ABSTRACTS

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THERMAL STREAMS AT USE OF A CUTTING TOOL WITH WEAR-PROOF COATING
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ABSTRACT. Productivity of metal cutting operations can be increased by means of processing speed increase. At that, a limiting factor is the decrease in wear resistance of the cutting tool. Software «DeForm3D» has been used for simulation of the cutting, which makes possible to vary in heat-physical parameters and tribological properties of a contact zone, simulating characteristics of wear-proof coatings on border "tool-detail". Such a parameter can be not only heat conductivity of the coating, but also entry conditions of a pre-contact zone (for example, friction factor) which in turn influences formation of sources of heat and their intensity. In order the influence degree of the specified factors on efficiency of process of cutting to be assessed, the following experimental researches have been carried on: Analysis of tribo-technical characteristics at various temperatures which is made on an adhesion measuring instrument at use spherical indenters from High-Speed Steel without a covering and with coverings (TiCr)N and (TiCr)N, and also indenters from High-Alloy Steel with coverings TiN, (TiCr)N, (TiAl)N, (AlTi)N, (TiAlCr)N, (AlTiCr)N. In quality of pair a friction special samples from a Constructional Steel with hardness 20 HRC are used. As a result of researches, the role of the arrangement of the various coating layers of the multilayered architecture, synthesized at use of thermochemical processes CVD is defined. It is revealed, that the greatest temperature of cutting corresponds to processing by the tool without a coating. The maximum decrease in intensity of thermal streams in system "tool-preparation" is provided with the coatings having multilayered architecture, and intensity of a thermal stream considerably depends on sequence of making layers of a multilayered coating.

WEAR RESISTANCE OF THE MODIFIED SURFACE OF THE CUTTING TOOL
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ABSTRACT. A way to improve cutting tools is a new kind of multilayered coatings that combine wear resistance and antifriction properties to be developed. The objective of the present work is to study effects of antifrictional sublayer composition on the life of cutters with these engineered coatings and to finding scientific basis for developing multilayered coatings with programmable change of properties, providing each layer of the coating to fulfill a given function at a certain stage of wear. The ‘triplex’ multilayered coatings are studied. The coating was deposited using three units. Used as the base, the high-speed steel (HSS) was previously nitrided in the glow discharge. Then the tool surface was modified by ion doping prior to applying the hard coating. Finally, the modified layer was deposited with the (Ti, Cr)N coating by the PVD method. Researches show that the mixing of antifrictional alloys, that is widely used to improve conditions of sliding friction, allows to increase the tool life not more than two times. This way of the tool life increase, reduces the shear strength of adhesion bonds developed between the tool and the workpiece does not seem to be the most efficient one for the multilayered coating under analysis. For almost all studied antifrictional materials, the adhesion of the coating to the modified surface was rather low. This precludes their practical application due to technological reasons. Implanting the chemical elements makes possible better results to be obtained. Such elements as indium, silver and nitrogen enhance the tool life by 2 – 3 times under different cutting conditions (with and without cooling). The obtained results can be regarded as regular. Indium and silver are the least interactive ones with ferrum, and they can be used as metal lubricants. They promote a crushed chip forming at cutting using coating under the study. Ion modification of the tool surface with other studied elements exhibits unstable or negative effects, i.e. reduction of tool life and failure to provide high adhesion between the hard coating and the substrate.

PHYSICAL AND TECHNOLOGICAL PRINCIPLES FOR OBTAINING A NANOMETRIC RELIEF OF THE SURFACE AT THE PROCESSING OF HARD BRITTLE MATERIALS
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ABSTRACT. Hard brittle materials, including the minerals diamond and leikosapphire are used in microelectronics for printed microcircuit substrates. The quasi-plastic grinding allows a surface of high quality with roughness 1 - 10 nm to be modeled without polishing. The acoustics oscillations generated of the blank at the processing could be used to control of the processing process and quality of the processed surface of the materials used in electronics.
PROCESSING OF SUPERHARD AND BRITTLE MATERIALS AND MONOCRYSTALS IN REGIME OF QUASI-PLASTIC DEFORMATION OF THE MATERIAL BY THE METHOD OF DIMENSIONAL MICROGRINDING ON CNC MACHINE

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ABSTRACT. By theoretical and experimental researches, it has been found out that in certain conditions at mechanical action the brittle hard materials show plastic properties. It become possible the brittle materials to be processed in a way, at which the prevalent mechanism is not the destruction, but the plastic flow. The theoretical model of dimension-adjustable and non-defect processing of minerals with hard structure by cutting has been developed on the basis of the physical mesomechanics. The physical mesomechanics of the materials is based on a new paradigm – the conception of the structural levels of the hard bodies’ deformation. The regime of plastic surface processing of brittle minerals and materials could be provided at a special choice of processing parameters.

