

ISSN 2181-8622

Manufacturing technology problems



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

**Volume 8
Issue 2
2023**



UDC 677.21.621.547

PRACTICAL AND THEORETICAL ANALYSIS OF THE RESULTS OBTAINED IN THE PROCESS OF CLEANING COTTON FROM IMPURITIES

ISAYEV SHAHBOZ

Senior teacher of Namangan Institute of Engineering and Technology
E-mail.: isayevshahboz90@mail.ru, Phone.: (+99890) 275-7372

MAMADALIYEV MIRZOHI

Master student of Namangan Institute of Engineering and Technology
E-mail.: mirzo_966@mail.ru, Phone.: (+99894) 308-7787

MUHSINOV IBROHIM

Assistent of Namangan Institute of Engineering and Technology
E-mail.: ibroxim14@mail.ru, Phone.: (+99894) 154-3657

INAMOVA MAFTUNA

Assistent of Namangan Institute of Engineering and Technology
E-mail.: inamova.93@mail.ru, Phone.: (+99894) 502-6233

EGAMOV SOHIBJON

Master student of Namangan Institute of Engineering and Technology
E-mail: egamov@mail.ru, Phone.: (+99894) 504-7595

Abstract:

Objective. In the article, the cleaning efficiency of the machine in the equipment for cleaning seed cotton from small and large impurities, the main control developments and calculation processes in the selection of the technological parameters of the cleaners are considered.

Medhods The main essence of the cleaner is to reduce the binding force between the waste particle and the fiber under the influence of dynamic force, and the theoretical aspects of its separation from the raw material mass have been determined.

Results. Experiments were conducted at different speeds to determine the performance and cleaning efficiency of pile drum and saw drum.

Conclusion. Calculation of forces acting on pile drum and pile, calculation of technological parameters of cleaning machines; Calculation of the productivity of the drum with a pile, calculation of the drum with a saw, calculation of the drum with a brush that separates cotton from the drum with a saw; It is carried out according to the method of calculation of the working rollers of the cleaning drum.

Keywords: cotton, technology, impurity, theory, equation, forces, model, fiber.

Introducation. The main tasks of cleaning machines, their classification, the main technical requirements for cotton cleaning machines, the main working bodies of the technological process; Calculation of forces acting on pile drum and pile, calculation of technological parameters of cleaning machines; Calculation of the productivity of the drum with a pile, calculation of the drum with a

saw, calculation of the drum with a brush that separates cotton from the drum with a saw; It is carried out according to the method of calculation of the working rollers of the cleaning drum.

Medhods. Experiments were conducted at different speeds to determine the performance and cleaning efficiency of pile drum and saw drum. In the test

S 6524, cotton raw material grade was used, its initial quality indicators: 2 industrial grade, 2nd class, moisture 9%, dirtiness 5.16%, coarseness 1.5%, degree of mechanical damage to the seed 2.17%. A selected sample of cotton raw material was transferred to the new ginning equipment, samples of cleaned cotton raw material were taken and laboratory analysis was carried out.

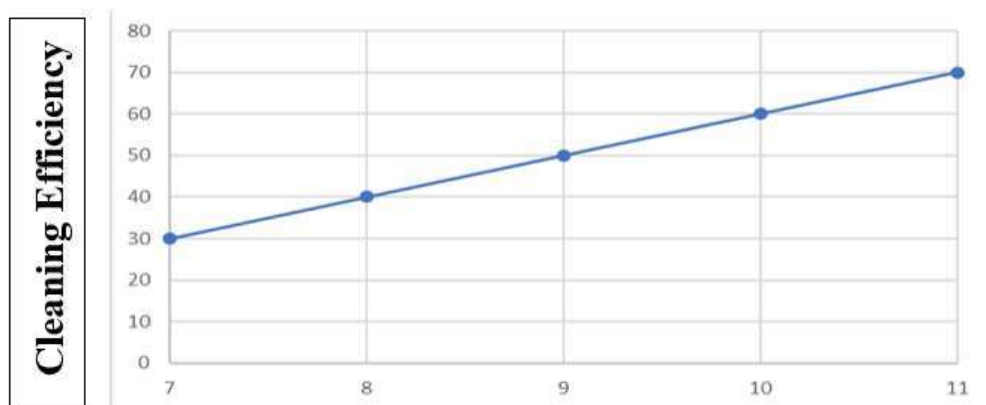
Results. The results of these analyzes of the effect of cleaning frequency on cleaning performance at different performance levels are presented in Table 1. As can be seen from the table, when the work productivity is 4 t/h in the cleaning of highly contaminated cotton raw materials, the cleaning efficiency increases from 45.8% to 65.1%. given in the table.

