

ABSTRACTS

Section of «Education»

UDC 378.14 Bardachev Yu. N., Rozov Yu. G. MODERN TENDENCIES OF DEVELOPMENT OF ENGINEERING EDUCATION IN UKRAINE ON THE EXAMPLE OF KHERSON NATIONAL TECHNICAL UNIVERSITY Based on the study and analysis of the current state and trends in the development of engineering education in Ukraine and in the world, the necessity and directions for the exit from the crisis of the higher technical school of Ukraine at the state level have been determined, as well as the main directions of innovative transformations based on the organization of the educational process at the Kher-son National Technical University . The proposed innovations envisage reforming the educa-tional process using modern educational technologies, means, methods and models of train-ing, and are based on a new level of organization of the process and the relationships of its participants at all stages of training and monitoring knowledge, skills and abilities, taking into account the requests from employers, as final consumers of educational services.

Keywords: engineering education, educational services, innovative changes, democra-tization of the educational process, cooperative learning, problem training, student autonomy, informatization, knowledge control.

Section of «Rolling production»

UDC 621.965.01 Borovik P.V. 3D MODELING OF THE PROCESSES OF THE CUTTING SECTION PROFILES ON THE SHEAR. On the basis of the finite element meth-od, three-dimensional mathematical models of the process of separation of a channel and a corner on shears were developed for the first time. These models the stress-strain state of met-al and energy-strength parameters allow analyzing. The adequacy of mathematical models is confirmed by experimental studies. The results of the work in further studies of the separation operations of shaped profiles on shears can be used.

Keywords: mathematical model, shears, angle, channel.

UDK 621.771.06. Verenev V. V., Baglaj A. V. KICKBACK THE ROLLING MILL STAND. Characteristic oscillograms of transient processes are shown in the lines of the main drive of the rolling stands, when reverse impacts occur during the capture and exit of the strips from the rolls. The conditions and reasons for their formation are considered. The im-pact level is commensurable with the static load during rolling. A weak correlation is estab-lished between the maximum dynamic load when the strip is grasped by the rolls and the level of the return stroke. It is proposed to use the phenomenon of back blows for diagnostic pur-poses, in calculations for strength and durability.

Key words: rolling mill, drive line, strip grip, output, back blows, diagnosis.

UDC 621.771.01 Yershov S., Kaiming Wu, Hress A., Isayev O., Xia Tao. THE STUDY OF EXISTING MODES OF REDUCTIONS DURING PRODUCTION OF RAIL-WAY AXLES. The article deals with the influence of deformation modes in the production of railway axles on the working of the metal structure of the central zone. Studies have been car-ried out for existing production regimes and deformation schemes.

It is shown that the use of box gauges is inefficient for better working out of the metal structure of the central zones of the billet. The best characteristics, from the point of view of working out the structure, has a rolling scheme in smooth rolls. The use of box gauges allows you to better work out the surface layers of the billet.

Keywords: the regime of reduction, the scheme of deformation, the caliber, the railway axle.

UDC 621.771.09 Ivanov G. B., Shtoda M. N. THE PROPOSALS ON MODERNIZATION THE TWO-STAGE COOLING LINE OF THE WIRE ROD MILL 400/200 PJSC DNEPROVSKY INTEGRATED IRON AND STEEL WORKS In the article proposes a version of the reconstruction the two-stage cooling line of the wire rod mill 400/200 PJSC Dneprovsky Integrated Iron and Steel Works. The water-air cooling section is installing on the first section roll table-refrigerator. Based on the analysis was results calculation of the temperature coils a wire with a diameter 6-16 mm at the end water-air cooling section, it was proposed to use nozzles 3 of the secondary cooling zone continuous casting machine.

Keywords: two-stage cooling, water-air cooling, wire rod temperature calculation.

UDC 338.45: [334.754:621.774]] (477) Ksaverchuk L. P., Korol R. N. CONDITION AND PERSPECTIVES OF THE PIPE SEDIMENT OF THE MINING AND METALLURGICAL COMPLEX OF UKRAINE. Considered the current state of enterprises in Ukraine, specializing in the manufacture of pipes. There was a significant reduction in production and the number of employees in the sub-industry. Prospects for the development of the pipe sub-sector are due to the development of domestic consumption, expansion of sales markets and technical re-equipment of existing enterprises.

Key words: pipe sub-branch, main pipelines, water pipes.

