

PROCESS PARAMETER IN BLOW ROOM

With all harvesting methods, however, the cotton seed, together with the fibers, always gets into the ginning plant where it is broken up into trash and seed-coat fragments. This means that ginned cotton is always contaminated with trash and dust particles and that an intensive cleaning is only possible in the spinning mill.

Nep content increases drastically with mechanical harvesting, ginning and subsequent cleaning process. The reduction of the trash content which is necessary for improving cotton grade and appearance unfortunately results in a higher nep content level.

The basic purpose of Blow room is to supply

- small fibre tufts
- clean fibre tufts
- homogeneously blended tufts if more than one variety of fibre is used

to carding machine without increasing fibre rupture, fibre neps, broken seed particles and without removing more good fibres.

The above is achieved by the following processes in the blowroom

1. Pre opening
2. pre cleaning
3. mixing or blending
4. fine opening
5. dedusting

CLEANING EFFICIENCY:

Cleaning efficiency of the machine is the ratio of the trash removed by the machine to that of total trash fed to the machine, expressed as percentage

Cleaning efficiency % = $((\text{trash in feed \%} - \text{trash in del \%}) \times 100) / (\text{trash in feed \%})$

Following are the basic parameters to be considered in Blowroom process.

- no of opening machines
- type of beater
- type of beating
- Beater speed
- setting between feed roller and beater
- production rate of individual machine
- production rate of the entire line
- thickness of the feed web
- density of the feed web
- fibre micronaire
- size of the flocks in the feed
- type of clothing of the beater
- point density of clothing
- type of grid and grid settings
- air flow through the grid
- position of the machine in the sequence
- amount of trash in the material
- type of trash in the material
- temp and relative humidity in the blow room department

PREOPENING:

Effective preopening results in smaller tuft sizes, thus creating a large surface area for easy and efficient removal of trash particles by the fine openers.

If MBO (Rieter) or BOW (Trutzschler) type of machine is used as a first machine

- the tuft size in the mixing should be as small as possible. Normally it should be less than 10 grams
- since this machine does not take care of long term blending, mixing should be done properly to maintain the homogenous blending
- the inclined lattice speed and the setting between inclined lattice and clearer roller decides the production of the machine
- the setting between inclined lattice and clearer roller decides the quality of the tuft
- if the setting is too close, the tuft size will be small, but the neps in the cotton will be increased due to repeated action of the inclined lattice pins on cotton.
- the clearance should be decided first to confirm the quality, then inclined lattice speed can be decided according to the production required
- the setting of inclined lattice depends upon the fibre density, fibre micronaire and the tuft size fed. If smaller tuft is fed to the feeding conveyor, the fibre tufts will not be recycled many times, hence the neps will be less.
- if the machine is with beater, it is advisable to use only disc type beater. Saw tooth and Pinned beaters should not be used in this machine, because the fibre damage at this stage will be very high and heavier trash particles will be broken in to small pieces.
- the beater speed should be around 500 to 800 rpm depending upon the rawmaterial. Coarser the fibre, higher the speed
- the setting between feed roller to beater should be around 4 to 7 mm
- this machine is not meant to remove trash , hence the fibre loss should also be less
- trash removal in this machine will result in breaking the seeds, which is very difficult to remove
- It is easier to remove the bigger trash than the smaller trash, therefore enough care should be taken to avoid breaking the trash particles
- this machine is just to open the tufts into small sizes so that cleaning becomes easier in the next machines.
- the fibre tuft size from this machine should be preferably around 100 to 200 milligrams.
- If tuft size is small, removing trash particles becomes easier , because of large surface area

If Uniflco11(Rieter) or Blendomat BDT 019(Trutzschler) is used as a first machine

