Performance of card and comb sliver blended yarn

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Abstract

Now a days, quality is the way of life. In every walk of life quality is assumed as special importance of yarn export. There has been large improvement in quality parameters in recent past. There are major problem with yarns like imperfections, Etc. To minimize the faults and to improve the quality of yarn we have blended the card and comb sliver with different proportion at finisher draw frame. These different proportions of sliver are blend by keeping all machine parameters constant. These draw frame sliver are processed on speed frame and ring frame machine. The delivery material of ring frame is tested to check the various yarn parameters like count, strength, count strength product [CSP], unevenness [U%] and imperfection of yarn. The statistical analysis for about test result is applied. Then the results are compared with each other to know which proportion of the blended sliver gives better quality of yarn.

Keywords: *Card Sliver, Combed Sliver, Blending, Yarn properties.*

I. Introduction

Major problem of India yarns were higher incidences of imperfection and yarn faults, lot of work has been done by various research area in this direction to improve quality of the yarn by optimizing various process parameters in blow room carding, break draft, roving twist multiplier [TM], spacer size, drafting roller and aprons also it is observed that influence of the material [1, 2]. Since carded sliver or combed sliver are not much uniform in various applications so that to overcome these problem we can combine the carded and combed sliver in proportion like 2:4, 4:2 at draw frame. This method is used for binary is adjusted by the number of sliver of each component and the hanks of the respected sliver. The 6 slivers in Carded to Combed ratio of 2:4, 4:2, and 3:3 are mixed at finisher draw frame. Blending is the combining of different fibres together intimately to achieve a desired product characteristic. Blends can influence colouring, strength, softness, absorbency, ease of washing, resistance to wrinkling, ease of spinning, cost, etc. [3]. The most popular method used for blending natural fibers, which required different opening and cleaning treatment, is draw frame blending. This is the most widely used method of blending of cotton. The required blend proportion adjusted by selecting appropriate number of sliver of components and their respective hank [4]. Another method of blending involves web or fleece blending on blending draw frame. These frames are feed with many more sliver than normal draw frame. One commercial blending draw frame is fed with sliver up to 24 numbers. The slivers are drafted on 4 drafting units and resulting webs from each unit are super imposed [5, 6]. With draw frame blending it is easier to obtain uniform blend ratio along length of product. Unlike blow room blending ration cannot Change in the sub sequent stages because no process waste is made subsequently. During the opening in the blow room and carding, optimum setting can be used for each blend component for better quality of output with lesser damage to component fibers [7,8]. The normal draw frame blending is seen to suffer from poor transverse or lateral blending the fiber in yarn cross section are not properly mixed [9,10]. The fiber each type are present as groups and are not present as randomly distributed fiber without any distinction of the fiber type [11]. This is fact that during drafting there is little lateral movement of fibers. Further, when the web is condensed into a sliver in drafting web tends to retain its entity. It is only after repeated drawing passage that the degree of mixing or blend homogeneity improve and reach a value close to that of blow room blending [12,13]. However draw frame blending gives very good blending evenness in the longitudinal direction. To solve the problem of over degree of blending a specially developed blending draw frame can be used. This draw frame functions as blending unit. In this system number of drafting web are super imposed before the final drafting and are then condensed into sliver. The superimposition gives an improvement in transverse blending. This is method therefore gives better longitudinal and traverses blending than with normal blending. The improved blend homogeneity, expressed as the degree of mixing is as good as that with blow room blending [14,15].

II. Material and Method

For this study, we have selected 100% cotton material.
Type of cotton Variety: - MECH
Properties of MECH Variety:-

Table No. 1 Properties of MECH Variety

Length	30.10 mm
Strength	30.9
Elongation%	4.9%

Micronaire	3.5
Trash	4 %
Moisture	8%

1. Card and comb sliver with different proportion are processed on finisher draw frame by keeping parameters constant and six different type of sliver are produced.
2. These slivers are then processed on speed frame and ring frame machines.
3. Count of yarn is 50 Ne
4. 10 bobbins of each proportion are prepared on ring frame machine.
5. The ring frame machine yarn is taken in Statistical Quality Control department to carry out of testing of yarn properties.
6. Results are concluded by statistical analysis.

III. Experimental Work

Count of yarn: - 50 Ne

Testing:- Unevenness [U%], Imperfection, Count, Strength, Count Strength Product [CSP]

1. Testing results showing that the Unevenness is increasing proportional wise. Unevenness of 100% comb is less than other proportional.
2. Testing results showing that imperfection of yarn is increased than other proportional. Because of comb sliver proportional is decreases.
3. Testing results showing that the strength is decreasing proportional wise.
4. Testing results showing that Count Strength Product is decreasing proportional wise because of comb sliver proportional.

