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AERODYNAMIC CALCULATION OF THE MOVEMENT OF RAW COTTON BY A DRYING-TRANSPORT DEVICE

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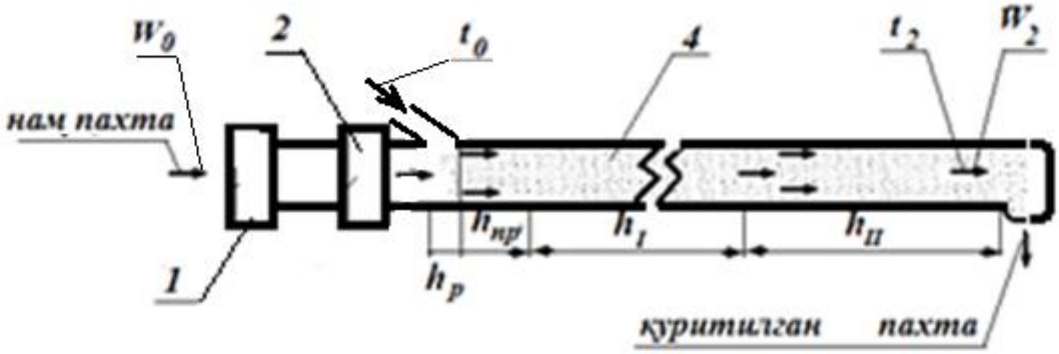
ABSTRACT
This article studied the aerodynamic calculations of raw cotton moving in a stream of hot air in a drying and transport device, including the drying period depending on the speed of cotton in the pipeline, parameters such as the minimum temperature of the drying agent and its speed .

Keywords: solar collector, drying agent, raw cotton moisture, raw cotton movement, hot air flow, drying cycles, gravity, dynamic force, cotton lobule density, medium density, flow rate, flow regime, cotton lobule drag coefficient.

The principle of operation of the proposed drying and transportation device for drying cotton raw materials is based on the fact that wet cotton raw materials move along with the heated air flow. the economic scheme of the cotton drying and transportation device is shown.

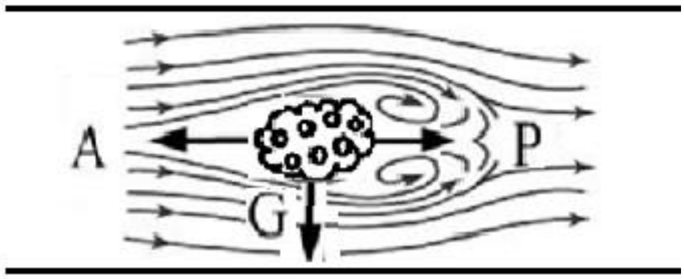


Picture.1. Kuritish - tashish kurilmazining calculation scheme.

1-colorifier; 2-fan; 3-supplying; 4-kuritish-tashish-kuvuri; h_r-accelerated survey of the site; h_pr-kyzish plot; h_I-kuritishning round rice; h_II-kuritishning round dish; t_o-heat transfer; t_o-mining; t_2-mining; W_o-raw cotton sleeve.; w_o-cotton hand; w_2-cotton gomashesin suspension namligaНам пахта хом ашёси пневмоқуритгичга таъминлагич орқали узатилади, ва у колорифердан the incoming hot air will mix with 90-100o C, continue its movement inside the drying and transportation pipeline, the length of the pipes is 150-250 meters, and a certain amount of moisture will be released from cotton raw materials along the length of the pipe.

The calculation of the aerodynamics of the drying and transportation device is based on determining the speed of movement of cotton raw materials, and below we will consider this issue.

The action of the dryer-carrier on a piece of cotton directed along the axis of the pipe in a stream of hot air: pain or gravity G, lifting (Archimedes) Force A, and dynamic pressure Force P of the flow assuming that under the influence of forces, cotton raw materials act between the pipe, we cannot take into account the mutual friction force (Figure 2).



Picture. 2. Cotton homashesiga kuvur ichidagi Issyk introduced an ongoing movement to influence the kuchlar scheme.

Cotton buzlagini ellipsimon and uning the equivalent of the adjective d_x-cotton bravlagining diameter deb karasak, on hold:

$G = \frac{\pi * d_i^3}{6} * \rho_i * g;$

$A = \frac{\pi * d_x^3}{6} * \rho_x * g;$

$P = \boldsymbol{\xi}_{sud} * \frac{\pi * d_i^2}{6} * \frac{V_{sud}^2 * \rho_x}{2};$

Here ρ_x, - density of a piece of cotton; $\rho_м$-muxit density, кг/м³; V_{sud} - flow rate, м/с; $\boldsymbol{\xi}_{sud}$– the coefficient of resistance of a piece of cotton, which depends on the mode of flow;.

