7universum.com
UNIVERSUM:
ТЕХНИЧЕСКИЕ НАУКИ

UNIVERSUM:
ТЕХНИЧЕСКИЕ НАУКИ

Научный журнал
Издается ежемесячно с декабря 2013 года
Является печатной версией сетевого журнала
Universum: технические науки

Выпуск: 1(118)

Январь 2024

Часть 4

Москва
2024

УДК 62/64+66/69
ББК 3
U55

Главный редактор:
Ахметов Сайранбек Махсутович, д-р техн. наук;

Члены редакционной коллегии:
Горбачевский Евгений Викторович, канд. техн. наук;
Демин Анатолий Владимирович, д-р техн. наук;
Дехканов Зульфикахар Киргизбаевич, д-р техн. наук;
Звездина Марина Юрьевна, д-р. физ.-мат. наук;
Ким Алексей Юрьевич, д-р техн. наук;
Козьминых Владислав Олегович, д-р хим. наук;
Ларионов Максим Викторович, д-р биол. наук;
Манасян Сергей Керопович, д-р техн. наук;
Мажидов Кахрамон Халимович, д-р наук, проф;
Мартышкин Алексей Иванович, канд.техн. наук;
Мерганов Аваз Мирсултанович, канд.техн. наук;
Пайзуллаханов Мухаммад-Султанхан Саидвалиханович, д-р техн. наук;
Радкевич Мария Викторовна, д-р техн наук;
Романов Андрей Александрович, спец. по направлению гидрогеология и инженерная геология;
Серегин Андрей Алексеевич, канд. техн. наук;
Старченко Ирина Борисовна, д-р техн. наук;
Усманов Хайрулла Сайдуллаевич, д-р техн. наук;
Юденков Алексей Витальевич, д-р физ.-мат. наук;
Tengiz Magradze, PhD in Power Engineering and Electrical Engineering.

U55 Universum: технические науки: научный журнал. – № 1(118). Часть 4., М., Изд. «МЦНО», 2024. – 64 с. – Электрон. версия печ. публ. – http://7universum.com/ru/tech/archive/category/1118

ISSN : 2311-5122

DOI: 10.32743/UniTech.2024.118.1

Учредитель и издатель: ООО «МЦНО»

ББК 3

© ООО «МЦНО», 2024 г.

Содержание

Papers in english **5**

Computer science, computer engineering and management **5**

THE IMPORTANCE OF INNOVATIVE TECHNOLOGIES IN REMOTE MONITORING OF AGRICULTURAL PRODUCTS 5
Xalima Abasxanova
Sakhibjamol Ruziyeva

DEVELOPMENT OF SOFTWARE FOR MONITORING CARGO DURING TRANSPORTATION 8
Markhamat Khaydarova
Mirrakhmon Khaydarov

Mechanical engineering and machine science **12**

MATHEMATICAL MODELING OF THE ACCEPTABLE PARAMETERS OF THE PLATE SCRUBBER 12
Rasuljon Tojiev
Abdurakhmon Sulaymonov
Ulugbek Usmonov

Processes and machines of agroengineering systems **19**

APPLICATION OF TENSOR CALCULUS OPERATIONS FOR ELASTIC BODIES 19
Nodir Narbekov

CALCULATION OF ELEMENTS IN CENTRAL COMPRESSION DEFORMABLE STRUCTURES 23
Nodir Narbekov

Civil engineering and architecture **26**

APPLICATION OF UNMANNED AERIAL VEHICLE TECHNOLOGIES IN CONSTRUCTION 26
Denis Popov

Transport **30**

CAR MAINTENANCE IN UZBEKISTAN 30
Mukaddas Mamasalieva

Transport, mining and construction engineering **32**

DETERMINATION OF THE INFLUENCE OF COMPOSITION MODIFIERS BASED ON SECONDARY POLYMER MATERIALS ON THE CORROSION OF THE PIPELINE SYSTEM 32
Ahmadjon Ibadullaev
Askar Babaev
Umar Chorshanbiev
Sultanmurod Kurbanov
Lobar Elmuratova

Technology of materials and products of the textile and light industry **37**

PROMISING USE IN THE TEXTILE INDUSTRY DOMESTIC WOOL FIBERS 37
Shakhnoza Karimova

ESEARCH OF WATER RESISTANCE OF COAT FABRIC 40
Sanovar Khamraeva
Shamsiya Shumkarova
Marguba Rajapova

FORMULATION OF PACKAGING MATERIALS FOR OUTER CLOTHING 45
Mastura Rasulova
Kamola Khodjaeva
Nilufar Axmedova

Food technology **51**

TECHNOLOGICAL CHARACTERISTICS OF EDIBLE GRAPES ON TRANSPORTABILITY AND DURABILITY 51
Ja'far Shamshiyev
Azret Shingisov

Chemical engineering **53**

STUDY OF THE PHYSICOCHEMICAL PROPERTIES OF CELLULOSE OBTAINED FROM PAULOWNIA WOOD 53
Umid Mukhitdinov
Ramizitdin Sayfutdinov
Khasanjon Amirov
Rukhsora Zokirova

DETERMINATION OF ACCEPTABLE DIMENSIONS OF BIOFERTILIZER PRODUCTION 59
Zuhriddin Voqqosov
Maftuna Ikromova

PAPERS IN ENGLISH

COMPUTER SCIENCE, COMPUTER ENGINEERING AND MANAGEMENT

THE IMPORTANCE OF INNOVATIVE TECHNOLOGIES IN REMOTE MONITORING OF AGRICULTURAL PRODUCTS

Xalima Abasxanova
Associate professor,
Tashkent University of Information Technologies
named after Muhammad Al-Khwarizmi,
Republic of Uzbekistan, Tashkent
E-mail: halimaabasxanova@gmail.com

Sakhibjamol Ruziyeva
Student,
Tashkent University of Information Technologies
named after Muhammad Al-Khwarizmi,
Republic of Uzbekistan, Tashkent

ЗНАЧЕНИЕ ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ В ДИСТАНЦИОННОМ МОНИТОРИНГЕ СЕЛЬСКОХОЗЯЙСТВЕННОЙ ПРОДУКЦИИ

Абасханова Халима Юнусовна
доцент,
Ташкентский Университет Информационных Технологий
имени Мухаммада Аль-Хоразмий,
Республика Узбекистан, г. Ташкент

Рузиева Сахибжамол Нуралиевна
студент,
Ташкентский Университет Информационных Технологий
имени Мухаммада Аль-Хоразмий,
Республика Узбекистан, г. Ташкент

ABSTRACT

The article highlights the methods of farmers working in the field of agriculture, clusters, grow agricultural products in greenhouses and other closed areas and use innovative technologies in their monitoring as a result of automatic irrigation, climate control, temperature, humidity, nitrogen, potassium, phosphorus level measurement tools, nutrient supply, fruit ripening and irrigation. The possibilities of using the automatic control system fertilization, determination of parameters of the soil composition and the cultivation of each agricultural product based on them were foregrounded.

АННОТАЦИЯ

В статье описаны возможности использования автоматически управляющей системы для фермеров, работающих в сфере сельского хозяйства. В результате применения инновационных технологий выращивания сельскохозяйственной продукции в теплицах и других закрытых помещениях и их мониторинга, автоматического полива, климат-контроля, температуры, влажности, азота, калия, средства измерения уровня фосфора, обеспечения питательными веществами, методы созревания плодов и орошения. Внесение удобрений, определение параметров состава почвы и автоматическое управление, предназначенное для выращивания каждой сельскохозяйственной продукции.

Keywords: innovative technologies, management, database, agriculture, precision farming, smart agriculture, smart greenhouse.

Ключевые слова: инновационные технологии, управление, база данных, сельское хозяйства, точное земледелие, умное сельское хозяйства, умная теплица.

Библиографическое описание: Abasxanova X.Y., Ruziyeva S.N. THE IMPORTANCE OF INNOVATIVE TECHNOLOGIES IN REMOTE MONITORING OF AGRICULTURAL PRODUCTS // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16640*

Introduction

In recent years, regulation of land and water relations in agriculture, effective use of agricultural arable land, introduction of innovative technologies in the field, production of high-profitable, exportable products due to the reduction of low-yielding cotton and grain areas, state needs financial stability of agricultural enterprises is ensured by increasing the purchase price of agricultural products. Today, the rapid development of all spheres of society and state life requires the implementation of reforms based on modern innovative ideas, developments and technologies that ensure rapid and high-quality development of our country on the way to becoming one of the leaders of world civilization [1].

Methods

The main goal of the research is to manage and monitor the total agricultural production, farming and livestock products created in the country on the basis of smart technologies. As a result of the research, an automatic management system for farmers working in the agricultural sector, clusters, monitoring their development in greenhouses and other closed areas, automatic irrigation, fertilizing, determination of soil composition parameters, and based on them, the production of each agricultural product. supply and technology have been developed [6]. The methods of climate control, temperature, humidity, nitrogen, potassium, phosphorus level measuring devices, providing nutrients, fruit ripening and irrigation devices were used as research methods. The scientific significance of the research consists in the development of monitoring methods and algorithms for the remote use of satellite data in the rapid and accurate assessment of the condition of agricultural lands and the crops grown on them [5].

Results

The analysis shows that the tools currently used in the practice of state and city administration do not provide a completely acceptable level of providing the population with agricultural products in Uzbekistan. Part of the demand for some food products is met by imports. Taking this into account, "Smart Greenhouse" is suitable for the current purpose. "Smart Greenhouse" has a fully automated system[4].

A smart greenhouse includes the following systems: automatic irrigation system, through drip irrigation; system of automatic storage of soil temperature; automatic soil recovery system (mulching); auto-ventilation system; automatic lighting system.

Thanks to drip irrigation, watering is carried out directly to the roots of plants. Watering occurs in small doses applied to each plant separately. This method is carried out using drip irrigation due to the many branches of irrigation systems. Thanks to this method of watering plants, the upper part of the soil is always wet, which allows the plants to receive the necessary amount of water.

The advantages of drip irrigation are as follows: absence of the process of spreading weed crops; uniform distribution of water in the soil; water saving. Disadvantages of this type of irrigation: relatively complex design; high price of equipment; constant monitoring of water purity is required.

The irrigation reservoir can also be equipped with an electric pump and float to regulate the water level in the reservoir. We can call this system fully automatic thanks to the introduction of the automatic tank filling system. In the "Smart Greenhouse" system, automatic heating of the soil is not important, its temperature is controlled based on the data set in the thermostat [2].

The soil heating system includes: Temperature regulator; heating element The thermostat for temperature control allows you to keep the temperature in the range of +5 to +45 degrees Celsius. Thus, the initially set temperature is established and this temperature is maintained.

The process of ventilation of greenhouses is carried out by opening the leeward side, thereby avoiding the negative effects of cold wind. However, thanks to new research in this field, the simultaneous opening of two transoms on either side of the greenhouse is as follows. This method, in addition to adjusting the amount of CO2 and air humidity, allows for maximum control of warm currents inside the greenhouse.

An automatic irrigation system requires the use of a soil: water level sensor, which detects the current water level in the reservoir and thus determines whether water needs to be added if the reservoir lacks water. In this way, the system determines when to start the irrigation process.

An LCD display is used to monitor soil moisture and see irrigation system installation processes. The microcontroller transmits the obtained result to the control device and starts the water supply system after the signal. The system for managing the tasks and settings of irrigation processes, the warning device serves to notify and display information about the lack of water during the work process [3].

The following elements are used for the automatic ventilation system: a temperature and soil moisture sensor, based on the readings obtained by this sensor, the current condition inside the greenhouse is determined. After the signal from the microcontroller, the control device, that is, the ventilation system, is activated. The following elements are required for the automatic soil heating system: soil temperature sensor (contact type). After the signal from the microcontroller, the load controller started heating the soil after adjusting the task control system and the soil heating processes. Monitoring of the soil temperature and viewing the installation process of the soil heating system is reflected on the LCD display.

Arduino series Atmel microcontroller is used to control all smart greenhouse systems. The Arduino microcontroller has the advantages necessary for control, it allows you to control the power, the duration and timing of the signals.

Thanks to the I2C module, the problem is solved, such as the need for too many pins to connect up to 4 to the Arduino, so in addition to this, the I2C module also

has a trimmer resistor, with which the light can be easily adjusted.

Soil surface and soil temperature sensors are used to monitor changes in soil temperature.

The sensor detects changes in indicators from - 10 degrees to + 40 degrees. Such a choice of temperature indicators is related to the analogues discussed above, in which thermostats work within these limits and there is no need for a temperature of more than + 40 ° C in the soil heating system. A sufficiently small margin of error of the measured values is also taken into account, and the temperature sensor receives the most accurate values. The supply voltage is 5V. The data received on the DS18B20 temperature sensor is exchanged with the microcontroller using a single-wire interface [3].

Conclusion

To conclude, conditions are created for the creation of varieties of crops resistant to stress, high yield, adapted to transportation, rich in bioactive substances. and allows to significantly reduce human participation in them. Applications of such technologies in agriculture include precision farming, "smart" farms, "smart" greenhouses, raw material management, agricultural product storage, agricultural transport management, "big data" and others. . "Smart warehouses" for fruits and vegetables allow to monitor the condition of the product during storage using specially defined algorithms (set temperature, humidity level, carbon dioxide content) in real time, which helps to make the right decision. If the conditions are violated, the system corrects the situation and informs the warehouse owner about the change.

References:

1. Abasxanova X.Yu. Qishloq xo'jaligi maydonlarini monitoring qilish va nazorat qilish uchun geoaxborot tizimlarini ishlab chiqish usullari [Methods of development of geoinformation systems for monitoring and control of agricultural areas]. Monograph. Tashkent - 2021. “Fan va texnologiyalar nashriyot -matbaa uyi”. –132 p. https://scholar.google
2. Khalima Abaskhanova. Analysis of information and communication technologies in green environment monitoring. ICISCT 2022. https://www.icisct2022.org(Scopus). https://www.icisct2022.org/
3. Khalima Abaskhanova features of introduction of innovative technologies in agriculture of Uzbekistan. Universum: texnicheskiye nauki. №12. pages 24-28 . DOI - 10.32743/UniTech.2021.93.12.
4. Abasxanova X.YU. Applying infocommunication technologies to agriculture. Current problems of modern science. International conference. Chicago USA - 2022. –Б.27-2 (GoogleScholar).
5. Intellektualniye texnicheskiye sredstva APK : uchebnoye posobiye [Intelligent technical means of agro-industrial complex: textbook] / Ye.V. Truflyak, Ye.I. Trubilin. – Krasnodar : KubGAU, 2016. – 266 p.
6. Abasxanova X.Yu., Amirsaidov U.B. Mikroprotsessorlar. Oliy o'quv yurtlari uchun o'quv qo'llanma [Microprocessors. Textbook for University students]. Tashkent, 2017. -350 p. https://scholar.google

DOI - 10.32743/UniTech.2024.118.1.16632

DEVELOPMENT OF SOFTWARE FOR MONITORING CARGO DURING TRANSPORTATION

Markhamat Khaydarova
Associate Professor,
Tashkent University of Information Technologies
named after Muhammad Al-Khwarizmi,
Republic of Uzbekistan, Tashkent
E-mail: khaydarovamarkhamat@gmail.com

Mirrakhmon Khaydarov
Student,
Tashkent University of Information Technologies
named after Muhammad Al-Khwarizmi,
Republic of Uzbekistan, Tashkent
E-mail: kh.mirraxmon@gmail.com

РАЗРАБОТКА ПРОГРАММНОГО ОБЕСПЕЧЕНИЯ МОНИТОРИНГА ГРУЗА ВО ВРЕМЯ ТРАНСПОРТИРОВКИ

Хайдарова Мархамат Юнусовна
доцент
Ташкентского Университета Информационных Технологий
имени Мухаммада Ал-Хоразмий,
Республика Узбекистан, г. Ташкент

Хайдаров Миррахмон Мирбахромович
студент
Ташкентского Университета Информационных Технологий
имени Мухаммада Ал-Хоразмий,
Республика Узбекистан, г. Ташкент

ABSTRACT

In the time of globalization and digitalization of business, the significance of viable checking of products during transportation increments essentially. The development of cargo tracking software contributes to enhanced customer trust, increased process transparency, and improved supply chain management. This article centers around the critical parts of growing such programming, with an accentuation on the utilization of GPS innovation to screen and convey freight area and assessed season of appearance consequently.

АННОТАЦИЯ

В эпоху глобализации и цифровизации бизнеса, важность эффективного мониторинга грузов в процессе транспортировки значительно возрастает. Разработка программного обеспечения, предназначенного для отслеживания грузов, способствует улучшению управления цепочками поставок, повышению прозрачности процессов и усилению доверия клиентов. Эта статья фокусируется на ключевых аспектах разработки такого программного обеспечения, с акцентом на использовании GPS-технологий для автоматического мониторинга и передачи данных о местоположении груза и его приблизительном времени прибытия.

Keywords: software development, cargo tracking, GPS, up-to-date information, logistics companies, clients, technical aspects, functional aspects, selection of sensors and technologies, user interface, data security, system integration, project management, teamwork.

Ключевые слова: разработка программного обеспечения, отслеживание грузов, GPS, актуальная информация, логистические компании, клиенты, технические аспекты, функциональные аспекты, выбор датчиков и технологий, пользовательский интерфейс, безопасность данных, интеграция с системами, управление проектом, командная работа.

Библиографическое описание: Khaydarova M.Y., Khaydarov M.M. DEVELOPMENT OF SOFTWARE FOR MONITORING CARGO DURING TRANSPORTATION // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16632*

Introduction

In this day and age, where worldwide strategies assumes a critical part in the economy, compelling and solid checking of merchandise during transportation is becoming significant, yet in addition a vital part of fruitful business tasks. In an always developing interest for quick and safe conveyance of products, the security of the freight, yet additionally the advancement of the whole coordinated operations chain relies upon the precision and proficiency of checking.

Over the previous period, because of the continuous state strategy in the vehicle area, huge scope work has been done in the country to arrange a powerful vehicle framework that addresses the issues of the economy and the populace in transport administrations by all methods of transport. Right now, spatial network of all areas of the nation has been guaranteed, underlying changes have been completed in the field of traveler and freight street and air transportation, and conditions have been made for dynamic and viable joining into the worldwide vehicle space. Simultaneously, the nation's vehicle framework should take care of various difficult issues that diminish its effectiveness. This will require serious institutional changes pointed toward further developing the nation's vehicle strategy, guaranteeing a sharp expansion in the quality and volume of traveler and freight transportation, diminishing their expense for shoppers, expanding the volume of freight travel through Uzbekistan and framing a cutthroat market for transport and operations administrations, expanding the degree of wellbeing, ecological neighborliness and advancement. all modes of transportation The objective of this article is to examine and describe the process of creating software for tracking cargo while it is being transported, with an emphasis on GPS-based automatic location tracking. Customers can get up-to-date information about the status of their orders thanks to the presented strategy, which not only makes monitoring easier for logistics companies but also makes it easier for them. The article will cover specialized and utilitarian angles, including sensor and innovation determination, UI plan, information security, and combination with existing frameworks.

Literature review

In crafted by T.R. Zhabaeva [1] , centers around the utilization of portable advancements in vehicle observing. The creator examines the vital job of the vehicle business in the advanced economy and the requirement for mechanized frameworks to oversee transportation successfully [1] presents both the benefits and detriments of transport observing strategies, including the utilization of GPS and cell phones to follow vehicle developments. Particular issues related to inappropriate use of official transportation are discussed in Work [3]. These systems' capacity to address issues related to traffic flow management and control underscores their significance [4].

"Mechanized control frameworks for metropolitan traveler transport" by Atazhanov M.K. [2] covers issues of working on metropolitan vehicle in Uzbekistan through the presentation of mechanized control frameworks. She calls attention to the issues related with the expansion in the quantity of vehicles: expanded gridlocks, contamination and mishaps. The creators propose mechanized control frameworks as a way to enhance traffic the board, which lessens outflows and save fuel. Route monitoring, fuel usage analysis, driver behavior monitoring, passenger information systems, and emergency notification systems are all functions of the system. The article accentuates the significance of a coordinated way to deal with the issue, which will influence the whole vehicle complex, and records the essential specialized parts, like GPS modules and online reconnaissance frameworks.

Research methodology

Making a freight global positioning framework incorporates joining with cutting edge GPS innovations and the improvement of solid information handling calculations. The utilization of satellite following permits freight area data to be refreshed progressively, expanding observing exactness. The cargo route tracking system will send regular emails with information about the cargo's current location to ensure maximum customer convenience. This approach kills the need to download extra applications or projects, improving on the most common way of getting data for the client. Messages will be sent consequently consistently, furnishing clients with modern data on conveyance progress.

Each letter will contain itemized data about the area of the freight, including geological directions and the assessed distance to the objective. For comfort, all messages will be gathered in one correspondence string related with an extraordinary freight number. By entering the cargo number into the search bar of their email, customers will be able to access the movement history of their cargo at any time.

The computerized framework should work out the excess distance to your objective in light of your ongoing pace and expected street conditions. In the event that freight is halted for in excess of a predefined timeframe, the framework ought to quickly send notices to managers. This enables you to respond promptly to potential issues or delays, enhancing logistics operations' overall efficiency.

Utilizing your ongoing area, speed, and course conditions, the framework can appraise your assessed season of appearance (estimated time of arrival). For supply chain planning, accurately calculating ETA is essential, particularly in industries like food and medical products where delivery times are critical.

Powerful administration of freight development information requires a dependable data stockpiling framework. A significant part of creating programming for freight following is the making of a data set that will gather, interaction and store all information connected with courses, time spans, area of freight and the historical backdrop of its development.

The database needs to be built in such a way that it can handle queries at a lightning-fast rate and scale to handle larger data volumes. It will incorporate tables

to store data about every shipment, its ongoing area, timestamps for sending refreshes, and other related information. Data can be structured according to a number of parameters, like the date of departure, the estimated date of arrival, and the identifiers for the vehicle and the route, to make it easier to analyze and report.

Additionally, it is essential to implement cutting-edge encryption techniques and safeguards against unauthorized access to guarantee a high level of data security. This includes using secure data links between vehicles, servers, and end users as well as strict authorization measures for database access.

To work on cooperation with the data set and give speedy admittance to data to chairmen and clients, the framework might incorporate a web connection point or Programming interface. This will permit you to coordinate freight area information with other data frameworks involved by the organization and give adaptability in overseeing planned operations processes.

This piece of software is in charge of keeping an eye on and responding to unforeseen events like road accidents, traffic jams, vehicle issues, and trailer issues. The framework ought to be arranged to naturally recognize such circumstances utilizing information from GPS trackers and the driver's very own call.

At the point when the framework distinguishes what is going on, it promptly sends a notice to the overseer. This notice might contain point by point data about the idea of the issue, its area and possible effect on the conveyance plan. The executive, having gotten the warning, can direct a more nitty gritty examination of the circumstance and settle on additional activities.

After endorsement by the manager, the program naturally creates and sends a letter to clients related with this conveyance. The letter will incorporate a depiction of the issue, as well as the assessed time for goal and potential changes in the conveyance plan. This gives straightforwardness and keeps up with client certainty by illuminating them regarding potential deferrals and measures taken to limit their effect.

Conclusion

Developing freight monitoring software that covers the critical aspects of customer awareness, data management and emergency response is a key step in improving the efficiency and reliability of logistics operations. Using email to regularly update customers on cargo location provides transparency and convenience without the need to install additional software. At the same time, using a SQL database to store all logistics data reliably, scalably and securely improves information management efficiency and responsiveness to changes. An automated notification system that responds to unforeseen circumstances, such as road or vehicle problems, and then sends information letters to customers if approved by the administrator, increases customer trust and satisfaction, maintaining a high level of service even in difficult conditions. These elements combine to form a powerful and integrated solution that not only strengthens customer relationships, but also provides companies with powerful tools to optimize their logistics processes, making them more flexible, transparent and adaptable to changing market conditions.

References:

1. Zhabaev, T.R. Analysis of the operation of the transport monitoring subsystem using mobile devices Journal Young Scientist. - 2017. - No. 33 (167). — P. 4-8. —
2. Atazhanov M.Ch., Sayliev M.I., Farmonov Sh.Sh. Automated control systems in urban passenger transport Achievements of science and education. 2020. No. 3 (57).
3. Markelov V.M. Creation of cartographic logistics models for logistics Earth Sciences. 2012. No. 3. P.54-58
4. Gagarina L.G., Kiselev D.V., Fedotova E.L. Development and operation of automated information systems. - M.: Forum, Infra-M, 2015. - 384 p.
5. Abasxanova X.Yu., Amirsaidov U.B. Mikroproesessorlar. Oliy o'quv yurtlari uchun o'quv qo'llanma. "Fan va texnologiyalar" . Toshkent -2016. - 272b.
6. Abasxanova,X.Yu.5.55.01.01-Telekommunikatsiyatexnologiyalar (telekommunikatsiya,teleradioeshittirish.mobil aloqa) ta'lim oluvchi talabalar uchun darslik. "Muhr-press", Toshkent -2022. –284b.
7. Abaskhanova, X.Yu, Juraev l.N., Khoshimova F.R. 5.55.01.01- Telekommunikatsiya texnologiyalar yo'nalishida ta'lim oluvchi talabalar uchun o'quv qo'llanma. "Muhr-press", Toshkent -2022. –200b.
8. Abasxanova X., Abdullaev U. Acmeological approach as the development of educational process. Международный научный журнал «Universum: технические науки». 2022, Выпуск: 12(105), часть 6, –P.58-61 DOI - 10.32743/UniTech.2022.105.12
9. Abaskhanova, H.Y. "Applying infocommunication technologies to agriculture." Current problems of modern science. Xalqaro конференция. Chicago USA-2022.
10. Abasxanova, X. Yu. "Modeling digital devices with the help of vhdl programming language. Current problems of modern science." International conference. Chicago USA. 2022.
11. Abaskhanova X. Applying infocommunication technologies to agriculture. International scientific and current research conferences, 2022., 27–29. Retrieved from https://orientalpublication.com/index.php/iscrc/article/view/615
12. Khalima Abaskhanova. Analysis of information and communication technologies in green environment monitoring. ICISCT 2022. https://www.icisct2022.org(Scopus)

13. X.Yu.Abasxanova, J.B. Baltayev, N.V. Yaronova O‘zbekiston Respublikasi Transport vazirligi tomonidan oliy o‘quv yurtlarining 5350700 – “Radioelektron qurilmalar va tizimlar” (temir yo‘l transporti) ta‘lim yo‘nalishi talabalari uchun darslik. №332-005.Тошкент-2023.-400b.
14. Abasxanova X.Yu Application of information technologies for remote monitoring of greenhouse land plots**.** Международный научный журнал «Universum: технические науки». 2023, Выпуск: 1(106), часть 4, – P. 31-35 // Universum: технические науки : электрон. научн. журн. 2023. 1(106). URL:https://7universum.com/ru/tech/archive/item/14878

MECHANICAL ENGINEERING AND MACHINE SCIENCE

DOI - 10.32743/UniTech.2024.118.1.16663

MATHEMATICAL MODELING OF THE ACCEPTABLE PARAMETERS OF THE PLATE SCRUBBER

Rasuljon Tojiev
Doctor of Technical Sciences,
Professor, Fergana Polytechnic Institute,
Republic of Uzbekistan, Fergana
E-mail: r.tojiyev@ferpi.uz

Abdurakhmon Sulaymonov
Doctoral student,
Fergana Polytechnic Institute,
Republic of Uzbekistan, Fergana
E-mail: sulaymonov.abdurahmon@mail.ru

Ulugbek Usmonov
Master's degree student,
Fergana Polytechnic Institute,
Republic of Uzbekistan, Fergana
E-mail: u.usmonov@mail.ru

МАТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ ПРИЕМЛЕМЫХ ПАРАМЕТРОВ ПЛАСТИНЧАТОГО СКРУББЕРА

Тожиев Расулжон Жумабаевич
д-р техн. наук, проф.,
Ферганский политехнический институт,
Республика Узбекистан, г. Фергана

Сулаймонов Абдурахмон Махамадович
докторант (PhD),
Ферганский политехнический институт,
Республика Узбекистан, г. Фергана

Усмонов Улугбек Султонбек угли
магистрант,
Ферганский политехнический институт,
Республика Узбекистан, г. Фергана

ABSTRACT

In the article, the influence of the hydraulic resistance of the plate scrubber, which cleans dusty gases in a wet method, on the cleaning efficiency and the energy used for the process was studied, and the optimal parameters of the device were determined using the mathematical planning method. Assuming that the influence of factors on the evaluation criteria in the mathematical planning method is fully described by a second-order polynomial, experiments (V4) are implemented based on the plan. Regression equations that adequately represent the evaluation criteria are HARTLI, with appropriate processing of the experimental results based on the -4 program. Based on the results of the experiment, the optimal parameters of the apparatus for the dust removal process selected for the sample are set to the standard state.

