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THEORETICAL ANALYSIS OF THE WORKING BODIES OF THE SPIN-OFF IN COTTON WASTE

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Abstract

In the paper theoretical study of separation of pollutant particles from cotton raw materials by using a spinning fiber in cotton wastes was carried out. On the basis of the corresponding mathematical model, differential equations of movement of cotton slices between the knife (CMP) and knives were developed, their solutions were determined, the parameters describing the processes were obtained and the corresponding graphs were obtained.

Keywords *– Arrange Headset (CMP), exhaust, blade, inlet pipe, fiber, drum, ribbon, supply roller, exhaust pipe.*

INTRODUCTION

Cotton wastes are present at the ginneries, which is called "Ulyuk", which, after the cotton harvesting process, separates the slag from the fiber-cleaning unit. It is estimated from 20% to 40% of the fiber content of the fiber that it contains. Spinning cotton fiber is defined as fiber that is 0.5 inches (12.7mm) long. Fibers less than 0.5 inches in length are not suitable for spinning, and such fibers do not participate in the spinning process. Because of these fibers are separated from cotton yarn by knitting and knitting machines at a spinning mill and remain waste until they can be welded and polished. There is a lot of scientific research work done on scientific justification of the presence of spin-resistant cotton fiber in the waste of cotton and elimination of technological, mechanical and technical problems in this area. The main issue is the creation of new equipment, addressing mechanical and technical problems in the production of spinning fiber in cotton waste. As a mechanical – technical problem:

a) All metal saw strip of worthy fibers in cotton waste
b) The position of the blades of the device at a certain slope
c) We get the optimization of the distance between the saw tape and the blades.

MATERIALS AND METHODS

Drum $\omega(t)$- drives fibers to E points in dt time as a result of rotation at angular velocity. R - is the distance from the center of the saw to the tip of the teeth. At this time the saw tooth passes through the $Rd\alpha$ - road.

Including:

$$t = 0: \ \alpha = 0$$
$$dt => \ \alpha = \varphi_2$$

At this time, the tip of the blade - at point B, gives the fibers a pressure of $\vec{P}$ and between them $F_{иш}$ – the -friction force. It is determined by the Pendant Low. In this case, the individual weight of the fibers is small enough compared to other forces. Therefore, we do not take into account the specific gravity of the fiber and its inertia. Ideally, the fibers will not produce frictional force between the blade surface and the saw teeth.

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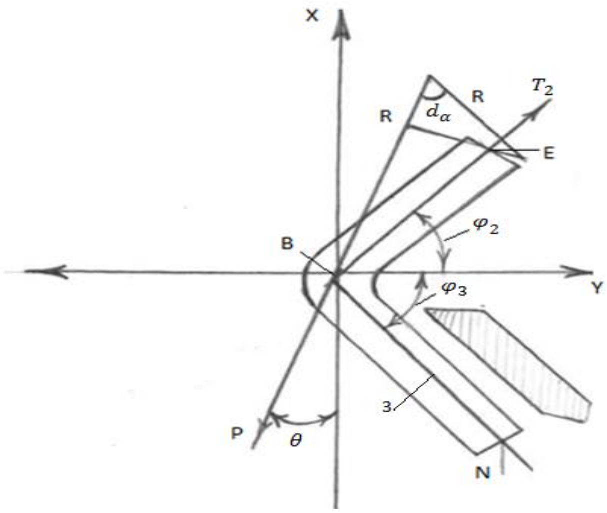

Figure 1. Effect of cotton waste between the saw set and the blade

In this case, the $P-$ force is directed at the bisector ofφ_2. Picture 1 - represents the $\theta-$ corner direction of the $P-$ force.

This angle is a parameter that determines the gravitational pull of a set of fibers by saw teeth. At the $BE-$ site (Picture 1), the collection is influenced by the T_2- tensile strength.

However, gravity does not occur on the BN-site. Because the tip of the fiber moves freely.

