


S/123/61/000/014/002/045
A004/A101

AUTHORS: Palatnik, L. S.; Lyubarskiy, I. M.; Lyubchenko, A. P.

TITLE: Some problems concerning the physics of metal wear

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 14, 1961, 13, abstract
14A91 ("Tr. 3-y Vses. konferentsii po treniyu i iznosu v mashinakh.
v. 1", Moscow, AN SSSR, 1960, 46-53)

TEXT: The authors investigated the criteria of metal interaction during dry friction, the metal substructure and its changes during the friction process. In their conclusions they point out that the resistance to wear of a friction couple of metals is determined by a combination of the structure and a number of properties: high compression, bending and shear resistance, a combination of high hardness and ductility, stability of mechanical properties at high temperatures and pressures, high heat conductivity and corrosion resistance. 

N. Sazonova

[Abstracter's note: Complete translation]

Card 1/1

BOBRO, Yu.G., kand.tekhn.nauk; LYUBCHENKO, A.P., kand.tekhn.nauk;
LEBEDENKO, V.V., kand.tekhn.nauk

Effect of heat treatment on the alpha-phase substructure of cast
iron. Metalloved. i term. obr. met. no.5:43-45 My '61.
(MIRA 14:5)

1. Khar'kovskiy politekhnicheskii institut.
(Cast iron--Metallography)
(Metals, Effect of temperature on)

20212

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808. dlm 1045 1045

S/126/61/011/002/011/025
E111/E452

AUTHORS: Bakakin, G.N. and Lyubchenko, A.P.
TITLE: Substructure of the Carburized Layer
PERIODICAL: Fizika metallov i metallovedeniye, 1961, vol.11, No.2, pp.247-251

TEXT: The authors give results of an experimental study of the phase composition and substructure of phases at various depths of carburized layer. The substructure of a phase is represented by the dimensions and disorientations of mosaic blocks and the size and nature of the change of micro-deformation of the crystal lattice with distance. The resistance to wear of the layer depends on both composition and substructure but published work on substructure has been limited to some definite depth (Ref.2 to 4). The forms of heat treatment used in the investigation were those adopted at many works but some experimental variants were also tried. Type 18XMB (18KhNVA), used for important parts of machines, was subjected to carburization to a depth of 1.7 to 1.9 mm with a solid carburizer at 920°C followed by one of the following:
1) cooling in furnace at about 1°C/min, 2) as (1) but at 3°C/min;

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E111/E452

Substructure of ...

3) oil quenching; 4) as (3) followed by oil quenching from 810°C and tempering at 150°C; 5) as (4) but followed by treatment with liquid oxygen; 6) as (2) followed by double tempering at 650°C, quenching from 810 and tempering at 150°C. Successive 0.1 to 0.2 mm thick layers were removed from the 4 x 8 x 15 mm specimens. At each depth, X-ray diffraction patterns were taken with iron radiation in a Debye camera, the (211) and (311) lines being focused for alpha- and gamma-phase respectively; microhardness was measured with a PMT-3 (PMI-3) machine at a load of 50 g. The carburized layer for all treatments consisted of alpha-, gamma- and carbide-phases. The nature of microhardness (kg/mm^2) changes with depth (hundredths of cm) is shown in Fig.1 in which the curve numbers correspond to the above treatment numbers: the least difference between the surface and deeper zone of the carburized layer is obtained with rapid cooling. Fig.2 gives corresponding curves for maximum relative deformation of the alpha-phase crystal lattice and Fig.3 those of alpha-phase mosaic block size. Treatment 6 gives least block size over the greater part of the layer and intensive work hardening of the alpha-phase.

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E111/E452

Substructure of ...