АННОТАЦИЯ

В статье исследовано влияние гидравлического сопротивления пластинчатого скруббера, очищающего запыленные газы мокрым способом, на эффективность очистки и энергозатраты на процесс, а также определены оптимальные параметры устройства с помощью математического уравнения. метод планирования. Полагая, что влияние факторов на критерии оценки в методе математического планирования полностью описывается полиномом второго порядка, эксперименты (V4) реализуются на основе плана. Уравнения регрессии, адекватно представляющие критерии оценки, представляют собой HARTLI с соответствующей обработкой экспериментальных результатов на основе программы -4. По результатам эксперимента оптимальные параметры аппарата процесса обеспыливания, выбранные для образца, устанавливаются в штатное состояние.

Библиографическое описание: Tojiev R., Sulaymanov A., Usmonov U. MATHEMATICAL MODELING OF THE ACCEPTABLE PARAMETERS OF THE PLATE SCRUBBER // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16663*

Keywords: plate scrubber, plate, HARTLI-4, wet method, hydraulic resistance, superphosphate dust, local resistance coefficient, working surface, nozzle.

Ключевые слова: скруббер пластинчатый, пластина, ХАРТЛИ-4, мокрый способ, гидравлическое сопротивление, пыль суперфосфата, коэффициент местного сопротивления, рабочая поверхность, насадка.

Introduction

The cleaning efficiency of wet dust gas cleaning devices and the energy used for the process are determined according to the constructional structure of the device. One of the main tasks of the scientific research conducted in this field is to increase the cleaning efficiency and reduce the energy consumption per unit volume of the apparatus.

On the basis of these tasks, many scientific research works and information presented in the literature [1,2,3, 4,5,7] were systematically analyzed on the basis of the MatLab program, and on the basis of these, an improved design scheme of the scrubber with a cylindrical plate with a simple structure and low energy consumption was developed, and a physical model of the device was developed (Fig. 1) [14,15]. Hydraulic resistance, the effect of hydraulic resistance on energy consumption and cleaning efficiency were studied in the experimental apparatus. In determining the cleaning efficiency and energy consumption, the equations proposed in the research work of KTSemrau [2,7] were used.

Figure 1. Overview of the laboratory model

During the experiments, within the following limits of the variable factors, the diameter of the liquid nozzle d_n=3 mm, the liquid consumption Q_{liq}=0.071÷0.189 m^3/h, the intermediate step increased by 0.021 m^3/h, the diameter of the plate valve hole d_f=2, 3 and 4 mm, the plate valve installation angle to the device β=15º; The number of 30º and 45º plates is 2 according to the angle of installation, the intermediate step was increased by an average of 5.5 m/s to the gas speed υ_g=7.4÷28.8 m/s.

Superphosphate mineral fertilizer dust was selected as dust gas, and its density was determined as ρ_c=3.38 kg/m^3 for a mixture of air and superphosphate mineral fertilizer dust (in which the amount of gas and dust mixture is 2697.79 mgr [2,8,14] in 1 m^3 of air). Taking into account the influence of the external environment during the experiments, the temperature for the water and gas system was set at 200C±2. Experiments RD 34.20. 519-97 “Испытания гидравлического сопротивления трубопроводов. Машины и аппараты для измерения расхода газов и давления. Программа и методы испытаний” [2,6,9,10,11,12]. The results of the experiment are presented in Tables 1 and 2. Taking into account the multifactor nature of the conducted experiments, the results obtained for the minimum and maximum gas velocities are presented in the tables.

Table 1.

Experimental results obtained on the effect of hydraulic resistance on cleaning efficiency and energy consumption. V_{gas}=7.4 m/s const.

V_{gas} m/s	Q_{liq} m^3/hour	Plate Ø4, φ = 15°			Plate Ø3, φ = 15°			Plate Ø2, φ = 15°		
		ΔP_{cb}, Pa	K_{SP}, W	η, %	ΔP_{cb},Pa	K_{SP},W	η, %	ΔP_{cb}, Pa	K_{SP}, W	η, %
7.4	0.071	272	65.2	39.4	282	69.1	39.62	312	79.7	40.04
	0.08	285	65.44	39,49	294	69.3	39.64	325	79.9	40.05
	0.13	300	65.7	39.5	310	69.6	39.65	340	80.2	40.06
	0.147	313	65.9	39.51	322	69.8	39.66	352	80.4	40.07
	0.168	323	66.1	39.52	332	70	39.67	362	80.7	40.08
	0.189	335	66.4	39.53	345	70.3	39.68	372	80.9	40.09
		Plate Ø4, φ = 30°			Plate Ø3, φ = 30°			Plate Ø2, φ = 30°		
7.4	0.071	198	47.7	38.8	205	50.5	38.9	227	58.3	39.2
	0.08	208	47.9	38.81	215	50.7	38.92	237	58.5	39,22
	0.13	219	48.1	38.82	226	51	38.93	248	58.8	39,23
	0.147	228	48.4	38.83	235	51.2	38.94	257	59	39,24
	0.168	235	48.6	38.84	242	51.4	38.95	264	59.2	39.25
	0.189	245	48.8	38.85	252	51.6	38.96	253	59.4	39,26
		Plate Ø4, φ = 45°			Plate Ø3, φ = 45°			Plate Ø2, φ = 45°		
7.4	0.071	177	42.3	38.6	184	45.1	38.7	203	52.1	38.97
	0.08	185	42.6	38.61	192	45.3	38.71	212	52.3	38.98
	0.13	195	42.8	38.62	202	45.5	38.72	221	52.5	38.99
	0.147	204	43	38.63	210	45.7	38.73	229	52.7	39,
	0.168	210	43.2	38.64	216	45.9	38.74	236	53	39.1
	0.189	218	43.5	38.65	225	46.2	38.75	226	53.2	39.2

Table 2.

Experimental results obtained on the effect of hydraulic resistance on cleaning efficiency and energy consumption. y_{gas}=28.8 m/s const.

V_{gas} m/s	Q_{liq} m^3/hour	Plate Ø4, φ = 15°			Plate Ø3, φ = 15°			Plate Ø2, φ = 15°		
		ΔP_{cb}, Pa	K_{SP}, W	η, %	ΔP_{cb}, Pa	K_{SP}, W	η, %	ΔP_{cb}, Pa	K_{SP}, W	η, %
28.8	0.071	4128	989.9	99.71	4272	1045	99.76	4728	1210	99.8
	0.08	4320	990.1	99.72	4464	1046	99.77	4927	1210.2	99.89
	0.13	4551	990.4	99.73	4695	1047	99.78	5150	1210.4	99.92
	0.147	4743	990.6	99.74	4887	1049	99.79	5334	1210.6	99.96
	0.168	4897	990.8	99.75	5041	1050	99.8	5496	1210.8	99.97
	0.189	5089	991	99.76	5233	1054	99.81	5643	1211	99.99
		Plate Ø4, φ = 30°			Plate Ø3, φ = 30°			Plate Ø2, φ = 30°		
28.8	0.071	3013	722.7	98.3	3118	762.8	99.66	3451	883.2	99.75
	0.08	3153	722.8	98.31	3259	762.9	99.67	3596	883.3	99.76
	0.13	3322	723.1	98.32	3427	763.2	99.68	3759	883.6	99.77
	0.147	3462	723.2	98.33	3567	763.3	99.69	3894	883.8	99.78
	0.168	3574	723.4	98.34	3679	763.5	99.7	4011	883.9	99.79
	0.189	3714	723.5	98.35	3819	763.7	99.71	3838	884	99.81
		Plate Ø4, φ = 45°			Plate Ø3, φ = 45°			Plate Ø2, φ = 45°		
28.8	0.071	2690	644.4	98.24	2784	680.4	98.28	3081	788.5	99.35
	0.08	2816	644.5	98.26	2909	680.5	98.29	3211	788.6	99.36
	0.13	2966	644.8	98.27	3060	680.8	98.3	3356	788.8	99.37
	0.147	3091	644.9	98.28	3185	680.9	98.5	3476	789	99.38
	0.168	3191	645	98.29	3285	681.1	98.52	3581	789.1	99.39
	0.189	3316	645	98.3	3410	681.2	98.54	3426	789.2	99.41

In order to evaluate the influence of the variable factors on the cleaning efficiency and energy consumption in the apparatus, it was determined using the method of mathematical planning of multifactorial experiments [11,12,13,15].

In theoretical studies and multi-factor experiments, it was found that the diameter of the squeegee plate hole (X1), dust gas velocity (X2), angle of installation of the squeegee plate on the device (X3) and liquid consumption (X4) are the factors that most affect the cleaning efficiency and energy consumption of the device. Based on the above-mentioned practical and theoretical studies and the results of multi-factor experiments, the change ranges of these factors were determined. Table 3 shows the levels and intervals of change of the factors.

Table 3.

Factor levels and change intervals

No	Factors	Unit of measure	Identification of factors	Interval of change	Levels of factors		
					lower (–1)	main (0)	high (+1)
1.	Spherical plate hole diameter	mm	X1	1	2	3	4
2.	Dust gas velocity	m/s	X2	10.7	7.4	18.1	28.8
3.	The angle of mounting the spherical plate to the device	degree	X3	15	15 o	30 o	45 o
4.	Fluid consumption	m^3/ hour	X4	0.059	0.071	0.13	0.189

The hydraulic resistance of the device (Y1), the energy spent on dust cleaning (Y2) and the cleaning efficiency of the device (Y3) were taken as the evaluation criteria when conducting multi-factor experiments. Assuming that the influence of factors on the evaluation criteria is fully described by a second-order polynomial, experiments (V_4) was implemented based on the plan [2].

In order to reduce the influence of uncontrollable factors on the evaluation criteria, the sequence of conducting experiments was determined using a random number table, and separate experiments were conducted to determine the optimal parameters for cleaning scoperphosphate dust. The results of the experiment are presented in Table 4.

Table 4.

Experimental results obtained using a table of random numbers

X1	X2	X3	X4	Y1	Y2	Y3
-1	-1	-1	1	312	79.6	89.77
1	-1	-1	1	3316	645.3	99.87
-1	1	-1	-1	4728	1209.8	99.98
1	1	-1	-1	4128	989.5	99.91
-1	-1	1	-1	203	52.2	68.5
1	-1	1	-1	177	42.4	66,86
-1	1	1	1	3426	789.3	99.95
1	1	1	1	3316	645.3	99.79
-1	0	0	0	1501	351.3	91.8
1	0	0	0	1326	291.5	97.59
0	-1	0	0	226	51	69.48
0	1	0	0	3427	763.2	99.78
0	0	-1	0	1875	419.6	98.18
0	0	1	0	1222	273.5	96.65
0	0	0	-1	1259	309.3	97.57
0	0	0	1	1542	310.3	98.93
0	0	0	0	1367	306.3	98.41

The following regression equations that adequately represent the evaluation criteria are HARTLI, treating the results of the experiment accordingly– Received under 4 programs:

The hydraulic resistance of the rotary plate scrubber is determined by the following regression equation, Pa;

2470,775+209,5003 X1+1601,823X2-
326,934X3+141,8045X4+
+161,0046X1X1+574,1728X2X2+295,7188X3X3+
+147,6249X4X4-461,386X1X2-
317,93X1X3+440,4072X1X4+0,087585X2X3-
343,963X2X4- 151.66X3X4

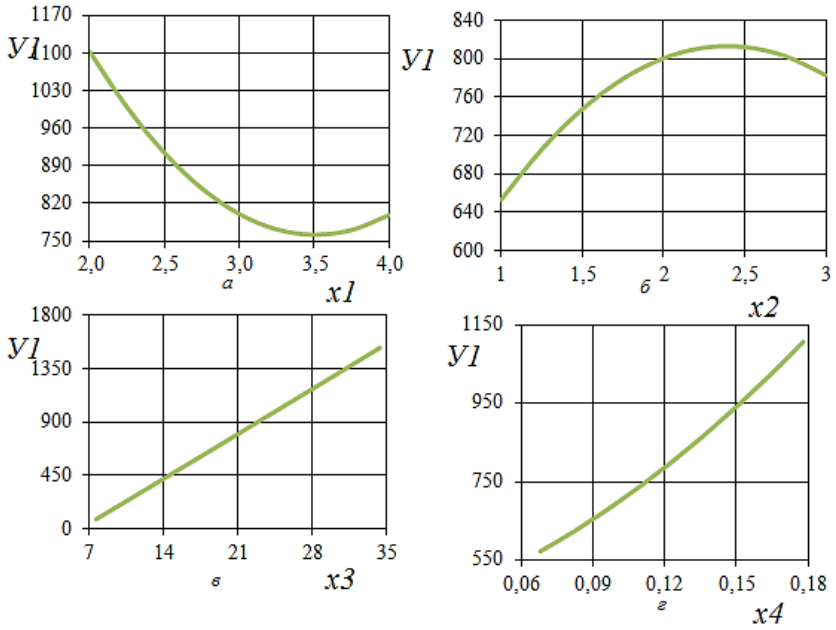
The energy consumption for the superphosphate dust cleaning process is determined according to the following regression equation, kJ/1000m^3

525.1424+13.20617X1+356.413X2-73.1211X3+0.467121X4+ +43.71852X1X1+129.4685 X2X2+68.82625 X3X3+32.07387 X4X4-115.137 X1X2-62.4607 X1X4+81 X1X45 -17.2835 X2X3-101.424 X2X4-4.25413 X3X4

Superphosphate dust removal efficiency is determined by the following regression equation, %

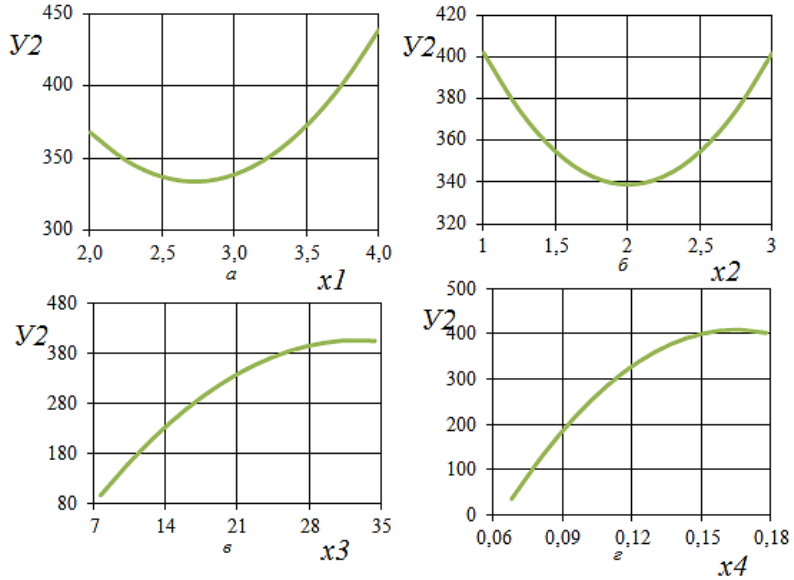
99.66916+1.401656 X1+15.14628 X2-0.76481X3+0.679833X4-0.31127X1X1-10.3738 X2X22.408061X3X3+3.242856X4X4-1.47839X1X3+1.455893X1X3+1.455893X2X084+ ,03727X2X4-5,81982X3X4

Using the regression equation obtained for the superphosphate dust cleaning process and energy consumption, graphs of dependence of cleaning efficiency and energy consumption on the variable factors in the apparatus were constructed. The results are presented in Figures 2, 3 and 4.



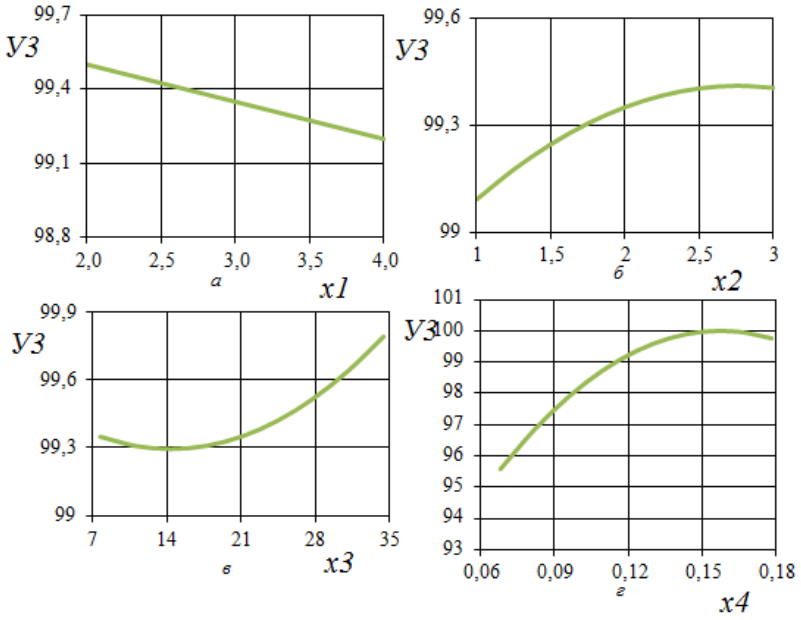
a–dependence of hydraulic resistance on the diameter of the plate hole; b – dependence of hydraulic resistance on gas speed; v - dependence of hydraulic resistance on the angle of installation of the spherical plate on the apparatus; g – dependence of hydraulic resistance on liquid consumption

Figure 2. Dependence of hydraulic resistance on variable factors



a–dependence of energy consumption on the diameter of the plate hole; b – dependence of energy consumption on gas speed; v - dependence of energy consumption on the angle of installation of the spherical plate on the apparatus; g – dependence of energy consumption on liquid consumption

Figure 3. Dependence of energy consumption on variable factor



a–the dependence of cleaning efficiency on the diameter of the plate hole; b – dependence of cleaning efficiency on gas speed; v - dependence of the cleaning efficiency on the angle of installation of the spherical plate on the apparatus; g – dependence of cleaning efficiency on liquid consumption

Figure 4. Dependence of cleaning efficiency on variable factor

As can be seen from the analysis of the obtained regression equations and graphs, all factors have a significant impact on the evaluation criteria. In addition, fluid consumption, dust air velocity, diameter of the plate hole and the angle of installation of the plate on the apparatus are in a complex relationship with the studied factors.

In order to determine the optimal values of factors affecting the researched processes, i.e. hydraulic resistance of the apparatus, cleaning efficiency and energy consumption, regression equations (1), (2) and (3) were solved separately for the superphosphate dust cleaning process. In this case, the condition that the superphosphate dust cleaning efficiency is higher than 98.78% was accepted according to the requirements of GOST-62-198-142 [2]. This task was solved using the Excel program "search for a solution" (poisk reshenia) function on the PK "Pentium IV" computer, and the coded variable factors acceptable values in the form were obtained and changed from coded values to natural values Table 5.

Table 5.

Converting from coded values to natural values

No	Factors	Unit of measure	Conditional designation	Encoded value	Real value
				Superphosphate dust	Superphosphate dust
1.	Spherical plate hole diameter	mm	X1		3.75
2.	Dust gas velocity	m/s	X2		22.6
3.	The angle of mounting the spherical plate to the device	degree	X3		20
4.	Fluid consumption	m^3/hour	X4		0.163

Thus, the optimal parameters of the apparatus for the dust removal process selected for the sample were brought to the standard state and can be written as follows.

For the superphosphate dust removal process;

- The diameter of the hole of the spherical plate, df=3.75 mm
- Dust gas velocity, y=22.6 m/s
- The angle of mounting the spherical plate to the device, b=20 degrees
- liquid consumption, Q_c=0.163 m^3/hour for one nozzle. If we take into account that the number of nozzles in the device is 4, then the liquid consumption is Q_c=0.652 m^3/ hour

At these values of the factors, the energy consumption of the device was 4.2 kW/h, the cleaning efficiency was 99.6691%, and its hydraulic resistance was 2.47 kPa.

Conclusion

According to the experimental results, the cleaning efficiency is 6.03% higher than the existing wet cleaning devices, $1m^3$ it was found that the liquid used for air cleaning is 2 times less and the energy consumption is 0.8 times less, which fully satisfies the technical requirements for this type of equipment.

References:

1. Архипов В.А., Березиков А.П. Основы теории инженерно-физического эксперимента. Томск: Изд-во Томского политехнического университета. – 2008. – 206 с.
2. Кольцов В.Б., Кольцова О.В. Процессы и аппараты защиты окружающей среды. – 2016. – 239стр.
3. Исомидинов А.С. Разработка эффективных методов и устройств очистки пылевых газов химической промышленности: Дисс. … PhD. – Ташкент, 2020. – 118 с.
4. Исомидинов А.С. Исследование гидравлического сопротивления роторно-фильтрующего аппарата // Universum: технические науки. – 2019. – №. 10-1 (67). – С. 54-58.
5. Мадаминова Г.И., Тожиев Р.Ж., Каримов И.Т. Барабанное устройство для мокрой очистки запыленного газа и воздуха //Universum: технические науки. – 2021. – №. 5-4 (86). – С. 45-49.
6. Исомидинов А.С., Тожиев Р.Ж., Каримов И.Т. Чангли ҳавони тозаловчи ротор-фильтрли аппарат фильтрловчи тўрли материалининг актив ва пассив юзаларини аниқлаш. I Международной научно-практической конференции “Актуальные проблемы внедрения инновационной техники и технологий на предприятиях по производству строительных материалов, химической промышленности и в смежных отраслях”. 2019/5/25. Т-3. № 5. 429-431б.
7. Вальдберг А.Ю., Николайкина Н.Е. Процессы и аппараты защиты окружающей среды. – М.: Дрофа, 2008. – 239 с.
8. Rasuljon T. et al. Research of the hydraulic resistance of the inertial scrubber //Universum: технические науки. – 2021. – №. 7-3 (88). – С. 44-51.
9. Исомиддинов А.С., Давронбеков А.А. Исследование гидродинамических режимов сферической углубленной трубы //Universum: технические науки. – 2021. – №. 7-1 (88). – С. 53-58.
10. Isomidinov A.S., Madaliev A.N. Hydrodynamics and aerodynamics of rotor filter cleaner for cleaning dusty gases // LI international correspondence scientific and practical conference" international scientific review of the problems and prospects of modern science and education". – 2018. – С. 29-32.
11. Кобзарь А.И. Прикладная математическая статистика. Для инженеров и научных работников.–Москва: Физматлит, – 2006. – 816 с.
12. Выгодский М.Я. Справочник по высшей математике. – Москва: Наука, – 1972. – 872 с.
13. Isomidinov A. Mathematical modeling of the optimal parameters of rotory filter apparatus for wet cleaning of dusty gases //International journal of advanced research in science, Engineering and technology. – 2019. – Т. 6. – №. 10. – С. 258-264.
14. Isomiddinov A. et al. Application of rotor-filter dusty gas cleaner in industry and identifying its efficiency //Austrian Journal of Technical and Natural Sciences. – 2019. – №. 9-10.
15. Tojiev R.J., Sulaymonov A.M. Comparative analysis of devices for wet cleaning of industrial gases //Scientific progress. – 2021. – Т. 2. – №. 8. – С. 100-108.

PROCESSES AND MACHINES OF AGROENGINEERING SYSTEMS

APPLICATION OF TENSOR CALCULUS OPERATIONS FOR ELASTIC BODIES

Nodir Narbekov
Associate professor vb,
Department of "General Engineering Sciences"
Jizzakh Polytechnic Institute,
Republic of Uzbekistan, Jizzakh

ПРИМЕНЕНИЕ ОПЕРАЦИЙ ТЕНЗОРНОГО ИСЧИСЛЕНИЯ ДЛЯ УПРУГИХ ТЕЛ

Нарбеков Нодир Нарматович
доцент В.Б.,
кафедра «Общие инженерные науки»
Джизакский политехнический институт,
Республика Узбекистан, г. Джизак

ABSTRACT

In this article, the history of scientific research on elastic bodies and the current work, their stability evaluation, tensor calculations for elastic bodies are explained through examples.

АННОТАЦИЯ

В данной статье на примерах поясняется история научных исследований упругих тел и современные работы, оценка их устойчивости, тензорные расчеты упругих тел.

Keywords: external and internal forces, hypothesis, elastic body, stress, stress tensor, principal stresses, stress tensor invariants, stability, theory of elasticity.

Ключевые слова: внешние и внутренние силы, гипотеза, упругое тело, напряжение, тензор напряжений, главные напряжения, инварианты тензора напряжений, устойчивость, теория упругости.

---

1. We can find the first information about determining the strength of buildings in the manuscripts of the great medieval scientist Leonardo da Vinci (1452-1519). However, the great Italian scientist Galileo Galilei (1564-1642) is rightfully recognized as the founder of the theory of stability.

2. In the XVII-XVIII centuries, the science of resistance of materials mainly developed. Hooke, Mariotte, Jacob, Bernoulli, Leonard Euler, Coulomb, Jung and others contributed greatly to the development of this science. Thus, by the second half of the 19th century, the basis of the science of material resistance was created. By this time, it became necessary to create a general theory of a deformable spatial body. French scientist Navye was the first to deal with this issue . In 1821, Navye founded the theory of elasticity with his lecture on the equilibrium equation of a deformable rigid spatial body at the Paris Academy of Sciences.

