

GRINDING OF THE COTS

Grinding process of rubber cots in spinning mills is very important. Periodically and orderly planned and practiced cot grinding helps to improve the yarn quality and machine efficiency

It is not possible to expect a good result from a technologically well manufactured cot, if ground improperly. For example the surface of a cot which is ground with overspeed will get a roughy surface and the cot will tend to lap up, also an excentric ground cot affects the yarn quality negatively and causes decrease of yarn strength.

Everybody who has experience in cot grinding, knows exactly this process and the influence of the operator on the result of grinding. For that reason the grinding operator must be skilled by all means. In our company we organize "grinding operator training programs", customer's operators are invited to take part in this program.

Periodically and properly practiced cot grinding, permits during the running life of the cot, a better yarn quality and a higher machine efficiency .



Grinding Machine

3.1. WHY GRINDING ?

•The surface of cots are affected by mechanical and chemical factors while running. The part, where the fibers continuously pass through will collapse or swell out and the cot loses the ability of control the fiber bundle and results in irregularity of the yarn and increase of thick and thin places and yarn breakage.



•Due to the continuous friction of rubber cot on to the steel bottom cylinder, rubber surface will wear away and becomes slippery and hard. As the slippery surface will not be able anymore to control the fiber bundle, it is inevitable to have more thin and thick places and yarn breakage.

[https://www.researchgate.net/publication/326612242](#)

•Generally, grinding is necessary in order to eliminate the possible hook wounds and knife cuts on the surface of rubber. But in case if the wound is too deep and regular grinding can not eliminate it, changing the cot with a new one is inevitable.



•The new fitted cots have to be ground before mounting on the ring spinning machine in order to straighten the surface which could be uneven during pressing. Using new fitted cots without grinding will result with quality loss.

3.2. WHEN TO GRIND?

Allways grind before beginning of quality loss. Never prolong the grinding period. Never prolong it in order to save money. This can cause to many problems.

When this period is exceeded, the yarn quality values will fall down and to be able to eliminate the damage on the cot surface, more rubber have to be ground out and the running life of the cot will be shortened.

Extending the grinding period is a wrong method of saving money. Your customer loses his reliance to your quality. It is a rationalistic way of thinking to avoid problems before happening.

Recommended and mostly practiced grinding periods for roving and ring spinning machine cots by cot manufacturers;

63 SH	Every 2 months
68 SH	Every 3-4 months
75 SH	Every 5-6 months
83 SH	Every 7-8 months

These periods can vary according to the fiber type and yarn count

3.3. HOW MUCH TO GRIND OUT?

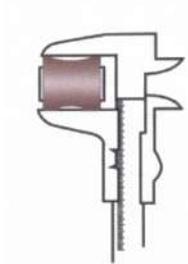
- By the new fitted and before first time using grind out 0,2 mm
- By the 63 SH -68 SH cots grind out 0,3 mm
- By the 75-83- 85 SH periods grind out 0,2 mm
- Hook wounds, and cut through cots, must be ground until a smooth surface has been achieved. If the hook wound is too deep, cot must be exchanged with a new one.
- All cots of a machine must be ground out by the grinding period to the same diameter.

3.4. WHAT ARE THE PROBLEMS OF CONICAL, CONCAVE, EXCENTRICITY, ROUGHNESS, STONE CUT DURING GRINDING ?

Concave surface:

If the cot will be ground with a single feeding amount, which is too much, the cot becomes extremely hot and dilates. When the cot gets cold again the surface will get a concave profile. To control this, the cot will be layed on a smooth surface and looked against light. The concaveness can be seen easily.

By cots with concave profile, fiber control will not be the same on the whole surface and yarn irregularities can accure.



Conical surface:

If one of the outer end diameters of the cot is bigger then the other, it means that the cot has been ground "conical".

Conical surface can originate whether due to bad setting of the grinding machine or due to the defected bearing. it can be checked through a digital compass or clamping the cot between the two chins of a compass and looking against the light.

By the conical ground cots the tensile strength will not be equal and will cause yarn irregularities.

Rough surface:

The roughness of the rubber surface can occure due to filled pores of the grinding stone, dullness of the surface of the stone or high grinding speed.

If the cot surface is too rough, it will result in increased roller lapping tendency and increases wearing ratio.

