

ANNOTATIONS

P. Begen. Technical preparing executive instruments in operating folding devices. *In this article the author proved methodology of software development for automated designing of profile of the folding guides in the operating device. The program for automatic construction of guides depending on the sizes of cardboard involute has been created. The construction of device that is intended for forming of profile of guides on the basis of data about the coordinates of the points got as a result of work of the program is worked out.*

O. Bezvesilna, A. Tkachuk. Diagnosis piezoelectric gravimeter automated gravimetric aviation system by constructing its calibration characteristics. A new piezoelectric gravimeter of automated aviation gravimetric system (AGS), which has more accuracy (1 mGal) and speed (fully automated) than known is described in this article. The principle of piezoelectric gravimeter is based on the phenomena of direct and reverse piezoelectric effect, namely, the conversion of mechanical tension that creates the acceleration due to gravity, the output voltage and vice versa. The equation of motion of a piezoelectric gravimetric is given and all components are characterized. Found that by selecting the design parameters of the piezoelectric sensor can be set gravimeter its own frequency 0.1 rad/s and avoiding the need to use a low pass filter to the automated AGS. The calibration characteristic of the piezoelectric gravimetric of automated AGS is analytically calculated and compared it with the calibration curves obtained experimentally with the help of the developed laboratory model. Found that the accuracy of the new piezoelectric gravity meter is 1 mGal, and measuring the angle of rotation of its axis relative to the reference vertical effect is directly proportional to his original testimony and the value of its error.

O. Bezvesilna. Design of new devices for measuring the acceleration of gravity gravimetric aviation complex. A new way to improve the accuracy of measuring the gravity by linear acceleration meter of aviation gravimetric systems by eliminating the systematic errors due to cross-velocity and the angular velocity of rotation of the Earth, the value of which more than 254 mG l unacceptably high for precision air gravity measurements is described in this article. A new gyrogravimeter, which is in contrast to gyro integrator linear acceleration (GILA), measuring linear acceleration (MLA) is suggested. The expressions and numerical values of the dynamic and static MLA errors are given. It is shown that such MLA has a much smaller systematic error in the translational and angular vibrations basis than GILA. As a result of the displacement the center of gravity axis of external framework, the device becomes a two-component meter acceleration of gravity, there is no need, unlike GILA (and string gravimeters, strongly damping and other types), use the platform to be installed MLA, stabilized in the field of acceleration due to gravity of the Earth. It is shown that increasing the transmission rate of the channel measurement can reduce the static error twogirosopes MLA.

V. Bogushevskiy, K. Egorov, O. Skachko, V. Suhenko. Control of viscosity characteristics of cast iron in the converter process control system. Viscosity - one of the most important physic and chemical characteristics of the melt, reflects the internal structure and the properties (mass and heat transfer components.) It reflects resistance to movement of the particles within the fluid to overcome the energy barrier is equal to the energy of activation of viscous motion. The main processes in the basic oxygen furnace are at the interface. The melt viscosity, which makes hydrodynamic regime at the interface can be used to determine the degree of absorption of oxygen by blowing. Indeed, according to the modern concept of the mechanism of vesicle wrap turbulent drag acts on it, very few, and mostly viscous resistance is dissipative, i.e. lift

bubbles of CO at their lapse expended on overcoming the viscous forces of the metal. Great influence on the hydrodynamic conditions at the interface is its content of surface-active agents (surfactants), and the oxide components - liquid ferrous slag, which is a donor of oxygen. In modern control systems, converter process, the viscosity of iron are not controlled. If it is justified to foreign converter shops, given a lot of attention to them in the preparation of charge materials, the domestic - it leads to performance converters, reducing their effectiveness due to improper management organization slag regime, loss of time on unnecessary rolling slag. These studies were carried out in an article in the National Technical University of Ukraine "KPI" on "Mathematical models and algorithms for control oxygen furnace" state registration number 0110U002880.