3. Scientists such as Cauchy, Lyame also contributed greatly to the formation of the theory of elasticity as a science.

4. The next (XIX century) development of the theory of elasticity is associated with the names of many scientists, such as Russian scientist D.I. Juravsky, French scientist Saint-Venant, Russian academician A.V. Gadolin, Professor X.S. Golovin, French scientist Bussineska, Gers, F.K. Yasinsky.

5. In the theory of elasticity, a real body with a complex structure is replaced by a homogeneous body, not taking into account the fact that bodies are made up of a complex structure of atoms. The Saint-Venant principle is widely used in the theory of elasticity. According to Saint-Venant's principle, the stress at a point a certain distance from the external load does not depend on how the load is applied or the nature of the load.

6. Another requirement of the theory of elasticity is the assumption that an elastic body is cohesive. In this case, the elastic body is assumed to be continuous throughout its volume. In the theory of elasticity, a deformable body is considered to be purely elastic, that is, it is assumed that the body returns to its original state after an external load is removed.

7. All operations of the theory of elasticity are based on the correct proportionality between stress and strain, that is, Hooke's law. It should be noted that, in general, the relationship between stress and strain is not strictly proportional. But in the case of small stress and small deformation, if the relationship between them is taken as linear, that is, correctly proportional, then a big mistake is not allowed.

Библиографическое описание: Narbekov N.N. APPLICATION OF TENSOR CALCULUS OPERATIONS FOR ELASTIC BODIES // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16634*

8. An elastic body with uniform characteristics is said to be a body in which the elasticity characteristics of any point of this body are the same in all directions.

9. An elastic body with different properties is a body whose elasticity properties are the same at all points and are different in directions. The classical theory of elasticity requires a body to have the six listed properties.

The first of these properties is the contiguity hypothesis, which means that a body adjacent to a deformer must remain contiguous after deformation. In this, any part of the body, including a very small particle, does not have gaps and discontinuities. The assumption of continuity allows us to consider displacements and deformations as a continuous function of coordinates, and to check them it is possible to use the apparatus of continuous functions of mathematics. If the body is ideally elastic, the relationships between strains and stresses are assumed to be linear. In doing so, a bridge of mutual value is established between stresses and strains for each value of temperature and independent of time.

The elastic body is sufficiently uniform is assumed to have. In other words, displacements of body points are small compared to its linear dimensions, relative elongations (shortenings) and displacement angles are required to be relatively small. The same requirement and the linearity of the relationship between stresses and strains make it possible to apply the principle of independence of force effects. It is known that this principle allows to calculate the effect of the system of forces acting on the body as the sum of the individual effects of each of the forces entering the system.

An ideal elastic body should be homogeneous. This means that under the influence of the same stresses, the same deformations occur at all points of the body. In other words, homogeneity requires considering the quantities characterizing the elastic properties of the body as constant over its entire volume.

lying on an arbitrary field defined by the state vector $M(x_i)$ of a deformed solid body $\vec{n}$. For this, $\vec{n}$ we separate from the body an elementary volume in the form of a tetrahedron, whose dimensions are infinitesimally small and whose three edges are normal to the fourth edge consisting of coordinate planes (Fig. 1.1).

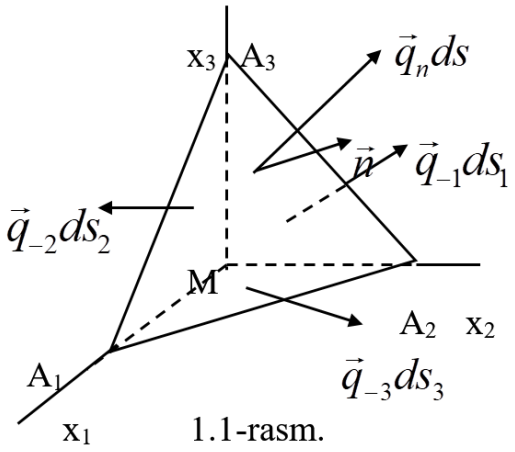


Figure 1. Scheme

$x_1 x_2 x_3$ the basis vectors of the Cartesian coordinate system are denoted $\vec{e}_i$ by , $\vec{n}$ and $n_i = \cos(x_i;\vec{n}), \quad i = 1,2,3.$ the direction cosines of the vector n_i

of the tetrahedron coordinate plains with top - top descender legs in it perpendicular was coordinate Read it number with define : ds_1 with x_1 to the perpendicular was turn on surface , ds_2 and ds_3 s with x_2 and x_3 to the arrows perpendicular was of yqs surfaces is ds determined with while $\vec{n}$ to normal perpendicular was the fourth turn on surface is determined. Then, as we know from the geometry course,

$$ds_i = n_i ds \qquad (1.2)$$

equality is appropriate. In addition to surface forces, the edges of the element are affected by volume. But since we are interested in the stress state of the point, we will infinitely reduce the size of the tetrahedron. In this case, the volume forces also tend to zero, and eventually these forces become zero when the tetrahedron tends to the point. That's why we don't consider volume forces.

Under the influence of external surface forces, the considered element is in a state of equilibrium. Then the principal vector of external forces should be equal to zero, i.e

$$\vec{q}_n ds + \vec{q}_{-1} ds_1 + \vec{q}_{-2} ds_2 + \vec{q}_{-3} ds_3 = 0 \qquad (1.3)$$

equality holds. If we put the expressions (1.1) and (1.2) into the equation (1.3) and remember that the sum is calculated by repeated indices (property of the "gung" index), from the equation (1.3)

$$\vec{q}_n = \vec{q}_i n_i \qquad (1.4)$$

we get an expression.

This equality shows that the stress vector $м$ in an arbitrary field with $\vec{q}_n$ a normal to the body through the point $\vec{n}$ is completely determined by the stress vectors in the coordinate planes and three coordinate planes $\vec{q}_i$ each passing through the point. $м$ Now, using the fact that any vector can be expanded in terms of basis vectors, $\vec{q}_i$ and we write $\vec{q}_n$ the voltage vectors $\vec{e}_j$ in terms of basis vectors as follows:

$$\vec{q}_i = \tau_{ij}\vec{e}_j; \qquad \vec{q}_n = q_{nj}\vec{e}_j, \qquad (1.5)$$

here are the projections of the $\tau_{ij}(j = \overline{1,3})$ magnitude $\vec{q}_i$ vector on the coordinate axes or i the components of the stress vector on the coordinate plane;

-components of the stress vector q_{nj} on an arbitrary field $\vec{q}_n$. In general , the nine components of the three stress vectors $\sigma_{ij}(i, j = 1,2,3)$ in the three coordinate planes $\vec{q}_i(i = 1,2,3)$ will play an important role in our further practice.

Now substituting the first expression of (1.5) into (1.4).

$$\vec{q}_n = \vec{q}_i \cdot n_i = \sigma_{ij} \cdot \vec{э}_j \cdot n_i = \sigma_{ij} n_i \vec{э}_j$$

we get the formula. We put the resulting expression (1.5) on the left side of the second of the expressions: $q_{nj} \cdot \vec{э}_j = \sigma_{ij} n_i \vec{э}_j$ and from the condition of equality of vectors

$$q_{nj} = \sigma_{ij} n_i \qquad (1.6)$$

we form the expression.

the nine components of σ_{ij} the three vectors $\vec{q}_i$ are the components of the second color tensor. This tensor is called T_σ *the stress tensor and* is denoted by It is accepted to write this tensor in matrix form as follows:

$$T_\sigma = \begin{Vmatrix} \sigma_{11} & \sigma_{12} & \sigma_{13} \\ \sigma_{21} & \sigma_{22} & \sigma_{23} \\ \sigma_{31} & \sigma_{32} & \sigma_{33} \end{Vmatrix} \quad \text{or } T_\sigma = (\sigma_{ij}) \qquad (1.7)$$

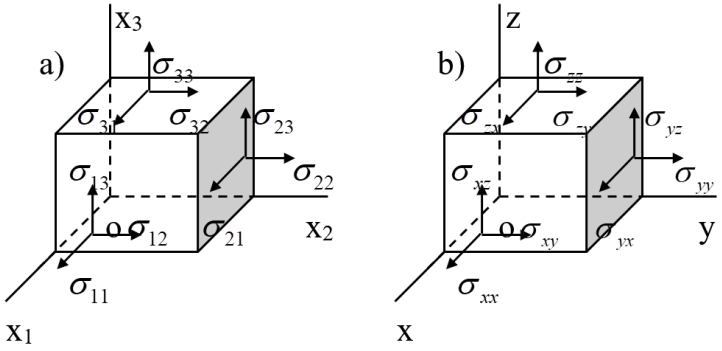
the first index of the components of $\vec{q}_i$ the stress tensor σ_{ij} corresponds to the index of the coordinate axis x_i perpendicular to the field of the stress vector , that is, the first index x_i indicates that this component of the tensor acts in the plane perpendicular to the axis. The second index σ_{ij} indicates the effect of the component in the direction of the coordinate axis. x_j For example: σ_{23} the component x_2 acts in the direction of the axis σ_{11} in the plane parallel to the plane x_3 perpendicular to the component, in $x_1 o x_3$ the direction x_1 perpendicular to $x_2 0 x_3$ the component x_1. Therefore, (1.7) elements of the matrix directed along the coordinate axes σ_{ii} (i do not sum along) or $\sigma_{11}, \sigma_{22}, \sigma_{33}$ the normal stresses in the coordinate plane or T_σ normal components of the stress tensor is called The remaining $\sigma_{ij}\ (i \neq j)$ elements of the matrix are the experimental stresses in the coordinate planes or T_σ stress components of the stress tensor is called

Thus, the components of the stress tensor are normal stresses at a given point and . Therefore, σ_{ij} the components of the stress tensor completely determine the state of stress at a given point of the body. In other words, T_σ if the tensor is known, $\vec{q}_n$ determining the projections of the stress vector on any field passing through the considered point is easily solved using the formula (1.6):

$$\begin{aligned} q_{n1} &= \sigma_{11} n_1 + \sigma_{21} n_2 + \sigma_{31} n_3, \\ q_{n2} &= \sigma_{12} n_1 + \sigma_{22} n_2 + \sigma_{32} n_3, \\ q_{n3} &= \sigma_{13} n_1 + \sigma_{23} n_2 + \sigma_{33} n_3, \end{aligned} \qquad (1.8)$$

If the field under consideration overlaps with the surface surrounding the body or is a part of it, the components $\vec{q}_n$ of the stress tensor $q_{ni}\ (i = 1,2,3)$ will differ from the components of the external surface forces acting on the surface of the body. Then equations (1.8) are conditions on the surface of the body they call it. They connect external forces with internal ones.

It should be noted here that in order to describe the state of stress at a point of the body with planes perpendicular to the coordinate axes around this point, they consider separately the elementary volume consisting of a parallelepiped whose sides are parallel to the coordinate axes and whose edges tend to zero. In this case, the effects of corresponding voltages on each side are depicted by arrows (Fig. 1.2).



1.2-rasm.

Figure 2. Scheme

In the picture, $x_1x_2x_3$ in the Cartesian coordinate system, 1.6 - a picture and typical designations 1.6. - b The picture depicts a parallelepiped.

In conclusion, when solving problems of the theory of elasticity, coordinate systems other than the Cartesian coordinate system are used, in particular, cylindrical and spherical coordinate systems.

References:

1. Rikholmurodov, XXXudoynazarov "Theory of elasticity" Part I-II. Tashkent , 2003.
2. Mamatkulov Sh. Lectures on " Theory of elasticity " . T.: University, 1995.
3. Tymoshenko S.P., Guder J. The field of theory. M., Mir, 1975.
4. Alexandrov A.V. Potapov V.D. "Osnovy teorii uprugosti i plastichnosti" M.Vys.shk. 1990 g. 400 St.

CALCULATION OF ELEMENTS IN CENTRAL COMPRESSION OF DEFORMABLE STRUCTURES

Nodir Narbekov

Associate professor vb,
Department of "General Engineering Sciences"
Jizzakh Polytechnic Institute,
Republic of Uzbekistan, Jizzakh

РАСЧЕТ ЭЛЕМЕНТОВ ПРИ ЦЕНТРАЛЬНОМ СЖАТИИ ДЕФОРМИРУЕМЫХ КОНСТРУКЦИЙ

Нарбеков Нодир Нарматович

доцент В.Б.,
кафедра «Общие инженерные науки»
Джизакский политехнический институт,
Республика Узбекистан, г. Джизак

ABSTRACT

In this article, the determination of the stresses and the calculation of their strengths under the influence of the compressive force of the compressible elements with different cross-sectional surfaces are considered using examples.

АННОТАЦИЯ

В данной статье на примерах рассмотрено определение напряжений и расчет их прочности под действием сжимающей силы сжимаемых элементов с различными поверхностями поперечного сечения.

Keywords: construction, cross-sectional area, stress, strength, compressive element, compressive strength, priority.

Ключевые слова: конструкция, площадь поперечного сечения, напряжение, прочность, сжимающий элемент, прочность на сжатие, приоритет.

All constructions, machines, mechanisms and details used in our daily life must satisfy the conditions of durability, integrity and priority in order to work flawlessly without causing any danger in the working processes. Structural elements must resist various deformations in working conditions. In this process, the correct selection of the material and cross-sectional surfaces of structural elements is the basis for their undamaged operation. In this article, we consider the assessment of the strength of structural elements under the influence of compressive forces.

The compressive elements of constructions include columns, beams, columns and beams of trusses, and some elements. Under the influence of the compressive force N, compressive stress σappears on the cross-sectional surfaces. Wood materials perform well in compression versus elongation. Because, in this case, eyes, cracks and other defects have very little effect on strength. Therefore, for the preparation of compressible elements, materials of type II, i.e., with a calculated resistance R_s =13 MPa, are used. Brushes with a cut surface size greater than 13 cm work relatively well, because in this case the percentage of cut fibers is less than that of boards. Therefore, the calculated resistance is also high, that is, R_c =15 MPa. In particular, this value is much higher R_c =16 MPa in wood with a circular cross-section surface, because in this case the fibers are not cut at all.

The strength and stability of the compressed elements depends on the cross-sectional area (A), their length (l) and the connection of the ends. This relationship φis taken into account by the longitudinal bending coefficient ( ). Compressive wooden elements are calculated according to strength and stability as follows.

$$\sigma = \frac{N}{A} \leq R_c; \sigma = \frac{N}{A \cdot \varphi} \leq R_c$$

The first formula is calculated for strength for elements up to 7 times the thickness of the length of the element, and the second is for priority for elements greater than the above value. If the cross-sectional area is equal to the full surface of the element, or the weakening area does not exceed 1/4 of the total area, then $A_h = A_{br}$. If the above indicator is more than 25%, or if the ratio exceeds 1/4, $A_h = 2/3 \cdot A_{nt}$ is equal. If the weakened surfaces extend to the outer edges, or if there is a non-symmetrical weakening, then $A_h = A_{nt}$. Longitudinal bending coefficient is φrelated to the calculated length of the element (l_0), the radius of inertia of the cross-section surface (r) and the elasticity of the rod (λ)

depends. $\lambda = l_0 / r$. Then, $\varphi = 3000 / \lambda 2$ if $\lambda > 70$; $\varphi = 1 - 0.8$

(λ/100)2 will be if $\lambda \leq 70$. The calculated length depends on the connection of the ends of the compression rods (Fig. 1).

Библиографическое описание: Narbekov N.N. CALCULATION OF ELEMENTS IN CENTRAL COMPRESSION OF DEFORMABLE STRUCTURES // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16635*

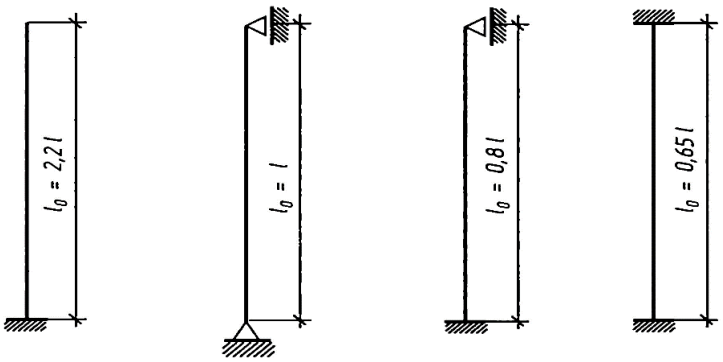


Figure 1. Calculation scheme of central compressible struts

The radius of inertia of the cross-section surface (r) depends on the cross-sectional area (A) and the moment of inertia of the cross-section surface (J).

$$r = \sqrt{\frac{J}{A}}$$

The radius of inertia is 0.289h for cones and 0.25d for circular materials. The elasticity of the compressive elements λis also limited ( ), and this value is as follows.

a) up to 120 for columns and belts of trusses;

b) up to 150 for other elements;

c) for compressible connectors it is up to 200;

If the elasticity of the cross-sectional surface λand φthe corresponding calculated resistance R_s are known, the load-carrying capacity of the compressible element is determined as follows

$$N = \varphi \cdot A \cdot Rc$$

The deformation scheme of the compressed element is presented in Fig. 2.b.

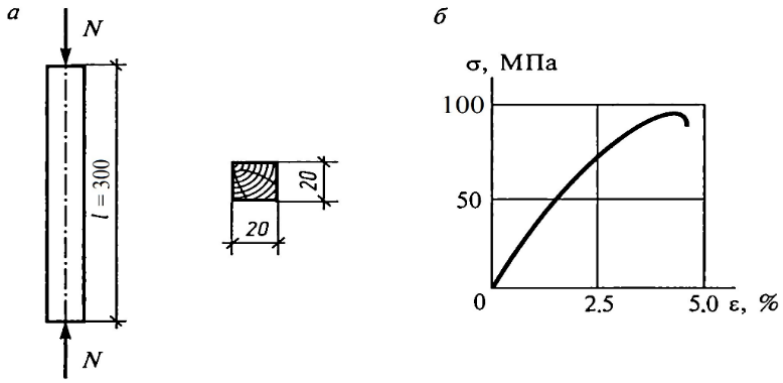


Figure 2. a) standard sample; b) longitudinal stress and deformation connection diagram

If λthe value of ductility ( ) is given, then the longitudinal bending coefficient (φ) can be determined from the Euler curve. φis always less than 1.

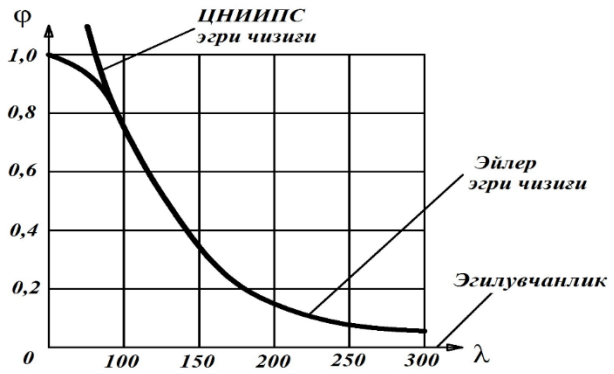


Figure 3. Longitudinal bending coefficient and ductility diagram

Thus, the value of the longitudinal bending coefficient is determined, and the strength of the compressible elements is checked by the formulas given above.

It can be seen that the structural elements not only resist compressive deformation, but also resist longitudinal bending when under compressive force. In short, when calculating construction elements, the material from which they are made and the surface of the cross section should be taken into account, and their strength should be checked.

References:

1. T. Mamatkulov Wooden and plastic constructions. Study guide Samarkand 2019.
2. K.M. Mansurov Resistance of materials. Textbook. Tashkent 1983.
3. N.N.Narbekov Resistance of materials. Textbook. Tashkent 2023.
4. A. Usmankulov., K. Ismayilov., O.K. Odilov., Sh.R. Yakhshiboev Resistance of materials. Study guide. Tashkent 2018.
5. Narbekov N.N. Preparing students for innovative engineering activities as a pedagogical problem // Proryvnye Nauchnye Islandovania Kak Engine Nauki : collection state Mejdunarodnoi nauchno - practical conference (February 12 , 2022 , Kaluga city).- Ufa : OMEGA. - 2022. - S. 15.
6. Igamberdiev, Kh.Kh., & Narbekov, N.N. (2021). Puti razvitii professionalnoy competentsii budushchix prepodavateley. Universum: technical science , (5-1 (86)), 32-34.
7. Narmatovich, N.N. (2021). Methodology Of Training Engineers For Professional Activity On The Basis Of Module-Competent Approach. húnándàxuéxuébào (zìránkēxuébǎn) , 48 (12).

CIVIL ENGINEERING AND ARCHITECTURE

DOI - 10.32743/UniTech.2024.118.1.16657

APPLICATION OF UNMANNED AERIAL VEHICLE TECHNOLOGIES IN CONSTRUCTION

Denis Popov
Master's degree
Don State Technical University,
Russia, Rostov-on-Don
E-mail: popovdv.rnd@gmail.com

ПРИМЕНЕНИЕ ТЕХНОЛОГИЙ БЕСПИЛОТНЫХ ЛЕТАТЕЛЬНЫХ АППАРАТОВ В СТРОИТЕЛЬСТВЕ

Попов Денис Викторович
магистр,
Донской государственный технический университет,
РФ, г. Ростов-на-Дону

ABSTRACT

When implementing an information modeling model for capital construction projects, one of the most important problems is the collection and harmonization of data collected during construction on the geometric parameters of the construction object and territory at the stages of investment evaluation, design, production and operation. Within the framework of this article, a comprehensive scientific and technical solution is presented, based on the combination of methods for diagnosing construction objects, monitoring ongoing construction works, as well as technologies for automated identification of the number of necessary works using remote sensing technologies using unmanned aerial vehicles and information modeling (BIM technologies).

АННОТАЦИЯ

При внедрении модели информационного моделирования для объектов капитального строительства одной из важнейших проблем является сбор и согласование собранных в ходе строительства данных о геометрических параметрах объекта строительства и территории на этапах инвестиционной оценки, проектирования, производства и эксплуатации. В рамках данной статьи представлено комплексное научно-техническое решение, основанное на сочетании методов диагностики строительных объектов, мониторинга проводимых строительных работ, а также технологий автоматизированного определения количества необходимых работ с использованием технологий дистанционного зондирования с использованием беспилотных летательных аппаратов и информационного моделирования (BIM-технологии).

Keywords: monitoring, point cloud, unmanned aerial vehicle, capital construction facilities, design automation.

Ключевые слова: мониторинг, облако точек, беспилотный летательный аппарат, объекты капитального строительства, автоматизация проектирования.

Collection, coordination and systematization of information about the building and territory under construction, including geodetic surveys, geodetic monitoring, information on the degree of execution of the construction plan, as well as data on the final quality and quantity of work performed, is one of the most pressing problems of modern capital construction when creating and implementing an information modeling system, especially at the stages of investment assessment profitability of the facility, creation of its project, direct construction and operation. Because of this, the process of monitoring the construction work performed and the parameters of the construction object is greatly complicated, and the construction process itself may be delayed or involve financial losses that can reach 30% of the initial cost of the project. At the same time, it is worth noting that currently 4D modeling technology is the creation of a one-time and non-updatable predictive model of a future construction object. If one or more processes deviate from the original plan during the construction process, then this model is no longer predictable and is subject to change or addition of input data.

According to the authors of the study, this problem can be solved through an integrated approach that allows from a scientific and technical point of view to diagnose a construction object, monitor the construction process, as well as automate the determination of the volumes of work required for construction using remote sensing

Библиографическое описание: Popov D. APPLICATION OF UNMANNED AERIAL VEHICLE TECHNOLOGIES IN CONSTRUCTION // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16657*

technologies that combine unmanned aerial vehicles and information modeling technologies (BIM technologies).

According to the Code of Rules of the Russian Federation regarding construction works, the following rules are distinguished that regulate the processes of monitoring construction, including geodetic, as well as the processes of using BIM technologies:

- SP 333.1325800.2020 "Information modeling in construction. Rules for the formation of an information model of objects at various stages of the life cycle";
- SP 471.1325800.2019 "Information modeling in construction. Quality control of construction works";
- SP 317.1325800.2017 "Engineering and geodetic surveys for construction. General rules of work";
- SP 126.13330.2017 "SNiP 3.01.03-84 Geodetic works in construction".

The use of BIM modeling technologies is mandatory for the construction of capital facilities at the expense of budgetary funds, starting from January 1, 2022. This suggests that at the present stage of development of the construction sector, digitalization of these processes while maintaining previously formed requirements for the composition and volume of information and indicators collected is an important part of construction production and control over it.

Based on this, one of the primary tasks is to identify a number of technologies, taking into account already developed strategies and new, information-modeled ones that can be used within the framework of construction processes already today. These technologies also include 4D modeling. In addition, ground-based laser scanning (NLS) technologies are highlighted, which allow you to track the geometric parameters of the object being built and create objects with greater accuracy, as well as air laser scanning (VLS) technologies, whose task is to design detailed digital models of the territory of the object being built. Also, among these technologies, special photogrammetry methods are distinguished in order to more accurately and realistically recreate geo-linked models of buildings and territories under construction.

A feature of these types of technologies is the transmission of data in the form of a dense point cloud (point cloud), which is tied to a specific geolocation. This feature allows you to combine these methods of collecting geospatial information, taking into account the shortcomings of each of them and the possibility of using the most effective methods. When choosing technologies for measuring and collecting information, it is impossible to exclude such previously developed methods as total stations, the use of laser rangefinders, theodolites, levelers and other geodetic equipment.

The authors of this article focus on the specifics of technologies such as radar, radar and photogrammetry, that is, on those methods of data collection that allow you to obtain additional data (for example, in the form of a billion points, allowing you to determine the position of an object in space), speed up field work (for photogrammetry and radar), collect large-scale volumes information about tens and hundreds of hectares for extensive and areal objects, as well as visualize the data obtained visually. Let's take a closer look at each technology based on modern research works:

1. Ground laser scanning. This technology is implemented through the use of a laser scanner – a special method of shooting that allows you to calculate the distance from the scanner itself to the object being built at a speed of thousands to a million points per second. Another feature of this technology is the ability to fix both horizontal and vertical angles of an object and recreate it as a three-dimensional model from a point cloud. It is characteristic that the scanner itself may not move at the same time and fix the image from several static positions, after which the resulting images are combined into a single point cloud, which allows you to continue collecting information. As an inertial navigation system (INS or IMU – a special measuring unit that allows you to record the angles of inclination and rotation of the scanner), a visual navigation system (VNS) and a satellite global navigation system (GNSS), the laser scanner can also be mounted on a mobile vehicle or moved manually. In addition, information about where the scanner is located allows you to simulate a point cloud at the same second.

2. Aerial laser scanning. Like the previous technology, the VLC is equipped with a laser scanner that collects information about the object. The difference of this technology is that the scanner is initially equipped with inertial and satellite navigation systems, which allows it to be used as part of unmanned vehicles (UAVs) and improve the acquisition and recording of geodata.

3. Using photogrammetry methods. A specific feature of this technology is the determination of the location of a point in space using its images. Both conventional digital images and analog ones can be used in this case. The camera itself does not matter, as well as what range of visibility is depicted in the picture. Also, the picture can be taken with the help of an unmanned vehicle, and manually. If there are navigation systems on the camera, this data collection method can also read information about the camera's position in space. Based on the obtained images, the photogrammetry method allows you to create a point cloud, orthophotoplanes, digital terrain and landscape models, polygonal and textured models for further decoding.