- It helps to maintain the homogeneity of the long term blending
- cotton is opened gently without recycling as it is done in manual bale openers
- with the latest automatic bale opening machines, the tuft size can be as small as 50 to 100 grams without rupturing the fibres
- the opening roller speed should be around 1500 to 1800 rpm.
- the depth of penetration of the opening should be as minimum as possible for better quality
- It is better to use this machine with one mixing or maximum two mixing at the same.
- If the production per feeding machine is less than 150 kgs, then four mixings can be recommended
- production rate of this machine depends upon the no of mixings working at the same time
- production rate depends upon opening roller depth, traverse speed and the fibre tuft density
- in general , the machine parameters should be set in such a way that maximum number of take-off points are available per unit time.
- with the latest machines (Rieter -Unifloc A11), around 60% of take-off points are more compared to earlier machines

PRECLEANING:

Precleaning should be gentle. Since removing finer trash particles is difficult , seeds and bigger trash particles should not be broken. Finer trash particles require severe treatment in Fine openers. This will lead to fibre damage and more nep generation. Therefore, precleaning should be as gentle as possible and no compromise on this. If preopening and precleaning are done properly, consistency in trash removal by fine openers is assured. Dust removal should be started in this machine. Enough care should be taken remove dust in this **process**.

Rieter's Uniclean B11 and Trutzschler's Axiflow or Maxiflow are the machines which does this work

- the fibre treatment in this machine is very gentle because the fibres are not gripped by the feed roller during beating. Fibre tufts treated by the pin beater when it is carried by air medium
- all heavy trash particles fall down before it is broken
- cleaning efficiency of this machine is very high in the blow room line
- Mostly all heavy seeds(full seeds) fall in this machine without any problem
- around 50 pascal suction pressure should be maintained in the waste chamber for better cleaning efficiency

- beater speed, air velocity through the machine, grid bar setting and gap between grid bars will affect the cleaning efficiency
- higher the cleaning efficiency, higher the good fibre loss, higher the nep generation and higher the fibre rupture
- the optimum cleaning means maximum cleaning performance, minimum loss of good fibres, a high degree of fibre preservation and minimum nep generation
- Rieter has a unique concept called "VARIOSET". With this machine, selective trash removal is possible. Waste amount can be changed in a range of 1:10.

