ISSN 2181-8622

Manufacturing technology problems

Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX COPERNICUS INTERNATIONAL

Google Scholar Crossref doi SLIB.UZ Scientific library of Uzbekistan

Volume 10
Issue 4
2025

NamMTI ILMIY-TEXNIKA JURNALI TAHRIR HAY'ATI A'ZOLARI

EDITORIAL BOARD OF SCIENTIFIC AND TECHNICAL JOURNAL OF NAMANGAN INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIS OF IMPLEMENTATION OF RESOURCE-EFFECTIVE SHAFT PRODUCTION

OBIDOV AVAZBEK

Professor, Namangan State Technical University, Namangan, Uzbekistan
Phone.: (0593) 941-7775, e-mail.: aobidov@list.ru
Corresponding author

ABDURASULOV AXROR

Professor, Namangan State Technical University, Namangan, Uzbekistan
Phone.: (0593) 913-2698, e-mail.: axroruz12345678@gmail.com

Abstract: Increasing energy efficiency in the cotton industry is one of the pressing issues. This article presents the results of research aimed at reducing energy consumption during the operation of a cotton 5LP linter machine. The issues of creating and refining methods for calculating high-performance machine drives and shafts are of particular importance in creating machines for the cotton ginning industry. The article shows that the task of reducing the mass of the main working body of the linter, the sawn cylinder shaft, was performed by grooving and slotting, and the design features of the resource-saving shaft are determined.

Keywords: Linter, sawn cylinder, shaft, raw material shaft, cooling, mass reduction, shear, structural features, bending stiffness.

Introduction. In a market economy, manufacturing enterprises, in their activities to improve and introduce new techniques and technologies into production, focus on creating innovations with characteristics required by the market [1-2]. In practice, the production activities of the enterprise should be fully oriented to market requirements in terms of understanding the "image" of the product and the consumer's willingness to purchase it. In this regard, effective conditions for ready-made innovative developments in machine-building and similar production (cotton ginning) enterprises are an important condition for the development and introduction of new types of products. This requires continuous communication between manufacturers and scientists (researchers) to identify the need to improve certain characteristics of basic technologies.

In particular, the number of failures encountered by manufacturers in introducing new products to the market, both in mechanical engineering and cotton ginning enterprises, is due to the fact that these products were developed and created based on emerging needs, rather than on new knowledge gained by manufacturers through the introduction of scientific and technological advances.

It should be noted that the analysis of the potential for introducing newly created machines and parts into the enterprise should be planned at the development stage, based on both expert and mathematical assessment methods. After identifying potential technical ideas, the enterprise should be able to distinguish those that are not promising from a production point of view. The initial selection should include testing the ideas for their production and compliance with production requirements.

In this process, it is necessary to determine the production strategy of devices based on the potential for further implementation. The economic analysis of innovative products should be carried out methodically in the following stages:

- forecasting the costs associated with the implementation and commissioning of machines and parts;
- assessment of the scope of efficiency (technological, economic).
- profit forecast;
- taking into account uncertainty and factors related to implementation.

This means that the assessment of the prospects for the implementation and operation of innovative products allows for the effective operation, timely replacement of the device or its parts, and the planning of the introduction of modified products from the product range. This reduces instability and increases flexibility in the production process, including in optimizing the use of machine parts [3-4].

In particular, the introduction of the new design of the linter machine saw shaft proposed in the research work into production is also a responsible process of the research.

The resource-saving shaft design was introduced into the 5LP linter machine operating at the Turakurgan cotton ginning enterprise (Figure 1).

The purpose of introducing the new shaft was to study its error-free operation in the production process in a resource-saving mode. The tests conducted on the linter machine were carried out based on the 5-fold re-run method [5], the results were recorded in tables.

During the initial tests, no failures or malfunctions were observed in the linter machine, and the testing was carried out using established methods together with the company's specialists.

Figure 1. Shaft-mounted linter machine and saw drum

The theoretical and practical results obtained in the previous chapters were also substantiated by the tests carried out on the resource-saving shaft installed in the linter machine operating in the technological process of the enterprise. The results obtained in the production tests of the resource-saving shaft installed in the process are given in a comparative manner compared to the existing shaft (Table 1).

Table 1. Results of production tests

T/r	Indicators	Unit of measurement	Indicator quantity	
			There is	Improved
1.	Productivity on fluff	kg/hour	80	80-82
2.	Seed productivity	kg/hour	2000 until	2100 until
3.	Amount of fluff separation (total)	%	6-8	6-8
4.	Seed damage	%	2,5	2,1
5.	Required power including - saw cylinder -feeder and feeder - lifting mechanism	kW	30,6 18,5 11,0 1,1	26,6 14,5 11,0 1,1
6.	Saw diameter	mm	310	310
7.	Saw drum shaft dimensions - length - diameter - weight	mm	2200 100 110	2200 100 87

During the production tests, the rational parameters determined for the bending position were checked, taking into account the fact that the mass of the proposed shaft (Figure 2) was reduced. It was found that as a result of reducing the mass of the proposed linter saw cylinder shaft, the energy consumption required for shaft rotation decreased (Table 1), and this and the reduction in material consumption for shaft manufacturing also indicated that the main goal of the research work was achieved.

