# DEVELOPMENT TO NEW DESIGN OF THE PROFILE OF COGS OF THE GIN SAW AND INCREASING TO THEIR CAPACITY

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## Abstract:

Currently, there is no scientific justification for improving the geometric parameters of the genie saw and the standards of accuracy of functional parameters. However, despite the success achieved in separating fiber from seeds during ginning, there are major disadvantages in that most cotton plants produce cotton fiber and seeds with increased ginning vices. The study on change of geometric parameters of various authors is considered. The issue of improving the geometrical parameters of the saw is important and therefore requires urgent resolution. The article discusses issues related to improving the profile of the teeth of the genie saw and increasing its productivity.

## Keywords:

Improvement of the working surface, fiber size, fiber removal, brush drum, tooth thickness, fiber defects, fiber content.

Since the earliest times, people have used cotton mainly after separating the fiber from its seeds. Initially, the separation of cotton fibers from seeds was carried out manually. At the same time, the productivity of one person did not exceed 1 kg per day [1].

The development of human history has led to the fact that the separation of cotton fiber from seeds was carried out by machine.

Especially in such areas, the achievement of science is the improvement of the main working bodies of the profile of the genie saw [2].

Taking into account the prevailing influence of the state of the teeth of the saw blade on the quality of processed raw cotton products, it is necessary to ensure high-quality manufacturing of the disc in compliance with both the geometric parameters of the tooth and the roughness of its working surfaces.

The articles Normatov E. A. [3] and Ismailov A. A. dr. [2] were published on the change in the geometric parameters of the tooth.

В обеих статьях были рассмотрены более обстоятельно вопросы геометрии зуба джинной пилы и сделаны следующие выводы:

Akhmedova S. came to the conclusion that " With a shorter tooth with a constant pitch and a hollow that has the most rational shape, i.e., the shape of an isosceles triangle with the largest gripping area, the gripping ability does not decrease, and the tooth becomes more stable in operation and more economical in operation. Based on this, you can find the height."

According to Normatov E. A., the height of the tooth is equal to 2.6 mm [3].

Ismailova A. A. and others on the basis of theoretical research came to the following main conclusions:

The maximum value of the fiber capture area will be at the angle of:

$\alpha = 90^{\circ} - \gamma$;

where: $\gamma$-is the angle between the guides of the relative speed of the fiber and the circumferential speed of the saw. Note that the article does not address issues related to the height of the tooth, and not draw conclusions inconsistent statement the authors note that the angle α=45 ° to the appropriate tooth height equal to h=2.6 mm (with r=0.4 mm and wedge angle δ=20º) [4].

Makhkamov R. G. based on the analysis of the literature [3], as well as on the basis of his previous theoretical assumptions, considers the question of the geometry of the tooth of a genie saw and makes the following proposals: The

height of the saw teeth should be reduced to 2.6 mm; the gap between the grates should be kept within 2.8–3.2 mm; the tooth chamfer should be removed.

However, despite the progress made in separating the fiber from the seeds during ginning, there are major drawbacks, they are that most cotton mills produce cotton fiber and seeds with increased gining defects.

In order to determine the optimal variants of the profile of the teeth of the genie saw, a laboratory installation was tested. The optimal profile of the genie saw tooth was determined, aimed at reducing its height. Then the teeth with such profiles were tested in production gins and some results were obtained to reduce the amount of fiber defects and seed crushing.

When analyzing the results of ginning and with the same tooth profiles on the laboratory and production gin, we found some changes.

For example, when ginning "DP-130", intense selection of fiber occurred with a long tooth, and when testing saw blades with a height of 2 mm on a production gin, the opposite results were obtained, i.e., intense selection of fiber occurred with a short tooth [7].

Normatov, E. A., based on logical assumptions, considered the work of the tooth in relation to the work of the grate, the raw chamber and the brush drum. The author did not consider the geometry of the tooth.

