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Research Article

AERODYNAMIC FORCES IN INCREASING SPINDLE ACTIVITY

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ABSTRACT

we implement "aerodynamic forces in increasing spindle activity" in the program "Compass-3D". the topic presents the methodology and results of the graphoanalytical study of the rotating finger kinematics of the multi-finger mechanism belonging to the multi-contour finger mechanism of the vertical spindle drum of the cotton harvester.

KEYWORDS

Crank-fingered (CF), "Compass- grafo", forces. cotton harvester (CH), The mechanism of the introduction of cotton stalk (MICT), Uzbek machine testing station (UzMTS).

INTRODUCTION

I.A.In the development of the Department of TashSTU “ground vehicles and their system” named after Karimov, the XNP -1.8 a-type experimental cotton harvester equipped with a The mechanism of the introduction of cotton stalk has been confirmed to have high indicators of test speed and period completeness in many cotton farms. This cotton harvester was reported in the first state test evidence at the Uzbek machine testing station (UzMTS) during the 1992 harvest season to have a clearly higher rate of production at 1.5 times greater than an experimental cotton harvester serialized machine at 1st period increase of -7.7...12.0% in period of harvest completeness, and a 6.1% higher rate than an experimental machine at period two times.

Importance of the problem: The mechanism of the introduction of cotton stalk inserts the cotton stalks into the cotton harvester and separates the cotton from the burs and sends it through the air suction channels to the bunker. The mechanism of the introduction of cotton stalk feeds the cotton stalks into the CH through the finger to the separator. In that process, the length, speed, and acceleration of the finger itself affect the quality of work.

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The aerotechnical indicators of cotton harvester largely depend on the operating conditions of the spindles. The mechanism of the introduction of cotton stalk is to increase the useful coefficient of work that is, there should be enough time left to catch the fibers with a spindle tooth and separate the cotton from the bur. [2-6]

However, when picking cotton on cotton harvester, basically the spindle requires high-speed rotations. As a result of this, it breaks up and seriously damages cotton stalk. This event is explained by the peculiarities of the construction of the cotton harvester and the location of the opened cotton(figure 1). The burs are located close to the main stem (Figure 1 A) or along the axis of the row (B), they are in the maximum near zone of the spindles of adjacent pairs of drums, that is, in the working camera begins to be picked. In a similar working camera, the intensity of further picking increases when picking, since the working slit between the spindles of adjacent drums (the width of the working part) is as small as possible, and the force required to cover the cotton stalk increases sharply, which allows you to achieve a enough time when picking cotton from the bur.

Table 1

pointer names	quantity of pointers			
	controllable mechanism	test mechanism		
		$\varphi=35^{\circ}$	$\varphi=45^{\circ}$	$\varphi=55^{\circ}$
1	2	3	4	5
Machine-picked cotton average statistics of the raw material bunker %,	85,78	86,32	87,66	86,28
mean quadratic deviation %,	2,25	2,08	2,4	2,14
reliability limit 5%.	83,57 88,01	83,45 89,25	84,22 91,1	84,59 88,07
Cotton stalk medium statistics %,	7,80	6,40	6,34	7,00
variation coefficient %,	9,46	16,37	15,11	12,97
reliability limit 5%,	6,97 8,63	5,64 7,16	6,59 7,41	5,04 7,64

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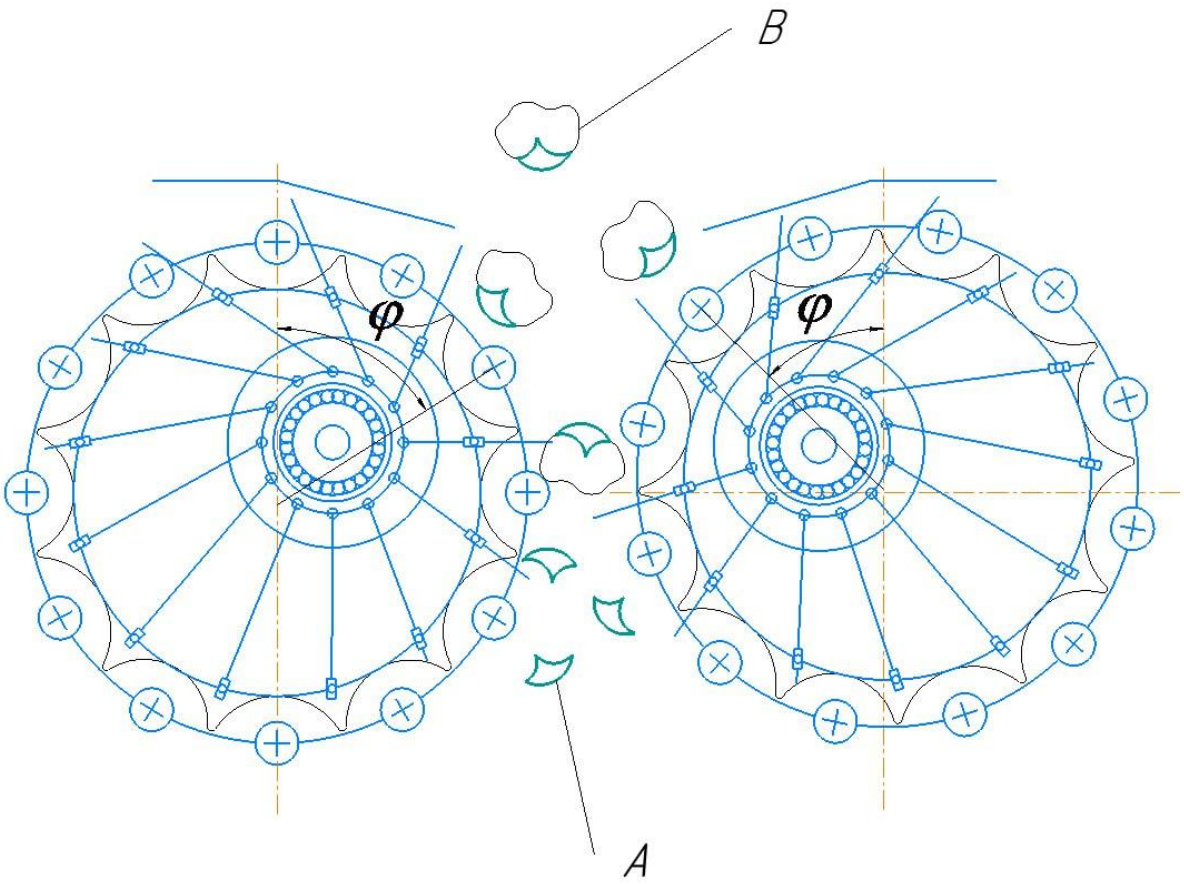

