fragmentation can be assessed from the increase in the width of the X-ray lines. In Fig. 6, the increase in the width ($\beta 10^{-3}$ radians) of the (211) lines is plotted against the degree of deformation at temperatures indicated by each curve. It will be seen that a maximum degree of polygonization is attained in the material extended to 9% elongation at 1 150 °C. If, however, a specimen in this condition is held under a load at 1 150 °C for 80 min, the X-ray reflections become more diffuse, indicating that this treatment brings about an increase in the dimensions of blocks.
There are 8 figures and 10 references: 9 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference mentioned is: Ref. 4: Cahn, R.W. - Proc. Phys. Soc., A63, 1950.

ASSOCIATIONS: Institut mashinovedeniya GKAMSM SSSR (Institute of Machine Science of GKAMSM USSR)
Moskovskiy institut stali (Moscow Institute of Steel)

S/180/62/000/002/016/018
E193/E383

18.1280

AUTHORS: Lozinskiy, M.G. and Pertsovskiy, N.Z. (Moscow)

TITLE: Microstructural study of deformation of palladium stressed in tension at elevated temperatures

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 2, 1962, 136 - 144

TEXT: In continuation of their earlier work (Ref. 7 - Izv. AN SSSR, OTN, Metallurgiya i toplivo, no. 1, 1961), the authors studied the process of deformation and fracture of palladium in creep at 400 and 600 °C. Experiments were carried out on 99.8% pure Pd test pieces, preliminarily annealed for 1.5 hours at 1 300 °C with an average grain size of 1.25 mm and hardness of 42 - 44 kg/mm^2. The creep tests were conducted in vacuum under stresses ranging from 2.5 to 7.0 kg/mm^2. In addition to the determination of creep curves, photomicrographs of the surface of the test pieces were taken at regular intervals without interrupting the test; on the completion of each test a

Card 1/3

S/180/62/000/002/016/018
E193/E383

Microstructural study ....

supplementary metallographic test was carried out and hardness measurements were taken. The results of creep tests are given in a table. The results of the metallographic examination indicated that under the experimental conditions employed, slip in the interior of the grains was the predominant mechanism of deformation. Slip lines (straight and wavy), formed as a result of both uniform "translation" slip and transverse slip, were observed. On raising the test temperature from 400 to 600 °C both the thickness of and the distance between the slip bands increased. Movement of the grains relative to each other was observed at the higher test temperature, as well as formation and propagation of intercrystalline cracks. There are 6 figures and 1 table.

ASSOCIATION: Institut mashinovedeniya AN SSSR
(Institute of Science of Machines of the AS USSR)

SUBMITTED: March 15, 1961

Card 2/3

S/180/62/000/002/016/018
E193/E383

Microstructural study ....

Table key: Results of study of palladium specimens tested for creep in vacuum

1 - No. of test; 2 - temperature, °C;
3 - $\sigma_{нач}$, kg/mm^2 (initial applied stress)
4 - $\tau_{исп}$, hrs (test duration); 5 - elongation on the gauge length 6 mm, %; 6 - rate of steady creep, %/hour; 7 - H_V, kg/mm^2 (hardness);
8 - in the deformation region; 9 - on the head of the test piece.

* Results of hardness measurements in the centre of the "hot" zone (for deformed specimens) at a distance of 3 mm from the plane of fracture (for fractured specimens)
** The test piece did not break.

Card 3/13

S/180/62/000/003/007/016
E111/E152

AUTHORS: Sokolkov, Ye.N., Lozinskiy, M.G., and Chupakova, N.P. (Moscow)

TITLE: Some peculiarities in the mechanism of plastic deformation of austenitic steels and alloys in high-temperature thermo-mechanical treatment

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no.3, 1962, 71-77

TEXT: High-temperature thermo-mechanical treatment entails plastic deformation, carried out at temperatures above the recrystallization temperature. In the present work some specific features of the mechanism of this process are studied in the chromium-nickel-manganese steel and a Nimonic-type alloy. The treatment was carried out at 1000-1100 °C with rolling at speeds of 3-6 m/min to give 25-30% reductions; nucleation and growth of new grains being arrested by cooling in water. Resulting microstructures were compared with those produced by ordinary

Card 1/2

heat treatment. The authors conclude that in the course of the treatment studied a slip occurs accompanied by rectification of the crystal lattice in the zones of slip and in the adjacent regions. In addition, a diffusion displacement of parts of grain-boundaries also occurs. These segments, formed as a result of the emergence of slip planes onto grain boundaries, undergo diffusion displacement similar to grain-boundary migration in a stress field. Slip and displacement of grain boundary segments cause serrated distortion of grain boundaries specific to the treatment, the coarseness of the serrations increasing with intensification of the diffusion displacement. As a result of the diffusion redistribution of the crystal lattice defects produced in plastic deformation, substructure sometimes appears; its preferential appearance at the grain boundaries indicates that plastic deformation is most intense there.
There are 6 figures.

SUBMITTED: December 6, 1961

Card 2/2

S/123/62/000/015/002/013
A052/A101

AUTHORS: Sadovskiy, V. D., Sokolkov, Ye. N., Lozinskiy, M. G., Petrova, S. N., Antipova, Ye. I., Gaydukov, M. G., Mirmel'shteyn, V. A.

TITLE: The effect of thermomechanical treatment on refractory properties of austenitic steel

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 15, 1962, 21, abstract 15A115 (In collection: "Issled. po zharoprochn. splavam". T. 7, Moscow, AN SSSR, 1961, 202 - 209)

TEXT: The effect of thermomechanical treatment on the change of structure of austenitic alloyed steel in the process of high-temperature stretching in a vacuum (at 900°C and 950 kg/mm^2 stress) and on the rupture strength at 650°C (σ = 35 and 38 kg/mm^2) was studied. The thermomechanical treatment consisted of rolling with 25 - 30% reduction in area and 5.7 m/min. speed at 1,000 - 1,100°C and a subsequent water hardening. It is pointed out that thermomechanical treatment increases the rupture strength and inhibits the process of creep rupture; this is explained by the characteristics of the structure forming at a high-tem-

Card 1/2

S/123/62/000/015/002/013
A052/A101

The effect of thermomechanical...

perature plastic deformation. There are 16 references.

[Abstracter's note: Complete translation]

Card 2/2

LOZINSKIY, M.G. (Moskva); PERTSOVSKIY, N.Z. (Moskva)

Main types of deformation microreliefs occurring at high temperatures in polycrystalline metals with a face-centered cubic lattice. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.1:105-126 Ja-F '62. (MIRA 15:2)
(Crystal lattices)
(Metallography)
(Metals, Effect of temperature on)

BOKSHTEYN, S.Z. (Moskva); KISHKIN, S.T. (Moskva); LOZINSKIY, M.G. (Moskva); SOKOLKOV, Ye.N. (Moskva); Prinimali uchastiye: PODVOYSKAYA, O.N.; ZILOVA, T.K.; SOROKINA, K.P.; POLYAK, E.V.; MOROZ, L.M.; BULYGIN, I.P.; LASHKO, N.F.; POKAMESTOVA, T.N.; GORDEYEVA, T.A.; YAGLOV, R.V.; VOLODINA, T.A.; KORABLEVA, G.N.; ANTIPOVA, Ye.I.

Thermomechanical treatment of chromium-nickel-manganese austenitic steel. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.2:15-21 Mr-Ap '62. (MIRA 15:4)
(Chromium-nickel steel--Hardening)

LOZINSKIY, M.G. (Moskva); PERTSOVSKIY, N.Z. (Moskva)

Microscopic investigation of palladium deformation in the process of stretching at high temperatures. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.2:136-144 Mr-Ap '62. (MIRA 15:4)

1. Institut mashinovedeniya AN SSSR.
(Palladium--Metallography) (Deformations (Mechanics))
(Metals at high temperatures)

SOKOLKOV, Ye.N. (Moskva); LOZINSKIY, M.G. (Moskva); CHUPRAKOVA, N.P. (Moskva)

Some characteristics of the mechanism of plastic deformation of austenitic steels and alloys during high-temperature thermomechanical treatment. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.3:71-77 My-Je '62. (MIRA 15:6)
(Steel--Hardening) (Deformations (Mechanics))

40723

18.8200

S/180/62/000/004/003/009
E193/E383

AUTHORS: Lozinskiy, M.G. and Pertsovskiy, N.Z. (Moscow)

TITLE: Specific features of deformation of nickel at various temperatures and strain-rates

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, no. 4, 1962, 90 - 102

TEXT: The object of the present investigation was to study the effect of temperature and strain-rate on the deformation-induced structural changes in Ni. To this end, tensile tests were conducted on 99.3% pure Ni (containing 0.39% Co, 0.06% C, 0.17% Fe, 0.04% Cu, 0.05% Si, 0.002% S and traces of Mn and P) at temperatures ranging from 20 - 1 000 °C and at strain rates of 0.5-0.6, 6-8 and 600-800% per hour, the total elongation attained in any one experiment not exceeding 20%. The structural changes were studied by hot-stage metallography, entailing the use of a cine-camera, and by metallographic examination of extended specimens at room temperature. Stress/strain diagrams were constructed for specimens extended at various temperatures

Card 1/4

and the temperature-dependence of the stress required to provide a strain of 20% was determined. In addition, the temperature-dependence of hardness of Ni was studied and the microhardness was measured in various zones of extended test pieces. The effect of various factors studied on the stress/strain relationship is demonstrated in Fig. 1, where the stress (σ, kg/mm^2) is plotted against elongation (ε, %) of Ni specimens extended at strain rates of 0.5 - 0.6% per hour (graph a) and 600 - 800% per hour (graph b) at temperatures indicated by each curve. The results of metallographic examination can be summarized as follows: 1) metallographic studies of the surface of extended specimens showed that deformation of Ni at 20 - 400 °C at slow (0.5 - 8% per hour) rates of strain is reflected in the formation of microrelief in the interior of the grains, where evidence of cross-slip can also be observed. The deformation, as revealed by slip bands, is not uniformly distributed. The formation of sub-boundaries at 400 °C can be just observed and there is some evidence of relative movement of the grains. 2) The formation of intragranular microrelief at 600 - 900 °C (at the same strain rates) is much less

Specific features of ....

pronounced, the relative movement of grains becoming the predominant mode of deformation. Intercrystalline cracks appear and the formation of clearly defined sub-structures takes place, the sub-grains tending to become more equi-axial as the temperature of deformation increases. 3) Deformation (at a slow rate of strain) at 1 000 °C is accompanied by a recrystallization whose onset can be detected almost immediately after application of the load. No visible slip lines are formed but the formation of sub-structure can be observed even at low magnifications. 4) Deformation by slip becomes more pronounced at all temperatures studied at higher (600 - 800% per hour) strain rates, with a corresponding decrease in the degree of deformation in the grain-boundary regions; the distribution of slip bands is very nonuniform, there is a marked refinement of the sub-structure, particularly in the 800-1 000 °C range and recrystallization in the early stages of deformation at 800 - 1 000 °C is suppressed. 5) In common with many other metals and alloys, Ni appears to be prone to hot-shortness in the 600 - 800 °C range. There are 8 figures and 1 table.