We derive a set of fibers by the law of motion, with respect to the law of the oxy-coordinate system of the impulse protection (Picture 2).

$$P_0F_0dS_2(\dot{x_2}-\dot{x_3})=(T_2\cos\varphi_2-P\sin\theta-fP\cos\theta)dt \quad (1)$$

$$P_0F_0dS_2(\dot{y_2}-\dot{y_3})=(-T_2\cos\varphi_2-P\sin\theta-fP\cos\theta)dt \quad (2)$$

Here: *x* and *y* - fibers *Ox* and *Oy* - projection of velocity in coordinate axes, f - coefficient of friction; P_0, F_0- the initial density of the stack of fibers and the transverse cross-sectional surface; d_s- elemental length of the inspected fiber batch. (1)and (2) - From the equations, *x* and *y* indexes respectively $BE-2-$ plot, $BN-3$ represents the plot.

In this case, the condition for the continuity of the fibers shift is written as follows.

$$dS_2=dS_3$$

Here:
$$dS_2=\frac{[\dot{x}_2]dt}{\cos\varphi_2}=\frac{[\dot{y}_2]dt}{\sin\varphi_2} \quad (4)$$

$$dS_3=\frac{[\dot{x}_3]dt}{\cos\varphi_3}=\frac{[\dot{y}_2]}{\sin\varphi_3} \quad (5)$$

In addition:
$$s_2=\sqrt{(\dot{x}_2dt)^2+(\dot{y}_2dt)^2}=\vartheta dt=\omega Rdt \quad (6)$$

Thus (1) and (6) system of equations, $\dot{x}_2,\dot{y}_2,\dot{x}_3,\dot{y}_3,T_2,dS_2,dS_3-$ It is a closed system that defines such parameters as:

$$T_2^*=\frac{T_2}{P_0F_0};\ P^*=\frac{P}{P_0F_0} \quad (7)$$

(4) and (5) from a relationship;
$$\begin{cases}\dot{x}_2=\vartheta\cos\varphi_2\\ \dot{y}=\dot{\vartheta}\sin\varphi_2\\ \dot{x_2}=\vartheta\cos\varphi_3\,;\dot{y}=\vartheta\sin\varphi_3\end{cases}$$

(7) => (1) and (2);
$$\begin{cases}\omega^2R^2=(\cos\varphi_2+\cos\varphi_3)=T_2^*\cos\varphi_2-P^*(\sin\theta+f\cos\theta) \quad (8)\\ \omega^2R^2(\sin\varphi_2-\sin\varphi_3)=\ T_2^*\sin\varphi_3-P^*(\cos\theta-f\sin\theta) \quad (9)\end{cases}$$

From this system T_2^* and P^* we will determine.

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$$P^* = \frac{\omega^2 R^2 \sin\left(\frac{Vt}{R}+\varphi_3\right)}{\cos\left(\frac{Vt}{R}+\theta\right) - f\sin\left(\frac{Vt}{R}+\theta\right)} \qquad (10)$$

$$T^* = \frac{V^2 \sin(\varphi_2+\varphi_3) + P^*[\cos(\varphi_2+\theta) + f\sin(\varphi_2-\theta)]}{\sin 2\varphi_2} \qquad (11)$$

$$V = \omega R = 25\ ^{\text{M}}/_{\text{C}}.$$

In many cases extending the bundle of fibers through the knife and the drum also plays an important role in the separation of fibrous fibers from fibrous waste. In this case, the strain on stretching of the fibrous waste bundle is also influenced by its mass.

The basis of A.G. Sevostyanov changed the working drum to a surprising achievement, a common scale, for those leaving the cell and the fiber.

We describe this change by the following function [1]

$$m(t) = m_0\, exp\left(-\frac{bknt}{1+\alpha}\right) \qquad (12)$$

Here: $m(t) -$ t- total waste fiber at the time; $m_0 - t = 0$ in $a, b -$ proportionality coefficients; k – number of knives; $n -$ drum rotation frequency; $t -$ The effect of time, the waste treatment, is expressed by the following function:

$$\mathcal{E}_0(t) = \frac{m_0 - m}{m_0} = 1 - exp\left(-\frac{bknt}{1+\alpha}\right) \qquad (13)$$

RESULT AND DISCUSSION

The result of calculations shows the variation of the pressure forces acting on the drum teeth of the drums and the blades, and the variation of the force of gravity resulting from the drag.