Table 1

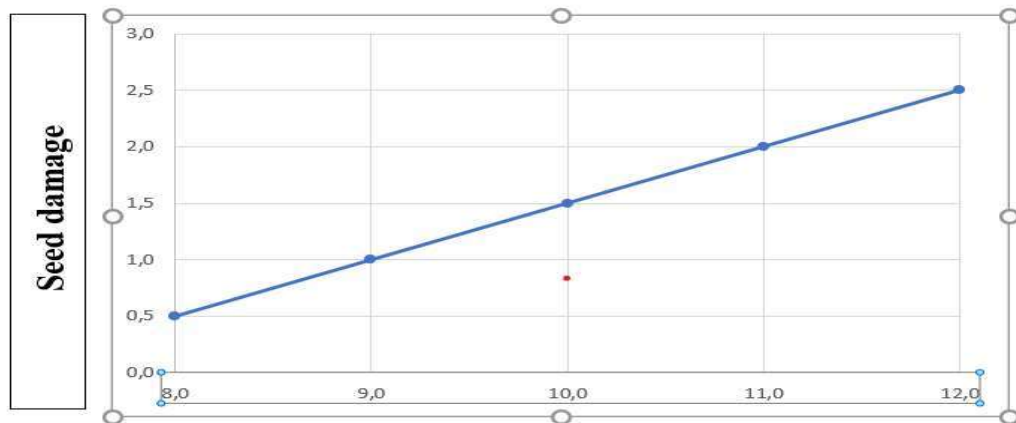
Experiment plan

Selection variety	Angle speed	Cotton x/a soiling		The seed Injury		Free fiber		Clean Efficient	
		Before cleaning	From cleaning after	Cleani ng before	Cleani ng after	From cleani ng after	Cleani ng after	Gene ral	Йи-рик ифл
Free fiber 9.14 %									
C-6524	7,8,	5,16	2,86	2,17	2,17	0,16	0,17	45,8	23,8
	8,9,	- /- /-	2,23	- /- /-	2,20	- /- /-	0,18	56,9	33,1
	9,10,	- /- /-	1,96	- /- /-	2,25	- /- /-	0,20	63,2	36,1
	10,11,	- /- /-	1,84	- /- /-	2,32	- /- /-	0,18	65,6	41,9
	11,12,	- /- /-	2,03	- /- /-	2,45	- /- /-	0,17	62,0	47,6
Hand skin cotton moisture 8,23 %									
C-6524	7,8,	2,69	1,41	0,02	0,02	0,14	0,14	48,5	22,6
	8,9,	- /- /-	1,08	- /- /-	0,03	- /- /-	0,15	60,8	30,3
	9,10,	- /- /-	0,92	- /- /-	0,08	- /- /-	0,17	66,7	34,0
	10,11,	- /- /-	0,87	- /- /-	0,20	- /- /-	0,15	63,2	35,2
	11,12,	- /- /-	0,96	- /- /-	0,40	- /- /-	0,14	65,1	30,7

Table of growth of cleaning efficiency due to differential change of pile drum speed



The pile drum in the cleaner is highly differentiated determine the speed



Linear speed of pile drum, m/s

- 1) Incoming parameters
- 2) X1-Supplier speed
- X2-Pile drum rpm
- X3-Saw drum rpm

table 2

Experiment plan 1

Factors	X_{max}	X_{min}	$\Delta = \frac{X_{max} - X_{min}}{2}$	$X_{cp} = \frac{X_{max} + X_{min}}{2}$
1.Provider speed	25	15	5	20
2. Pile b-n speed	500	400	50	450
3. Arrali b-n speed	350	250	50	300

Table 3

Experiment plan -2

Factors	X_{max}	X_{min}	$\Delta = \frac{X_{max} - X_{min}}{2}$	$X_{cp} = \frac{X_{max} + X_{min}}{2}$
1.Provider speed	25	15	5	20
2. Pile drum speed	500	400	50	450
3. Saw drum speed	400	300	50	350

An outgoing parameter:

Efficiency of U1-purifier, t/s;

4 Table

No τ/p	X ₁	X ₂	X ₃	Y _{u1}	Y _{u2}	Y _{ucp}	S _u ²	\bar{Y}_u	R _u (%)
1	-	-	-	2300	2400	2350	5000	4.25	4.25
	+	-	-	2500	2700	2600	20000	1.68	1.68
3	-	+	-	2400	2500	2450	5000	4.08	4.08
4	+	+	-	3100	3300	3200	20000	1.37	1.37
5	-	-	+	2700	2900	2800	20000	3.58	3.58
6	+	-	+	3400	3650	3525	31450	2.04	2.04
7	-	+	+	3200	3400	3300	20000	3.03	3.03
8	+	+	+	3800	4100	3950	45000	1.11	1.11

We process the obtained test results in a separate statistical method for each factor in a certain sequence.

