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Effect of Processing Parameters on Incidence of Slubs in Polyester-Viscose Yarn and Fabric

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The effect of blend percentage, yarn count and different processing parameters, viz. spindle speed, break draft, spinning draft and apron spacer size, on the incidence of slubs in polyester-viscose blend yarn and at fabric stage (in weft direction) was studied. With increase in the polyester content in the polyester-viscose blend the number of slubs decreased; increase in spindle speed, break draft and finer count resulted in increase in the number of slubs. Minimum number of slubs occurred at a particular spinning draft and apron spacer size; and if these were increased or decreased, the frequency of slubs increased. However, there was no significant difference in the number of slubs in the fabric state.

A serious yarn defect which mars the appearance of polyester-viscose blend fabrics is the incidence of slubs[1], which cause rejection of fabrics. Many of the conventional slub-catchers are not satisfactory because of their poor efficiency.

On the effect of parameters, such as break draft, spinning draft, spindle speed and apron spacer size, on the incidence of slubs, very little published information is available. Hence the present study, in which an electronic slub-catcher (cleaning efficiency, 85-90%) was used for determining the frequency of slubs.

Eighteen samples of polyester-viscose (P/V) yarn were prepared. Of these, 16 were of 65:35 P/V and rest were of 80:20 and 48:52 P/V; the yarn counts were 10s, 30s, 34s and 40s. Polyester and viscose used were both of the same staple length (51 mm) and denier (2).

The blend was prepared by laying the polyester and viscose layer in sandwich and the blending was done in blowroom. The particulars of the blowroom are : no. of beating points, 2; lap hank, 0.0016; beats/in., 30; 1st K.beater, 36; and 2nd K. beater, 23. The particulars of machines used in the preparation of yarn are given in App. 1.

Yarn samples prepared were tested on the ATIRA electronic slub-catcher for counting slubs at yarn stage. As the weight per unit length of yarn changes from the normal, the capacitance of the capacitor changes and, as a result, actuates the cutter which cuts the yarn before the fault is wound onto the package. By visual examination the slubs were distinguished from fluffs and spun-in lint. For each yarn sample of 20 kg, the number of slubs cut at the winding machine was counted. The instrument was set at 4 cm length and 4 times the yarn diameter, and the correlator was set at 4.

The material was run at a speed of 600 m/min. The yarn passing through the electronic slub-catcher was doubled and was used as weft in the fabric. Fabric samples, each of 10 m, were prepared for counting the remaining slubs in the yarn because the clearing efficiency of the slub catcher is 90% only. The fabric was visually examined for the number of slubs in grey state.

Fig. 1 shows that as the polyester constituent in P/V blend increases, the incidence of slubs is reduced. It is known that the inter-fibre cohesion of viscose fibre is more than that of the polyester fibre. So a higher proportion of viscose in the P/V blend requires a higher number of beats per inch for maintaining the same degree of openness. But in this investigation the same number of beats per inch was maintained for all the blends. The lesser degree of openness of the tufts in the case of higher proportion of viscose fibre in a blend may result eventually in the incidence of slubs in the yarn.

The effect of count on the incidence of slubs was studied for three different yarn counts of 10s, 30s and 40s. Fig. 1 shows that as the count of yarn spun is made finer, the number of slubs increases. All the yarns were spun from the same roving of delivered hank of 1.3. Hence the amount of draft increases for the finer yarn spun from the same hank of roving. The more the amount of draft the more the irregularities. These irregularities may contribute to a higher incidence of slubs in the yarn. This means that the higher draft

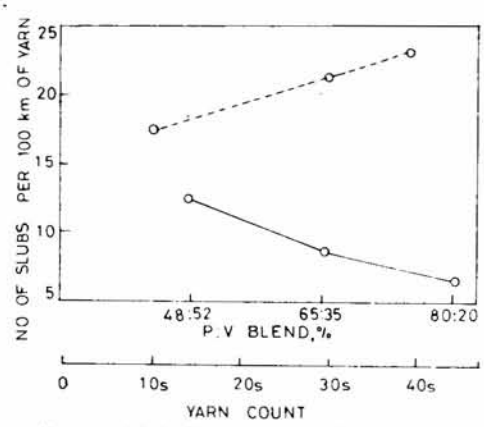

Fig. 1 Effect on slub incidence of P V blend ( ) and of yarn count ( )

causes the incidence of slubs in the yarn. This result is in agreement with the finding of Grover and Subramanian[1].