Operating intensity and effectiveness

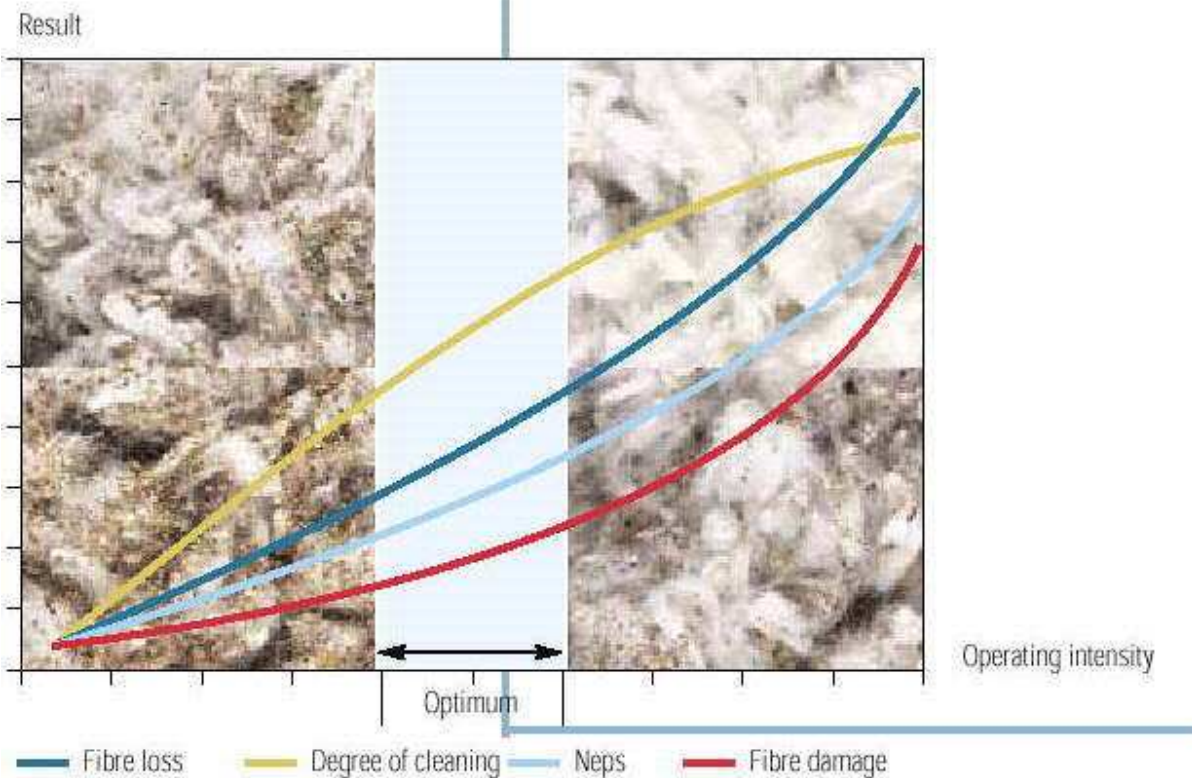


fig: from Rieter which shows , degree of cleaning, fibre loss, neps, fibre damage.

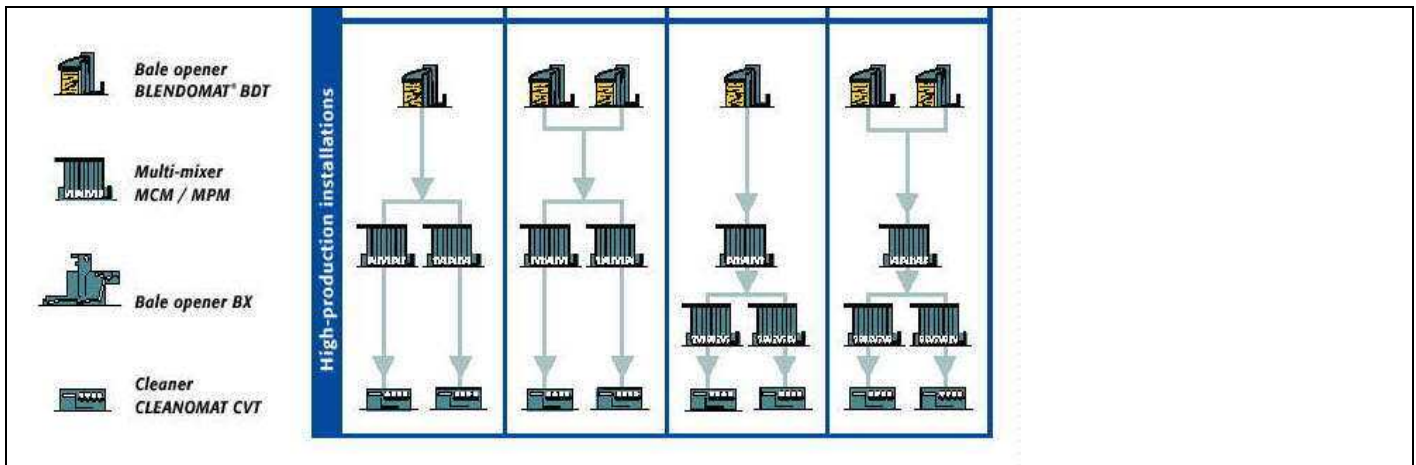
with normal machines like Monocylinder or axiflow, a lot of trials to be conducted to arrive at optimum beater speed, air velocity(fan speed), grid bar setting and grid bar gap.

in general the beater speed is around 750 and minimum 50 pascal suction pressure to be maintained in the suction chamber

BLENDING:

- Barre or streakiness is due to uneven mixing of different cottons. Hence mixing technology is a decisive factor in spinning mill technology
- bigger the differences of cotton parameters like fineness, color and staple length, the greater the importance of mixing
- if the cotton has honeydew, the intensive mixing of the rawmaterial is a precondition for an acceptable running behavior of the complete spinning mill