Stone cut surface:

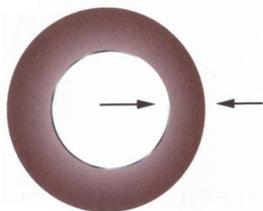
Just after levelling of the grinding stone some micro sand granules will remain on it. In case of grinding cots at this stage diagonal cuts on the surface of cot can occur.

These cuts are to be seen only under magnifier but cause roller lappings.



Excentricity:

The reason is, that the thickness of the rubber is not the same on every point. Occures if the grinding stone is rotating excentric or the clamping adaptors for top rollers are defected. Results in increased thin and thick places.



In spectogram a chimney of about the length of the circuit will occur.

3.5. CHOICE OF THE GRINDING STONE AND MOUNTING

Specifications of the grinding stone

Grinding material : **EKR**

Gravity of the granules and hardness : **80 Sh.**

Pores of the stone : **14**

Tissue fastening agent : **V-130**



1- Before mounting the grinding stone to the machine, by knocking on with a light hammer, the voice have to be controlled. A perfect stone will give a clear and tinny voice.

2-Don't strain the stone to the shaft. If the hole of the stone is not wide enough, try to widen with the lathe or with a coarse file. If the hole is extremely small, send it back to the manufacturer. The hose shouldn't be too wide. Otherwise the stone will hang on the shaft and gets disbalanced.





3- In order to mount the stone use regular safety guaranteed flanges. Flanges should be the same size.

4- During running the machine never leave tools or rags near to the stone.

5- New mounted stones should run, according to the safety regulation rules, 5 minutes at full speed. This should be practiced under the presence of a responsible person and with a safeguarded surrounding.

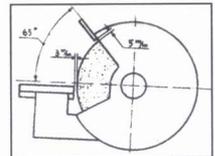


6- The speed of the stone must be controlled before processing

7- Care must be taken to the transmission belt, if it is in the right step of the V-pulley and in adjustable motors, the right speed must have been set. This is especially important by new fitted stone.

8- Don't forget to tighten the nuts. By new fitted stone, tighten them after a certain time again.

9- The protection cover of the stone should be manufactured from steel or cast steel but not from cast iron. By fitting the grinding stone follow these instructions.



3.6. LEVELLING OF THE STONE

The grinding stone must be levelled in certain periods.

Levelling Process:

Grinding stone must by all means be levelled;

by narrow stones (25-30mm)	after 1000 top roller grinding
by wide stones (410 mm)	after 2000 top roller grinding

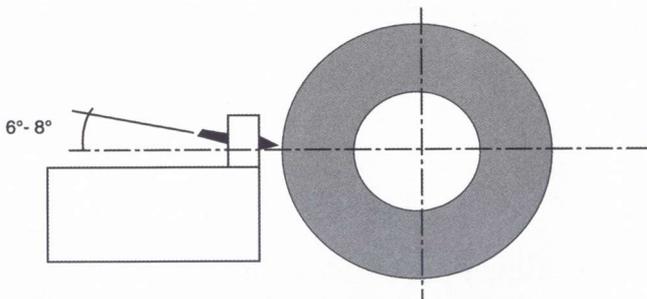
Guidelines for the levelling of grinding stone:

- Before beginning levelling, the properly fitting of the stone to the shaft and rotating without balance should be controlled.

•The diamant could be fitted to the device so that no vibration will take place. The diamond should have an angle of 6-8 degrees to the rotating direction of the stone. During every levelling the diamond should not be set to the same point, the touching point of the diamond to the stone must be changed through changing its axis so that the diamond wears out equally



Polishing of the grinding stone



Grinding adaptor of the grinding stone

•Feeding speed of the diamond should be set to 4 cm/min. and by every levelling cycle the stone must be ground off about 0,02 to 0,05 mm.

•The end of levelling can be determined through the sound arising. If the sound gets lower, this is the sign that levelling is getting to be finished.

•After levelling the surface, the stone must be cleaned with pressured air. The remaining granule sand rests should be removed by an oil stone or by the dull side of a maquette knife. This can be achieved through slightly touching of the diamond to the rotating stone.

DURING THIS PROCESS ATTENTION MUST BE PAYED TO THE SAFETY RULES AND HUMAN HEALTH REGULATIONS.

