



SCIENTIFIC AND TECHNICAL JOURNAL
Namangan Institute of Engineering and Technology

«CARRYING OUT THEORETICAL STUDIES OF THE COTTON
REGENATOR»

Mamajanov Shavkatjon

Researcher

Namangan Institute of Engineering and Technology

<https://doi.org/10.5281/zenodo.7952007>



ISSN 2181-8622

Manufacturing technology problems



**Scientific and Technical Journal
Namangan Institute of
Engineering and Technology**

**Volume 8
Issue 1
2023**



8. Akhmedkhodzhaev Kh.T. other. Investigation of the process of impact interaction of cotton seeds // Cotton industry. 1992. No. 5-6.
9. Novitsky I.I. Some physical and mechanical properties of cotton seeds. – Oil and fat industry. 1964. No. 5.
10. Akhmedkhodzhaev H.T., Yakubov D., Obidov A.A. Ways of sorting fiber seeds after the ginning process. // Collection of articles of NamMII international scientific and practical conference. - Tashkent, 2002. - p. 389-392.
11. Akhmedkhodzhaev Kh.T., Boyturaev U.G., Tajibaev M.A. Probability of seeds coming out of a genie with varying degrees of hairiness. - T.: 1993. - 29 p. - Dep. in UzNIINTI No. 1451-Uz.
12. Isakhanov Kh.I. Study of the process of regeneration of under-ginned cotton seeds before linting and the creation of a device for its implementation: Dis. ... cand. tech. Sciences. - Tashkent: TITLP, 1986.- 243 p.
13. Akhmedkhodzhaev Kh.T., Karimov A.I., Obidov A.A. Study of the vibration movement of cotton seeds on vibrating carriages of parallel oscillation. // Journal of Textile Problems. - Tashkent, 2003. - No. 4. - P.65-67.
14. Obidov Avazbek, Sultonov Mirzaolim, Muhksinov Ibrohim, Abdullaev Shokir. The Theoretical Studies of the Cultivation of Three Cotton Seeds along the Plain. Engineering Vol.10 No.08(2018), 514-520 P.
15. A.A.Obidov M.M.Sultanov. To research the method of separating fibers suitable for spinning on a needle drum. International scientific and practical conference CUTTING EDGE-SCIENCE. June 29-30, 2020 Shawnee, USA, 128-131 P.
16. Sultonov M.M. Obidov A.A. Study of fiber motion in a needle drum fiber separation device. Universum: Technical science, 5-74, 33-37 P.
17. Mirzaolim Sultanov, Avazbek Obidov. Investigation of working parts of fixed device designed to separate spinning fibers from fibrous waste that can be spun. Journal of Critical Reviews, JCR. 2020; 7(4): 2314-2322, doi: 10.31838/jcr.07.04.362, 5614-5623 P.
18. Obidov A.A. Investigation of the working surface of a new seeding machine // Journal of Textile Problems. - Tashkent: TITLI, 2006. - №2. - 29-32 p.
19. Avazbek Obidov, Muhiddin Vokhidov, Jahongir Abdurahmonov. Exploring the Efficiency of Experimental Construction of Sorting Ginned Cotton Seed Machine. Engineering, Scientific Research Publishing. Vol.13 No.1, January 2021.
20. Obidov A.A. Improvement of the technology of cleaning and sorting of ginned seeds. Dissertation of Candidate of Technical Sciences. - Tashkent: TITLI, 2007. - 200 p.

CARRYING OUT THEORETICAL STUDIES OF THE COTTON REGENERATOR

MAMAJANOV SHAVKATJON

Namangan Institute of Engineering and Technology
Phone.: (+99894) 590-45-50

Abstract: In this paper, it was determined the strength of a newly installed slatted drum shaft by improving the design of the regenerator and conducting experiments on it. Based on the research, it was determined that the minimum value of the strength reserve coefficient is equal to 166, and it was concluded that this shaft fully meets the specified requirement for the device.