Figure 1. spindle drums working slit

We build a plan of forces for the 12 position of the mechanism parts (with a step of 30 degrees), determine the kinematic parameters of the characteristic points of the mechanism fingers in a single position.

We took the scale coefficient of linear dimensions to be μl = 1 so that the subsequent calculation work is easy, which simplifies the calculation work when drawing up a plan of forces and accelerations and determining the parameters of the characteristic points of the mechanism fingers. We take the number of drum rotations n1 = 105 cy/min. We determine the angular velocity of the drum from the following equation.

$$\omega_1 = \frac{\pi \cdot n}{30} = \frac{3{,}14 \cdot 105}{30} = 10{,}99\ c^{-1} \qquad (1)$$

The mechanism input is determined by the rate of point A1 from the following formula:

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$$V_{A1}=OA_1\cdot\omega_1=0{,}146\cdot10{,}99=1{,}6045 \text{ m/s} \quad (2)$$

In order for the results obtained in the study to be easy to analyze, we build a godograph of forces

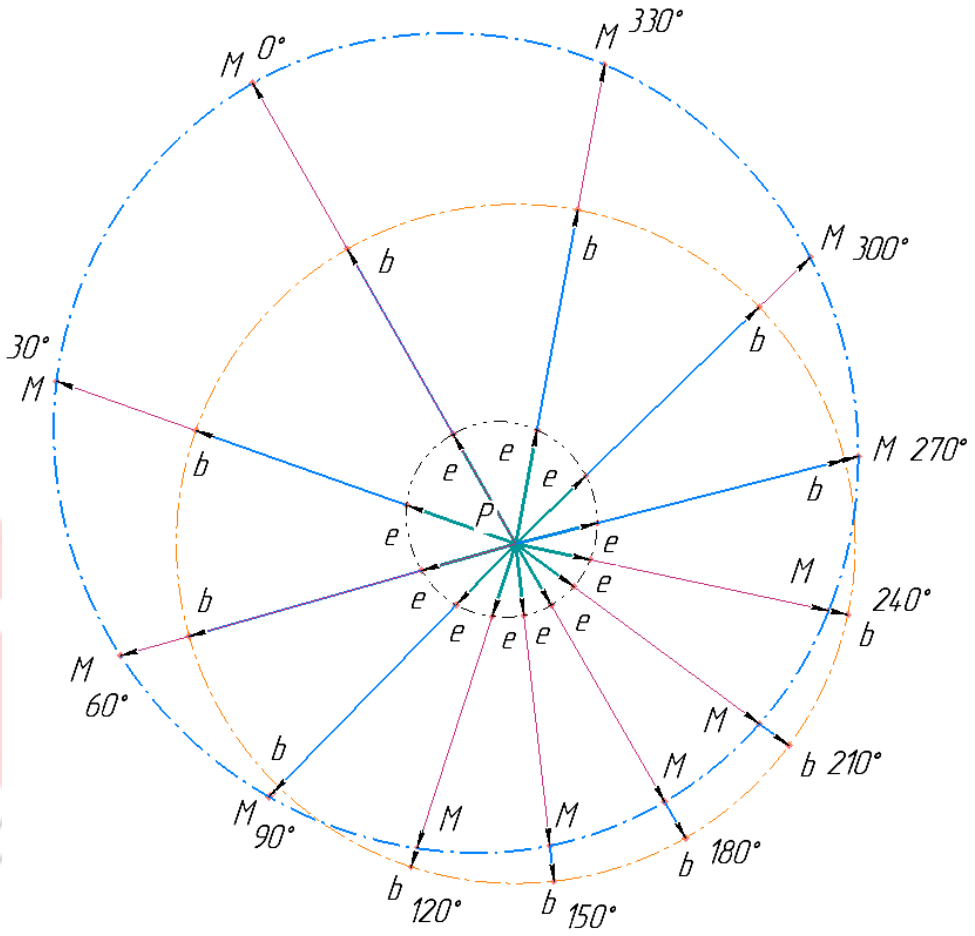

Figure 2. the force godograph of MICT working finger characteristic points (E,B,M)

CONCLUSION

Due to the accuracy and ease of control of the methods of grapho-analytical and graphic research, when analyzing aerodynamic forces in increasing spindle activity in conducting such research, it is important to quickly check the correctness of analytical calculations, visually indicate the characteristics of the mechanisms, and the results of their research showed that the quality of the skin increased by 2.4%, and the damage degree of cotton steams after picking decreased by 5-6%.

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