The latter makes diffraction maxima so diffuse that reliable block-size and deformation data cannot be obtained. The work hardening of the gamma-phase is less than that of the alpha and is very small at "working" depths of the carburized layer when quenching from the carburization temperature is carried out. This is in line with the observation of A.P.Lyubchenko and others (Ref.1,2) that such quenching increases resistance to wear compared with that obtained with treatment 6 (which is used in practice). The results of the present investigation support the views of the present authors (Ref.1,2 and 6) that rapid cooling from the carburizing temperature produces a favourable form of substructure of carburized-layer phases. Slow cooling after carburization to a considerable extent exhausts the possibilities of good wear resistance even before the part is installed because of the high degree of phase work hardening which the heat treatment produces over the whole depth of the carburized layer. There are 3 figures, 2 tables and 7 Soviet references. ✓

ASSOCIATION: Zavod im. V.A.Malysheva g.Khar'kov
(Works imeni V.A.Malyshev, Khar'kov)

Card 3/5

20212

Substructure of ...

S/126/61/011/002/011/025
E111/E452

SUBMITTED: June 1, 1960

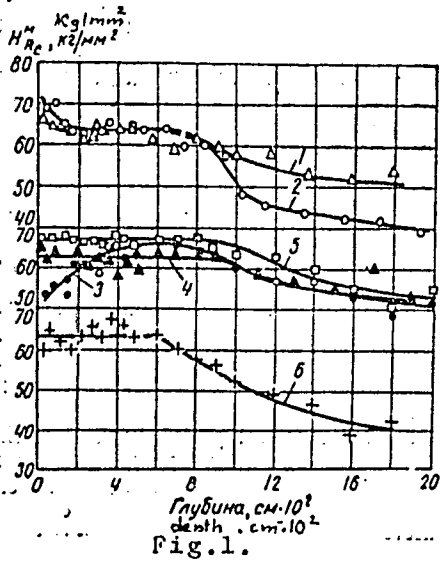


Fig. 1.

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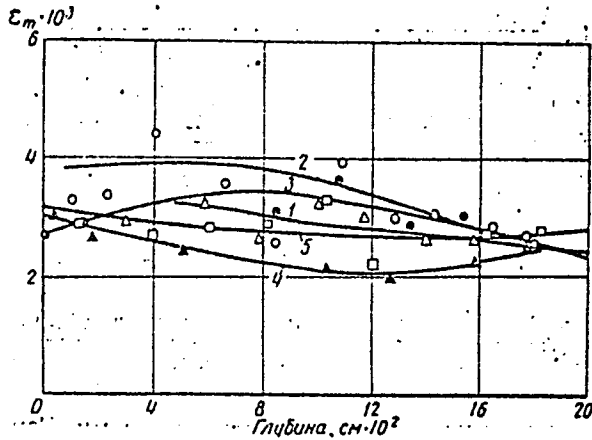


Fig. 2.

Fig. 2 on page 29 attached to page 30

Substructure of ...

S/126/61/011/002/011/025
E111/E452

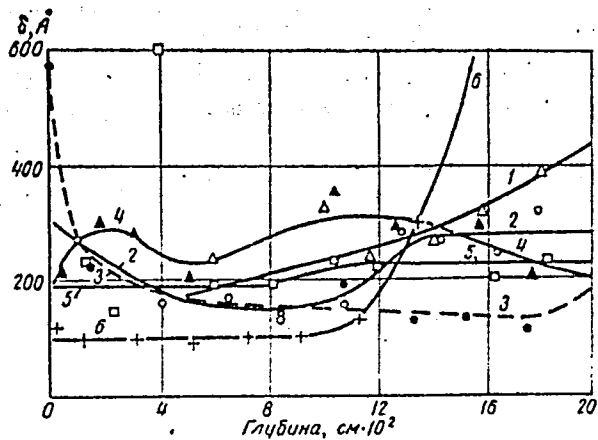


Fig.3.

Card 5/5

LYUBCHENKO, A.P.