FUNDAMENTAL PRINCIPLES OF WORKING IN RESONANT CONVERTER FOR INDUCTION HEATING

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ABSTRACT. In the paper has been given theoretical layout of the device for induction heating of the metals. Practical results on realized device show that the device can be used for regenerate of used metals, and for melting the copper concentrate with quality bigger than 60%. The results are procured on copper concentrate procured with extraction in the mine Bucim in Macedonia and Asarele in Bulgaria.

THE LIFE OF WELDED FRICTION DISCS 4K4016 IN CZECH REPUBLIC

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ABSTRACT. The mining equipment of type 4K4016 at OKD, a.s., Ostrava is delivered by ČKD Praha. In the region of cyclic stressing 5.10⁷ cycles it is necessary to repair the welding parts. The article brings the solution of design.

LIFE-CYCLE ASSESSMENT OF STEEL CONSTRUCTIONS IN CZECH REPUBLIC

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ABSTRACT. Paper deals with life-cycle assessment of steel constructions in Czech Republic. We survey the flow between its particular stages (raw materials mining, processing, production of raw iron, production of raw steel, production of semi-finished products, production of steel constructions, consumption and disposal) and environment. Very detailed information was obtained about inputs and outputs. Better accuracy of information is gained by presentation methodology. Conversion and recalculation of data from production of raw steel and production of semi-finished products according specific standards are mentioned. Specific standards are deriving from structure prefabricated elements, which are used for production of steel constructions in monitored company.

ADAPTATION OF THE ADVANCE SYSTEM FOR KS-3M SHEARER ADAPTED FOR 295-842 RYBNIK CONVEYER

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ABSTRACT. The paper presents technical solutions to correlate the function of KS-3M shearer with Rybnik 295/842 conveyer in order to observe Occupational Health and Safety requirements. These machines, alongside of CMA-5H powered support make up a powered face complex used to extract coal in panel 4/seam 3/block VI in Paroseni Mine.
ABOUT HYDROABRASIVE DETERIORATION OF ELEMENTS OF MECHANISATION OF SYSTEMS FOR HYDROTRANSPORT OF A WASTE OF CONCENTRATING FACTORIES
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ABSTRACT. In the report the mechanism of hydroabrasive deterioration is surveyed. On base known analytical and experimental dependences, are defined factors which influence on hydroabrasive deterioration. Experiments and supervision in real industrial conditions on system for hydrotransport finding on storehouse for a waste of enriching of minerals „Rudozem 2” are made. The variant for increase to a technical resource of the cores has been developed and introduced are frequent mechanisation.

COMPUTER PROGRAM FOR CALCULATING THE DRIVING FORCE OF MULTI-DRUM BELT CONVEYERS WITH FINAL AND INTERIM POINTS OF LOADING
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ABSTRACT. A program system for calculating belt conveyers with final and interim distribution of the points of loading has been designed based on the theory for forming and distribution of the driving force of two- and three-drum systems for driving belt conveyers. The algorithm of the program considers the distribution of the driving force as well as the boundaries of adhesion with the belt. The work of the program has been shown by a numerical example of a real belt conveyer, operated at the “Maritsa East” Mines EAD.

COMPARATIVE ANALYSIS OF THE ANALYTICAL AND CAD-CAE METHODS FOR DETERMINATION OF CONTACT STRESS IN THE ROLLING BEARING USED FOR ROTOR MINING EXCAVATORS
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ABSTRACT. This article deals with analytal way of analysis of contact stresses between the balls and bearing rings for supporting base of excavator SRs 2000 operated under the conditions of Mini Maritsa Iztok EAD. The results were compared with those from the CAD-CAE analysis on the same problem. The results are compared and there are conclusions about the possibilities of using both methods of calculation in the repair and reconstruction of the excavator support.

STUDY OF THE INFLUENCE OF SEVERAL FACTORS ON THE STABILITY OF A TOWER CRANE
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ABSTRACT. The coefficients of stability of different cranes with capacities of 2.5, 5, 8 and 10t are determined. The influence of the slope, the length of the boom and the height of the tower is studied.

INFLUENCE OF THE ROTATION SPEED AND THE BOOM LENGTH ON THE START TIME OF THE ROTATION MECHANISM OF A TOWER CRANE
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ABSTRACT. The acceleration time of the rotation mechanism of a tower crane with capacity 5t is determined. Calculations at three rotation speeds and five boom lengths are made. Three different motors are used for the calculations.

