CALCULATION OF DEFORMATION DURING BENDING OF THE EXCHANGEABLE ELEMENT IN THE WORKING ZONE OF THE COLUMN IN THE SAWING MACHINE

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ABSTRACT

In this article, the value of the force required to bend the exchanger elements of the chain saw gin in the desired radius is calculated theoretically and compared with the value determined based on experience. Taking into account the elastic deformation of the material during the bending process, the return value of the material was calculated and the numerical values of the stresses required during the bending process were determined.

Key words: colossal, chain saw, interchangeable element, bending, working part, console, grid, spacing.

In the world, large-scale scientific and research work is being carried out to improve the technique and technology of separating fiber from seed and to create their scientific basis. In this regard, it is important to increase the productivity of the saw gin machine, which is the main machine of cotton ginning enterprises, to determine the resource-saving profile of the working chamber, to justify the technical and technological parameters of the machine, to develop mathematical models and to preserve the natural quality of the cotton fiber obtained as a result of their replacement.

Decreasing the saw spacing from 20.64 to 14.59 mm reduced fiber length by 0.1–0.2 mm, but decreasing to 13.11 mm reduced fiber length by 1.0–1.3 mm. In this direction, the number of saws in the chain saw cylinder was increased from 80 to 100, i.e. by 25%. As a result, the release of seed from the chamber is reduced. Thus, increasing the number of saws in the saw cylinder due to the reduction of the gap between the saws did not lead to an increase in gin productivity, but to a decrease, that is, to contamination of the fiber with short fibers, and to an increase in seed damage.

So, in order to keep the distance between the column and the saw unchanged, the bending and return angle of the exchange element installed on the column can be analytically calculated using the amount of stress and elastic deformation, and it can be determined by experimental testing and measurement.

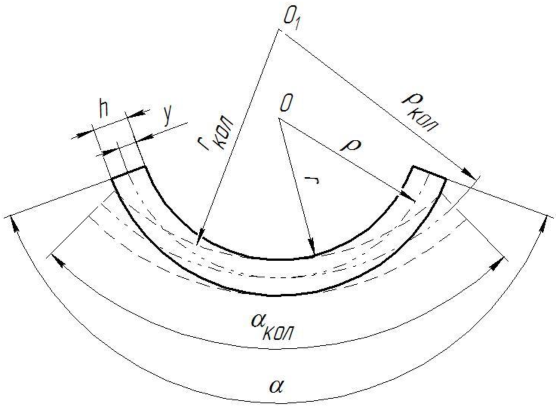

Figure 1. Schematic diagram of the bending and material return process of the interchangeable element

Analytical quantities of residual stress and material recoil, manifested in changes in the curvature and bending angle of the exchangeable element, can be determined based on the load-unloading theorem [1], which was further developed in works [2] related to sheet stamping.

According to this theorem, the relationship between stresses and strains during unloading obeys Hooke’s law. If various deformations occurred in the part during loading, residual stresses appear in it during unloading. Their amount is determined only as the difference between the stresses and external forces that act when the part is loaded during elastic deformation.

From the equality of the moment of plastic bending of the exchangeable element (a rectangle of width b and thickness h) using the hypothetical moment of unreinforced and bending deformation, we find the value of stress σel in the surface layers of the workpiece with hypothetical elastic bending (where y=s/2 and β=1) .

$$(M_{пл} = \frac{bh^2\sigma_s}{4}) = (M_{эл} = \frac{bh^2\sigma_{эл}}{6}); \quad \sigma_{эл} = \frac{3\sigma_s}{2}. \qquad (1)$$

Then, the stress generated by the elastic moment of the hypothetical elastic bending in the structure is determined from the following expression

$$\sigma' = \frac{3}{2}\sigma_s \frac{2(\rho-\rho_c)}{h} = 3\sigma_s \frac{\rho-\rho_c}{h} = 3\sigma_s \frac{y}{h}, \qquad (2)$$

where ρc is the mean radius of the artificial surface; u is the distance from the middle surface to the visible layer (ρ - ρ_c).