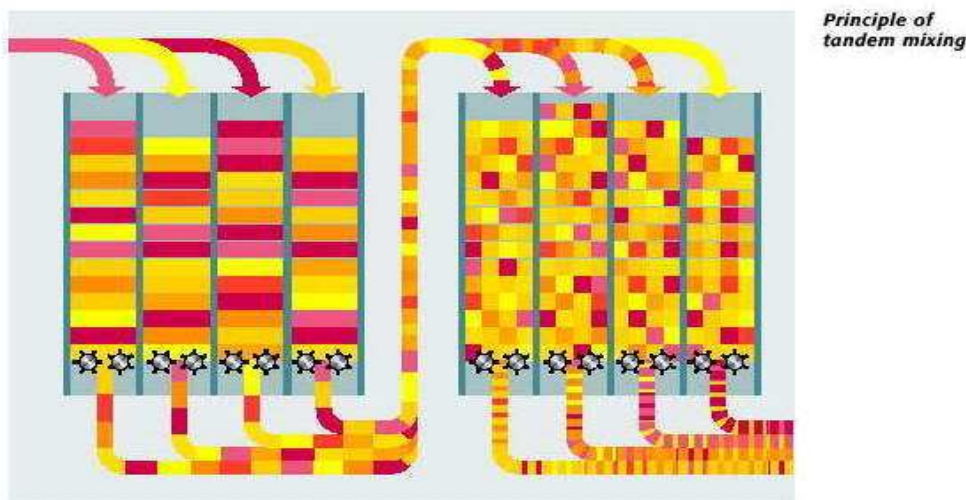
following fig is given by trutzschler for different mixing requirements



standard standar- plus high high-end

- Trutzschler's tandem mixing concept is an ultimate solution, if the mixing requirement is very high. This principle guarantees a maximum homogeneous of the mix

FIG.Tandem mixing concept from TRUTZSCHLER:



FINE CLEANING:

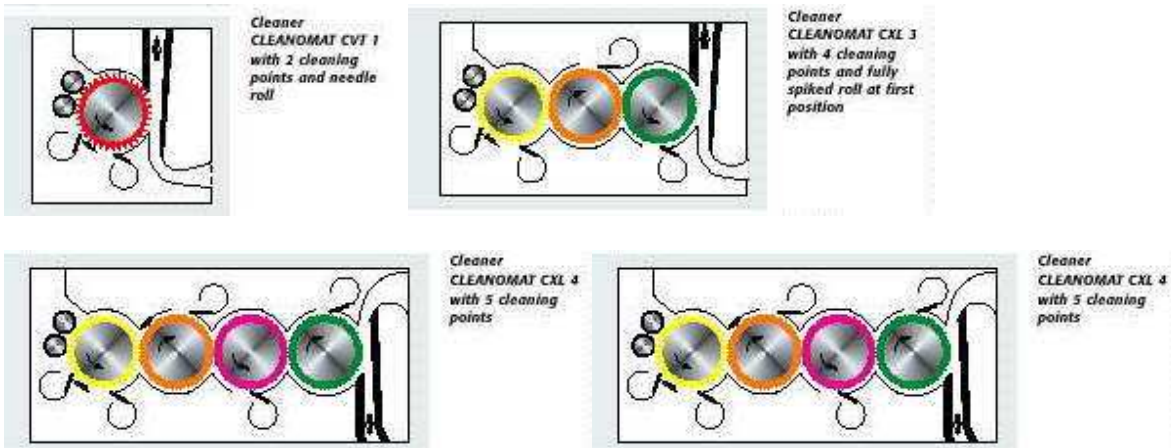
Fine cleaning is done with different types of machines. Some fine cleaners are with single opening rollers and some are with multiple opening rollers.