1) In the same number of parallel tests, we check the homogeneity of the dispersion, the dispersion of the results: S_u^2

$$S_u^2 = \frac{\sum_{p=1}^m (Y_{up} - Y_{ucp})^2}{m-1} = \frac{\sum_{p=1}^2 (Y_{up} - Y_{ucc})^2}{1}$$

Here u - variant serial number ($u = 1.2..N$).

$p = 1.2.3..m$ - sequence number of parallel experiments, $m=2$ $\bar{y}_u = \frac{1}{m} \sum_{p=1}^m \bar{y}_{up}$ -

Average number of trials in each option.

Statistics ($S_{u(\max)}^2 = S_8^2 = 45000$ - maximum value in options):

$$G = \frac{S_{u(\max)}^2}{\sum_{u=1}^N S_u^2} = \frac{45000}{166250} = 0,271 \quad (4.4)$$

Check the Cochran criteria: G_{α, k_1, k_2} - values are taken from table data. α - significant level ($0 < \alpha < 1$), $k_1 = N$, $k_2 = m - 1$ number of degrees of freedom. In our case $\alpha = 0.05$, $m = 2$, $N = 8$, $G_{\alpha, k_1, k_2} = G_{0.05, 8, 1} = 0.68$, $G < 0.68$ because it is appropriate, the homogeneity of the variance is fulfilled in all variants of the parallel experiment, then the average value

of the variance can be chosen $S_y^2 = \frac{1}{N} \sum_{u=1}^N S_u^2 = \frac{166250}{8} = 20781$

(4.6)

2) We calculate the regression coefficients using the following formula:

$$b_0 = \frac{1}{N} \sum_{u=1}^N \bar{y}_u, \quad b_i = \frac{1}{N} \sum_{u=1}^N X_{iu} \bar{y}_u, \quad b_{ij} = \frac{1}{N} \sum_{u=1}^N X_{iu} X_{ju} \bar{y}_u, \quad b_{ijk} = \frac{1}{N} \sum_{u=1}^N X_{iu} X_{ju} X_{ku} \bar{y}_u, \quad (4.7)$$

The numerical coefficients of the regression coefficients have the following form:

$$b_0 := 3021.875000 \quad b_1 := 296.8750000 \quad b_2 := 203.1250000 \quad b_3 := 371.8750000 \\ b_{12} := 53.1250000 \quad b_{13} := 46.8750000 \quad b_{23} := 28.1250000 \quad b_{123} := -71.8750000$$

We determine the coefficients using the table values and write the regression

$$\text{equation: } \hat{y} = b_0 + \sum_{i=1}^k b_i x_i + \sum_{i<j}^k b_{ij} X_i X_j + \sum_{i<j<l}^k b_{ijl} X_i X_j X_l$$

$$y := 3021.875000 + 296.8750000 X1 + 203.1250000 X2 + 371.8750000 X3$$

$$+ 53.1250000 X1 X2 + 46.8750000 X1 X3 + 28.1250000 X2 X3$$

$$- 71.8750000 X1 X2 X3$$

(4.8)

3. We check the significance of the regression coefficients according to the Student's criterion. Initially, all regression coefficients in the same confidence interval must meet the following condition:

$$\Delta b = t_{\alpha,k} \frac{S_y}{\sqrt{N}},$$

Here $t_{\alpha,k}$ - Student criteria, α - level of importance, $\alpha = 0.05$, $k = N(m-1)$ - number of degrees of freedom.