Including: According to the scheme shown in Figure 2.

a) $\theta = 20^0, 30^0, 40^0$ in the corners, pressure force $P^* = P^*(\varphi_3)$, gravity $T^* = T^*(\varphi_3)$,s $\varphi_2 = 10^0, 20^0, 30^0$ corresponding graphs for. In third picture $\theta = 40^0$ graphs are presented, for the remaining cases, characteristic values of pressure and gravity 1, 2- the table below.

b) $\varphi_2 = 10^0, 20^0, 30^0$ In the corners

Pressure force: $\begin{cases} P^* = P^*(\theta) \\ T^* = T^*(\theta) \end{cases}$ functions $\varphi_3 = 40^0, 50^0, 60^0$ gravity

The regularities of variation in angular values are also graphically presented.

Including in the third picture $\varphi_2 = 10^0$ graphs showing the change in pressure and gravity

a) The following conclusions can be drawn from Table 1. The angle where the blades are arranged in a horizontal direction of the pressure force on the fibers $\varphi_3 = 60^0$ when the maximum value is reached $P_{max} = 1500$ attains success.

The angle of gravity affecting the fibers at this angle is 1300, in this case $\theta = 20^0, \varphi_2 = 20^0$ is equal to.

The maximum amount of pressure force $\theta = 40^0,\ \varphi_2 = 20^0, \varphi_3 = 60^0$ at $P_{max} = 10000$ equals, amount of gravity $T = 1500$ isotope.

From this we can conclude that the angle of deviation of the blades in a horizontal direction is that the optimal angle of $\varphi_3 = 60^0$

b) The following conclusions can be drawn from Table 2: When we examine the force of pressure and gravity of the blades on the fiber, due to the change in $\theta -$angle, the angles of gravity and the pressure pressed horizontally: $\varphi_2 = 10^0, 20^0, 30^0$; $\varphi_3 = 40^0, 50^0, 60^0$;

The maximum pressure force amount when the values change $\theta = 58^0$да 500: 4500 intervals $\theta > 58^0$ increases rapidly.

This is also determined by the force of gravity. Therefore, it is necessary that the angle of $\theta -$angle be less than 30^0

In the general case, the slope of the blades with the horizontal direction is the optimum for the fiber removal $\varphi_3 = 60^0,\ \theta = 20^0$.

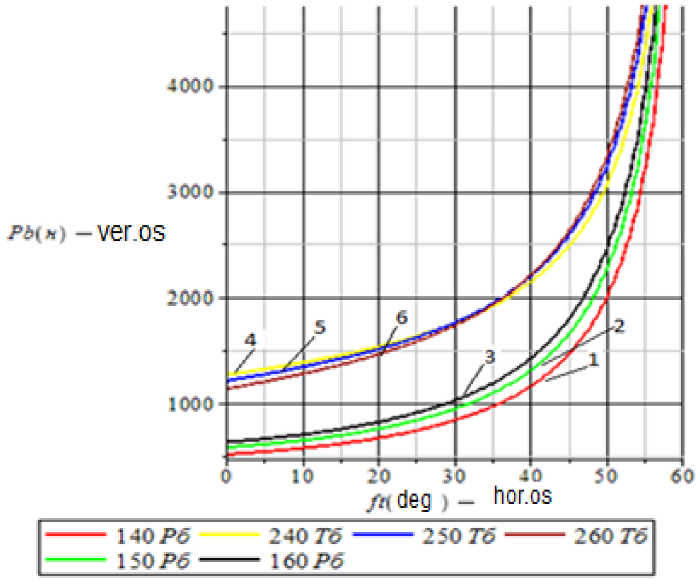

Figure 2. Shows the law of the change in pressure in the case of P^* emissions due to the $\theta -$ angle change in the vertical pressure of $P^*$and the force of gravity - T*.
a) P^*:1- $\varphi_3 = 40^0$, 2- $\varphi_3 = 50^0$, $3 - \varphi_3 = 60^0$,
b) T*: 4 - $\varphi_3 = 40^0$, 5-$\varphi_3 = 50^0$, 6 - $\varphi_3 = 60^0$; $\varphi_2 = 10^0$;

