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PRODUCT QUALITY CONTROL. STANDARDIZATION. ORGANIZATION OF PRODUCTION

N. V. Pereborova, A. M. Litvinov, L. V. Titova

DOI: 10.46418/2619-0729_2022_2_1

SOLVING THE TASK OF INCREASING THE QUALITY AND COMPETITIVENESS OF PRODUCTS OF TEXTILE AND LIGHT INDUSTRY

The key problems of ensuring the competitiveness of the textile and light industries are considered. Factors are noted that objectively predetermine the need for state participation in the formation and implementation of innovative programs in traditional industries, which include the textile and light industries. The importance of state support for the initial phases of innovation processes - scientific, design, technological - is emphasized. The role of such an innovative resource as staffing is noted. The expediency and potential possibility of increasing the role of universities as centers for the development of scientific research on the problems of the industry and the training of highly qualified personnel capable of ensuring the implementation of innovative processes at all stages - from scientific ideas to their commercialization.

Keywords: textile and light industry, innovations, competitiveness, management, organization of production

S. V. Kiselev, A. A. Kozlov

DOI: 10.46418/2619-0729_2022_2_2

DIGITALIZATION OF PREDICTION OF OPERATIONAL PROCESSES OF POLYMERIC TEXTILE MATERIALS

Methods for digitalization of forecasting the operational processes of polymeric textile materials based on mathematical modeling of these processes are considered. This forecasting makes it possible to solve the problem of a comparative analysis of the properties of materials, as well as to investigate the relationship between the properties of materials and their structure.

Keywords: computer prediction, mathematical modeling, polymeric materials, deformation properties, relaxation, creep

N. V. Pereborova

DOI: 10.46418/2619-0729_2022_2_3

SOLUTION OF THE PROBLEM OF QUALITY MANAGEMENT OF MATERIALS FOR TEXTILE AND LIGHT INDUSTRY

The article deals with the issues of carrying out qualitative control of functional properties and improving the quality of textile and light industry materials, which are supposed to be carried out on the basis of mathematical modeling and system analysis of these properties.

Keywords: polymeric textile materials, quality control, mathematical modeling, system analysis, increasing the competitiveness of products

S. V. Kiselev

DOI: 10.46418/2619-0729_2022_2_4

METHODS FOR MONITORING THE VISCOELASTIC CHARACTERISTICS OF POLYMER FABRICS

The article discusses methods for controlling the viscoelastic characteristics of polymer fabrics based on computer prediction of deformation processes. Computer prediction makes it possible to separate the tissue deformation energy into elastic and viscoelastic-plastic components. The proposed methods are illustrated on textile materials used in protective impact products.

Keywords: computer prediction, mathematical modeling, polymer protective fabrics, deformation properties, relaxation, creep

E. A. Ageeva

DOI: 10.46418/2619-0729_2022_2_5

WAYS TO REDUCE THE ENERGY INTENSITY OF PRODUCTS PRODUCED AT TEXTILE AND LIGHT INDUSTRY ENTERPRISES

The article presents an overview of studies on energy saving for textile and light industries. Methods and ways of reducing the energy intensity of manufactured products are described. All previous studies were divided into groups, followed by a retrospective review for every group. Textile and light industries have energy saving potential. However, energy saving measures are rarely implemented in practice. This is due to the lack of methodological recommendations of the most effective ways to reduce the energy intensity of manufactured products, as well as the shortage of examples of practical implementation of energy-saving projects within the industries.

Keywords: textile and light industry, industrial enterprise, consumption of energy resources, cost of production, energy intensity of industrial enterprises, automation, energy saving, energy efficiency.

P. A. Shikov

DOI: 10.46418/2619-0729_2022_2_6

IMPROVING THE EFFICIENCY OF AN INDUSTRIAL ENTERPRISE IN THE CONTEXT OF THE INTRODUCTION OF INDUSTRIAL INNOVATIONS

The article presents studies on improving the efficiency of economic activity of an innovative enterprise in the process of automation, introduction of information technologies, digitalization of production. In the process of selecting technologies for digital transformation, benchmarking was used, which allowed not only to study the experience of leading companies and industry leaders, but also to transfer it to the enterprise of System Code LLC in the shortest possible time. The concept of lean manufacturing has been applied as an innovative technology that ensures efficiency, development and competitive advantages.

