PalArch's Journal of Archaeology of Egypt / Egyptology

PROBLEMS OF DEVELOPMENT AND SOLUTION OF TECHNOLOGICAL PROCESSES OF CLEANING COTTON WITH SMALL DISPERSION PARTICLES AND DUST

Sabitkhan Hashimov[1], IrisqulovFarxodSultonboyevich[2], ImamnazarovErkinDexkanaliyevich[3], ErkinovHusniddinBakhtiyoro'g'li[4], AbdujalilovSodiqjonMuhammadamino'g'li[5]

[1]Associate Professor of Informatics and IT Department of Namangan Engineering Construction Institute
[2]Teacher of Informatics and IT Department of Namangan Engineering Construction Institute
[3,4,5]Teacher of Informatics and IT Department of Namangan Engineering Construction Institute
E-mail: nammqiinfo@edu.uz

SabitkhanHashimov,IrisqulovFarxodSultonboyevich,ImamnazarovErkinDexkanaliyevich,ErkinovHusniddinBakhtiyoro'g'li,AbdujalilovSodiqjonMuhammadamino'g'li, PROBLEMS OF DEVELOPMENT AND SOLUTION OF TECHNOLOGICAL PROCESSES OF CLEANING COTTON WITH SMALL DISPERSION PARTICLES AND DUST-– Palarch's Journal of Archaeology of Egypt/Egyptology 17(2) (2020). ISSN 1567-214X.

Keywords: development of cotton industry, modernization of ginneries, cotton textile clusters, cotton cleaning equipment, the technological process of cleaning cotton with small dispersion particles and dust, seedy cotton, cotton sorts, amountof defects and waste in cotton seeds, pile-drum cleaners during cotton cleaning,mesh surface, dirt chamber.

Abstract

The article highlights the importance of the cotton industry of the Republic in Uzbekistan's economy and its development, making it one of the leading cotton producing countries in the world. It analyzes the results of scientific work done by researchers in the field of high-quality fiber and highlights the fact that high fiber quality is largely dependent on cotton-cleaning technology. In addition, it has been recently reported that foreign countries, including China (China), have been interested in Uzbek cotton, and that their experts have been critical of the Uzbek cotton fiber, and that it contains "neps" in the fiber, resulting in poor quality of Uzbek cotton. In order to overcome this problem, this article proposes a computer model of a device for the treatment of seedycotton, based on a completely new

cotton cleaning technology. This technology is described in detail in order to preserve the natural state of the cotton seeds being cleaned and not to damage the seeds during cleaning.

1. Introduction

The Republic of Uzbekistan is currently the sixth-largest cotton fiber producing country in the world with an output of about 1 million tons.. At the same time, it should be noted that China (People's Republic of China, 1452 kg / ha), Brazil (1,418 kg / ha) and Australia (2107 kg / ha) are the leaders in cotton production. It is known that in the Republic of Uzbekistan (754 kg / ha) this indicator is 2-3 times lower. However, there is an opportunity to increase the productivity of cotton by increasing the volume of cotton fiber production in the country. These opportunities play an important role in the country's economy and its the development under market economy conditions. [1].

According to the Inspectorate for the Control of Agroindustrial Complex under the Cabinet of Ministers of the Republic of Uzbekistan, Uzbekistan is among the top ten cotton-producing countries and one of the top five cotton fiber quality states. It is reported that the main buyers of Uzbek cotton are local producers, 90% of which is purchased by local businesses, and the largest consumer of cotton abroad is China.

In recent years, the Government has developed the Concept and Development Program of the Cotton Industry of the Republic of Uzbekistan (for 2016-2020). To ensure the implementation of the program in practice, the analysis of the current state of the techniques and technologies required for the preprocessing of the cotton raw material and the importance of increasing the focus on their modernization. By the Decree of the President of the Republic of Uzbekistan No. , 3408 dated November 28, 2017, a set of measures to modernize the cotton industry and develop equipment of ginneries and improve the competitiveness of productshave been developed and achieved.

The experience of foreign countries has shown that one of the effective forms of textile industry development is the establishment of clusters. The model envisages the establishment of a single production cycle, which includes the production, processing, processing of raw materials at the ginneries and the production of high-quality finished textile products [2,3].

According to experts, cotton consumption in Uzbekistan is expected to grow in coming years. Increasing dozens of investment projects under the Concept of Development of the Cotton Industry of the Republic of Uzbekistan and Development Program is expected to increase the processing capacity of cotton fiber by 80% and increase export potential of the industry more than three times . And these actions are considered as the future economic policy of the Republic.