Keywords. Cotton raw material, impurities, regeneration, regenerator, colostrum grid, drum, drum shaft, planks, torque, weight

Introduction. In the technological processes of many cotton-ginning enterprises in the world, one of the main tasks is to clean cotton raw materials from various scalping, impurities based on highly efficient technological processes and at the same time preserve its natural properties. In the United States of America, Australia, China, India, and some Central Asian countries, special attention is being paid to the creation of efficient technologies for the cleaning of cotton raw materials, to increase the amount and efficiency of cotton fiber production, to create resource-saving technologies, to modernize technological processes, and to increase the competitiveness of the fiber. Many researchers are engaged in the cleaning of cotton raw materials from foreign impurities, the introduction of various innovative developments in technological processes, the application of technology and systems for mechanical and air cleaning of small and large impurities. One of the important tasks is to create an intensive automated system for cleaning cotton raw materials from various scalping, develop new methods and directions of cleaning technology, including increasing the number of cleanings in order to increase the cleaning efficiency of the machine. The analysis of the research conducted in this direction to solve the mentioned tasks confirms the relevance of the topic of this article.

Today, the increase of the amount of cotton pieces in the waste, which is separated from the technological equipment for cleaning cotton from large impurities in cotton ginning enterprises, causes them to disappear with the waste. In order to prevent this problem, 1RX cotton regenerator is installed in enterprises for each cleaning system [1-2].

One of the main disadvantages of existing regenerators in enterprises is the low productivity and cleaning efficiency of separated cotton pieces, and it was observed that waste and pieces of cotton

passed between the columns as a result of hitting the columns when entering from the middle pipe of the waste cotton supply with air. Due to the extreme dirtiness of the cotton coming out of the regenerator, if it is mixed to the cotton coming to the cleaning system, the negative effect on the overall quality indicators of the received fiber will increase [3]. It is necessary to strengthen the cleaning of separated cottons in the regenerator, taking into account the need to bring the level of contamination to the same state in order to add the piece of cotton separated from the regenerator to the cotton in the flow.

Brushes are replaced several times in a season due to wear of the brushes of the separating brush drums of the 1RX cotton regenerator. In addition, wear varies between brushes, causing the brushes to become less efficient at removing cotton from sawing drum saws. Therefore, using a drum with a rubber plate instead of a brush drum to separate the cotton from the saw teeth is considered a solution to the problem of constantly changing the brushes. The separating drum of the 2RX-M cotton regenerator, developed by the "Pakhtasanoat Scientific Center" JSC, was made with a rubber plate, and this drum regenerator was introduced to the "Baghdod" cotton ginning enterprise in 2019 and has been used without repair until today. It was recommended to replace the separating brush drums of 1RX cotton regenerators with rubber-plate drums [4, 5]. Based on these recommendations, some changes were made to the construction of the unit to increase the efficiency of cleaning and separation of 1RX type cotton regenerators, which are used in cotton ginning enterprises. It was observed that the 1RX regenerator was fed from both ends of the waste cotton sawdust drum, and air was drawn from the middle, resulting in a reduction of cotton pieces in the waste. In this case, when the waste cotton is divided into two parts during its movement in the air duct, it is easier to

clean it by dividing it into small pieces towards the saw drum. Our next change is that the slats of the drum with the separator plate are installed at an oblique angle along the axis to the center of the drum, so that the cotton is removed from the saw tooth and directed towards the center and then relearning takes place. In order to reduce the amount of cotton pieces from the regeneration drum to the waste, the distance between the columns of the lower column grid is reduced [6].

In addition, it is necessary to determine the strength of the newly installed plate drum in order to improve the design of the regenerator and carry out experiments on it. The body providing this stability is considered to be the drum shaft, and in this work, the strength of this shaft was checked using a special program.