Keywords: enterprise efficiency, production innovations, automation of production processes, digitalization of production, Industry 4.0 concept, digital transformation

P. A. Shikov

DOI: 10.46418/2619-0729_2022_2_7

PRINCIPLES OF JUSTIFICATION OF IMPROVING THE EFFICIENCY OF LIGHT INDUSTRY ENTERPRISES IN THE CONDITIONS OF DIGITALIZATION OF PRODUCTION

The article discusses the principles of justification of improving the efficiency of light industry enterprises in the conditions of digitalization of production. Based on the method of expert assessments, the possibilities of priority principles, the complexity of their application and implementation by means of modern information technologies are determined, the ranking of the presented principles is carried out. The relevance of design work on digitalization of production of light industry enterprises is determined.

Keywords: principles of production management, digitalization of production, the concept of Industry 4.0, digital transformation, the method of expert assessments

L. N. Nikitina, E. A. Kraikina, N. M. Kasumova

DOI: 10.46418/2619-0729_2022_2_8

ANALYSIS OF THE DEVELOPMENT AND PROSPECTS OF THE RAW MATERIAL BASE OF THE TEXTILE INDUSTRY

The purpose of the study is to substantiate the problems and prospects of the development of textile products of the Russian Federation, taking into account the modern requirements of organizational, production and material and technical bases in the period 1980, 2007-2020. In accordance with this goal, the volume of textile products shipped on the territory of the Russian Federation, as well as the export and import of equipment for the textile industry, was analyzed.

Keywords: textiles, equipment, export, import, USSR, Russian Federation, Strategy

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DOI: 10.46418/2619-0729_2022_2_9

THE DIRECTION AND PROSPECTS OF THE DEVELOPMENT OF THE RAW MATERIAL BASE OF TEXTILE PRODUCTS AT THE PRESENT STAGE

The purpose of this study is to study the raw material base of the textile industry, taking into account the challenges of the present time. To increase the efficiency of the domestic light industry, a deep analysis of the state and prospects for the development of the raw material base is necessary. This scientific study examines one of the most important indicators of the raw material base – cotton, studies of exports and imports for the period 1985-2000, 2015-2020. Recommendations on improving cotton production in the territory of the Russian Federation are given.

Keywords: cotton, raw material base, export, import, strategy, USSR, Russian Federation.

T. A. Flyagina, L. N. Nikitina

DOI: 10.46418/2619-0729_2022_2_10

DEVELOPMENT OF A QUADRATIC INTEGRAL INDICATOR FOR DETERMINING PRODUCTION EFFICIENCY

The article discusses the development of an integral indicator for determining the efficiency of production using mathematical programming methods. The proposed calculation method allows us to assess the impact of a particular indicator on the process of organizing production.

Keywords: textile and light industry, organization of production, production efficiency, integral indicator, industrial enterprise

A. I. Bogdanov, Yu. S. Kulesh

DOI: 10.46418/2619-0729_2022_2_11

STOCHASTIC MODEL OF OPTIMIZATION OF THE NEW PRODUCT DEVELOPMENT PLAN

A stochastic mathematical model of optimization of the plan for the development of new product models according to the criterion of maximizing the mathematical expectation of profit, as well as an algorithm implementing it, is proposed. Calculations were carried out to optimize the plan for the development of new product models at one of the light industry enterprises.

Keywords: new development plan, optimization, mathematical model, light industry.

A. I. Bogdanov, K. V. Kaisheva

DOI: 10.46418/2619-0729_2022_2_12

APPLICATION OF QUALIMETRY METHODS TO PERCEIVED QUALITY ESTIMATION

(Article in English)

Customer perceived quality estimation is a significant element of the operation management system and is usually quantified by means of expert statistical method. Poor reliability of expert evaluations unfortunately adds even more uncertainty to such a subjective category as perceived quality. Hence, the aim of the current research is to determine the most reliable method of estimation. The carried out analysis allowed us to recommend the method of a priory setting of the mathematical model type of the integral indicator in combination with the expert weighted evaluation of simple indicators. It should be noted, that the choice of the integral quality indicator representation form should take into account the particular requirements. These requirements are representativeness, monotonicity, sensitivity and normalisation. It was found that the geometric weighted average fully meets them.

Keywords: quality evaluation, quality indicators, customer perceived quality

M. N. Titova, L. K. Sirotina

DOI: 10.46418/2619-0729_2022_2_13

METHODOLOGICAL STAGES OF DIGITALIZATION OF OPERATIONAL AND PRODUCTION ORDER PLANNING AT A SEWING ENTERPRISE

The article describes the stages of algorithmization of solving the problem of modular order production planning for a sewing enterprise. The types and procedures for the formation of documents and reports for evaluation and use in planning and control activities during the execution of a production order are listed. The practical application of the described methodology is reflected by the control and analytical indicators of operational and production planning of the sewing enterprise.