Each of the three methods has both advantages and disadvantages. In accordance with the qualitative criteria, they are presented in Table 1:

Table 1.

Comparison of methods by qualitative criteria

Name of the criterion	Ground-based laser scanning	Aerial laser scanning	Photogrammetry
Cost	High	High	Low
Accuracy of the received data	High (up to 1-2 mm)	Medium (3-5 cm in plan and height)	Medium (3-5 cm in plan and height)
The speed of data collection (relative to the volumes received)	Average	High (tens of hectares per hour of flight, depending on the required density)	High (tens of hectares per hour of flight, depending on the required density)
Data processing speed	Medium (requires significant computing power for large amounts of data)	High (as a rule, the output data is already in a single point cloud, requiring only equalization in the coordinate system)	Medium (requires significant computing power for large amounts of data)
Features	Low mobility (in the case of static laser scanners) allows you to receive data on a small area, but with high accuracy, including indoors. It may be difficult to collect data in some areas (roofs, elements "in the shade")	It is possible to obtain data on the terrain covered by vegetation (forest or grass), access to hard-to-reach areas (roofs, impassable territories) is possible	It is possible to access hard-to-reach areas (roofs, impassable territories), visual visualization of the obtained materials is possible (textured polygonal model), there is a strong dependence of the quality of the material on the shooting conditions

After analyzing the data in the table, we can conclude what a comprehensive model of monitoring and diagnostics of capital construction projects under construction should look like, including the use of all technologies, as well as remote research methods from drones, at different life stages.

Based on the previously identified positive features of information collection technologies, a technology can be proposed that allows using the advantages of ground and air scanning, as well as the photogrammetry method. With the help of the proposed technology, it is possible to obtain data in the form of a single digital model of the object being built or its separate element in the form of a point cloud, a digital or polygonal model of the territory, an orthophotoplane.

The integrated use of three types of technologies makes it possible to move away from the use of BIM technologies, the main disadvantage of which is the need for constant updating of data on the construction object. In the case of the proposed model, the data will be automatically updated due to the regular correlation of the object's information model with its geometric characteristics in reality through the use of digital diagnostic tools for the object and the territory around it. In addition, the integrated model allows you to separately consider the elements of the construction object, take into account the peculiarities of the surrounding infrastructure and landscape relief.

Figure 1. Drones on the construction site

The technology proposed in this study has been tested and implemented at pilot facilities, as well as used to solve certain construction tasks at such life stages of the facility as:

- construction of a model of the object and the adjacent territory in digital form;
- measurement of the amount of work required, as well as control over the quality of their performance (excavation, installation of enclosing and load–bearing structures);
- monitoring and evaluation of the quality of construction work, as well as the degree of their compliance with geometric parameters;
- making changes to the digital model of a construction object, tracking structural damage using visual assessment, etc.

The technology described in the article was used in infrastructure construction projects, as well as in environmental monitoring of construction sites.

The proposed technology was used to identify the actual volumes of solid household waste in unauthorized warehouses in order to determine the material damage suffered. Also, with the help of Technology, the features of the facades of individual housing non-residential buildings as part of a single complex and an underground parking lot were studied, which made it possible to determine the degree of deterioration of the facade of the building due to violations of the rules when cocking a construction object. In particular, the technology was used in other similar projects.

The introduction of the Technology allows us to conclude about the effectiveness of its practical use. Thus, this Technology allows you to fully evaluate and monitor all construction processes, as well as monitor compliance with geometric parameters, without resorting to the direct participation of highly qualified specialists during construction. As a result, the data obtained showed that the advantage of using the Technology is to reduce financial costs of up to ten million rubles per thousand hectares of a construction object, as well as reduce the amount of construction waste by 10%, and reduce the time spent on construction by up to 20%.

The technology considered in this article for evaluating capital construction projects at all life stages using remote sensing methods using unmanned means and previously created accurate digital models of the object under construction has a number of advantages, one of which is the ability to make timely changes to the previously created model taking into account geometric data, which makes it easier to process construction production. As a result, the risks of disrupting the construction schedule, as well as possible financial losses and losses associated with the violation of the start date of the facility are reduced. The technology of unmanned aerial vehicles in combination with remote sensing methods also reduces the number of hours spent studying information about a construction site, while the volume and accuracy of the collected data increases.

Also, the use of this technology makes it possible to use less manual measurement of geometric data with the help of special devices, because the information collected by drones allows you to remotely decrypt it, without direct participation in the collection process. This also entails a reduction in the costs associated with the payment of physical labor and the time to search for them, which will reduce the number of employees by improving their skills.

In addition, this technology allows the use of spatial analysis, which will increase the number of ways to classify individual building elements. The use of drones for diagnostic sensing also makes it possible to develop new methods that are aimed at automatically updating the schedule of construction work based on a comparison of the planned amount of work obtained by 4D modeling and the actual one obtained on the basis of a regularly updated digital model of the project. This requires a subsequent study of the possibilities of analyzing geometric space and topological comparison of two types of models, taking into account their use in construction production, which allows the introduction and adaptation of BIM technologies at all stages of construction.

References:

1. De Melo, R.R., Costa, D.B., Álvares, J.S., Irizarry, J.: Applicability of unmanned aerial system (UAS) for safety inspection on construction sites. Saf. Sci. 2017. 98. Pp. 174–185.
2. Outay, F., Mengash, H.A. and Adnan, M.: Applications of unmanned aerial vehicle (UAV) in road safety, traffic and highway infrastructure management: Recent advances and challenges. Transportation Research Part A: Policy and Practice. 2020. 141. Pp. 116–129.
3. Barmpounakis, E., Sauvin, G.M., Geroliminis, N.: On the new era of urban traffic monitoring with massive drone data: The pNEUMA large-scale field experiment. Transport. Res. Part C: Emerg. Technol. 2020. 111. Pp. 50–71.
4. Dupont, Q.F., Chua, D.K., Tashrif, A., Abbott, E.L.: Potential applications of UAV along the construction's value chain. Procedia Eng. 2017. Pp. 182. 165–173.
5. Álvares, J.S., Costa, D.B. and Melo, R.R: Exploratory Study of Using Unmanned Aerial System imagery for construction site 3D mapping. Construction Innovation. 2018. Pp. 1471-4175.
6. Travush V.I.: Digital technologies in construction // Academy. Architecture and construction. 2018. No. 3. pp. 107-117.
7. Adamtsevich L.A., Kharisov I.Z.: Overview of Industry 4.0 technologies for the development of a remote control system for a construction site // Construction and architecture. 2021. Vol. 9 No. 4(33). pp. 91-95.
8. Avetisyan R.T., Bilonda T.E., Kazaryan R.R.: Prospects for the development of automated control of a construction site based on data from drones // Construction production. 2019. No. 3. pp. 29-32.

TRANSPORT

DOI - 10.32743/UniTech.2024.118.1.16637

CAR MAINTENANCE IN UZBEKISTAN

Mukaddas Mamasalieva
Acting Associate Professor,
Tashkent State Technical University named after Islam Karimov.
Republic of Uzbekistan, Tashkent
E-mail: mamasaliyevamuqaddas@gmail.com

ТЕХНИЧЕСКОЕ ОБСЛУЖИВАНИЕ АВТОМОБИЛЯ В УЗБЕКИСТАНЕ

Мамасалиева Мукаддас Ибадуллаевна
и.о.доц.
Ташкентского государственного технического университета
имени Ислама Каримова,
Республика Узбекистан, г. Ташкент

ABSTRACT

This article provides a general overview of the state of timely maintenance of road transport in the Republic of Uzbekistan. Periodic maintenance of the car to reduce the risk of emergencies is substantiated.

АННОТАЦИЯ

В данной статье приводится общий обзор по состоянию своевременного технического обслуживания автомобильного транспорта в Республике Узбекистан. Обосновано периодическое техническое обслуживание автомобиля для снижения риска возникновения аварийных ситуаций.

Keywords: car, wear and tear, maintenance, fuel, production, energy saving.
Ключевые слова: автомобиль, износ, техническое обслуживание, топливо, производство, энергосбережение.

At the present time, when Uzbekistan is an integral part of the international community and the global financial and economic market, in order to modernize the national economy, technical and technological re-equipment of industries and production of products that meet the requirements of world standards, one of the urgent tasks is the training of personnel - specialists on the basis of new requirements and methods, teaching them modern knowledge [1].

Automobile industry is the youngest industry created in our independent state. In an unprecedentedly short period of time, a uniquely equipped automobile production has been created and is successfully developing in our country. The new industry is now becoming a powerful locomotive for the development of the entire economy of Uzbekistan

Mechanical engineering is the leading branch of the whole industry, its "core". The products of machine-building enterprises play a decisive role in the realization of scientific and technological progress in all areas of the national economy. The quantitative and qualitative peculiarity of automobile rolling stock that has developed in the Republic of Uzbekistan requires the solution of a set of scientific problems on economic and social support of the development of the transport complex. Changes that are currently taking place in the macroeconomy, affect all aspects of society. As it is known the ecological safety of vehicles is the most important part of industrial ecology, which considers the impact of machinery on the environment, determined by thermal and vibroacoustic impact on the environment. It is also necessary to consider the technogenic impact on the environment of the process of creating a car, which is characterized by the volume of emissions of harmful substances, oxygen consumption and energy consumption to obtain structural and operational materials.

Recently, the Republic has been continuously developing the service industry. As a result of development and improvement in the structure of the service market, new promising types of services have appeared - bank, finance, insurance, information communication and others. The sharp increase in the use of complex household appliances, computers and cars by the population has led to an increase in their service areas [6].

"Service" in translation from the English word "SERVICE" means service, rendering of service. Modern car service in many countries of the world has a widely branched and well-established network of enterprises, both for servicing cars, and for trade in spare parts and materials for them, as well as their storage [3].

Therefore, correctly selected and observed periodicity and lists of service operations are one of the main mechanisms of influence of engineering and technical staff of service enterprises on the level of serviceability

Библиографическое описание: Mamasalieva M.I. CAR MAINTENANCE IN UZBEKISTAN // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16637*

of vehicles, as well as on fuel consumption, environmental pollution and resources of vehicles and units.

A car, even in good condition, is a source of increased danger, and driving it requires a certain level of knowledge and skills. Periodic maintenance of the vehicle is necessary to ensure stable operation of all its units and assemblies, and also contributes to extending its service life.

Driving a technically sound vehicle will not only reduce the risk of accidents, but will also save the driver from being fined or having the car towed by traffic patrol officers.

Even a new car requires close attention of the driver - the slightest malfunction can provoke an accident or cause a more serious problem that will take a lot of time and money to fix [3].

A new car purchased in a car dealership is under warranty service at the dealer, and the car owner is obliged to visit the service at a certain mileage or after a period of time set by the manufacturer. Failure to fulfill this condition entails loss of warranty, and in case of detection of factory defects it will be necessary to eliminate them at your own expense, which is often much more expensive compared to the funds spent on maintenance.

Owners of old cars, deprived of warranty, also should not neglect periodic visits to the service station - a timely detected malfunction in the future will help to avoid significant repair costs. Failure to perform repair and preventive maintenance can cause many problems.

For example, untimely engine oil change leads to engine failure. Over time, the engine oil loses its lubricating properties, and as a result, the cylinder-piston group suffers. Compression and oil rings due to insufficient lubrication begin to rub against the cylinder walls, in parallel destroying the perfectly smooth coating of the walls themselves. This leads to increased oil consumption, soot on the pistons and valves, reduced engine thrust and unstable operation. Increased oil consumption may cause insufficient oil level in the engine, leading to piston jamming or connecting rod breakage [4, 2].

As a result, the engine cannot be restored, although the cost of timely engine oil change is not even a tenth of the cost of a new engine. Each manufacturer personally establishes the frequency of oil change, usually it is 8-10 thousand kilometers of mileage.

Modern cars have many indicators that tell the driver of various faults, including low washer fluid levels, a non-functioning headlight bulb, or worn pads. This helps minimize the daily maintenance of the car - often it consists of washing or wiping the windows and headlights. But it is still worth paying enough attention to the vehicle a couple of times a week and checking the technical condition of all its systems [4].

Numerous researches show that up to 70-80 % of machine failures occur due to wear of friction units. In our country a lot of money is spent annually on repair of machines and equipment, a great number of spare parts are produced, a large park of machine-tool equipment works for repair, more and more people are involved in the sphere of repair and maintenance of machines.

Operation of machinery in the climatic conditions of the Central Asian republics, characterised by an abundance of light and heat, strong winds and dust storms, low air humidity and high plus temperature, leads to a sharp - 1.5-2 times compared to the zone of temperate climate - decrease in the efficiency of machines and mechanisms.

In the hot climate zone, machines operate at high temperatures, intense solar radiation, dust storms, low relative air humidity and high dust content. In dusty air the size of dust particles varies widely - from <0,005 to 0,6 mm and more, dust contains up to 80-95% of quartz and oxides of aluminium, calcium, iron. Service life of machines in such conditions is sharply reduced, intensity of wear of parts increases 2-10 times, and -~80% of them are out of service due to abrasive wear [2].

High wear resistance of fast wearing parts is the key to ensuring reliability and durability of machines.

References:

1. Diagnostics and maintenance of machines / A.D. Ananyin, V.M. Mikhlin, I.I. Gabitov et al. - Moscow: Prospect, 2008. - 440 p., ill.
2. Ishmuratov H.K, Mirzaev N.N, Abdullaeva B and Mamasalieva M.I. Energy analysis of wear sliding friction units 2023 E3S Web of Conferences 383 04019
3. Kleiner B.S. Technical maintenance and repair of automobiles. -M.: Transport, 1986. - 289 c.
4. M. Kazopoulo, I. Kaysi, M. El Fadel. Transportation Research Part D: Transport and Environment. (2007) A stated-preference approach towards assessing a vehicle inspection and maintenance programme pp. 55-61.
5. Mamasalieva M.I. State and prospects of rational use and reduction of losses of fuel and lubricants of the Republic of Uzbekistan. Moscow. Assembling in mechanical engineering and instrument making. Vol. 21 3(236) 2020 pp 141-145.
6. Mamasalieva M.I. State of fuel and energy resources and their rational use in the agro-industrial sector of the Republic of Uzbekistan 2023 E3S Web of Conferences 401 03052

TRANSPORT, MINING AND CONSTRUCTION ENGINEERING

DOI - 10.32743/UniTech.2024.118.1.16654

DETERMINATION OF THE INFLUENCE OF COMPOSITION MODIFIERS BASED ON SECONDARY POLYMER MATERIALS ON THE CORROSION OF THE PIPELINE SYSTEM

Ahmadjon Ibadullaev
Professor,
Tashkent State Transport University,
Republic of Uzbekistan, Tashkent
E-mail: umarttymikq25@gmail.com

Askar Babaev
Docent,
Tashkent State Transport University,
Republic of Uzbekistan, Tashkent

Umar Chorshanbiev
Doctoral student,
Tashkent State Transport University,
Republic of Uzbekistan, Tashkent

Sultanmurod Kurbanov
Doctoral student,
Tashkent State Transport University,
Republic of Uzbekistan, Tashkent

Lobar Elmuratova
Assistant,
Tashkent State Transport University,
Republic of Uzbekistan, Tashkent

ОПРЕДЕЛЕНИЕ ВЛИЯНИЯ МОДИФИКАТОРОВ СОСТАВА НА ОСНОВЕ ВТОРИЧНЫХ ПОЛИМЕРНЫХ МАТЕРИАЛОВ НА КОРРОЗИЮ ТРУБОПРОВОДНОЙ СИСТЕМЫ

Ибадуллаев Аҳмаджон
профессор,
Ташкентский государственный транспортный университет,
Республика Узбекистан, г. Ташкент

Бабаев Аскар Рузибадалович
доцент,
Ташкентский государственный транспортный университет,
Республика Узбекистан, г. Ташкент

Чоршанбиев Умар Равшан ўғли
аспирант,
Ташкентский государственный транспортный университет,
Республика Узбекистан, г. Ташкент

Курбанов Султанмурод
аспирант,
Ташкентский государственный транспортный университет,
Республика Узбекистан, г. Ташкент

Библиографическое описание: DETERMINATION OF THE INFLUENCE OF COMPOSITION MODIFIERS BASED ON SECONDARY POLYMER MATERIALS ON THE CORROSION OF THE PIPELINE SYSTEM // Universum: технические науки : электрон. научн. журн. Ibadullaev A. [и др.]. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16654*

Элмуратова Лобар
ассистент,
Ташкентский государственный транспортный университет,
Республика Узбекистан, г. Ташкент

ABSTRACT

In the article, the problems of the pipeline system used in the transportation of beneficiation residues in the state of hydromixing in the mining industry, copper beneficiation factory are studied. The parameters of the flow affecting the production of pipes are defined. The influence of the modification of dispersed systems in the hydraulic mixture on the pipe wall was studied, while studying the methods of improving the characteristics of the flow parameters, reducing the production of the pipeline system, and increasing the service life and efficiency. The flow of dispersed system hydromix without modifier and with modified condition was studied in reducing pipe construction. As a result of the conducted research, it was possible to increase the service life of the pipe by 29% and 31%, respectively, by the mass and thickness, and the overall average efficiency of the pipe by 30%.

АННОТАЦИЯ

В статье изучены проблемы трубопроводной системы, используемой при транспортировке остатков обогащения в состоянии гидросмешивания в горнодобывающей промышленности, меднообогащающем комбинате. Определены параметры потока, влияющие на производство труб. Изучено влияние модификации дисперсных систем в гидравлической смеси на стенки трубы при изучении методов улучшения характеристик параметров потока, снижения производительности трубопроводной системы, увеличения срока службы и эффективности. Исследовано течение гидросмеси дисперсной системы без модификатора и в модифицированном состоянии в конструкции редукционной трубы. В результате проведенных исследований удалось увеличить срок службы трубы на 29% и 31% соответственно по массе и толщине, а общий средний КПД трубы - на 30%.

Keywords: hydromix, dispersed system, composite modifier, pipe, dissolution, hydrotransport.
Ключевые слова: гидросмес, дисперсная система, композиционный модификатор, труба, растворение, гидротранспорт.

Introduction. Today, in the mining industry, hydrotransport systems are used to transport waste from the enrichment plant in a hydromixed state [1, 2, 3]. It remains an urgent issue to reduce the wear and tear of the hydrotransport systems in use, to increase the service life and efficiency [2, 3]. The stress on the pipe walls during the flow of the coarse dispersed systems in the hydraulic mixtures, the formation of hydraulic resistance due to the friction of the dispersed systems, and the corrosion problems caused by the elements contained in the hydraulic mixture are considered to be the branches for solving the problem. The construction of pipe walls leads to an increase in operating costs. One of the most important tasks to increase the service life and efficiency of pipelines, to reduce the friction and wear of dispersed systems in the hydraulic mixture is to reduce the effect on the pipe during the flow of the hydraulic mixture [1, 5].

In the article, the use of the method of modifying the dispersed systems in the hydromix with composite compounds is recommended as a modifier of the composite compound based on secondary organic materials.

Research object and method. As a research object, a system of pipes used in the transportation of waste from a mining industry copper beneficiation plant was taken. In order to increase the stability of the pipelines, prolong their service life and increase their efficiency, the indicators of the pipeline system were studied based on GOST 9.908-85 and GOST 10704-76. For the modification of dispersed systems, we used a composite compound based on secondary organic materials as a modifier.

Research results and discussion. Pipe production was studied on the basis of pipes with D=720 mm and thickness of 12 mm in our facility. 1.5 m steel pipes with a weight of 6,435 kg D=50 mm and a thickness of 3,8 mm were used to determine the yield. The test process was carried out in 2 stages, in the 1st stage we measured the actual weight of the pipe m_0 (the actual weight was 6,435 kg), prepared a hydromix with a concentration of 25% from waste slag from the 2-MBF and observed its movement in the pipe for 8 hours. Then the pipe was removed and re-measured, and the volume was determined in mass units based on the formula (1-5):

$$\Delta m = \frac{m_0 - m_1}{S} \text{ kg/m}^2 \quad (1)$$

Here m_0 – the weight of the sample before the test, kg; m_1 – sample weight after testing, kg; S – surface of the sample, m^2.

Also, the share of production as a result of hydromix movement was as follows:

$$m_{mel} = \frac{m_0 - m_1}{m_0} 100\% \quad (2)$$

The maximum deflection of a pipe with D=50 mm is allowed up to 42% of the total weight, therefore, if we calculate the service life:

$$E_{av.th} = \frac{(100-42)}{m_{mel}} \text{ , day} \quad (3)$$

In the experimental test, taking into account the dimensions of the sample, the change in thickness

of the sample due to mass loss, ΔL mm, was calculated as follows:

$$\Delta L = \frac{\Delta m}{\rho}, \text{ mm} \quad (4)$$

Here Δm – mass loss per area units of the sample, kg/m^2;

ρ – the density of the pipe material kg/m^3.

The thickness of our chosen pipe is 3,8 mm, the limit yield thickness is 1,2 mm, and the average service life up to the limit yield thickness was as follows:

$$E_{av.th} = \frac{(3{,}8-1{,}2)}{\Delta L}, \text{ day} \quad (5)$$

Secondary organic substances - gossypol tar, carboxymethylcellulose, secondary adsorbents (Alkanolamines) produced as a result of natural gas processing were used in the preparation of the composite compound for use as a modifier [6, 7].

We added the prepared composite compound to the hydraulic mixture at a ratio of 80 g/t and observed the behavior of the modified hydraulic mixture in the pipe. Based on the conducted studies, the influence of the dispersed systems in the hydraulic mixture on the pipe parameters and the changes in the parameters after the modification of the dispersed systems were calculated.

We mentioned above that the dispersed systems in the hydraulic mixture moving in the pipe rub against the pipe walls during the flow. The weight of the pipe is lost per unit of surface area as a result of friction. We determined the loss of pipe weight per surface area under the influence of dispersed systems for 8 hours in laboratory conditions, and to reduce it, we modified the dispersed systems using composite compounds prepared on the basis of local raw materials, and we observed the behavior of the hydromix with the modified dispersed system in the pipe again for 8 hours. Based on the experiments, we found that the effect of the dispersed systems modified with the composite compound on the pipe wall was reduced by 31% in the case of kg/m^2 (Fig. 1).

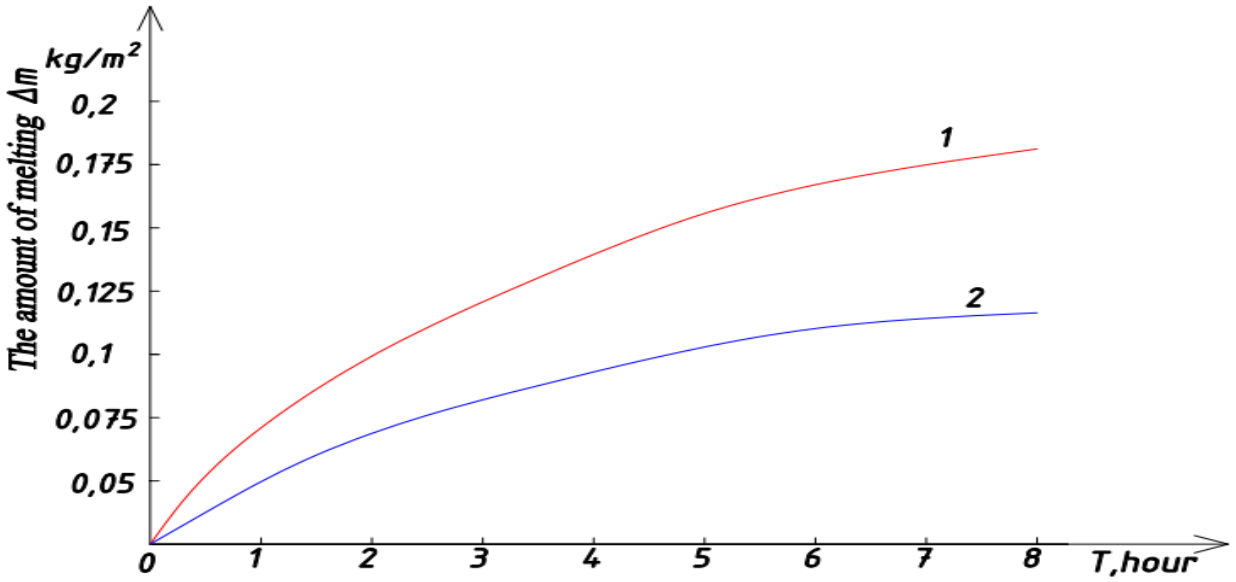


Figure 1. To reduce the weight-to-surface ratio of piping:
1- situation before the modification of dispersed systems moving in the pipeline; 2 - state after modification

During the use of the pipeline system, its weight is reduced to a certain extent due to wear, therefore, in the pipe system of all diameters, there is a limit percentage indicator of the weight of the pipe in use, therefore, in our research work, we conducted laboratory studies to reduce the percentage of wear, the test time is 8 hours, the duration of repetition is 2 times did by modifying the dispersed systems in the hydraulic mixture with the help of a composite compound, we achieved a 31% reduction in the percentage of pipe failure (Fig. 2).

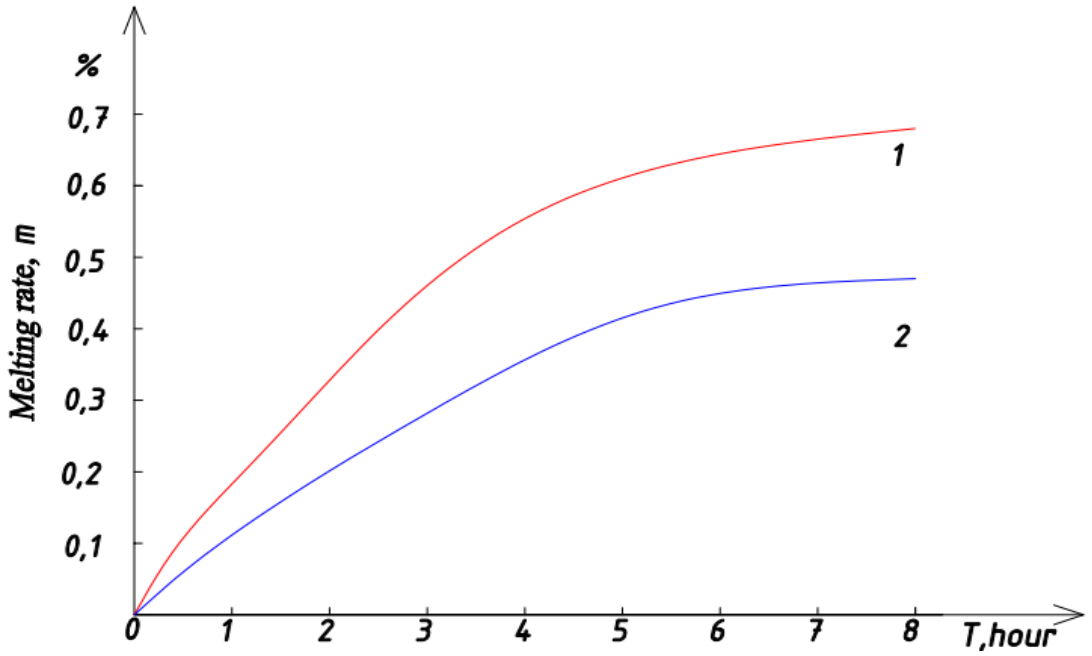


Figure 2. Reducing the fraction of the pipe by weight:
1- situation before the modification of dispersed systems moving in the pipeline; 2 - state after modification

It is important to increase the service life of the pipeline system in order to improve its efficiency. In our research work, increasing the service life of pipes was carried out according to 2 parameters - pipe mass and thickness. By modifying the dispersed systems in the hydraulic mixture moving in the pipeline with composite compounds, we proved that it is possible to increase the service life of the pipeline by 29% up to the permissible percentage by mass (Fig. 3).