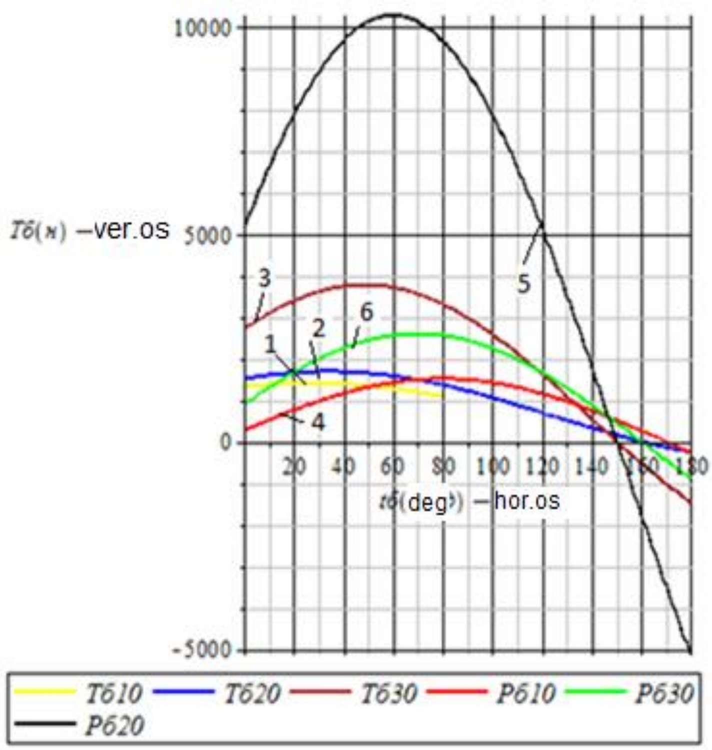

Figure 3. Shows the variation in the pressure angle, the horizontal axis of the blades forming the pressure of P* and the force of gravity - T* on the spin-resistant fiber.

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Table 1

$\theta = 20^0$	$\varphi_2 = 10^0$	$P_{max} = (\varphi_3 = 80^0) = 750$	$T_{max}(\varphi_3 = 80^0) = 1000$
	$\varphi_2 = 20^0$	$P_{max} = (\varphi_3 = 60^0) = 1500$	$T_{max}(\varphi_3 = 60^0) = 1300$
	$\varphi_3 = 30^0$	$P_{max} = (\varphi_3 = 70^0) = 1100$	$T_{max}(\varphi_3 = 70^0) = 1350$
$\theta = 30^0$	$\varphi_2 = 10^0$	$P_{max} = (\varphi_3 = 80^0) = 1100$	$T_{max}(\varphi_3 = 85^0) = 1000$
	$\varphi_2 = 20^0$	$P_{max} = (\varphi_3 = 60^0) = 2500$	$T_{max}(\varphi_3 = 60^0) = 1800$
	$\varphi_2 = 30^0$	$P_{max} = (\varphi_3 = 70^0) = 1500$	$T_{max}(\varphi_3 = 70^0) = 1600$
$\theta = 40^0$	$\varphi_2 = 10^0$	$P_{max} = (\varphi_3 = 80^0) = 1500$	$T_{max}(\varphi_3 = 20^0) = 1000$
	$\varphi_2 = 20^0$	$P_{max} = (\varphi_3 = 60^0) = 10000$	$T_{max}(\varphi_3 = 60^0) = 1500$
	$\varphi_2 = 30^0$	$P_{max} = (\varphi_3 = 70^0) = 2800$	$T_{max}(\varphi_3 = 70^0) = 3800$