Card 3/4

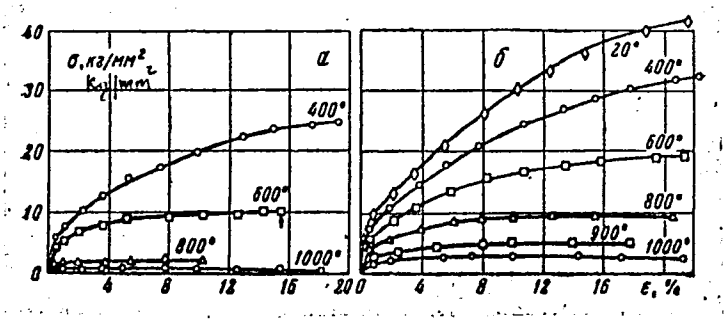
S/180/62/000/004/003/009
E193/E383

Specific features of ....

ASSOCIATION: Institut mashinovedeniya Goskomiteta SM SSSR po avtomatizatsii i mashinostroyeniyu (Institute of Machine Science of the State Committee of SM SSSR for Automation and Machine-building)

SUBMITTED: February 1, 1962

Fig. 1:



Card 4/4

ASSONOVA, Ye.A., inzh.; LOZINSKIY, M.G., doktor tekhn.nauk

Effect of temperature on hardness changes and the elasticity modulus of alloys in the system Fe - Ni. Metalloved. i term. obr. met. no.10:11-15 O '62. (MIRA 15:10)

1. Institut mashinovedeniya Gosudarstvennogo komiteta Soveta Ministrov SSSR po avtomatizatsii i mashinostroyeniyu.
(Iron-nickel alloys—Testing)
(Metals, Effect of temperature on)

S/129/62/000/011/003/007
E073/E535

AUTHORS: Lozinskiy, M.G., Doctor of Technical Sciences and Antipova, Ye.I., Engineer

TITLE: Features of the structure of nickel at elevated temperatures

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no.11, 1962, 18-20

TEXT: High-purity nickel specimens were heated in vacuum to 1100°C for 30 min, then cooled to 500°C and subjected to the effect of twelve successive 1 cm^3 doses of air. The structural changes caused by the oxidation process were studied by observing the microstructure, particularly as regards coloration. The lowest rate of increase in the thickness of the oxide film was observed in the light yellow sections of the surface with an orientation approaching (100). The oxidation was more intensive in the orange coloured sections with orientations approaching (111). The highest rate of oxidation was in the blue sections, the orientation of which was near to that of the dodecahedron plane (110). The change in colour was most intensive for the

Card 1/2

grains with the orientation (110) which passed through the entire range of colour changes, indicating that nickel is chemically more active in the crystallographic direction (110) than in the directions (100) and (111). Coloured selective oxidation after high-temperature vacuum heating can be usefully applied for investigating the initial stages of corrosion and for closer study of the fine crystalline structure of various materials. There are 3 figures.

ASSOCIATION: Institut mashinovedeniya GKAM SM SSSR
(Institute of Machine Science GKAM SM USSR)

35953

S/126/62/013/001/014/018
E193/E383

18.1100

AUTHORS: Lozinskiy, M.G., Sokolkov, Ye.N., Varli, K.V. and Skakov, Yu.A.

TITLE: The effect of high-temperature thermomechanical treatment on the fine crystal structure of austenitic steels and alloys

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no. 1, 1962, 137 - 143

TEXT: In contrast to treatment which consists of plastic deformation of steel below the upper limit of the martensitic-transformation range (i.e. at 400 - 600 °C), followed by quenching and which, according to the present authors, should be referred to as "low-temperature thermomechanical treatment" (NTMO), the term "high-temperature thermomechanical treatment" (VTMO) is proposed for a similar treatment in which steel is deformed at a temperature above its recrystallization temperature before quenching. It has already been established that a substantial increase in the strength of steel can be brought about

Card 1/6

The effect of ....

by this treatment and it has been postulated that this effect is partly associated with changes in the fine crystal structure of the material, formation of stresses of the second type and texture. It was in order to check this postulate that the investigation described in the present paper was undertaken. Experiments were carried out on a Cr-Ni-Mn steel containing 0.36% C, 0.5% Si, 8.0% Mn, 12.2% Cr, 8.5% Ni, 1.5% V, 1.15% Mo, 0.3% Nb (alloy A) and on Nimonic type alloy containing 0.05% C, 0.5% Si, 0.3% Mn, 20.09% Cr, 0.6% Al and 2.4% Ti (alloy B). Test pieces (square rods measuring 11 x 11 x 60 mm) were heated in air in an electric furnace, hot-rolled, quenched and then aged, the various schedules employed being given in Table 1. In some cases, a higher rolling speed (5.7 m/min) or heavier reductions (56%) were used. At the same time, pilot test pieces were heat-treated in the conventional manner by quenching from temperatures given in column 4 of Table 1. The effect of each type of treatment was then studied by metallographic examination, measuring Vickers hardness and electrical resistivity at room temperature, determining the lattice parameters of the

The effect of ....

solid-solution matrix, block dimensions and the magnitude of microstresses, and by evaluation of the character of texture of the specimens. Some of the typical results are given in Table 2. Similar results were obtained for alloy B, which, however, requires supplementary study. The conclusions reached can be summarized as follows:

1) VTMO brings about substantial (in comparison with the conventional hardening treatment) changes in the shape of the grain boundaries and orientation of the grains, and markedly affects the condition of the solid-solution matrix.

2) VTMO promotes more complete dissolution of the second phase on heating and more complete precipitation of this phase during ageing than the conventional heat-treatment.

3) VTMO brings about a decrease in the dimensions of the mosaic blocks (down to 0.05 μ in the case of alloy A), this effect becoming less pronounced if higher temperatures or faster rolling speeds are employed.

4) Quite large (up to 1×10^{-3}) microstrains are set up in the alloy as a result of VTMO, ageing or quenching from relatively

The effect of ....

high temperatures.
5) Materials subjected to VTMO have a texture close to axial, the [111] direction being the preferred orientation parallel to the direction of rolling.
6) A maximum increase in strength is attained after VTMO followed by ageing. The beneficial effect of this treatment is associated with the precipitation of a large quantity of the hardening-phase particles, with more favourable distribution of this precipitate and indirectly with the reduced size of the mosaic blocks. There are 2 tables.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals of the AS USSR)

SUBMITTED: September 18, 1961

Card 4/6

The effect of ....

Table 1: Schedules of VTMO and subsequent heat-treatment of test pieces which were hot-rolled during VTMO to 25% reduction at a rolling speed of 1.5 m/min and then quenched in water.

Material	No. of treatment schedule	Temperature, °C and holding time, hrs	Rolling temperature, °C	Ageing conditions, °C
Alloy A	I	1150 - 1 hr	1100	750 - 4 hrs
	II	1175 - 1 hr	1000	750 - 4 hrs
	III	1200 - 1 hr	1200	750 - 4 hrs
Alloy B	I	1080 - 8 hrs	1080	700 -16 hrs
	II	1080 - 8 hrs	1000	700 - 16 hrs

Card 5/6

The effect of ....

Table 2: Properties of Alloy A after VTMO carried out according to schedule I [as given in Table 1]

Type of Treatment	Lattice parameter, kX	resistivity ρ, $\mu\Omega$-cm	Block dimensions Δ, μ	Microdeformation, $\xi \cdot 10^4$	HV, kg/mm^2
Conventional hardening without ageing	3.595	62.7	>0.2	0	220
Conventional hardening with ageing	3.592	61.2	—* / >0.2	10 / 8	290
VTMO (without ageing)	3.598	63.4	0.06 / 0.05	4 / 7	240
VTMO (with ageing)	3.590	59.4	0.06 / 0.05	7 / 10	330

* in the numerator - results obtained by the approximation method; in the denominator - results of harmonic analysis.

Card 6/6

S/126/62/014/006/005/020
E193/E383

AUTHORS: Lozinskiy, M.G., Mirotvorskiy, V.S. and Rakhshtadt, A.G.

TITLE: A study of ageing of beryllium bronze

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 6, 1962, 834 - 842

TEXT: Microhardness measurements were used to study various aspects of ageing of 2.5% Be-Cu alloys, which were given 24-hours treatment at 780 °C, followed by water quenching, to ensure structural homogeneity of the experimental specimens. Ageing as well as hot-hardness measurements were carried out in vacuum. The investigation covered the following: determination of the temperature-dependence of microhardness of both solution-treated material and specimens aged for 1.5 hours at 350 °C; comparison of microhardness of the alloy at various stages of ageing, both at the ageing temperature and after cooling to room temperature; comparison of the kinetics of ageing in the interior of the grains and in the grain-boundary regions. The results can be summarized as follows. 1) The microhardness of beryllium bronze

Card 1/3

aged for 1.5 hours at 350 °C increases slightly on heating, reaching a maximum value at about 300 °C and decreasing rapidly above 400 °C. The microhardness of solution-treated specimens also increases on heating due to decomposition of the solid solution but the values obtained at any given temperature are lower than those of the preliminarily aged material. 2) When the beryllium bronze is age-hardened at 350 °C for 30 - 60 min, its maximum microhardness at the ageing temperature is the same as that measured (after ageing) at room temperature. When the ageing time exceeds 60 min the room-temperature microhardness of the alloy becomes lower than that measured at the ageing temperature, the difference between these two values reaching about 90 kg/mm^2 for alloys aged for 6 hours. 3) The microhardness of solution-treated beryllium bronze is higher in the grain-boundary regions than in the interior of the grains. This effect is due to a higher concentration of beryllium in the grain-boundary regions where - possibly - some precipitation-hardening takes place during quenching. 4) The grain-boundary region and the interior of the grains harden at different rates during ageing. The interior of the grains hardens at a faster rate in the initial

stages of ageing. The microhardness of the grain-boundary zones and the interior of the grains is paractically the same at the moment corresponding to maximum hardness; the decrease in hardness in the grain-boundary regions is much more pronounced under conditions of over-ageing. 5) After ageing for 10 min at 350 °C the microhardness of the β-phase in the wolution-treated alloy increases from the initial value of 360 kg/mm^2 to 640 kg/mm^2. 6) Ageing of beryllium bronze for critical applications should be carried out under conditions which ensure equal hardness at the grain boundaries and in the interior of the grains. The optimum ageing time at 350 °C is 1 hour. There are 7 figures and 2 tables.

ASSOCIATION: Institut mashinovedeniya (Institute of Science of Machines)

SUBMITTED: December 27, 1961 (initially)
June 20, 1962 (after revision)

LOZINSKIY, M.G.