- If single roller cleaning machines are used, depending upon the amount and type of trash in the cotton, the number of fine cleaning points can be either one or two.
- If the production rate is lower than 250 kgs and the micronaire is less than 4.0, it is advisable to use single roller cleaning machines instead of multiple roller cleaning machine.
- Saw tooth beaters can be used, if trash particles are more and the machine is not using suction and deflector blades. i.e beater and regular grid bar arrangements
- Normal beater speeds with sawtooth beater depends upon the production rate, fibre micronaire and trash content

TYPE OF COTTON	COTTON MICRONAIRE	PRODUCTION RATE kgs/hr	BEATER SPEED rpm
----------------	-------------------	---------------------------	------------------

more trash	3.5 to 4.0	200 to 300 kgs /hr	600 to 750
less trash	3.5 to 4.0	200 to 300 kgs/hr	600 to 750
more trash	4.0 to 4.5	200 to 300 kgs	700 to 850
less trash	4.0 to 4.5	350 to 500 kgs	1000 and above

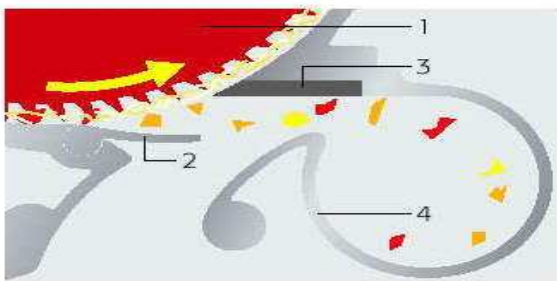
- the number of wire points depends on the production rate and trash.
- setting between feed roller and beater depends on the production rate and micronaire. The setting should be around 2 to 3 mm. Wider setting always result in higher rawmaterial faults, if carding does not take care.
- closer the setting between beater and moteknives, higher the waste collected. It is advisable to keep around 3 mm.
- If it is a Trutzschler blowroom line, it is better to use CVT1 (single opening roller machine) if roller ginned cotton is used.
- CVT3 or CVT4 machines with 3 or 4 opening rollers can be used for saw ginned cotton.



- The cleaning points in CVT1, CVT3, CVT4 etc consists of opening roller, deflector blades, moteknives and suction hood. Trash particles released due to centrifugal forces are separated at the moteknives and continuously taken away by the suction. This gives better cleaning

FIG: trash removal concept in CVT cleaners:

- 1 Cleaning roll
- 2 Deflector blade
- 3 Mote knives
- 4 Suction hood



- suction plays a major role in these machines. If suction is not consistent , the performance will be affected badly. Very high suction will result in more white fibre loss and less suction will result in low cleaning efficiency.

- The minimum recommended pressure in the waste chamber (P2) is 700 pascals. It can be upto 1000 pascals.
- material suction (P1) should be around 500 pascals
- Whenever the suction pressure is changed, the deflector blade settings should be checked
- Deflector blade setting can not be same for all the three rollers or four rollers. The setting for deflector blades in the panel looks like this 3, 12, 30 for 1st, 2nd and 3rd deflector blades.
- The deflector blade setting should be done in such a way that the setting should be opened till the fibres start slipping on the deflector blade.
- wider the deflector blade setting, higher the waste. If the setting is too wide, white fibre loss will be very high.
- for saw ginned cottons, the above concepts helps a lot because of constant suction concentrated directly at the moteknives, ensures much removal of dust from the cotton.

DEDUSTING:

Apart from opening cleaning of rawmaterial, dedusting is the very important process in blowroom process.

- normally dedusting starts with precleaning
- it is always better to have a separate machine like DUSTEX of TRUTZSCHLER for effective dedusting
- dedusting keeps the atmospheric air clean
- dedusting in machines like unimix , ERM of Rieter is good
- stationary dedusting condensers can be used for this purpose
- in exhausts of unimix , condensers , ERM etc, positive pressure of 100 pascal should be maintained. Exhaust fan speed and volume should be accordingly selected
- DUSTEX should be installed before feeding to the cards, because better the fibre opening better the dedusting
- fine openers like ERM, CVT cleaners also help in dedusting
- It is always better to feed the material through condenser for a feeding machine of cards. Because condenser continuously removes the dust from a small quantity of fibres and the material fed to the feeding machine is opened to some extent.
- Since material is not opened well in Unimix, the dedusting may not be very effective, eventhough dedusting concept in Unimix is very good
- for rotor spinning dedusting is very important. It is better to use a machine like DUSTEX after the fine opener.