V. Bogushevskiy, K. Zubova. Mathematical modeling of the converter process for energy-saving technologies.

Energy-saving technology (EST) of converter process is considered. Established that at specific chemical composition pig iron, heat treatment process is dependent on the rate of decarburization, the degree of afterburning of CO to CO₂ and the amount of iron oxides in the slag, which in turn depend on the distance of lance to quiet bath. It is proved that the process of decarbonization is non-stationary, and is described by the inertial link of the first order, the transfer coefficient and the time constant of which depend on the duration of the period of melting and blowing. Changing the degree of post-combustion of CO to CO₂ is also described by the inertial link. The numerical values of the coefficients of equations describing the converter process by EST. Mathematical model of the controlled system is described as nonstationary oscillatory link. Mathematical model regulation of the oxygen-converter process can be implemented on a PID or fuzzy logic controllers.

A. Gavrysh, T. Royik, O. Gavrysh, Y Vitsyuk. Roughness of the surface of high-speed bearings from new composite materials for technological systems engineering at borazon grinding.

The results of experimental studies of the fine borazon grinding of high-alloy composite alloys synthesized from waste production tool for surface bearings technologist complexes. The advantages of the process borazon circles. The recommendations on the choice of cutting conditions for a thin borazon grinding bearings of the new composite alloys for high-speed rotary printing machines and compression stations for gaz streams, which provide the requirement to obtain the corresponding parameters of the surface roughness.

L. Dobrovol'ska. Stress state modelling near through-thickness cracks contours nonlinear along thickness of thin-walled structural elements.

A class of problems of determining the stress intensity factors near cracks contours nonlinear along the plate thickness is considered. It was assumed that the plates are stretched by uniformly distributed stresses which are applied perpendicularly to the crack plane, and the contours of such cracks are not perpendicular to the plate surfaces (nonlinear along the

plate thickness). Therefore the problem of stress state determination near the cracks contours comes to the determination of stress intensity factors which are variable along the cracks contours. It is accepted that the cracks length is much greater than the plate thickness and area of nonlinear change cracks contours. To solve such problems the generalizations of known boundary interpolation method were made. Based on this the approximate formulas for stress intensity factors calculating in case of tension of cracked plates were found, including infinite plate with linear crack; band with a central crack; band with edge crack; plates with linear cracks whose length is much greater than the changes value of crack contour along the plate thickness. It was shown that the stress intensity factor takes a maximum value at the crack contour point that comes to the plate surface of its smallest length. During the crack contour alignment and approaching to the surface point of its longest length the stress intensity factor decreased. In case of relative thickening of plate the stress intensity factor increased. In the case of band with edge crack with oblique contours along the band thickness that is stretched by forces perpendicularly applied to the crack plane the critical value of the external load was found. These critical values of external forces were compared with known in the literature experimental data for the same scheme of band fracture with edge crack that was made of epoxy resin. This comparison proved sufficient accuracy for engineering application of the proposed approach for determining the stress intensity factors near nonlinear contours of through-thickness cracks in thin-walled structural elements.

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O. Knysh, T. Sloboda. Fracture mechanics paperboard scissor cutting using a sharp knife and pointed anvil.

Analysis of scientific researches proved its expediency and methodology of investigation of mechanical cardboard destruction during knife cutting process. The scheme of interaction between cutting tools and cardboard which form the basis for analytical determination of linear efforts depending on the type of cardboard, cutting tools design and their technological parameters. The analytical researches justified the reduction of technological efforts caused by destructive shear tension which is less than compressive tension arising from the die-cutting. The advice concerning the choice of blades gap width depending on the cardboard thickness in terms of minimal linear efforts have been offered to ensure the necessary quality of cardboard sweep share design.

V. Kopp, A. Balakin, E. Chuyko, M. Zamorenov. Use of the principle of the maximum of entropy at the assessment of demanded number of measurements for instrument systems.

Definition of density of distribution of a random variable by the being sum of two independent random variables concentrated on final intervals, providing a maximum of its uncertainty under a condition that values on borders of an interval in which the random variable is concentrated, are equal to zero is given. The theorem on the basis of which necessary conditions of a maximum of entropy of the sum of two random variables concentrated on final intervals are defined is formulated.