BERG, A.I., glav. red.; TRAPEZNIKOV, V.A., glav. red.; BERKOVICH, D.M., zaml glav. red.; LERNER, A.Ya., doktor tekhn. nauk, prof., zam. glav. red.; AVEN, O.I., red.; AGEYKIN, D.I., red.; kand. tekhn. nauk, dots., red.; AYZERMAN, M.A., red.; VENIKOV, V.A., doktor tekhn. nauk, prof., red.; VORONOV, A.A., doktor tekhn. nauk, prof., red.; GAVRILOV, M.A., doktor tekhn. nauk, prof., red.; ZERNOV, D.V., red.; IL'IN, V.A., doktor tekhn. nauk, prof., red.; KITOV, A.I., kand. tekhn. nauk, red.; KOGAN, B.YA., doktor tekhn. nauk, red.; KOSTOUSOV, A.I., red.; KRINITSKIY, N.A., kand. fiz.-mat. nauk red.; LEVIN, G.A., prof. red.; LOZINSKIY, M.G., doktor tekhn. nauk, red.; LOSSIYEVSKIY, V.L., red.; MAKSAREV, Yu.Ye., red.; MASLOV, A.A., dots., red.; POPKOV, A.A., red.; RAKOVSKIY, M.Ye., red.; ROZENBERG, L.D., doktor tekhn. nauk, prof., red.; SOTSKOV, B.S., red.; TIMOFEYEV, P.V., red.; USHAKOV, V.B., doktor tekhn. nauk, red.; FEL'DBAUM, A.A., doktor tekhn. nauk, prof., red.; FROLOV, V.S., red.; KHARKEVICH, A.A., red.; KHRAMOY, A.V., kand. tekhn. nauk, red.; TSYPKIN, Ya.Z., doktor tekhn. nauk, prof., red.; CHELYUSTKIN, A.B., kand. tekhn. nauk, red.; SHREYDER, Yu.A., kand. fiz.-mat. nauk, dots., red.; BOCHAROVA, M.D., kand. tekhn. nauk, starshiy nauchnyy red.; DELONE, N.N., inzh., nauchnyy red.; BARANOV, V.I., nauchnyy red.; PAVLOVA, T.I., tekhn. red.

(Continued on next card)

BERG, A.I.—— (continued). Card 2.

[Industrial electronics and automation of production processes]Avtomatizatsiia proizvodstva i promyshlennaia elektronika. Glav. red. A.I.Berg i V.A.Trapeznikov. Moskva, Gos.nauchn. izd-vo "Sovetskaia Entsiklopediia." Vol.1. A - I. 1962. 524 p. (MIRA 15:10)

1. Chlen-korrespondent Akademii nauk SSSR (for Sotskov, Kharkevich, Zernov, Timofeyev, Popkov).

(Automatic control) (Electronic control)

LOZINSKIY, M.G.; ANTIPOVA, Ye.I.; ASSONOVA, Ye.A.; MIKITINA, I.I.

Strength of nickel at room and elevated temperatures as affected by the specific structural state arising in high-temperature thermomechanical treatment. Dokl. AN SSSR. 144 no.6:1289-1292 Je '62. (MIRA 15:6)

1. Institut mashinovedeniya Gosudarstvennogo komiteta Soveta Ministrov SSSR po avtomatizatsii i mashinistroyeniyu. Predstavleno akad. A.A.Bocharoym.
(Metals at high temperatures) (Nickel)
(Bocharoym)

AM4008924 BOOK EXPLOITATION S/

Lozinskiy, Mikhail Grigor'yevich

Structure and properties of metals and alloys at high temperatures (Stroyeniye i svoystva metallov i splavov pri vy*sokikh temperaturakh) Moscow, Metallurgizdat, 1963. 525 p. illus., biblio., index, plates. Errata slip inserted. 4850 copies printed.

TOPIC TAGS: vacuum metallography, high temperature metallography, metal macrostructure, metal microstructure, metal creep, metal thermal fatigue, internal friction, metal hardness, alloy hardness, tool steel, low alloy steel, nickel alloy, thermal etching, metal hot hardness, diffusion, evaporation, seizing

PURPOSE AND COVERAGE: This book is intended for engineering personnel, scientific research workers, technicians, and laboratory workers studying the behavior of metals and alloys at various temperatures. It may also be useful to advanced students at metallurgical and machine-building schools of higher education. New methods for studying the microstructure and properties of metals and alloys at high temperatures are reviewed. Results

Card 1/10

AM4008924

of investigations of specific features of the structure of metals and alloys are presented, and laws governing the change in properties of numerous pure metals and alloys in a wide range of temperatures are discussed. From 1947 to 1950 the research in high-temperature metallography was carried out at the Institute of Metallurgy im. A. A. Baykov under the guidance of Academician N. T. Gudtsev; from 1951 to 1953, at the Institute of the Science of Machines under the guidance of I. A. Oding, Corresponding Member of the Academy of Sciences USSR; and since 1953, by the author. In the investigation of the microstructure and properties of metals and alloys at high temperatures considerable assistance was extended by Academicians I. P. Bardin and A. A. Blagonravov. E. I. Antipova, M. B. Guterman, N. P. Zaytseva, L. A. Yevdokimova, A. M. Kosinskiy, V. S. Mirotvorskiy, N. Z. Pertsovskiy, E. P. Sinodova, A. E. Fedorovskiy, and S. G. Fedotova participated in the development of new equipment and experimental methods and in the carrying out of investigations.

TABLE OF CONTENTS:

Card 2/10

ALEKSEYEVA, T.A. (Moskva); LOZINSKIY, M.G. (Moskva)

Characteristics of the kinetics of plastic deformation in commercial-grade iron at temperatures from 20 to 1000°. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.2:116-123 Mr-Ap '63.
(MIRA 16:10)

KRYLOV, V.D. (Moskva); LOZINSKIY, M.G. (Moskva); NIKITINA, I.I. (Moskva)

Fine crystal structure of nickel following a high-temperature thermomechanical treatment. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.4:135-140 Jl-Ag '63. (MIRA 16:10)

L 17321-63 EPR/EWT(1)/BDS AFFTC/ASD Ps-4 WW

ACCESSION NR: AP3004909 S/0120/63/000/004/0158/0159

AUTHOR: Lozinskiy, M. G.; Fridman, Ye. M.; Nikolayenko, G. M.; 62
Ioffe, Yu. K.

TITLE: Sharp-focused higher-power X-ray tube for structure analysis 21

SOURCE: Pribory*i tekhnika eksperimenta, no. 4, 1963, 158-159

TOPIC TAGS: X-ray tube, structure analysis, URS-70 X-ray outfit, sharp-focused X-ray tube

ABSTRACT: A new design of a linear-focus X-ray tube with electrostatic focusing of the electron beam is described. A 215-mm-long copper housing has a vacuum-tight beryllium window and water-cooled anode. Tube prototypes were tested in a regular URS-70 X-ray outfit; stable operation was noted at a rated voltage of 45 kv and test voltage of 50 kv. Maximum currents: 2.5 ma with Mo and Cu mirrors and 500 microamp, with Fe, Co, Ni, or Cr mirrors. A sample

Card 1/2

L 17321-63
ACCESSION NR: AP3004909

of a diffraction curve of an alpha-quartz polycrystal determined with the above X-ray tube is presented. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 25Jul62 DATE ACQ: 28Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 000

Card 2/2

L 11114-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JT

ACCESSION NR: AP3000491 S/0129/63/000/005/0054/0060

58
56

AUTHOR: Lozinskiy, M. G.; Mirotvorskiy, V. S.; Antipova, Ye. I.

TITLE: Effect of rolling conditions on recrystallization and heat resistance of nickel

18

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1963, 54-60

TOPIC TAGS: nickel, thermomechanical treatment, recrystallization range, microhardness, heat resistance, rupture life, total elongation, deformation mechanism

ABSTRACT: The effect of thermomechanical treatment (TMT) on recrystallization and heat resistance in 99.5% pure Ni has been studied. Round bars, 16 mm in diameter and 160 mm long, were annealed at 1100C for 1 hr, cooled to 900, 800, 700, 600, 500, 400, or 20C, rolled at these temperatures with a reduction of 25%, and water quenched. The specimens were then subjected to recrystallization annealing for 1 hr in a vacuum at 500—900C. Hardness tests and microscopic examination revealed that an increase in temperature of TMT increases the temperature of the beginning and end of recrystallization. For instance, in specimens rolled at room temperature recrystallization begins at approximately 575C

Card 1/3

and is completed at approximately 650C. Corresponding figures for specimens rolled at 900C are approximately 660 and 740C. The temperature interval between the beginning and end of recrystallization is not affected by the conditions of TMT and remains approximately 75C for all conditions tested. The kinetics of recrystallization were studied at 600C in a vacuum of 10^{-5} mm Hg. At this temperature a sharp decrease of microhardness begins after approximately 1 hr in all specimens rolled at 20—800C. After 50 hr recrystallization was completed and microhardness dropped from the original 190—120 kg/mm^2 to approximately 70 kg/mm^2. In specimens rolled at 900C the recrystallization proceeded at a much lower rate and was not completed even after annealing 100 hr, when microhardness dropped from approximately 120 kg/mm^2 to 80 kg/mm^2. The stress-rupture tests at 600C under an initial stress of 10 kg/mm^2 showed that rolling at 20—900C considerably improves heat resistance as compared with that of Ni annealed at 1100C. Specimens rolled at 20, 400, 800, and 900C had the longest rupture life. Specimens rolled at 20 and 700—900C had the lowest creep rate in the first-stage creep. The total elongation in stress-rupture tests, which does not exceed 3—4% for Ni annealed at 1100C, varied in TMT specimens from 15% (rolled at 500C) to 42% (rolled at 600 and 700C). Microscopic examination revealed a considerable difference in the mechanism of deformations between fully

L 11114-63

ACCESSION NR: AP3000491 2

annealed and thermomechanically treated Ni. In the former, microcracks began to form at the grain boundaries at the very beginning of the stress-rupture test without grain deformation, while in the latter, microcracks (also at grain boundaries) appeared only after completion of recrystallization. Recrystallization appears to delay both the generation and propagation of microcracks. Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Institut mashinovedeniya GKAM pri Gosplane SSSR (Institute of the Science of Machines GKAM under the Gosplan SSSR)

SUBMITTED: 00 DATE ACQ: 03Jun63 ENCL: 00

SUB CODE: ML NO REF SOV: 012 OTHER: 002

Card 3/3

LOZINSKIY, M.G.; PERTSOVSKIY, N.Z.

Effect of temperature and the rate of tensioning on the kinetics and mechanism of deformation of iron-nickel alloys with 30 o/o Fe. Metalloved. i term. obr. met. no.9:37-45 S '63. (MIRA 16:10)

1. Institut mashinovedeniya AN SSSR.

USSR

ACCESSION NR: AP3007468 S/0286/63/000/009/0058/0058

AUTHOR: Lozinskiy, M. G.; Vishnevskiy, G. Ye.

TITLE: Unit for studying the laws of deformation and destruction of samples

SOURCE: Byul. izobret. i tovarn. znakov, no. 9, 1963, 58

TOPIC TAGS: plastic deformation, structural plastics, destructive testing

ABSTRACT: 1. Unit for studying the laws of deformation and destruction of samples, for example, of structural plastic sheets subjected to one-sided high-temperature heating using air as a medium, or a protective medium, during testing for pulling stress, bending, or compression. This unit is equipped with a system for the tensometric measurement of the load and deformation of samples, and also a movie camera for recording the processes of deformation and destruction of samples.

Distinguishing features: In order to measure the temperature of the surfaces of the samples at the time they are being tested according to the scheduled program, the unit is equipped with an open electric furnace, which automatically moves in

Card 1/3

ACCESSION NR: AP3007468

accordance with a master pattern to or from the sample.