Calculation of cotton regenerator slatted drum shaft.

$$q_1 = \frac{G_{\text{вал}} + G_{\text{зав}} + G_{\text{коб}} + G_{\text{пл.}}}{l_0} \quad (1),$$

here:

$G_{\text{вал}}$ – shaft weight between supports, kg;

$G_{\text{зав}}$ – weight of flanges, kg;

$G_{\text{коб}}$ – weight of shells, kg;

$G_{\text{пл.}}$ – plank weight, kg;

- evenly distributed load on the cantilever part of the shaft q_2 ;
- pulley mass $G_{\text{шк}}$;
- torque of the electric motor $M_{\text{эпр}}$

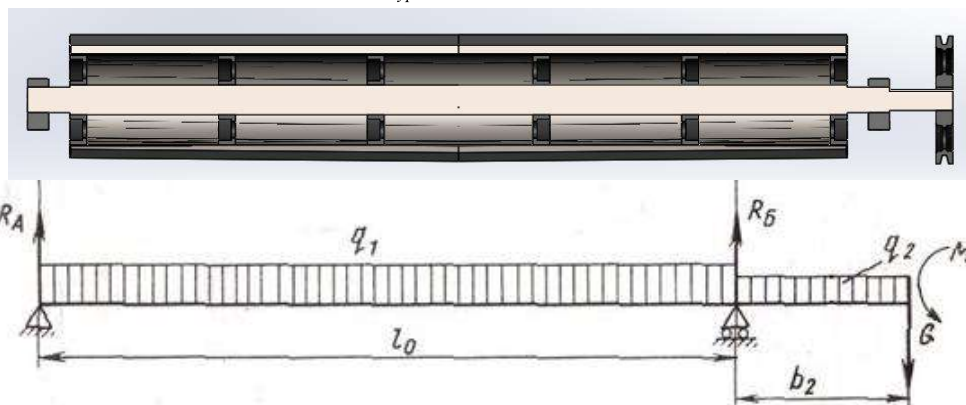


Figure 1. Calculation scheme of the loads acting on the shaft of the slatted drum

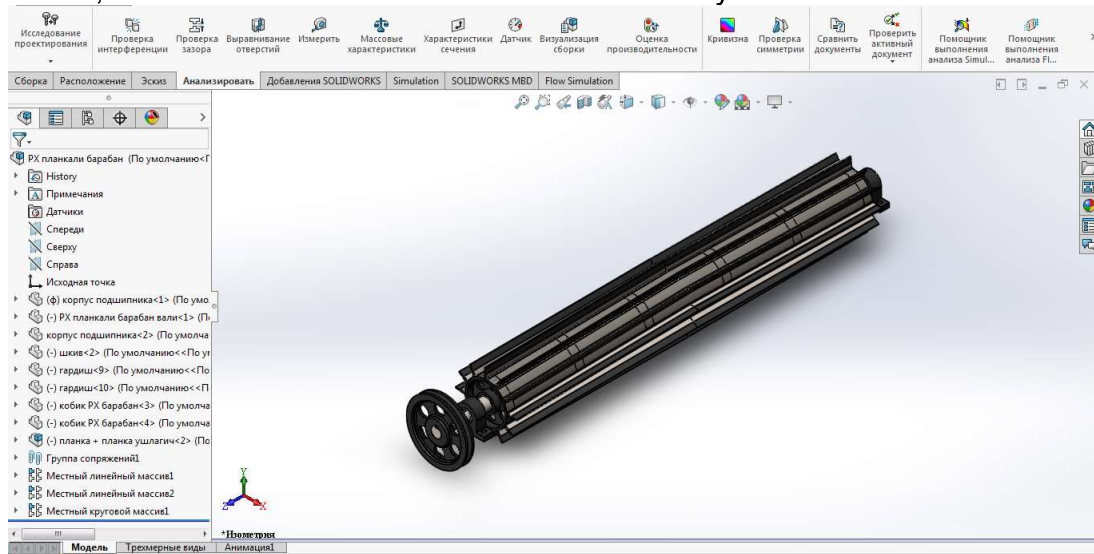
Torque acting on the slatted drum shaft $M_{бур}$