OTHERS:

- setting between feed rollers is different for different types. It should be according to the standard specified by the manufacturer. For Unimix it should be around 1 mm.
- it is advisable to run the fans at optimum speeds. Higher fan speeds will increase the material velocity and will create turbulence in the bends. This will result in curly fibres which will lead to entanglements.
- If the feeding to cards is not with CONTI -FEED, the efficiency of the feeding machine should be minimum 90 % and can not be more than 95%.
- if the cards are fed by CONTI-FEED system, the feed roller speed variation should not be more than 10%. If the variation is more, then the variation in tuft size also will be more. Hence the quality will not be uniform
- If two feeding machines feed to 10 cards and the no of cards can be changed according the requirement, then frequent changes will affect the tuft size which will affect the quality, if the line is fixed with CONTI-FEED.
- if contifeed system is tuned properly and there are no machine stoppages, continuous material flow will result in better opening and even feeding to the cards
- If the production rate per line is high, the reserve chamber for the feeding machine should be big enough to avoid long term feed variations.
- it is advisable to reduce the number of fans in the line.
- fan speeds, layout of machines should be selected in such a way that material choking in the pipe line, beater jamming etc will not happen. This will lead to quality problems
- all blowroom machines should work with maximum efficiency. The feed roller speeds should be selected in such a way that it works atleast 90% of the running time of the next machine.
- blow room stoppages will always affect the sliver quality both in terms of linear density and tuft size. Blow room stoppages should be nil in a mill
- heavy particles like metal particles, stones should be removed using heavy particle removers , double magnets

etc, before they damage the opening rollers and other machine parts.

- Number of cleaning points are decided based on type of ginning (whether roller ginned or sawginned), the amount of trash, and the number of trash particles and the type of trash particles.
 - machinery selection should be based on the type of cotton and production requirement. If the production requirement of a blowroom line is less than 200 kgs, CVT-4 cleaner can not be recommended, instead CVT-1 can be used.
 - Since blow room requires more space and power, it is better to make use of the maximum production capacity of the machines
 - material level in the storage chambers should be full and it should never be less than 1/4 th level.
 - grid bars should be inspected periodically, damaged grid bars should be replaced.
 - grid bars in the front rows can be replaced earlier
 - if the cotton is too sticky, the deposits on the machine parts should be cleaned atleast once in a week, before it obstruct the movement of the fibre
 - fibre rupture should be checked for each opening point. 2.5 % span length should not drop by more than 3% . If the uniformity ratio drops by more than 3%, then it is considered that there is fibre rupture.
 - high fan speed, which will result in high velocity of air will increase neps in cotton
 - nep is increased in the blowroom process. The increase should not be more than 100%.
 - the nep increase in each opening machine should be checked with different beater speeds and settings, and the optimum parameters should be selected. But please remember that everything should be based on yarn quality checking. e.g. if nep increase in blow room is more and the beater speed or feed roller setting is changed, the tuft size will become more. This may result in bad carding quality. Sometimes if the neps are slightly more and the fibre is well opened, the neps can be removed by cards and combers and the yarn quality may be better. Therefore all trials should be done upto yarn stage.
- Blow room machinery lay out should be desined in such a way that there should be minimum number of bends, and there should not be sharp bends to avoid fibre entanglements.

fibre travelling surface should be smooth and clean

temperature should be around 30 degrees and the humidity is around 55 to 60%.

A best blowroom can be achieved by selecting the following machines:

- 1.RIETER UNIFLOC- A11 (pre opening)
- 2.RIETER UNICLEAN B11 (pre cleaning)
- 3.TRUTZSCHLER MPM 6 + MPM6 (two mixers for blending)
- 4.TRUTZSCHLER CVT-1 (for roller ginned cotton) CVT-3 (for saw ginned)
- 5.CONTAMINATION DETECTOR from either BARCO OR JOSSI
- 6.TRUTZSCHLER DUSTEX-DX (for dedusting)
- 7.TRUTZSCHLER CONTI-FEED and others

But enough care should be taken to synchronise the machines for better performace , and to run the line without any electrical system breakdowns.