If the regression coefficient is above the confidence interval, then the coefficients are significant:

$$|b_0| \geq \Delta b, |b_i| \geq \Delta b, |b_{ij}| \geq \Delta b, |b_{ijk}| \geq \Delta b \quad (4.9)$$

$$\text{Let's look at the following } t_{0.05,8} = 2.78, \Delta b = 2.78 \frac{S_y}{\sqrt{N}} = 2.78 \frac{\sqrt{20781}}{\sqrt{8}} = 141.69$$

(4.9) significant coefficients in the regression equation according to inequality b_0, b_1, b_2 or b_3 is written as the regression equation

$$y := 3021.875000 + 296.8750000 X1 + 203.1250000 X2 + 371.8750000 X3 \quad (4.10)$$

Conclusion. If the regression equation is taken in the form (4.8), the variance test is equal to zero. In this case, everyone $N = 2^k$ regression coefficients were calculated N significant model fit is fully achieved. Such planned experience is said to be saturated. If some insignificant coefficients (4.8) are removed from the regression equation, the model should be checked for adequacy again. Compatibility experimental values are input parameters (Y_{cpu}) with the book value (\bar{Y}_u) When the level of various output factors is

different from each other, it is determined by the following formula: $R_u = 100 \frac{|Y_{cpu} - \bar{Y}_u|}{Y_{cpu}}$

$$(u = 1 \dots 8) \quad (4.11)$$

If the full regression equation (4.8) is replaced by the reduced (4.9), then (4.11) is the largest difference. Add two terms to the regression equation to reduce variance b_{12} and b_{13} we write keeping

$$y := 3021.875000 + 296.8750000 X1 + 203.1250000 X2 + 371.8750000 X3$$

$$+ 53.1250000 X1 X2 + 46.8750000 X1 X3 \quad (4.12)$$

4. We enter the values obtained using the obtained regression equation and the value of the resulting differences in Table 3

To check the adequacy of the regression equation (4.12) according to the Fisher criterion, we use the residual variance formula ($k = 3$ - number of incoming factors):

$$S_{oc}^2 = \frac{\sum_{u=1}^N (\bar{Y}_u - Y_{cup})^2}{N - k - 1} = \frac{\sum_{u=1}^8 (\bar{Y}_u - Y_{cup})^2}{8} = 12727$$

Let's look at these statistics: $F = \frac{S_{oc}^2}{S_y^2} = 0.612$. Fisher's criterion F_{α, k_1, k_2} is accepted

here α - аҳамиятлилик сатҳига қараб $k_1 = N - k - 1 = 4$, $k_2 = N(m - 1) = 8$, we find from the table: $F_{\alpha, k_1, k_2} = 3.01$ $F < F_{\alpha, k_1, k_2}$ since the inequality holds, the concordance hypothesis is valid.

Table 5

Y₂ - cleaning efficiency of cotton, %;

№ τ/ρ	X ₁	X ₂	X ₃	Y _{u1}	Y _{u2}	Y _{ucp}	S _u ²	\bar{Y}_u	R _u (%)
1	-	-	-	37	41	39	0.765	38.12	2.243
2	+	-	-	39	44	41.5	1.890	48.87	3.313
3	-	+	-	38	42	41	0.391	40.62	1.562
4	+	+	-	44	49	46.5	1.265	45.37	2.419
5	-	-	+	41	46	43.5	1.410	43.87	0.862
6	+	-	+	46	53	49.5	1.265	48.37	2.272
7	-	+	+	42	51	46.5	0.015	46.37	0.268
8	+	+	+	47	54	50.5	0.391	51.12	1.237

Statistics ($S_{u(\max)}^2 = S_8^2 = 40.5$ - the maximum value of the variance in options):

$$G = \frac{S_{u(\max)}^2}{\sum_{u=1}^N S_u^2} = \frac{40.5}{143} = 0,283$$

$G_{\alpha, k_1, k_2} = G_{0.05, 8, 1} = 0.68$, $G < 0.68$ since it is reasonable that the homogeneity of the variance is fulfilled in all variants of the parallel experiment, then the mean value of the variance can be chosen

$$S_y^2 = \frac{1}{N} \sum_{u=1}^N S_u^2 = \frac{143}{8} = 17.785$$

The numerical coefficients of the regression coefficients have the following form:

$$b_0 := 44.62500000 \quad b_1 := 2.375000000 \quad b_2 := 1.250000000 \quad b_3 := 2.875000000$$

$$b_{12} := .250000000 \quad b_{13} := .125000000 \quad b_{23} := -.250000000 \quad b_{123} := -.750000000$$