2. Identification of problem

Considering the aforementioned bases, the cotton sector faces major challenges: to innovate in the sector to improve the productivity of the country's economy, technical and technological modernization of production, production of cotton textile clusters (cotton raw materials and creation of new products by cotton) requires the introduction of new promising technologies at the expense of the creation of modern technologies[3].

The high quality of cotton fiber produced by the textile and light enterprise industry and its compliance with international standards is a key factor in its global market demand.

It is known that the quality of harvested cotton and cotton fiber obtained after processing cotton depends on many factors.These include timely picking and delivery of cotton to ginneries, cleaning and maintaining adequate moisture and pollution.However, even under these conditions, the quality of the cotton fiber is poor due to the following reasons: firstly, the inability of cotton machines to clean the impurities in the cotton, and secondly, there are problems with the storage and cleaning of cotton and problems with the transmission of machines and other negative factors.

Abovementioned problems and many others make the modernization of the ginneries and the further improvement of their material and technical base a daily life.These negative factors are mainly due to the presence of extraneous heavy impurities (stone, mud, etc.) in the cotton linter, and the inadequate cleaning technology of the cotton prior to its injection into the gin apparatus.

According to Chinese experts, Uzbekistan's cotton is "less attractive" and less competitive, including "Uzbek cotton is worse than other cotton producers"; high content of neps (percentage of tangled fiber) in cotton fiber; due to insufficient purification of the raw cotton, the presence of fiber-free impurities and the poor quality of the fiber due to them[1].

There are several types of cleaning equipment at the ginneries of the Republic.Examples are OXB-10, XK, UXK, 6A-12M, CHX-3M2, and so on. These devices differ in their operation. In the context of Uzbekistan, the following activities were followed during the research process at the cotton ginneries, including the Kosonsay Cotton Ginning Plant in Namangan region: Cotton raw material is dried on drying drums (2 SB-10); the dried cotton raw material is purified from the harsh and minor filth utilizing the UCC cleaning line; purified cotton raw material separates cotton from seeds in 5 DP –130 (jeans) equipment; then the fiber is packed in the press shop by DB - 8237 press eqioment; The fiber is weighed on electronic scales and transferred to the finished product warehouse using a ribbon transporter. In linear units, LP type cotton is extracted from cotton seeds and is mounted on DA-237 press equipment.The cotton is weighed electronically and transferred to the finished product warehouse. Seed products are weighed in electronic scales and transferred to the seedbed through elevators and screws.

3. Research hypothesis

When we observed the process at the Kosonsay ginnery in Namangan region, it was clear that the quality of the fiber out of the process was also affected the process of cotton picking (manual cotton picking).In other words, the quality of cotton in the early stages of cotton harvesting is almost as good as it should be (Figure 1 a, we will call it the "Seedy A-Cotton "), it would be few problems with its cotton processing. However, the quality of the fiber is deteriorating due to the presence of factors affecting the quality of the fiber in the middle and later stages of the picking cotton (precipitation, dirties, etc.). Cotton has two types of dirties: small dirties (leaves, twigs, sand,crumbs and dust) and large dirties, including impurities: stone, fragments, scrap metal, etc. is possible.

For example, it was found that despite the increased control over the cotton picking process,some cotton pickers (main and assistants) were found to pick cotton with a lot of cotton contamination and were handed over to the factory (Figure 1b, we will call itB condition of seedy cotton).Various problems arise when processing such cotton(frequent failures of cotton cleaning equipmetns on the ginneries, malfunctions, work productivity, etc.).

From the above observation, we can conclude that after both cases (Case A and B) of seedy cotton, cleaning cotton by the UCC line, the C-condition, second stage of the cotton seeds begins. Although cotton seeds were cleaned virtually by the UCC line, on the other hand, it was observed that cotton was divided into smaller pieces (seeds).

It is known that the cottonseed (box) consists of 3-5 parts (Figure 1 d).One piece of cotton hollow can contain 7 to 12 seeds. At present, cotton ginneries mainly treat cotton with the help of cleaning equipment - UCC cleaner.

Figure 1. Cotton cases.

Seedy cotton cleaned with the help of this device, after processing, is divided into 7 to 12 single-seeded cotton pieces.In general, the length of the cotton fiber generally remains at a low level, which ultimately leads to a decline in the quality of the cotton fiber.Cotton yarn made of such fibers is inadequate, and it is likely that in the future there will be less demand in the international markets and less "buyer" status.