If G-A>P or G-A<P, the cotton lump will act in a turbulent flow inside the pipe, if G-A=P -, all forces acting on the cotton lump are balanced, the cotton lump will crawl at the bottom of the pipe, and it will be possible to say "creep" this speed.A piece of cotton with a speed equal to zero at the beginning of the pipe is captured by a stream of hot air, increasing their speed to a stable speed of movement.

And this is the accelerator part ($h_р$) the so-called. At the end of the accelerator section, the cotton splinter will have a speed determined based on the condition of the equality of gravity and the resistance of the medium.

At the end of the accelerator section (h_r), the cotton lump will have a speed of the following equality, which is determined from the balance of the force of the fan gravity and the Resistance Forces:

$\frac{\pi * d_x^3}{6} * (\rho_i - \rho_x) * g = \boldsymbol{\xi}_{sud} * \frac{\pi * d_i^2}{4} * \frac{V_{sud}^2 * \rho_x}{2};$ (1)

(1) from the equation, the creep rate of a piece of cotton will be equal to:

(2) $V_{sud} = \sqrt{\frac{4 * g * (\rho_i - \rho_x) * d}{3 * \rho_x * \boldsymbol{\xi}_{sud}}}$

The task of thermal calculation of the drying and transportation device is to determine the diameter and length of the drying pipe. Below is a simplified method of thermal calculation of the drying and transportation device [1].

Heat consumption for drying cotton raw materials: the heat consumption for heating wet cotton raw materials consists of the sum of the heat consumption in the I - period of drying and the heat consumption in the II-drying period:

$Q_c = Q_{пр} + Q_I + Q_{II}$.

The initial heating period for a piece of cotton is equal to:

$Q_{пр} = G_{qur} * (C_m + C_V * t_2) * (W_m - W_o)$.

The heat consumption during the first drying (I) period is determined by the following formula:

$$Q_I = G_{qur} * (W_o - W_k) * r_1$$

For heat consumption during the second drying (II) period:

$Q_{II} = G_{qur} * [(C_m + C_V * W_2) * (t_2 - t_m) + (W_k - W_2) * r_2]$,

In this case,G_{qur} is a mass of hot air spent on dry cotton raw materials,

$C_m, C_V, C_п$- heat capacity of absolute dry cotton, W_o, W_k, W_k - initial, critical and final moisture content of cotton raw materials, $t_о$, t_2, t_m-initial, critical and final tribute of cotton raw materials, r_1, r_2- evaporation of moisture during the I and II period of drying.

Loss of heat to an external fan:

$Q_{таш}$=k*$F_{пр} * \Delta t \approx 0{,}1 * Q_c$.

Total consumption of drying agent:

$Q_a = \frac{Q_n + Q_{tash}}{c_r*(t_{r1} - t_{r2})}$,

Here c_r- average heat capacity of the drying agent, t_{r1}, t_{r2}- the Charter of the drying agent at the entrance and exit to the drying chamber.

Depending on the consumption of the drying agent, the size surface and diameter of the drying device pipe are calculated

$F_{quv} = \frac{L_a}{3600*\rho_x*V_r}$,

$D_{quv} = \sqrt{\frac{4*F_{quv}}{\pi}}$,

in this $V_r = V_{вит} + (18 - 20м/с)$-the speed of the drying agent. The amount of heat supplied from the drying device to the cotton raw materials is determined by the heat exchange equation:

$$Q_t = \alpha * F_m * \Delta t = \alpha_V * F_{quv} * \Delta t = \alpha_V * F_{quv} * h_{quv*}\Delta t = \alpha_h * h_{quv*}\Delta t.$$

In the heat transfer equation F_m surface area of cotton flakes F_{quv} it is replaced by the cross-sectional area of its pipe. α_V – the concept of the amount of heat transferred to cotton raw materials per unit of time, α_V volume heat transfer coefficient was introduced –

1 $м^3$ the amount of heat that the pipe transfers to the raw material of wet cotton in T khajm. The volume of the heat exchange coefficient will be in the range of 100-1200 W/(m*K).

