

## Card Setting: A Factor for Controlling Sliver Quality and Yarn

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### Abstract

In carding different organs revolved at different speed which was impact on sliver quality. Fiber opened with blow room fed to Card in the small tuft form and furthers it open again and individualization of fiber takes place in between cylinder and flats, finally fibers were converted into sliver form. In order to obtain better sliver quality the setting parameters of card and machinery condition plays important role, small deviation in machine setting parameter and speeds leads to produce inferior sliver quality The Neps is a undesirable factor which reduce the quality of the yarn and ultimately reduces the cost of the final products, In order to reduce the neps and improvement in card sliver quality an experiment trials were conducted at carding on DK760 Trutzschler card by changing setting of cylinder and flat, cylinder to doffer respectively. Carded material processed separately till Ring frame stage for 24.60 Tex (24 Ne), to determine yarn quality in spinning, adopted for large-scale working in spinning department.

**Keywords:** Cylinder to flat setting; Cylinder to doffer setting; Thick place; Thin place; Neps; Rkm.Neps +200%

### Introduction

In the blow room, where rolling of cotton takes place causes the fiber to be tangled in to neps. The carding is the heart of entire spinning process equally important function is the removal of impurities, neps, shorts fiber and individualized the fiber. NEP is an undesirable thing in cotton. They are fine specks in the form of tiny balls of entangled fibers. They are formed either due to bad mechanical processing conditions such as, in Ginning, in Blow room and in cards or due to excessive quantity of dead fibers.

“Carding is the heart of spinning process” and as such requires almost care. “To card well is to spin well” is a very widely used term by all those concerned with spinning technology. There have been remarkable changes in other areas of spinning, but so far as carding are concerned basic operations of the machine remained almost unchanged. Carding action removes as well as generates neps. The tendency for both opening and spinning process to be shortened is favorable to the production of yarns with less neps from cottons prom to this trouble wider settings between cylinder and flats of a card make the fiber roll and tangle giving chance for neps to form. Even in blow room where rolling of cotton takes place neps do form a very closes setting between cylinder and doffer helps more fiber transfer and less neps formation.

The object of carding is to open out thoroughly the tiny lumps, flocks or tufts to a state where every fiber becomes individualized and the cotton is no more in an entangled state. Equally important function is the removal of all impurities, neps, short fibers, etc., which have escaped the blow-room action. And finally it has to prepare the well cleaned material into a compact sliver form and lay into continuous for subsequent processes.

### Literature Review

Klein [1], defined various zones in blow room i.e. Zone 1 to Zone 5. In Blow room machines sequence, absence of any defined zones leads to create more deviation introduced in to the material. In order reduce the variation, in flock size and volume of flock, are important parameter which is controlled by cleaning point and beating point .While Shrivastav [2] studied in his investigation effect of type of trash size on properties of yarn. Garde et.al [3] given importance to individual cleaning efficiency of beater and trash content of cotton shows linear relationship with cleaning efficiency, if trash content of

material is more, cleaning efficiency is also more and vice versa [4]. Plawat [5] suggested various speed and settings of carding machines in order get optimum quality at carding. From literature it was found that, in unconventional blow room line sequence of operation of machines and speed of machine are very important in order to produce quality product excess beating and cleaning of cotton leads to deteriorating yarn quality.

Pattabhiram [6] stated in his studies, Carding is the most important process in spinning. It contributes a lot to the yarn quality. Process parameters and setting are to be selected properly to produce a good yarn quality with less neps. The setting between cylinder and doffer is the very close setting in the card this setting is mainly depend upon, cylinder speed, hank of delivered sliver. Cylinder speed more than 450 rpm. The setting ranges from 0.125 to 0.15 mm. The most critical setting in a carding machine is between cylinders and flat can be close as 0.2 to 0.25 mm; neps are directly affected by this setting. Very close setting increase the flat waste. Normally the setting between the feed plate and licker in is around 0.45 to 0.7 mm. The setting between licker in and mote knife is round 0.35 to 0.5 mm. This help to remove the heavier trash particles and dust.