Y. Kyznetsov, A. Stepanenko, Hamyela J.A. Gerra. Multi-morphological synthesis of small milling machines with computer control. *The possibility of using multi-level morphological synthesis to create a small milling machines with computer control. The examples of construction machines as the resulting of three-level synthesis.*

F. Krisak. Washing process modeling and process parameters of washing machine. *The new construction of the drum and blade washing machine for root crops, the process of intensification of which is realized thanks to the increasing of the friction and activity of the washing water circulation upon root crops is proposed by the author. The apportionment of root crops contacts inside the drums and in the intervals between the drums is received. Approaches to the determining of the root crops general totality coefficient, which appears as the statistical assessment of the root crop form coefficient are proposed in the article. This coefficient gives an opportunity to determine the optimum loading of the working part of the washer by the root crops. Results of the research outlined in the investigation enable the continuation of searching in the direction of the washing machine constructive and technological parameters optimization.*

V. Marchuk, L. Ravenets, S. Marchuk. Modeling relations design and technological factors with indicators of technological operations bearing production. *In the article the problem of bearing details of performance that require detailed analysis of the relationship of design and technology and production factors in terms of the process at different stages of the life cycle of the product. The proposed simulation method of structural-parametric and structural and functional relationships in the structure of the life cycle of detail on the example of the Rings roller bearings creates prerequisites for an integrated approach to process quality products in reconfigure bearing production. The work was confirmed and further development of a hypothesis about the impact of technological inheritance from previous operations shaping operations quality indicators that form the finish operations.*

V. Melnik, V. Shirokov, O. Shirokov. Algorithm for determining the boundary points viznachennya mikroizobrazheny structural bits and pieces of equipment for technological complexes. *The three-dimensional investigations of microobjects in micron and submicron spheres are significant during projection of the functional elements of many technological complexes, using high-precise technologic operations. Distinguishing of the solid components of the microscopic structure during the automatic morphological analysis is problematic, because such components are perceived as one structural element. This leads to a distortion of the results. They are the overestimation of large cell number and the understatement of the number of the smaller ones. For morphological and planimetric analysis of solid components due to electron microscopic images the a new method based on the Voronoi-Delaunay algorithm suggested, which is based on the use of so-called "Voronoi discrete axes", aimed to determine the boundary points of distinguishing the structural elements.*

Y. Melnik, A. Shostak, C. Syniy. 3D-reconstruction of the subsurface structure of the functional and technological complexes some of the elements using the rem-stereomikrotomografii. *A fundamentally new method for studying near-surface topology of three-dimensional solid-state structures of objects, perform by functional elements of technology systems is proposed. The method is based on a combination of the principles of electronic microtomography and stereomeasurements and provides reconstruction of internal volume of the structure of the object according to the energy spectrum of the reflected electrons. An attempt to use quantitative microtomography on algorithms developed for stereoimages is submitted in the article. The important point is that the proposed method is not simply adding the benefits of two known methods. Their combination opens up entirely new possibilities microstructural studies – obtaining accurate quantitative information about the internal structure of the solid state object that allows to visualize hidden under the surface of the inner volume details of micro irregularities and perform a quantitative reconstruction of the topology of the object in depth. This is particularly important, such as in materials science and microelectronics.*

S. Prystupa. Characteristic metal cutting machinability examples in the context optimization during machining. *Improved machinability of materials in modern engineering is an actual scientific problem. However, in the literature, the concept machinability has no clear definition. The criteria machinability is a significant number of parameters, but the most common metal machinability rating score is the speed of cutting. To determine the workability of materials used as indicator of resistance to deformation. Solving the problem of improving the treatment process is to establish conditions that are optimal for all elements of the cutting: the material, the cutting tool and the rigidity of their interaction. The paper analyzed the known approaches to determining machinability of materials by cutting, the methods improve the workability and propose a new energy method for determining the machinability of materials.*