UDC 621.771.237 Kurpe O. G. Kukhar V. V. Shebanitc O. M. DEVELOPMENT OF PILOT BATCH AND GRADE ESTIMATION OF COILS OF STEEL GRADE S355MC AT ROLLING MILL «1700», PJSC «ILYICH IRON AND STEEL WORKS» There has been developed technology, and pilot batch of hot rolling coils (6×1500 mm, steel grade S355MC) has been produced using thermo-mechanical controlled process (TMCP) for the wide-strip rolling mill 1700. The integrated technology for TMCP coil production (steel grade S355MC) has been firstly developed for the rolling mill 1700 in accordance with EN 10149-2. Air cooling for coils to 450°C after coiling has been firstly used in the developed technology, which provides for decrease in air scale and improvement of surface quality for the customers.

Key words: thermo-mechanical controlled process, hot rolling coils, rolling force, temperature conditions, technology

UDC. 621. 771. 01 Maksimenko O., Loboiko D., Shtoda M. THE INFLUENCE OF BANDS TENSION AND FRICTION MODELS FOR LONGITUDINAL STABILITY PROCESS OF ROLLING. It was established in the paper that the tension of the strip affects the longitudinal stability of the process. In this case, the rear tension has a more significant effect on the resultant longitudinal forces compared to the foreleg. With increasing rear tension, this resultant decreases in absolute value, which indicates a decrease in the longitudinal stability of the process.

The solution of the T. Karman equation with the model of smooth variation of the specific frictional forces yields results on the distribution of normal contact stresses, their average

value and longitudinal stability of the strip in rolls closer to the experimental data in comparison with the Coulomb friction model. The calculations have shown that the technique used in the work to evaluate the longitudinal stability of the rolling process can be applied in assessing the stability of the process under real conditions of medium- and thin-sheeted rolling with a strip tension.

Keywords: contact stresses, tension, friction, longitudinal stability.

UDC 621. 771. 01 Maksimenko O., Loboiko D. THE METHODS FOR ESTIMATION OF THE STABILITY OF THE ROLLING PROCESS ON THE RESULTING LONGITUDINAL FORCES OF PLASTIC DEFORMABLE METAL. Theoretical studies carried out in the work showed that under certain conditions the rolling process can proceed steadily without slipping during a single-zone slip of the strip in the deformation zone. In addition to this, unstable rolling cases are possible in the presence of a significant advance zone. A technique for estimating the longitudinal stability of a strip in rolls has been developed, which made it possible to theoretically substantiate the results of experimental studies related to the specific limiting conditions of the rolling process.

Keywords: outrunning, longitudinal stability, band.

UDC. 621. 771. 01 Maksimenko O., Loboiko D., Shtoda M., Shtoda I. STUDY OF THE LONGITUDINAL STABILITY OF THE BAND FOR ROLLING ON CONTINUOUS MILLS. The paper was developed method of estimating the longitudinal resistance strips in the deformation zone during continuous rolling. When developing the methodology, we used a new model of frictional force variation. It includes some regularities related to the kinematics of the process and the limiting conditions. In addition, conditions were developed for matching the front tension of the strip in the previous mill with the rear tension in the subsequent. The analysis of stability at rolling on a continuous mill 1680 at manufacture of a sheet 0,6x1000 mm is executed. It is shown that the band tension regime adopted at the mill is optimal, both from the point of view of the longitudinal stability of the metal and in terms of saving energy costs.

Keywords: continuous rolling, tension, sheet, longitudinal stability, friction.

UDC. 621. 771. 01 Maksimenko O., Samokhval V., Loboyko D., Locman A. THE BEHAVIOR OF THE LUBRICATING LAYER AFTER ITS UNLOADING DURING ROLLING. In the paper presents the results of experimental studies of the behavior of the lubricating layer after the removal of the load. The results of studies have shown that during a significant period of time, it is in a state of thermodynamic equilibrium. The mechanism of lubricating action and the character of friction in the next rolling mill during rolling in a continuous group of cages using various lubricants is described.

Keywords: lubricating layer, friction, rolling mill, thermodynamic equilibrium.

UDC 621.771.074 Maksimenko O. P., Shtoda M. N., Marchenko K. K. DEVELOPMENT NEW METHOD STUDYING WEAR OF ROLLS DURING ROLLING IN WIRE BLOCK The method of evaluation of rolls wear on the base the use an light optical stand. The method allows studying the quality and quantity wear of calibers finish wire block. The researches measurements of wear calibers rolls of the wire block of rolling mill 400/200 of PJSC «DMK» were conducted. The results studies have shown that the depth of wear rolls on

stands wire block is unevenly distributed and most depends on distribution of average pressure on block stands. When rolling wire with a diameter of 5.5 mm, calibers of rolls 4 and 5 stands are most worn out. The surface of the calibers is subject to abrasive and small pox wear especially the first two stands of the block. There are traces of the thermal grid on surface of the calibers.