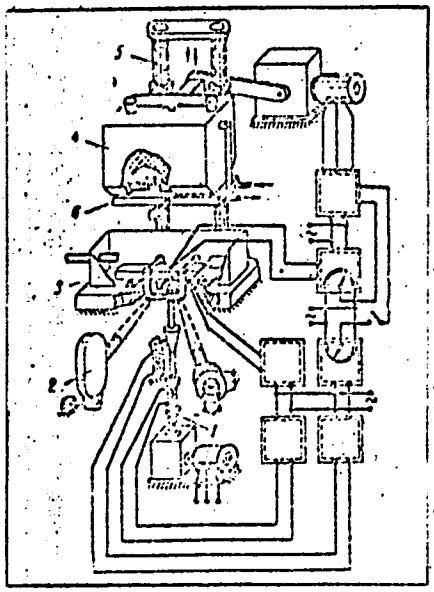
2. Unit as per paragraph 1. Distinguishing feature: In order to determine the exact moment of start of the testing with high-speed one-sided heating, it is equipped with a moveable water-cooled slide valve for shielding the open zone of the furnace.

ASSOCIATION: none

SUBMITTED: 27Feb61	DATE ACQ: 14Oct63	ENCL: 01
SUB CODE: ML	NO REF SOV: 000	OTHER: 000

Card 2/3

ACCESSION NR: AP3007468 ENCL: 01



1. tensometric system
2. movie camera
3. tested sample
4. open electric furnace
5. Guides for moving the furnace
6. moveable water-cooled valve

Card 3/3

USSR

ACCESSION NR: AP3007709 S/0286/63/000/012/0051/0052

AUTHOR: Lozinskiy, M. G.

TITLE: Device for testing the bonding of metals and alloys in contact during exposure to high temperature and to compression in vacuum and various gaseous media

SOURCE: Byul. izobret. i tovarn. znakov, no. 12, 1963, 51-52

TOPIC TAGS: metal testing, alloy testing, vacuum testing, gas testing

ABSTRACT: A device for testing the bonding of metals and alloys in contact during exposure to high temperature and to compression in vacuum and various gaseous media, consisting of a vacuum test chamber within which are found the sample under study with a heater and heat shield arrangement; a loading arrangement, consisting of a rod and various weights which can be attached to it and a connecting rod for transmitting the force to the sample, the changing of the loading being accomplished without breaking the vacuum by use of a sylphon bellows coupling the connecting rod to the bell jar; characterized in that in order to determine the magnitude of the force necessary to break the zone of the bond and in order to

Card 1/2

ACCESSION NR: AP3007709

characterize its stability properties, the device is outfitted with a tensiometric system which includes a thrust plate to which is attached the end of the rod which couples to the connecting rod and also an elastic element to which is attached an indicator, e.g., a resistor, inductor, or capacitor.

ASSOCIATION: none

SUBMITTED: 00	DATE ACQ: 15Oct63	ENCL: 00
SUB CODE: ML	NO REF SOV: 000	OTHER: 000

Card 2/2

LOZINSKIY, M.G.; MIROTVORSKIY, V.S.; RAKHSHTADT, A.G.

Effect of tensile stresses on the beryllium bronze aging process.
Fiz. met. i metalloved.16 no.3:366-369 S '63. (MIRA 16:11)

1. Institut mashinovedeniya AN SSSR.

LOZINSKIY, M.G.; FERENETS, V.Ya.

Experimental determination of the role of grain boundaries in the general deformation of platinum during tension at a constant speed and heating from 20-1000°. Fiz. met. i metalloved. 16 no.3:409-415 S '63. (MIRA 16:11)

1. Institut mashinovedeniya AN SSSR.

S/032/63/029/002/025/028
B101/B186

AUTHORS: Lozinskiy, M. G., Antipova, Ye. I., and Nikitina, I. I.

TITLE: Device for protecting the inspection glass in high-temperature studies

PERIODICAL: Zavodskaya laboratoriya, v. 29, no. 2, 1963, 237 - 238

TEXT: In order to avoid misting of the field of vision caused by sublimates when studying the microstructure of heated samples in vacuo, driving device is suggested which causes a quartz glass disc of 105 mm diameter to rotate and simultaneously to shift in plane-parallel direction at a rate of 3.8 mm per rotation. This ensures that a clear section of the quartz glass always appears in front of the eyepiece. There are 2 figures.

ASSOCIATION: Institut mashinovedeniya (Institute of the Sciences of Machines)

Card 1/1

ANTIPOVA, Ye.I.; LOZINSKIY, M.G.

Kinetics of the oxidation of metals during heating studied by means of selective coloring. Zav.lab. 29 no.7:815-817 '63. (MIRA 16:8)

(Metals--Corrosion) (Metallography)

L 10000-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4/
Pad IJP(c) MJW/JD/HW/GS
ACCESSION NR: AT4049809 S/0000/64/000/000/0014/0026

AUTHOR: Lozinskiy, M. G.

TITLE: The importance of the structural factor in solving problems of the strength of alloys and metals designed for service at high temperatures

SOURCE: Soveshchaniye po uprochneniyu detaley mashin, 1962. Protsessy uprochneniya detaley mashin (Processes of the hardening of machine parts); doklady soveshchaniya. Moscow, Izd-vo Nauka, 1964, 14-26

TOPIC TAGS: nickel, nickel alloy, nickel heat resistance, nickel structure, nickel alloy structure, nickel strength, high temperature strength

ABSTRACT: The strength of metals and alloys may be increased either by changing their chemical composition with alloying elements or by changing their structure. The structure can be changed by creating ideal monocrystals or by thermal, mechanical and/or thermomechanical working. Thermomechanical working is subdivided [illegible] techniques for different groups of materials: 1) heating hot over 100- [illegible] and 2) heating at high temperatures of 900C and over. Thermal working of steel is performed at 100-150C, ensuring the formation of austenitic solid solutions. The main disadvantage of this process is deterioration of the martensite

Card 1/4 3

when the steel is heated above 150C. This method is known as "ausforming" or "marworking." The high-temperature thermomechanical method includes a combination of hot plastic deformation at temperatures above the recrystallization temperature with rapid cooling (hardening) and subsequent aging. This method, based on stabilized hot working, is abbreviated NHW. The advantage of this NHW method, was worked out by V. D. Sadovskiy [illegible] and the author of [illegible] that the heat treatment [illegible] the importance of structural factors in the [illegible] of steel [illegible] ture nickel and EI437B nimonic alloy were tested. Billets having a diameter [illegible] mm were rolled at a rate of 6.7 m/min. The nickel was kept in a furnace at [illegible]C for 1 hour and cooled in the furnace to 900, 800, 700, 600 and 500C with [illegible] ment rolling. The EI437B alloy was kept in a furnace at 1100C for 30 minutes [illegible] rolled after cooling to 1100 and 1000C. Treatment was finished by aging at [illegible]C for 16 hrs. The grain structure after NHW shows "fracturing" of the grain [illegible] separate fragments with slippage lines indicating the appearance and completion of local displacement, as well as the formation of irregularities at the grain boundaries. These irregularities may be estimated by the period and amplitude of recesses and projections at the joints. They vary from scores to fracti[illegible]

Card 2/4

L 40000-65
ACCESSION NR: AT4049809

of microns. The increase in the time required for deformation of the sample to the allowable limit during NHW in comparison with normal treatment under creep tests is explained by the structure formed during NHW. The redistribution of dislocations and their concentration is very important for increasing the strength of materials after NHW. As the NHW temperature increases, the nickel resistance under plastic [illegible] drops, lowering the degree of [illegible] and hardness. X-ray analysis [illegible] to detect changes in crystal structure. The marked deviations in the [illegible] of the deformed nickel prevent recovery during NHW. Due to the [illegible] processes during NHW, [illegible] determined by the heat treatment [illegible]. It is probably caused by accumulation of dislocations at the [illegible] grain and block boundaries which prevent shifting of separate dislocations leading to micro-deformations in the material. This permits the conclusion that the fine [illegible] structure appearing after NHW does not affect hardening, but [illegible] of hot working properties obtained at high deformation temperatures. The results of mechanical testing of nickel showed that nickel has the highest stability after NHW at 900C. Orig. art. has: 9 figures.

SUBMITTED 21MAY64

Card 3/4

L 2962-65 EWT(m)/EWP(b) Pad JD/JW/JG

ACCESSION NR: AT4048869 S/0000/64/000/000/0358/0366

AUTHOR: Lozinskiy, M. G., Pertsovskiy, N. Z., Ferenets, V. Ya.

TITLE: Evaluation of the importance of various deformation processes in the elongation of nickel at high temperatures B

SOURCE: AN SSSR. Nauchny*y sovet po probleme zharoprochny*kh splavov. Issledovaniya staley i splavov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 358-366

TOPIC TAGS: nickel, high temperature stretching, nickel elongation, nickel deformation, grain slippage, nickel structure, nickel crystallization, tensile stress

ABSTRACT: The importance of different deformation processes may be evaluated by quantitative metallography. The present article includes data on the total elongation of nickel samples when tested on the IMASh-5S machine at 400-1000C and at rates from 0.5 to 800%/hr. The flat 5x2 mm nickel samples were 99.3% pure and had passed metallographic tests. The grain size variation was calculated by the Rachinger equations. Elongation was measured on a PMT-3 table with 130X magnification. The quantity and size of intercrystalline fractures was also measured. The main variations in nickel grain shape and size for different testing conditions are shown in Figures 1 and 2 of the Enclosure. An

Card 1/5

increase in the rate of elongation to 600-800%/hr causes marked disintegration of the structure. By comparing the curves in Fig. 2, it may be seen that when the grains are further from the surface, with elongation rates of 0.5 to 8%/hr, the grains become larger, while at 600-800%/hr, the structure disintegrates. Sliding along the grain boundaries was determined on the nickel samples under tension at 400 and 800C and a rate of 0.5-0.6%/hr. On the basis of the data obtained it is concluded that at a rate of 0.5-0.6%/hr the highest quantity of cracks per unit sample length, the maximum average crack width in the direction of tension and the largest fraction of total elongation occur at 800C. Further away from the surface, these deformations drop sharply. The total length of separate cracks was also calculated, being equal to 0.25 mm at 400-600C and reaching 0.4-0.6 mm at 800-900C. The test data obtained show that nickel deformation at temperatures above 600C is accompanied by recrystallization. The recrystallization process varies for different deformation rates, grain growth increasing as the rate drops. It is noted that nickel recrystallization is higher than for aluminum as polygonization proceeds under these conditions for aluminum. The laws of variation of grain shape and size were also determined for different nickel sections under tension at 400-1000C and various deformation rates from 0.5 to 800%/hr. It is proven that the sharp enlargement of grain boundaries [illegible] deformation rates and at 800C limits the development of integranular deformation [illegible]. Grain slippage is observed at these rates, as well as lack of recrystallization.

L 9962-65
ACCESSION NR: AT4046869

D

The difference in deformation processes at the surface and inside the nickel is explained by prior recrystallization in the inner layers and by unequal distribution of intergranular [illegible] in the material. Orig. art. has: 4 figures, 4 equations and 1 table.