We determine the coefficients using the table values and write the regression equation:

$$y := 44.62500000 + 2.375000000 X_1 + 1.250000000 X_2 + 2.875000000 X_3$$

$$+ .250000000 X_1 X_2 + .125000000 X_1 X_3 - .250000000 X_2 X_3$$

$$- .750000000 X_1 X_2 X_3$$

All regression coefficients in the same confidence interval must meet the following condition:

$$\Delta b = t_{\alpha, k} \frac{S_y}{\sqrt{N}} = 2.73 \frac{\sqrt{17.785}}{\sqrt{8}} = 4.55$$

(4.9) is a significant coefficient in the regression equation according to inequality is written as the regression equation

$$y = b_0 = 44.625$$

If the full regression equation is reduced

$$y = b_0 = 44.625 \text{ then the biggest difference is } 14.42\%.$$

Add two terms to the regression equation to reduce variance b_1 , b_2 and b_3 we write keeping

$$y := 44.62500000 + 2.375000000 X1 + 1.250000000 X2 + 2.875000000 X3$$

We enter the values obtained using the obtained regression equation and the value of the resulting differences in table 4

Using the residual variance formula ($k = 3$ -number of incoming factors) let's find out:

$$S_{oc}^2 = \frac{\sum_{u=1}^N (\bar{Y}_u - Y_{cpu})^2}{N - k - 1} = \frac{\sum_{u=1}^8 (\bar{Y}_u - Y_{cpu})^2}{8} = 1.531$$

$$\text{Statistical value } F = \frac{S_{oc}^2}{S_y^2} = 0.0566$$

$F < F_{\alpha, k_1, k_2}$ since the inequality holds, the concordance hypothesis is valid.

References

- 1.A.G.Sevostyanov.Metodi i sredstva issledovaniye mexanikotexnologicheskix prot sessov tekstilnoy promishlennosti.Moskva»Legkaya promishlennost» 1980.g
- 2.G.I..Miroshnichenko. Osnovi proyektirovaniya mashin pervichnoy obrabotki xlopk a. M. Mashinostroyeniye, 1972.
- 3.F.B. Omonov tahriri ostida. Paxtani qayta ishlash spravochnigi. Toshkent 2008 y.
- 4.Lebedev D.A. i dr. Nelineynaya model vozdeystviya na sornuyu chastitsu pri ochistke volokna. Jurnal «Texnologiya tekstilnoy promishlennosti», №5(320), 2009 g.

CONTENTS

PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY

N.Khalikova, S.Pulatova	
A research of consumer opinions in forming the important factors of fur garments.....	3
N.Khalikova, S.Pulatova	
Literary analysis new technologies of women's outer clothing from carakul....	9
Sh.Korabayev, H.Bobojanov, S.Matismailov, K.Akhmedov	
Study of aerodynamic characteristics of cotton fiber in separator of pneumo-mechanical spinning machine.....	14
Sh.Korabayev	
Research of the movement of fibers in the confusion between the air channel and the rotor in a pneumo-mechanical spinning machine.....	18
M.Mirsadikov, M.Mukimov, K.Kholikov, N.Karimov, Sh.Mamadjanov	
Analysis of technological parameters and physic-mechanical properties of interlock knitted fabric knitted from cotton-nitron yarn.....	23
M.Mirsadikov, M.Mukimov, K.Kholikov, N.Karimov	
Study of technological parameters and physical-mechanical properties of rib fabric knitted from spinning cotton-nitron yarn.....	32
N.Karimov	
Analytical calculation of the deformation state of the saw gin saw teeth bending under the action of a load.....	38
Z.Ahmedova, A.Khojiyev	
Analysis of headwear and beret in fashion.....	42
N.Khusanova, A.Khojiyev	
Creation of a new model of women's coat.....	51
M.Abdukarimova, R.Nuridinova, Sh.Mahsudov	
Method of designing special clothing based on approval of contamination assessment methodology.....	59
Sh.Isayev, M.Mamadaliyev, I.Muhsinov, M.Inamova, S.Egamov	
Practical and theoretical analysis of the results obtained in the process of cleaning cotton from impurities.....	67
GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES	
D.Saribaeva, O.Mallaboyev	
Scientific basis for the production technology of fruit lozenges (marshmallow)	74
R.Mohamed, K.Serkaev, D.Ramazonova, M.Samadiy	
Development of technology to incorporate dehydrated murunga leaf powder in paneer cheese.....	79
B.Adashev, D.Salikhanova, D.Ruzmetova, A.Abdurahimov, D.Sagdullaeva	
Indicators of blending of refined vegetable oils.....	87
O.Ergashev, A.Egamberdiev	
Choosing acceptable parameters for experiment on new energy-saving vacuum sublimation drying equipment.....	92