Keywords: finish wire block, wear of caliber, light optic method.

UDC 621 621.771.22:539.3:001 Palamar D. G., Vorobey S. A., Ershov S. V., Razdobrev V. G., Prikhodko I. Y. DEVELOPMENT OF SIMPLIFIED METHOD OF ESTIMATION OF DEFORMATION PROCESSING OF CENTRAL ZONES OF RASKAT SECTION FROM CONTINUOUS COLLECTION IN ROLLING IN CALIBERS. A simplified method for estimating the working out of the central zones of the rolling section is developed. It is shown that this method is expedient for applying for preliminary determination of the parameters of the calibers and the degree of deformation providing a higher degree of processing of the axial zone of continuously cast billets, which will allow us to narrow the field of further searching for the optimal solution for each scheme of rolled metal production in calibers.

Keywords: method, rolling, working, caliber.

UDC 621.791.92: 621.771.01 Peremitko V. V., Nosov D. G., Kolomoyets I. V. CONSIDERING THE SCOPE OF DEPRECIATION IN SHEET ROLLING MILLS IN DEVELOPING THE TECHNOLOGY OF THEIR RENOVATION. The paper presents the results of studies of the hardness and microstructure of welded metal of low-alloy steel 09Г2С, into the melt of which carbon-containing materials were introduced under the action of an external magnetic field. It is shown that carbon-containing fibers in combination with superposition of a magnetic field contribute to the formation of a finely dispersed ferrite-carbide structure, which provides an increase in the hardness of the weld metal. The results of the work can be used in the development of manufacturing technology and the renewal of parts that work on abrasive wear.

Key words: arc-fusing, carbon-containing materials; modifying component, local introduction; metal, hardness and microstructure of rollers.

UDC 621.774 Pylypenko S. V., Hryhorenko V. U. INFLUENCE OF THE VALUE OF THE EXTENSION OF THE MANUAL OF THE CALIBER AND THE VALUE OF THE SPRING CUSTOMS OF THE MILL HPT ON THE DISTRIBUTION OF THE ROLL ON THE WALL THICKNESS BETWEEN DIRECT AND REVERSE CERTAINS. The analysis of the existing method of calculating the amount of compression along the wall thickness along the deformation cone was carried out, as well as the study of the influence of the size of the camber and the spring of the HPT mill stand on the distribution of compression between the forward and reverse cages. It has been established that there is a significant effect of the magnitude of elastic deformations on the distribution of the amount of compression between the forward and reverse cages and to ignore this effect when modeling the process leads to a significant distortion of the results.

Key words: tube cold rolling mill, pipe wall thickness, cage straight run, compression.

UDC 621.771 Podkorytov A. L., Semy`on Y`.Yu., Chudnovecz A. N., Orobcev A. Yu. 129 YEARS OF DMK – YEARS OF LABOR PERFORMANCE. The main stages of development and achievements of the world-famous enterprise – the Dneprovsky Metallurgical Plant, since 1889, are considered. The unique production and technological solutions, innovations in the processing of raw materials, the production of steel and rolling products are noted. The plant's team continues the sustainable development and improvement of its technologies, setting ambitious goals for the introduction of unique technologies and the development of new types of high-quality products.

Key words: blast furnace, converter, long products, rebars, wire rod.

UDC 621.771.06 Podobedov N. Y. MECHANICS OF INTERACTION OF ROLLS WITH METAL IN LONGITTED ROLLING. Based on the experience of modeling the dynamicTs of multi-mass mechanical systems, a version of the presentation of the transient process of sequential filling of the deformation zone from the point of view of interacting solids, including rolled metal, as an equal element of a mechanical system is considered. It is shown that the forces of surface friction do not affect the moment and effort of resistance to deformation, since they are oppositely directed and compensated in magnitude. The movement of the metal is carried out by rolling the roll through the front point A, which is the instantaneous axis of rotation of the roll, which is a distinctive feature of this approach to the description of the dynamics of the longitudinal deformation of the metal. This position takes into account both longitudinal and vertical movement of the roll.

Key words: longitudinal rolling, rolls, deformation zone, friction forces, rolling friction, advance.

UDC 621.774.35 Popov M. V., Balaky`n V. F., Solov`eva Y`. A. INTENSIVE PLASTIC DEFORMATION IN TECHNOLOGIES OF PRODUCTION OF PRODUCTS WITH IMPROVED STRENGTH AND OPERATIONAL PROPERTIES. The article presents the results of structural analysis, as well as the results of studies of changes in the properties of metal pipes depending on the technological and design parameters of the double-row periodic rolling process, allowed us to develop physical and technological requirements for creating new deformation processes that have a higher deformation capacity, a lower production cycle, operational properties.