ASSOCIATION: None

SUBMITTED: 16Jun64 ENCL: 02 SUB CODE: MM

NO REF SOV: 012 OTHER: 010

Card 3/3

L 0951-65
ACCESSION NR: AT4046869

ENCLOSURE: 01

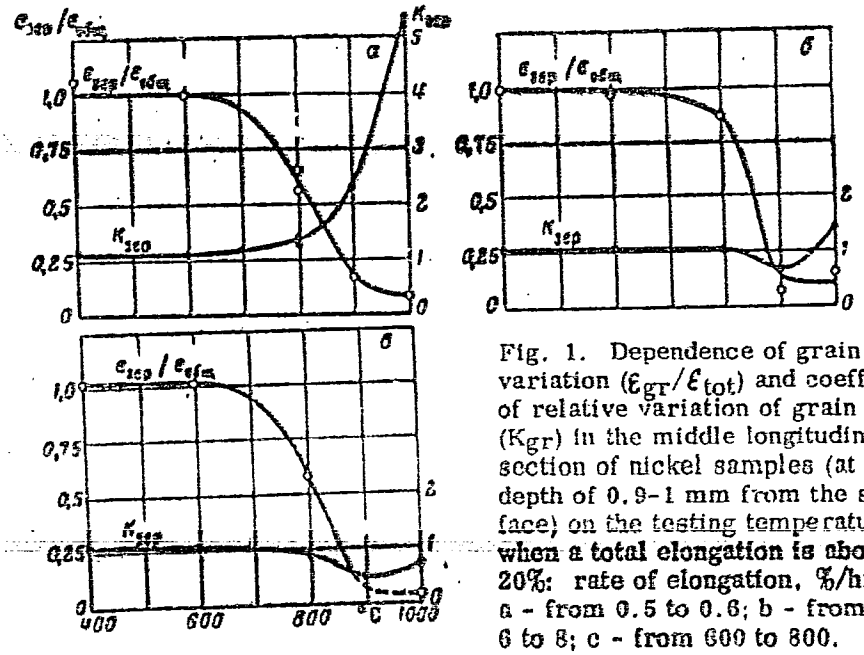


Fig. 1. Dependence of grain size variation ($\varepsilon_{gr}/\varepsilon_{tot}$) and coefficient of relative variation of grain size (K_{gr}) in the middle longitudinal section of nickel samples (at a depth of 0.9-1 mm from the surface) on the testing temperature when a total elongation is about 20%: rate of elongation, %/hr: a - from 0.5 to 0.6; b - from 6 to 8; c - from 600 to 800.

Card 4/5

L 9962-65
ACCESSION NR: AT4046869

ENCLOSURE: 02

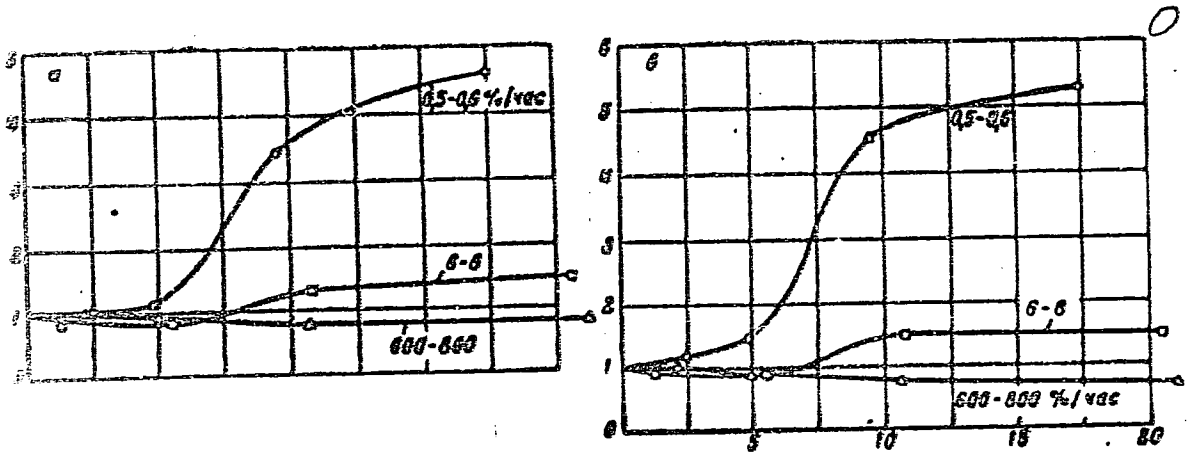


Fig. 3 Variation of relative grain size in nickel samples during the deformation process at 1000C at different rates of elongation: a - at a depth of 0.05-0.08 mm from the surface; b - in the middle longitudinal section of the samples (at a depth of 0.9-1 mm).

Card 6/5

LOZINSKIY, M.G. (Moskva); FERENETS, V. Ya.

Effect of cyclic temperature fluctuations and tensile stresses on changes in the microhardness along the cross-section of grains and deformations occurring in commercial-grade iron. Izv. AN SSSR Met. i gor. delo no.2:97-104 Mr-Ap'64 (MIRA 17:8)

L 8944-65 EWT(m)/EWP(q)/EWP(b) JD/JG

ACCESSION NR: AT4043509 S/3107/64/000/003/0091/0103

AUTHOR: Lozinskiy, M. G.(Doctor of technical sciences); Pertsovskiy, N. Z.(Candidate of technical sciences)

TITLE: Use of microstructural analysis to study palladium deformation during creep testing in vacuum

SOURCE: Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promy*shlennosti. Sektsiya metallovedeniya i termicheskoy obrabotki. Metallovedeniye i termicheskaya obrabotka, no. 3, 1964, 91-103

TOPIC TAGS: palladium deformation, palladium creep test, palladium microstructure, palladium property, palladium creep, palladium

ABSTRACT: Specimens of 99.82% pure palladium 3x3x50 mm, which had been vacuum annealed at 1300C for 1.5 hr to an average grain size of 1.25 mm, were subjected to creep testing in vacuum at 400—1000C under an initial stress of 4.42—68.6 Mn/m^2 (0.45—7.0 kg/mm^2) at a steady creep rate of 0.5—1.0%/hr. The results showed that at 400—600C the mechanism of palladium creep is characterized by intragranular slip; the slip bands become wider, and the space between them increases as the test temperature increases. Above 600C the creep gradually

Card 1/2

L 8944-65
ACCESSION NR: AT4043509

changes from intragranular to intergranular. At 1000C displacement of grains, migration of grain boundaries, and formation of intercrystalline cracks and subboundaries are observed. Orig. art. has: 7 figures and 1 table.

ASSOCIATION: Nauchno tekhnicheskoy obshchestvo mashinostroitel'noy promyshlennosti (Scientific Technical Society of Machine Construction Industry)

SUBMITTED: 00 ATD PRESS: 3107 ENCL: 00

SUB CODE: MM NO REF SOV: 009 OTHER: 014

Card 2/2

BERG,A.I.,glav.red.; TRAPEZNIKOV,V.A.,glav.red.; TSYPKIN, Ya.Z., doktor tekhn.nauk,prof.,red.; VORONOV,A.A., doktor tekhn.nauk,prof.,red.; SOTSKOV,B.S., doktor tekhn.nauk,red.; AGEYKIN,D.I., doktor tekhn. nauk, red.; GAVRILOV,M.A., red.; VENIKOV,V.A., doktor tekhn.nauk, prof.,red.; CHELYUSTKIN,A.B., doktor tekhn. nauk,red.; PROKOF'YEV, V.N., doktor tekhn.nauk,prof.,red.; IL'IN,V.A., doktor tekhn.nauk, prof.,red.; KITOV,A.I.,doktor tekhn.nauk,red.; KRINITSKIY, N.A., kand. fiz.-matem.nauk,red.; KOGAN,B.Ya., doktor tekhn.nauk, red.; USHAKOV,V.B., doktor tekhn.nauk,red.; LERNER,Yu.A., doktor tekhn. nauk,prof., red.; FEL'DBAUM, A.A.,prof., doktor tekhn.nauk,red.; SHREYDER,Yu.A., kand. fiz.-mat. nauk,dots.,red.; KHARKEVICH,A.A., akad., red.;TIMOFEYEV,P.V., red.; MASLOV,A.A.,dots.,red.; LEVIN, G.A., prof.,red.; LOZINSKIY,M.G., doktor tekhn.nauk,red.; NETUSHIL, A.V., doktor tekhn.nauk,prof.,red.; POPKOV,V.I.,red.; ROZENBERG, L.D.,doktor tekhn.nauk,prof.,red.; LIVSHITS,A.L.,kand.tekhn.nauk,red.

[Automation of production and industrial electronics] Avtomatizatsiia proizvodstva i promyshlennaia elektronika; entsiklopediia sovremennoi tekhniki. Moskva, Sovetskaia Entsiklopediia. Vol.3. Pogreshnost' resheniia - Teleizmeritel'naia sistema chastotnaia. 1964. 487 p. (MIRA 17:10)

1. Chlen-korrespondent AN SSSR (for Sotskov, Gavrilov, Timofeyev, Popkov).

ACCESSION NR: AP4028551 S/0191/64/000/004/0037/0043

AUTHOR: Vishnevskiy, G. Ye.; Lozinskiy, M. G.

TITLE: Durability of VFT-S and KAST-V glass cloth samples on flex testing under conditions of unidirectional heating

SOURCE: Plasticheskiye massy*, no. 4, 1964, 37-43

TOPIC TAGS: glass cloth, flex test, unidirectional heat, VFT-S glass cloth, KAST-V glass cloth, durability, life, strength, deformation, stability, stress limit, critical deflection, IMASh-11 test unit, flexing breakdown mechanism

ABSTRACT: The strength of VFT-S and KAST-V glass cloth sheets heated on one side to 1000C at temperature increase rates of up to 50 degrees per second was tested on a unit designed by the authors (Ustanovka IMASh-11 dla izucheniya prochnostny*kh i deformatsionny*kh svoystv listovy*kh konstruktsionny*kh plastmass v usloviyakh odnostoronnego vy*sokotemperaturnogo nagreva. Izd. TsITEIN, 1963. "IMASh-11 unit for testing strength and deformation properties

Card 1/3

of sheet plastics under conditions of unidirectional high-temperature heating.") Depending on their thickness, these fiberglass samples withstood stresses of 500 kgs/cm^2 for 30 to 120 seconds when heated at a rate of 10 and 25 degrees/second. In flex tests under unidirectional heating, when the stress is toward the heater, the sample life is longer than when stress is away from the heater. The relationship between the life (τ) of the samples and the level of the initial estimated stress in the limits of 10 to 120 seconds on the time scale is characterized with sufficient accuracy by the expression $\tau = A - B\sigma_0$. It is assumed that if the heating conditions are not stationary, causing structural changes in the material, the given relationship can differ from the known time-strength relationship at constant temperature. With the help of motion pictures it was established that sample breakdown on flexing takes place in two stages. In the first stage the preliminary elastic-plastic deformation under the action of the normal tensile forces of compression of the surface subjected to heat causes the "critical deflection" of the samples. In the second stage, after the "critical deflection" is exceeded, the stability of the layers of the compression zone is lost, characterized by the formation of the shifted folds directed at an angle of about 45° to the

ACCESSION NR: AP4026551

plane of the cross section of the sample. Orig. art. has: 8 figures, 3 tables and 3 equations.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 28Apr64 ENCL: 00

SUB CODE: MA NO REF SOV: 011 OTHER: 001

Card 3/3

LOZINSKIY, M.G.; FERENETS, V. Ya.