It is well known that at the ginneries the proper technological process for obtaining high-quality product fromseedy cotton is of special importance. If the technological process of the enterprise is properly organized, the quality of the products will be better, the cost and production costs will be reduced, and the company will benefit and develop.

Despite the fact that today almost all ginneries in Uzbekistan have modern equipment, rational technology, compact production areas, and well-developed infrastructure, we can’t say that it has been achieved to get quality fiber on international level.

Therefore, our research suggests that we need to have a closer look at this situation. However, modern requirements cause not only the cotton processing process, but also the modernization of cotton cleaning industry, technical and technological re-equipment of the cotton industry, and the introduction of modern flexible technologies in order to produce modern competitive products.

Based on the foregoing reasons, we believe that cleaning seedy cotton in the B-condition (with lots of dirties) with the UCC line is "very effective" because the seedy cotton is cleaned from dirties.Cleaning the seedy Cotton in A-condition through this equipment (UCC) is not effective,this is due to the fact that during the process of cleaning the high grade ripe cotton raw material, the cotton loses its natural condition, fibers get ripped and result in the poor quality of cotton.For this reason, it can not be said that activities of ginneries operating with current traditional technologies to clean cotton such as drying cotton raw

materials (2 SB-10 - drying drums) and cleaning the fine contaminants in the cleaning shop (UCC cleaning line) meets today's requirements.

To improve the quality of cotton fiber, we aim to create a new technological cleaning equipment.

Observations show that cotton with high levels of contamination quickly heats up on its own because dirty cotton has a higher content of temporarily retained moisture components - cotton leaves and other impurities. We call the technological process of cleaning cotton from such impurities "The process of cleaning cotton with small dispersion particles and dust," and we focus our research.

The study found that dirt, such as small particles in the cotton that needs to be cleaned, is also contained in the inner part of cotton, which affects the quality of the cotton fiber and requieres for a deeper exploration: modernization, technical and technological renovation of the cotton industry. active realization of re-equipment, introduction of modern transformative technologies, providing production of modern, competitive products. Therefore, it is appropriate to address the following issues in the research:

- to study best practices of leading cotton producing countries (USA, China, Brazil, Australia, etc.);
- Take into account environmental requirements ISO 14001 and OHSAS 18001 health and safety standards for the technical and technological cleaning of cotton following ISO 9001 international quality standards;
- Identification of factors that significantly affect the transition of cotton fiber to low classes;
- creation of modern developments equipped with automated and computerized elements of technological base with advanced and improved technical indicators;
- step-by-step modernization of changing the existing cleaning equipment with fast-spreading units (grates, drums, brushes, etc.) tothe ones which are cheaper to use and more reliable in constructive performance;
- Development of a complex of equipment with modernized components of the cotton-cleaning equipment, modeling and adjustment of control processes, improving the quality of fiber and reducing the parameters of losses.;
- Considering the increase in the productivity of cotton processing equipment, improving the quality of cotton fiber and other cotton products, lowering electricity and operating costs, and finally lowering the prime cost of cotton products due to increased fiber output in the development of ginneries.

4. The research' results and theirdiscussion

In addition to examining the above sources, we have highlighted in our research that great pollutants in cotton are less concentrated in cotton raw materials, but whereas smaller pollutants are more deeply absorbed in cotton.The removal and separation of such minor impurities, in turn, require sophisticated vibration (horizontal and vertical vibration), and it is necessary to work on developing a new slope lace vibration surface device.

The device proposed by us (Figure 2-3) is based on the sequential method of separation (cotton separation) in cotton cleaning technology, which aims to solve this problem.For this reason, the movement of cotton pieces on the

surface of the vibration is theoretically studied and is being investigated [19 - 26].

In this device (Figure 2-3), a completely new cotton cleaning technology is proposed, using a separation method (based on the fact that cotton slices pass through six sieves in a row) (Figure 4).Seedy cotton is attached to the unit (1), which supports the movement of the device, and through the teeth of the roller the cotton is transferred (the cotton fiber stretches out compared to the previous one), surface of the net is maximally used to remove any dirties in the process of separation(2).For this purpose, after the first lattice surface, the 2,3,4,5,6-lattice piece of cotton is moved to the surface of the protective surface (4). based on the passage of small dirties (sieves, sand, cotton leaves and other seasons) on the surface of the lattice (sieve).