The volume of the coefficient of heat exchange is determined by the following tengama: $\alpha_V = \alpha * f_{ud}$ in this f_{ud}=$\frac{F_m}{V_{quv}} = 6 * \beta_V/(d_m * \rho_m)$ –relative surface of heat exchange m2/m3 ;

V_{quv}- volume of pipe occupied by cotton raw materials, m3;

$\beta_V = \frac{G_{qur}}{V_r} * F_{quv}$ - the amount of available cotton raw materials in the pipe, kg/m3 .

The heat exchange surface (the surface of the cotton lump) is calculated as follows: $F_m = \pi * d_i^2 * n = 6 * G_{qur}/(d_m * \rho_m)$,

In this $n = \frac{G_{qur}}{V_m*\rho_m} = 6 * G_{qur}/(\pi * d_m^3 * \rho_m)$- the number of pieces of cotton raw materials inside the pipe.

Drying-finding the length of the carrying pipe, drying will consist of the sum of periods:

$H_{quv} = \frac{Q_n - Q_{tahs}}{3{,}6*\alpha_V*F_{quv}*\Delta t}$,

The convective heat exchange coefficient for creeping cotton lumps in the pipe is calculated as follows:

$\alpha = 2 * \boldsymbol{\lambda}_r/d_m$ учун $Re_{sud} < 20$

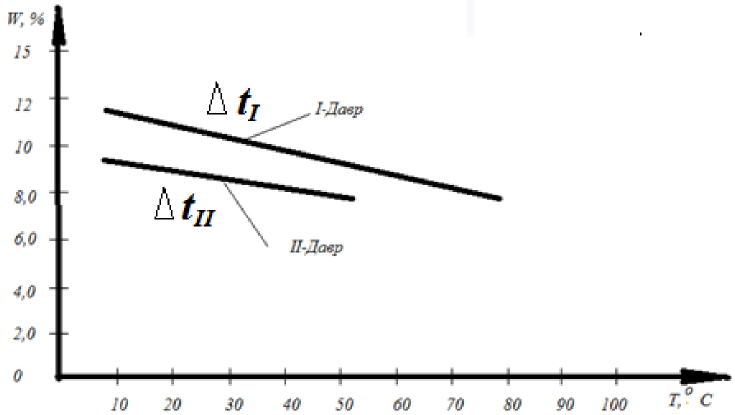
ёки: $\alpha = 0{,}186 * Re_{sud}{}^{0,8} * \boldsymbol{\lambda}_r/d_m$ учун $20 < Re_{sud} < 480$

ёки: $\alpha = 1{,}14 * Re_{sud}{}^{0,8} * \boldsymbol{\lambda}_r/d_m$ учун $480 < Re_{sud} < 2000$

For drying cotton raw materials, the waste stream is treated for each drying period:

$$\Delta t_I = \frac{(t_1 - W_1) - (t_2 - W_2)}{ln\frac{(t_1 - W_1)}{(t_2 - W_2)}} = \frac{(90 - 12) - (40 - 8)}{ln\frac{(90 - 12)}{(40 - 8)}} = \frac{78 - 32}{ln\frac{78}{32}} = \frac{46}{ln 2{,}43} = \frac{46}{0{,}8909} = 51{,}63^{o}\text{C}$$

$$\Delta t_{II} = \frac{(70 - 10) - (40 - 8)}{ln\frac{(70 - 10)}{(40 - 8)}} = \frac{28}{ln\frac{60}{32}} = \frac{28}{ln\, 1{,}875} = \frac{28}{0{,}628} = 44{,}5^{o}\text{C}$$



3.- picture. Drying of cotton raw materials-a graph of the connection of the rate of acting cotton raw materials in the transport device to the minimum Charter of the drying agent for the 1st and 2nd period of drying