Effect of cyclic $\alpha \rightleftarrows \gamma$-transformations on shape modifications of iron specimens. Metalloved. i term. obr. met. no.12:42-43 D '64 (MIRA 18:2)

1. Institut mashinovedeniya Gosudarstvennogo komiteta po mashinovedeniyu pri Gosplane SSSR.

L 16449-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) Pad ESD(t)/AEDC(a)/SSD/AFWL/
AS(mp)-2/ASD(p)-3 JD/HW/JT
ACCESSION NR: AP4042050 S/0126/64/017/006/0903/0908

AUTHOR: Lozinskiy, M. G.; Pertsovskiy, N. Z.

TITLE: The problem of the mechanism of failure of polycrystalline metals at high temperatures

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 6, 1964, 903-908

TOPIC TAGS: boundary strength, grain strength, polycrystalline metal, Jeffries theory, high temperature, plasticity, brittleness, Ni, Ni Fe alloy

ABSTRACT: The effects of temperature on boundary and grain strength of polycrystalline metals have been widely studied by Jeffries whose views are commonly accepted. The authors came up with results which make a further investigation of Jeffries' proposals necessary. They applied tensile tests in a 10^{-5} mm Hg vacuum at 20, 400, 700 and 1000 C to 99.3% Ni and Ni + 30% Fe specimens. At 20 and 400 C the plasticity of Ni specimens was 72 and 51% respectively. Deformed grains were characteristic of the microstructure. With temperatures at 700 C, plasticity dropped to 15.8% but was restored during further temperature increase of up to 1000 C. Microexaminations showed the predominance of equiaxial grains. Plasticity

Card 1/3

was also high in the Ni-Fe specimen with negligible restoration (4.7%) at 1000 C. The authors propose a generalized diagram of changes in the mechanism of failure of polycrystalline metals within a wide range of temperatures. The diagram should be adjusted in accordance with the purity and the nature of the material but otherwise it is applicable to many metals and alloys that exhibit a tendency towards hot brittleness and recrystallization during high-temperature deformation. However, the rate of deformation has to be invariable within a wide temperature interval. Orig. art. has: 4 figures.

ASSOCIATION: Institut machino-vedeniya Goskomiteta po machinostroyeniyu pri Gosplane SSSR (Institute of Machine Construction, State Committee of Machine Construction, State Planning Commission)

SUBMITTED: 20Jul63 ENCL: 01

SUB CODE: MM NO REF SOV: 011 OTHER: 004

L 16449-65
ACCESSION NR: AP4042050

ENCLOSURE: 01

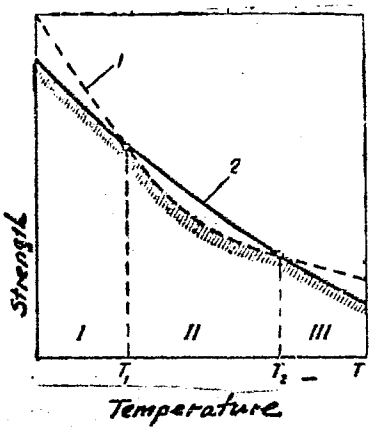


Fig. 4. Diagram of changes in the mechanism of failure of polycrystalline metals during heating (v_{def} = const); (1) intercrystalline strength; (2) intracrystalline strength.

Card 3/3

L 24853-65 EWG(j)/EWT(m)/EPF(c)/EPR/EWP(t)/EWP(b) Pr-4/Ps-4/Pad IJP(c)/
SSD/AFWL/APETR JD/HW

ACCESSION NR: AP4046099 S/0126/64/018/003/0473/0475

AUTHOR: Antipova, Ye. I.; Lozinskiy, M. G.; Mirotvorskiy, V. S.

TITLE: Comments on the problem of the kinetics of recovery in recrystallization

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 3, 1964, 473-475

TOPIC TAGS: recrystallization, hardness, reduction, nickel, workhardening

ABSTRACT: Technically pure Ni was reduced to 25% at room temperature, subjected to hardworking at 900C and another 25% reduction and subsequently water quenched. The recrystallization of Ni was characterized by an appreciable decrease in hardness with time and a high initial hardness of the recrystallized sections of the structure which also decreased as the holding period was extended. Specimens reduced at high temperatures and specimens annealed for 3 hours within the 500 to 900 C range were characterized by an analogous pattern of initial high hardness of the recrystallization section. Apparently, the new grains are subjected to the stresses which expand throughout the workhardened material

Card 1/2

although the level of internal stresses is considerably lower than in that workhardened part. With the formation of new grains, microhardness decreases in both the new and the workhardened grains. Deviations from the linear relationship observed in the recrystallized sections when recrystallization is slight and in non-crystallized sections when it is appreciable, are attributed to the base layer. With a base layer softer than the object of investigation, the hardness values are lower and with a harder base layer they are higher. This relationship may prevail in the beginning and towards the end of the process of recrystallization when small amounts of new grains and the remainders of non-crystallized old grains occur in the basic mass of the opposite structure. Orig. art. has: 4 figures

ASSOCIATION: Institut mashinovedeniya (Institute of Machine Science)

SUBMITTED: 10Nov63 ENCL: 00

SUB CODE: MM NO REF SOV: 001 OTHER: 000

LOZINSKIY, M.G.; MIROTVORSKIY, V.S.

Precision of microhardness measurements. Zav. lab. 30 no.7: 894-896 '64. (MIRA 18:3)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut mashinovedeniya.

LOZINSKIY, M. G.; ROMANOV, A. N. (Moscow)

"Some features of the fracture mechanism of commercial iron during fatigue tests within wide ranges of temperature."

report submitted for 2nd Conf, Dimensioning and Strength Calculations, Budapest, 5-10 Oct 1965.

L 13514-66 EWT(d)/EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)

ACC NR: AT6003652 JD/GS SOURCE CODE: UR/0000/65/000/000/0096/0112

AUTHORS: Lozinskiy, M. G.; Mirotvorskiy, V. S.

ORG: none

TITLE: Construction of devices and the precision of determining microhardness at high temperatures

SOURCE: Soveshchaniye po mikrotverdosti. 2d, 1963. Metody ispytaniya na mikrotverdost'. Pribory. (Methods and instruments for microhardness testing). Moscow, Izd-vo Nauka, 1965, 96-112

TOPIC TAGS: hardness, [redacted], iron, metallurgic testing machine, high temperature research, pressure measuring instrument

ABSTRACT: A general discussion of microhardness testing devices is presented. The devices are divided into four types. To type I belong those in which indentation is produced at a high temperature but the size is determined at room temperature. Type II includes those devices in which the indentation is measured at the temperature at which it is produced. Type III devices are similar to the type II ones, but include sighting attachments for precise locating of the indentations. Type IV devices are similar to those of type III but also include a mechanism for applying tensile stresses to the specimens. Five different microhardness testers are discussed (all previously described in the literature). The performance of three devices in determining microhardness of iron in the temperature range of 20--1300C is explained, and the

Card 1/2

experimental results are tabulated. It is concluded that the performances of the three devices are approximately the same. The equipment tested here has been described by H. Schenk, E. Schmidtmann, H. Brandis, and K. Winkler (Arch. Eisenhuettenwesen, 1958, 29, H. 10, S. 653), by M. G. Lozinskiy and V. S. Mirotvorskiy (Izd. TsITEIN, tema 32, No. P-61-16/4. M., 1961), and by Ye. S. Berkovich (Zavodskaya laboratoriya, 1963, No. 10). It was also found that there was little or no discrepancy between microhardness determinations obtained from indentation dimensions measured at high and at room temperatures for temperatures below 1100C. It is noted that little information is available on the effect of high temperatures on the properties (especially on the shape) of microhardness indentors. Further research along these lines is in progress. Orig. art. has: 2 tables and 7 figures.

SUB CODE: 13,11,20/SUBM DATE: 18Jun65/ ORIG REF: 003/ OTH REF: 004

L 15316-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b) IJP(c)

ACC NR: AT6003654 JD/HW/GS SOURCE CODE: UR/0000/65/000/000/0148/0157

63
61
B+1

AUTHORS: Lozinskiy, M. G.; Mirotvorskiy, V. S.

ORG: None

TITLE: Certain areas of application of the microhardness method at high temperatures 49,55, 16

SOURCE: Soveshchaniye po mikrotverdosti. 2d, 1963. Metody ispytaniya na mikrotverdost'. Pribory. (Methods and instruments fo. microhardness testing). Moscow, Izd-vo Nauka, 1965, 148-157

TOPIC TAGS: hardness, ~~metal, bronze~~, nickel, ~~beryllium~~, metal rolling, ~~iron, steel/ KhVG steel~~ high temperature effect, recrystallization, pressure measuring instrument

ABSTRACT: The kinetics of high-temperature weakening of cold-worked, technically pure nickel was studied by the microhardness method. The specimens, originally cold-rolled at 20C, were hot-rolled at 400--900C and were subsequently hardened by water immersion. The microhardness of the specimens at 600C was determined as a function of the annealing time. The experimental procedure followed that described by M. G. Lozinskiy (Stroyeniye i svoystva metallov i splavov pri vysokikh temperaturakh. Metallurgizdat, 1963). The effect of recrystallization on the microhardness of nickel specimens rolled at 20C and 900C respectively was determined, and the experimental results are presented graphically (see Fig. 1). These results are compared with previously reported data for technical iron by the authors (Izv. AN SSSR, OTN, Metallurgiya i toplivo, 1959, No. 3),

Card 1/2

for tempered steel KhVG and beryllium bronze Br.B 2,4 by M. G. Lozinskiy, V. S. Mirotvorskiy, and A. G. Rakhshtadt (Fizika metallov i metallovedeniye, 1963, 16, vyp. 3). It is suggested that measurements of "hot" microhardness may yield valuable information on the behavior of metals and alloys at high temperatures, particularly when these metals are subjected to various stresses.

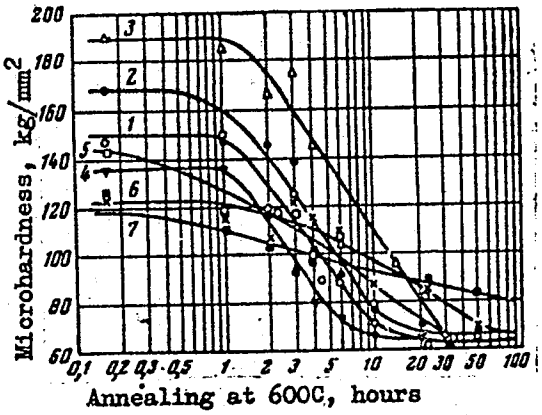


Fig. 1. Change of the high-temperature microhardness of nickel during annealing at 600C. Preliminary treatment: 1 - rolled at 20C; 2 - at 400C; 3 - at 500C; 4 - at 600C; 5 - at 700C; 6 - at 800C; 7 - at 900C

Orig. art. has: 7 graphs.