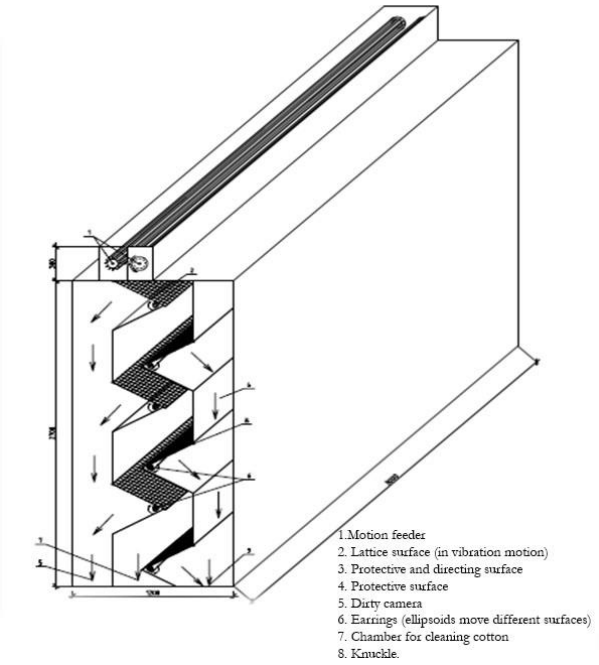

Figure 2. Hypothetical image of a cotton cleaning equipment.

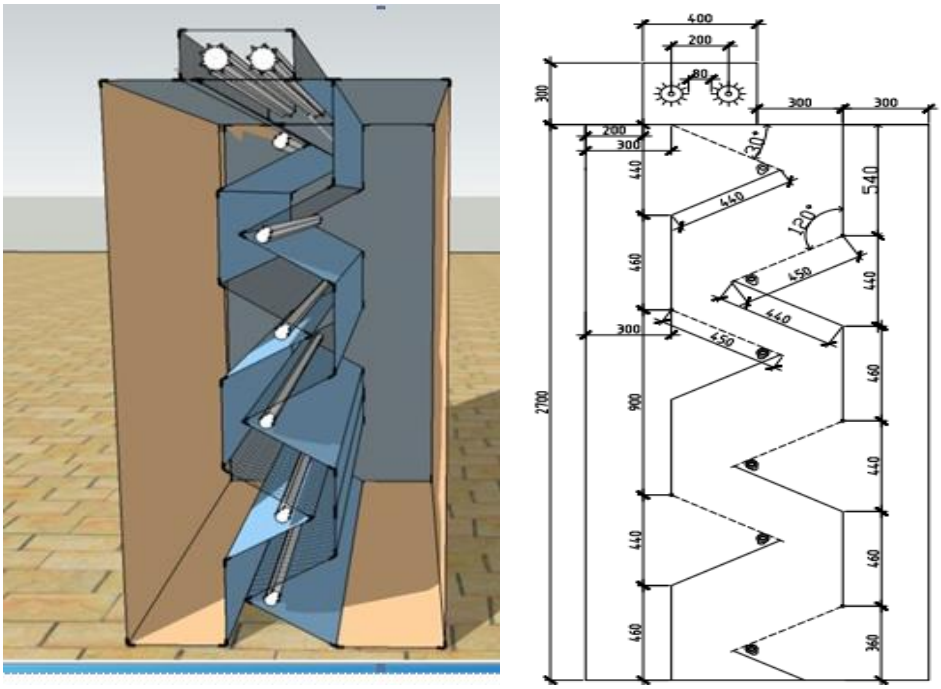

Figure 3. General (A) and schematic (B) views of the cotton cleaning equipment (with dimensions).