Characteristics of the kinetics of diffusion processes in cemented
layers of alloys. Fiz. met. i metalloved. 11 no. 5:714-724 My '61.
(MIRA 14:5)

(Cementation (Metallurgy)) (Diffusion)

S/123/61/000/023/009/018
A052/A101

AUTHORS: Bakakin, G. N., Gerasimenko, K. S., Doshchechkin, V. I., Lyubarskiy, I. M., ~~Lyubchenko, A. P.~~

TITLE: The selection of the optimum heat treatment conditions of case hardened 18 XHBA (18KhNVA) steel

PERIODICAL: Referativnyy zhurnal Mashinostroyeniye, no. 23, 1961, 63, abstract 23B449 (V sb. "Radioakt. izotopy i yadern. izlucheniya v nar. kh-ve SSSR, v. 3"; Moscow, Gostoptekhizdat, 1961, 90-92) ✓

TEXT: The structure and physico-mechanical properties of the case-hardened layer of 18KhNVA, 20X2H4A (20Kh2N4A) and other steels were investigated from the viewpoint of the chemical heat treatment. The heat treatment conditions differ by the speed of cooling after case hardening. The speed of cooling after case hardening affects the phase composition, the substructure of phases and their saturation with alloying components, which in its turn affects the wear resistance of the case hardened layer. Compared with the conditions adopted at the plant, the recommended conditions (for large machine elements - case hardening with additional oil hardening at 810 C; for small parts - case hardening with

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S/123/61/000/023/009/018
A052/A101

The selection of the optimum ...

subsequent oil hardening, tempering at 650°C or case hardening with subsequent water hardening, tempering at 150°C) increase considerably the wear resistance of the case hardened steel layer".



N. Il'ina

[Abstracter's note: Complete translation]

Card 2/2

LYUBCHENKO, A. I.

PHASE I BOOK EXPLOITATION SOV/5458

Girshovich, Naum Grigor'yevich, Doctor of Technical Sciences, Professor, ed.

Spravochnik po chugunnomu lit'yu (Handbook on Iron Castings) 2d ed., rev. and enl. Moscow, Mashgiz, 1961. 800 p. Errata slip inserted. 16,000 copies printed.

Reviewer: P. P. Berg, Doctor of Technical Sciences, Professor; Ed.: I. A. Baranov, Engineer; Ed. of Publishing House: T. L. Leykina; Tech. Eds.: O. V. Speranskaya and P. S. Frumkin; Managing Ed. for Literature on Machine-Building Technology (Leningrad Department, Mashgiz): Ye. P. Naumov, Engineer.

PURPOSE: This handbook is intended for technical personnel at cast-iron foundries. It may also be of use to skilled workmen in foundries and students specializing in founding.

COVERAGE: The handbook contains information on basic problems in the modern manufacture of iron castings. The following are discussed: the composition and properties of the metal; the making of molds; special casting methods; the charge preparation; melting

Card ~~1/1~~

Handbook on Iron Castings

SOV/5458

and modifying the cast iron; pouring, shaking out, and cleaning of castings; heat-treatment methods; and the inspection and rejection of castings. Information on foundry equipment and on the mechanization of castings production is also presented. The authors thank Professor P. P. Berg, Doctor of Technical Sciences, and staff members of the Mosstankolit Plant, headed by the chief metallurgist G. I. Kletskin, Candidate of Technical Sciences, for their assistance. References follow each chapter. There are 287 references, mostly Soviet.

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Handbook on Iron Castings

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Card 10/11

LITUBCHENKO, A.P.; MOZHAROV, M.V.; BOBRO, Yu.G.

Autoradiographic and radiometric investigation of modified
cast iron with globular graphite. Fiz. met. i metalloved.
12 no.2:233-239 Ag '61. (MIRA 14:9)
(Cast iron--Metallography)

LYUBCHENKO, A.P.; MOZHAROV, M.V.

Diffusion and the microdistribution of cerium in iron and cast
iron. Fiz. met. i metalloved. 14, no.1:61-67 J1 '62. (MIRA 15:7)
(Iron--Metallography) (Cerium--Isotopes)

LYUBCHENKO, A.P.; YERMOLAYEV, V.N.

Effect of cerium on the self-diffusion of iron. Fiz. met. i
metalloved. 14 no.1:157-160 JI '62. (MIRA 15:7)
(Iron--Metallography)
(Cerium)

45641

S/126/63/015/001/029/029
E073/E151

247500

AUTHORS: Iyubchenko, A.P., Sherman, D.G., and Kuz'minov, G.S.