The main object of the card, separation to individual fibers is done between the main cylinder and the flats only by means of this fiber separation; it is possible to eliminate the fine dirt particles and dust. When a flat enters the working zone, it gets filled up very quickly. Once it gets filled, after few seconds, thereafter, hardly any further take-up of fibers occurs only carding. Accordingly, if a fiber bundle does not find place at the first few flats, then it can be opened only with difficulty. It will be rolled between the working surfaces and usually leads to neps formation. The flats can be moved forwards or backwards, i.e. in the same direction as or in opposition to the cylinder. In reverse

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movement, the flats come into operative relationship with the cylinder clothing on the doffer side. At this stage, the flats are in a clean condition. They then move towards the taker-in and fill up during this movement. Part of their receiving capacity is thus lost, but sufficient remains for elimination of dirt, since this step takes place where the material first enters the flats. At this position, above the taker-in, the cylinder carries the material to be cleaned into the flats. The latter take up the dirt but do not transport it through the whole machine as in the forward movement system.

## Material and Methods

Medium grade cotton was used to study, neps reduction at card. The cotton fibers were processed through a blow room, carding and one passage of draw frame as Breaker, Finisher, Speed Frame and Ring Frame. The specification of the cotton which was used in the study is as follows:

Effective Length: 31 mm S-6 (Shankar- 6)

Bundle Strength (gm/tex): 24.5

Micronaire: 4.2

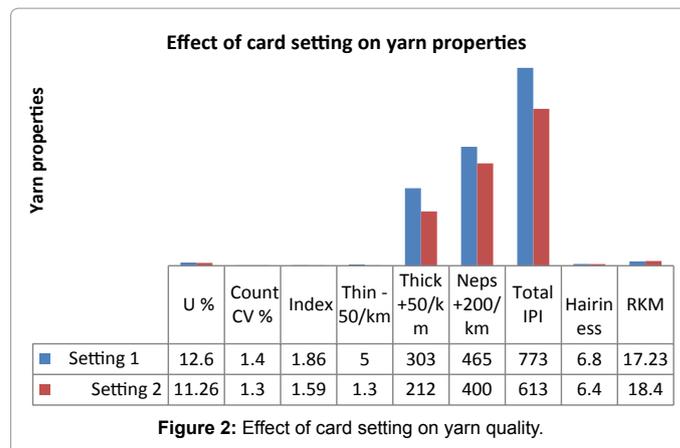
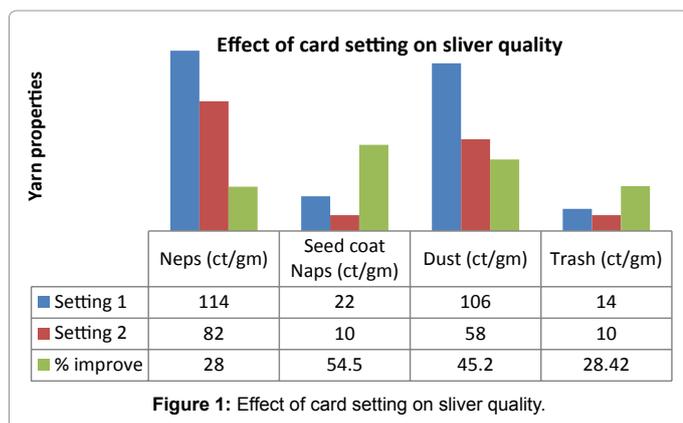
Trash content: 2.5%

In this experiment, trials conducted at carding by changing setting of cylinder and flat, cylinder to doffer respectively on DK 760 Trutzschler card. This carded material processed separately till Ring frame stage to produce 24.60 Tex, to determine imperfection, (thick, thin, neps) and short term evenness (U %) of yarn rather than length, strength. This gives the desired yarn quality and in spinning, adopted for large-scale working in spinning department. For all samples, the finisher draw frame sliver linear density is kept at 6.71 ktex. The yarn samples were prepared in a Ring Frame machine (TOYOTA Model-RX 240) with a Speed of 15500 rpm. The details of machinery parameter which are selected for study were below.

## Result and Discussions

### Effect of card setting parameters on sliver and yarn quality

Present investigation reveals that, in card setting, cylinder to flat and cylinder to doffer setting plays important role. From Tables 1-4, Figures 1 and 2 it was concluded that, as setting between cylinders to flat changes from setting 1 to setting 2 quality parameters of sliver improved, closer setting gives more intensive opening of feeding tuft. Due to higher speed of cylinder and slower speed of flat, fibers were number of times transferred to flat and cylinder and vice versa, so



Machine Parameters	Normal Setting 1	Setting 2
Feed roll speed	9 rpm	9 rpm
Licker in speed	988 rpm	988 rpm
Cylinder speed	450 rpm	450 rpm
Flat speed	254 mm/min.	254 mm/min.
Doffer speed	46 rpm	46 rpm
F B K pressure in Pascal	280	280
Draft	95	95
Wing setting	2,2 degree	2,2 degree
Delivery speed	130 m/min.	120 m/min.