Figure 2. Experimental copy of a resource-saving shaft

As is known, the results obtained in any scientific research work should serve to improve production conditions and facilitate human labor. In addition, the innovative

developments or improved working details created must be compatible with production conditions and ensure uninterrupted operation of machines and equipment. Therefore, the machine with a resource-saving shaft developed in the research work and the parameters set for it were thoroughly tested in the conditions of the enterprise.

It was determined during production tests that the shaft part with a new improved design bends within the permissible amplitude and therefore does not exceed the strength limit. As a result of the reduction in the mass of the shaft, the vibration state decreased by 1.3 percent (usually this value exceeds 0.9 mm).

In the production of a resource-efficient shaft, the state of strength (resistance to bending) was studied separately.

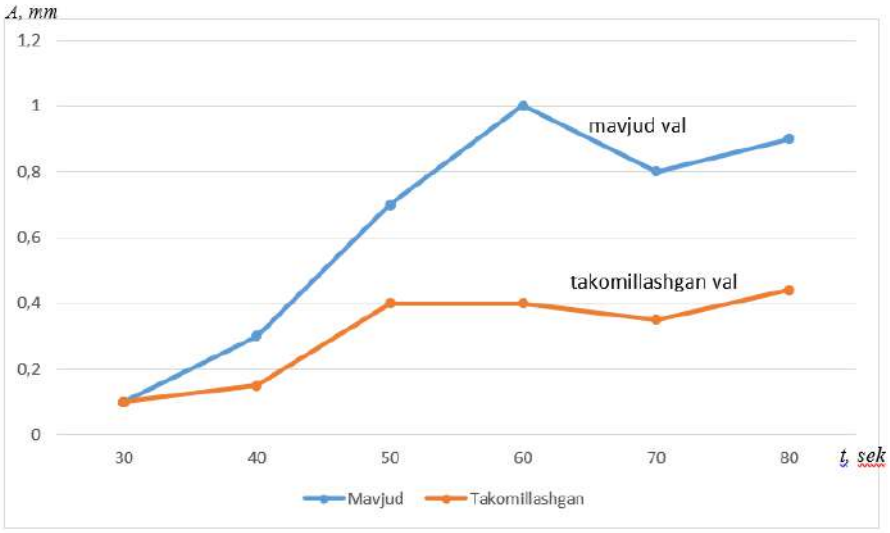

Figure 3. Diagram of the shaft vibration state over time

The vibration state of the shaft introduced in the research work was also checked in production conditions (Figure 3). When a simple shaft in a previously operating linter machine was studied, it was found that the vibration amplitude during the operation of the machine exceeded 0.9 mm. However, in a linter machine with an improved shaft, it was found that the shaft vibration did not exceed 0.4 mm and that its stability was ensured during its operation.

Taking into account the above, the reduction in the mass of the shaft ensures its bending within the permissible limits, and as a result, the machine's ability to operate smoothly increases.

Used literature

1. Obidov A.A, Mirzaumidov A.SH, Otaqo'ziyev D, Abdurasulov A. Deformation of the shaft in torsion and the effect of torsion along with bending. ISSN 2181-8622 Scientific and Technical Journal Namangan Institute of Engineering and Technology Volume 9 Issue 2 2024 Manufacturing technology problems. B- 208-216.

2. Abdurakhmanov J.B. Applying a cleaning device to a linter machine and justifying its parameters. PhD Research - N.: 2024. - p. 116.

3. Radjibaev P. "Povyshenie effektivnosti raboty pilnogo dzhina s primeneniem sectional-composite kolosnikovoy reshetki so smennoy rabochey chastyu". diss. Ph.D. Tashkent, 1994, 165 pages.

4. Lugachev A.E., Salimov A.M. Pervichnaya obrabotka klopka. T: 2007.

5. Ibragimov.F.Kh. Scientific and technical foundations of creating an effective design of sawing cylinders for fiber separators and linter machines. Abstract Diss. Ph.D., Tashkent, 2024, 28 p.