Keywords: production order, sewing enterprise, ERP system, technological documentation, production task, production accounting, production, deviation control.

A. D. Kilimova

DOI: 10.46418/2619-0729_2022_2_14

THE USE OF AN EXPERT SYSTEM FOR THE MODERNIZATION OF THE TECHNOLOGICAL PROCESS AT LIGHT INDUSTRY ENTERPRISES

The processes of globalization always have a multidirectional impact on the life of society from the economic point of view. While new technologies reduce and optimize primitive spheres of human activity, they also create many new, high-level directions. One of these areas is the creation of expert systems based on artificial intelligence and machine learning. The article discusses the learning algorithms of a system capable of optimizing outdated workflows and constantly learning new ones, reducing costs and increasing the productivity of any production.

Keywords: automation of production, light industry, expert system, sewing production, technological process

MACHINES, AGGREGATES AND TECHNOLOGICAL PROCESSES

M. V. Stepanov, A. A. J. K. Mahdi Hamdan, A. G. Usov

DOI: 10.46418/2619-0729_2022_2_15

MODELING THE BENDING OF TISSUE FLAP SUSPENDED AT SOME POINT

The article concerns the automation of the movement of flexible sheets, such as textile flaps, to the working bodies of technological machines. The problem of calculating the shape of a deformed flap, captured at some of its internal points with a pneumatic grip or hook, is considered. A technique for constructing the equilibrium shape of the flap, when its median surface has a conical shape, is described. The structure of the program for calculating such a form is described and an example of calculation is given.

Keywords: flexible flaps, technological machines, flap capture, conical flap bending model

SYSTEM ANALYSIS, CONTROL AND INFORMATION PROCESSING

A. G. Makarov, D. A. Ovsyannikov

DOI: 10.46418/2619-0729_2022_2_16

DETERMINATION OF THE ACTIVATION ENERGY OF THE PROCESSES OF RELAXATION AND CREEP OF POLYMERIC MATERIALS

The article considers a systematic analysis of the activation energy of the relaxation and creep processes of polymeric textile materials. A method for calculating the indicated activation energy based on mathematical modeling of relaxation processes and creep processes of these materials is presented.

Keywords: activation energy, relaxation, creep, viscoelasticity, deformation

A. M. Litvinov, D. A. Ovsyannikov, A. G. Makarov

DOI: 10.46418/2619-0729_2022_2_17

SYSTEM ANALYSIS OF SEWING MATERIALS CREEP PROCESSES

The article discusses the methods of system analysis of the processes of creep of sewing materials used for the manufacture of individual means of protecting a person from external mechanical impact.

Keywords: creep, viscoelasticity, deformation, sewing materials, prediction, recovery processes

A. G. Makarov, S. V. Kiselev, A. A. Kozlov

DOI: 10.46418/2619-0729_2022_2_18

MATHEMATICAL MODELING AND PREDICTION OF OPERATIONAL PROCESSES OF POLYMERIC TEXTILE MATERIALS

The questions of mathematical modeling and forecasting of operational processes of polymeric textile materials are considered. The use of the optimality criterion for mathematical modeling of viscoelasticity makes it possible to control the degree of accuracy in determining operational characteristics and the degree of reliability in predicting operational processes. The proposed method allows solving problems of a technological orientation for the selection of materials with optimal relaxation characteristics in terms of operational properties.

Keywords: mathematical modeling, polymeric textile materials, deformation properties, relaxation processes, operational processes

R. A. Gorshkov, A. R. Raitseva, I. A. Voilokov

DOI: 10.46418/2619-0729_2022_2_19

SYSTEM ANALYSIS OF THE CAUSES OF DAMAGE TO THE FACING CERAMIC BRICK

The paper covers the main causes of damage to the facing ceramic brick as part of the multilayer walls of modern monolithic frame buildings. The authors examine the mechanism of destruction of the front brick as a result of moistening of its front surface and subsequent swelling. It is shown that high-quality mortar used in the masonry of the facing stone layer restrain the deformation of the brick. As a result, compressive forces arise in the brick, the magnitude of which exceeds the resistance of the brick to the cut. The considered mechanism of damage is most frequently observed when hollow perforated bricks are used in masonry walls. The mechanism of damage also occurs if the horizontal seams of the masonry are not completely filled with mortar.

Keywords: masonry, multilayer wall construction, facing ceramic brick, hollow perforated brick, moistening, swelling, chipping, damage, repair, restoration.