$$M_{бур} = 9550 \cdot \frac{N}{n} \quad \text{Nyuton} \cdot m,$$

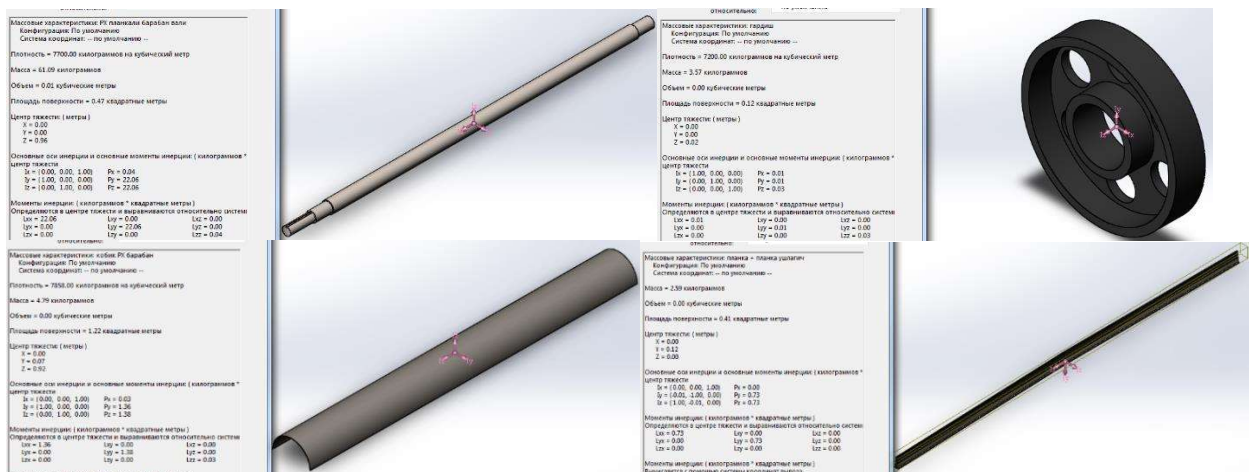
where: N – power transmitted to the flat drum ($N = 3,0 \text{ kVt}$);
 n – Rotational speed of the slatted drum ($n = 1000 \text{ ayl / min}$).

$$M_{бур} = 9550 \cdot \frac{3,0}{1000} = 28,65 \quad \text{Nyuton} \cdot m.$$

We use the Simulation package of the SolidWorks program for the calculation. For this purpose, the slatted drum was drawn separately in 3D according to the detailed dimensions, the material was selected and the assembly was made.



To find $q_1, q_2, G_{шк}$, we determined the mass of the details using the SolidWorks Analysis function, and found the mass using Mass characteristic.



Массовые характеристики шкива		
Конфигурация: По умолчанию		
Система координат: -- по умолчанию --		
Плотность = 7300.00 килограммов на кубический метр		
Масса = 9.82 килограммов		
Объем = 0.00 кубических метры		
Площадь поверхности = 0.22 квадратных метры		
Центр тяжести: (метры)		
X = 0.00		
Y = 0.00		
Z = 0.00		
Основные оси инерции и основные моменты инерции: (килограммов *		
центр тяжести		
Ix = (1.00, 0.00, 0.00)	Iy = 0.06	Iz = 0.12
Iy = (0.00, 1.00, 0.00)	Ix = 0.06	Iz = 0.12
Iz = (0.00, 0.00, 1.00)	Ix = 0.06	Iy = 0.06
Моменты инерции: (килограммов * квадратные метры)		
Определяются в центре тяжести и вычисляются относительно системы		
Lxx = 0.06	Lyy = 0.00	Lzz = 0.00
Lxy = 0.00	Lyz = 0.06	Lxz = 0.00
Lyx = 0.00	Lzy = 0.00	Lzx = 0.12



That is, $G_{вал} = 61,09$ kg; $G_{зар} = 3,57 \times 6 = 21,42$ kg; $G_{коб} = 4,79 \times 2 = 9,58$ kg; $G_{пл} = 2,59 \times 12 = 31,08$ кг; $G_{шк} = 9,82$ кг; $q_2 = 2,21$ кг.*

We put the obtained values in equation (1).