Referenkes

1. Лакомкин В.Ю., и.др Расчет и проектирование пневматической сушильной установки: метод.указания/ СПбГТУРП.СПб., 1994.
2. Нестеренко А.В. Основы термодинамических расчетов ветиляции и кондиционирования воздуха. –М.: Высшая школа, 1971.
3. Safarov N.M. , A.T. Majidov. Energy consumption in the processing of saws. // Universum technical sciences: electronic sciences. Journal. 2019. No. 1 (58). URL http: // 7 Universum.com.ru/tech/archive/item/6827.
4. Rasulov, R., Rasulov, V., & Eshboltaev, I. (2016). On the Theory of the Shift Linear Photovoltaic Effect in Semiconductors of Tetrahedral Symmetry Under Two-Photon Absorption. Russian Physics Journal, 59(1).
5. Rustamovich, R. V., Yavkachovich, R. R., Bahroovich, A. B., Arabboyevich, M. I., & Xusnitdin, N. (2020). TWO-PHOTONE LINEAR-CIRCULAR DICHROISM IN NARROW-ZONE SEMICONDUCTORS. European science review, (7-8), 54-59.
6. Rasulov, V. R., Rasulov, R. Y., Eshboltaev, I. M., & Qo'chqorov, M. X. (2021). Interband Multiphoton Absorption of Light in Narrow-Gap Crystals. European Journal of Applied Physics, 3(5), 51-57.
7. Rasulov, V. R., Rasulov, P. Y., Eshboltaev, I. M., & Sultonov, R. R. (2020). Size Quantization in n-GaP. Semiconductors, 54(4), 429-432.
8. Rasulov, V. R., Rasulov, R. Y., Eshboltaev, I. M., & Tolaboyev, D. (2018). PHOTON DRAG EFFECT IN p-Te. European Science Review, (9-10-1), 249-252.

9. РАСУЛОВ, В., РАЗИКОВ, Ж., КАРИМОВА, Г., АБДУБАНАНОВ, А., & ЭШБОЛТАЕВ, И. (2017). Расчет коэффициента прохождения электронов через многослойной полупроводниковой структуры, состоящей из прямоугольных потенциальных ям и барьеров. Современные научные исследования и разработки, (2), 183-185.
10. Rustamovich, R. V., Yavkachovich, R. R., Rustamovich, S. R., Mamirjonovich, E. I., & Bahromovich, A. B. (2020). Phenomenology of two and three photon linear-circular dichroism of light absorption in p-GaAs. European science review, (1-2), 97-100.
11. Xalmatjanova, G., & Sadikova, F. (2022). The Importance of the Cluster Method of Production in Agriculture. Texas Journal of Agriculture and Biological Sciences, 5, 10-13.
12. Jakbarovich, S. B., & Rahimovna, S. F. (2020). SMALL BUSINESS AND PRIVATE ENTREPRENEURS AS THE SOCIO-ECONOMIC BASIS OF CIVIL SOCIETY. MODERN VIEWS AND RESEARCH, 1, 36.
13. Садыкова, Ф. (2022). ҚИШЛОҚ ХЎЖАЛИГИ МУАММОЛАРИНИ ҲАЛ ҚИЛИШГА ЙЎНАЛТИРИЛГАН ИНВЕСТИЦИЯЛАР САМАРАДОРЛИГИ: https://doi. org/10.55439/ECED/vol23_iss3/a18. Экономика и образование, 23(3), 120-126.
14. Mahmudovna, A. M., & Isaboeva, M. M. (2022). Forms of organizing the cognitive activity of students in the process of solving problems and exercises in biology. Web of Scientist: International Scientific Research Journal, 3(7), 68-76.
15. Mahmudovna, A. M., & Isaboeva, M. M. (2022). Forms of organizing the cognitive activity of students in the process of solving problems and exercises in biology. Web of Scientist: International Scientific Research Journal, 3(7), 68-76.
16. Юсупова, М. Н., & Ахмедова, М. М. (2020). МЕВАЛИ ДАРАХТЛАРНИ ЗАРАРКУНАНДАЛАРИГА УЙҒУНЛАШГАН КУРАШ ЧОРАЛАРИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, 2(8).
17. ТУРДИЕВА, О. М., ТОЖИБОЕВА, С. Х., & ТУРСУНОВА, Ш. А. (2015). О ПРЕДОТВРАЩЕНИИ УСТАЛОСТИ У ШКОЛЬНИКОВ. In БУДУЩЕЕ НАУКИ-2015 (pp. 422-426).
18. Tursunova, S. A., & Mamasoliev, S. T. ALGOFLORA OF TYPICAL GRAY SOILS FOR CONTINUOUS TILLAGE. Chief Editor.
19. Рузиматов, Р. Я., Махкамов, Г. М., Отажонова, С. Р., & Турсунова, Ш. А. (2017). Промышленное развитие в Коканде, причины экологических проблем (1956-1975гг.). Высшая школа, (6), 77-78.
20. Тошматова, Ш. Р. (2016). Показатели достоверности и нарушения подразделений экологических ниш тлей. Молодой ученый, (20), 50-53.
21. Toshmatova, S. R., & Usmonov, S. O. (2021). Biological aspects of human adaptation to environmental conditions. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2185-2188.
22. Kalonova, M., Tashmatova, R. V., & Mukhamadiev, N. K. (2020). Preparation of melanin from silkworm wastes and studying its physical and chemical characteristics. CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES, 1(2), 8-12.
23. Muminova, R. N., & Tashmatova, R. S. (2021). Bioecological features and significance of higher aquatic plants of the syr darya basin. ASIAN JOURNAL OF MULTIDIMENSIONAL RESEARCH, 10(4), 939-943.
24. Toshmatova, S. R., & Ernazarov, I. (2021). THE IMPORTANCE OF THE PROBLEM OF BIOREMEDIATION AS AN IMPORTANT SCIENTIFIC AND PRACTICAL PROBLEM IN THE FIELD OF HUMAN ACTIVITY. Экономика и социум, (1-1), 274-276.

