TA'LIM FIDOYILARI
GUVOHNOMA № 1170
ISSN:2181-2160
SJIFACTOR: 4.27 RESEARCHBIB(I.F): 6.2 U.I.F: 6.8
WWW.REANDPUB.UZ

THE INTERACTION BETWEEN THE PRODUCT TO BE GROUND AND THE GRINDING BLADE IN THE GRINDING CHAMBER

Kurbanov Nematilla

senior teacher of Namangan Institute of Engineering and Technology, Uzbekistan

email: nematillo@mail.ru

Raximov Umidjon

PhD of Namangan Institute of Engineering and Technology, Uzbekistan

email: rumid8887@mail.ru

Sobuddinov Soxibjon

assistant of Namangan Institute of Engineering and Technology, Uzbekistan

email: ssohib@mail.ru

Abstract. In this article, according to the analysis of the work process of the crusher-crusher devices, it was found that the composition of the crushed product is the same due to the fact that they are crushed in one pass. Based on this, this technological deficiency of existing devices is based on the parameters of the interaction of the working parts with raw materials.

Key words: rotor, blade, grinding, the number of revolutions of the rotor, the interaction of the grinding blade, time

I*NTRODUCTION*

Today, resource-efficient technology and production of equipment for processing grains and preparing concentrated feed occupy the main place in the world. It is directed to the development of new scientific and technical solutions of resource-efficient technologies of grinding grains and preparing high-quality concentrated feeds from them and the technical means that implement them[1-9].

According to the crusher-crusher operation process, the product coming out of the hopper must first be crushed to a certain size using the crusher blades[10-17]. For this, it is important to consider the interaction between the cuttings coming down from the hopper and the chopper blade, and to determine the correlation between their movements[17-20].

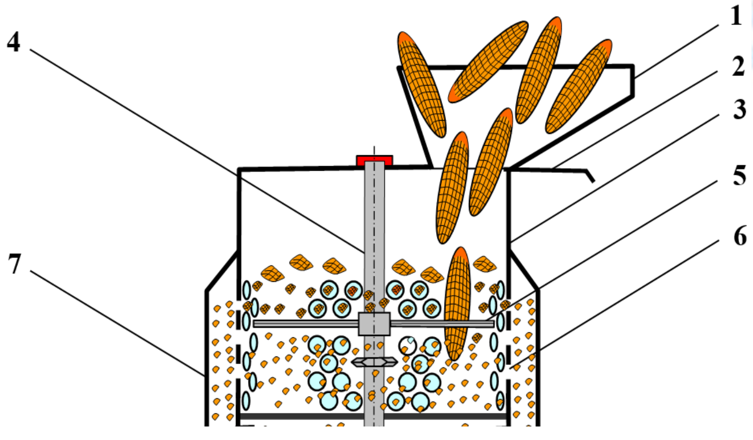
METHODS

When viewing the interaction between the product and the grinding blade [21-25] in the grinding chamber (Fig. 1), we adopt the following view:

1. The raw material is coming towards the knife from a certain height at a uniform speed.

2. The first blade cuts through the raw material and then the stalk moves downward without changing its position until the second blade comes to cut the stalk. we look at it.

3. The second blade is located at 180°C from the first blade, that is, on the opposite side.



TA'LIM FIDOYILARI
GUVOHNOMA № 1170
ISSN:2181-2160
SJIFACTOR: 4.27 RESEARCHBIB(I.F): 6.2 U.I.F: 6.8
WWW.REANDPUB.UZ

1-bunker, 2-regulating beam, 3-grinding chamber, 4-grinding rotor,
5-knife, 6-grinding chamber holes, 7-transfer chute

Figure 1. Schematic diagram of the raw material shearing process of the grinder blade in the grinding chamber

RESULTS

In that case, the rotor of the chopper must be half-turned so that the second blade can come and cut the grain. We determine the time it takes for the second blade to reach to cut the stalk in a half rotation of the rotor as follows.

$$t_n = \frac{1}{2} \cdot \frac{60}{n_p} = \frac{30}{n_p}, \qquad (1)$$

where tn is the time it takes for the second blade to cut the wood in half a rotation of the rotor, s; np is the number of rotor revolutions, min-1.

Now, we consider the wood falling from a certain height towards the chopper blade as a material body, and consider its movement based on the well-known laws of theoretical mechanics. In this case, the rod moves up and down under the influence of gravity, and its motion is according to the differential equation

$$m\ddot{h}_m = mg, \qquad (2)$$

where *m* is the mass of the meat, kg;

h_m - the height of the fall of the soot, m;

g - acceleration of free fall, m/s ^{2}.