TITLE: Effect of cerium content of iron on self-diffusion

PERIODICAL: Fizika metallov i metallovedeniye, v.15, no.1, 1963, 158-160

TEXT: The authors have already shown that Ce additions of up to 0.5% have no effect on the ratio of the intercrystalline (D_{Boun}) and transcrystalline (D_{Body}) self-diffusion coefficients of Fe.

J

Further investigations were carried out on pure Armco iron, vacuum induction melted, into which Ce was added, and the ratio K_{Fe} which equals

$$d(D_{Boun} \times D_{Body}^{-1/2})$$

was determined using the isotope Fe^{59} . It was found that Ce additions of up to 0.52% had little effect on the self-diffusion ratio, and that at elevated temperatures the individual values for inter- and trans-crystalline diffusion were not greatly changed.

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Effect of cerium content of iron...

S/126/63/015/001/029/029
E073/E151

Fluctuations of $\pm 100\%$ in the value of K_{Fe} were obtained as Ce was increased from 0 to 0.52%, but the overall effect, discounting the fluctuations, appeared to be negligible. This is contrary to the findings of K.P. Dunin and Ya.M. Malinochka that the effect of spheroidisers was to equalise the inter- and trans-crystalline mobilities of the Fe atoms. The experimental and published results show that the effect of Ce, Mg, etc. on the graphite in cast iron is not related to the kinetics of self-diffusion and it is probable that the surface active properties of the spheroidiser are responsible for spheroidisation. The electron orbits of additions appear to influence the shape of the graphite particles, as is seen by comparing the electron structures of spheroidising agents (Li, Na, Mg, K, Ca, Sr, Ba, Ce) with those of de-spheroidising agents (Ti, Cu, Sb, Pb, Bi). Inconsistencies in the behaviour of added elements on the structure of the graphite appears to be due to changes in electron configuration caused by interaction with impurities in the iron. Spheroidisation can also be achieved by additions which ensure the required electron configuration when absorbed on the graphite.

Card 2/3

Effect of cerium content of iron ...

S/126/63/015/001/029/029
E073/E151

There are 2 tables.

ASSOCIATION: Khar'kovskiy zavod transportnogo mashinostroyeniya
im. V.A. Malysheva
(Khar'kov Transport Engineering Works imeni
V.A. Malyshev)

SUBMITTED: April 10, 1962

f

Card 3/3

LYUBCHENKO, A.P., kand.tekhn.nauk; BOBRO, Yu.G., kand.tekhn.nauk; MOZHAROV,
M.V., inzh.

Radiography and radiometry of inoculated cast iron with spheroidal
graphite. Metalloved. i obr. met. no.8:15-17 Ag '62.
(MIRA 15:11)

(Cast iron--Metallography)

LYUBCHENKO, A.P.; SHERMAN, D.G.; MOZHAROV, M.V.

Growth of the graphitic phase during the crystallization of cast
iron. Lit. proizv. no.6:34-37 Je '63. (MIRA 16:7)

(Cast iron--Metallography)
(Crystallization)

45641

S/126/63/015/001/029/029
E073/E151

247500

AUTHORS: Iyubchenko, A.P., Sherman, D.G., and Kuz'minov, G.S.

TITLE: Effect of cerium content of iron on self-diffusion

PERIODICAL: Fizika metallov i metallovedeniye, v.15, no.1, 1963,
158-160TEXT: The authors have already shown that Ce additions of up to 0.5% have no effect on the ratio of the intercrystalline (D_{Boun}) and transcrystalline (D_{Body}) self-diffusion coefficients of Fe. JFurther investigations were carried out on pure Armco iron, vacuum induction melted, into which Ce was added, and the ratio K_{Fe} which equals

$$d(D_{\text{Boun}} \times D_{\text{Body}}^{-1/2})$$

was determined using the isotope Fe_{59} . It was found that Ce additions of up to 0.52% had little effect on the self-diffusion ratio, and that at elevated temperatures the individual values for inter- and trans-crystalline diffusion were not greatly changed.

Card 1/3

Effect of cerium content of iron...