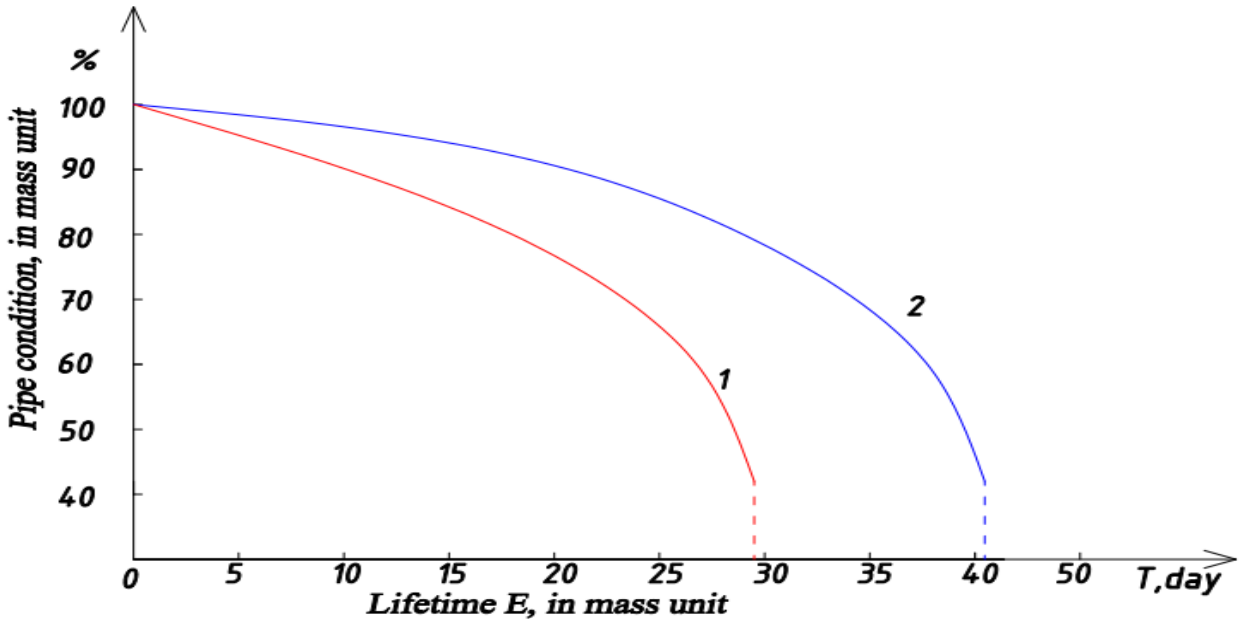


Figure 3. Increasing the service life of the pipe by weight:
1- situation before the modification of dispersed systems moving in the pipeline; 2 - state after modification

The second parameter is the reduction of influence on the pipe walls of the dispersed systems modified by the composite compound prepared from local raw materials in increasing the service life of the pipe thickness. We proved in laboratory conditions that the service life of the pipe is increased by 31% according to the permissible thickness (Fig. 4).

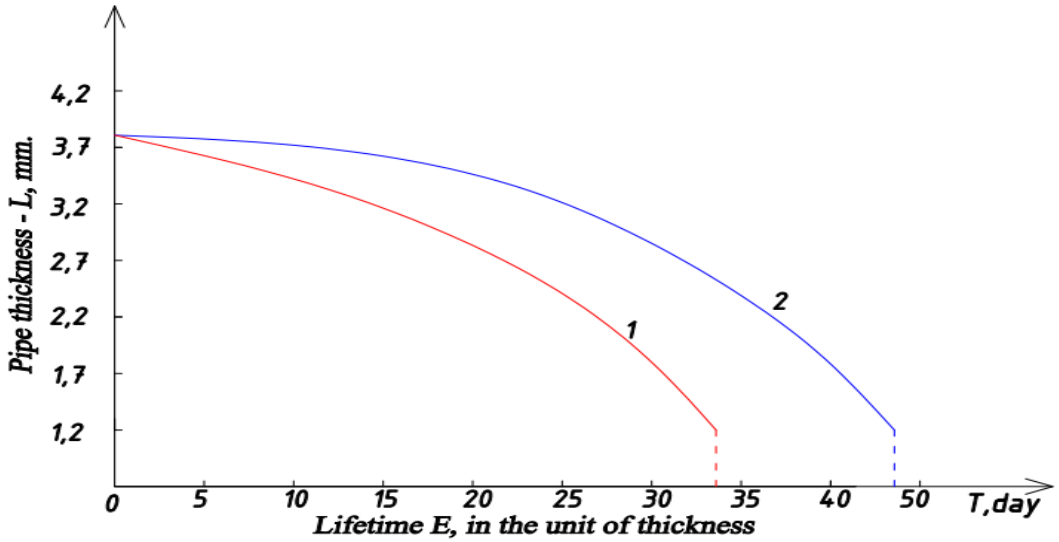


Figure 4. Increasing the efficiency of use by the thickness of the pipe: 1-situation before the modification of dispersed systems moving in the 1st pipeline; 2-state after modification

Studies conducted in the course of studying the effect of compositional modifiers on the performance of piping systems have proven their effectiveness.

Conclusion. During the research, we determined the factors affecting the performance of the pipeline system, we prepared a composite compound that improves the characteristics of these factors, reduces the performance of the pipeline system, and increases the service life and efficiency. We studied their effect on the pipe wall by modifying the dispersed systems with a composite compound prepared on the basis of secondary organic materials. As a result of the conducted research, the service life of the pipe mass and thickness increased by 29% and 31%, respectively, and the overall average service efficiency of the pipe increased by 30%.

References:

1. Chorshanbiev, U., Ibadullaev, A., Toshpulatova, D., Babaev, A., & Kakharov, B. (2023). Modification of dispersed systems and its effect of the internal corrosion of hydrotransports. In E3S Web of Conferences (Vol. 383, p. 04032). EDP Sciences.
2. Chadwick, J. (2011). Hydrotransport. International Mining, 57-65.
3. Makhkamov, D.A., Chorshanbiev, U.R., & Babaev, A.R. (2022). Laboratory Research of Multiple Flow Movement in Pipelines. Global Scientific Review, 1, 42-46.
4. Brock, S.T. H. (2006). The use of hydrotransportation systems in the mining environment. Journal of the Southern African Institute of Mining and Metallurgy, 106(12), 789-792.
5. Chorshanbiyev, U., Ibadullayev, A., & Babayev, A. Study of the action of modification of solid particles in hydrotransport systems. FarPI - 2023. No. 4. P. 88-93.
6. Akhmadzhon Ibadullaev, Elmira Teshabaeva, Umar Chorshanbiev, Akhror Obidzhonov, & Ilkhom Matmusaev (2023). Research of reducing the environmental impact of copper processing plant waste based on composite compounds. Universum: технические науки, (9-5 (114)), 16-21.
7. Babaev, A., Teshabaeva, E., Obidjonov, A., & Chorshanbiev, U. (2023). Study of the hydraulic parameters of the flow of solid particles in the process of hydrotransport. In E3S Web of Conferences (Vol. 401, p. 03034). EDP Sciences.

TECHNOLOGY OF MATERIALS AND PRODUCTS OF THE TEXTILE AND LIGHT INDUSTRY

DOI - 10.32743/UniTech.2024.118.1.16587

PROMISING USE IN THE TEXTILE INDUSTRY DOMESTIC WOOL FIBERS

Shakhnoza Karimova
Assistant, NamMTI.
Republic of Uzbekistan, Namangan
E-mail: shahnozak940@gmail.com

ПЕРСПЕКТИВНОЕ ИСПОЛЬЗОВАНИЕ В ТЕКСТИЛЬНОЙ ПРОМЫШЛЕННОСТИ ОТЕЧЕСТВЕННЫХ ШЕРСТЯНЫХ ВОЛОЛКОН

Каримова Шахноза Рахмонжоновна
ассистент,
НамМТИ.
Республика Узбекистан, г. Наманган

ABSTRACT

In this article, the fact that the wool processing industry is at a high level in the regions that are the leading country in the livestock sector. One of the main tasks facing the wool processing industry is highlighted the possibilities of increasing the yield of products, improving the quality of products, increasing labor productivity, effective use of raw materials and materials

АННОТАЦИЯ

В данной статье рассматривается тот факт, что промышленность по переработке шерсти находится на высоком уровне в регионах, которые являются ведущими в стране в секторе животноводства. Одной из основных задач, стоящих перед шерстоперерабатывающей промышленностью, выделяются возможности увеличения выхода продукции, улучшения качества выпускаемой продукции, повышения производительности труда, эффективного использования сырья и материалов

Keywords: wool and semi-wool fabrics, knitwear, odeal, carpet, wash, fiber, processing, length, coarse, blackcurrant, hisori and jaydari sheep quality, linen, chemical fibers, raw materials.

Ключевые слова: шерстяные и полушерстяные ткани, трикотаж, одеал, ковер, стирка, волокно, обработка, длина, грубость,, черная смородина, качество овец хисори и джайдари, лен, химические волокна, сырье.

Introduction. Socio-economic reforms in textile and light industry implementation, different threads from cotton, wool, linen, natural silk and chemical fibers production is in demand from them, yarn for the specified purposes is gauze, silk, wool preparation of fabrics, non-woven materials, textile attaching products, quality positive resolution of the personnel issue, raising the level of life of the population, in order to improve the quality of products, increase its export potential Modern in textile and light industry enterprises of our republic from raw materials produced in technologies to ready-made specialists, there is a great need for specialists and Masters [1].

Leading livestock sector nationally in the regions, the wool processing industry is working at a high level. Finding such raw materials in any region and districts of our republic can. Southern provinces in particular have sufficient cattle wool in the Oasis according to statistics, the number of sheep and goats being raised on a territory scale is 4 million 480 more than a thousand heads. The processing of goat wool is underway. Goat wool has its own buyer as well as the available area of application. But even this raw material is still not processed industrially. We want to stop wider and what we have today is a sheep, the main part of which is being wasted unused wools is special. From the experience of local breeders, it is known that sheep of the local breed receive an average of 1.5-2 kilograms per year, and sometimes even more than this amount of wool. From the very beginning, when homaki is considered, it becomes clear that 6 thousand tons of raw materials can be prepared in a year by livestock breeders in the Oasis. This is a high figure, and at the same time fully productive of this advantage in the territory not used. Making our goat markets on our own filling with quality clothing made of fabrics, as well as it is important to increase the export potential of our republic, that is, to ensure that textile products can compete in the world and domestic markets.

Библиографическое описание: Karimova Sh.R. PROMISING USE IN THE TEXTILE INDUSTRY DOMESTIC WOOL FIBERS // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16587*

Buyer in foreign markets, with high added value to increase the production of modern finished products and to a new level lifting to stable high growth rates of exports of finished products in achieving, it will undoubtedly give rise to a big ground. It must be said that today on the day, work on this issue was sent in our country. At the same time this each type of promising raw materials and semi-finished products with high potential in order to have a clear program of deep processing on fabrikat for 2020, 2025, 2030, a completely new software requires an integrated approach [2].

The wool industry is an important branch of the textile industry. Wool and semi-wool fabrics, knitwear, odeal, carpet in wool industry enterprises, threads for the production of products used for technical purposes is obtained. One of the main tasks facing the wool industry is the volume of products increase, improve product quality, increase labor productivity, use of raw materials and materials as efficiently as possible. Wool fiber manufacturers science and technology to increase the volume and improve the quality of the extracted thread implementation of achievements in industry, reconstruction of existing enterprises and it is carried out at the expense of rearmament from the technical side. From wool fiber an important place in the production of products is the enterprises of the initial work of wool holds. Wool is given in these enterprises, and raw materials in spinning enterprises wool fiber is obtained, which is supplied as. The quality of the wool fiber will affect the quality of the products, since the quality of the fiber is the only quality product produced can be released. This made the wool in the initial processing enterprises it assumes a thorough study of the processes to be carried out [3].

The wool industry is now one of the textile industries and the network processing of wool in enterprises from pure wool or its other fibers threads of different linear densities from a mixture of woolen fabrics, homogeneous technical and special fabrics, carpet and carpet products and non-woven materials manufactured in release [4].

Breeds of sheep and goats that are bred in our country sarodjin and Tajiki sheep are semi-coarse wool, karakul, hisori and jaydari sheep coarse wool is considered.

From these: Karakul Sheep-sur for growing karakul skin, basically, sheep that are harvested in Uzbekistan. Bark sheep to natural conditions more irresistible to other Cormorant sheep, blue Cormorant sheep more durable than it is. Owls 40-45 kg, Rams 55-60 kg of annual Wool product 2.5-3.0 kg. The top variety of sur Teri grow and breeder I to get more Rams, sur owls are pure breed sur from Rams is avoided. Sur lambs range from 90% when the Sur cattle is avoided and when the deer, the black owls, and the sur geese are avoided, the sur geese are the first deer lambs have 4-6° / O, 27-28% of the second deer, latest it makes up 48-50% of the bagels. Karakulchi-breeders, the fertile"Surkhan" of sur sheep by specialists and shepherds turi," Nurota " type, "Karakum" type of silver sur Sheep, Gold, Silver sur leather the species of "rubella" that give are created.

The Lincoln sheep breed is a breed of semi-fine wool sheep raised for meat-wool. Cultivated in England in the 19th century. Rams weigh 130-160 kg, Owls 100-120 kg. Rams give 10-12 kg of wool per year, Owls-5-6 kg. The length of the wool is 20-30 cm, the same, crispy, 55-65% pure wool chic. On average, 120 lambs are taken from 100 owls. Dagal was interbreed with woolly and Merino owls, and a serjun productive hybrid of the crossbred type was obtained. With jaydari qoylyar in Uzbekistan mutton is bred, and serjun-carnivorous hybrid sheep are bred. These hybrids wool jaydari is 2-2.5 times more than sheep's wool,semi-tender, crossbred type, length 13-16 CM.

The askania sheep breed is a tender fibrous serjun breed. The genus was erected in 1925-34 in Ukraine by choosing local merino sheep and American rambul bred by avoiding Rams. Ascania sheep breed with fine wool the largest of the sheep. The average weight of Rams is 100-110 kg (of which 10 kg up to of wool can be obtained), the weight of the soaps is 60-65 kg (gives 5.5-6 kg of wool). Juni thin. In the 1950s, the Tashkent breeding farm was brought to the Jizzakh horse factory. The ascanian sheep breed gave the same product as in these farms: two-year-old Breed Rams with a weight of 82.3 kg gave 7 kg of wool. The length of the wool is 8.3 CM, the thinness is 21.7 mk; the output of pure wool is 41.4%.

Sigay sheep breed-wool-semi-tender, which is bred for meat and meat-wool woolen sheep. The appearance and quality of the wool are close to that of merinos. There are varieties of serjungoštdor and meat-serjun. Serjun-the living weight of the carnivorous species Rams is 85-95 kg, and the Owls ' 45- 50 kg. The length of the wool is 8-10 cm, from Rams 6.5-7.5 kg, and from soaps 3.5-5 kg of wool are cut. It turns out 56-58% pure wool. The living weight of carnivorous-serjun species Rams is 100-110 kg, that of owls 55-60 kg. The length of the wool is 10-12 cm. 7.5 - 8.5 kg of wool is removed from the Rams, and 4 - 4.5 kg of wool from the Owls. It turns out 56-60% pure wool. Sigay in breeding plants bred species of sheep are grown.

Merinos are a breed of sheep with uniform fine wool. Fine wool sheep Homeland middle Asia quotes merinos from other countries in the 19th and early 20th centuries several types, as well as breeds bred by Russian specialists in Russia increased to. More productive of merinos by Russian specialists askania and merinos, Azerbaijani mountain Merino, Caucasian, Altai, salsk, stavropol and other breeds were bred. Merinos ' neck, sometimes, body skin is also wrinkled is. The wool consists of thin (transverse cross-section 15-25 mk) fluffy fibers, length 6-8 cm; cut once a year, 8-12 kg of wool is obtained from Rams, and 4-6 kg of wool from owls. 35-45% pure wool comes out. Weight of Rams 80-100 kg, 40-60 kg.

Hisori sheep breed-coarse woolen buttock sheep, which is bred for meat-fat breed. Bred in Tajikistan by folk selection. Ram's body height 80-85 CM, Owls 75-80 CM. Live weight of Rams 130-140 kg, Owls 80-90 kg. The body structure is plump, the chest is wide. The head is large, the hornless haunt is blunt, with long ears. Buttocks 18-20 kg. Tusi is mainly a beetle, are fast. At the age of 6 months, 60 kg or more will come. 58-60% makes meat. Wool is made of coarse, felt and felt. Wool from 1.3-1.6 kg from Rams and from 1.0-1.4 kg from owls is cut. Hardy, adapted to grazing all year round.

From every 100 owls, 115-120 lambs are taken. Bred in Tajikistan and Uzbekistan.

Degeres sheep are a new breed of sheep with semi-fine, long wool. In Kazakhstan the shiropshir breed was bred by crossbreeding sheep with Dune (jaydari) Owls. Male lambs isolated from milk weigh 40-44 kg, females 35-38 kg, one semi-juvenile Rams weigh 70-80 kg, Owls-53-60 kg, mature the weight of the old Rams is 110-118 kg (some 135 kg), and the Owls 61- 67 kg (some 84 kg), when slaughtered, makes 60-62 kg of meat-fat. From his Owls 3-3.5 kg, 4-6 kg of wool from Rams are cut. Of these, 66-68% pure wool it turns out. The wool is white, long (14-16 CM), the quality and spinning feature are excellent. It began to be brought to Uzbekistan from 1959. From Degeres Rams Dune sheep in Samarkand, Fergana, Andijan and Namangan regions used in improvement [5].

Among them are sheep of the karakul breed, which are widespread in our republic. Wool from sheep distributed in our republic twice a year in spring and autumn is feared. The abundance of tivite fibers compared to spring trimming autumn and it is distinguished by its wide use in spinning. Autumn trimmings are widely used as raw materials for NA'mat and non-woven products. Wool fibers are valued and used as valuable raw materials in the textile industry [6].

References:

1. Wool is the word wool. Week 2017 in london once again served up a vibrant, modern, sustainable fusion of wool to support the industry. International wool textile organisation. Wool review. Iissue 2. 2017. 25-27 P. http://tad-birkorfermer.uz/qoy-zotlari
2. Қутметов М.Қ., Комилов А.З., Матмуратова Ш.Х. Маҳаллий хом ашѐдан экспортбоп маҳсулотлар ишлаб чиқариш // Тўқимачилик муаммолари Тошкент 2007. №3. 32-35 бетлар.
3. Wool is the word wool. Week 2017 in london once again served up a vibrant, modern, sustainable fusion of wool to support the industry. International wool textile organisation. Wool review. Iissue 2. 2017. 25-27 P.
4. Юсупов С.А. Жун таркибидаги турли толалар улуши ва уларнинг хусусиятлари // Тўқимачилик муаммолари – Тошкент 2008. №4. 48-51 бетлар.
5. Горелова А., Файзуллаев Ш., Гафуров К.Г. Неровнота смешанной кенафно-нитроновой пряжи // Тўқимачилик муаммолари Тошкент 2007. № 3.
6. Сидорцов В.И., Белик Н.И., Сердюков И.Г. Шерстоведение с основами менеджмента качества и маркетинга шерстяного сырья. Учебник. - Москва: Колос; Ставрополь: АГРУС, 2010. - 288 с.
7. Состояние производства и переработка шерсти в Узбекистане ИКАРДА 27.09.12 г. УзНИИКЭП, д.с.х.н. проф. Юсупов С.
8. http://lex.uz/ Постановление президента республики Узбекистан. о мерах по ускоренному развитию каракулеводческой отрасли. г. Ташкент, 14 марта 2018 г., № ПП-3603.

ESEARCH OF WATER RESISTANCE OF COAT FABRIC

Sanovar Khamraeva
Professor
of Tashkent Textile and Light Industry Institute,
Republic of Uzbekistan, Tashkent

Shamsiya Shumkarova
Associate Professor
of the Jizzakh Polytechnic Institute,
Republic of Uzbekistan, Jizzakh

Marguba Rajapova
Candidate
of Technical Sciences, Associate Professor
of the Jizzakh Polytechnic Institute,
Republic of Uzbekistan, Jizzakh
E-mail: margubarajapova@gmail.com

ОПРЕДЕЛЕНИЕ ВОДОСТОЙКОСТИ ТКАНИ ПАЛЬТО

Хамраева Сановар Атоевна
профессор
Ташкентского института текстильной и легкой промышленности,
Республика Узбекистан, г. Ташкент

Шумкарова Шамсия Пулатовна
доцент,
Джизакского политехнического института,
Республика Узбекистан, г. Джизак

Ражапова Маргуба Назимовна
канд. техн. наук, доцент
Джизакского политехнического института,
Республика Узбекистан, г. Джизак

ABSTRACT

In the article, the water resistance (water permeability) property of suit fabric with 100% cotton yarn, 50% polyester and 50% cotton fibers was studied. Average value of research results, mean square deviation, coefficient of variation, The quality of the results was analyzed according to the A.N. Kolmogorov criterion.

The effect of thermal factors leads to aging and changes in the structure of the adhesive material - polymer sewing thread, glue and adhesive bonding, polymer base material and solder bonding. Vse eto takje privodit k snijeniyu prochnosti soedineniy detaley izdeliya.

To compare its results, the results of the water resistance of the 1.5-layer fabric were checked using the Shapiro Wilkie criterion, and n = 10, W 0.05 = 0.842. W = 0.964 > W 0.05.= 0.842 it can be concluded that the obtained results correspond to the normal distribution law.**АННОТАЦИЯ**

В статье было изучено свойство водостойкости (водопроницаемости) ткани для пальто, состоящей из 100% хлопчатобумажной пряжи, 50% полиэстера и 50% хлопчатобумажных волокон. Среднее значение результатов исследования, среднеквадратичное отклонение, коэффициент вариации, качество результатов анализировались по критерию А.Н. Колмогорова.

Воздействие термических факторов приводит к старению и изменению структуры клеевого материала - полимерной швейной нити, клея и адгезионного соединения, полимерной основы и паяного соединения. Все это так же приводит к уменьшению прочности соединений деталей изделия.

Чтобы сравнить его результаты, результаты водостойкости 1,5-слойной ткани были проверены с использованием критерия Шапиро Уилки, и n = 10, W 0,05 = 0,842. W = 0,964 > W 0,05.= 0,842 можно сделать вывод, что полученные результаты соответствуют нормальному закону распределения.

Библиографическое описание: Khamraeva S.A., Shumkarova Sh.P., Rajapova M.N. ESEARCH OF WATER RESISTANCE OF COAT FABRIC // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16649*

Keywords: cotton, polyester, coat fabric, water resistance, criterion, standard deviation, coefficient of variation, criterion, theoretical probabilities.

Ключевые слова: хлопок, полиэстер, ткани для пальто, водонепроницаемость, критерий, стандартное отклонение, коэффициент вариации, критерий, теоретические вероятности.

This is the first most important PC of raincoat fabrics; its weight is the greatest and amounts to B = 2.5. Tests were carried out in accordance with GOST 3816 “Textile fabrics. Methods for determining hygroscopic and water-repellent properties" using a penetrometer device [1, 2].

Water resistance is determined by the height of the water column in mm, corresponding to the moment the first three drops of water appear in different places on the inner surface of the sample. To carry out the test, at least five round samples with a diameter of at least 160 mm or a square sample with a size of 160x160 mm are cut from a spot sample so that they do not contain the same groups of warp threads or loop stitches and weft threads or loop rows, as well as local vices.

To assess the compliance of the distribution of test results with the theoretical law, the standard number of tests is not enough, so an increased number of measurements was carried out, amounting to ten. Let us consider the methodology for analyzing and selecting a statistical model of the water resistance of the fabric under study [3, 4].

The following results for determining water resistance were obtained: 865; 856; 859;849; 864; 865;859; 857; 869;861 mm water column. Based on these primary data, the following were found: average value $\bar{B}$ = 860.4 mm water column. Standard deviation found by the formula:

$$\sigma_x = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}}$$

where X_i are the results of determining water resistance;

$\overline{X}$ - -sample average

σ_x = V((865 - 860,4 + 856 - 860,4 + 859 - 860,4 + +849 - 860,4 + 864 - 860,4 + 865 - 860,4+ 859-860,4 + +857-860,4 + 869-860,4 +86 1 - 860,4)^2/10) = =5,72 ммwat.kup., coefficient of variation found by the formula:

$$C = \frac{\sigma_x}{\overline{X}} \bullet 100 = \frac{5,72}{860,4} \bullet 100 = 0,66\%$$

Since the normal distribution is most widespread, it is advisable to start checking the consistency of the results of determining the water resistance of the tissues under study with it. In addition, the water resistance of fabrics depends on a large number of different factors, which corresponds to the probabilistic-statistical model of the normal law. To construct a leveling line, it is enough to calculate two points using the formula:

$$U_p = \frac{X_i - \overline{X}}{\sigma_x}$$

where Xi is the value of the random variable;

$\overline{X}$ -average value;

σ_x - standard deviation.

In this example, these are the extreme points of the sample. For the data under consideration we have.

$$U_{p1} = \frac{X_i - \overline{X}}{\sigma_x} = \frac{849,0 - 860,4}{5,72} - 1,99;$$

$$U_{p10} = \frac{869,0 - 860,4}{5,72} = 1,50$$

A straight line is drawn along the found points. If the experimental points are located near the straight line, then the distribution under study corresponds to the selected theoretical one[5, 6].

Table 1 shows an example of the necessary calculations for plotting the water resistance values of raincoat fabric 1 on normal law probability paper.

Table 1.

Example of the necessary calculations for plotting the water resistance values of raincoat fabric 1 on normal law probability paper

Serial number of the result of the ranked series,№	Test results, recorded in ascending order, V, mm water. St	Cumulative frequency of the empirical distribution, W	Theoretical probabilities of the studied quantity, U’p
1	849	0,05	-1,65
2	856	0,15	-1,04
3	857	0,25	-0,67
4	859	0,40	-0,25
5	859	0,40	-0,25
6	861	0,55	0,13
7	864	0,65	0,39
8	864	0,80	0,84
9	865	0,80	0,84
10	869	0,95	1,65

Knowing the Xi results and the corresponding Up', the corresponding results are plotted on the probability paper and a straight line is drawn through the obtained points. If the experimental points are grouped quite well around a straight line in the middle zone of the graph, i.e. If the points lie on a straight line or are at a very small distance from it, then we can assume that the experimental distribution does not contradict the theoretical one.