Integrating this equation, we find the speed of the soot falling towards the chopper blade

TA'LIM FIDOYILARI
GUVOHNOMA № 1170
ISSN:2181-2160
SJIFACTOR: 4.27 RESEARCHBIB(I.F): 6.2 U.I.F: 6.8
WWW.REANDPUB.UZ

$$V_c = gt_m + C_1, \qquad (3)$$

where V_c is the speed of the sawdust falling towards the chopper blade, m/s;

t_m – the time of the soot falling towards the chopper blade, s;

S_1 is an integral constant.

Integrating the equation (3) , we determine the height of the drop of the soot

$$h_m = \frac{gt_m^2}{2} + C_1 t_m + C_2, \qquad (4)$$

where S_2 is an integral constant.

h_m =0 at t_m =0; Since $V_{c=0,}$ S_1 =0 and S_2 =0.

Then the expression (4) will have the following form

$$h_m = \frac{gt_m^2}{2}. \qquad (5)$$

From this expression, we derive the expression that determines the time t_m of the soot falling towards the chopper blade.

$$t_m = \sqrt{\frac{2h_m}{g}}. \qquad (6)$$

If we transfer the value of t_m from the expression (6) to the expression (3), then the expression of the speed of the soot falling towards the chopper blade will be as follows

$$V_c = \sqrt{2gh_m}. \qquad (7)$$

Depending on the time t_m of the wood falling from the top and the falling speed V_c, the length of cutting or grinding the wood is as follows.

$$l_м = V_c t_m, \qquad (8)$$

where $l_м$ is the length of cutting or grinding the sorghum, *m*.

Taking into account the expression (7), from the expression (8) the time of falling of the soot t_m can also be written as follows

$$t_m = \frac{l_м}{V_c} = \frac{l_м}{\sqrt{2gh_m}}. \qquad (9)$$

In order for the cuttings to be cut or crushed to the required size in the grinding chamber, the time it takes for the second knife to reach the cuttings in half a revolution of the rotor, t_n, is less than or t_m to the time the cuttings fall from the top, i.e. the following condition must be met.

$$t_n \le t_m. \qquad (10)$$

According to expressions (1) and (9), condition (10) can be written as follows

$$\frac{30}{n_p} \le \frac{l_м}{\sqrt{2gh_m}}. \qquad (11)$$

(11) is the expression of the interaction between the straw falling from the hopper and the chopper blade, this expression is the height of the drop of the straw h_m, the number of rotations of the rotor with the chopper blade n_p and determines the relationship between shear length λ_m.

CONCLUSION.

The number of revolutions of the rotor providing the required shear length l_{m} is n_p we define

$$n_p \ge \frac{30\sqrt{2gh_m}}{l_м}. \qquad (12)$$

If we take into account that g=9,8 m/s^2, h_m=0,15 m according to the calculations according to expression (12), the number of revolutions of the rotor with a chopper blade to ensure that the logs are cut with a maximum length of $l_м$=20 mm is 2571,9 min^{-1}

REFERENCES

1. Соколов А.Я., Журавлев В.Ф. и др. Технологические оборудование предприятий по хранению и переработки зерна. – М.: Колос, 1984. – 445 с.

2. Баранов Н., Филинков А. Измельчитель ИКБ-01. // Сельский механизатор. № 10, 2001. – с. 28–29.

3. Wanjun W. Profile of the Development of Agricultural Mechanization of China.// AMA, 1983. – №1. – p. 41–43.

4. Алферов С.А., Попов А.А. Механическая повреждаемость зерна при ударе // Механизация и электрификация сельского хозяйства. – Москва, 1981. – № 3. – С. 50-51.

5. Астонақулов К., Қурбанов Н. Математическое описание процесса дробления зерна в молотковом дробилке // Инновацион ривожланиш даврида интенсив ёндашув истиқболлари: Ҳалқаро анжуман материаллари тўплами, – Наманган: НамМТИ. 11-том, 2018. – Б. 297-298.

6. Соколов А.Я., Журавлев В.Ф. и др. Технологические оборудование предприятий по хранению и переработки зерна. – М.: Колос, 1984. – с. 326-347.