S/126/63/015/001/029/029
E073/E151

Fluctuations of $\pm 100\%$ in the value of K_{Fe} were obtained as Ce was increased from 0 to 0.52%, but the overall effect, discounting the fluctuations, appeared to be negligible. This is contrary to the findings of K.P. Bunin and Ya.M. Malinochka that the effect of spheroidisers was to equalise the inter- and trans-crystalline mobilities of the Fe atoms. The experimental and published results show that the effect of Ce, Mg, etc. on the graphite in cast iron is not related to the kinetics of self-diffusion and it is probable that the surface active properties of the spheroidiser are responsible for spheroidisation. The electron orbits of additions appear to influence the shape of the graphite particles, as is seen by comparing the electron structures of spheroidising agents (Li, Na, Mg, K, Ca, Sr, Ba, Ce) with those of de-spheroidising agents (Ti, Cu, Sb, Pb, Bi). Inconsistencies in the behaviour of added elements on the structure of the graphite appears to be due to changes in electron configuration caused by interaction with impurities in the iron. Spheroidisation can also be achieved by additions which ensure the required electron configuration when absorbed on the graphite.

Card 2/3

Effect of cerium content of iron ... S/126/63/015/001/029/029
E073/E151

There are 2 tables.

ASSOCIATION: Khar'kovskiy zavod transportnogo mashinostroyeniya
im. V.A. Malysheva
(Khar'kov Transport Engineering Works imeni
V.A. Malyshev)

SUBMITTED: April 10, 1962

f

Card 3/3

S/126/63/015/002/024/033
E193/E383

AUTHORS: Lyubchenko, A.P., Sherman, D.G. and Udovikov, V.I.
TITLE: The effect of small magnesium additions on the self-diffusion of iron
PERIODICAL: Fizika metallov i metallovedeniye, v. 15, no. 2, 1965, 295 - 297
TEXT: In continuation of earlier work (A.P. Lyubchenko et al - FPM, 1962, 14, 1; 1962, 14, 6), the present authors studied the nature of self-diffusion of iron modified with additions of magnesium in quantities (0.005 - 0.02%) usually used in the fabrication of high-strength, nodular cast irons. Similar experiments were also carried out on grey and magnesium-modified cast irons. The diffusion of iron was studied at 960 - 1 200 °C. Both the radiometric and outer radiographic methods were used. Conclusions: 1) the grain-boundary diffusion predominates in Mg-bearing iron at 900 - 1 200 °C. 2) The order of magnitude of the self-diffusion coefficient of iron is not affected by Mg additions - the same applying to diffusion of Fe in Mg-modified cast iron. 3) Mg acts as a grain-refining agent and slows down the rate of grain-growth
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S/126/63/015/002/024/055
E193/E383

The effect of

in Fe at 960 - 1 100 °C. This is demonstrated in a figure where the grain size (μ) is plotted against the annealing temperature (°C) of armco iron (top curve) and iron with 0.005, 0.14 and 0.02% Mg (lower curves, in this order); the graph has been constructed for specimens annealed for 20 hours. There are 1 figure and 1 table.

ASSOCIATION:

Khar'kovskiy zavod transportnogo mashinostroyeniya
im. V. A. Malysheva (Khar'kov Transport Machinery
Works im. V.A. Malyshev)

SUBMITTED:

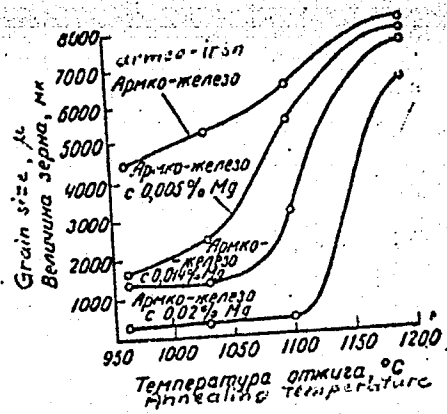
June 6, 1962 (initially)
August 9, 1962 (after revision)

Card 2/3

S/126/63/015/002/024/033
E193/2383

The effect of

Fig. 1:



Card 3/3

LYUBCHENKO, A.P.; MOZHAROV, M.V.