We find the distribution of residual stresses after unloading by the thickness of the fabric from the following expression:

$$\sigma_{кол} = \sigma_s - \sigma' = \sigma_s - 3\sigma_s \frac{y}{h} = \sigma_s(1 - 3\frac{y}{h}). \qquad (3)$$

In the outer layer (at y=h/2), the value of the residual stress is equal to the following

$$\sigma_{колR} = \sigma_s - \frac{3}{2}\sigma_s = -\frac{\sigma_s}{2}. \quad (4)$$

It follows that during bending of the structure, the outer layer is stretched and subjected to a stress of σs, and after unloading, it is compressed with a stress of -0.5 σs. Because the unloading of the load occurs under conditions of elastic deformation, and the change of the bending radius during this time can be determined by the following equation. σs - we can determine the value of the stress from the value of the maximum force in the graph of the bending force of the exchangeable element as a function of deformation (Fig. 2). The dimensions of the alternatingelemen(h, b, L) are taken from [3] articles in computational studies.

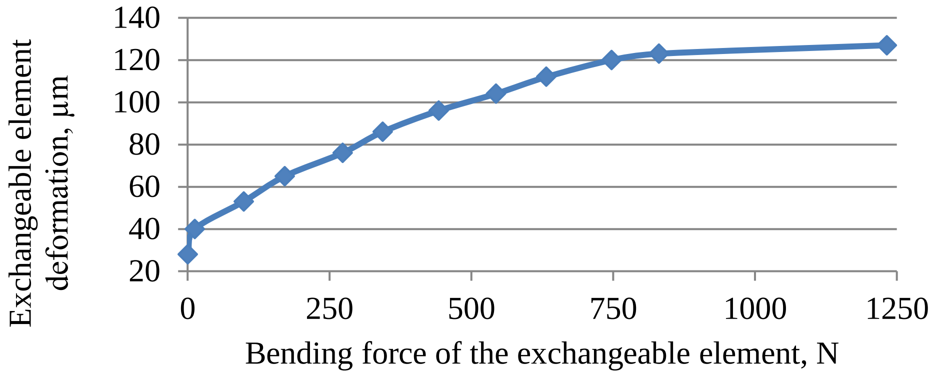

Figure 2. A graph of the change in the bending deformation of the replacement element as a function of the bending force

REFERENCES:

1. МУХАММАДИЕВ, Д., АХМЕДОВ, Х., & ЭРГАШЕВ, И. STUDY OF RIB BENDING AT INSTALLATION OF INSERTION INTO RIB ИССЛЕДОВАНИЕ ИЗГИБА КОЛОСНИКА В ПРОЦЕССЕ УСТАНОВКИ ВСТАВКИ В КОЛОСНИК.

2. Мухаммадиев, Ф. Х. Ибрагимов, О. Х. Абзоиров, & Л. Ю. Жамолова (2022). Расчет устойчивости междупильной прокладки при сжатии. Современные инновации, системы и технологии, 2 (4), 0301-0311. doi: 10.47813/27822818-2022-2-4-0301-0311

3.xir Yusupovich Radjabov, Akbar Turg‘Unboyevich Ergashev, Ilhomjon Yusufjonovich Mirzaolimov, & Abdulaziz Ikhtior Ugli Karshiboev (2022). EXAMPLE OF CALCULATION OF REINFORCED CONCRETE BEAM SPANS FOR TEMPORARY (A-14 and NK-100) AND PERMANENT LOADS. Academic research in educational sciences, 3 (TSTU Conference 1), 908-913.

4 Мухторов, Ш. С. ў., & Махмудов , А. А. (2023). КОЛОСНИКЛИ ПАНЖАРАНИНГ ТОЛА АЖРАТИШ ЖАРАЁНИ РДБ БОШҚАРИШ ДАСТГОХЛАРИГА ЎТКАЗИШ. Educational Research in Universal Sciences, 2(5), 379–385. Retrieved from http://erus.uz/index.php/er/article/view/3155

5 Срожидинов , Ж. Р. ў., & Мухторов, Ш. С. ў. (2023). АВТОМАТЛАШТИРИШ СИСТЕМАЛАРИНИ ЛОЙИҲАЛАШ ВА БОШҚАРИШ ИСТИҚБОЛЛАРИ. Educational Research in Universal Sciences, 2(5), 363–367. Retrieved from http://erus.uz/index.php/er/article/view/3152

6 Рустамова , М. М., & Мухторов , Ш. С. ў. (2023). МАЙДА ДОНАДОР АРАЛАШМА МАТЕРИАЛЛАРИНИ ЗИЧЛАШДА ҲОСИЛ БЎЛГАН МАССАНИНГ ЗЎРИҚҚАН ҲОЛАТИНИ ТАТБИҚ ҚИЛИШ. Educational Research in Universal Sciences, 2(14), 1200–1204. Retrieved from http://erus.uz/index.php/er/article/view/4628