$$q_1 = 61,09 + 21,42 + 9,58 + 31,08 = 123,17 \text{ кг.*}$$

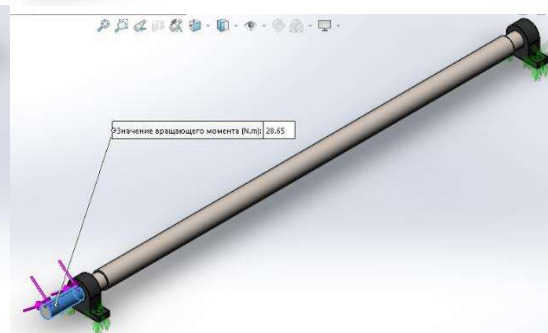
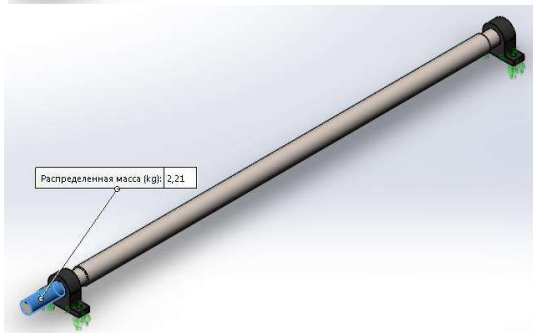
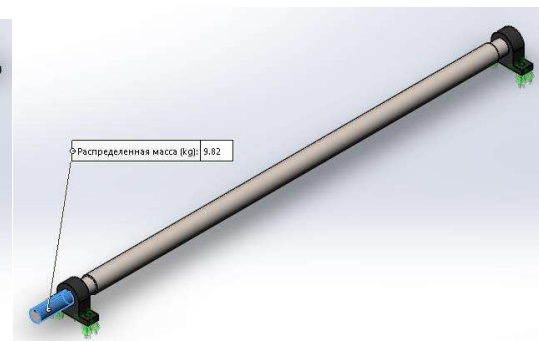
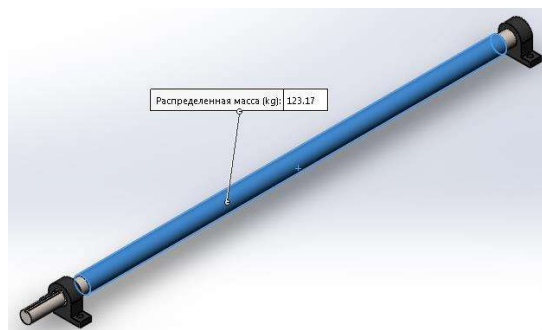
Note: the program itself calculates the equality of distribution of weight to length.

All the data for the static calculation of the slatted drum shaft are ready. To simplify the calculation, we use q_1 instead of the shaft between the supports, flanges, shells, plank, q_2 instead of the pulley base of the shaft, and $G_{шк}$

$q_2 = 5,45$ kg, the part of the pulley base of the shaft and we select $G_{шк} = 9,82$ kg, the part of the pulley base of the shaft, and the torque we insert $M_{бyp} = 28,65 \text{ N} \cdot \text{m}$. (2 picture).

We select the working part of the shaft and select $q_1 = 123,17$ kg, the part of the pulley base of the shaft and we select

To make the calculation more accurate, we also take into account the centrifugal force and write 1000 rpm (Figure 2).



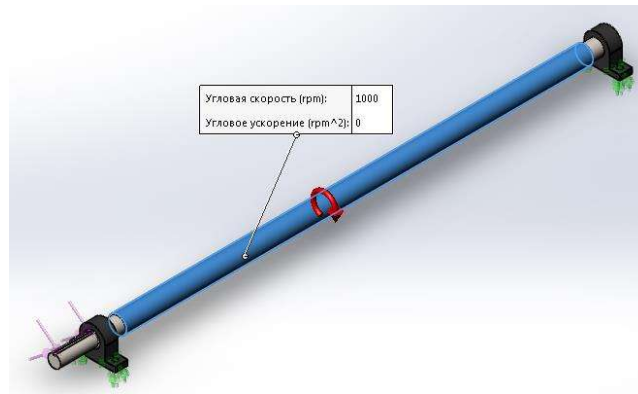


Figure 3 shows the obtained curves. So, the greatest stress in our shaft was ≈ 3.69 MPa and it occurred in the place painted in red (Fig. 3, a), the greatest displacement occurs in the cantilever part of the shaft and was 0.0081 mm (Fig. 3, b Fig.), the equivalent deformation of the shaft was 0.0000135 (Fig. 3, c) and the strength reserve factor was 166.

