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THE EFFECT OF SHORE HARDNESS OF TOP ROLLER COT, COT GRINDING, APRON WASH AND SPACER SIZE ON YARN QUALITY

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ABSTRACT

Rassel MA (2018) The effect of shore hardness of top roller cot, cot grinding, apron wash and spacer size on yarn quality. *J. Innov. Dev. Strategy*. 12(1), 74-76.

The effect of shore hardness of rubber cots which are used as top roller in the drafting zone, the effect of cot grinding, the effect of apron wash by jet powder and the effect of spacer size in the ring machine on yarn quality have been studied in this paper. It was observed that yarn quality was improved by using softer synthetic rubber cot, grinding the cot roller, replacing the grooved (partially) apron by new apron, washing the aprons by jet powder and yellow color spacer (2.5 mm). This was the best performance to produce 30°KH from 0.75Ne roving hank.

Key words: *wash, quality, method, yarn, apron*

INTRODUCTION

The definition of yarn quality is changing and improving every day as of the products. While the leading European buyers always mention the criteria for purchase of yarn as quality, price and delivery time, quality becomes the first and foremost item of processing (Salam 1995). So, there is no scope to compromise with quality in the process.

The revolution towards shorter spinning process at high speed necessitates the role of cots to withstand the high pressure on fibers applied during high speed drafting system. Proper selection and proper maintenance of right quality of cots is the pre–requisite for the production of high quality yarns. Top roller pressure and its shore hardness have considerable influence on yarn quality. Presenting untwisted roving to the main drafting zone is the function of top and bottom aprons. While doing so, the grip on the fibers by these two aprons is the major deciding factor for yarn quality. So, quality of rubber used for the manufacture of top and bottom aprons is critical. Bottom apron is drawn by the middle button rollers through nose bar. As the apron must be tight, a tension device is used. The bottom apron drives the top apron over a cradle. If apron condition is channeling, cuts or looseness, it should be replaced whenever necessary (Amin 2001).

Drafting system is the key element in ring spinning system, which influences the yarn quality to greater extent. The roving which enters the back roller nip of the drafting system should be attenuated slightly in the back drafting zone so that the mild twist imparted to the roving at speed frame is released and the fleece is prepared for the main drafting in the front drafting zone. In the main drafting zone where the fleece of material is attenuated to a greater extent, the fibers are guided up to the front roller nip by the means of top and bottom aprons. This facilitates better evenness of yarn and better controlling of the floating fibers.

Even though, spacer is tiny in size, the selection of this parts depends upon the count of the yarn to be produced; roving hank gives the total quality requirement of a yarn. With the spacer, the nipping point within the two aprons can be shortened or lengthened in relation to one another, without straining the long fibers too much.

MATERIALS AND METHODS

Material was 100% cotton (Origin- CIS, Staple length- 1.12 inch, micronaire-4.4). This experiment was carried out on same carded roving. Rovings were collected from the simplex machine under special supervision so that quality of the rovings through bobbins would remain constant. That is why; there is no scope to fluctuate the experiment results by roving quality.

Experiment procedure for cot shore hardness:

10 simplex roving bobbins were collected and were fed in the ring spinning machine where 65^o shore hardness cots in the front top roller and 70^o shore hardness cots in the back top roller were set. It is to be mentioned here that all parameters were checked very carefully before fitting the cots and rovings and ensured it as accurate. After doffing ring cops were collected and tested in the Premier Tester (PT-4). Then, 65^o shore hardness cots in the front and 70^o shore hardness cots in the back were replaced by cots of shore hardness of 70^o and 75^o respectively. In the same way, 70^o and 75^o shore hardness cots were replaced by 75^o and 80^o respectively and after doffing the yarns from the ring cops were tested in the previous way.

Experimental procedure for cot grinding:

The previous collected sample of 10 simplex roving bobbins were fed in the ring spinning machine where cots were not grinded and the machine was started to run and after full doff, the ring cops were collected and tested in the Premier Tester (PT-4). This was done before cot grinding experiment. After grinding the same cots, another trial was under taken and this was done after cot grinding trial.

Experimental procedure for old and new apron:

The samples of 10 simplex roving bobbins were fed in ring spinning machine where (partially) grooved apron was used. This trial was for grooved apron. And then the old aprons were replaced by new one and trials were conducted for new aprons.

Experimental procedure for apron wash:

The previous 10 simplex roving bobbins were fed in the ring spinning machine where aprons were not washed and this trial was for before apron wash. Then, those aprons were washed by jet powder and water, and were dried in the air. These aprons were placed in the previous place and trials were conducted.

Experimental procedure for spacer:

The previous 10 simplex roving bobbins were fed in the ring-spinning machine where red spacers 2.0 mm (distance clip) was set and this trial was for red spacer. Then, red spacers were replaced by yellow (2.5 mm), white (3.0 mm) and black (3.5 mm) successively and trials were conducted (Mahabubuzzaman 2007).

