

Theoretical Analysis of Cotton Breaking and Calculation Device For Production

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Abstract: *The article is devoted to the current problem in the conditions of rapid development of modern scientific and scientific-technical data, the most important requirement today is to re-equip ginneries with new equipment and technologies, as well as sectors of the economy. This is evidenced by the current growth of the Republic's relations with foreign countries, Uzbekistan's entry into international trade, growth of exports and imports of products and goods, modernization through the implementation of development programs of leading developed countries, re-equipment of economic sectors with new equipment and technologies. possible.*

Keywords: rapid development, re-equip ginneries, cotton ginning industry, seed cotton.

INTRODUCTION

One such sector is the cotton ginning industry. Currently, more than 80 countries are engaged in the cultivation and production of cotton. Today, the United States, China, India, Brazil, Uzbekistan, Pakistan and Mexico are the main cotton-producing countries.

It is known from the processes of harvesting, transportation, sorting and storage of cotton, as well as the processing of seed cotton, that due to insufficient mechanization, especially in unfavorable weather conditions, sometimes due to incorrect technological regimes and equipment selection at ginneries and ginneries the natural quality properties of the fiber are significantly damaged, resulting in this reflecting its negative impact on the finished product. At present, the ginning industry uses labor-intensive mechanisms and devices designed for complex mechanization of heavy work in the processing of seed cotton and its products. To date, the mechanisms and devices created to reduce the labor-intensive and heavy workload in the storage of seed cotton are insufficient. Therefore, it is necessary to create modern and automated equipment and mechanisms for the production of seed cotton.

MATERIALS AND METHODS

Currently, we are conducting practical and patent research on the device for the transfer of seed cotton to production. On the basis of this work is calculated design and technological parameters of the device for the production of seed cotton. The most optimal version of the transmission device has been selected, a new prototype of the device has been prepared and work is underway on its calculation.

It is known that today cotton is stored indoors and outdoors in ginning facilities. Especially high-grade (I-II grade) cotton is stored in cages for 3 to 5 months. The most common method in the analysis of foreign technology is the US modular system in this regard, where the module is delivered directly to the cotton processing plant and transferred to the integrated technology. The transmission of this module is based on the technological process shown in Figure 1. It can be seen that the module is sent to the crushing production using vertical drums. The drum pegs separate the cotton module into layers and then pass it on for further processing. Of course, in this case, the porosity of cotton, its density values by layers are not taken into account. It is known that cotton belongs to the class of materials with a high degree of porosity, its porosity is 95-98%.

RESULTS

Therefore, when stored for a long time, the density of its layers increases, especially in the lower layers of the pile, where the density value even reaches 300 kg / m³. Of course, a large amount of force is required to separate the cotton pieces from a cotton layer with such a density. Preliminary calculations by RBX or RP, a device for crushing this cotton bale, showed that the impact force used to separate the cotton bales from the bale was on average $P = 2.5-4.0$ N. An increase in the impact force by an average of 4.0 N can cause mechanical damage to the seed and breakage of the fiber. In order to prevent this situation, the results were analyzed by comparing the process of separating cotton seeds from the top and bottom of the pile layer using a pile breaking device.

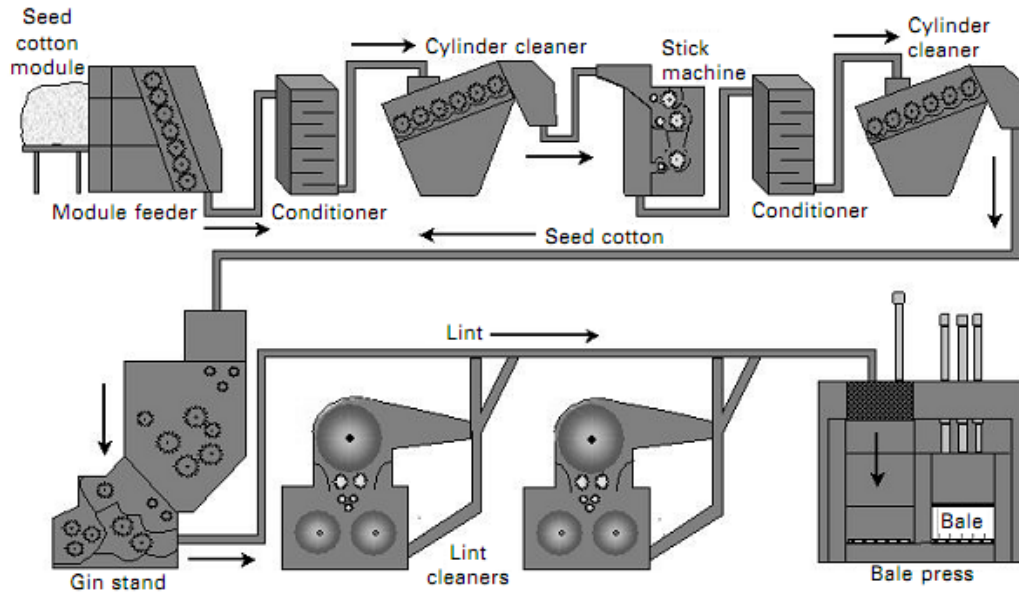


Figure 1 - Modern foreign technological process in cotton processing.

We know that in RBX and RP bale-breaking devices, the hoop, which is the main working body in separating the cotton bale from the cotton baler, consists of a working body with a pile that rotates from top to bottom. In this case, a layer of seed cotton separates the cotton from the bottom layer of the bale and transmits it to the production using a moving tape. We place the lower bound of the layer at the coordinate head and direct the OX axis from bottom to top. We assume that the relationship between density and pressure is linear:

$$\rho = \rho_0(1 + Bp)$$

where, ρ_0 - the initial density, B - the coefficient of inclination (podatlivosti).

In this case, the frictional force on the sides of the layer is inversely proportional to the speed of movement of the separated layer. Given this situation, we consider the problem of setting and solving the problem of pressure distribution over the top of the layer from top to bottom and from bottom to top, corresponding to the state of separation of the layer on the surface of the pile.

CONCLUSIONS

When choosing a new design and shape of the device for the transfer of cotton to production, first of all, it is necessary to ensure the following conditions:

- Achieving a reduction in energy consumption during transmission. Its amount should be reduced by almost 25 per cent;
- Extremely maneuverable appearance, minimizing the overall dimensions of the transmission;
- Improving the control system of the transmission device.

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