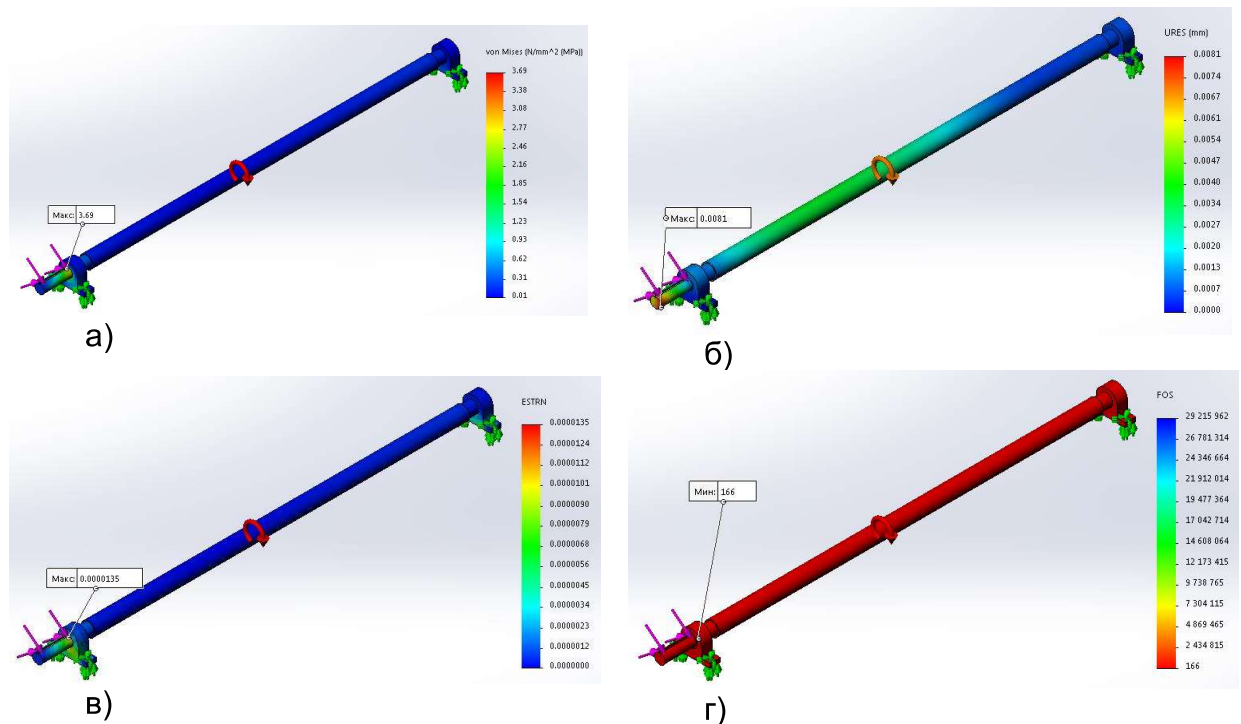


Figure 3. Plank drum shaft epuratures

Concussion. As can be seen from Figure 3, the minimum value of the strength reserve factor is 166. For shafts, this coefficient should be $[k] \geq 1,5 \div 2,5$. So our shaft meets the demand.

References

1. R.K. Djamolov, U.M. Ismailov. Improving the efficiency of cotton regeneration technological equipment. Proceedings of the international scientific-practical conference "Modern innovative technologies in light industry: problems and solutions", Bukhara Institute of Engineering and Technology, Bukhara-November 19-20, 2021, p. 391-396.