By narrow stones, the cot will generally be ground on the edges of the stone. The middle part of it serves as a polisher. For that reason the edges of the stone must be controlled frequently in order to be sure that edges are not damaged.

3.7. MAINTENANCE OF THE GRINDING MACHINE

In order to receive good results from the grinding machine, it is necessary to maintain the machine properly. Lowered oil level, clogged oil circulation causes intermittent travers of the device.

The abrasion of the bearings of the stone causes balanced rotation of the stone. And worn clamping adaptors of top rollers will result in dimensional changes of cot. These are the main problems to be faced on the grinding machine.

3.8. NECESSARY EQUIPMENT NEEDED IN GRINDING ROOM

In order to realize a controlled and proper grinding, the operator needs following equipment:

1- A spotlight , illuminating the point of contact between stone and cot, in a such position that sight of the operator will not be hindered.



Pressured Air Installation

2- In grinding room, there must be pressured air available. During grinding process the grinding stone should be cleaned 2-3 times a day with pressured air.

3- For setting the machine and measuring the cots definitely digital compass must be used. It is not possible to make sensitive measurements with a manual compass.

4- Magnifier , it is necessary for seeing the regularity of grinding, to see if there is any stone cut problems

5-The ground cots must be transported to the machine in special trays or in suitable carriages in order to avoid contact of the cots with each other.

6-During fitting of the ground cots to the spinning machine, a piece of clean rag or hand gloves should be used. Dirty and oily hands, fat and sweat of the hand when touching the surface of the cot, increases the trend to lapping.

7-Shelf systems should be used when storing the ground cots in trays.

3.9.1. Measuring value "Ra" for the surface uniformity

The "Ra" value gives information about the surface roughness. There are simple test equipment available to test this parameter. In this way the surface roughness can be controlled. Before measuring the surface roughness, the cot must cool off and the average of three measurement results from different directions must be taken.

The surface roughness and tending to lapping have a direct relation. If the surface roughness is higher than required, lapping problems can also increase without taking the cot quality into consideration.



Comparator

About "Ra" value different manufacturers and experts give different standarts. Generally following values will be accepted:

"Ra" value for cotton spinning mills

0,6 -0,8 very good
0,8 -1 ,2 good
1,2> not recommended

"Ra" value for worsted spinning mills

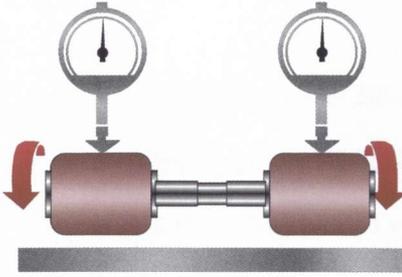
0,9 -1 , 1 very good
1-1 ,5 good
1,5 > not recommended



Use always clean gloves during fitting the cots on to the drafting system

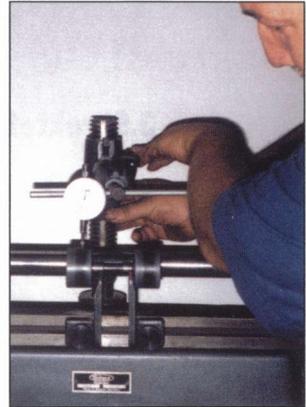
3.9.2. Measuring of the excentricity of the cot

The excentricity of the cots must be controlled after each grinding. More than 0,03 mm excentricity causes irregularity on yarn. This is especially important for mills, spinning fine count yarns.



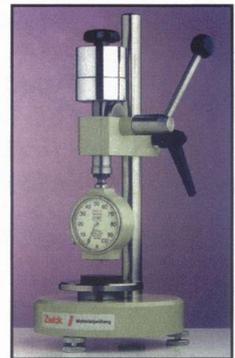
3.9.3. Excentricity control of the drawframe cylinder roller

In drawframe and combing machine rollers, lapping excentricity can occur from time to time. Therefore it is advised to control the bar roller with a comparator once in a while. Even after fitting the cot a control should be carried out.

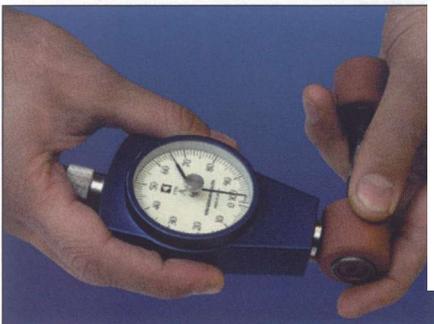


3.9.4. Measuring of the Shore hardness

A-Shore hardness measurement standart is as follows: 1 Kg force will be applied to a rubber with 5 mm thickness and the value shown in the pointer within the first five seconds is the Shore hardness.