He [4], in the article "Point Jinnah drink" was considered and the problems of geometry of the tooth Jinnah saw; "... the slope of the back of the top of a tooth modern is not needed, and the saw tooth can have triangular and trapezoidal shape with a flat top ...". Author

he proposed to get such a flat top at the point due to a slight shortening of the tooth height. In conclusion, the author suggests that the proposed method allows for the possibility of repeated tooth points, since the analysis of its operation proves that the working face of the tooth, i.e., the face that is really necessary for work and gives products, does not exceed 3/3 of its entire height, therefore, there is no danger of deterioration in productivity, even if the saw tooth is worn off and ½ of its height."

In the collection No. 4 of the Experimental Plant, an article by Sapaev U. A., "Evaluation of the use of various devices for ginning wet snapper", was published, in which an attempt was made to install a stirrer in the raw gin chamber to ensure the normal rotation of the raw roller when ginning cotton from the wet snapper. The author came to the conclusion that the use of agitators does not provide significant assistance. Therefore, they have not found application in industry.

In the same period, the researcher Sanyama of Tilavov B. N. studied the influence of the quality of steel used to develop drinking, and properties of raw cotton on the service life of drinking in "the Influence of hardness and strength of steel for the main indicators of ginning". As a result of research, the author came to the conclusion that the service life of the saw cylinder is not determined by the durability of cutting steel, and with the number of impurities trapped in the working chamber of gin, the size of the tooth and mechanical qualities of steel which is made from a saw.

In 1989, No. 5 journal "Textile industry" contains an article Gulidova N. G. "On the tooth profile Jinnah saw", which argues about the definition of rational tooth profile according to which the increase in the angle α (front face) must be accompanied by a decrease in the height of the tooth.

According to the proposal of Gulidov N. G., the angle α and the height h should mean that an increase in the angle α (front face) corresponds to a decrease in the height of the tooth (the other parameters do not change).

In 2008, published an article Mahkamova R. G. "on the theory of volunatary", which discusses the issues of conclusion of tooth form parabolic front of his face, the author wrote "Based on the optimal conditions, the strength of the tooth to improve gripping ability by increasing the angle of the working edge, build a parabola with vertex at the base of the working face of the tooth."

Note that the tooth with a parabolic construction of the front face has not found application in industry due to the complexity of its manufacture.

This contradiction is explained by the design features of the laboratory and production gins, i.e., in the first case, the fiber is removed by a brush drum, and in the second by an air removal device. There are also differences in power, speed, working bodies, and much more [5].

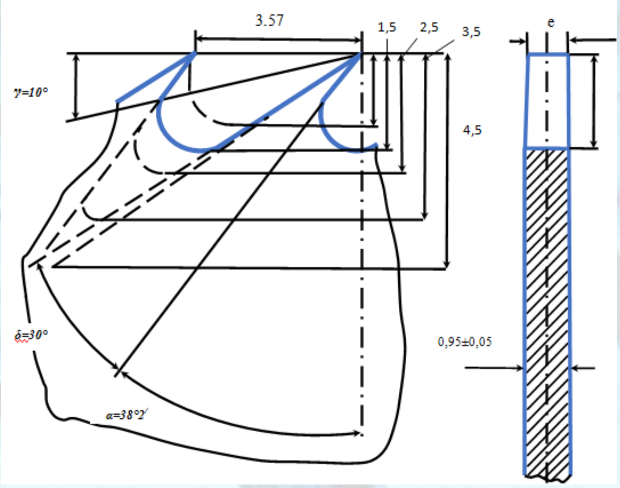


**Fig. 1. Diagrams of the tooth of a genie saw with different thickness at the top.**

*e-I option-the saw blades had teeth of thickness at the top = 0.2-0.3 mm, i.e., on both sides of the tooth, the chamfer was removed on abrasives.*

This was the objective reason that forced us to conduct further experiments only in production conditions - on existing gins.

Further, based on the experiments conducted only on production gins, the questions of the influence of different tooth heights of the genie saw on the technological properties and on the nature of gin processing are highlighted.