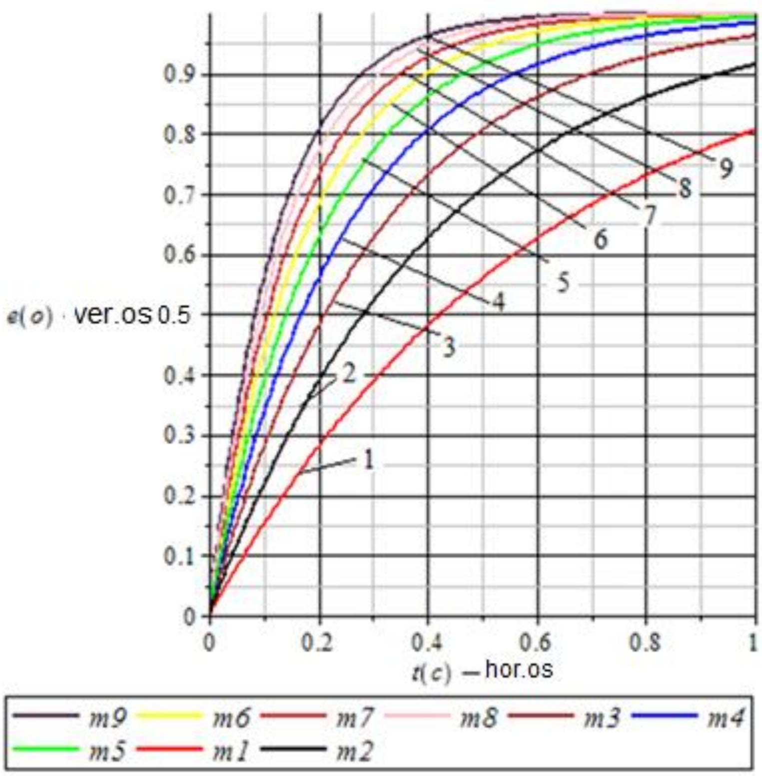

Figure 4. Separation of cotton waste from fiber mass the number of blades in percentages of effectiveness - n time – dependent patterns of change t -.
n = 2, 3,4,5,6,7,8,9,10;
a) P^*:1- $\varphi_2 = 10^0$, 2- $\varphi_2 = 20^0$, 3 $-$ $\varphi_2 = 30^0$,
b) T*: 4 - $\varphi_2 = 10^0$, 5-$\varphi_2 = 20^0$, 6 - $\varphi_2 = 30^0$; $\theta = 40^0$;

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Table 2

$\varphi_2 = 10^0$	$\varphi_3 = 40^0$	$P_{max}(\theta = 58^0) = 500 \div 4500$	$T(\theta = 58^0) = 1300 \to 4250$
	$\varphi_3 = 50^0$	$P_{max}(\theta = 55^0) = 550 \to 4300$	$T(\theta = 55^0) = 1250 \to 4250$
	$\varphi_3 = 60^0$	$P_{max}(\theta = 53^0) = 600 \to 4250$	$T(\theta = 53^0) = 1200 \to 4250$
$\varphi_2 = 20^0$	$\varphi_3 = 40^0$	$P_{max}(\theta = 45^0) = 3500 \uparrow$	$T(\theta = 45^0) = 4500$
	$\varphi_3 = 50^0$	$P_{max}(\theta = 48^0) = 4000 \uparrow$	$T(\theta = 48^0) =$4500
	$\varphi_3 = 60^0$	$P_{max}(\theta = 58^0) = 4100 \uparrow$	$T(\theta = 58^0) = 4500$
$\varphi_2 = 30^0$	$\varphi_3 = 40^0$	$P_{max}(\theta = 40^0) = 3800 \uparrow$	$T(\theta = 40^0) = 5000$
	$\varphi_3 = 50^0$	$P_{max}(\theta = 40^0) = 4100 \uparrow$	$T(\theta = 40^0) =$5000
	$\varphi_3 = 60^0$	$P_{max}(\theta = 40^0) = 4200 \uparrow$	$T(\theta = 40^0) = 5000$

CONCLUSION

1. A system of differential equations under the law of the movement of waste fibers has been developed, which provides the analytical expressions of the compressive forces acting on the fibers and the force generated by the fibers. In addition to the pressure, the laws of change of the force of gravity and the angle of the blade angle are obtained.