Keywords: severe plastic deformation, increased strength and performance properties, structural analysis, form change.

UDC 669-131:669.296 Romaniuk R., Levchuk K., Hasylo Yu. THE ASSAYING OF HABITS PRODUCTION ENGINEERING TREATMENT OF ZIRCONIUM PRESSURE ON MANUFACTURE. Paper is devoted the assaying of basic technological habits hot and cold rolling of sheet from zirconium, a tube making and bars, and also a wire drawing. A hot rolling is led in a protective shell which then acts in film; the sheet is poisoned in acid and is exposed to cold rolling. Obligatory operation a cold strain of sheet is the process annealing in vacuum. At manufacturing of funnels, owing to tall shown demands, it is necessary to use the specialized equipment (vacuum remelting furnaces, leveling machines, pickling installations, etc.). Habit of a wire drawing is the oxide film formation which prevents sticking of metal to the die and is a ground for oiling.

Keywords: zirconium, rolling, draw, funnel, production engineering.

UDC 621. 771. 25 Samokhval V. M., Maksymenko O. P., Shtoda M. M. FEATURES OF CONSTRUCTIONS OF WORKING STANDS LONG PRODUCT ROLLING MILLS AND TRENDS OF THEIR DEVELOPMENT. The analysis of constructive features of working stands of modern of long product rolling mills and trends of their development on the basis of a retrospective review of known constructions is carried out. It is shown, that on the modern long product rolling mills the most widespread is use of housingless working stands and the features of their constructions are considered. In addition to basic housingless stands are widely used stands with a console arrangement of rolls. Other variants of the design of the stands, such as «bi-support stand», according to the concept of the core, three roll or four roll stands, have a limited application. Such a variety of stands designs allows consumers to choose the most effective options for their own needs, and even develop specialized designs for certain types of rolled product, taking into account the features of the technology used.

Keywords: working stand, long product, housingless stand, cantilever stand, adjustment mechanism, balancing mechanism, radial roller bearings.

UDC 539.3 / 4 Chigirinsky V. V, Putnoki A. Yu., Dya G., Knapinsky M. THEORETICAL ANALYSIS OF TRANSITION PROCESSES OF CONTINUOUS BROAD-BAND STANS. The dynamic problem in rolling under the conditions of a continuous broad-band mill is considered. During the period of metal capture by rollers, elastic damped rotational oscillations of the main line of the working stand arise. It is established that the dynamic excitation of the gripping cage is transmitted through the rolling band to adjacent cells, causing dynamic reactions in the main lines. A feature of this solution is the representation of the transfer of a disturbance from one stand to the adjacent one in the form of a wave process in an elastic medium. Consistently examined are the interactions of different systems: the roll is the focus of deformation, the focus of deformation is the band in the intercellular gap, the strip in the intercellular interval is the roll of the adjacent stand. The mathematical model of the jogging action of the deformation focus on the strip is represented in the form of boundary conditions for the wave problem. The solution of the linear wave equation is obtained using the function argument method. Moving is a function of not only time, but also coordinates, which allows estimating the damping of dynamic processes in the band.

Keywords: nonstationary problem, interaction, damped torsional oscillations, kinematics of the deformation focus, boundary conditions, advance.

UDC 621.771.014.2 Shtoda M. M., Maksimenko O. P., Chudnovets O. M. COEFFICIENT SPREADING DURING ROLLING STRIPS WITH A BACK SPECIFIC TENSION IN THE CALIBRES OF «OVAL – ROUND» SYSTEM Investigations of the reducing of circular and oval profiles under the influence of stationary tensile forces in the space before the deformation zone are carried out in the article. It is proved that in calculations of metal deformation during rolling in the calibers of system "oval - circle" between the stands deformation can't be taken into account. On the basis of performed experiments, the refinements of the formulas for calculating the coefficient spreading when rolling the strips in the calibers of system "oval - circle", taking into account the size of the back specific tension.

Keywords: coefficient spreading, continuous rolling, back tension.

UDC 621.771.29 Shtoda M. N., Melnyk S. N., Rovkov V. L. ANALYSIS OF THE POSSIBILITY GROWTH PROFITABILITY BALL ROLLING MILLS OF PJSC DNEPROVSKY INTEGRATED IRON AND STEEL WORKS In the article experimental investi-

gations of heating temperature bars, the frequency of motors and power parameters during rolling balls with diameter 40 mm on the mills BRM-1 and BRM-2 are carried out. The calculations of the power-force parameters rolling balls with diameter 40 mm are carried out on the existing four-thread calibration and using five-thread calibration. The results of researches allow to raise productivity of ball-rolling mills without reconstructive measures up to 4,6 t/hour.