It is to be mentioned here that in case of each experiment, ring speed, roller setting and other changeable parameters were unchanged.

RESULTS

Effect of shore hardness of rubber cot on yarn quality:

In spinning to achieve better control and proper drafting of the fibres, top roller cots play a vital role. Softer cots have greater area of contact, enclose the fibers strand more completely and therefore provide better guidance for the fibres (Kundu 1958).

Table 1. Experiment results on shore hardness of rubber cot

Count: 30^sKH

Shore Hardness	Um%	CVm%	Irregularity Index	Thin places (-50%)	Thick places (+50%)	Neps (+200%)	Hairiness
Front-65^0 Back-70^0	10.87	13.81	1.47	2	87	217	5.08
Front-70^0 Back-75^0	11.03	14.02	1.49	3	106	219	5.30
Front-75^0 Back-80^0	11.21	14.25	1.52	5	118	233	5.35

Effect of cot grinding on yarn quality:

Table 2. Experiment results of cot grinding

Count – 30^s KH

Name of Experiment	Um%	CVm%	Irregularity Index	Thin (-50%)	Thick (+50%)	Neps (200%)	Hairiness
Before cot grinding	11.23	14.31	1.51	4	107	232	5.24
After cot grinding	11.03	14.02	1.49	2	94	212	5.11

Effect of apron wash on yarn quality:

Table 3. Experiment results of apron wash by jet powder

Count: 30^sKH

Name of Experiment	Um%	CVm%	Irregularity Index	Thin (-50%)	Thick (+50%)	Neps (200%)	Hairiness
Before Apron wash	11.19	14.21	1.51	2	125	239	5.34
After Apron wash	11.14	14.20	1.62	2	154	172	5.07

Effect of grooved apron and good apron on yarn quality:

Table 4. Experiment results of grooved apron and good apron

Count: 30^sKH

Name of Experiment	Um%	CVm%	Index	Thin (-50%)	Thick (+50%)	Neps (200%)	Hairiness
Grooved apron	11.33	14.39	1.53	4	131	237	5.30
New apron	10.97	13.97	1.49	5	100	221	5.10

Effect of spacer on yarn quality:

Table 5. Experiment results of spacer size

Count: 30^{s}KH

SKF Spacer	Um%	CVm%	Index	Thin (-50%)	Thick (+50%)	Neps (200%)	Hairiness
Red 2.0mm	11.09	14.12	1.50	4	119	226	5.05
Yellow 2.5mm	11.02	13.99	1.49	3	90	209	4.90
White 3.0mm	11.02	14.01	1.49	4	104	204	5.37
Black 3.5mm	11.45	14.54	1.66	6	128	231	4.97

DISCUSSION

When shore hardness of rubber cot was increasing, yarn quality was deteriorating. The result of front-65^0 and back-70^0 shore hardness gave the lowest imperfections (IPI) (Banbaji 1959). So, it can be concluded that shore hardness of synthetic rubber cot has a great effect on yarn quality and softer cot gives better result.

Before cot grinding, the imperfection (IPI) was 343, after cot grinding, IPI of yarn was 308. In case of Um%, CVm%, Index & Hairiness was also improved. So, it was observed that there was a significant effect of cot grinding on yarn quality (Banbaji 1959).

After apron wash by jet power, it was found that imperfections (IPI) were reduced than that of before apron wash. Here, it can be recommended that apron of ring machine should be washed once in 3 months during 100% cotton processing to maintain consistent yarn quality. Um%, CVm%, Irregularity Index, Imperfections (IPI), and Hairiness were more in case of grooved apron. Partially grooved apron gave worse results than good apron. So, it can be concluded that grooved aprons contribute to more faults in the yarn, whenever grooved apron is found; it should be replaced by good apron (Klien 1998).

Um%, CVm%, Index, Imperfections (IPI) and Hairiness value was the lowest in case of yellow spacer. So, it can be concluded that yellow color spacer (SKF) is the best one to produce 30^{s}KH from 0.75Ne roving hank.

CONCLUSION

Rubber cot, apron and spacer are vital elements of drafting system. So, their contributions to produce quality yarn are significant. Appropriate choice of rubber cot, apron spacer gives better results. For maintaining consistent yarn quality, cot grinding, apron wash, right choice of spacer are very essential. The effect of shore hardness of rubber cots which are used as top roller in the drafting zone, the effect of cot grinding, the effect of apron wash by jet powder and the effect of spacer size in the ring machine on yarn quality have been studied in this paper. It was observed that yarn quality was improved by using softer synthetic rubber cot, grinding the cot roller, replacing the grooved (partially) apron by new apron, washing the aprons by jet powder and yellow color spacer (2.5 mm). This was the best performance to produce 30^{s}KH from 0.75Ne roving hank.

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