Experiments of some plants showed that the operation of teeth with an increased thickness of the tooth tip against GOST 1413-48 gave some improvements in product quality. In this regard, the first task was to determine the thickness of the tooth at the top, and then to determine the rational height of the tooth.

When determining the optimal thickness of the tip of the saw tooth, the remaining parameters of the tooth remained in accordance with GOST 1413-48.

The specifics of our tests were to conduct them in production conditions.

Saw blades with a diameter of 312 mm with different thicknesses at the tops of the teeth were prepared in five versions of 100 saws each (Fig. 1). Option

II-at e= 0.4-0.5 mm, the chamfer was removed from both sides of the tooth.

Option III-at e= 0.6-0.7 mm, the chamfer is removed slightly on both sides of the tooth.

Option IV-at e= 0.8-0.9 mm, only the burrs on the side of the punch exit were removed.

V option - at 0.95 > e > 0.9, i.e., the teeth after the intersection were not processed to remove the chamfer or burr, only grinding in sand baths was carried out according to the existing operating instructions for the equipment of the saw shop.

The saw blades of the I-IV variants were also sanded under different conditions, in a sand bath, according to the existing instructions.

The saw blades of each variant were separately mounted on specific shafts for a separate battery genie. Thus, each gin was equipped with saws of a certain version, after which all the gins underwent the same adjustment.

The tests were carried out under the same conditions and different modes of gination. All the gins worked mainly on the fourth tooth of the feed, which corresponded to a productivity of 9-10 kg of fiber per saw per hour. The pressure in the air chamber was maintained at 180-140 water column. The duration of the test on the II, III and IV variants was 48 hours, on the I and V variants 4 hours. The reason for the short duration of the I and V variants was a noticeable deterioration in the quality of the fiber and seeds due to an increase in the density of the raw roller and poor removal of fiber from the teeth, especially in the V variant. In the II, III and IV variants, the gin process proceeded normally and the fiber was also eaten normally.

To assess the technological properties of fiber and seeds, the plant's laboratories took samples under our control and according to the developed methodology [10].

Fiber samples were taken from the neck of each gin for each variant, seed samples from the seed trays of each gin. The sample was taken three times per shift, i.e. for the II, III and IV variants 18 times, and for the I and V-3 times.

Technological analyses were carried out in the laboratory of the plant according to the existing rules.

At the time of sampling, the current in the phases of the electric motor of the gin saw cylinder was also measured.

For clarity, the results are presented in the form of graphs 1-5.

From Graph 1, it can be seen that with an increase in the thickness of the tooth vertices, the number of defects in the fiber decreases, which occurred mainly due to a decrease in broken seeds in the fiber. At the same time, the content of litter and selection of fiber in the fiber almost does not change.

The explanation that an increase in the thickness at the top of the tooth causes a decrease in the amount of defects in the fiber, apparently, is that the specific pressure of the tooth edge on the fiber and the seed decreases and this was accompanied by a decrease in the damage of the latter.

In contrast to the general pattern, the amount of fiber defects on the V version of the saw had an overestimated value.

This can be explained by the fact that the saw blades of the V variant did not undergo chamfering after the tooth was crossed, only the teeth were ground in a sand bath under different conditions with other options for preparing the saws. Apparently, such an identical condition for processing the teeth for all variants is not sufficient for the V variant, and the teeth of the V variant are obviously not free from invisible burrs. Thus, the number of burrs on the teeth of the V variant was greater than on the teeth of the I, IV variants. And in the industry, it has long been known that the presence of burrs leads to a deterioration in the quality of products.

Graph 2 shows that the change in seed fragmentation is inversely proportional to the change in thickness at the tooth tips. The reasons for this can also be found in the change in the specific pressure on the seeds from the edge of the tooth.

From Graph 3, it can be seen that the change in the total omission of the seeds occurs in the opposite proportion to the change in the thickness of the tooth vertices.