2. The graphs of the pressure applied by the blades to the set of fibers, the regularities of the change depending on the angles forming the blades horizontally, and the results of the characteristic angular values are shown in the tables.

3. Analysis of the tables revealed the optimal slope angle of the blades that give maximum pressure to the fiber stack.

4. A.G. According to Sevostyanov's model, the law of change of mass reduction and purification effect over time due to emission of waste from waste fiber content.

REFERENCES

1. Sevostyanov AG, Sevostyanov PA Modeling of technological processes. M. 1986.
2. Karimov Abdusamat, Ismanov Muhammadziyo “Research on the cotton and heavy impurities in the working chamber of pneumatic cleaner,” Afro Asian Journals Sci Tech, 2016,3 (1), 250 – 262.
3. R.Muradov, A.Karimov, B.Mardonov. Theoretical and Experimental Studies of the Effect of Inclined Scraper on Raw Cotton from Mech Surface World Journal of Mechanics, USA.2014, 4, 371-377.http//dx., doi.org/ 10.4236/wjm.2014.412036. Published Online December 2014 in Series. http://www.scirp.org/journal/wjm
4. A.Karimov, Sh.Azizov, M.Ismanov. Mathematical modeling Of the Technological Processes Original Processing Of Cotton International Journal of Innovation and Applied Studies .ISSN 2028-9324 Vol. 6 No. 1 May 2014, pp. 28-39. Innovative Space of Scientific Research Journals. http://www.ijias.issr-journals.org/
5. A.Karimov, Ismanov M. Research on movement of cotton and heavy impurities in the working chamber of pneumatic cleaner AFRO ASAIN JOURNALS.SciTech,2016,3(1),250-262.ISSN234
6. R.Muradov, A.Каримов, B.Aliev The theoretical recearch of separating the dirt particples in cotton raw material with the help of different cylindreklike constraction Международная научно-практическая конференция, посвящённая году экологии России .с. Соленое Займще-2017.
7. Salokhiddinova Makhliyo Nurmukhammad qizi, Muradov Rustam Muradovich, Karimov Abdusamat Ismonovich, Mardonov Botir Mardanovich. American Journal of Science and

Technology. The Shortfalls of the Vacuum Valve Cotton Separator. 2018; 5(4): 49-55. http://www.aascit.org/ journal/ ajst. ISSN: 2375-3846.

8. Polyakova D.A., Ermilov G.A., Drozdov N.A., et al. Rotary method for spinning and reinforcing M: Legprombytizdat, 1987.-300s (Course for accelerating scientific and technological progress).
9. Polyakova D.A., Drozdov N.A. and other Rotary method of spinning and reinforcing M: Legprombytizdat, 1987. With 159-160.
10. Application 62-238830 Japan, MKI D 01 H 7/02. Device for manufacturing reinforced yarn / Shinoko Matsu no. Claim 4.04.86, N 60-126598, publ. 10.19.87.
11. Grekova S.V., D.A. Polyakova., N.A. Drozdov Central Research Institute of Chemical Biology, Moscow, L.V. Kartisheva VNIITT, Yaroslavl. Rotary reinforcement technology is one of the ways to save natural fiber. Textile industry. Moscow. 1990, pp. 40-42.
12. Pat. 4899529 USA, MKI D 01 H 13/16, D 01 G 15/00. A method of manufacturing a reinforced yarn. / Fumio Tanay. Declared 12.12.88 283308, publ. 02/13/90