Keywords: balls rolling, multi-thread calibration, power parameters.

Section of «Engineering. Mechanics»

UDC 621.77.016.3 Abkhari P. B., Kuzenko O. A. DEFECTUALIZATION IN COMBINED EXTRUSION IN MULTIPLE MATRIXES In this work, features of the shapeforming of the workpiece under various geometric parameters in the processes of combined radial extrusion with two-way filing based on the finite element method in the software QForm 2D are studied. It has been established that in the formation of different-sized flanges, the defect in the form of retraction is observed on the inside of the parts of the parts. The elimination of the defect is possible due to the kinematic effect. It is also established that the maximum intensity of deformations is observed in the zone of formation of the defect type of retraction.

Key words: combined extrusion, mathematical modeling, formation defects, intensity of deformations.

UDC 621.777.4 Alyev Y. S., Kordenko M. Iu. Salnytskyi F. A. FORMATION THE BLANK IN THE PROCESS OF SADE EXTRUSION The purpose of the work is to analyze the regimes and regularities of shaping the blanks in the process of side extrusion and obtaining the information necessary to predict the quality of the stamped parts. It was established that in the case of lateral extrusion with a double-sided metal, the focus of the deformation has a symmetrical shape, in the course of deformation, the zone of large deformations in the deformation focuses continuously displaced along the movement of the punch, and also that the maximum intensity of deformations is observed in the center of the deformation center and in the transition zones adjoining the edges of the matrix.

Key words: extrusion, detachable matrix, deformation center, maximum intensity.

UDC 621.7.044 Arhat R., Puzyr R., Haikova T., Markevych A. THEORETICAL INVESTIGATIONS OF THE STRESSED STATE ON THE EXCHANGE RATE OF MATRIX AT HIGHLY CYLINDER PARTS. The paper presents the results of theoretical studies on the distribution of components of the stress tensor on the extractor rib of the matrix during the extraction without the clamping of the cylindrical part. Such studies should more fully disclose the laws of stress distribution and deformation during plastic deformation in order to obtain formal connections between the parameters of the process and their impact on the quality of the final product. The mathematical model of the change of stresses during extraction on a void surface of a matrix is obtained, which more accurately describes their distribution in comparison with existing dependencies.

Key words: extract; blank; meridian voltage; extracting edge of the matrix.

UDC 621.313, 624.014 Arkhipov O., Arhipova T. STRENGTH AND RELIABILITY OF PARAMETERS OF DESIGN OF BASHT OF ATTRACTION. The article presents the results of solving the problem of ensuring the reliability of the production of structural ele-

ments attraction's tower. The methods of calculating internal forces in elements of core systems by methods of mechanics of a deformable solid are shown. The presented calculating apparatus allows to estimate the influence of wind loading on the strength and stability of the structure.

Keywords: strength, deformation, working stress, equilibrium stability of structural, wind loading.

UDC 669.013.002.5:531.3 Beygul O., Grischenko D., Beygul V. BASIS OF DYNAMICAL LOADS TOWARD BAND LOOP FRAME FOR ARTICULATED CONTAINER TRUCK ON PNEUMATIC WHEELS AMONG DISTURBANCE MOTION. Mathematical model of disturbance motion for articulated container truck on pneumatic wheels has been worked out by analytical mechanics method with Lagrange equation of second type. Natural dynamical characteristic, critical speed of motion, dynamic coefficient have been received, that has been secured accuracy of force calculation, rational metal capacity of constructions.

Keywords: articulated dynamical loads, articulated container truck, mathematical model, band loop frame, analytical mechanics.

UDC 622.673 Belmas I. V., Kolosov D. L., Bilous O. I. INTERACTION OF ROPE REINFORCED BY ELEMENTS WITH A DRIVE DRUM The model of the tensely deformed state is built and united to the rope reinforced metallic elements with поздовжними appearances loaded with tangent forces from the side of drive drum with circular ditches. Quantitative descriptions of the tensely deformed state and condition of durability are certain to the rope. Dependence of maximal forces which arise up in the elements of re-enforcement a rope from his construction is set.

Keywords: a flat hauling organ is reinforced ropes, drum, tension, deformation, durability.