DYNAMIC LOADING OF THE VEHICLE’S TRANSMISSION UNDER THE CARDAN SHAFT’S ANGLE VARIATION
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ABSTRACT. A dynamic model of a vehicle which includes elements of the suspension and the transmission is presented. The angles between the shafts of the double cardan clutch are changing in the process of motion. The kinematic distortion and the moment of torsion in the transmission are analytically defined. A numerical experiment is conducted to research the influence of the varying angles on the dynamics of the transmission.
COMPREHENSIVE MATHEMATICAL MODEL OF THE MINE SHEAR SYSTEM
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ABSTRACT: With the systematic approach have been developed comprehensive mathematical model of the mine shear system as a complex electromechanical model provides opportunity for research of the dynamic interaction. Between the essential elements of the shear system: manageable electric drive, shear machine, shear ropes (main and counterweigh) and reinforcement of the shaft.

STUDY THE FACTORS AFFECTING ON POWER SUPPLY OF THE MAIN LOADERS MACHINES IN “ASSAREL” MINE
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ABSTRACT. An analysis of the factors having impact on the electric supply of basic loading machines operating in the Assarel Mine is made in the report. Processing and analysis of data is made for shovel downtimes due to interruption of electric supply for a period of 24 months.

DETERMINATION OF THE POWER EFFICIENCY OF METHODS USED FOR ADJUSTMENT THE EFFICIENCY OF ROTARY PUMPS
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ABSTRACT. The article introduces a methodology for comparative evaluation of the electric power consumption at changing the centrifugal-type pump capacity through throttle control and frequency control of the induction motor speed, driving the pump.

STUDY THE INFLUENCE OF THE VOLTAGE AT LOSS OF ELECTRICITY IN SYNCHRONOUS ELECTRIC MOTORS
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ABSTRACT. Examination the influence of supplying voltage on the separate kinds of losses and on the total losses of electric power in the synchronous electric motors.

FAILURE ANALYSIS OF THE POWER SUPPLY SYSTEMS IN OPEN-AIR MINE “TROJANOVO-NORTH”
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ABSTRACT. This article deals with safety analysis of the electrical power supply systems in open-air mine “Trojanovo-north” of the mine “Maritza-east” – Ltd.. The data of failures are collected and investigated for five years time period. Classification of failures by reason of events is presented. All statistical researches are carried out using MATLAB and STATGRAPHICS packages.

SPECTRAL ANALYSIS OF ELECTROMAGNETIC RADIATION FROM ELECTRICAL DISCHARGES, POSED FROM ELECTRICAL DISCHARGES OF ELECTRIFIED DIELECTRICS
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ABSTRACT. Was made a review of existing methods of determining the static electricity in various technological processes in explosives production. For this purpose apparatuses are used to measure electrical intensity and on that basis draw conclusions about the electrical discharges. The article provides a way to indicate electrostatic discharges in a potentially explosive atmosphere by analyzing the electromagnetic field that can be perceived as a signal of their existence.
ANTISTATIC AND SPARK RESISTANT FLOORINGS FOR A PRODUCTION PROCESSES WITH POTENTIAL EXPLOSION ATMOSPHERE

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ABSTRACT. In the present report was made a classification of modern and antistatic flooring without occurrence of sparks. Systematics was made of the basic requirements under existing regulations and current world trends. Attention is paid to both the tests related to conductivity and not form sparks and the tests in terms of strength and deformation characteristics. Application areas are determined.

PARAMETERS OF GROUNDING CIRCUIT OF MOBILE MINING MACHINES IN IT SYSTEMS CONTAINING HIGHER HARMONICS IN VOLTAGE

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ABSTRACT. Paper presents development of studies for optimizing the grounding resistance of mobile mining machines, supplied by systems with insulated neutral (IT) and containing higher harmonics in voltage. This problem became topical with the increasing application in mines of powerful rectifiers for direct current drives, of frequency control of asynchronous motors and of non-linear loads, which are sources of higher harmonics in current and voltage. Parameters of grounding circuit obtained related to limitation criteria from European norms for coefficients on non-sine in LV networks. An example without discrimination of higher harmonics by filters is examined.

PHYSICAL MODELING AND STATISTIC ANALYSIS REGARDING THE OPERATING PARAMETERS OF CONDUCTIVE CONCRETE ENCASED GROUNDING ELECTRODES FOR APPLICATION IN MINING INDUSTRY

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ABSTRACT. The paper presented inhere clarifies the advisability regarding the use of conductive concretes for encasing vertical and horizontal grounding electrodes as components of grounding installations for application in open air mines’ environment in our country aiming at grounding resistance decrease and increasing electrodes’ corrosion protection. Relevant conclusions are made on the basis of conductive concrete encased grounding electrodes’ physical modeling in real conditions; statistic data obtained by operating parameters site measurements and its consecutive post processing regarding the applicability and economic effect that these proposed grounding electrodes would have if applied in industry.