**Table 1:** Machine settings speed at carding.

Parameters	Normal Setting 1	Setting 2
Feed plate to feed roll	0.15 mm	0.15 mm
Feed roll to licker in	0.75 mm	0.75 mm
Licker in to mote knife	0.35 mm	0.35 mm
Licker in to under casing	1.00 mm	1.00 mm
Licker in to combing segment	0.55 mm	0.55 mm
Cylinder to licker in	0.2 mm	0.2 mm
Cylinder to top back plate	0.55 mm	0.55 mm
Cylinder to bottom back plate	1.00 mm	1.00 mm
<b>Cylinder to flats</b>	<b>0.35/0.25/0.25 mm</b>	<b>0.25/0.2/0.2 mm</b>
Cylinder to under casing	1.00 mm	1.00 mm
Cylinder to front plate (top)	1.00 mm	1.00 mm
Cylinder to doffer	0.15 mm	0.125 mm
Wing setting	2-2 degree	2-2 degree

**Table 2:** Card setting.

the trash particles which deeply associated with fibers were removed and trash particles were very close correlation with quality parameters, Trash particles embedded in sliver leads to deteriorating sliver and yarn quality. If sufficient opening and cleaning not takes place which leads to increase thick and thin places in subsequent processing of sliver and yarn. It was observed that, setting 2 gives more effective than setting 1, which improved quality of sliver in terms of reducing neps, seed coats, and dust.

### Cylinder and doffer

Cylinder and doffer setting is important quality parameter because as cylinder and doffer setting reduced from 0.150 to 0.125, cylinder loading reduces and stripping of web more effectively removed from

Test Parameter	Setting 1	Setting 2	% Improvement
Neps (ct/gm)	114	82	28
Seed coat Naps (ct/gm)	22	10	54.5
Dust (ct/gm)	106	58	45.2
Trash (ct/gm)	14	10	28.42

**Table 3:** Shows Effect of card setting on sliver quality and improvements.

Yarn Properties	Setting 1	Setting 2	% improvement
U%	12.6	11.26	10.8
Count CV%	1.4	1.3	5.7
Index	1.86	1.59	27.5
Thin - 50/km	5	1.3	
Thick + 50/km	303	212	
Neps + 200/km	465	400	
Total IPI	773	613	20
Hairiness	6.8	6.4	2.7
RKM	17.23	18.4	6.8

**Table 4:** Shows Effect of card setting on yarn quality and improvement.

cylinder by doffer. In cylinder loading, fibers are revolving number of times on the surface of cylinder before it is being transferred to doffer. If fibers remain on surface of cylinder for long period of time, leads to increase fiber breakages, neps and deteriorating sliver quality. Consequently if fibers transferred immediately leads to increase transfer efficiency of card and improving quality parameters in subsequent processing. It was also observed that, setting 2 improving yarn quality parameter in terms of Thick, Thin, and Neps.

## Conclusions

Present investigation summarized, In DK -760 Trutzschler card, As setting between cylinder to flat changes from setting 1 to setting 2, (Table 2) The distance between cylinder and flats were reduced, which

gives more intensive opening of fibers and individualization of fiber takes place neps which were removed which are formed in previous process and trash which are deeply adherence with fibers were removed but constraint is that, effective cleaning of flats or stripping of flats are required on card, in order to maintain sliver quality.

As setting between Cylinder and doffer changes from 0.150 to 0.125, distance between cylinder and doffer reduces, which extracted deep stripping of web from cylinder which reduces cylinder load. In card, Surface area of cylinder and speed of cylinder is more while doffer has less surface area and speed, so fibers are revolving number of times on the surface of cylinder before it is being transferred to doffer. If fibers remain on surface of cylinder for long period of time, leads to increase fiber breakages, neps and deteriorating sliver quality. Consequently If fibers transferred immediately leads to increase transfer efficiency of card and improving sliver, yarn quality parameters in subsequent processing.

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