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ABSTRACTS OF PUBLISHED ARTICLES

UDC 669.15–194.56:539.56

To a question on the nature of tempering hydrogen embrittlement austenite chromium-nickel steels. Malyshev V. N. – Problems of Materials Science, 2008, N 4(56), pp. 5–11.

It is observed influence of hydrogenation for metal of a foil at thickness ~0,08 mm from steel 03X18H12 after pickling in 1N solution HCl at room temperature upon its toughness and crack resistance. As testify the data obtained with use of specimens of small thicknesses, hydrogenation of austenite chromium-nickel steels 03X18H12 up to level 25-30 sm³/100 g of metal as a result of acid pickling had not influenced upon its toughness and crack resistance. Feature was only that in this case the hydrogen absorbed by steel, at room temperature escapes from it very slowly.

Key words: austenite chromium-nickel steels, hydrogenation, crack resistance, tempering hydrogen embrittlement.

UDC 669.14.018.29:621.9.048

Influence of not isothermal diffusive processes upon properties and structure of structural steels at laser hardening without flashing of a surface. Gorynin V. I., Popov V. O. – Problems of Materials Science, 2008, N 4(56), pp. 12–17.

Influence of not isothermal diffusive processes upon properties and structure of structural steels of different alloying and structural state is observed at a laser hardening without flashing of surface. It was examined generation of homogeneous and relatively fine grain structures of surface layer after laser thermo-hardening without flashing and characteristics of hardness of surface. It is positioned, that kinetic of not isothermal processes essentially influences not only upon structure of surface layer, but often determines also mechanical properties of surface layer that it is necessary to consider by development of technological processes of laser thermo-hardening of steels in different structural conditions.

Key words: structural steels, not isothermal diffusive processes, laser hardening without flashing of surface, structure, mechanical properties.

UDC 661.666.2:621.9.048

Increasing of wearing capacity of structural graphites. Pak E. V., Udalov Yu. P., Sharonov E. A. – Problems of Materials Science, 2008, N 4(56), pp. 18–23.

Characteristics of porous structure of structural fine-grained graphites for series МПГ modified by solutions of hexavalent oxide of chromium are studied, carried out X-ray and micro-X-ray spectrum analyses. Tests of modified graphites at the stand at a face friction in pair with steel 14X17H2 have displayed that after modification by offered technology graphites of series МПГ essentially increase wearing capacity.

Key words: structural fine-grained graphites, modification, wearing capacity.

UDC 621.791.052:669.35`71:669.14

Research of features generation of composition and structure of meld metal at fusion welding of aluminium bronzes with steels and their influence upon mechanical properties of welded joints. Vajnerman A. Ye., Pichuzhkin S. A. – Problems of Materials Science, 2008, N 4(56), pp. 24–36.

Features of generation of composition, structure and properties of weld metal and welded joints are examined at welding of aluminium bronzes with steels. It is displayed, that for tensile strength resistance and impact strength of welded joint at a level of properties of bronze welding should be executed with reduced degree of steel melting.

Key words: steel, aluminium bronze, welded joints, structure of metal, mechanical properties.

UDC 669.295:621.791.011

Design estimation of level and distribution of the residual welding stresses in joints from titanium alloy 5B of heavy gages. Ivanova L. A., Ilyin A. V., Leonov V. P., Mizetskij A. V., Sakharov I. Yu., Khatuntsev A. N. – Problems of Materials Science, 2008, N 4(56), pp. 37–53.

Results of design estimation of level and distribution of components residual welding stresses in joints from a titanium alloy 5B for heavy gages executed by manual argon-arc and electron-beam welding are presented. It is displayed, that at electron-beam welding longitudinal and thickened components of

stresses reach 0,9 yield strength of base metal. Load tension at hydraulic forging of welded joints slightly redistributes stresses in zones of the joints executed by electron-beam welding, and reduce stresses in zones of manual welding.

Key words: titanium alloy 5B, residual welding stresses, design estimation.

UDC 669.15–194:621.791.011

Influence of local residual welding stresses upon initial stage of evolution of cracks in welded joints. Leonov V. P., Mizetskij A. V. – Problems of Materials Science, 2008, N 4(56), pp. 54–65.

Influence of local residual welding stresses upon possible extending of cracks on initial stage of their evolution in welded joints from high-strength chrom-nickel-molibdenum steels is examined at phase transformations in a heat-affected zone and weld metal. The approach to definition of starting rated stresses, allowing determine the load limit securing non-distribution of crack is offered.