2. A.A. Obidov M.M. Sultanov. To research the method of separating fibers suitable for spinning on a needle drum. International scientific and practical conference Cutting Edge-Science. June 29-30, 2020 Shawnee, USA, 128-131 P.
3. Patent FAP 00335 RUz "Drum for removing raw cotton from saw cylinders and transporting it in cleaners".
4. Avazbek Azamatovich Obidov and Mirzaolim Mirzarakhmatovich Sultanov. Study of Technological Parameters of Fiber Separation Device. International Journal of Psychosocial Rehabilitation. 2020, Volume 24 - Issue 5, 6400-6407 P.
5. Borodin, P.N. report, on topic 9807, JSC SPC "Paxtasanoatilm", Tashkent, 1999.
6. G.I. Miroshnichenko. Fundamentals of designing machines for the primary processing of cotton. M., "Engineering", 1972. 486 p.
- 7 Under the general editing of A.I. Makarova. Fundamentals of designing textile machines. M., "Engineering", 1976. 416 p.
8. A.A. Umarov, D.M. Kurbanov. Methodical guide for practical training in "Engineering analysis in the cotton industry". Namangan, 2021. 144 p.

C O N T E N T S

PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY

A.Shodmonkulov, R.Jamolov, X.Yuldashev	
Analysis of load changes in the chain drive during the drying process of cotton falling from the longitudinal shelves of the drum.....	3
A.Xomidjonov	
Influence and characteristics of drying mechanisms in leather production on the derma layer.....	8
J.Monnopov, J.Kayumov, N.Maksudov	
Analysis of elastic fabrics for compression sportswear in the new assortment	13
S.Matismailov, K.Matmuratova, Sh.Korabayev, A.Yuldashev	
Investigation of the influence of speed modes of the combined drum on the quality indicators of the tape.....	18
A.Shodmonkulov, K.Jumaniyazov, R.Jamolov, X.Yuldashev	
Determination of the geometric and kinematic parameters of the developed chain gear for the 2SB-10 dryer.....	23
R.Jamolov, A.Shodmonkulov, X.Yuldashev	
Determination of dryer drum moisture extraction depending on its operating modes.....	27
A.Djuraev, K.Yuldashev, O.Teshaboyev	
Theoretical studies on screw conveyor for transportation and cleaning of linter and design of constructive parameters of transmissions.....	29
S.Khashimov, Kh.Isakhanov, R.Muradov	
Creation of technology and equipment for improved cleaning of cotton from small impurities.....	36
G.Juraeva, R.Muradov	
The process of technical grades of medium staple cotton at gin factories and its analysis.....	40
I.Xakimjonov	
Literature analysis on the research and development of the method of designing special clothes for workers of metal casting and metal processing enterprises.....	44
GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES	
A.Khodjiev, A.Choriev, U.Raximov	
Improving the technology of production of functional nutrition juices.....	49
U.Nishonov	
Research in beverage technology intended to support the functions of the cardiovascular system.....	53

Z.Vokkosov, S.Hakimov	
Development of new types of vegetable juices and beverages technology...	59
CHEMICAL TECHNOLOGIES	
M.Latipova	
Analysis of the current status of thermoelectric materials and technology for obtaining and manufacturing half-elements.....	66
G.Ochilov, I.Boymatov, N.Ganiyeva	
Physico-chemical properties of activated adsorbents based on logan bentonite.....	72
U.Nigmatov	
Simulation of heat transfer process in absorber channels.....	77
T.Abduxakimov, D.Sherkuziev	
Procurement of local raw materials complex fertilizers with nitrogen-phosphate-potassium containing moisture.....	84
P.Tojiyev, X.Turaev, G.Nuraliyev, A.Djalilov	
Study of the structure and properties of polyvinyl chloride filled with bazalt mineral.....	89
M.Yusupov	
Investigation of phthalocyanine diamidophosphate- copper by thermal analysis.....	95
L.Oripova, P.Xayitov, A.Xudayberdiyev	
Testing new activated coals AU-T and AU-K from local raw materials when filtration of the waste mdea at gazlin gas processing plant.....	101
N.Kurbanov, D.Rozikova	
Based on energy efficient parameters of fruit drying chamber devices for small enterprises.....	107
Sh.Xakimov, M.Komoliddinov	
Basic methods and technological schemes for obtaining vegetable oils.....	113
A.Boimirzaev, Z.Kamolov	
Size-exclusion chromatography of some polysaccharide derivatives from natural sources.....	117
MECHANICS AND ENGINEERING	
U.Erkaboev, N.Sayidov	
Dependence of the two-dimensional combined density of states on the absorbing photon energy in GaAs/AlGaAs at quantizing magnetic field.....	124
I.Siddikov, A.Denmuxammadiyev, S.A'zamov	
Investigation of electromagnetic current transformer performance characteristics for measuring and controlling the reactive power dissipation of a short-circuited rotor synchronous motor.....	136
Sh.Kudratov	
Evaluation and development of diagnostics of the crankshaft of diesel locomotives.....	141