A.Eshonto'rayev, D.Sagdullayeva, D.Salihanova	
Determining the effectiveness of soaking almond kernels before processing..	97
CHEMICAL TECHNOLOGIES	
Sh.Kiyomov, A.Djalilov, R.Zayniyeva	
Adhesion of a thermoreactive epoxy waterful emulsion film former on metal..	102
A.Djalilov, Sh.Kiyomov	
Synthesis of a non-isocyanate urethane oligomer based on phthalic anhydride.....	107
T.Abdulxaev	
Water vapor adsorption isotherm on zeolite AgZSM-5.....	114
F.Juraboev, B.Tursunov, M.Togaeva	
Study of the catalytic synthesis of o-vinyl ether based on monoethanolamine and acetylene.....	120
S.Mardanov, Sh.Khamdamova	
Solubility of components in the system $\text{NaClO}_3 \text{ CO}(\text{NH}_2)_2\text{-NH}(\text{C}_2\text{H}_4\text{OH})_2 - \text{H}_2\text{O}$	124
D.Salikhanova, Z.Usmonova, M.Mamadjonova	
Technological basis of activated carbon production process through processing of plum seed waste.....	128
N.Alieva	
Analysis of the effect of adhesive substances on paper strength.....	134
Sh.Rahimjanova, A.Hudayberdiev	
Optimization of heating of mixtures of oil and gas condensate by hot flows of fractions in tubular heat exchangers.....	138
M.Mehmonkhanov, R.Paygamov, H.Bahronov, A.Abdikamalova, I.Eshmetov	
Binding materials for creating coal granules and their colloid-chemical characteristics.....	146
A.Khurmamatov, S.Boyturayev	
Analysis of oil dust released during processing of metal surfaces under laboratory conditions.....	152
M.Kalilayev, Sh.Bukhorov, A.Abdikamalova, I.Eshmetov, M.Khalilov.	
Study of foam formation in polymer solutions depending on the content and nature of surfactants.....	159
MECHANICS AND ENGINEERING	
Sh.Pozilov, O.Ishnazarov, R.Sultonov	
Frequency adjustment of well pumping equipment.....	167
H.Kadyrov	
Control of vibration parameters on the tank wall of oil power transformers in operation.....	179
S.Khudayberganov, A.Abdurakhmanov, U.Khusenov, A.Yusupov	
Methodology for assessing the level of train safety.....	185
Sh.Abdazimov, N.Muminjanova	
Use of integrated technologies in vocational education.....	189
M.Uzbekov, O.Bozarov, E.Begmatov, M.Begmatova	
Analytical analysis of the optimal dimensions and energy parameters of the impeller of a nozzle hydraulic turbine.....	196
B.Boynazarov, F.Nasretdinova, M.Uzbekov	

Analysis of solar energy devices.....	205
D.Mukhtarov, R.Rakhimov	
Determining comparative efficiency in composite film solar dryers.....	213
P.Matkarimov, D.Juraev, S.Usmonkhujayev	
Stress-strain state of soil dams under the action of static loads.....	221
A.Khayrullaev	
Microcontroller-based remote monitoring of overhead power lines.....	228
A.Mamaxonov, I.Xikmatillayev	
Design of a resource-efficient chain drive structure for the device drive that distributes the seed in the bunker to the linters.....	237
A.Yusufov	
Analysis of existing methods and approaches to the assessment of residual resources of traction rolling stock.....	243
A.Djuraev, F.Turaev	
Determination of the friction force between the composite feeding cylinder and the fiber rove.....	249
A.Kuziev	
Forecasting the prospective volume of cargo transportation for the development of the transport network.....	253
N.Pirmatov, A.Panoev	
Control of static and dynamic modes of asynchronous motor of fodder grinding devices.....	260
ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION	
K.Ismanova	
Systematic analysis of the state of control of the technological processes of underground leaching.....	267
K.Shokuchkorov, Y.Ruzmetov	
Analysis in solidworks software of the strengths generated in the underground part of the wagons as a result of the impact of force on the entire wheels of wagons.....	273
A.Yuldashev	
The processes of gradual modernization of the state administration system in uzbekistan over the years of independence.....	278
ECONOMICAL SCIENCES	
O.Khudayberdiev	
Fourth industrial revolution in the textile and garment manufacturing.....	287
N.Umarova	
Methodology for assesment of external factors affecting the financial security of building materials industry enterprises.....	293