STRUCTURE OF QUALITY AND DEPENDABILITY OF PRODUCTION

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ABSTRACT. With the help of the systemic approach the quality and dependability could be structured in three hierarchical levels: attributes, indicators and characteristics, whereas the attributes are expressed by indicators and the indicators – by characteristics. The basic elements of the conceptual definitions for quality and dependability of the production are found out. A qualification of the attributes and indicators of quality and dependability of the production is suggested. A classification of the numeral and functional characteristics of the indicators for quality and dependability of the production is worked out.


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ABSTRACT. In this paper is presented a case when two hetero-polar point-formed electrical sources are situated in three dimensional conductive areas – “earth” (restricted by indefinite surface of other area) - “air” (with indefinite great resistance). The aim is to be determined the intension of stationary electrical field and the potential in odd point, located in the conductive semi area and total density of electric current in the same semi area, as a function of the depth of the location of odd point.
POTENTIAL OF ELECTRICAL FIELD IN ODD POINT IN EARTH CREATED BY HETERO-POLE LINEAR SOURCES AND HETERO-POLED LINEAR POINT-FORM ELECTRICAL SOURCES

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ABSTRACT. The paper discusses the situations when two hetero-polar linear sources and hetero-polar linear point-form electrical sources are found in three dimensional conductive areas – “earth” (restricted by indefinite surface of other area) - “air” (with indefinite great resistance). We deduce expressions through that the potential of odd point from the conductive area (earth) for two cases examined.

ELEMENTS OF THE ELECTROMAGNETIC CALCULATION OF A VORTEX CONVERTER WITH AN INNER MAGNETIC CORE

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ABSTRACT. Some relationships between the dimensions and the electromagnetic parameters of a vortex converter with an inner magnetic core is established. They are very important to pick out an optimal variant in the design under desired magnetic induction and active volume of the working chamber.

EXPERIMENTAL INVESTIGATIONS ON THE MOVEMENT OF MAGNETIC MATERIAL IN TRAVELLING MAGNETIC FIELD

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ABSTRACT. A circuit for increasing the processes speed in an electromagnetic system of a separator, controlled by a thyristor rectifier is considered. Simulative models of the exiting and the proposed circuits are created. Comparative characteristics of the circuits investigated are given.

INFORMATIONAL AND MEASURING SYSTEM FOR MONITORING AND OPERATIVE CONTROL OF THE ELECTRICITY CONSUMPTION IN UNIVERSITY OF MINING AND GEOLOGY ST. IVAN RILSKI

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ABSTRACT. Informational and measuring system for monitoring and operative control of the electricity consumption in University of Mining and Geology ST. Ivan Rilski has been built. At the moment, the configuration includes 6 measurement points, 2 local stations, 2 operational stations and a server. A possibility for authorized remote access to the data in an arbitrary computer, connected to Internet is provided. The principles adopted, at the construction of the system provide its troublefree future amplification. As a result of the introduction of the system in practice, the informational base in the area of the administrative and the economic activity in UMG has been improved and an environment has been built for effective practical tuition of the students in problems, related to the control of the electricity consumption, automated electric drive and the systems for collection and processing of data.

METHODS FOR INCREASED CALCULATION PERFORMANCE IN SYSTEMS FOR MEASUREMENT AND CONTROL

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ABSTRACT. Modern approaches are explored for increasing the speed when implementing mathematical procedures, using specialized integrated circuits, strictly specialized microcontrollers, pipelines and multithreaded information processing, real-time event response systems. On behalf of the analysis shown, an event driven system is proposed. It offers a wide range of interrupts and provides capability of their simultaneous service routine execution.
ABSTRACT. Electronics is a part of the technical universities curriculum. It is taught variously under the auspices of Physics, General Science and Technology. Last tendency is, that the taught is influenced by developments in the bright area Design and Technology. Like other physical sciences so electronics suffers from a lack of teachers and the perception that it is hard. So it is necessary to be developed a electronics taught strategy. The employed tactics my include: development of an extensive website of support for both teachers of electronics and their pupils. Nanocube.org provides specialized service for online simulations. The supported information is available free of charge. The content is provided from the organization, which hosts nanocube.org and from the increasing number of users.

INITIAL RELATIONS FOR DETERMINATION OF COMMUNICATION SYSTEM RELIABILITY

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ABSTRACT: In the paper a mathematical model for description of communication system reliability is presented.