SUB CODE: 13, 11/ SUBM DATE: 18Jun65/ ORIG REF: 007/ OTH REF: 002

Card 2/2

BERG, A.I., glav. red.; TRAPEZNIKOV, V.A., glav. red.; TSYPKIN, Ya.Z., doktor tekhn. nauk, prof., red.; VORONOV A.A., prof., red.; AGEYKIN, D.I., doktor tekhn.nauk red.;GAVRILOV, M.A., red.; VENIKOV, V.A., doktor tekhn. nauk, prof., red.; SOTSKOV, B.S., red.; CHELYUSTKIN, A.B., doktor tekhn. nauk, red.; PROKOF'YEV, V.N., doktor tekhn. nauk, prof., red.; IL'IN, V.A., doktor tekhn. nauk, prof., red.; KITOV, A.I., doktor tekhn. nauk, red.; KRINITSKIY, N.A., kand. fiz.-mat. nauk, red.; KOGAN, B.Ya., doktor tekhn. nauk, red.; USHAKOV, V.B., doktor tekhn. nauk, red.; LERNER, A.Ya., doktor tekhn. nauk, prof., red.; FEL'DBAUM, A.A., doktor tekhn. nauk, prof., red.; SHREYDER, Yu.A., kand. fiz.-mat. nauk, red.; KHARKEVICH, A.A., akademik, red. [deceased]; TIMOFEYEV, P.V., red.; MASLOV, A.A., dots., red.; TRUTKO, A.F., inzh., red.; LEVIN, G.A., prof., red.; LOZINSKIY, M.G., doktor tekhn. nauk, red.; NETUSHIL, A.V., doktor tekhn. nauk, prof., red.; POPKOV, V.I., red.; ROZENBERG, L.D., doktor tekhn. nauk, prof., red.; LIFSHITS, A.L., kand. tekhn. nauk, red.; AVEN, O.I., kand. tekhn. nauk, red.; BLANN, O.M.[Blunn, O.M.], red.; BROYDA, V., inzh.,prof.,red.; BREKKL', L.[Brockl,L.] inzh., knad. nauk, red.; VAYKHARDT, Kh. [Weichardt, H.], inzh., red.; BOCHAROVA,M.D., kand. tekhn. nauk, st. nauchn. red.

[Automation of production processes and industrial electronics] Avtomatizatsiia proizvodstva i promyshlennaia elektronika; entsiklopediia sovremennoi tekhniki. Moskva, Sovetskaia entsiklopediia. (MIRA 18:6)
Vol.4. 1965. 543 p.

L 54497-65 EWT(m)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4/Pad LJP(c)
ACCESSION NR: AP5013121 JD/HW UR/0370/65/000/002/0167/0174
539.4.015/019

AUTHOR: Lozinskiy, M. G.; Pertsovskiy, N. Z.

TITLE: The effect of ausforming conditions on strength properties of nickel at high temperatures

SOURCE: AN SSSR. Izvestiya. Metally, no. 2, 1965, 167-174

TOPIC TAGS: ausforming, thermomechanical treatment, nickel, metallography

ABSTRACT: The wide use of nickel as a base for high temperature alloys led to the investigation of the effects of rolling at temperatures from 400-900°C (then quenching in water) at a rate of 5 m/min to reductions of 2-45%. Material rolled at room temperature and simply annealed material (1100°) were investigated. The most effectual treatments for increase in 100 hr rupture life at 400°C were hot rolling at 500°C and room temperature rolling at reductions of 25-45%. Ductility (reduction in area) for 100 hour rupture life below 20% rolling reduction is substantially lower for these treatments. Lower temperature treatments show better strength properties for both short and long time tests at 400°C, the best results being ob-

Card 1/2

L 54497-65
ACCESSION NR: AP5013121

tained from the material reduced at room temperature. Both 100 hour rupture life (all specimens) and short time ductility curves (room temperature and 500°C treatments) show pronounced minima at reductions of 5-20%. With increasing steps of reduction at all temperatures, optical metallography showed the structure of grain centers to become increasingly complex. Grain boundaries became irregular in an acicular way with deformation at the higher temperatures (700-900°C). This irregularity was also noticed on electron microscope replicas. Orig. art. has: 6 figures, 1 table.

ASSOCIATION: none

SUBMITTED: 14May64 ENCL: 00 SUB CODE: MM

NO REF SOV: 008 OTHER: 002

Card 2/2

ACCESSION NR: AP5014452 UR/0380/65/000/003/0056/0065
620.172.25+62-75

AUTHORS: Lozinskiy, M. G. (Moscow); Romanov, A. N. (Moscow)

TITLE: Basic types of microstructure deformations developing on the surface of industrial iron specimens during fatigue tests at a high temperature in a vacuum

SOURCE: Mashinovedeniye, no. 3, 1965, 56-65

TOPIC TAGS: fatigue strength, iron, microstructure

ABSTRACT: Testing equipment used in the iron microstructure experiments is described. The range of temperature was 20-1200C. The specimens tested were 90 mm long with a cross section 10 x 1 mm, and the load was symmetrical at 3000 cycles per minute. Studies were carried out after approximately 10 million cycles. Two series of investigations were conducted. In the first the dislocations within the grains were observed, and in the second the border zone of the grains was studied. Figure 1 on the Enclosure shows typical conditions found in the first series; Fig. 2 represents group two. The specimens were studied in three temperature intervals: 20 to 400C, 500C up to and over 800C, and 400 to 500C. Deformations (their origin and propagation) are described in full.

Card 1/2

L 53806-65
ACCESSION NR: AP5014452

Twelve high quality microscope photographs illustrate the experiments of both series. A special type of dislocation is shown, where "subgrains" smaller than one micron are formed within the grains. Another type of dislocation is found to be caused by recrystallization of the border zone, resulting in a change of the size of grains. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 14Jan65 ENCL: 02 SUB CODE: MM, SS

NO REF SOV: 006 OTHER: 001

Card 2/4

L 57067-65 EWT(d)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)/EWA(h)/EWA(c) Pf-4/Peb EM/JD

ACCESSION NR: AP5014209 UR/0122/65/000/005/0056/0063

620.178.3

AUTHORS: Lozinskiy, M. G. (Doctor of technical sciences); Romanov, A. N. (Engineer)

TITLE: State of the art of the study of fatigue failure in metals and alloys

SOURCE: Vestnik mashinostroyeniya, no. 5, 1965, 56-63

TOPIC TAGS: fatigue, metal fatigue, fatigue failure, slip line, slip band, fatigue life / IMASh 10 apparatus

ABSTRACT: The article presents a review of the state of the art of fatigue failure investigations. An elaborate chart of the different methods for studying the microstructure and the mechanical and physical properties of materials is presented (including methods used for high temperature fatigue). These methods are grouped under the broad classifications: a) light and electron microscopic and x-ray structural methods (for microstructure studies); b) measurements of elasticity and hardness (mechanical properties); c) electrical, acoustical, magnetic, and ultrasonic characteristics (physical properties). It has been established by V. S. Ivanova (Ustalostnoye razrusheniye metallov. Metallurgizdat, 1963)

Card 1/3

that fatigue cracks begin to appear after only 1-10% of the total fatigue life. The various microstructure methods used to study the formation and growth of these cracks have yielded the following general characteristics (see also Ya. B. Fridman, E. A. Gordeyeva, and A. M. Zaytsev, Stroyeniya i analiz izlomov. Mashgiz, [illegible]). Cyclic loading causes plastic shear within the grains, resulting in slip lines which grow in number and length (sometimes fragmenting the grains), form slip bands, and finally form microcracks which [illegible]. If loading is below the endurance limit, the bands do not cross grain boundaries, and the cracks do not grow. The elastic property and microhardness effects in fatigue are treated respectively by I. A. Oding (Dopuskayemye napryazheni/a v mashinostroyenii i tsiklicheskaya prochnost' metallov. Mashgiz, 1962) and T. Jakobory (Damage as an Initial Stage of Fatigue Fracture. Journ. Phys. Soc. Japan, v. 8, No. 6, 1953). These indicate that the microhardness increases with cycles until the slip bands are formed and then decreases while the elastic properties exhibit a hysteresis loop due to internal friction losses. Changes in electrical properties, magnetic properties (see N. S. Akulov and V.A. Franyuk. Ob izmenenii nekotorykh fizicheskikh svoystv metallov v protsesse ustalosti. Doklady AN BSSR, t. III, No. 3, 1959) and acoustic emission (see N. N. Redsterake, Metals "Sound Off" on Fatigue. "Iron Age", 192, No. 12, 1963) have also been used to study fatigue behavior. Ultrasonic techniques (see N. I. Bratina and D. Mills. Study of Fatigue in Metals using

L 57067-65

ACCESSION NR: AP5014209

Ultrasonic Technique. Metal Treatment and Drop Forging, v. 30, No. 213, 1963) have become useful in determining the amount of fatigue damage. The authors briefly describe an apparatus (IMASh-10) developed by them which permits observation and photographing of the sample microstructure during fatigue testing by [illegible] a stroboscopic flash synchronized with the specimen motion. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 013 OTHER: 007

Card 3/3

L 11096-66 EWT(m)/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) IJP(c) JD/HW

ACC NR: AP5026365 SOURCE CODE: UR/0370/65/000/005/0164/0169

AUTHOR: Lozinskiy, M. G. (Moscow); Pertsovskiy, N. Z. (Moscow)

44
B

ORG: none

TITLE: Increasing the heat resistance of Ni by means of high temperature thermo-mechanical treatment

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 164-169

TOPIC TAGS: mechanical heat treatment, dispersion hardening, heat resistance, tensile strength, annealing, yield stress

ABSTRACT: High temperature tensile tests were made on NP-2 Ni rods of 16 mm diameter. In addition to Co the Ni contained the following base impurities: 0.04% Mg, 0.02% Fe, 0.06% Si, 0.01% mn, 0.03% Cu, 0.015% Zn and 0.014% S. The rods were given a preliminary annealing treatment of 3 hrs at 1100°C and subjected to high temperature thermomechanical treatment (HTTT) at 500, 700 and 900°C (6.7 m/min) which yielded a series of samples respectively reduced by compression to 2, 5, 10, 15, 20, 30 and 45%. Some samples were tested in the annealed state and others after deformation at 20°C. Experimental results are presented for both brief and protracted tests for tensile strength at 400° and 500°C. As the HTTT temperature increased, strength decreased. Maximum increases (1.5 and 2 times) were observed for HTTT at 500°C, and

UDC: 669.24-157.9

Card 1/2

ACC NR: AP5026365

for cold working at 20°C--for the more heavily deformed (40 to 45%) samples. The yield stress was also found to increase more than the tensile strength; the best treatments resulted in increasing the yield to tensile strength ratio from 0.3-0.4 to 0.8-0.95. For short time testing the same general results were obtained at a somewhat lower test temperature (400°C). In the 100-hour tensile strength test, strengthening by HTTT was achieved after a deformation of more than 20%. At 45% deformation, the 100-hour strength of Ni at 500°C rose to 25.8, 26.6 and 30.8 (kg/mm^2) following HTTT at 900, 700 and 500°C respectively; after cold working, to 31.5 kg/mm^2. These values reflect an increase of 50-85% in strength. A schematic diagram illustrates the effect of preliminary plastic deformation at various temperatures on the heat resistance of metals and alloys. In no case did phase transformations or dispersion hardening occur. The low strength region in this diagram was for low deformation. Orig. art. has: 3 figures, 1 table.

SUB CODE: 11/ SUBM DATE: 06May65/ ORIG REF: 005/ OTH REF: 001

HW
Card 2/2

ACCESSION NR: AP5018059 UR/0129/65/000/007/0057/0060
620.186

AUTHOR: Lozinskiy, M. G.