25. ТОШМАТОВА, Ш. Р., ЭРНАЗАРОВ, З. М., & ИБРАГИМОВА, Д. А. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК Учредители: Андижанский государственный университет им. ЗМ Бабура, (4), 48-55.
26. Toshmatova, S. R., Ernazarov, Z. M., & Ibragimova, D. A. RESULTS OF ANALYSIS OF AN APPLE OF RED BLOOD APHID (ERIOSOMA LANIGERIUM) IN THE RESEARCH AREA. ILMIY XABARNOMA, 54.
27. Махкамов, Г. М., & Рузматов, Р. Я. (2020). Педагогические и психологические проблемы обучения детей с нарушениями зрения. Наука и мир, 2(4), 84-86.
28. Облабердиева, К. Д., Махкамов, Г. М., Рузметов, Р. Я., & Абдупаттоев, Х. А. (2016). Воспитание информационной и нравственной культуры у современной молодежи в интернете. In Сборники конференций НИЦ Социосфера (No. 12, pp. 116-118). Vedecko vydavatelske centrum Sociosfera-CZ sro.
29. Mahkamov, G. M., & Ruzmatov, R. Y. (2021). About the practice of using excursions in natural lessons. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2066-2070.
30. Mo'minova, R. N., & Sobirjonov, S. (2022). DEVELOPMENT OF ECOLOGY IN UZBEKISTAN. INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT, ENGINEERING AND SOCIAL SCIENCES ISSN: 2349-7793 Impact Factor: 6.876, 16(06), 82-85.
31. Махкамов, Г. М., & Рузиматов, Р. Е. (2019). ПРОМЫШЛЕННОСТЬ АНДИЖАНА В ГОДЫ ВЕЛИКОЙ ОТЕЧЕСТВЕННОЙ ВОЙНЫ. In Россия и мир в новое и новейшее время-из прошлого в будущее (pp. 335-337).
32. Рузиматов, Р. Я., Махкамов, Г. М., Отажонова, С. Р., & Турсунова, Ш. А. (2017). Промышленное развитие в Коканде, причины экологических проблем (1956-1975гг.). Высшая школа, (6), 77-78.
33. O'ZBEKISTON RESPUBLIKASI, O. V. O. (2021). RTA MAXSUS TA'LIM VAZIRLIGI Yusupov Ibragim Mirsaydalievich UMUMIY MIKROBIOLOGIYA 5110400-Biologiya o'qitish metodikasi DARSLIK Toshkent-2020 138-139 бетлар. Мувофиқлаштирувчи кенгашнинг ўқув-услубий бирлашма ва комиссиялари томонидан ижобий хулоса берилган. Ўз Р. Олий ва ўрта махсус таълим вазирлигининг.
34. Yusupov, I. (2021, July). METHODS OF DETERMINING THE MINERALIZATION OF THE SOIL. In Конференции.
35. Yusupov, I. (2021, August). METHODS OF DETERMINING THE MINERALIZATION OF THE SOIL: https://doi. org/10.47100/conferences. v1i1. 1393. In RESEARCH SUPPORT CENTER CONFERENCES (No. 18.06).
36. Mirsaydalievich, Y. I. (2022). SCIENTIFIC AND METHODOLOGICAL BASES OF ECOLOGICAL EDUCATION OF SCHOOLCHILDREN. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429, 11(06), 102-106.
37. Mirsaydaliyevich, Y. I. (2022). HISTORY OF BIOINFORMATICS. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429, 11(07), 72-76.