Short Communication

Pak J Sci Ind Res 1999 42 (5) 293-294

Effect of Different Models of Ring Spinning Frames Upon Tensile Parameters of 23's Polyester/ Cotton Blended Yarn

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(Received 5 September 1997; accepted 22 September 1999)

The ring spinning method (Fig 1) is the most successful form of spinning and is widely used for processing cotton. The ring frame is versatile and can produce yarn which is good enough for almost any end use. The quality of yarn is also influenced by condition and geometry of the ring spinning machine (Lord and Grover 1993). The object of this study was to compare the performance of some newer and older models or ring spinning frames and to asses the effect of technological development in spinning machinery upon tensile parameters of 23's polyester/ cotton (52:48) blended yarn.

This research work was conducted at the Department of Fibre Technology, University of Agriculture, Faisalabad and at the Crescent Textile Mills (Ltd.), Faisalabad, under the standard atmospheric conditions (i.e. 23 ± 2°C temperature and 65 ± 3% relative humidity) Cotton of MNH-93 variety with 27.37 millimeters staple length, 49.66 percent uniformity ratio, 4.14 micronaire value, 78.12 percent maturity, 6187 kg cm^{-2} strength and polyester fibres (ICI-Terylene) of 1.2 denier, 38 mm staple length and 8296 kg cm^{-2} strength used in this study. Both cotton and polyester fibre were processed separately at the blow room and blended at the finisher drawing to obtain blending ratio of 52:48 for polyester/cotton. Roving samples were fed to four different ring frames viz. R_1, R_2, R_3 and R_4, the later two modified and updated with latest innovations, to prepare the yarn of 23's count. The particulars of ring frames are given in Table 1. The yarn was evaluated for following tensile parameters.

Single yarn strength and elongation of the resultant yarn was determined with the help of "Uster Dynamat-II", according to the standard methods (ASTM 1968; Douglas 1991). Rupture per kilometer was calculated with the help of the following formula:

RKM = Single yarn strength x 0.00169 x Actual count

Analysis of variance technique was adopted for testing the differences among various quality characters as suggested by Steel and Torrie (1981).

The statistical analysis of variance for single yarn strength, elongation and rupture per kilometer presented in Table 2 indicates that the effect of different models of ring frames on these parameters is highly significant. The comparison of individual mean values for tensile parameters by Duncan Multiple Range (DMR) test is presented in Table 3.

It is clear from the results that the quality of yarn is significantly effected by different makes and models of ring frames and newer models of ring spinning machines definitely produced superior quality yarn. The finding are in agreement with that of Douglas (1989) and it may be concluded that the quality

Table 1

Particulars of ring spinning frames

Balloon control ring	R_1 (Japan)	R_2 (Japan)	R_3 (England)	R_4 (Germany)
Model	1971	1981	1954	1954
Drafting System	PK-255	PK-255	PK-225	PK-225
Ring diameter	45 mm	45 mm	42 mm	42 mm
Lift	8"	8"	7"	7"
Balloon control ring	Present	Present	Nil	Nil
Hank roving	1.0	1.0	1.0	1.0
Yarn count	23's	23's	23's	23' s
Spindle speed	14800	14800	14800	14800

Table 2

Analysis of variance for tensile parameters of 23's PC (52:48) yarn

S.O.V	D.F.	S.S.	M.S.	F. Cal
Single yarn strength (gm)				
Ring frames	3	34459.93	13217.57	148.4**
Error	28	2492.78	89.03	
Total	31	36952.71		
Yarn elongation (percent)				
Ring frames	3	0.65	0.218	5.45**
Error	28	1.125	0.040	
Total	31	1.78		
Rupture per kilometer				
Ring frames	3	49.29	10.43	147.88**
Error	28	3.11	0.11	
Total	31	52.40		

** Highly significant p = 0.01; S.O.V., Source of variance; D.F., Degrees of freedom; S.S., Sum of squares; H.S., Mean squares.

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Table 3

Comparison of individual mean values for different ring frames

Ring frames	R_1	R_2	R_3	R_4
Single yarn strength (gm)	564.90a	587.11b	509.45c	514.55c
Elongation(%)	10.00b	10.19ab	8.79c	10.27a
Rupture/km	21.91b	22.59a	19.65c	20.00c

Note: any two means not sharing a letter in common differ significantly at P = 0.01.

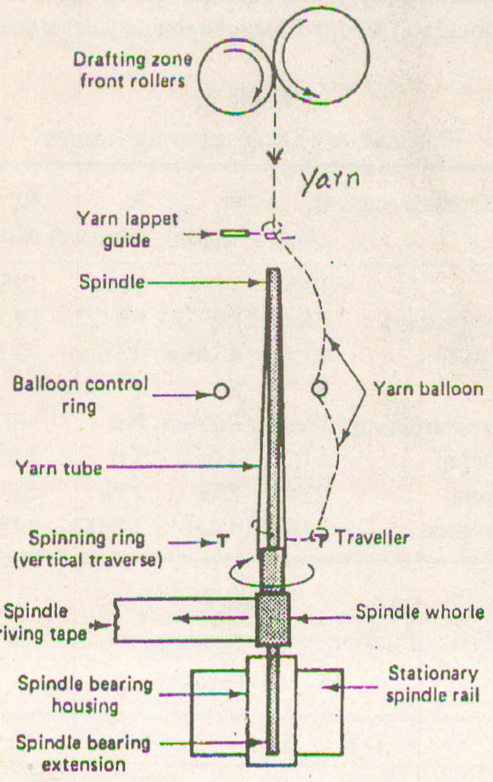

Fig 1. Ring spinning frame (side elevation/section).

of yarn is influenced by the type and geometry of machinery used, and numerous changes all over the world in design and geometry of textile machinery have improved all quality parameters of the yarn including tensile parameters. Older models of ring frame produced comparatively lower quality yarn. Alaiban (1981) reported that old drafting techniques in the ring spinning frame hinders smooth and controlled flow of Fibres on the spinning frame, which results in lower quality yarn.

An interesting result comes from yarn elongation, which reveals that the oldest model of ring frame (R_4) produced the yarn of highest elongation. This finding confirms our idea that an older model of ring frame with proper modification and adjustments can produce yarn of impressive quality. Some research workers reported that, by modifying and updating drafting system, rings, spindles and geometry an older frame is virtually as good as new one, and improvement in quality have been very impressive (Anon 1991; Klien 1987).

Present results are better than those reported by Javeed (1991), for 24's PC (50:50) yarn. This differences may be attributed to the fact that the above research worker used 50 percent polyester in blend, while in the present researches the share of polyester was 52 percent. This evidence get some support from many authors (Bergeron *et al* 1978; Hussain 1981) who narrated that the yarn strength and elongation increased with the addition of polyester fibre in the blend.

Key words: Textile machinery, Spinning, Blended yarn, Tensile parameters.

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