I. Seliverstov, D. Dmytryyev, Ju. Rozov, M. Podolsky. The design of the lever opening the autoclave unit. *In work existing designs of the mechanism of opening of a cover of an autoclave are considered. The new advanced mechanism of the opening, allowing to lower working costs in the course of its work is offered. For maintenance of working capacity of the mechanism computer modeling that has allowed to define positions of the mass centers of separate links and a design as a whole has been spent, the model of forces operating on a design and the static moments is constructed. The system of the parametrical equations for calculation of characteristics of the mass centers of links, dependences of balancing, definition and check of conditions of balance of system of the lever mechanism is made. Calculation and optimization of the static and overturning moments for counterbalance maintenance in static position and in the course of work is executed. As a result of the spent analysis the rational constructive sizes of the device, position of an axis of rotation, diameters of sliding bearings are accepted and the admissible effort of the opening is provided, allowing to carry out manual moving of large-sized objects of the big weight and opening of a cover of an autoclave for manufacturing porous concrete is direct.*

Stetsiv B. S., Petriashvili George. Experimental researches of dynamics of monomial swipe cam-mechanism with geometrical shorting. *The researches results of influence of sliding and rolling chock depending on the amount of marbles rollers or needles in the roller support (further the have been presented roller) on the dynamic coefficient of monomial swipe two-cam mechanism with geometrical shorting (MSTCMGS) of vorgreifer drive of small format offset printing press. The behaviour of the roller has also been researched with the purpose of exposure of influence of swipp vibrations on its angular, speed because the roller in transition from ore prophile to anater slow down and then disperses and slides in relation to the final prophile. Unlike cam-mechanisms with slot cams in MSTCMGS. The change of the angular speed of the roller in transition causes less intensive wear of the cam surfaces as a result of less difference of prophile linear speeds. Experimental researches have been conducted on the special stand with the coupled cams for two laws of periodic movement: «diagram of accelerations a cosinusoid» – K and «diagram of accelerations a sinusoid» – C_0 . The results of researches have been represented graphically.*

V. Stupnitskiy. Structure and function of the automated technological preparation of engineering production based on the concept of functionally-oriented design operations. *These papers describes a new concept in designing processes in development the structure and parameters of technological operations depending on the peculiarities of the product in the machines or technological systems and ensures implementation of the necessary or limit the operational capabilities of its work. This method is based on the results of the automated technological system forming (CAF) surface parts (Computer Aided Forming). This article describes a technique for technological design of the operations and cutting passes based on the function-oriented principle.*

(Computer Aided Forming).

V. Strutynsky, V. Symonyuk. Modeling patterns of slow recirculation vortex motion of granular mixtures in shock pulse load vibrobunker. *Based on the results of questions about vibroabrasive treatment, especially small, namely, parts of instrument, conducted modeling processes that occur in vibrobunker with a working formula. The basis was taken as a model vibroabrasive installation with four electromagnets. Electromagnets can be switch on in any order, but in this case the process was simulated with the simultaneous inclusion of all four electromagnets. It was considered very significant structural feature vibrobunker, namely that it is made in the form of thin-walled cylindrical container material which, under certain loads, has the ability deformed.*

L. Yampolsky. Multi-agent implementation of the iterative synthesis of artificial neural networks under fuzzy meta-identification. *The new approach of the Neuro-Nets' satisfactory topology automated choice, which corresponds to the demands of the modeling applied problem (or task), is proposed. The approach's realization based on using of the flexible automated multiagent system with multiobject configuration of its components with the metaidentification's functions. The peculiarities of the system's components interaction in its function are uncovered.*

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The new construction of the drum and blade washing machine for root crops, the process of intensification of which is realized thanks to the increasing of the friction and activity of the washing water circulation upon root crops is proposed by the author.

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A. Shostak, V. Bozhidarn k, O. Miller. Construction of rheological models for engineering modeling geodezic bits and pieces of technological systems.

The behavior of engineering objects elements of technological systems to be tested under external influence, as determined by its physic-chemical and rheological properties and appearance, intensity and duration of exposure. For correct mathematical description of the behavior of solids, deformable device commonly used continuum mechanics or continuum. The article proposes the construction method combined rheological model as a plane contact problem with the solution of the integral equation numerical method that is appropriate for solving engineering problems that make it possible to significantly reduce the dimension of the solution by several orders and, consequently, the amount of computations, and are effective in terms of application, such as the problems of parametric reliability.