Phosphorus distribution in microvolumes of cast iron with
various forms of graphite crystal surfaces. Fiz.mat.i metalloved.
15 no.1-580-583 Ap '63. (MIRA 16:6)

1. Khar'kovskiy zavod transportnogo mashinostroyeniya imeni
V.A.Malysheva. (Cast iron--Metallography) (Phosphorus)

LYUBCHENKO, A.P.; SHERMAN, D.G.; TANANKO, I.A.

Modeling the process of cast iron modification on transparent
crystals. Fiz. met. i metalloved. 16 no.3:378-384 S '63.
(MIRA 16:11)

1. Khar'kovskiy zavod transportnogo mashinostroyeniya imeni
V.A.Malysheva.

LYUBCHENKO, A.P.; SHERMAN, D.G.

Absorptive character of changes in the aspect of ammonium chloride
crystals under the effect of NH_4Cl . Fiz. met. i metalloved. 16
no.4:636 0 '63. (MIRA 16:12)

1. Khar'kovskiy zavod transportnogo mashinostroyeniya imeni
V.A.Malyшева.

BOBKO, Yuriy Georgiyevich, NOSKOV, B.A., prof., retsenzent;
LYUBCHENKO, A.P., kand. tekhn. nauk, retsenzent;
SAKHAROVA, A.V., dots., otv. red.; KOVALEVA, Z.G., red.

[Aluminum cast iron] Aluminievye chuguny. Khar'kov,
Izd-vo Khar'kovskogo univ., 1964. 194 p. (MIRA 17:6)

LYUBCHENKO, A.P.; MOZHAROV, M.V.; SHERMAN, D.G.

Despheroidizing effect of bismuth on the graphite phase in
cast iron. Fiz. met. i metalloved. 17 no.6:853-861 Je '64.
(MIRA 17:8)

1. Khar'kovskiy zavod transportnogo mashinostroyeniya imeni
Malysheva.

LYUBCHENKO, A.P.; MOZHAROV, M.V.; SHERMAN, D.G.; SOLOV'YEVA, Z.P.

Microdistribution of elements in cast iron altering the face
cut of graphite crystals. Fiz. met. i metalloved. 18 no.4:501-
572 O '64. (MIRA 18:4)

1. Khar'kovskiy zavod transportnogo mashinostroyeniya imeni
Malysheva.

BAKAKIN, G.N., inzh.; LYUBARSKIY, I.M., kand. tekhn. nauk;
LYURCHENKO, A.P., kand. tekhn. nauk; MOZHAROV, M.V., inzh.;
TUNIK, A.A., inzh.

Comparative laboratory wearing tests of cast irons with globular
and flaky graphite. Vest. mashinostr. 44 no.6:62-64 Je '64.
(MIRA 17:8)

LYUBCHENKO, A.P.; SHERMAN, D.G.; MOZHAROV, M.V.

Character of the microdistribution of cerium in cast iron.
Lit. proizv. no.3:48 Mr '65. (MIRA 18:6)

LYUBCHENKO, A.S.; MOZHAROV, M.V.

Distribution of sulfur and phosphorus in inoculated cast iron.
Lit. proizv. no.4:19-21 Ap '64. (MIRA 18:7)

L 2573-66 EWT(m)/EWP(w)/EPF(c)/T/EWP(t)/EWP(k)/EWP(b)/EWA(c) JD/RN/DJ/GS

ACCESSION NR: AT5022671

UR/0000/65/000/000/0133/0137

AUTHORS: Lyubarskiy, I. M.; Podgornaya, O. F.; Lyubchenko, A. P.; Voskoboynikov, D. B.; Turovskiy, M. L.