UDC 621.787:621.438 Kachan A. Y., Ulanov S. A. HARDENING OF PARTS OF TURBINE ENGINE AXIAL-FLOW COMPRESSOR ROTOR. The paper contains the results of the experimental research on the hardening of parts of the axial-flow compressor rotor: shaft, disk and blade by several methods, including diamond smoothing, fluidized abrasive bed, ultrasonic peening and vibration.

It is demonstrated, that the compressive residual stresses in the range from -200 to -450 MPa at the depth of up to $40...80$ μm are formed in the surface layer of the parts bearing surfaces after hardening and their durability limit increases 1.57 times.

Keywords: shaft, disk, blade, rotor, diamond smoothing, fluidized abrasive bed, ultrasonic peening, vibration hardening, residual stresses, durability limit.

UDC 539.374.001.8 Legotkin G. I., Slepynin A. G., Kozlov V. I., Chigirinsky V. V. DEVELOPMENT OF PRODUCTION WHEELS OF MOTOR VEHICLES IN UKRAINE. The only plant in Ukraine, which produces wheels of auto-vehicles and agricultural machinery, is the Kremenchug Coal Plant. There was a need for a radical restructuring of the internal services of the plant, of all production. The issues of production of the products that are in demand by the market, its quality. To do this, it was necessary to identify general trends in the development of wheel production in Ukraine, CIS countries and especially abroad. It is established that the most acceptable scheme of development is associated with the metal content of

the finished wheel. Technological features of thin-walled profiles are difficulties in rolling. The solution of this problem was carried out with the help of plastic shaping effects. The experience of introducing these wheel designs allowed us to develop a concept for the development of wheel production for a long time. World and domestic production schemes associated with the reduction of metal consumption of products were identified. This technical position has justified itself in difficult market conditions.

Key words: metal consumption, technical design, effects, concept, conditions.

UDC 621.735.3-416 Markov O. E., Gerasy`menko A. V., Zlygorev V. N., Y`nchakov E. V. STUDY OF THE PROCESS OF DECLINING PREPARATIONS WITH CONCURRATED SIDE. A new method of upsetting blanks is proposed. The method consists in upsetting of the blanks with concave faces. The studies were carried out on the basis of FEM. The main parameter of the study was the depth of the concave faces of the workpiece. This parameter varied in the range 0.75; 0.80 and 0.85. The angle of the concave faces was 120°. The result of theoretical studies was the distribution of temperatures in the body of the billet during the upsetting of blanks with concave faces. An effective degree of deformation is established, at which an intensive closure of defects occurs. The carried out researches have allowed to draw a conclusion about high efficiency of the proposed new method of settling blanks with concave faces.

Key words: concave faces, upsetting, stress-strain state, axial defects of the ingot, high-quality forgings.

UDK 621.922.02. 001.5 Tancura G. I., Vinnichenko E. E., Kovalenko A. S., Nazarenko O. O. INFLUENCE OF FORCE OF CUTTING IS ON THE TENSE STATE OF. The state of polishing instrument is certainly tense, as to the compo from abrasive grains of united in the unique construction by the special material – copula in the case of operating on him of the concentrated tangent force of cutting. Userednennya of mechanical properties of composite material is carried out for Foykhtu. In the reserved kind analytical expressions of parameters of the tense state of diamond-impregnated are got for the cases of appendix of the concentrated effort, effort up-diffused, on a line on length to the crystal and tension from the origin of moment of knocking over in investigation of the eccentric loading. Application of material of copula with greater values results the coefficient of Puassona in greater maximal tensions in material for unchanging other sizes. In general case, application of material of copula with greater values conduces the coefficient of Puassona to diminishing of endurance of material of copula and diminishing of time to the moment of fall of crystals. The indicated phenomenon can be utilized for the timely update of cuttings edges of instrument. Distributing of tensions is set, analytical dependences for their determination give possibility of prognostication of amount of cycles of loading of material of copula of abrasive grains in a polishing instrument to his destruction at the set effort of cutting. The cycle of change of tensions in material is symmetric.

Keywords: polishing, instrument, cutting grain, material of copula, tangent loading, mechanical tensions.

UDC 621.983:669.017 Titov V. A., Boris R. S. THE TERMS OF THE DISSIMILAR METALS AT THE RELIEF BOUNDARY SURFACE THINNING. A comprehensive methodology of theoretical and experimental studies drawing process with a two-layer preform thinning of dissimilar metals with the relief of the boundary surface. Using the theory of plas-

tic flow mathematical model of deformation of the joint drawing process with thinning of two dissimilar metals with heating under plane strain state, which allowed to establish the relationship parameters of the stress-strain state at the interface and the degree of deformation thinning with initial geometrical parameters of the workpiece, and analyze the necessary conditions for the boundary surface relief fill.

