Short Communications

Contribution of ringframe drafting condition to yarn count variability in fine counts

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Received 25 April 1990; accepted 10 August 1990

The results presented show that the old drafting systems at ringframe can be a source of yarn count variability in fine counts. Slippage of strand takes place under the drafting rollers under such conditions, leading to count variation. Frame-to-frame variation in count is encountered and individual frame-wise control in place of traditional group control is advantageous in keeping down the count variability between frames. C and D types of classimat faults and winding breaks also increase. Use of bigger diameter cots, incorporation of washer under the spring and renovation of top arm are shown as some interim measures helpful to bring down the count variability well under control.

Keywords  Bigger diameter cots, Ringframe, Second generation top arm, Yarn count variability

Count variability of a yarn has a profound influence on the sale value and processing performance of the material. Mills producing yarns of consistently low count CV normally get a premium in the price of their product. Fabric appearance improves noticeably with reduction in yarn count variability because of reduced incidence of warp-way streaks and weft bars. Further, performance of yarn in weaving is markedly improved with reduction in count variability.

Much of the earlier work on count variability has emphasized the importance of blowroom lap weight control, drawing sliver wrapping variability and between machine and between day variations in wrappings. Ringframe drafting on the other hand is normally considered to have influence over short-term variability and its effect on count variability is not considered to be of much significance. However, Balakrishnan and Balasubramanian showed that top roller weighting in ringframe drafting has a significant influence on count variability with polyester/polyviscose blends which have a high drafting force. Sett et al. showed that the drafting conditions at the speed frame can be a source of count variability. The present work extends the work on influence of ringframe drafting on count variability for superfine counts from extra-long staple cottons.

Source of count variation

The mill was getting a high count CV% of 4.7 in fine counts, especially 100s. The top arm drafting system was about 22 years old. But in the same mill, count variability was well under control in coarse and medium counts (20s-30s) ranging between 2.5 and 3.5.

A comparison of wrappings of corresponding lengths of rovings and yarns (4 and 120 yd) showed that the variability increased from 3.7 to 5.8 CV% on an average (40 wrappings at each stage, experiment repeated 10 times) from inter to yarn. Clearly, these results indicate that a significant contribution to count CV in the yarn comes from ringframe because of the slippage of strand under the drafting rollers.

Spindle-to-spindle variability

To get a better insight into the causes for the variability introduced at ringframe, the actual draft on different spindles as well as within/between bobbin CV were estimated by taking data on 30 spindles, 3 wrappings each. Draft was calculated by dividing yarn count by interhank for that spindle. The actual draft varied from 26.6 to 31.6 with an average of 28.0, against the mechanical draft of 32.7. Variability in the amount of slippage is responsible for the variation in draft. As Table 1 shows, both the within and between bobbin CV increased at ringframe.

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<tr>
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<th>CV%</th>
<th>Inter 4 yd</th>
<th>Yarn 120 yd</th>
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<tbody>
<tr>
<td>Within</td>
<td>0.88</td>
<td>1.36</td>
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<tr>
<td>Between</td>
<td>2.68</td>
<td>4.30</td>
<td></td>
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<tr>
<td>Overall</td>
<td>2.82</td>
<td>4.51</td>
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Table 1—Count CV before and after drafting at ringframe

*aBased on the paper presented at the 31st joint technological conference of ATIRA, BTRA, SITRA & NITRA, held at HT. New Delhi, on 16-17 February 1990.*
Remedial measures

Three remedial measures for improving top roller pressure, viz. use of larger cots, reconditioning of top arm, and increasing roller pressure by the use of washers, were tried out to find if these could bring down count variability. The results given in Tables 2 and 3 confirm that these measures help to reduce count CV significantly.

The count became finer with these remedial measures though the same change pinion was used. So much so that after inserting the washers under the spring, the change pinion had to be changed from 31 to 33 so as to get the same count. This means that slippage under drafting rollers gets reduced with increase in top roller pressure. Further, C and D class of yarn faults, which are attributable to drafting, came down markedly with increase in top roller pressure (Table 3). Since the investment on these measures is much lower than that in the replacement of top arm, they could be helpful as interim measures to extend the life of the top arm with reduced yarn count variability.

The reduction in count CV% that could be obtained by the use of second generation top arms at

<table>
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<tr>
<th>Parameter</th>
<th>Study 1</th>
<th>Study 2</th>
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<tr>
<td>Av. yarn count, Ne</td>
<td>90.2</td>
<td>93.7</td>
</tr>
<tr>
<td>Count CV%</td>
<td>5.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Uster U%</td>
<td>14.3</td>
<td>13.4</td>
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<tr>
<td>Winding breaks*</td>
<td>24.3</td>
<td>21.4</td>
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</table>

*Per lac metres due to yarn faults with optical clearer

Frame-wise control of count

When count variation is seen to increase at ringframe due to poor drafting, the chances of frame-to-frame variations in average count increase. Under such conditions, individual frame-wise control of count is likely to prove better than the normally recommended group-wise control of count.

Data from a group of 8 ringframes spinning 95s on old first generation top arm showed that under group-wise control, the average count varied from 89.5 to 98.1 between the different frames. Some frames tend to spin consistently coarser yarn count while some others tend to spin consistently finer count though all are fed by the same inters and have the same change pinion. The between frame differences in count naturally increase the overall count CV. Under such conditions it was thought that frame-wise control of count by using appropriate pinions on different frames may help to bring down variability in count between frames. Frame-wise control of count was instituted based on one lea from 16 bobbins per frame. Pinions ranging from 36 to 39 teeth had to be used on the different frames to get the same count. This showed a substantial improvement in count CV% between frames. The CV% between frames reduced from 2.63 (with group-wise control) to 1.02, 0.73, 0.83 over three consecutive months (with frame-wise control). The reduction in count CV is statistically significant. Detailed follow-up studies failed to show any differences in draft constant, top roller pressure, cot condition and contraction level between the frames to account for the difference in count. The extent of wear of bottom roller flutes on the different frames seems to be of varying order and as a result the same amount of group is not obtained leading to frame-to-frame differences in count.

Acknowledgement

The authors are thankful to the Century Mills for the facilities given in conducting these studies.

References