In Figure 1 shows the probability paper for the normal law and the location on it of the distribution points of the water resistance test results of raincoat fabric 1, as well as the leveling straight line. It can be seen from the graph that the points are well grouped around a straight line, so it is possible to use the normal distribution law to interpret the results of testing the water resistance of fabrics[7]. Let us check the compliance of the results obtained with the water resistance of raincoat fabric 1 according to A.N. Kolmogorov, which is based on the maximum value of the discrepancy Dn between the accumulated frequencies of the empirical and theoretical distributions:

$$\lambda = D_n\sqrt{n}$$

where n- is the number of tests.

For this purpose in table. 2 we write down the test results in ascending order. Determine the empirical frequencies Wi, as well as the accumulated frequencies Wi'. Values of accumulated theoretical frequencies Wi' for normaldistributionsare determined by the value

$$t = \frac{x}{\sigma_b}.$$

Next, the absolute values of the differences (Wi'- Wi) are calculated for each line and the maximum of them is designated Dn

Table 2.

The test results

№	V, mmwater. St.	W_i	t	Wi'	Wi'- W_i
1	849	0,05	-1,99	0,02	0,03
2	856	0,15	-0,77	0,21	0,06
3	857	0,25	-0,59	0,27	0,02
4	859	0,40	-0,24	0,42	0,02
5	859	0,40	-0,24	0,42	0,02
6	861	0,55	0,10	0,54	0,01
7	864	0,65	0,63	0,73	0,08
8	864	0,80	0,80	0,79	0,01
9	865	0,80	0,80	0,79	0,01
10	869	0,95	1,50	0,93	0,02

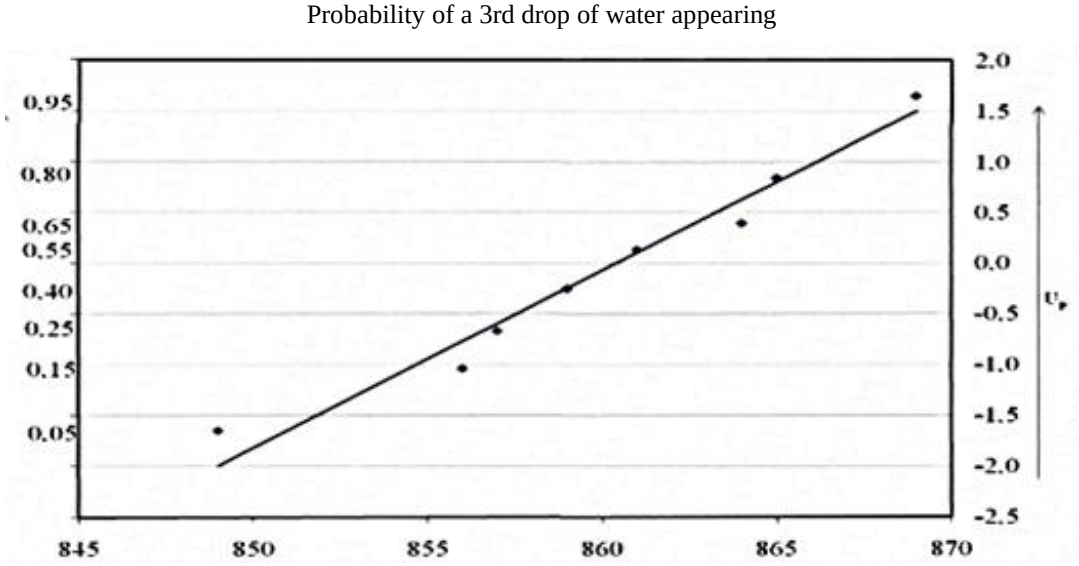


Figure 1. Results of determining water resistance for raincoat fabric based on the probability of the normal law

For the results of determining the water resistance of raincoat fabric, Dn = 0.08, therefore, according to formula (3.9) = 0.253. According to the table of probability values, P( ) = 0.999 > 0.05 = q. From the calculations it follows that the hypothesis that the test results correspond to the normal distribution law is not rejected [8].

As a rule, the Kolmogorov test is used for continuous distributions with a sufficiently large sample size, so for this calculation example it is more preferable to use the Shapiro Wilkie test

To calculate the Shapiro-Wilkie criterion (Table 3.4), the results of primary measurements are ranked in ascending order and the values of the ordinal index i are written in column 1, and the corresponding ranked values in column 2. In column 3, write the values of X2i, and in column 4, the values of the ordinal index j = 1,2, ..., e, starting from the last line in the reverse order compared to writing the values of index i. In this case, e = 0.5 • (n- 1), if n is an odd number. In our case, with n = 5 • e = 0.5 • (5-1) = 2. In column 5, the values of coefficient A corresponding to index j, which are determined for a given number of measurements (n = 10).The calculated differences Xn-j+1-Xj are inserted into column 6. In column 7, enter the values of the products of values in columns 5 and 6. The data in columns 2, 3 and 7 are summed up and written in the last line (Table 3).

Cording to the data indicated in table. 3.3, calculate the values (2 and b2 using the formulas):

$$\varphi = \sum_{i=1}^{n} X_i^2 - \frac{(\sum_{i=1}^{n} X_i)^2}{n}$$

φ^2= (8 4 9 ^{2} + 856 ^{2}+ 857^2 + 859 ^{2} + 859^2 + 861 ^{2} + 864^2 + 865^2 + 865^2 ++869 ^{2}) -(849 + 856 + 857 + 859 + 859 + 861 + 864 + 865 + 865 + 869)^2/10 = 294,40;

$$b^2 = \left[\sum_{j=1}^{e} A_{n-j+1}(X_{n-j+1} - X_j)\right]^2$$

b^2 =0,0399 (869-849) +0,1224 (865-856) +0,214 (865-857) +0,3291(864-859)+ +0,5739(861-859) = 16,84;

The Shapiro-Wilkie criterion is calculated using the formula:

$$W^2 = b^2 / \varphi^2 = \frac{16{,}84^2}{294{,}40} = 0{,}964$$

The obtained W values are compared with the table value of $W_{0.05}$. If W <$W_{0.05}$, then the probability that the sample under study from the general population has a normal distribution does not exceed 0.05, therefore, the hypothesis isrejected. In table 3 shows an example of calculating the criterion W for a primary population that has a normal distribution and does not exceed 0.05, therefore, the hypothesis is rejected[9, 10].

Table 3 shows an example of calculating the criterion for the primary results of determining the water resistance of raincoat fabric.

Table 3.

Example of calculating the criterion for the primary results of determining the water resistance of raincoat fabric

№	Xi	Xi^2	j	A_{n-j+1}	X_{n-j+1}-X_j	k5xk6
1	849	720801				
2	856	732736				
3	857	734449				
4	859	737881				
5	859	737881				
6	861	741321	5	0,0399	2	0,08
7	864	746496	4	0,1224	5	0,61
8	864	748225	3	0,2141	8	1,71
9	865	748225	2	0,3291	9	2,96
10	869	755161	1	0,5739	20	11,48
Сумма	8604	7403176				16,84

As a result of the calculations, the following values were obtained: =249.40; b 2 =283.74; W=0.964.

With the number of tests n = 10, W 0.05 = 0.842. Since W = 0.964 > W 0.05.= 0.842, we can conclude that the results correspond to the normal distribution law.

References:

1. Хамраева С.А., Шумкарова Ш.П. Оценка качественных показателей плащевых тканей. Международная конференция, Baku, BTU, 2023. -стр.41-43.
2. N Yusupova, S Khamrayeva, D Nazarova. Designing Suit Fabric on the Shortening of the Threfds // xv International Scientific Conference "INTERAGROMAS 2022H" 2, 2044-2049, 2023
3. Sanovar Khamrayeva, Dilbar Mirzanazarova, DilraboNazarova.Development of a New Blended Fabric on the RIFA-RFJW-10 Machine and Performance Analysis // E3S Web of Conferences, 2023., 376, EDP Sciences
4. Dilrabo Tolibjanovna Nazarova, SanovarAtoevnaXamraeva, Mirzanazarova Dilbar Jamalovna Vliyanie usadki na vozduxopronitsaemost tkaney// International Journal of Advanced Science and Technology, IBAST | Volume 3, Issue 3, March. R. 550-553
5. Хамраева С.А. Равновесия нити на поверхности ткани // Текстильная промышленность. - М., 2007.-№ 6. – С. 55-54.
6. Хамраева С.А. Аналитический расчёт движения прокладчика утка //Текстильная промышленность. -М., 2007.-№6. - С. 50-52.
7. Шумкарова С. и др. Влияние вторичных материальных ресурсов на физико-механические свойства напольных тканей //Материалы конференции АИП. – Издательство АИП, 2022. – Т. 2432. – №. 1.
8. Shumkarova S. et al. Correction coefficiency of physical and mechanical properties of fabrics and calculation of irrigation // AIP Conference Proceedings. – AIP Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 040025.
9. S. Khamraeva, D.Giyasova2 ,D.Kazakova. Study of the quality of yarns obtained from recycled composite fibers// Journal of Hunan University（NaturalSciences）Vol. 49. No. 12 December 2022, pp.1637-1642.
10. Yusupova N.B. ,Nazarova D.T., Khamrayeva S.A., Valiyeva Z.F. Evaluation of the Structure the Costume Fabric over its Surface // International Journal of Advanced Research in Science, Engineering and Technology. ISSN: 2350-0328 India, 2018. vol. 6738-6742.
11. Marguba R. et al. Change of physico-mechanical properties of t-shirt finishing with different fiber content // Universum: технические науки. – 2021. – №. 11-6 (92). – С. 59-64.
12. Shumkarova S.P. et al. Effect of Drying Temperature on Cotton Cleaning Efficiency and Change Class Change.

FORMULATION OF PACKAGING MATERIALS FOR OUTER CLOTHING

Mastura Rasulova
Tech. sciensces professor,
Tashkent Textile and Light Industry Institute,
Republic of Uzbekistan, Tashkent
E-mail: mastura_m@mail.ru

Kamola Khodjaeva
Assistant,
Tashkent Textile and Light Industry Institute,
Republic of Uzbekistan, Tashkent
E-mail: kamolax5@gmail.com

Nilufar Axmedova
Assistant,
Tashkent Textile and Light Industry Institute,
Republic of Uzbekistan, Tashkent

РАЗРАБОТКА ПАКЕТНЫХ МАТЕРИАЛОВ ДЛЯ ВЕРХНЕЙ ОДЕЖДЫ

Расулова Мастура Кабиловна
д-р техн. наук, профессор,
Ташкентский Институт Текстильной и Легкой Промышленности,
Республика Узбекистан, г. Ташкент

Ходжаева Камола Турдиевна
ассистент,
Ташкентский Институт Текстильной и Легкой Промышленности,
Республика Узбекистан, г. Ташкент

Ахмедова Нилуфар Равшан қизи
ассистент,
Ташкентский Институт Текстильной и Легкой Промышленности,
Республика Узбекистан, г. Ташкент

ABSTRACT

Taking into account the climatic conditions of Uzbekistan, the formation and research of a material package for men's outerwear that meets the functional and operational requirements is an urgent issue.

A new range of clothing has been developed and researched using textile materials to form the menswear package. When forming the material package, their physical and mechanical properties were taken into account.

Types of heating layers for outerwear, their thickness, surface density, suitability for a certain temperature, advantages and disadvantages, as well as air permeability and heat storage properties of package samples were studied at the "SENTEX.UZ" certification laboratory at the Tashkent Textile and Light Industry Institute. As a heating layer for outerwear, a package sample was prepared from mineral and basalt fiber heating layer materials obtained from natural mineral products produced in Uzbekistan and used in the national economy, and its physical and mechanical parameters were compared with existing package samples. The results of the research show that the basalt fiber heating layer has achieved a higher result than the existing heating layers in terms of lightness, shape stability, and heat retention. In order to form an outerwear package, it is recommended to scrutinize the properties of each heating material and choose package materials considering the climatic conditions of Uzbekistan.

АННОТАЦИЯ

Учитывая климатические условия Узбекистана, формирование и исследование пакета материалов верхней одежды, отвечающей функциональным и эксплуатационным требованиям для мужчин, является актуальной задачей.

Был разработан и исследован новый ассортимент одежды с использованием текстильных материалов для формирования пакета мужской одежды. При формировании пакета материалов учитывались их физико-механические свойства.

Библиографическое описание: Rasulova M.K., Khodjaeva K.T., Axmedova N.R. FORMULATION OF PACKAGING MATERIALS FOR OUTER CLOTHING // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16690*

Виды утепляющих слоев для верхней одежды, их толщина, поверхностная плотность, пригодность к определенной температуре, преимущества и недостатки, а также воздухопроницаемость и теплоудержающие свойства образцов пакета изучены в сертификационной лаборатории «CENTEX.UZ» Ташкентского Института Текстильной и Легкой Промышленности. В качестве утепляющего слоя для верхней одежды был приготовлен образец пакета из минеральных и базальтовых волокнистых материалов, полученных из природных минеральных продуктов производимых в Узбекистане и используемых в народном хозяйстве. Проведено сравнение физико-механических показателей с существующими образцами пакета. Результаты исследований показывают, что утеплительный слой из базальтового волокна достиг более высокого результата по легкости, стабильности формы и сохранению тепла чем существующие утеплительные слои. Для создания пакета верхней одежды рекомендуется тщательно проанализировать свойства каждого утеплительного материала и подобрать пакет материалов с учетом климатических условий Узбекистана.

Keywords: sintepon, hollofiber, tinsuleit, slimtex, wool, feather, batting, cotton, sherstin, sherstepon, mineral cotton, basalt cotton, metoaramid fiber, heating layer, construction, technology, gassing.

Ключевые слова: синтепон, холлофайбер, тинсулейт, слимтекс, шерсть, перо, ватин, хлопок, шерстин, шерстепон, минеральная вата, базальтовая вата, метоарамидное волокно, утеплительный слой, конструкция, технология, материал.

Introduction

Decree No. PF-5989 dated May 5, 2020 of the President of the Republic of Uzbekistan "On urgent measures to support the textile and sewing-knitting industry" and "On measures to promote the further development of light industry and the production of finished products" 2019 In order to ensure the implementation of the decision No. PQ-4453 of September 16, as well as to further improve the textile and sewing-knitting industry, an important task is assigned to the light industry and its largest branch - sewing production. The production of high-quality sewing products is directly related to the in-depth study of the technologies of fabric preparation, cutting, sewing and finishing, as well as the properties of the raw materials used [1-2].

A lot of scientific research work has been done on the production and research of the product using the heating layers in the outerwear package.

A new range of clothing has been developed and researched using a new range of textile materials in the formation of outerwear packages [3-4]. In this case, a new fiber-containing material was recommended as an avral gas for the package material.

In the scientific research work [5], the comfort feature in the underwear space in the outerwear package was investigated. When forming the material package, their physical and mechanical properties were taken into account.

In the scientific research conducted on the optimization of the construction of the heat-retaining package of clothing with the help of bulk materials and the assessment of the shape stability of the multi-layered package of clothing, the dependence of the air permeability and heat-retaining properties of the lining, lining and heating layer materials on the fiber content of the material was studied [6-7-8].

In the scientific research mentioned above, the selection of the package material for the outerwear, the properties of the lining, lining, heating material for the package, taking into account the climatic conditions of Uzbekistan, were not researched.

Taking into account the climatic conditions of Uzbekistan, the formation and research of a material package for outerwear that meets the functional and operational requirements is an urgent issue.

Material and methods. It is known that the climate of Uzbekistan is changeable, and outerwear used in the winter season should meet consumer requirements. In most parts of our country, the cold season lasts from October to March, and in this climate, comfortable and warm outerwear that meets functional and ergonomic requirements is recommended. In formulating an outerwear package, it is mainly required to be heat-retaining and at the same time light-weight. For this, various heating layers are used in production enterprises [9].

It is known that outerwear consists of aura, a lining and a warming layer and forms a clothing package. The main function of heat-retaining materials is to prevent the penetration of cold from the external environment and maintain the body's thermal balance. This process occurs due to the air between the fibers of the material package [10].

Natural, synthetic and mixed fiber heating layers are mainly used in the preparation of outerwear [11].

- Natural - unprocessed or minimally processed natural origin, wool, cotton and other fibers;
- Synthetic - fiber from polyester, synthetic heat-retaining materials and other artificial products of oil processing;
- Combined - has mixed compositions including natural and synthetic fibers [12].

Natural fiber materials are superior to synthetic fibers in terms of heat-retaining material indicators, but they do not retain their shape, so it is not recommended to use them for sewing outerwear. In addition, as a result of the influence of biological factors (increase of moth larvae), product quality decreases. The heating material made of synthetic fibers is light, warm, durable, keeps its shape well and is suitable for seasonal clothes [13].

Natural heat-retaining materials have been used for centuries, only as a result of the development of technology, the cleaning and processing of wool and cotton

has been improved. From processing, the properties of natural materials are improved and they inevitably become more expensive. Due to the difficulty of keeping natural fiber thermal insulation materials in hot weather (moth larvae increase in hot weather), the demand for natural thermal insulation materials is low in regions not above freezing -30^0 C. But on a cold day with a temperature of -30^0 C, the demand for natural heating layer materials increases. Bird, goose or duck, swan feathers are used as heat-retaining material for winter clothes [14].

The results of the conducted analysis show that [15], the degree of cold resistance of heat-retaining materials is defined as follows:

- 60 gr is recommended for air temperature up to 0^0 C;
- 80-100 gr is recommended for air temperature up to -10^0C;
- 100-150 gr — designed for air temperature of 15-18^0C;
- High level heating layer of 15^0-30^0C gr —-50^0C.

As a result of the analysis, it became known that scientific research work was carried out on the formation of outerwear package using coarse wool and methoaramid fibers to increase the heat transfer and fire protection properties [16-17].

Research results. Based on the above considerations, the task of studying the materials of the heating layer used for outerwear and determining the physical and mechanical properties of the material packages was determined. At the same time, the properties of mineral cotton, which is one of the natural raw materials as a heating layer, produced in Uzbekistan (suitable and cheap for the climatic conditions of Uzbekistan), were studied and the task of analysis was set in comparison with the indicators of existing heating layer package samples.

Mineral cotton, basalt cotton and methoaramid fiber are considered 100% natural products and are mainly used in the construction industry for heating rooms, as well as protection from heat, noise, water and fire. In addition, these materials are also used in the national economy for the purpose of protection against electricity [18-19].

In the preparation of the material package, the fabric "Dyuspo" was used for the lining, and the polyester fiber fabric was used for the lining. As a research object, the types of heating layer materials used in the garment industry were selected, and experimental research works were carried out based on existing methods in the "CENTEX.UZ" laboratory at the Tashkent Textile and Light Industry Institute [20].

The weight of heat-retaining materials, the degree of resistance to cold weather, the advantages and disadvantages of the material are presented in table 1.

Table 1.

Physico-mechanical parameters of samples of packages with a heating layer

Sample code	The name of the heating layer	Package thickness, mm	Package surface density g/m2	Air permeability, dm^3/cm^2 s	Heat preservation indicator, %
1	Sintepon	3,35	296,3	32,4	39
2	Sintepon (lining)	1,2	200,6	28,12	31
3	Holofiber	1,5	470,0	39,8	61
4	Slimtex - 200	4,0	200,0	64,3	46
5	Steam	2,7	582,6	32,4	63
6	Cotton	4,3	820,6	70,7	51
7	Motherland	3,9	379,0	28,12	46
8	Wool	5,1	600,0	37,7	48
9	Sherstin	1,2	390,0	45,0	55
10	Sherstepon	4,5	375,0	42,4	50
11	Mineral cotton	4,3	800,5	70,0	82
12	Basalt fiber	4,0	350,0	33,7	78
13	Metaaramide fiber	2,4	300,0	41,9	54

Analysis of research results. The results of air permeability and heat storage characteristics are presented in the form of a diagram (Figures 2-3).

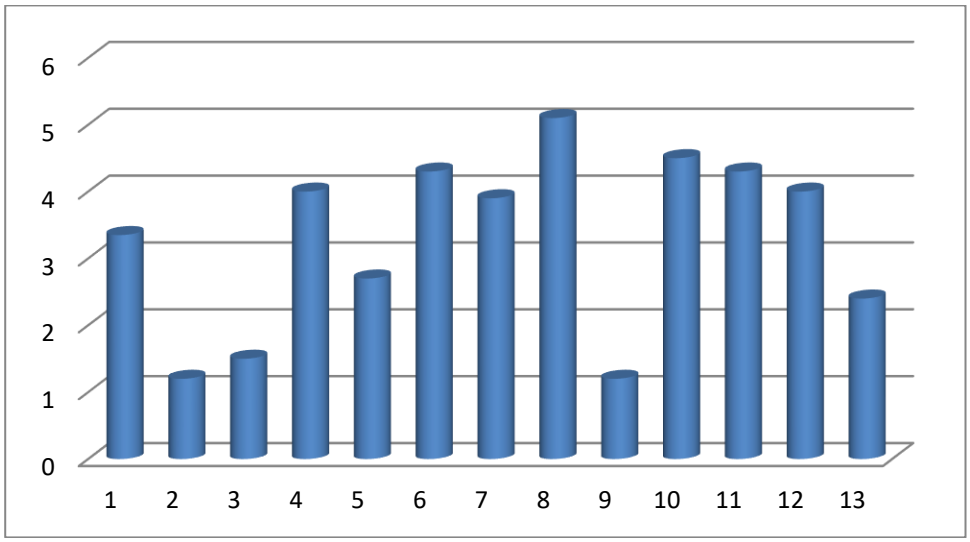


Figure 1. Thickness of package samples, mm

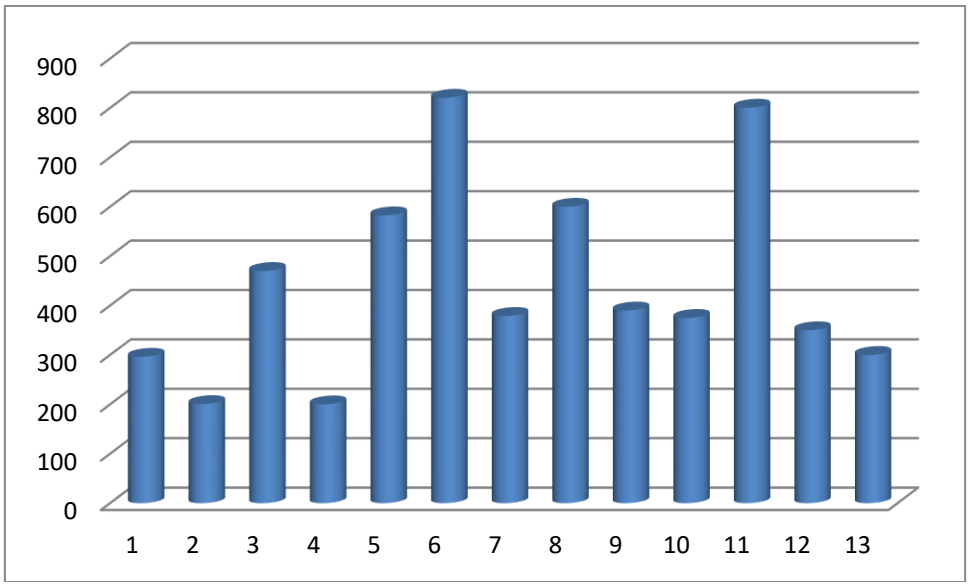


Figure 2. Surface density of package samples, g/m²

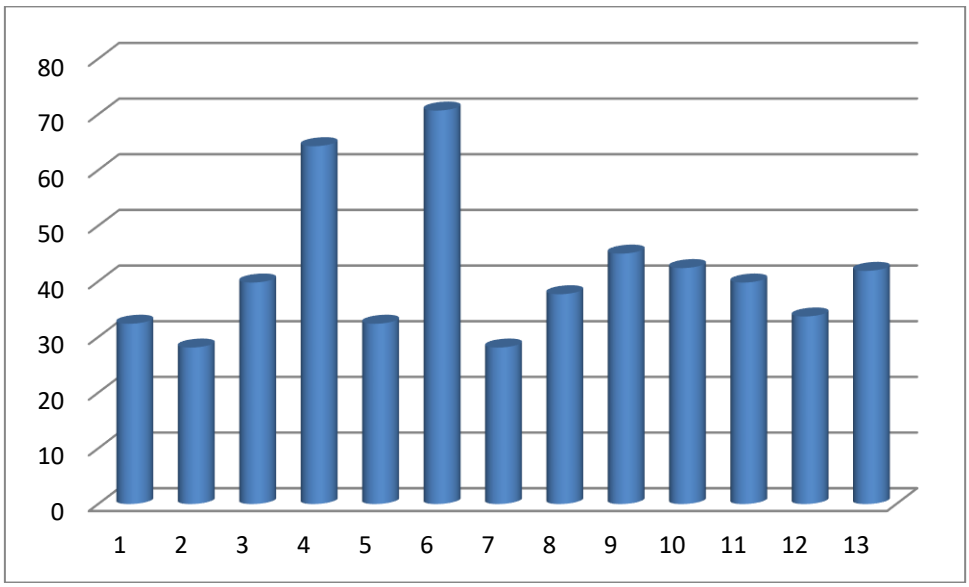


Figure 3. Air permeability of package samples, dm³/cm² s

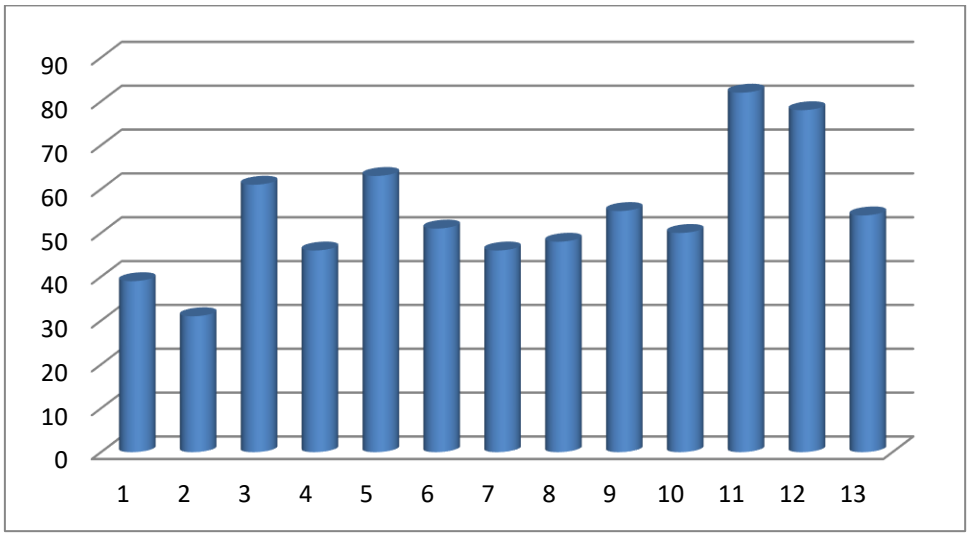


Figure 4. Heat retention index of package samples, %

The results of the research show that in terms of package surface density, the heating layer sample with basalt cotton is 350.0 g/m^2 and mineral cotton is 800.5 g/m^2, sherstepon is 375 g/m^2 and sherstin is 390.0 g/m^2, wool is 600.0 g/m^2. m^2 and cotton 820.6 g/m^2, batting 379.0 g/m^2 and sintepon lining 200.6 g/m^2, par 582.6 g/m^2 and methoaramid fiber 300.0 g/m^2, slimtex 200.0 g/m^2 m^2, sintepon 296.3 g/m^2 and holofiber 470.0 g/m^2. It can be seen that the surface density of natural fiber heat-retaining materials is 1.0-1.5 times higher than that of synthetic heat-retaining materials, and it was found that the basalt cotton heating layer sample is lighter in terms of surface density than other natural and synthetic heating layer samples.