Keywords: stress-strain state, the components of the stress and strain rate, dissimilar metals, the boundary surface, the degree of deformation, surface topography, extract with thinning, two-layer preform, the geometric parameters of the original piece.

UDC 621.7.011, 621.757.06. Frolov E. A., Agarkov V. V., Kravchenko S. I., Yasko S. G. ASSESSMENT OF THE RELIABILITY OF THE SYSTEM OF REVERSIBLE STAMPS WITH USE OF COMPOSITE MATERIALS AND ACCURACY OF THE STAMPED PARTS. The paper presents the results of studies to assess the reliability of adjustable dies for the separation operations in the designs of the assemblies which use AST-T plastic for fastening the working elements (matrices, punches) and guide columns.

It is established that the failure-free operation of the dies depends only on the reliability of the keyed connection of the structural modules, and there are also wear failures due to run-in. The obtained results of production tests allowed to estimate the probability of failures within the limits of the regulated working time of the stamps. At the same time, quantitative characteristics of the error were obtained and factors affecting the accuracy of the stamped parts during punching-cutting in these structures were revealed.

Keywords: Reversible dies, punching, cutting, reliability, accuracy, plastic masses.

UDC 622.23.05 Shevchuk S. P., Slidenko V. M. ELASTIC-DISSIPATIVE STABILIZATION OF DYNAMIC PROCESSES OF HYDROPULSE SYSTEMS OF MINING MACHINES. The results of investigations of the dynamic processes of the functioning of the hydropulse system and means of reducing the impact on the base machine that are given in the article. Effective elastic-dissipative connections of elements of structures that influence the stabilization of dynamic processes are offered. Their parameters are calculated by methods of finite and differential differences with conducting of experimental researches. Connections: the waveguide reduces the dynamic factor by 25–30 %; heterogeneous lyophobic system, which provides an increase in the decrement of the damping vibrations of 1,4–1,95.

Keywords: stabilization, stiffness, dissipation, hydraulic hammer, waveguide, heterogeneous lyophobic system.

Section of «Materials science»

УДК 669.017: 669.018.294.3 Babachenko O. I., Domina K. G., Khulin A. M. INFLUENCE OF HOT DEFORMATION ON DEFORMABILITY OF THE STRUCTURE OF AXLE BILLETS MADE OF STEEL EA1N. The evaluation of deformability of the structure of axle billets made of steel grade EA1N during the lengthwise rolling along the route $\varnothing 470 \text{ mm} \rightarrow \varnothing 380 \text{ mm} \rightarrow \varnothing 220 \text{ mm}$ has been carried out. On average within the section, coefficient of deformability of the structure K is equal 1,20 and 0,60 for billets with the diameter of 380 and 220 mm respectively. It has been shown that the change in the coefficient of deformability of the structure K within the section of these deformed billets has an extreme character.

Key words: hot deformation, deformability of structure, axle billets.

UDC: 669.112.227.1:669.141.24:621.771.294 Babachenko O. I., Kononenko G. A., Khulin A. M., Shpak O. A. THE INVESTIGATION OF AUSTENITE TRANSFORMATION KINETICS OF ENHANCED WEAR RESISTANCE WHEEL STEEL. Based on the results of previous analytical and laboratory studies, the optimum chemical composition was developed and industrially steel for the production of Class D wheels by the AAR M-107 / M-208 standard has been smelted. The critical points were determined and the kinetics of the decomposition of supercooled austenite with continuous cooling of low-alloy wheel steel with chromium, nickel and micro alloyed with vanadium and molybdenum was investigated for the reasonable developing of heat treatment modes which will provide high wear resistance.

Keywords: wheel steel, chemical composition, wear resistance.

UDC 621.793.7 Hlushrova D., Kalinin A., Voronkov A., Nikitchenko I., Kostina L., Bagrov V., Demchenko S. THE INFLUENCE OF PRECIPITATION PARAMETERS OF VACUUM-ARC NANOCRYSTALLINE COATING TI-MO-N ON NANO HARDNESS AND WEAR RESISTANCE OF PISTON RINGS. In work results of research of influence multilayered vakuu-arc nanocrystallized coverings Ti-Mo-N on wear-resistant piston rings are resulted. Influence of parameters vakuu - arc sedimentation on nanohardness is shown. It is established that in a blanket argon compressing pressure, and hardness in surface a layer raises that leads to substantial increase wear-resistant.

Key words: vacuum-arc settling, nanohardness, wear-resistant, piston rings.

