 kgs/shift of 8 hours.

No. of superlap machines required $= \frac{2350}{1200} = 2$ machines (approx)

Per-comb drawing frames :

Production/shift/frame = 346 kgs.

No. of machines required $= \frac{2350}{346}$

= 7 frames each with 6 deliveries (Approx),

Carding :

High production cards with 25 doffer rpm gives production of 96 kgs/8 hours.

Considering 5% card waste, the production at card should be $= \frac{2350 \times 100}{100 - \text{Waste \%}} = \frac{2350 \times 100}{95}$

= 2484 kgs/shift of 8 hours.

Hence, number of cards required are -

$= \frac{2484}{96} = 26$ machines (approx.)

Scutchers :

With Trutzler line - 160 kgs/hour or 1280 kgs/8 hour can be produced per scutcher.

Production required with 5% waste will be

$= \frac{2484 \times 100}{100 - \text{waste \%}}$

= 2615 kgs.

Hence, the number of scutchers required = 2 (approx.)

The scutchers will be preceded by the following machine sequence.

H.B.B. ⟶ Step Cleaner ⟶ H.F. ⟶ Procupine Opener ⟶

⟶ Two way distribution ⟶ H.F. ⟶ 3B.B. ⟶ K.B. ⟶ Lap and

We now go for a carded mixing in coarse count 20s and 30s. In the mill this problem of balancing machinery is also associated with adjustment of machinery between the two counts that are running in a mill. In production schedule of mill, therefore, the machine allotment is in fraction (like $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ etc.) and this means that some machines will have to be changed, as and and when required, to another count or hank.