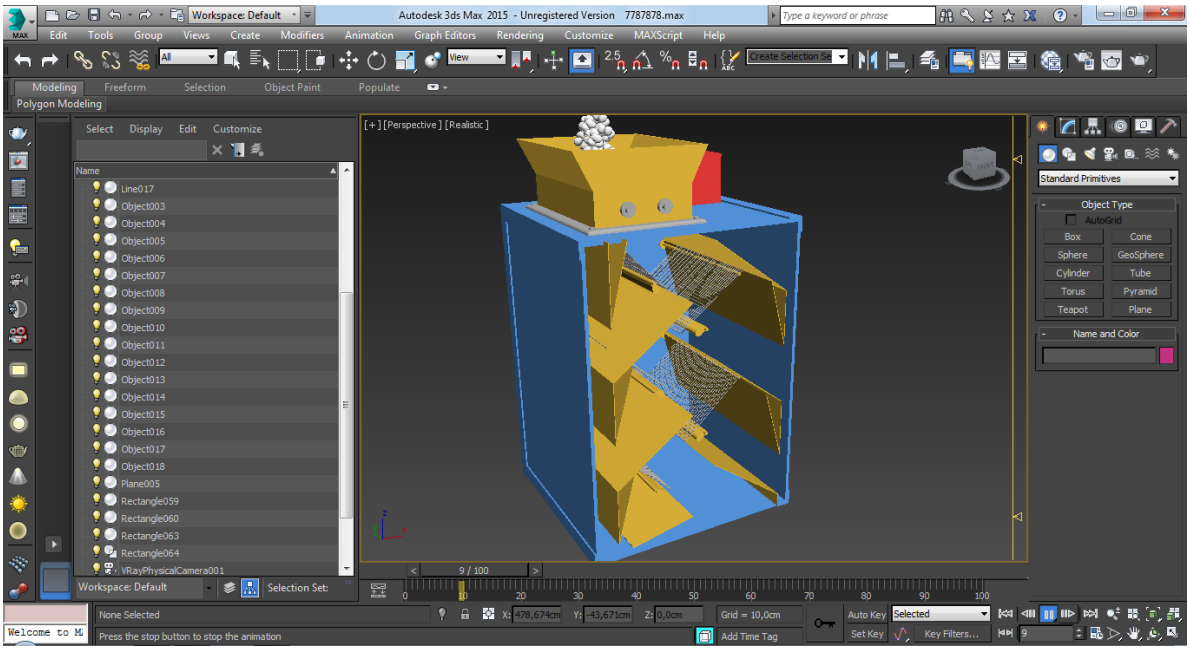

Figure 4. The cotton treatment unit created in 3D Max is a model that demonstrates the working process.

As a result, the impurities on the entire surface of the cotton piece begin to fall below the surface of the lattice, and the cotton is effectively cleaned; The fact that each surface is about 30 degrees relative to the horizon is important for effective cleaning of the cotton field.Because the angle of less than 30 degrees will slow down the movement of cotton wool on the surface, resulting in a reduction in the cotton cleaning proccess of the machine. Or greater than 30 degrees, which increases the velocity of the cotton piece on the surface, the device increases performance, but the cotton piece would not be cleaned fully on the surface, and the quality of cleaning may be poor, low-quality cotton is

cheap in price, which in the end can result in poor effectiveness.This means that the full surface area is about 30 degrees; dimensions of the surface area and the effect of this surface on the movement of cotton (friction indicators) may affect the performance of the device and more.

This device allows the cotton piece to pass through six sieves in a row and clean dirties from the cotton.The device can adjust the distance between the supplier cotton shaft (80-100mm) to improve the cleaning quality on the device. Also, it is possible to replace different surfaces acting as separators.An effective model of the Cotton Fiber Cleaner design can be developed nationwide at all ginneries (Figure 3).

5. Conclusion and Recommendations

When the proposed device is used for production: the cotton is preserved in its natural state, without damage to the length of the fiber and the seeds. In this device, the efficiency of cleaning may increase by 10% -15% compared to the existing device (UCC device), and the amount of impurities in the fiber obtained from the treated cotton can be reduced by 60% -80%.

There is an opportunity to develop and commercialize the device at “Mehmash” and other plants in Namangan region. The device can be used at primary cotton processing plants, farms, and ginneries.

In the future, an effective model for the construction of an effective cotton dust treatment plant will require continuous research and practice (technoparks) for large-scale testing and improvement of equipment on farms and cotton plants.Based on the results of additional theoretical and practical research, developing device parameters and optimal working conditions of the processing bodies is determined based on the customer's purchasing ability (cost of purchase) of the proposed cotton cleaning unit.And then it is desirable to design and commercialize the device.

References

1. The Concept of Development of the Cotton and Oil and Fat Industry in the Republic of Uzbekistan for 2016-2020. Holding company «Uzpakhtasanoateksport». Tashkent - 2016 year.

2. Decree of the President of the Republic of Uzbekistan On the strategy of further development of the Republic of Uzbekistan (Collection of Laws of the Republic of Uzbekistan, 2017, No. 6, Article 70, № 20, Article 354, No. 23, Article 448).

3. Decree of the President of the Republic of Uzbekistan. On measures for the accelerated development of the textile and garment-knitting industry. December 14, 2017 PF-5285.