According to the heat preservation properties of the samples of the heating layer package, mineral wool showed 82% and basalt fiber 78%, par 63% and holofiber 61%, sherstin 55% and sherstepon 50%. It was found that basalt and mineral wool have 1.5 times higher heat retention rate than synthetic heating layers, and 0.5 times higher than other natural heating layer samples. Metoaramid fiber has a heat retention rate of 54%, but this product has not entered our domestic markets.

The main goal of the research work is to form package materials for outerwear and to choose and recommend a heating layer suitable for the climatic conditions of Uzbekistan. Taking this into account, the specific characteristics of natural and synthetic fiber heat-retaining materials were studied based on the information provided in the literature [21-22] (Table 2).

Table 2.

Indicators of natural and synthetic heat-retaining materials

№	Indicators	Natural heat-retaining material	Synthetic heat-retaining material
1	The degree of heat preservation	excellent	Good/excellent
2	Compression	High	average
3	Weight	minimum	Depends on the heating layer
4	Durability	Moderately	high
5	Interaction with moisture	Not recommended	High stability
6	Air permeability	excellent	Average
7	Size recovery speed	Average	High
8	The task	Dry conditions	Changing conditions
9	Price	High	Average

As can be seen from the table, the natural heat-retaining material has a high level of heat retention, excellent air permeability, compression properties and a high price. Synthetic heat-retaining materials have a high level of heat retention, durability, volume recovery rate, and an average index in terms of compression properties, air permeability, and price.

The conducted analyzes show (Table 2) that the listed properties apply to existing heating layer materials used in the garment industry, and in terms of price, comfort, durability, heat retention, interaction with moisture, mineral and basalt obtained from natural mineral products and used in the national economy fiber heating layer materials have given positive results.

Conclusions. Based on the results of the conducted research, it can be concluded that the physical and mechanical properties of existing heating layer materials used for outerwear and mineral and basalt fiber materials used in the construction industry were studied and analyzed.

Mineral and basalt fiber materials obtained from local mineral resources have superior results compared to existing heating layer materials, such as price, comfort, durability, heat retention, interaction with moisture. The heat retention index was 1.5 times higher than synthetic heating layers, and 0.5 times higher than other natural material samples.

Based on the obtained results, it is recommended to use mineral and basalt fiber materials made from local mineral resources to form outerwear package and prepare outerwear package materials taking into account the climatic conditions of Uzbekistan. At the next stage, the task of developing the optimal options for the materials used for the outerwear package was set.

Reference:

1. Decree no. pf-5989 dated may 5, 2020 of the president of the republic of uzbekistan “on urgent measures to support the textile and knitwear industry”.
2. Decree of the president of the republic of uzbekistan pq-4453 dated september 16, 2019 "on measures to promote the further development of light industry and the production of finished products" to support the textile and clothing and knitwear industry.
3. GOST 28000-2004. Tkani odejniye chistosherstyaniye, sherstyaniye i polusherstyaniye. Obshiye texnicheskiye usloviya. - Moskva : Izd-vo standartov, 2004. - 29 s.
4. V.I Besshaposhnikova, N.A. Klimova, N.Ye. Kovaleva “Issledovanie vliyaneyestruktui na svoyestva obyomnih netkanih utepliteley odejdi”. Tekst nauchnoy stati po spetsiolnosti “Tehnologii materialov” Jurnal Materiali i tehnologii 2018 №2 – 28 s.
5. Kartashova M.A., Klesnik S.A. “Razpabotka predlojeniy po formirovaniyu paketov detskoy teplozashitnoy odejdi na osnove izucheniya assortimenta novih tekstilnih materialov”. Yujno-Possiyskiy gosudarstvennih universitet ekonomiki i servisa. Studenchiskiy forum. g. Sochi, 7-10 november 2021 – 34 s.
6. Vershinina A.V. “Razrabotka metoda i issledovanie komfortnosti pododejnogo prostranstva paketov materialov detskoy odejdi” – Diss na sois.k.t.n. Moskva: Izd-vo standartov, 2019 – 58 s.
7. Klimova N.A. i dr. “Innovatsionnie materiali dlya teplozashitnoy odejdi.” Sbornik nauchnih trudov mejdunarodnogo nauchno – tehnicheskogo simpoziuma Mejdunarodniy jurnal “Prikladnih i fundamentalnih issledovaniy” Tehnicheskiy nauki – 2019 god № 2 – 34 s.
8. Aleynikova O.A. “Optimizatsiya konstruksiy teplozashitnih paketov odejdi s obyomnimi materialami” - Diss na sois.k.t.n. Moskva: Shahti 2006 – 163 s.
9. Nazarenko Ye.V. “Issledovaniya I pazpabotkateplozashitnoy odejdi s pero – puhovim uteplitelem s vertikalnim prostegivaniyem” - Diss na sois.k.t.n. Moskva: 2006 150 s.
10. M.V.Goryachev “Razrabotka metoda otsenki i raschyota vozduhopronitayemosti tkaney, virabotannih iz mononitey” - Diss na sois.k.t.n. Moskva: Izd-vo standartov, 2002 – 45 s.
11. A.V.Kulichenko “Razrabotka modeley i eksperimentalnih metodov izucheniya vozduhopronisayemosti tekstilnih materialov” Diss na sois.k.t.n. Moskva: Izd-vo standartov, 2005 – 24s.
12. Nazarova M.V. Romanov V.Yu. “Razrabotka optimalnih tehnologicheskih parametrov virabotki petelnoy tkani s maksimalnoy vozduhopronisayemostyu”. Mejdunarodniy jurnal “Prikladnih i fundamentalnih issledovaniy” Tehnicheskiy nauki – 2016. - № 12 (chast 3) – s. 422-425
13. Bessonova N.G. Razrabotka metoda i issledovaniye teplofizicheskih svoystv tekstilnih materialov i pakerov pri deystvii vlagi i davleniya - Diss na sois.k.t.n. Moskva: Izd-vo standartov, 2005 – 60 s.
14. Murashova V.Ye. “Razrabotka resursosberegayushey tehnologii igloprobivnogo netkanogo materiala iz termostoykih volokon Diss na sois.k.t.n. Moskva: Izd-vo standartov,” 2008 – 54 s.
15. Klimova N.A. Prognozirovaniye svoystv termoreguliruyuщih materialov i proyektirovaniye paketov teplozashitnih izdeliy - Diss.na soisk.k.t.n. Moskva : Izd-vo standartov, 2021 – 63 s.
16. Z.D.Moldagajiyeva, R.O.Jelisbayeva, A.A.Talaspayeva Tema: «Ognezaщitniy paket materialov dlya odejdi» KZ patent A431502, A41D27/02, A41D31/02, A62B17/00, A41D13/00, 30.09.2016, byul. № 12.
17. Silnikov M.V., Vatnik M.P., Charnishev S.V. “Paket materialov dlya odejdi s promishlennimi teplosberegayushimisvoystvami” RF № B32B3/26, A41D31/02, A41D31, A41D27, A41D13 2000-06-10— Publikatsiya 1999-05-26 Podacha.
18. https://bazaltek.ru/o_nas/stati/bazaltovoe-volokno-tehnicheskie-harakteristiki
19. https://www.7kub.ru/ves-uteplitelya-na-m2-dlya-zimney-kurtki
20. Jernitsin Yu.L. Metodicheskoye ukazaniye po vipolneniyu nauchno issledovatelskih i laboratornih rabot po ispitaniyu produktsii tekstilnogo naznacheniya. Tashkent. 2007 – 18-39 s.
21. Kulichenko A.V. Razrabotka modeley i eksperimentalnih metodov izucheniya vozduhopronitsayemosti tekstilnih materialov. - Diss.na soisk.k.t.n. Moskva : Izd-vo standartov 2005 g - 33 s.
22. Shapochka N.N. Razrabotka metodov otsenki i issledovaniye svoystv ovchinnogo polufabrikata razlichnih sposobov obrabotki - Diss.na soisk.k.t.n. Moskva : Izd-vo standartov 2010 g - 33 s.

FOOD TECHNOLOGY

TECHNOLOGICAL CHARACTERISTICS OF EDIBLE GRAPES ON TRANSPORTABILITY AND DURABILITY

Ja'far Shamshiyev
q.x.f.f.d, phd
Jizzakh Polytechnic Institute,
Republic of Uzbekistan, Jizzakh
E-mail: jafarabdusalimovich@mail.ru

Azret Shingisov
t.f.b.f.d. professor
South-Kazakhstan State University named after Mukhtar Avezov
Republic of Kazakhstan, Shymkent
E-mail: azretutebai@mail. ru

ТЕХНОЛОГИЧЕСКИЕ ХАРАКТЕРИСТИКИ СЪЕЗДОВОГО ВИНОГРАДА ПО ТРАНСПОРТНОСТИ И ДОЛГОВЕЧНОСТИ

Шамшиев Джафар Абдусалимович
q.x.f.f.d, доктор философии,
Джизакский политехнический институт,
Республика Узбекистан, г. Джизак

Шингисов Азрет Утебаевич
профессор,
Южно-Казахстанский государственный университет
имени Мухтара Авезова,
Республика Казахстан, г. Шымкент

ABSTRACT

In this article, technological characteristics of edible grapes on transportability and durability are mentioned. Along with the soil, climate and weather conditions, the quality of its storage and transportability, as well as the agrotechnology of cultivation, are of great importance in the formation of the grape harvest.

АННОТАЦИЯ

В данной статье приведены технологические характеристики съедобного винограда по транспортности и долговечности. Наряду с почвой, климатические и погодные условия, большое значение в формировании урожая винограда имеют качество ее хранения и транспортабельность, а также агротехника возделывания.

Keywords: grapes, storage, heat, weather, variety, yield, agrotechnology, storage.
Ключевые слова: виноград, хранение, тепло, погода, сорт, урожайность, агротехника, хранение.

Grapes are a valuable food product. It is one of the most common fruits in the world in the form of freshly picked, wine, grape juice, raisins and processed products.

Vitis vinifera is the main grape variety cultivated. About 90% of the grapes grown in the world belong to the Vitis vinifera grape family, which has about 600 species. Most species of this family are not used by people for practical purposes. Several species are eaten fresh or processed, depending on whether they are found in cultivation or in the wild. Species of the Vitis vinifera family of grapes grow mainly in forests, mountain slopes and valleys with high humidity.

Some scientists believe that the most important conditions that determine the possibility of growing grapes for long-term storage in a certain area are the amount of heat and precipitation in a certain zone, the continentality of the climate, the growth of grapes and the storage of grapes. is the soil condition. He proposed a complex indicator called effective heat supply, taking the Shabash variety as an example, to characterize the zone and weather conditions of individual years of the growing

Библиографическое описание: Shamshiyev J.A., Shingisov A.U. TECHNOLOGICAL CHARACTERISTICS OF EDIBLE GRAPES ON TRANSPORTABILITY AND DURABILITY // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16705*

season for the suitability of grapes grown here for long-term storage.

It was found that between the shelf life of grapes and the effective heat supply of the zone, the correlation ratio is close for the Shebash variety in Crimea - 0.84 +/- 0.09 and for the black varieties Agaday and Shaani in the Absheron zone of Azerbaijan -0.79 +/- 0.81) there is a linear relationship. The areas where grapes are grown have a significant impact on its transportation. For example, depending on the farms of the supplier, the yield of standard grapes after processing was found to be 95-97% to 76-86% for Sabash varieties, 95-98% to 77-86% for Chaush. Similar data were obtained for Tashli and Tavriz varieties.

Along with the soil, climate and weather conditions, the quality of its storage and transportability, as well as the agrotechnology of cultivation, are of great importance in the formation of the grape crop. Excessive use of nitrogen fertilizers delays growth processes, increases plant mass and yield, reduces sugar content, storage quality, vine ripening; potassium and phosphorus fertilizers increase the sugar content of grapes during storage and transportation and increase their shelf life.

According to M.I.Odinaev, the average weight of the grape heads is a characteristic of the variety, and in all studied varieties, large grape heads characteristic of large-crown varieties are formed. The size of the grape cluster is an important technological indicator. The mass of 100 pieces varies between varieties, depending on the characteristics of the variety, that is, the size of the single cluster.

According to G.L. Naumova, the smallest losses of grapes of Nimrang and Taifi Rozovy varieties were a variant of increased potassium and nitrogen content from rotting and reddening (3%) during storage and transportation. An increase in potassium nitrogen, as well as moderate doses of phosphorus, significantly reduces the resistance of grapes to microbiological and physiological diseases.

Long-term studies have shown that calcium plays a very important physiological role in maintaining the natural resistance of grapes to fungal rot and physiological diseases, and increasing their calcium content increases their resistance to all diseases. Irrigation has a strong influence on the quality of grapes during storage and transportation.

In Nimrang, Taifi Rozovy, Terbash varieties, grapes have a higher indicator when watering is stopped 30 days earlier. The tension of the grapes is greatly reduced if the watering is stopped before or after this period. It was found that the grapes of Asma and Shabash varieties, grown without irrigation in conditions protected from moisture on the southern coast of Crimea, are distinguished by high quality of detergent.

According to V.A. Boyko, stopping irrigation 10 days before harvesting grapes, stopping irrigation 30 days before harvesting increased the yield of the Nimrang variety, the average weight of berries, and reduced the storage quality. During the months of storage, the loss from rotting increased by 10.82% and from blackening by 34.0%.

According to the research of V.D. Volosovtsev, studying the effect of irrigation method on productivity in the Hisar Valley of Tajikistan, studying the quality of Rozovy grape variety "Taifi", compared to drip irrigation, it was found that irrigation with furrows and without plow is the most effective. According to M.S. Dudarev, N.A. Basiy, V.I. Martovshuk, in-soil irrigation with ceramic humidifiers for Karaburnu vineyards helps to increase the yield, quality and preservation of grapes during storage. According to the authors, this progressive method of irrigating vineyards should become more widespread.

They found that one additional punching during the ripening stage of Nimrang grapes reduced the losses due to rotting during one month of storage. by 1.82, and by 58.0% from blackening compared to the control. It is explained that the yield, quality, and preservation of grapes during storage and transportation largely depend on the formation of the bush.

In recent years, it has been found that favorable conditions have been created for the realization of the growth potential not only in plantations formed in a special fence where rare bushes are planted, but also during compact planting, in the formation of stem plantations in the form of small cup-shaped bushes.

As one of the promising directions in the intensification of the network, the wide-row high-standard system of growing vineyards is becoming widespread. It has been determined that a wide range of high-standard technology for growing vineyards is fully compatible with the biology of the grape plant, allowing for a sharp increase in labor. productivity due to more complete mechanization of labor-intensive operations.

References:

1. Лазаревский М.А. Методы ботанического описания и агробиологического изучения сортов винограда. // Ампелография СССР. – М.: Пищепромиздат, 1946. – Т.I. – С. 347-400.
2. Простосердов Н.Н., Изучение винограда для определения его 119 использования. – Москва, Пищепромиздат – 1963. – С.56-58 с. // Доклады Всесою
3. Ненько Н.И., Ильина И.А., Воробьева Т.Н. и др. Современные инструментально-аналитические методы исследования плодовых культур и винограда: учеб.-метод. пособие / под общ. ред. Н.И. Ненько. Краснодар: СКЗНИИСиВ, 2015. – С. 16-18.зной научно-практической конференции. – Ялта. 1988. – С. 60-61.
4. Аралов Х.М., Иссаков Ш.А., Киличов А.А., (2023. Analysis of research on production of optimal and enriched fatty acid oils. Universum: технические науки. Выпуск: 1(106) Январь 2023 Часть 4 Москва 2023 66-67.

CHEMICAL ENGINEERING

DOI - 10.32743/UniTech.2024.118.1.16627

STUDY OF THE PHYSICOCHEMICAL PROPERTIES OF CELLULOSE OBTAINED FROM PAULOWNIA WOOD

Umid Mukhitdinov
PhD, associate professor,
Department of Technology of pulp and woodworking
Tashkent Institute of Chemical Technology,
Republic of Uzbekistan, Tashkent
E-mail: muxitdinovu@mail.ru

Ramizitdin Sayfutdinov
Doctor of Technical Sciences, professor,
Department of Industrial Ecology
Tashkent Institute of Chemical Technology,
Republic of Uzbekistan, Tashkent
E-mail: say-ram@mail.ru

Khasanjon Amirov
Student,
Department of Technology of pulp and woodworking
Tashkent Institute of Chemical Technology,
Republic of Uzbekistan, Tashkent
E-mail: amirovxasan994@gmail.com

Rukhsora Zokirova
Student,
Department of Technology of high-molecular compounds and plastics
Tashkent Institute of Chemical Technology,
Republic of Uzbekistan, Tashkent
E-mail: ruxsorazokirova1095@gmail.com

ИЗУЧЕНИЕ ФИЗИКО-ХИМИЧЕСКИХ СВОЙСТВ ЦЕЛЛЮЛОЗЫ ПОЛУЧЕННОЙ ИЗ ДРЕВЕСИНЫ ПАВЛОВНИИ

Мухитдинов Умид Давранович
PhD, доцент
кафедры «Технология целлюлозы и деревообработки»,
Ташкентский химико-технологический институт,
Республика Узбекистан, г. Ташкент

Сайфутдинов Рамизитдин
д-р техн. наук,
проф. кафедры «Промышленная экология»,
Ташкентский химико-технологический институт,
Республика Узбекистан, г. Ташкент

Амиров Хасанжон Бекназар угли
студент,
кафедры «Технология целлюлозы и деревообработки»,
Ташкентский химико-технологический институт,
Республика Узбекистан, г. Ташкент

Библиографическое описание: STUDY OF THE PHYSICOCHEMICAL PROPERTIES OF CELLULOSE OBTAINED FROM PAULOWNIA WOOD // Universum: технические науки : электрон. научн. журн. Mukhitdinov U. [и др.]. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16627*

Зокирова Рухсора Шухратовна
студент,
кафедры «Технология высокомолекулярных соединений и пластмасс»,
Ташкентский химико-технологический институт,
Республика Узбекистан, г. Ташкент

ABSTRACT

In this research work, we studied the characteristics of the Pavlova tree: roots, growth rate, reproduction, fruits, weight, strength, stability and quality indicators. Paulownia wood was first crushed to a thickness of 0.5-1.0 cm, then treated in 2.5-5.5% NaOH alkali at a temperature of 170^0C for 6 hours. Cellulose productivity, brightness level, moisture content, lignin content, ash content, viscosity, α-cellulose and polymerization levels of processed cellulose were determined.

The study should also note fundamental research into cellulose quality indicators, mechanical and physic-chemical indicators of this material, obtained under optimal conditions. Scientific data on the possibility of producing various paper products, as well as high-quality cellulose ethers and ethers from paulownia tree cellulose are analyzed.

АННОТАЦИЯ

В данной исследовательской работе мы изучили характеристики павловского дерева: корни, скорость роста, размножение, плоды, вес, прочность, устойчивость и качественные показатели. Древесину павловнии сначала измельчали до толщины 0,5-1,0 см, затем обрабатывали в 2,5-5,5%-ной щелочи NaOH при температуре 170^0C в течение 6 часов. Определены продуктивность целлюлозы, уровень белизны, влажность, содержание лигнина, зольность, вязкость, α-целлюлоза и уровни полимеризации переработанной целлюлозы.

В исследовании следует отметить также, фундаментальные исследования показателей качества целлюлозы, механические и физико-химические показатели данного материала, полученные при оптимальных условиях. Проанализированы научные данные о возможности получения из целлюлозы дерева павловнии различной бумажной продукции, а также высококачественных простых и сложных эфиров целлюлозы.

Keywords: Properties of paulownia wood, microscopic structure, wood fiber cells, cellulose, quality indicators.
Ключевые слова: Свойства древесины павловнии, микроскопическое строение, клетки древесного волокна, целлюлоза, показатели качества.

Introduction. Currently, research is being conducted in our Republic aimed at studying the cellulose components and their properties obtained from paulownia trees, due to the re-production of alternative energy sources and wood-based products. Research is investigating the various methods used to extract cellulose from paulownia trees, including the study of the properties of the resulting cellulose [1-3].

The results of the conducted scientific research show that the quality of cellulose obtained from paulownia trees is higher than that obtained from other sources, in addition, paulownia plants are known to be used in pharmacology, cosmetology, animal husbandry, and are used for the production of wood cellulose. In another effort, our government is implementing various measures to support the cultivation of paulownia trees, including allocating land for plantations and leasing land to farmers and businesses for timber production. In addition, cultivation of paulownia trees is a profitable resource and efforts are underway to optimize cultivation through new innovative agro-technologies for their propagation [4-5].

Paulownia is a fast-growing tree with large leaves, about 70 cm in diameter, and flowers up to 6 cm in diameter, with a beautiful crown. The diameter of the tree is up to 1 meter. The average lifespan is up to 100 years. Depending on the growing environment, trees can reach a maximum of 25 meters and different heights.

Root system: superficial, long-rooted, without a distinct central root.

Undemanding to soil, it will grow in any dry soil with up to 2% lime, but it thrives best in deep, moderately moist, drained, fertile moist soil. Does not like drought and swamp.

Light tolerance: prefers sunny, open, well-lit places.

Frost resistance: very cold resistant, can withstand temperatures down to - 28°C, and the buds freeze. It is sensitive to cold when it is young. It should be planted in places protected from winter winds.

Growth rate: grows very quickly, but slows down significantly in infertile soils. At 10 - 11 years old, depending on the species, it can reach 20 - 25 m.

Propagation: propagated by seeds and rhizomes.

Fruit: contains many seeds. It ripens in September-October. The seeds remain on the tree during the winter season and bear fruit at 5-6 years of age. One tree can produce up to 20 million seeds per year.

Weight: the average weight of paulownia wood is 208-282 kilograms per 1 cubic meter. Paulownia wood is almost four times lighter than oak at 850 kg per 1 cubic meter and half of pine wood at 482 kg per 1 cubic meter.

Strength: Paulownia has the highest strength-to-weight ratio of any wood species. Paulownia wood is resistant to load and deformation due to moisture.

Stability: Pavlonia wood takes at least 30 days to dry in the open air. The wood can be dried for 24 hours at high temperature in drying ovens until the moisture content in the wood reaches 10-12%. Wood raw materials have a relative shrinkage of 2.2% in drying and 4% in length [6-7].

The trunk and flowering parts of the paulownia tree:

Figure 1. 3 and 5 year plantation of paulownia tree

Macroscopic structure of paulownia tree: the bark is gray-brown, rather smooth, without cracks. The color of the wood is grayish yellow. The wood is straight-grained, straight fibers and texture with bright and expressive beautiful patterns of grains, shiny, light, odorless. The smoothness of the wood and the absence of knots indicate the quality of the wood material.

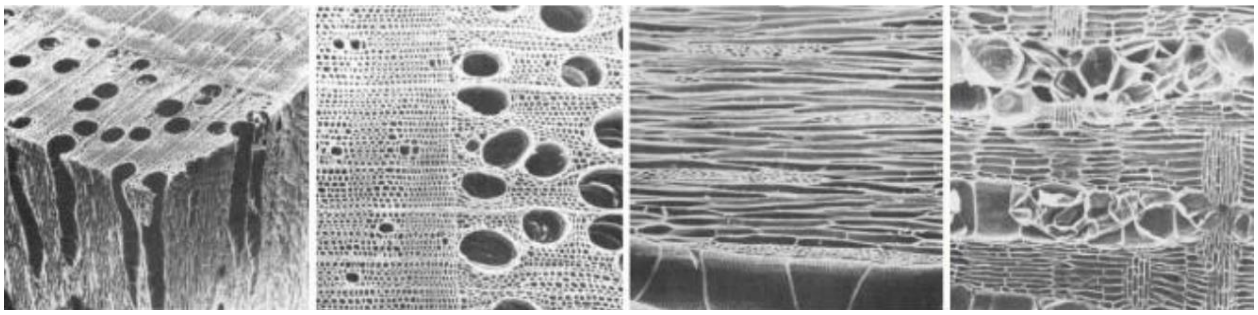
Microscopic structure:

1. Fibers: in cross-sectional holes, round or elliptical. The difference in fiber sizes and three to five perforations between early and late wood; with a maximum deviation of about ten times. The fibers are mostly single, sometimes circular, and the outer layer is smaller in size.

2. Nuclear rays are mostly homogeneous, sometimes heterogeneous, a few are spindle-shaped.

3. Parenchyma cells are well developed, there are tracheids, which are not found in all wood, hardwoods, for example, in oak, in the late layering zone throughout the year.

4. Wood fiber cells are present in growth rings at an early stage of development. Wood fibers are arranged in vertical rows, the cell wall is less than 3 microns thick, and the average length is 550-1700 microns.



1 *2* *3* *4*

Figure 2. Microscopic structure of paulownia wood

Due to its fast growth and large leaves, the paulownia tree absorbs a lot of CO_2 carbon dioxide and releases a lot of oxygen.

In the results of our study, the average value of the length of the fibers is 0.905 mm, the average fiber width is 34.59 μm, the average thickness is 26.80 μm, and the cell wall thickness is 3.89 μm.

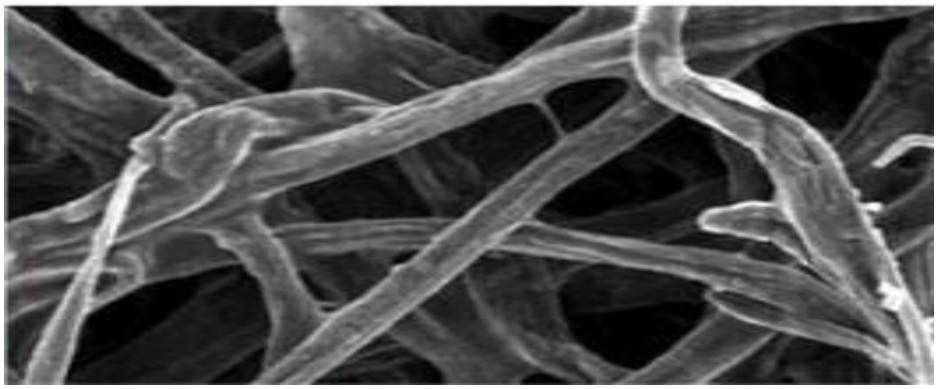


Figure 3. Microscopic structure of paulownia wood

The coefficient of elasticity of paulownia fibers is included in the group of elastic fibers. The flexibility coefficient of paulownia fibers is 75.96%.