CONTENTS

TECHNICAL SCIENCES: COTTON, TEXTILE AND LIGHT INDUSTRY

Saloxiddinova M.
Improving the separator design to prevent cotton fiber loss. **3**

Juraeva G.
Optimizing cotton fiber quality during the production process. **9**

Mamadaliev F.
Analysis of problem in the aerodynamic system of cottonseed lintering equipment in cotton processing plants. **16**

Kozokov S.
Conducting experiments with newly designed saw gin ribs in the cotton cleaning process for different cotton varieties. **23**

Usmonov I., Abdullajonov S.
Methods and results for determining the parameters and operating modes of irradiating watermelon seeds with ultraviolet rays. **30**

Majidov A.
Theoretical foundations of the technological parameters of a straight-flow fiber separation device. **36**

Rahmatova S.
Scientific approach to considering properties in the design of garments made from knitted fabrics. **44**

Rahmatova S.
Technology for obtaining knitted fabrics from various raw materials. **48**

Turaboyev G.
Methodology for determining the tribotechnical properties of structural materials interacting with raw cotton. **54**

TECHNICAL SCIENCES: AGRICULTURE AND FOOD TECHNOLOGIES

Khurmamatov A., Boyturayev S.
Results of industrial water treatment from mechanical impurities. **58**

Khurmamatov A., Alimardonov Kh., Akhmedova K.
Two-stage installation for deep air purification from fine-dispersed solid particles. **65**

Mamatusmonova D., Mamatov Sh.
Technical characteristics of the use of vibrating conveyors for drying rosa caninas. **73**

Toshboyeva S., Dadamirzayev M.
Physicochemical properties of a functional sauce for fish canned products. **79**

Saribayeva D., Maxmudova D. Study of protein–lipid composition in food products.	**83**
Gulomkhojaeva N., Zokirova M. Study of polyphenolic compounds in jujube (ziziphus jujuba mill.) grown in Uzbekistan.	**88**
Gulomkhojaeva N., Zokirova M. Investigation of the amino acid composition in black and white mulberry (morus nigra l. and morus multicaulis perr.) varieties.	**94**
Kadirov A., Vokkosov Z. New technology for growing microorganisms of the bacillus sp, rhizobium sp, azotobacter sp.	**101**
Rakhimova G. Development of an effective technology for producing soy milk from local soy raw materials, studying its composition and physical and chemical properties	**107**

CHEMICAL SCIENCES

Khabibullaev J., Shomurotov Sh. Oxidation of various cellulose containing materials using the HNO_3/H_3PO_4–$NaNO_2$ system.	**112**
Nuritdinov A., Abdullaev O. Technical parameters and energy efficiency of an oil sludge processing unit	**122**
Okhundadaev A. Study of the effect of various factors on the synthesis of vinyl esters of wine acids	**127**
Usmonova Z. Effectiveness analysis of thermally and steam activated plum seed adsorbents	**133**
Kaxarova M. Technological scheme for extracting naphthalene from pyrolysis oil by the extraction (phase separation) method	**139**
Oribzhonov M., Bektemirov A., Arislanov A., Azizov V. Method for producing biosuperphosphate fertilizers containing humic compounds	**143**
Erkinov R., Soliyev M., Arislanov A. Synthesis of sulfur containing organic compounds by reaction of thiol-en and thiol-in	**151**
Yusupov M., Nuritdinov A. Elemental analysis of carboxyl-modified copper phthalocyanine pigment	**156**

Nuritdinov A.
Thermal analysis of carboxyl-modified cobalt and calcium metal phthalocyanine pigments **162**

Isakov B.
Development and study of an anti-caking additive to improve the physico-mechanical properties of ammonium nitrate **168**

TECHNICAL SCIENCES: MECHANICS AND MECHANICAL ENGINEERING

Gulamova D., Bobokulov S., Eshonkulov E.
Resistance and voltage anomalies above 200k bscco synthesized by solar technology **173**

Kutbidinov O., Abdullabekov D., Usmonov D., Xushbakov M.
Analytical and experimental model for assessing the depreciation rate of transformer oil based on physicochemical factors **182**

Obidov A., Abdurasulov A.
Basis of implementation of resource-effective shaft production **188**

Utaev S.
Calculation of oil change intervals in diesel-based gas engines **193**

Isomiddinov A.
Derivation of differential equations for spindle oscillation in a system of rectangular coordinates **200**

Dedakhanov A.
Determination of fuel consumption for drying cotton raw materials **209**

Atambaev D.
Difference of the individual yarns in the composition of a wrapped yar on the quality of the yar and determination of acceptable values of the main factors affecting their production **215**

Rokhmonov D., Sulaymonov J.
Development of a control algorithm for a smart irrigation system based on soil moisture and meteorological data **224**

Mamakhonov A., Khikmatillaev I.
Modeling of a vibratory cleaning device with cosinosoidal and sinusoidal shapes in matching the longitudinal and transverse cutting surface **227**

Soliyev A.
Theoretical study and characteristics of yarns in the production of circular knit fabrics **239**

Nomanov M.	
With improved blade mixer results of research work on the development of the 5lp linter	**246**
Lastochkin P.	
The influence of carding parameters optimization on the useful time coefficient of a rotor spinning machine	**259**
Mirzaakbarov A.	
Improving the efficiency of the ginning process to enhance fiber quality	**260**

ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION

Abdumanonov A.	
Enhancing the methodology for applying intelligent control systems in the teaching of technical sciences	**265**
Makhmudov Z.	
Increasing students' activity and knowledge level using test assignments	**271**

ECONOMICAL SCIENCES

Sarimsakov B., Mirzabdullayev R.	
The role of contemporary HR technologies in improving business performance	**275**