It is possible that in the process of ginning happen and processes of partial intervene. If we assume this, then in our case, the increase in the thickness at the top of the tooth also caused an intensification of the linterization process during ginning. Therefore, an increase in the thickness at the top of the tooth caused a decrease in the complete omission of the seeds.

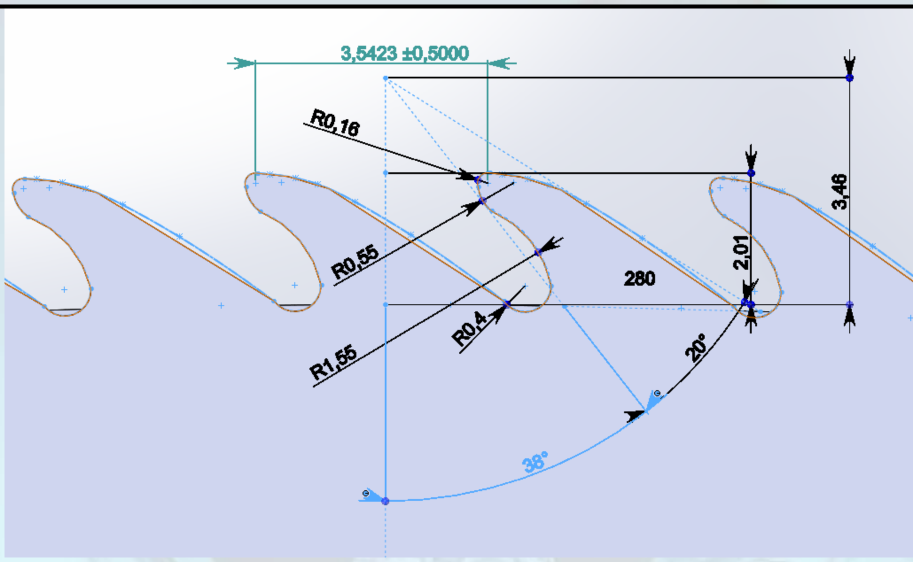


**Fig. 2. The developed profile of the genie saw tooth.**

Graph 4 shows that the residual fiber content of the seeds changes in inverse proportion to the change in the thickness of the tooth tip. The explanation for this is the same as in Graph 3.

And finally, from the graph 5 shows that the variation of the load on the motor of the saw cylinder Gina relative thickness change of the tooth flows by law direct proportion.

The explanation of the latter is that with an increase in the thickness at the top of the tooth, the degree of its contact with the mass of the raw roller increases and this causes an increase in the load on the gin shaft.

Thus, the results of tests and came to the conclusion that a rational thickness at the apex of the tooth gin saws is equal to e = 0,8 ± 0,1 mm, with which you can get the products naliases quality.

## Referents

1. Sapaev. U. A. Evaluation of the use of various devices in the gining of a wet snapper. "Problems of textiles" Tashkent, 2009, No. 2. pp. 51-56
2. E. A. Normatov, A. A. Ismailov, U. A. Sapaev, "Theoretical study of the oscillation frequency of the gin grate". Collection of scientific and practical conferences. Namangan 2011. 2-volume, pp. 303-305.
3. E. A. Normatov, A. A. Ismailov, "Methods of increasing the durability of genie saws and grates". Collection of materials of the Republican scientific and Practical conference of young scientists. Tashkent, 2011, pp. 71-73.
4. A. Ismailov, A. M. Akhmedov, A. A. Safoev, E. A. Normatov. "Improving the grate and the teeth of the genie saw" Collection of materials of the Republican scientific and practical conference of young scientists. Tashkent, 2011, pp. 27-30.
5. E. A. Normatov, A. A. Ismailov, A. M. Akhmedov, U. A. Sapaev, "Study of the wear resistance of various materials of genie saws" Collection of materials of the Republican scientific and practical conference of young scientists. Tashkent, 2010, pp. 119-121.