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MATERIALS SCIENCES,
METALLURGY

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Abstract. *The issues of theory and practice of programming the process of heat treatment of a part in conditions of laboratory automation in the emulation mode are considered. The interrelations between the parameters of logical control systems of technological equipment that determine the composition of software and hardware modules of logic controllers are established.*

Keywords: *PLC, graphic programming language SFC, steps, actions, transitions*

L.S. Babajanov, M.L. Babajanova, V.V. Gorbunov, T.A. Koryushkina, S.V. Tyapaev

METROLOGICAL ASSURANCE OF THE AUTOMATED EDDY CURRENT TESTING BEARING PARTS

Abstract. *The paper considers the issue of metrological assurance of automated eddy current testing of bearing parts, and provides information on measures associated with artificial defects for adjustment of control devices.*

Keywords: *eddy current control, bearing parts, metrological support, measures related to artificial defects*

A.A. Ignatiev, M.A. Ignatiev

METHODS FOR IDENTIFYING DEFECTS IN THE GROUND BEARING PARTS AT AUTOMATED EDDY CURRENT TESTING USING INTELLIGENT TECHNOLOGIES

Abstract. *The paper presents the methods for identifying defects of the surface layer of the polished bearing parts using automated eddy current testing based on the use of the pattern recognition method and neural networks.*

Keywords: *eddy current testing, bearing parts, rolling surface defects, pattern recognition, neural network*

M.A. Sashchenko, D.A. Pavlov, M.V. Zhigalov

COMPARATIVE ANALYSIS OF MATHEMATICAL MODELS OF THE BERNOULLI – EULER, TIMOSHENKO, SHEREMETYEV – PELEKH, AKAVCI, TUARATIER BEAMS AS AN EXAMPLE OF A CONTACT PROBLEM

Abstract. *The article presents mathematical models of contact interaction of a package of two geometrically linear beams using the hypotheses of Bernoulli – Euler, Timoshenko, Sheremetyev – Pelekh, Akavci, Tuaratier. Contact interaction is taken into account according to the model of B.Ya. Kantor. A study of the synchronization of beam vibrations was carried out.*

Keywords: *mathematical model, Bernoulli – Euler hypothesis, Timoshenko hypothesis, Sheremetev – Pelekh hypothesis, Akavci hypothesis, Tuaratier hypothesis, contact interaction*

B.L. Fayfel

MEMOIZATION IN THE HOMELISP

Abstract. *The article discusses the algorithm for memoization of Lisp functions in the HomeLisp system. The macro apparatus is used for implementation. A detailed analysis of all the development stages is conducted using an associative list and hash tables. The research may be of interest to educators using Lisp as a learning platform.*

Keywords: *memoization, HomeLisp, lisp, teaching*

O.Yu. Davidenko, N.A. Kumaksheva, Yu.V. Tarashevskaya

SIMULATION ABRASION-FREE MACHINING OF WORKING SURFACES OF BEARING RINGS

Abstract. *The article presents a simulation technology applied in abrasion-free machining of working surfaces of bearing ring that ensures an increased quality of raceways shaping. The simulation machining method and the device for its implementation are proposed. Technology options for the given engineering solution have been formulated, that will allow upgrading reliability and durability of the rolling bearings.*

Keywords: *simulation technology, abrasion-free machining, working surfaces of rings, simulation shaping, operational durability, reliability, rolling bearings*

E.A. Sigitov, A.A. Ignatiev, V.A. Dobryakov

INCREASING WORKING ACCURACY OF PRECISION TURNING MODULES BASED ON IMPROVEMENT OF NODES IN SHAPING SUBSYSTEMS

Abstract. *The impact of errors in the positioning of the support part and cutting unit, and dynamic balancing of the spindle in precision turning modules of the TPARM type on the working accuracy are considered.*

Keywords: *precision turning modules, shaping subsystem, accuracy of the support part and cutting block positioning, dynamic spindle balancing*

I.V. Zlobina, N.V. Bekrenev

PHYSICAL MODELING OF SURFACE DEFECT FORMATION AS A RESULT OF EROSIVE WEAR OF CARBON AND FIBERGLASS PLASTICS BY WAY OF ABRASIVE JET MACHINING

Abstract. *The article provides the results of experimental investigation into resistance of carbon and fiberglass plastic modified by treatment in the microwave electromagnetic field to erosive wear during operation under the influence of a stream of solid particles. Physical modeling of wear by means of abrasive jet machining was performed. The investigation shows a reduction in the number and size of surface defects in the experimental samples, a decrease in the roughness parameters of the treated surface upon the average by 40-70 % for carbon fiber and by 20-45 % for fiberglass plastics.*

Keywords: *polymer composite materials, microwave modification, erosive wear, abrasive jet machining, roughness of the wear surface*

Kh.M. Khojanazarov, I.N. Ganiev, F.K. Khojaev

POTENTIODYNAMIC INVESTIGATION INTO LEAD-BASED BABBIT BK (PbSb15Sn10K) WITH POTASSIUM IN 3 % NaCl ELECTROLYTE

Abstract. *Babbit PbSb15Sn10 is used for the manufacture of the bearing layer (cast, sintered, knurled) in multilayer thin-walled plain bearings,lightly loaded main and connecting rod bearings, liners, and thrust bearings. Babbitt PbSb15Sn10 is soft, has relatively good limited lubrication properties, low fatigue strength; works with hard and soft shaft. The results of the experimental study of the anodic behavior of lead babbit BK (PbSb15Sn10K) alloyed with 0,01 ÷ 1,0 wt. % potassium in an electrolyte medium of 3,0 % NaCl are presented. It is shown that potassium additions reduce the corrosion rate of the original PbSb15Sn10 alloy to 12 %. With an increase in the potassium concentration in the NaCl electrolyte, the corrosion and pitting potentials shift to the positive range of values.*

Keywords: *lead-based babbit BK (PbSb15Sn10K), potassium, corrosion, potentiodynamic method, anodic behavior, 3 % NaCl electrolyte*