Z.Khudoykulov, I.Rakhmatullaev	
A new key stream encryption algorithm and its cryptanalysis.....	146
T.Mominov, D.Yuldoshev	
Coordination of the movement of transport types in areas with high passenger flow.....	157
R.Abdullayev, M.Azambayev, S.Baxritdinov	
Analysis of research results according to international standards.....	163
R.Abdullayev, M.Azambayev	
Cotton fiber rating, innovation current developments, prospects for cooperation of farms and clusters.....	168
F.Dustova, S.Babadzhanov.	
Calculation of the load on the friction clutch of the sewing machine.....	174
Z.Vafayeva, J.Matyakubova, M.Mansurova	
Improvement of the design of the shuttle drum in the sewing machine.....	179
A.Obidov, M.Vokhidov	
Preparation of a new structure created for sorting of ginning seeds.....	185
Sh.Mamajanov	
Carrying out theoretical studies of the cotton regenerator.....	192
ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION	
A.Khojaev	
Methodological issues of organizing internal audits and control of off-budget funds in higher education institutions.....	199
I.Nosirov	
Theoretical foundations of establishing new technologies on personal management system.....	203
Z.Mamakhanova, D.Ormonova	
Specific characteristics of uzbek national art of embroidery.....	209
A.Raximov, M.Khusainov, M.Turgunpulatov, S.Khusainov, A.Gaybullayev	
Energy-saving modes of the heat treatment of concrete.....	213
ECONOMICAL SCIENCES	
M.Bekmirzayev, J.Xolikov	
Prospects for the development of service industries.....	222
A.Ilyosov	
Organizational and economic mechanisms to support the export of industrial products: a comparative analysis of foreign experience and proposals.....	227
I.Foziljonov	
The importance of multiplier indicators in assessing the effectiveness of the cash flow of the enterprise.....	232
K.Kurpayanidi	
Innovative activity of business entities in the conditions of transformation: a retrospective analysis.....	238

Sh.Muxitdinov	
Main characteristics of the risk management mechanism in manufacturing enterprises.....	248
Y.Najmiddinov	
Green economy and green growth. initial efforts of sustainable development in Uzbekistan.....	252
E.Narzullayev	
The methods for measuring the effectiveness of social entrepreneurship activity.....	259
E.Narzullayev	
Analysis of the management and development of environmental social entrepreneurship in Uzbekistan.....	265
F.Bayboboeva	
Legal regulation of entrepreneurial activity.....	270
Z.Boltaeva	
Foundations of neuromarketing strategy in industry.....	276
R.Rashidov	
Issues of regional development of small business.....	281
Sh.Abdumurotov	
Methodology for forecasting the competitiveness of an enterprise based on the Elliott wave principle.....	288
S.Goyipnazarov	
Assessment of impact of artificial intelligence on labor market and human capital.....	299
A.Norov	
Evolution of management science.....	307
K.Narzullayev	
Investment process in the republic of Uzbekistan.....	317
Kh.Irismatov	
Statistical analysis of assessment of the volume of the hidden economy in the republic of Uzbekistan.....	322