UDC 621.791.95 Gribkov E. P. COMPUTER-AIDED DESIGN DRAWING MODES CORED WIRE IN A METAL SHEATH. A finite element model of the cored wire drawing process is considered. On the basis of the model was considered computer-aided design of technological modes. As criteria, conditions were used to ensure the required core density, the required wire diameter, and maintain the continuity of the shell. The proposed algorithm for the computer-aided design of technological modes of drawing allows to determine the minimum number of passes while ensuring continuity of the shell and the required density of the powder core.

Keywords: drawing, flux-cored wire, shell, finite element model, technological settings.

UDC 669.715 Kalinina T. V., Lysenko O. B., Zahorulko I. V., Blashchuk O. V. PRODUCTION OF HIGH- AND HEAT RESISTANT AL-ALLOYS BY HOT EXTRUSION OF QUENCHING FROM A LIQUID STATE PRODUCTS According to the results of research of structure and mechanical properties, the optimal modes of hot extrusion which provide good quality of rods and increased strength characteristics in a wide (300-673 K) temperature range of the rapidly quenched Al-TM (TM-Cr, Mn, Fe, Zr) alloys have been determined. It was established that the main strengthening mechanism is the formation in the pressed alloys structure of dispersed (up to 0.4 microns) secondary intermetallics in the process of decomposition of supersaturated solid solutions.

Keywords: rapidly quenched flakes, hot extrusion, rods, dispersion strengthening.

UDC 669.715 Lysenko O. B., Kalinina T. V., Zahorulko I. V., Vlasova Yu. M. STRUCTURE AND PROPERTIES OF ALUMINUM WITH TRANSITIONAL METALS ALLOYS RECEIVED BY ROLLING THE MELT IN ROLLS. The investigations of the phase composition, microstructure and strength properties of rapidly quenched alloys of alu-

minum with transition metals (PM-Cr, Mn, Fe, Ni, V) was performed. It was established that structural changes, which are fixed in the conditions of rolled melt in rolls, leads to an increase in the strength of 3,5 to 5 times compared with analogues casting alloys. It has been proved that the alloying of binary alloys with the third component is accompanied by an additional (by 20–30 %) increase in the σ_B values of rapidly quenched ribbons.

Key words: quenching from the liquid state, Al-TM alloys, microstructure, phase composition, strengthening mechanisms.

UDC 669.18:621.771:621.74 (621.746.047:62-418) Nohovytsyn A. V., Baranov Y. R. PHYSICAL AND MATHEMATICAL MODELING OF THE ROLL BAND CASTING OF THE STEEL STRIP The aim of the work is to study the patterns of heat and mass transfer processes, solidification and deformation of the metal strip during casting-rolling, which will allow choosing the optimal technological conditions. The established regularities showed that the necessary conditions for a stable roller casting process are the constancy of the temperature and flow rate of the metal fed to the crystallizer rolls, and its uniform distribution along the roll gap.

Keywords: roller casting, melt temperature, magnetodynamic mixing.

UDC 621.77.014 Solona O. V., Derevenko I. A., Kupchuk I. M. DETERMINATION OF PLASTICITY FOR PRE-DEFORMED BILLET The calculation procedure for determining the plasticity of pre-deformed metals during their processing by pressure has been developed. The calculation procedure is based on a fracture model, which in turn is based on the tensor description of damage accumulation. With known mechanical characteristics, as well as with known plasticity diagrams, the fracture model makes it possible to evaluate the plasticity of pre-deformed bend for any kind of stress state. When manufacturing steeply curved branches using the pipe extrusion method, the procedure was tested. Verification of the mathematical model has shown a high level of its adequacy, and it can be used in assessing the plasticity of pre-deformed billet.

Keywords: metal forming, plasticity, technological heritage, damage tensor, plasticity resource.

UDC 621.98.044 Titov V. A., Garanenko T. R. DEVELOPMENT OF AN EXPERIMENTAL TECHNIQUE AND EVALUATE LIMIT OF PLASTIC DEFORMATION OF TITANIUM ALLOY OT4-0 UNDER SUPERPLASTICITY CONDITIONS. The method and unit for experimental research of membrane formation from titanium alloys under conditions of superplastic is developed, which allows to determine necessary parameters of deformation. The unit is designed to deform titanium sheets in isothermal conditions by applying a uniform distributed load. In this work, the limiting deformations of the sheet titanium alloy OT4-0 have been evaluated in the formation of the membrane. Installed during the process of superplastic deformation the connection between the external parameters of deformation.

Keyword: superplastic, biaxial tension, membrane, temperature, pressure.