Key words: high-strength chrom-nickel-molibdenum steel, local residual welding stresses

UDC 621.791.052:539.4

Stress state and strength of welded joints with asymmetrical mechanical inhomogeneity. Ostsemin A. A. – Problems of Materials Science, 2008, N 4(56), pp. 66–75.

On the basis of method of the solution a flat task of theory of toughness the design estimation of static strength of welded joints with asymmetrical mechanical inhomogeneity is executed. The offered procedure will allow to determine their carrying capacity by introduction in design formulas coefficients of mechanical inhomogeneity.

Key words: welded joints, stress state, asymmetrical mechanical inhomogeneity, design estimation.

UDC 539.434.014.1

Engineering design method of C*-integral at thermoforce loading of structure elements. Margolin B. Z., Gulenko A. G., Balakin C. M. – Problems of Materials Science, 2008, N 4(56), pp. 76–88.

For different types of specimens is carried out comparison of the engineering design procedure C*-integral applied at force loading with results of calculation by a finite elements procedure. The design analysis for stress state at crack tip is carried out at force and kinematic boundary criterions in conditions of creeping and stress relaxation. For the same conditions it is counted C*-integral. On the basis of fulfilled design researches is offered engineering method allowing calculate C*-integral both at force and at kinematic boundary conditions, and also at thermo force loading.

Key words: C*-integral, creeping, crack, reference stress.

UDC 669.14.018.8:539.4

Long-term cyclic strength of austenite corrosion-resistant steels. Filatov V. M., Yarygin Ye. G. – Problems of Materials Science, 2008, N 4(56), pp. 89–93.

Applied normative design procedures of elements of high-temperature structures upon long-term cyclic strength are observed. Results of calculation of cycles quantity before crack formation on the equation of Manson-Koffin type which includes characteristics of long-term cyclic strength and plasticity in comparison with test data on fatigue with creeping of steel 316 at 550°C are analysed.

Key words: corrosion-resistant steel, high-temperature long-term cyclic strength, normative design procedures.

UDC 669.15–194.56:621.039.531:539.422.24

Experiment-calculated research of resistance to thermo-fatigue failure destruction of austenite steels after neutron irradiation. Margolin B. Z., Beljaeva L. A., Balakin C. M., Buchatskij A. A., Potapova V. A. – Problems of Materials Science, 2008, N 4(56), pp. 94–105.

Experimental researches of resistance to thermo-fatigue failure destruction of austenite steels of X18H9 type in radiation-free state and after neutron irradiation by means of test of cylindrical specimens with longitudinal notches are executed. A thermo-cycle loading of specimens realized under cycle: slow heat on air up to the maximum test temperature 400°C and quenching in distilled water up to 50°C. Longevity of specimens as per criterion of crack birth determined on the basis of metallographic examinations of

templates, cut off from specimens through piece of loading cycles. Calculations of thermal field and mode of deformation of the tested specimens by a finite element method are carried out. Comparison of experimental results with simulation of fatigue for different regimes of neutron irradiation has displayed, that both for a material in an initial state, and in the irradiated state experimental data are well enough described by simulation.

Key words: austenite steel, resistance to thermo-fatigue failure destruction, procedures of research.

UDC 669.15–194:621.039.534:620.193.4

Method of increasing resistance to oxidation in heat-transfer agent lead-bismuth. Golubeva O. V., Markov V. G., Iakovlev V. A., Chikiriaka A. V. – Problems of Materials Science, 2008, N 4(56), pp. 106–115.

Method of protection for chrom-nickel austenite steel from oxidation at temperature 600°C in installations with lead-bismuth liquid-metal heat-transfer agent is offered. Experimentally the prevention opportunity of oxidation chrom-nickel corrosion-resistant steel in liquid alloy Pb-Bi at temperature 600°C by slip aluminizing at the optimized regime of annealing is determined.

Keywords: chrom-nickel austenite steel, heat-transfer agent lead-bismuth, oxidation, resistance to oxidation, slip aluminizing, optimization of annealing.

UDC 669.14.018.295:539.4

Control of level for metal mechanical characteristics of high-pressure tanks with using of measurements of hardness. Golub' S. A., Kucheriavykh G. G., Leonov V. P. – Problems of Materials Science, 2008, N 4(56), pp. 116–123.

Quantitatively defined interconnection of strength performances and impact strength of 38XH3MΦA steel with its hardness. Recommendations for control of mechanical characteristics of high-pressure tanks upon parameter of hardness are developed.

Key words: steel 38XH3MΦA, high-pressure tanks, level of mechanical characteristics, monitoring by parameter of hardness.