Sequence machinery use for blending:-

1] Card and comb slivers
2] Finisher Draw frame RSB –D 35 C
3] Speed frame Marzoli BC- 41
4] Ring frame KTTM REX1240

Blending Parameters on Carding Machine:-

1. Speed :- 750 rpm
2. Feed hank :- 0.100
3. Delivery hank :- 0.110

Blending Parameters on Draw Frame Machine:-

1. Speed of machine :- 461 mtr./min.
2. Hank of material :- 0.110
3. Doubling :- 6
4. RH % :- 52%
5. Temperature :- 31^{o}C
6. Material :- 100% cotton

Blending Parameters on Speed frame Machine:-

1. Speed :- 950 rpm
2. Feed hank :- 0.110
3. Delivery hank :- 1.2

Blending Parameters on Ring frame Machine:-

1. Speed :- 17800 rpm
2. Feed hank :- 1.2
3. Count :- 50 Ne
4. Twist Multiplier [TM] :- 4.8

IV. Results and Discussion

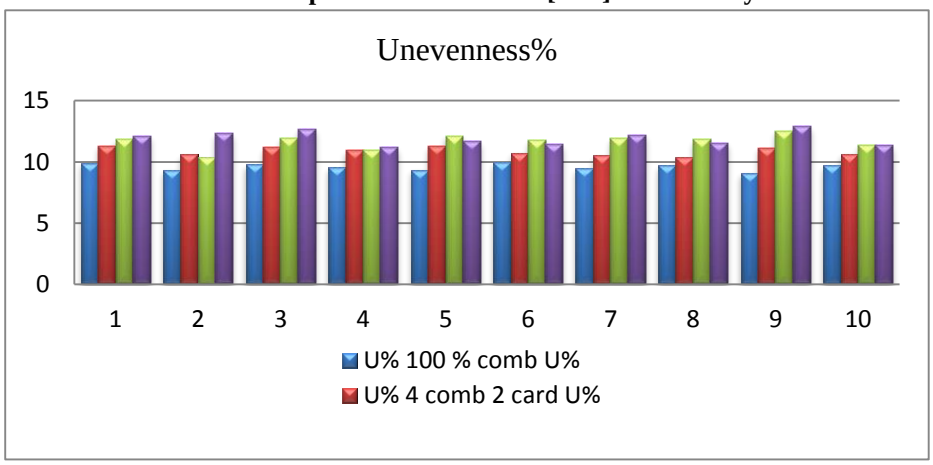
1. Unevenness [U %]

Table No. 2 Unevenness in yarn

Sr. No	100 % Comb	4 comb 2 card	3 comb 3 card	2 comb 4 card
1	9.91	11.32	11.85	12.11
2	9.34	10.59	10.37	12.32
3	9.81	11.2	11.96	12.7
4	9.54	10.94	10.94	11.16
5	9.32	11.27	12.11	11.7

6	9.95	10.74	11.73	11.42
7	9.47	10.54	11.9	12.19
8	9.7	10.37	11.84	11.54
9	9.09	11.13	12.54	12.92
10	9.68	10.63	11.39	11.36
Average	**9.78**	**10.87**	**11.81**	**11.94**

Graph 1: Unevenness % [U%] of blended yarn



The table 2 and graph 1 shows the results of Unevenness %. In every proportion it is found that, as there is increase in the comb sliver proportion, Unevenness % is going on increasing. 100% comb shows less Unevenness % than other proportion.

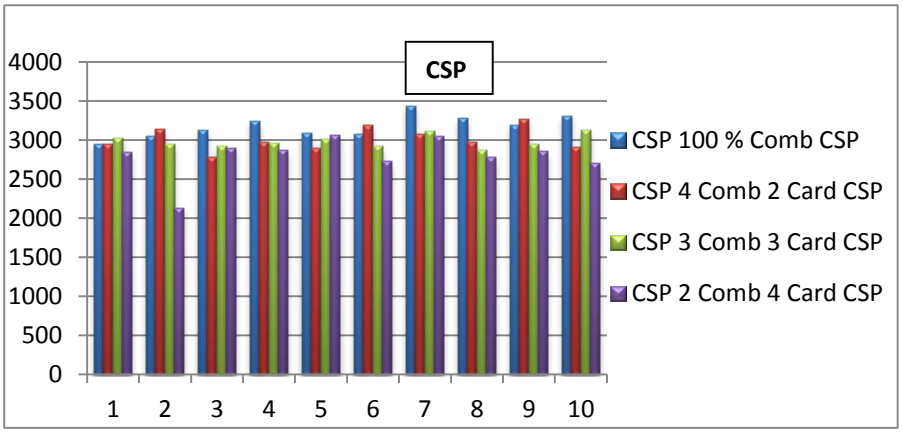
2. Count Strength Product (CSP) :-

Table No. 3 of CSP of yarn

Sr. No.	100 % Comb	4 comb 2 card	3 comb 3 card	2 comb 4 card
1	2952	2944	3030	2845
2	3051	3139	2950	2124
3	3132	2783	2924	2901
4	3236	2980	2957	2877
5	3094	2902	3007	3063
6	3073	3196	2921	2731
7	3440	3069	3113	3043
8	3273	2976	2864	2787
9	3194	3265	2947	2852
10	3310	2907	3125	2710
Average	**3175**	**3016**	**2984**	**2793**

The table 3 and graph 2 shows the results of count strength product. In every proportion it is found that, as reduce in the comb sliver proportion, count strength product is going on decreasing. 100% comb shows more count strength product than other proportion.