To study the effect of spindle speed on slubs in yarn, three different spindle speeds were selected. Fig. 2 shows that there is an increase in the number of slubs with a corresponding increase in spindle speed. The increased end breakage rate, poor quality of piecing at higher spindle speed and irregularities produced at high speed may all contribute to higher incidence of slubs in the yarn. These results are in close agreement with those of Pillay and Hariharan[2], who reported that increase in spindle speed caused an increase in the number of slubs. A very little difference was observed in the number of slubs for three different samples at fabric stage in weft direction.

The effect of various break drafts on slubs shows that the number of slubs for 100 km of yarn length increases from 7.8 to 17.0 on increasing the break draft from 1.24 to 1.61 at ringframe for 34s P/V yarn (Fig. 2). This may be due to the higher irregularities created in the back zone when spinning at higher break draft. Also, for a fixed total draft, as the draft in the back zone is increased the draft in the front zone is reduced and results in slub formation to a greater extent. Grover and Subramanian[1] also pointed out that higher break draft could be a reason for higher slub formation during drafting at ringframe.

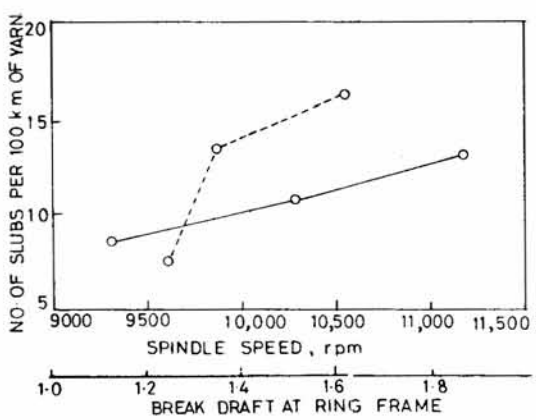

Fig. 2—Effect on slub incidence of spindle speed (O—O—O) and of break draft (O---O---O)

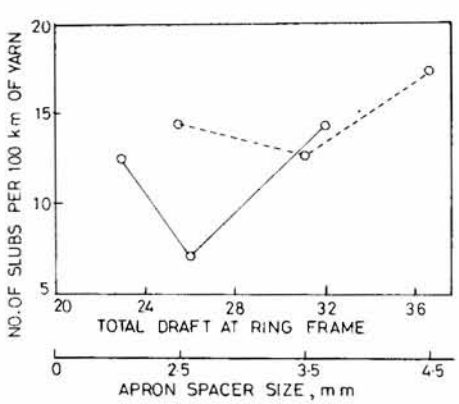

Fig. 3—Effect on slub incidence of spinning draft (O—O—O) and of apron spacer (O---O---O)

Fig. 3 shows that there is an optimum draft of 26 for 34s count at which the slubs are minimum. This is in close agreement with the results of Balasubramanian[3], who suggested a spinning draft of 24-26 for a medium mixing of 24-40s count. As the spinning draft is increased or lowered from 26, the frequency of slubs increases.

There is an optimum apron spacing for a particular count. As is evident from Fig. 3, a 3.5 mm spacer gives minimum number of slubs for the count spun. Very high or very low settings of the spacer show a tendency to adversely affect yarn quality and increase the

App. 1—Particulars of Machines Used in Yarn Preparation

Hank of sliver	0.16
Drawing	
Machine used	Lakshmi Rieter (DO/2S)
Drafting system	3/5 Polar system
No. of drawing passages	Two
Setting	
Back zone	57 mm
Front zone	54 mm
Top roller pressure	1.2 kg/cm^2
First passage drawing	
Hank del.	0.180
Doubling	6
T. draft	6.75
Break draft	1.732
Second passage drawing	
Hank del.	0.160
Doubling	8
T. draft	7
Break draft	1.32
Simplex	
Machine used	MMC S4
Hank delivered	1.3
Spindle speed	600 rpm
TM	0.7
Drafting system	4/4
Bottom roller gauge	
Back	54, 63
Front	67
Spacer used	5 (SKF)
Top roller pressure	14, 13, 13, 16
Ringframe	
Machine used	Texmaco Zinser
Drafting system	3/3 SKF PK-235
Hank del.	34s
TM	3.1
Spindle speed	11, 200 rpm
Break draft	1.3
Spacer size	3.5 mm
Bottom roller setting	
Front zone	73
Back zone	56
Top roller pressure	14-12-12 (front-to-back)

incidence of slubs, which is in close agreement with the finding of Pillay and Hariharan[2], who found an optimum apron spacing for a particular count.

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