TECHNOLOGY AND PROCESSING OF SYNTHETIC AND NATURAL POLYMERS AND COMPOSITES

P. V. Kaurov, V. S. Kurov, N. N. Kokushkin, N. P. Midukov

DOI: 10.46418/2619-0729_2022_2_20

ON FURTHER INCREASE OF WORKING SPEEDS OF FLAT-MESH PAPER MACHINES

The article provides information on increasing the speed of the paper and cardboard machine. The authors believe that the limit in increasing the speed of paper and board-making machines is associated with the ineffective removal of air from the paper web when lying on the forming part of the machine. After analyzing the most advanced design of the deaerator, a technical solution was proposed that would allow to increase the speed of a paper and cardboard machine having a paper forming device and overcome the limit of 1100 m/min.

Keywords: paper-making machine, cardboard-making machine, speed of paper machine, deaeration.

N. V. Evdokimov, A. N. Keutaeva

DOI: 10.46418/2619-0729_2022_2_21

WOOD WASTE CHARACTERISTICS IN CHIPS PRODUCTION AND EVALUATION OF THEIR POSSIBILITY AS A RAW MATERIAL FOR ADDITIVE TECHNOLOGIES

The article is devoted to assessing the possibility of using wood waste as a raw material for additive technologies. The possibility of using wood waste arising in the pulp and paper industry is analyzed. One of the common schemes of the wood preparation workshop of the pulp and paper mill was considered, which involves the arising of 2-5% of sawdust. A description of the equipment is given, as a result of which the fraction of wood waste required for 3D printing can be arised. The quality of wood waste obtained from softwood and hardwood is determined by the fractional composition using a particle analyzer. For comparison, the particle size distribution function of the imported gypspolymer is used, with respect to the content of which the percentage of wood material suitable for additive technologies is predicted.

Keywords: Additive technology, chips, wood waste material

A. S. Chornous, I. A. Raspopov, N. P. Midukov

DOI: 10.46418/2619-0729_2022_2_22

PULP MOLDING PRODUCTS BY WET AND DRY METHODS USING 3D PRINTED FORMS

The article presents the possibilities of pulp molding products from secondary raw materials by different way on a mesh made using 3D printing. As a result of work on a laboratory installation, samples were obtained by classical (conventional) casting and dry molding. To do this, an installation has been created, the main element of which is a form made using a 3D printer. In contrast to a standard hand sheets making device, the apparatus allows the same product to be manufactured using wet and dry molding technology. The manufactured product can be of a complex shape, which is specified in programs that form images and surfaces in 3D projection.

Keywords: pulp molded products, 3D-printer, paper product, dry fiber

TECHNOLOGY OF PRODUCTION OF TEXTILE AND LIGHT INDUSTRY PRODUCTS

A. A. Kozlov, S. V. Kiselev, D. A. Ovsyannikov

DOI: 10.46418/2619-0729_2022_2_23

MATHEMATICAL MODELING OF MECHANICAL PROCESSES OF POLYMERIC TEXTILE MATERIALS

A variant of mathematical modeling of mechanical processes of polymeric materials is proposed, on the basis of which deformation processes of varying complexity are predicted - from simple relaxation and simple creep processes to complex deformation-recovery processes and reverse relaxation processes with alternating loading and unloading.

Keywords: mathematical modeling, polymeric textile materials, deformation properties, relaxation processes, operational processes

A. G. Makarov, A. V. Demidov

DOI: 10.46418/2619-0729_2022_2_24

PREDICTION OF ELASTIC, VISCOELASTIC AND PLASTIC DEFORMATION OF TEXTILE MATERIALS

The article proposes a method for digital prediction of elastic, viscoelastic and plastic deformation components of polymeric fibrous materials. The decomposition of the total strain into components is based on digital prediction of the process of uniform stretching of the specified materials. Knowledge of the elastic, viscoelastic and plastic deformation components of polymeric fibrous materials is of particular importance in the design of various kinds of products with the required functionality.

Keywords: mathematical modeling, digital prediction, polymeric fibrous materials, deformation properties, elasticity, viscoelasticity, plasticity

A. A. Kozlov

DOI: 10.46418/2619-0729_2022_2_25

MODELING THE ELASTICITY OF TEXTILE YARNS

The article studies the modeling of the elastic properties of polyester twisted textile yarns. Reducing the degree of twist of textile threads within acceptable limits affects the reduction of time spent on the technological process of production and brings an economic effect.

Keywords: mathematical modeling, polyester yarns, elastic properties, deformation, degree of twist

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