

YARN QUALITY DEPENDS UPON THE SETTINGS AND SPINDLE SPEEDS

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The study has been conducted for five counts like, 34^s carded, 40^s carded, 40^s combed (H), 60^s carded and 80^s combed. The paper also gives the results of the study on the effect of different spindle speed on evenness, imperfections and hairiness then effect of different back-zone setting in ring frames on imperfections. (Samples were collected from same set of spindles and also back process).

Key words: Ring frame, Spindle speed, Yarn, Zone setting.

INTRODUCTION

The spindle speed variation in this study was between 13,500 to 19,500 rpm. Three different spindle speeds changed in each count. As regards yarn hairiness, the effects are significant, hairiness increasing with speeds. This, in turn, could be expected to help to go in for higher spindle speeds (in ring frame without increasing end breaks). Three different back-zone setting changed in each count.

MATERIAL AND METHODS

Table - 1: Process Parameters

| Count | 34 ^s Carded | 40 ^s Carded | 40 ^s Combed (H) | 60 ^s Carded | 80 ^s Combed |
|---------------------|------------------------|------------------------|----------------------------|------------------------|------------------------|
| Simplex Hank | 1.40 | 1.40 | 1.40 | 2.85 | 2.85 |
| Ring Frame TPI | 22.90 | 26.80 | 23.55 | 31.20 | 35.60 |
| Ring Frame Settings | | | | | |
| Front Zone (mm) | 44 | 44 | 44 | 44 | 44 |
| Back Zone (mm) | 51 | 51 | 51 | 51 | 51 |

FIBRE PROPERTIES OF COTTON

Table - 2: Fibre Properties

| Count | 34 ^s Carded | 40 ^s Carded | 40 ^s Combed | 60 ^s Carded | 80 ^s Combed |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Bundle Strength (g/tex) | 22.7 | 23.0 | 25.2 | 24.5 | 28.3 |
| Micronaire Value | 3.2 | 3.4 | 3.5 | 3.4 | 3.3 |
| 2.5% Span Length (mm) | 28.0 | 28.8 | 30.5 | 32.4 | 36.0 |
| Uniformity Ratio (%) | 47.6 | 48.2 | 52.6 | 53.0 | 53.7 |
| Trash (%) | 3.0 | 2.3 | 1.0 | 1.8 | 1.0 |

RESULT AND DISCUSSIONS

Effect of Spindle Speed on Yarn Strength, Strength Variation and Hairiness

The strength, strength variation and hairiness of yarns produced different spindle speeds. Hairiness Index total length of all protruding fibres expressed in cm measures over a yarn length of 1 cm (measured in UT-3). As shown in Table - 3.

Strength cv% showed a tendency to increase with spindle speed. Hairiness showed a tendency to increase with spindle speed. Hairiness Index has between Uster 10 to 23%. In this investigation even in increase spindle speeds.

Effect of Spindle Speed on Unevenness and Imperfections

Unevenness and imperfections of yarns spun at various spindle speeds. Results are given in Table - 4.

However U%, Thick place, Thin place and Total imperfection per 1000 meters showed a tendency to increase with spindle speed.

Effect of Back-Zone Settings in Ring Frame on Uster Imperfection

Normally ring frame bottom roll setting 44 x 51 mm, 44 mm front zone and 51 mm back zone. Three different back zone setting study taken like, 44 x 51 mm, 44 x 56 mm and 44 x 60 mm in each count on thick place and thin place per 1000 meters. The clear results are shown in Table - 5.

It is clear from the table that when ring frame back-zone setting is increased, uster thin place get reduced, through there was no clear trend with regard to uster thick places.

Table - 3 : Yarn Qualities at Various Spindle Speeds

| Count | Spindle Speed in rpm | RKM Value in (g/tex) | Strength c.v% | Hairiness Index |
|----------------|----------------------|----------------------|---------------|-----------------|
| 34s Carded | 13,800 | 15.36 | 7.88 | 4.99 |
| | 14,300 | 15.72 | 8.01 | 5.12 |
| | 14,900 | 15.91 | 8.37 | 5.40 |
| 40s Carded | 14,700 | 16.16 | 8.16 | 4.88 |
| | 15,920 | 16.44 | 9.22 | 5.02 |
| | 17,100 | 16.40 | 10.05 | 5.13 |
| 40s Combed (H) | 14,000 | 15.64 | 8.96 | 4.32 |
| | 15,800 | 15.80 | 9.04 | 4.51 |
| | 17,000 | 15.76 | 9.10 | 4.66 |
| 60s Carded | 15,800 | 16.62 | 8.69 | 4.13 |
| | 16,800 | 16.80 | 8.99 | 4.30 |
| | 17,600 | 16.96 | 9.23 | 4.61 |
| 80s Combed | 17,200 | 18.07 | 9.98 | 3.52 |
| | 17,900 | 18.48 | 10.64 | 3.57 |
| | 19,150 | 18.36 | 11.57 | 3.98 |

Table - 4 : Different Spindle Speeds on Unevenness, Thick and Thin Places

| Count | Spindle Speed in rpm | Yarn | Thick Place/1000 Meters | Thin Place/1000 Meters |
|----------------|----------------------|-------|-------------------------|------------------------|
| 34s Carded | 13,800 | 15.20 | 1222 | 138 |
| | 14,300 | 15.33 | 1296 | 151 |
| | 14,900 | 16.02 | 1302 | 167 |
| 40s Carded | 14,700 | 13.11 | 1103 | 122 |
| | 15,920 | 13.32 | 1146 | 138 |
| | 17,000 | 13.37 | 1221 | 163 |
| 40s Combed (H) | 14,400 | 12.64 | 322 | 22 |
| | 15,800 | 12.72 | 310 | 28 |
| | 17,000 | 12.76 | 302 | 30 |
| 60s Carded | 15,800 | 12.96 | 392 | 120 |
| | 16,800 | 13.08 | 430 | 134 |
| | 17,600 | 13.27 | 442 | 146 |
| 80s Combed | 17,200 | 13.29 | 342 | 101 |
| | 17,900 | 13.64 | 359 | 113 |
| | 19,150 | 13.61 | 351 | 122 |

Table 5: Different Back - Zone Settings on Imperfections

| Count | Front-zone setting in mm | Back-zone setting in mm | Imperfection per 1000 metres | |
|----------------|--------------------------|-------------------------|------------------------------|------|
| | | | Thick | Thin |
| 40s Carded | 44 | 51 | 711 | 212 |
| | 44 | 56 | 726 | 224 |
| | 44 | 60 | 734 | 201 |
| 40s Combed (H) | 44 | 51 | 344 | 31 |
| | 44 | 56 | 358 | 26 |
| | 44 | 60 | 320 | 24 |
| 60s Carded | 44 | 51 | 410 | 192 |
| | 44 | 56 | 404 | 161 |
| | 44 | 60 | 360 | 109 |
| 80s Combed | 44 | 51 | 370 | 169 |
| | 44 | 56 | 392 | 161 |
| | 41 | 60 | 345 | 136 |

CONCLUSION

At increase spindle speeds, yarn quality attributes like strength, evenness and thick places do not get high affected. Thin places, strength C.V.% and hairiness show a tendency to increase with spindle speed.

While increasing back-zone settings of the ring frame thin places fault (measured Uster tester-3) get reduced.

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