Absolute measuring method



Approximate measuring method

B- Manual measurements depend on the force applied and on the person who makes the measurement. According to the DIN-Norms tolerance of Shore hardness measurements is $\pm 3^\circ$

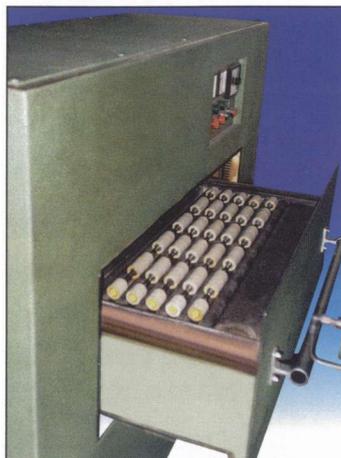
3.10. SURFACE TREATMENTS AFTER GRINDING



Opening of the pores on the surface of the cot and hillocks appearing during cutting, cause to lap ups, during the first running after

Surface image of the cot by electron microscope

grinding. (These pores and hillocks can not be seen with normal eyes, but with an electronic microscope). These pores and hillocks, dissappear after several days of running. Pores will get filled up and the hillocks will be rounded and problems concerning these effects will automatically be solved.



UV irradiation method



Practycal powdering method

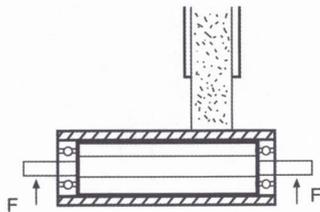
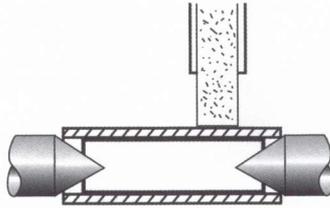
In spinning mills, in order to overcome this period without problem, two methods can be used: First method is to oxydate the surface with UV rays in order to round the small hillocks and lap ups will be hindered.

Second method is to use white filling material (i.e. talcum, chalk powder, white lead, calcid).

The second method is extremely cheap and easy to apply. Therefore will be used in a wide range of mills. In recent times a special type of textile powder has been developed, including long lasting antistatic elements and giving excellent results.

3.11. APPLICATION EXAMPLE FOR GRINDING OF THE INTERSECTING CYLINDERS

Drawing cylinders that are used by long fiber systems, will first be covered at the work-shop of the cot producers and then be ground between the two points of the milling machine and sent back to the customers (Fig. 1).



In the plant the bearings and bushes will be mounted to the inside of the cylinder. After that the cylinder should be ground again after positioning it to the machine (Fig. 2).

In many plants and in many cases, this process will be neglected and problems of irregularity will occur. To prove that, following sample application is practiced:

Machine used : NSC intersecting machine
Sliver count : 18 g/m
Material : Acrylics



Grinding adaptor for drafting cylinder

By the system shown in (Fig. 1), the cylinder ground and delivered by the manufacturer has been directly mounted on the machine after placing the bearing and bush inside of it. The outgoing sliver has been tested on the Uster equipment (Fig. 3) The U % value of the sliver was 1.83 and showed a chimney between 20-30 cm.



Grinding the drafting cylinders with adaptor

After that same cylinder was ground again at the running position and mounted afterwards to the machine. The Uster values were as follows:

U% values were sunk to 1.26 and the chimney at 20-30 cm was disappeared. (Fig. 4)

In other words, there was no more irregularities recorded. **The cylinders coming from the coverer must absolutely be ground again before using.** It is possible to modify the existing grinding machines of the spinning mill for this purpose.

Fig 3

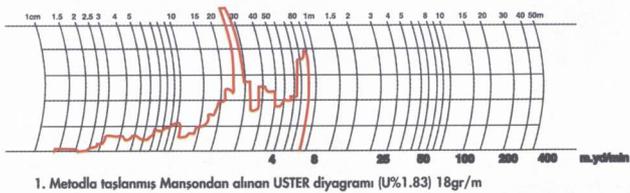


Fig 4

