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# Method for Reducing Energy Consumption in Cotton Ginning

**MM Agzamov[1]*, Sh Sh Khakimov[2], Kh M Nosirov[3], Z N Agzamova[4] and A S Khamidov[5]**

[1]*PhD, docent of the department "Technological machines and equipment", Tashkent institute of textile and light industry, Uzbekistan*

[2]*Professor of the department "Technological machines and equipment", Tashkent institute of textile and light industry, Uzbekistan*

[3]*Researcher of the department "Technological machines and equipment", Tashkent institute of textile and light industry, Uzbekistan*

[4]*Researcher, designer of UZ-KOR Technopark, Uzbekistan*

[5]*Lecturer of the department "Labor protection and ecology", Tashkent institute of textile and light industry, Uzbekistan*

***Corresponding author:** MM Agzamov, docent of the department "Technological machines and equipment", Tashkent institute of textile and light industry, Uzbekistan.

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## Abstract

The article presents the results of research on finding ways to reduce energy costs in the process of saw ginning. There is information on the development of an installation for determining the coefficient of friction of raw cotton on a steel surface and the values of the speed of movement of raw cotton determined by experimental studies at various temperatures of the steel surface.

## Introduction and Preliminaries

As is well known, at present, saving electricity is one of the priorities of all types of production where it is consumed.

In the technological process of primary processing of raw cotton, one of the main transitions is ginning. In a saw gin, the main amount of electricity consumed is accounted for by overcoming the forces of friction of the raw roller against the inner surface of the working chamber and the forces of separation of the fibers from the seed. Thus, it can be noted that a decrease in the friction force of the raw roller on the inner surface of the working chamber leads to energy savings [1-3].

In order to reduce the friction of the raw roller on the inner surface of the working chamber, a working chamber of the saw gin was developed with heating of these surfaces, because with increasing temperature, the coefficient of friction of fibrous materials on the steel surface decreases [4-6].

## Materials and Methods

In connection with the above, it became necessary to conduct research to determine the change in the coefficient of friction of a fibrous material on a steel surface at different surface temperatures [7-9]. For this, a device was created to implement the proposed method (Figure 1).

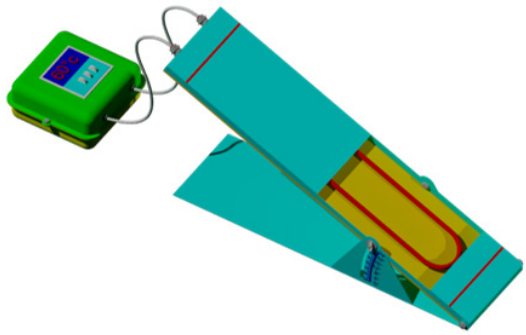

**Figure 1:** Device for determining the coefficient of friction.

The method is carried out as follows: for greater purity of experiments, the sample is preliminarily cleaned from trash. After that, they are installed on the marked point of the start of movement on an inclined surface preheated to the required temperature. After that, a flat weight is applied to the sample and movement is reported. In this case, the time of movement of the sample from the beginning of the point of movement to the end point of movement is fixed and the coefficient of friction is calculated [10-12].

The data obtained are summarized in (Table 1) and (Figure 2).

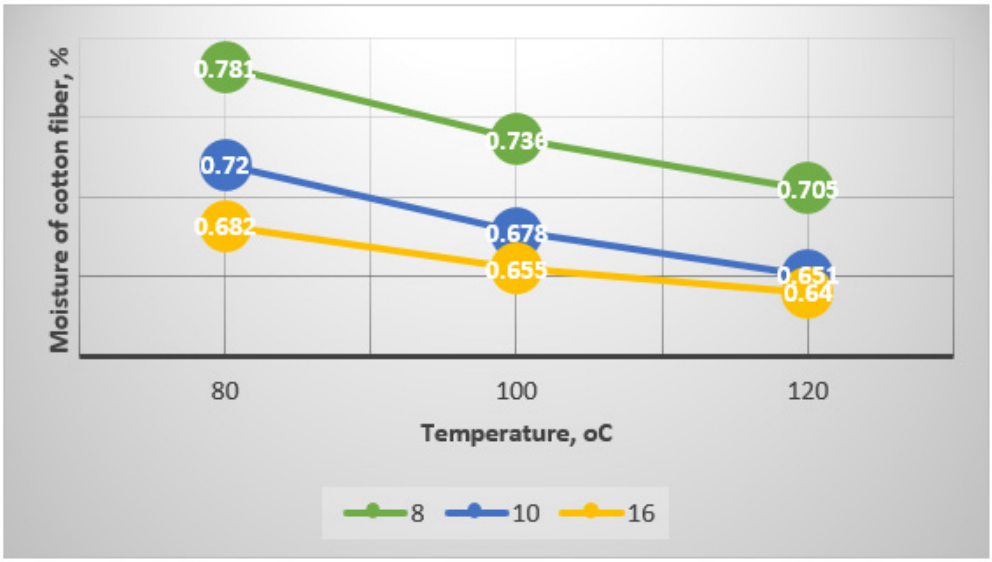


**Figure 2:** The dependence of the time of movement of the fibrous material on the surface temperature.

**Table 1:** Change in the time of movement of the fibrous material depending on the surface temperature.

| Moisture content of raw cotton fiber, (%) | Temperature, (°C) | | |
|---|---|---|---|
| | 80°C | 100°C | 120°C |
| 8 | 0,781 | 0,736 | 0,705 |
| 10 | 0,720 | 0,678 | 0,651 |
| 16 | 0,682 | 0,655 | 0,640 |

## Results

As can be seen from the tables and graphs, with increasing surface temperature, the time of movement of the fibrous material along the inclined surface decreases, which indicates an increase in the speed of movement due to a decrease in the friction forces between the fibrous material and the surface.

## Acknowledgement

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## Conflict of Interest

No conflict of interest.

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