4. Jabborov.J. Technology of processing seedy cotton. “The Instructor”, Tashkent, 1987.

5. Salimov AM, Akhmatov MA Initial processing of cotton. “Knowledge”, Tashkent, 2005.

6. Miroshnichenko G.I. Basics of designing primary cotton machines. M .: Engineering, 1972, p.63-65.

7. AE Lugachev. A new method for the seperation of small impurities in cotton. Tashkent - 2003

8. Uldyakov AI and etc. «Improving the cleaning process of raw cotton picked with machine harvest. (review)., Tashkent, UzNIINTI, 1977, p.40
9. MJKoshakova. «Universal kinematic excitation vibrating stand for cleaning raw cotton». Collection of scientific work. «Technology of textile raw materials and materials ». TITLP. Tashkent 1984. pp.10-14.
10. Tikhomirov GA, Normuhammedov TA, Khafizov IK and etc. "The effect of moisture in raw cotton on the ginning process " (review), Tashkent, UzNIINTI, 1976, pp. 4-13.
11. Makhkamov R.G. «Investigation of some quality parameters of American cotton fiber ». Cotton Industry, 1970, No. 4. pp. 11-13
12. Khodjinova MA "The effect of damage to cotton fibers on the quality of textile raw materials "., Publishing House of ANRUz, 1963, p.142.
13. R.Muradov, A.Karimov, E.Tadayeva “Separation of dirties particles in the raw material slices on different surfaces with curved contours by means of shock and drag” Ferghana Scientific and Technical Journal FarPI 2015.
14. Muradov R., Karimov A., Tadaeva E. “Theoretical study of mechanical (shock) release of large and small impurities in the raw cotton raw material’’ Fergana scientific-technical journal FarPI ITJ-2015.
15. Tadaeva E. «Determination of the amount of fibers removed from the purification zone », 2016. Volume 2, Problems of mechanics Tashkent 2016.
16. Tadaeva E. “Theoretical study of clarification of raw cotton by mechanical influence of large and small litter” by Role of Using Innovative Teaching Effectiveness in Education, Moscow 2017, volume 2.
17. Ataullaev AH, Ravshanov N. Studies of the process of separation of effervescent family members of cotton and russel.- Moscow. - 1989g. S.— Dep. v VINITI., 1989. N2035.
18. N. Ravshanov Modeling of unsteady technological process of separation of difficult-to-separate mixtures (on the example of cotton seeds and their collapse products) with a layer of air flow / Questions of cybernetics: Sat.Tech.- Tashkent. -S.81-85.
19. Muradov RM, Hoshimov S., Dadajanov A. The State Patent Office of the Republic of Uzbekistan The decision to grant a patent for an invention Application No. IAP 2050069, Date of filing of the application 02.03.2005.
20. Hashimov S., Erkinov H. Computer technology of modeling of cotton cleaning processes. Issues of constructive and seismic safety of buildings and structures of modern construction. Proceedings of the Republican scientific-practical conference, NamEPI, April 11, 2017. Pages 273-275.
21. Hashimov S., Shokirov D. Problems of cleaning cotton seeds. NamSU Scientific Bulletin, No. 1, 2018, pp. 85-88.
22. Hashimov S., Shokirov D. Design and development of modern equipment for cleaning of raw cotton NamSU Scientific Bulletin, No. 1, 2018, pages 96-100.
23. Hashimov S. Development and introduction of modernized ginneries. International Conference “Perspectives of Intensive Approach in Innovative Development”, Namangan, 2018 July 10-11, pages 411-413.
24. Hashimov S., Mathematical model of a moving body on a plane and its software. Republican scientific-practical conference “The role of innovative

educational technologies in improving the quality of education: problems and solutions".

25. S.Khashimov, M.Dadamirzaev, M.Turgunov, B.Otabaev Problems of development of effective equipment for cleaning of cotton with the help of air flow Republican scientific-practical conference on "Improving the efficiency of industrial enterprises based on investment diversification". Namangan, 2019. 7-8 June, pages 296-298.

26. Khashimov, S., Abdullayeva, N., Dadamirzaev, M., & Rizamuhamedova, G. Introduction of a technical and technological re-equipment for cotton cleaning industry in Uzbekistan. SOI: 1.1 / TAS DOI: 10.15863 / TAS International Scientific Journal Theoretical & Applied Science p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online) Year: 2019 Issue: 05 Volume: 73 Published: 30.05. 2019 http://T-Science.org .Philadelphia, USA .. ISJ Theoretical & Applied Science, 05 (73), 536-540. Soi: http://s-o-i.org/1.1/TAS-05-73-82 Doi: https://dx.doi.org/10.15863/TAS