44,55

44,55

16,44,55

68
69
611

TITLE: The structural mechanism of wear (on the question of the fatigue nature of wear)

SOURCE: AN SSSR. Nauchnyy sovet po treniyu i smazkam. Teoriya treniya i iznosa (Theory of friction and wear). Moscow, Izd-vo Nauka, 1965, 133-137

TOPIC TAGS: friction, wear, friction wear, surface wear, surface fatigue

ABSTRACT: As an extension of his earlier formulation of the three-stage process of friction wear, I. V. Kragel'skiy has proposed a mechanism of fatigue type of wear. Based on structural and property investigations of individual microvolumes in the active friction layers, the nonuniformity of structure and material properties of separate microvolumes has been established. It can be assumed that the friction of rough surfaces is a statistical combination of simultaneous processes of brittle fracture and plastic deformation of microirregularities. The relative importance of the two processes is determined by the different effects of thermal and surface treatments and of friction on the α and γ -phases and their substructures. Under heavy friction conditions, processes of cold hardening of the γ -phase and

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ACCESSION NR: AT5022671

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weakening of the α -phase (separation of carbide phase, etc) occur. The most wear-resistant conditions for a homogeneous α - γ alloy are met when the γ -phase is not "cold hardened," while the α -phase is "cold hardened." The wear rate (ml/cycle) histories of many experiments performed under gear tooth friction conditions indicate the cyclic nature of the wear rate. Microhardness histories during the experiments showed a comparatively high initial austenite hardness, which increased with time, until it and the friction torque suddenly decreased. Thus wear occurs when individual microvolumes of the surface lose their plasticity due to cold working and are worn away, exposing new surface which repeats the cycle. Orig. art. has: 4 figures.

ASSOCIATION: Nauchnyy sovet po treniyu i smazkam, AN SSSR (Scientific Committee on Friction and Lubrication, AN SSSR)

SUBMITTED: 18May65

ENCL: 00

SUB CODE: ME

NO REF SOV: 000

OTHER: 000

Card 2/2

LYUBCHENKO, A.P.; SHEVCHUK, I.S.

Absorption of globularizing elements on graphite crystals in
cast iron. Fiz. met. i metalloved. No. 10:303-306, 1965.

LYUBCHENKO, A.P.; SHERMAN, D.G.

Modeling with the use of transparent crystals the
deglobularization process of the graphitic phase in
cast iron. Fiz.-met. i metalloved. 20 no.5:712-718 N
'65. (MIRA 18:12)

1. Submitted October 10, 1964.

L 46704-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) WV/JD/JG/WB/GD
ACC NR: AT6020709 (N) SOURCE CODE: UR/0000/65/000/000/0110/0117

AUTHOR: Klyucharev, A. P.; Nikolaychuk, A. D.; Lyubchenko, A. P.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tehnicheskij institut AN UkrSSR)

TITLE: Investigation of the properties of titanium, zirconium, and hafnium coatings deposited by the photodissociation method

SOURCE: AN UkrSSR. Fizika metallicheskich plenok (Physics of metal films). Kiev, Naukova dumka, 1965, 110-117

TOPIC TAGS: titanium, zirconium, hafnium, metal film, protective coating, refractory coating, corrosion protection

ABSTRACT: The authors investigated the feasibility of depositing anti-corrosion coatings of Ti, Zr, and Hf on metals and alloys by a thermodissociation (iodide) method, with a directed flow of iodides of these elements in a continuously evacuated system. This method was previously proposed by the authors (UFZh, 1962, v. 8, 1027) for the production of thin isotopic foils. The advantages of the method over others are described in detail. The produced coatings were tested for porosity (by the ferroxyl method), corrosion resistance (by comparison with Cd, Zn, Ni, or steel coatings), and electrochemical characteristics (by electrode potential measurements). The results showed that Ti, Zr, and Hf coatings 5 μ thick had more corrosion resistance than Zn, Cd, and Ni coatings 20 μ thick. Microstructure and phase-composition tests showed the coatings to be homogeneous and to have higher microhardness than the protected

Card 1/2

L 46701-66

ACC NR: AT6020709

metal. It is concluded that the proposed method can yield machine parts of high corrosion and heat endurance. Orig. art. has: 2 figures and 1 table.

SUB CODE: 20, 11/ SUBM DATE: 30Oct64/ ORIG REF: 004/ OTH REF: 002

Card 2/2 fv