Cross section of paulownia under microscopic magnification:

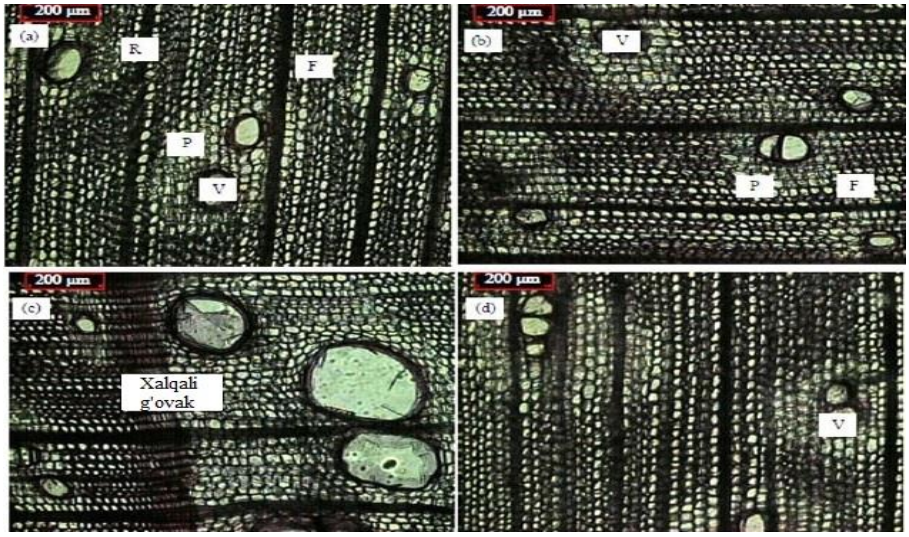


Figure 4. (a and b) - small pores, (c) - compression of fibers, (d) - several large pores, F: proteins, P: parenchyma, R: rays, V: vessels

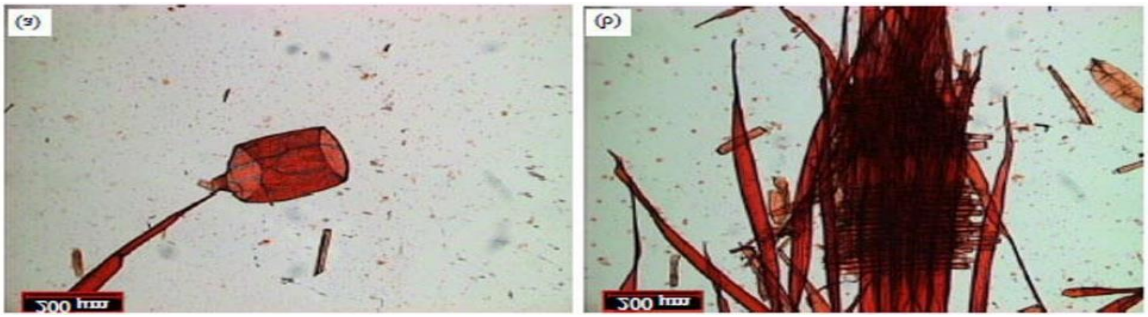


Figure 5. (a) – vessel sample maceration, (b) – radial section, F: fibers, R: rays

Paulownia wood fibers are not as dense as other dense woods. As you can see in the picture above, the fiber morphology of paulownia wood is good. Paper is a good raw material for manufacturing products. Paulownia tree replaces 35-40 year old pine with a girth of 50-60 cm and a height of 12-15 m.

Currently, in countries with developed cellulose industry, various researches are being conducted to reduce the participation of factors that cause various destructive conditions in the process of extracting cellulose from various plants containing natural polymers. Because the quality indicators of the obtained cellulose are required to be at a level that allows for its wide use in the future. Taking into account the above points, some simplifications were made in the process of obtaining cellulose from the perennial plant paulownia tree. The plant stem was first cut into small pieces and chemically processed under special laboratory conditions [3,7].

Methodical part. Propagation of the paulownia plant is underway, it is a fast-growing tree that is used as a building material. In order to determine the suitability of the paulownia plant for chemical processing, individual parts (trunk, branches, roots, bark) were studied.

The results of the analysis of the components of paulownia (table 1) show that the most valued component of wood - cellulose is present in the largest amount in the trunk of the tree and is 45.5%, while the least amount of cellulose is present in the bark (24.5%).

Table 1.

The amount of cellulose and other components in the components of paulownia

№	Components	Body	Horns	Roots	Bark
1	Cellulose, %	45,5	37,2	39,1	24,5
2	Lignin, %	21,8	18,7	19,2	17,1
3	Ash content,%	1,71	1,53	1,71	4,6
4	Moisture,%	18,3	18.5	18,2	17,5
5	Extractable substances,%	3,21	4,1	5,6	4,7

Table 1 shows that the branches and roots of paulownia can be used as secondary raw materials for chemical processing, as they contain up to 37.2 and 39.1%, respectively, that is, only 6-8% less cellulose than the body. will be available. Lignin, the second chemical component of paulownia, increases with decreasing cellulose content. 21.8, 18.7, 19.2 and 17.1% of lignin were found in the trunk, branches, roots and bark, respectively. It is desirable to use paulownia bark with the least amount of lignin to obtain fibrous semi-products. The remaining components are valuable secondary resources for chemical processing to extract cellulose.

From paulownia wood, cellulose is obtained by first hydrolysis and then alkali treatment. For the chemical treatment to be effective, the paulownia fiber is cut and crushed in 0.5-1 cm size. Then 100 g is taken out, put in a glass and 500 ml of water is poured into it. The mixture is boiled for 4 hours, extracted and filtered to separate the pulp. After the mass is separated from the liquid, it is hydrolyzed in a 3% nitric acid solution for 60 minutes, then it is washed to pH 6.5...8.5 and boiled with 5% sodium alkali to separate the pulp from lignin, polysaccharides and fatty substances. After washing the obtained cellulose to pH 9...9.5, it is bleached with hydrogen peroxide solution. Then the mass is washed and bleached cellulose is dried in a drying cabinet. In order to determine the optimal conditions for the extraction of cellulose from the paulownia fiber, it was cooked in 5% alkali for different times (table 2).

Table 2.

Effect of pavlonia cooking time on cellulose content

Time, hours	Cellulose, %	Lignin, %	Polysaccharides, %	Ash content, %	Tar and oils, %	Water soluble substances, %
2	39,5	23,8	37,1	1.92	4,7	9,1
3	42.4	22,1	36,2	1.85	4,9	9,8
4	44.1	21,5	35,5	1.71	2,6	10,6
5	45.5	20,7	34,1	1.63	4,6	10,1

According to the results of the experiments presented in table 2, the most favorable conditions for baking pavlonia dough are as follows:

1. Extraction in water - boiling for 60 minutes.
2. Hydrolysis in 3% nitric acid - 2 hours, temperature - 110ºC.
3. Boiling in 5% alkali at 110ºC for 3 hours to remove impurities from cellulose.

In the experiment according to table 2, the productivity of cellulose is 39.5-45.5%, the amount of lignin is 23.8-20.7%, the amount of polysaccharides is 37.1-34.1%, the amount of ash is 1.92-1.63%, the amount of tar and oil is 4.7-4.6%, and water-soluble substances are 9.1 - made up 10.1%. In order to determine the optimal conditions for the extraction of cellulose from the paulownia fiber, it is cooked in different concentrations of alkali for 6 hours (table 3).

Table 3.

Quality indicators of cellulose obtained from 3- and 5 year old paulownia trees

№	NaOH, %	Boiling τ, hours	Temperature, ^{0}C	Quality indicators of cellulose							
				Cellulose product, %	Whiteness level, %	Humidity, %	Lignin, %	Ash content, %	Viscosity, cPs	α – cellulose, %	*DP
3 years old											
1	2.5	6	170	37,8	61,3	3.2	23,9	4.83	7,1	61.5	351
2	3.5	6	170	40.1	71,5	3.6	27,5	3.65	9,3	68.3	376
3	**5.0**	**6**	**170**	**43.6**	**87,2**	**3.5**	**29,1**	**3.51**	**11,6**	**70,1**	**410**
4	5.5	6	170	45.3	91,4	3.3	30,2	3.32	12,4	74.6	451
5 years old											
1	2.5	6	170	39,5	65,7	3.4	21,8	3.92	19,4	73.2	1105
2	3.5	6	170	42.4	76,4	3.6	22,1	2.75	21,5	85.4	1069
3	**5.0**	**6**	**170**	**46.1**	**89,6**	**3.7**	**20,7**	**2.51**	**23,2**	**87.1**	**1025**
4	5.5	6	170	48.3	93,1	3.5	23,2	2.27	24,1	88.5	957

* *DP – Degree of polymerization*

In table 3, in order to determine the optimal concentration of alkali solution for extracting cellulose from the composition of 3 and 5 year old raw materials, it was boiled for 6 hours in its 2.5, 3.5, 5.0, 5.5% solution and the optimal conditions were determined (table 3). It can be observed from the table that certain properties of cellulose produced under the influence of different alkali concentrations have different indicators. At the alkali concentration of 5.0%, the 3 year paulownia cellulose content increased to 43.6%, α-cellulose to 70.1%, whiteness to 87.2%, lignin to 29.1%, ash to 3.51%, viscosity to 11.6 and polymerization degree to In 410 and 5 year old paulownia cellulose, the amount of cellulose is 46.1%, α-cellulose is 87.1%, whiteness is 89.6%, lignin is 20.7%, ash is 2.51%, viscosity is 23.2, and the degree of polymerization is 1025. it became known in the experiment.

Conclusion. Experiments were conducted in the process of processing pavlonia plant, and it was found that cellulose and its derivatives, as well as paper products, can be produced with high-quality products in determining the quality indicators of raw materials.

1. Microscopic structure of paulownia wood, round or elliptical structures in cross-section of fibers, growth rings in the initial stage, thickness of cell wall, their sizes were thoroughly studied;
2. Cellulose extraction from the paulownia tree, its optimal conditions were thoroughly studied;
3. The main quality indicators were determined from the cellulose of three and five year old paulownia trees;
4. It is recommended in the chemical industry and various paper products production industries to obtain various esters from the cellulose obtained from the paulownia tree.

References:

1. Миркамилов Т.М. Технология хлопковой целлюлозы. -Ташкент: Фан, 1996. – с. 272.
2. U. Muxitdinov, R. Sayfutdinov, M. Abdumavliyanova, Sh. Mirkamilov. Extraction of cellulose from paulownia plants and it's simple ester carboxymethyl cellulose (Na-KMC) technology. E3S Web of Conferences 371, 01018 (2023) https://doi.org/10.1051/e3sconf/202337101018 (Q3) p.1-5.
3. Primqulov M., Raxmanberdiyev G'. // Sellyuloza va qog'oz texnologiyasi // - Toshkent. Fan va texnologiya. – 2009 y. – 165 b.
4. Zhu Zhao-Hua, Chao Ching-Ju, Lu Xin-Yu, Xiong Yao Gao. Paulownia in China: cultivation and utilization by Chinese academy of forestry staff. ISBN 9971-84-546-6. p.74.
5. Saim Ates., Yonghao Ni., Mehmet Akgul., Ayhan Tozluoglu. Characterization and evaluation of Paulownia elongota as a raw material for paper production. Africal Journal of Biotechnology. Vol.7(22), pp. 4153-4158.
6. Электронный ресурс www.paulowniagroup.com.ua
7. Курбанова Н.К. // Разработка технологии получения целлюлозы из древисины павловния // - Ташкент. – 2013. - с. 113.

DETERMINATION OF ACCEPTABLE DIMENSIONS OF BIOFERTILIZER PRODUCTION

Zuhriddin Voqqosov
PhD
of Namangan Institute of Engineering and Technology,
Uzbekistan, Namangan
E-mail: voqqosov_zuxriddin@rambler.ru

Maftuna Ikromova
Doctoral student
of Namangan Institute of Engineering
Uzbekistan, Namangan
E-mail: ikromovamaftuna@gmail.com

ОПРЕДЕЛЕНИЕ ПРИЕМЛЕМЫХ РАЗМЕРОВ ПРОИЗВОДСТВА БИОУДОБРЕНИЙ

Воккосов Зухриддин
PhD
Наманганского инженерно-технологического института,
Республика Узбекистан, г. Наманган

Икромова Мафтуна
докторант
Наманганского инженерного института,
Республика Узбекистан, г. Наманган

ABSTRACT

In this article, microorganisms were used to speed up the decomposition process of various wastes by microorganisms by 3-5 times, as a result, biofertilizers with the following composition changes were obtained. First, the problem of organic fertilizer; secondly, the issues of enriching the soil with nutrients and thirdly, protecting the environment from waste pollution will be solved.

АННОТАЦИЯ

В данной статье были использованы микроорганизмы для ускорения процесса разложения микроорганизмами различных отходов в 3-5 раз, в результате были получены биоудобрения со следующими изменениями состава. Во-первых, проблема органических удобрений; во-вторых, будут решены вопросы обогащения почвы питательными веществами и, в-третьих, защиты окружающей среды от загрязнения отходами.

Keywords: humus, biofertilizer, farming, enterprises remains leftovers, household service, apartment waste, food-food waste, plant remains .

Ключевые слова: перегной, биоудобрение, земледелие, остатки предприятий, бытовой сервис, квартирные отходы, пищевые отходы, растительные остатки.

Introduction The use of chemical fertilizers in agriculture has increased over the years in order to meet the strong demand of the population for food products. The problem with these chemical fertilizers is soil degradation. Biofertilizers to overcome these problems **.** These biofertilizers try to reduce the impact of agriculture on the environment, prevent soil degradation and improve its quality.

Fertilizers are the main factor in improving soil properties and productivity. Fertilizers can be divided into 2 groups: traditional and non-traditional. Traditional fertilizers are fertilizers that have become a tradition in agriculture, are obtained on an industrial scale and are available in local conditions. Such fertilizers include mineral and microfertilizers, livestock and poultry manure , green fertilizers produced in factories . Non-traditional fertilizers are a new type of fertilizers in agriculture, which are obtained by composting various wastes and residues [1].

There is a high demand for traditional fertilizers in the agriculture of our country, and in some cases there is a shortage of them. For example, in the conditions of Uzbekistan, 15-20 tons of organic fertilizers should be applied annually to each hectare of irrigated land to maintain the humus balance in a deficit-free state. However, it is not possible to collect this amount of organic fertilizers [2].

Библиографическое описание: Voqqosov Z.K., Ikromova M. DETERMINATION OF ACCEPTABLE DIMENSIONS OF BIOFERTILIZER PRODUCTION // Universum: технические науки : электрон. научн. журн. 2024. 1(118). URL: *https://7universum.com/ru/tech/archive/item/16680*

Microorganisms promote plant growth through rhizosphere symbiosis with various mechanisms, the most important of which are: increased use of nutrients and water, introduction of nitrogen into the plant-soil system through biofixation by Rhizobium bacteria, etc. [3-5].

These biofertilizers are gaining strength compared to general fertilizers because the environmental impact is significantly reduced. Thanks to the use of microorganisms capable of improving soil conditions and its quality, it is possible to achieve improved productivity without damaging the soil.

Research methods and materials . In order to quickly and easily achieve the intended goal in conducting scientific research and conducting experiments, first of all, it is necessary to know how to correctly choose the methods of analysis. In particular, when obtaining biofertilizers based on local raw materials, it is desirable to use fast, modern and, of course, highly accurate analytical methods to determine various physical and chemical parameters of raw materials and finished products [5-17].

The main food wastes used for scientific research were plant residues, manure, and samples of different types of food waste. The main chemical composition of these raw materials is presented in Table 1.

Food waste mainly consists of carbohydrates, proteins, lipids and traces of inorganic compounds. The composition varies depending on the type of food waste and its components. Food wastes consisting of rice and vegetables are high in carbohydrates, while food wastes consisting of meat and eggs are high in proteins and lipids. Table 1 summarizes the composition of food waste studied in different parts of the globe.

Table 1.

Amount of nutrients in common waste and residues in Uzbekistan

Waste and scraps	Organic mass	Mass ratio of air humidity in %			Amount in 20t mass (kg)			
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	Organics (kg)
Food waste	70	0.70	0.31	-	140	74	-	14000
Plant remains	82	0.92	0.85	0.95	192	170	190	16900
Cattle manure	60	0.50	0.25	0.60	100	50	120	12000
Tree leaf	88.2	0.37	0.24	0.27	74.0	48	54	17640

The advantage of biofertilizers is that, firstly, they are obtained at the expense of free raw materials; The use of chemical fertilizers is reduced. As an alternative to chemical fertilizers, biofertilizers have a positive impact on the environment by reducing the use of ammonia in the production of chemical fertilizers and reducing global energy consumption. Crop development and soil conservation. The use of this microorganism improves the fertility of land and crops, prevents erosion, and promotes proper soil structure. Improving the nutritional capacity of plants. The use of these types of organic fertilizers can increase the uptake of plant nutrients such as nitrogen, zinc or phosphorus. They allow the use of organic waste. Productivity increases by 30%. Improved soil maintenance helps plants grow better during dry periods.

Research results and discussion . From us laboratory researches were carried out on obtaining biofertilizers by rotting various food wastes and plant residues, cattle manure, various poultry wastes with the help of whey microorganisms. Food waste, The quantities of biofertilizers obtained based on cow dung, manure waste and plant residues and milk whey putrefactive microorganisms were studied. For this, food waste was taken in the ratio of cattle manure: plant residues and SZM in the ratio of 60:100: 40: 100, and the resulting mixture was composted in the ratio (40-60:100:(20-40):100). The change in chemical composition during the process was studied.

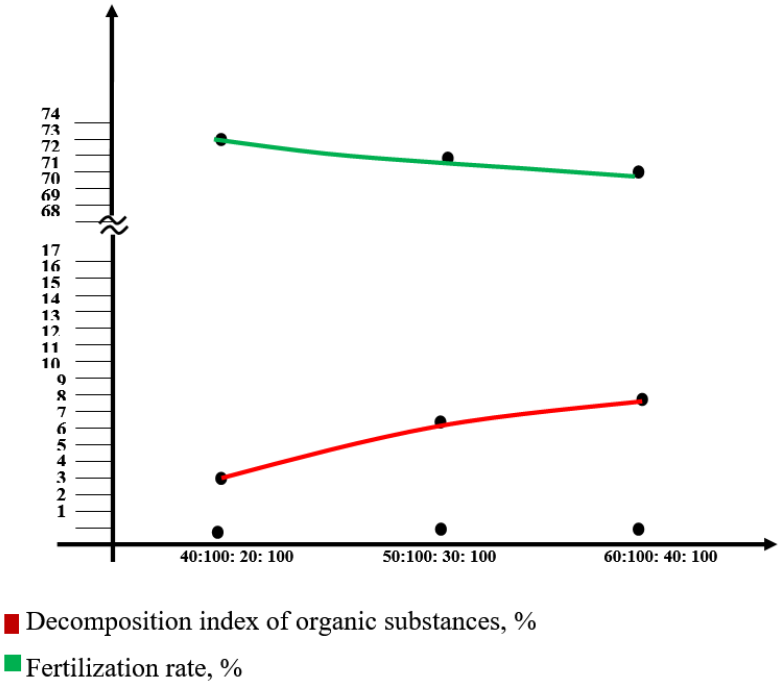


Figure 1. Graph

Chemical composition of biofertilizer samples obtained on the basis of food waste, cattle manure, plant residues and whey microorganisms (FW:CM:PR:WM)= (40-60):100:(20) -40):100)).

In the table above, the proportions of the main components in biofertilizers obtained in optimal sizes are 40:100: 20: 100 and 60:100: 40: 100 We can see that the amount of fertilizer has changed from % 3.16% to 7.86% and the index of decomposition of organic matter has changed from % 72.94% to 70.56%, which in turn is as follows (wt., %) : $P_2O_{5\ general.}$ - 0.7; organic substances - 41.27; humic acids - 4.73; fulvic acids - 7.6; water-soluble organic matter. In turn, the index of decomposition of organic substances in bio fertilizers is equal to 70.56 % and the level of humification is equal to 7.86 % . From the point of view of agrochemical and economic efficiency (FW:CM:PR:WM)= (40-60):100:(20-40):100)), the optimal ratio and the compost ripening time as in the previous case It can be taken as 80 days. In this case, we can observe that the total amount of nitrogen, humic acids, fulvic acids P_2O_5 increases accordingly.

Conclusion Bio-fertilizers are organic in nature and contain all the nutrients (macro- and micro-elements) necessary for plants, as well as a large amount of amino acids. These amino acids are a source of nutrients for microorganisms, and microorganisms enrich the microflora of the soil and activate microbiological processes (rotting, mineralization, ammonification) in its composition. It is clear that the rational use of such fertilizers is very important for agriculture.

Literature:

1. Maftuna I.. Xayrullo Q.. Zuhriddin V. FERTILIZERS OBTAINED FROM NON-NATURAL RAW MATERIALS AND THEIR TYPES //International journal of advanced research in education. technology and management. – 2023. – Т. 2. – №. 3..
2. Vokkosov Z.K. U. Obtaining organomineral fertilizers based on local agricultural ores, mineral fertilizers, cattle manure and solutions of nitrogen-fixing microorganisms // Universum: technical sciences. – 2022. – No. 6-4 (99). – pp. 44-48.
3. Воккосов З.К. У. и др. РАЗРАБОТКА И ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ ОРГАНИЧЕСКИХ УДОБРЕНИЙ // Universum: технические науки. – 2022. – №. 12-5 (105). – С. 10-15..
4. Kanoatov X.M., Vokkosov Z. K., Xodjiev A.A. & Alieva G.S. (2021). Organic-Mineral Fertilizer Based On Manure. NVEO-NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO. 10631-10636.
5. Zukhriddin V. Murodillaevich K. K.. Elbekovich S. B. Obtaing Organomineral Fertilizers on Base of Local Raw Materials and Nitrogen-fixing Microorganisms //Chemical Science International Journal. – 2022. – Т. 31. – №. 4. – С. 44-53.
6. Z.K. Vokkosov. X.M. Kanoatov Analysis of physical-chemical and mineralogical indications of local agriculture (bentonite and phosphorite flour) in the production of organomeneral fertilizers. // NamMTI ILMIY-TEXNIKA JURNALI. 2181-8622. 2022-№2 Vol. 7. Issue 2 –pp 109-113.

7. Voqqosov Z., Холдарова Г. Production of organic mineral fertilizers on the basis of local raw materials and nitrofificating microorganisms. // NamMTI ILMIY-TEXNIKA JURNALI. ISSN 2181-8622. 2022-№1 84-87 pp.
8. Sharipov S.Y., Azizov A.S., Vakkasov Z.K. Storage of apples in different methods in the valley region of Uzbekistan // IOP Conference Series: Earth and Environmental Science. – IOP Publishing. 2022. – Т. 1068. – №. 1. – С. 012029.
9. Zuxriddin V. & Hakimov S. (2023). DEVELOPMENT OF NEW TYPES OF VEGETABLE JUICES AND BEVERAGES TECHNOLOGY. Scientific and Technical Journal of Namangan Institute of Engineering and Technology. 8(1). 59–65. Retrieved from http://niet.uz/index.php/nj/article/view/101
10. Voqqosov Z., Kanoatov K. The influence of organo-mineral fertilizers on the growth of evening apple varieties throughout the year //E3S Web of Conferences. – EDP Sciences. 2023. – Т. 390.
11. Zuhriddin V. PRODUCTION OF ORGANIC FERTILIZERS USING LOCAL RAW MATERIALS // Universum: technical sciences. – 2023. – №. 4-8 (109). – С. 12-14..
12. Komolxon ogli V.Z., Soxibjon S. OLMA NAVILARINI BIOMETRIK KUZATUV JARAYONIGA ORGANOMINERAL O ‘G ‘ITLARNI TA’SIRI //Journal of new century innovations. – 2023. – Т. 30. – №. 3. – С. 156-160.
13. Komolxon ogli V.Z. et al. OLMA NAVILARINI FENOLOGIK VA BIOMETRIK KUZATUV JARAYONIGA ORGANOMINERAL O ‘G ‘ITLARNI TA’SIRI //Journal of new century innovations. – 2023. – Т. 23. – №. 2. – С. 66-70.
14. Komolxon ogli V.Z. et al. OLMANI SAQLASH JARAYONLARINING NAZARIY ASOSLARI //Journal of new century innovations. – 2023. – Т. 23. – №. 2. – С. 60-65.
15. Шарипов С.Я., Воккосов З.К. У. СПОСОБЫ ХРАНЕНИЯ ПОЗДНИХ СОРТОВ ЯБЛОК, ВЫРАЩЕННЫХ В КЛИМАТИЧЕСКИХ УСЛОВИЯХ НАМАНГАНСКОЙ ОБЛАСТИ //Universum: технические науки. – 2021. – №. 12-4 (93). – С. 29-33.
16. Худайбердиева Лайло Абдисаматовна, Ходжаназарова Мутабар Кушоковна, Азимова Дилдора Муминжановна, Воккосов Зухриддин Комолхон Угли ИССЛЕДОВАНИЕ ПРОМЫШЛЕННЫХ СОРТОВ СЛИВ И СОВЕРШЕНСТВОВАНИЕ ТЕХНОЛОГИЙ ХРАНЕНИЯ И СУШКИ // Universum: технические науки. 2023. №11-4 (116). URL: https://cyberleninka.ru/article/n/issledovanie-promyshlennyh-sortov-sliv-i-sovershenstvovanie-tehnologiy-hraneniya-i-sushki (дата обращения: 05.01.2024).
17. Шарипов Султон Янгибаевич, Воккосов Зухриддин Комолхон Угли СПОСОБЫ ХРАНЕНИЯ ПОЗДНИХ СОРТОВ ЯБЛОК, ВЫРАЩЕННЫХ В КЛИМАТИЧЕСКИХ УСЛОВИЯХ НАМАНГАНСКОЙ ОБЛАСТИ // Universum: технические науки. 2021. №12-4 (93). URL: https://cyberleninka.ru/article/n/sposoby-hraneniya-pozdnih-sortov-yablok-vyraschennyh-v-klimaticheskih-usloviyah-namanganskoy-oblasti (дата обращения: 05.01.2024).

ДЛЯ ЗАМЕТОК

Научный журнал

UNIVERSUM:
ТЕХНИЧЕСКИЕ НАУКИ

№ 1(118)
Январь 2024

Часть 4

Свидетельство о регистрации СМИ: ЭЛ № ФС 77 – 54434 от 17.06.2013

Издательство «МЦНО»
123098, г. Москва, улица Маршала Василевского, дом 5, корпус 1, к. 74
E-mail: *mail@7universum.com*
www.7universum.com

Отпечатано в полном соответствии с качеством предоставленного оригинал-макета в типографии «Allprint»
630004, г. Новосибирск, Вокзальная магистраль, 1
16+