7. *Astanakulov K., Fozilov G., Kurbanov N., Abdurazzokova M., Adashev B. Indicators of operation of the top grinding chamber of grinder crusher for steps grinding of grain // Journal Of Critical Reviews. Vol 7, Issue 13, 2020. pp. 1012-1014. (Scopus,* IF=0.6, www.jcreview.com*)*

8. Salimov. Z. Basic processes and devices of chemical technology.: Textbook for students of higher educational institutions. T.1.-T.: Uzbekistan, 1994.-366 p.

9. Salimov.Z. Basic processes and devices of chemical technology. T.2. Metabolism processes: a textbook for higher educational institutions.-T.: Uzbekistan, 1995.-238 p.

10. Рахманов Ш. В., Игамбердиева Д. А., Рахимов У. Ю. Пути повышения плодородия эродированных почв в Наманганской области //Молодой ученый. – 2017. – №. 20. – С. 226-228.

11. Рахимов У. Ю., Жумаева Д. Ж. Investigation of physico-chemical properties of thermally activated adsorbents on the basis of local waste //НамИТИ Научный-технический журнал. – 2021. – №. 2. – С. 92-97.

12. Атаханов Ш. Н. и др. Исследование физико-химических показателей и пищевой ценности полуфабрикатов овощных соусов-паст //Universum: технические науки. – 2019. – №. 6 (63). – С. 60-63.

13. Jumaeva, D., Toirov, O., Okhunjanov, Z., Raximov, U., & Akhrorova, R. (2023). Investigation of the adsorption of nonpolar adsorbate molecules on the illite surface. *Journal of Chemical Technology and Metallurgy*, *58*(2), 353-359.

14. Атаханов Ш. Н., Маллабоев О. Т., Рахимов У. Ю. Исследование свойств и качества десерта из соковых выжимок топинамбура //Хранение и переработка сельхозсырья. – 2017. – №. 1. – С. 13-14.

15. Рахимов У. Ю. Разработка импортозамещающего адсорбента из отходов пищевой промышленности //Наука молодых-наука будущего. – 2023. – С. 229-232.

16. Рахимов У. Ю., Аймурзаева Л. Г., Жумаева Д. Ж. Invesrigation of the physicochemical of steam activated adsorbents //Узбекский химический журнал, Ташкент. – 2021. – №. 5. – С. 45-51.

17. Атаханов, Ш. Н., Каноатов, Х. М., Сарибаева, Д. А., Маллабоев, О. Т., & Рахимов, У. Ю. (2016). Технология переработки соковых выжимок топинамбура для получения пищевых продуктов. *Молодой ученый*, (18), 55-57.

18. Рахимов У. Ю., Шамуратова М. Р., Охунжонов З. Н. Исследование парагазоактивированных адсорбентов на основе отходов выжимки виноградных косточек //Наука молодых-наука будущего. – 2023. – С. 224-228.

19. Жумаева, Д. Ж., Рахматуллаева, Н. Т., Шамуратова, М. Р., Бахронов, Х. Н., & Рахимов, У. Ю. (2022). Дифференциальные теплоты адсорбции паров воды на

адсорбенте полученного на основе отходов древесины. *Universum: химия и биология*, (9-1 (99)), 63-68.

20. Аймурзаева, Л. Г., Рахимов, У. Ю., Жумаева, Д. Ж., & Эшметов, И. Д. (2022). Эффективное осветление стоков текстильных предприятий с применением коагулянтов-адсорбентов серии апак. *Universum: химия и биология*, (3-1 (93)), 66-70.

21. Рахимов У. Ю., Жумаева Д. Ж., Агзамова Ф. Н. Чщинди асосида термик фаол адсорбентнинг физик-кимёвий хусусиятларини анщлаш. – 2021.

22. Атаханов Ш. Н., Рахимов У. Ю., Маллабоев О. Т. Исследование физико-химических и бактериологических показателей джема из соковых выжимок топинамбура //Хранение и переработка сельхозсырья. – 2017. – №. 6. – С. 36-38.

23. Murodullayevich, X. Q., Akramjanovna, D. S., Yunusjonovich, U. R., & Abduvaliyevich, O. M. (2020). Obtaining oil from recycled materials and its use in the food industry. *European Journal of Molecular & Clinical Medicine*, *7*(2), 2020.

24. Jumaeva, D., Raximov , U., & Muxtorjonov , M. (2023). Analysis of micrograph of activated adsorbents. Educational Research in Universal Sciences, 2(2), 17–20.

25. Рахимов У.Ю., Жумаева Д.Ж. Получение и исследование парагазоактивированных адсорбентов на основе отходов выжимки виноградных косточек // The Scientific Heritage. 2021. №78-2.