Graph 2: CSP of yarn



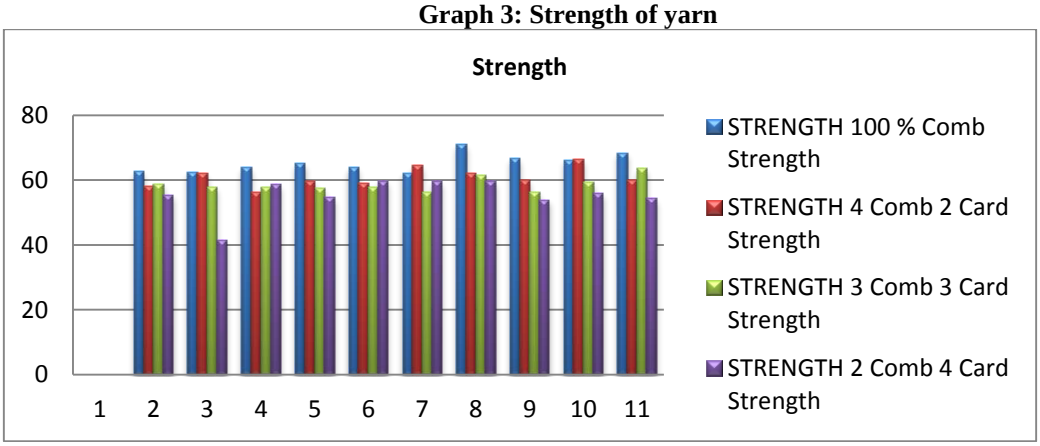
3. Strength

The table 4 and graph 3 shows the results of strength of yarn. In every proportion it is found that, reduce in the comb sliver proportion, strength of yarn is going on decreasing. 100% comb yarn shows more strength than other proportion.

Table No. 4 of Strength yarn

Sr. No.	100 % Comb	4 comb 2 card	3 comb 3 card	2 comb 4 card
1	62.69	58.07	58.82	55.49
2	62.48	62.05	57.97	41.4
3	63.98	56.13	57.87	58.61
4	65.17	59.79	57.64	54.74
5	63.98	58.93	57.96	59.79
6	62.26	64.41	56.35	59.68
7	71.08	61.94	61.4	59.68
8	66.67	60.11	56.35	53.88
9	66.24	66.46	59.25	55.81
10	68.39	60.11	63.55	54.41
Average	**65.3**	**60.8**	**58.72**	**55.35**

Graph 3: Strength of yarn

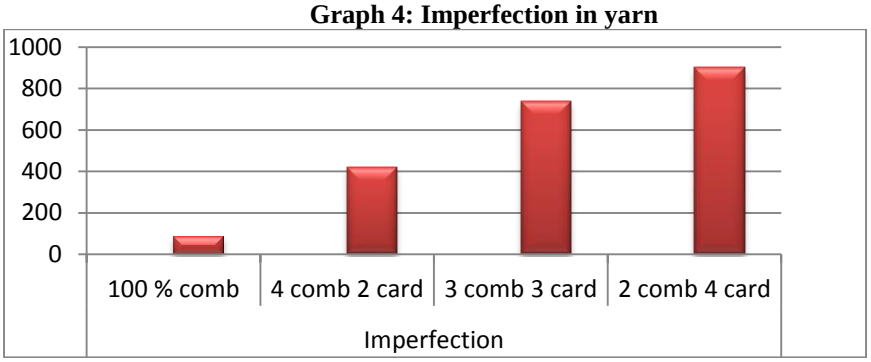


4. **Imperfection**

Table No.5 Imperfection in yarn

	100 % comb	4 comb 2 card	3 comb 3 card	2 comb 4 card
Average	88	418	736	903

Graph 4: Imperfection in yarn



The table 5 and graph 4 shows the results of imperfections in yarn. In every proportion it is found that, reduce in the comb sliver proportion, imperfection is going on increasing. 100% comb shows less imperfection than other proportion.

V. Conclusion

From this study we concludes that,

- Reduce in the comb sliver proportion results in increase of Unevenness% of the yarn. Unevenness% of 100 % comb yarn less than the yarn obtained from 2 comb 4 card proportion.
- Reduce in comb sliver proportion, count strength product in yarn decreases. 100% comb yarn count strength product more than others.
- Decreasing comb sliver proportion, strength of yarn is decreases. 100% comb yarn strength more than others.
- Decreasing comb sliver proportion, imperfection in the yarn increases. Imperfections in 100% comb yarn less than others.

Yarn irregularity rises with, the more proportion of card sliver in comb and card sliver blend. Comb and card sliver blending method gives better longitudinal and traverse blending than with normal blending. The improved blend homogeneity, expressed as the degree of mixing is as good as that with blow room blending. Blended yarn gives better quality than 100% carded yarn. Also optimum cost of yarn can be achieved. Cost of blended yarn is less as compare to 100% comb yarn and more than 100% card yarn.

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