TITLE: New trends in high-temperature metallography

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 7, 1965, 57-60, and inserts facing pp. 25, 40, and 41

TOPIC TAGS: high-temperature metallography, vacuum metallography, fatigue tester, tungsten strength, metal structure

ABSTRACT: The paper briefly describes two new trends in high-temperature metallography: the study of microstructural peculiarities of samples subjected to fatigue tests during heating in a vacuum, and the study of high-melting materials by direct observations during heating up to 3000C and their stretching in a vacuum or in various gaseous media. The first method was made possible by the construction of the IMASh-10 device (made jointly by the author and A. N. Romanov) which permits a 300-times magnified observation of microstructures during variable loading and heating between 20 and 1200 C in a vacuum of 10^-5 mm Hg. The author

Card 1/2

L 62819-65
ACCESSION NR: AP5018059

4

approach was carried out on the IMASh-18 device (likewise designed by the author) which permits direct structural observations and the measurement of deformations following the stretching of samples subjected to contact electrical heating up to 3300C. Block diagrams of both devices are given and are accompanied by brief descriptions of their operation. The results of studies of the strength properties of tungsten (carried out by Ye. I. Antipova) agree fully with data reported by I. Taylor (Journal Less-Common Metals, 1964, v. 7, no. 4). Orig. art. has: 5 figures.

ASSOCIATION: Institut mashinovedeniya (Institute of Machine Design)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM, TD

NO REF SOV: 007 OTHER: 002

Card 2/2

LOZINSKIY, M.G.; ROMANOV, A.N.

Stroboscope for illumination during study of the fatigue kinetics in metals. Zav. lab. 31 no.2:244-246 '65. (MIRA 18:7)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut mashinovedeniya.

L 3378-66 EWT(d)/EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)/EWA(h)/EWA(c) IJP(c) JD

ACCESSION NR: AP5017207 UR/0020/65/162/006/1277/1280

AUTHORS: Lozinskiy, M. G.; Romanov, A. N.; Bochvar, A. A.

TITLE: Concerning the mechanism of extrusion and intrusion displacement of microvolumes of alpha iron during fatigue tests under high temperature heating

SOURCE: AN SSSR. Doklady, v. 162, no. 6, 1965, 1277-1280

TOPIC TAGS: iron, mechanical fatigue, high temperature fatigue, fatigue test, crystal imperfection

ABSTRACT: The authors report some results of observations of the fine structure of crystalline samples of technical iron, subjected to fatigue tests by alternating bending in one plane, and simultaneously to radiation heating in vacuum. The apparatus used for this purpose (IMASh-10) was developed by the authors and described by them earlier (Zav. lab. no. 2, 1965). The apparatus makes it possible to carry out fatigue tests and microstructure analysis of samples heated to 1200° under different mechanical loading conditions. The tests were

Card 1/2

L 3378-66
ACCESSION NR: AP5017207 2

made on commercial iron of standard composition. Electron-microscope photographs of the tested samples show that the relatively straight glide lines, on the boundary of which the extrusion and intrusion takes place, are located at distances equal to (2--6) x 10^3 crystal--lattice periods. The causes of occurrence of zones with increased displacement mobility at these intervals are not yet clear. It is deduced, however, from the existence of such an effect that during the time of the experiment the imperfections in the crystal become redistributed and move to individual glide planes. The kinetics of this effect is discussed in some detail. This report was presented by A. A. Bochvar. Orig. art. has: 4 figures

ASSOCIATION: Institut mashinovedeniya (Institute of the Science of Machines) 55

SUBMITTED: 19Nov64 ENCL: 00 SUB CODE: SS, MM

NR REF SOV: 007 OTHER: 003

Card 2/2 Md

L 17809-66 EWP(e)/EWT(m)/ETC(f)/EWG(m)/EWP(t) IJP(c) JD/JG/AT/WH

ACC NR: AP6007702 SOURCE CODE: UR/0413/66/000/003/0081/0081

INVENTOR: Lozinskiy, M. G.

ORG: none

TITLE: Device for direct observation of the structure of refractory materials at high temperatures. Class 42, No. 178549

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 3, 1966, 81

TOPIC TAGS: refractory material, refractory material structure, high temperature structure, structure observation

ABSTRACT: This Author Certificate introduces a device for direct observation of the structure of refractory materials at high temperatures. The device contains a chamber for the refractory specimen, an optical system with a movie camera, a high-brightness illuminator, and a mechanism for loading specimens. To widen the range of test temperatures, the spectral characteristics of the illuminator do not coincide with those of the tested specimen. Orig. art. has: 1 figure. [AZ]

SUB CODE: 14/ SUBM DATE: 24Nov64/ ATD PRESS: 4211

Card 1/1

UDC: 620.173.251.2
620.175.251.2

L 36088-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6016589 (A,N) SOURCE CODE: UR/0129/66/000/005/0027/0029

AUTHORS: Lozinskiy, M. G.; Temyanko, V. G.; Natanzon, Ye. I. 48 47

ORG: Institute of Mechanical Engineering (Institut mashinostroyeniya) B

TITLE: The use of three-layered U7-30-U7 steel for automobile springs

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1966, 27-29

TOPIC TAGS: contact stress, shot peening, fatigue strength, spring steel, steel/ U7 steel, 30 steel, 50KhG spring steel

ABSTRACT: The results of a study of three-layered U7-30-U7 steel for automobile springs are given. This material was used to obtain high hardness of the spring-leaf surfaces while preserving a ductile center. The material consists of comparatively thin outer layers of U7 steel and a center layer of 30 steel. In order to obtain a spring band with a thickness of 7 mm after rolling when the thickness of the outer layers of U7 steel is 1.2 mm, the thickness of the blank of U7 steel must be 30 mm before rolling when the total thickness of the packet is 180 mm. Springs of this material are found to have a higher fatigue limit under the influence of contact stresses than 50KhG steel. The fatigue strength of the three-layered steel that has undergone shot peening is 28--30% greater than that of 50KhG steel (see Fig. 1).

Card 1/2 UDC: 621.135.3:621.771.8

L 36088-66

ACC NR: AP6016589

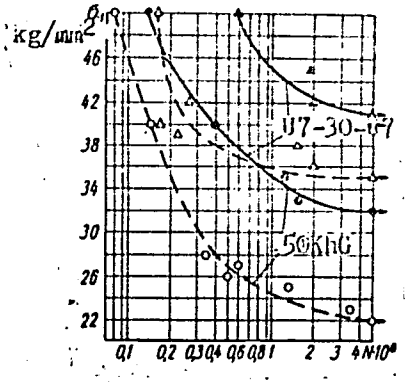


Fig. 1. Fatigue strength of three-layered U7-30-U7 steel and 50KhG steel of standard composition tested under conditions of contact stresses: _____ shot peened; -----without cold working.

Orig. art. has: 2 graphs and 1 table.

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 009

Bimetal

Card 2/2

ACC NR: AP6028719 SOURCE CODE: UR/0122/66/000/008/0059/0063

AUTHORS: Lozinskiy, M. G. (Doctor of technical sciences, Professor); Russinkovskiy, I. P. (Engineer)

ORG: none

TITLE: Intensification of surface hardening processes of steel and cast iron parts during high frequency induction heating under a fluid

SOURCE: Vestnik mashinostroyeniya, no. 8, 1966, 59-63

TOPIC TAGS: surface hardening, steel, ferrite, magnetic material, induction hardening/ F_2-100 ferrite, I4 magnetic material, I5 magnetic material, 45 steel, 50 steel, 40 Kh steel, 40 KhN steel, ShK15 steel

ABSTRACT: The first part of the report discusses the improved performance of induction heaters at 60--400 kcps when ferrite F_2-100 or magnetic materials I4 or I5 are used as magnetic conductors. A special dual-inductor geometry (developed by the authors) is described. The cooling rates in water, in a 30% water solution of glycerin, and in oil after surface induction heating were investigated on plate specimens (30 x 100 x 200 mm) of steels 45, 50, 40 Kh, 40 KhN, and ShKh15, on tube specimens (200 mm in diameter, 15 mm wall thickness, 200 mm long) of steel 40Kh, and on rods (40 mm in diameter, 120 mm long) of steel 40Kh. Curves of the cooling rates as a function of surface temperature are presented. The hardening effects of surface

Card 1/2 UDC: 621.785.5:621.3.023

ACC NR: AP6028719

induction heating under a fluid are discussed qualitatively and, to some extent, quantitatively. Equipment is described for induction surface hardening of hollow cylinders (inside), of cylindrical parts (outside), and of large machine parts, and schematic diagrams of equipment configurations are presented. It is concluded that surface hardening by induction heating under a fluid has a bright future. Orig. art. has: 7 figures and 1 table.

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 011

Card 2/2

L 08122-67 EWT(d)/EWT(m)/EWP(w)/EWP(v)/EWP(t)/ETI/EWP(k)/EWP(h)/EWP(l) IJP(c)

ACC NR: AT6034460 (N) SOURCE CODE: UR/0000/66/000/000/0231/0236

JD/JG/GD

AUTHOR: Lozinskiy, M. G.; Antipova, Ye. I.

ORG: none

TITLE: New method and IMASh-18 unit for examining the microstructure of refractory-metal materials during tensile tests at temperatures up to 3300C in vacuum, argon, helium or hydrogen

SOURCE: AN SSSR. Institut metallurgii. Svoystva i primeneniye zharoprochnykh splavov (Properties and application of heat-resistant alloys). Moscow, Izd-vo Nauka, 1966, 231-236

TOPIC TAGS: refractory ~~metallic material~~ metal, refractory ~~metallic material~~ product, ~~microstructure~~, microstructure investigation, ~~microstructure investigation equipment~~ metal test

ABSTRACT: A new IMASh-18 unit has been designed for the microscopic examination of the structure of specimens subjected to tensile tests at temperatures of up to 3300C in a vacuum of 1.10^{-5} mm Hg or in an atmosphere of argon, helium or hydrogen. The unit features three new elements: a lighting system for the MVT microscope which uses a mercury lamp of the DRSh-100-2 type (power, 100w; brightness, about 100 ksb); an MIM-13C0 objective which magnifies 270 times; and a

Card 1/2

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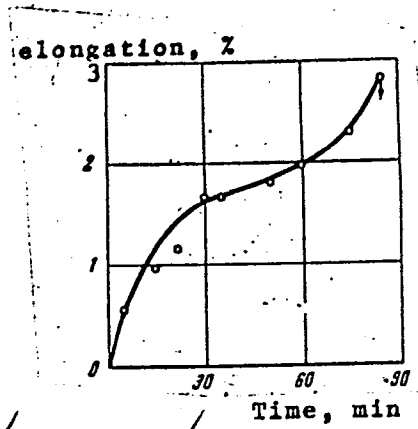

Fig. 1. Elongation-time curve for an AV-3 tungsten specimen tested in the IMASh-18 unit.

monochromatic filter which passes light waves λ = 546 mμ. Specimens of AV-3 99.9%-pure tungsten containing 0.03% of aluminum and 0.002% of calcium were tested in this unit for tensile strength at 3000C under a constant stress of 0.835 kg/mm^2 and were found to have very low ductility even at high temperature (see Fig. 1). Orig. art. has: 4 figures.

SUB CODE: 13, 11/ SUBM DATE: 10Jun66/ ORIG REF: 006/ OTH REF: 001/
ATD PRESS: 5103

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Card 2/2

ACC NR: AP7005397 SOURCE CODE: UR/0148/67/000/001/0142/0145

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TITLE: A method for determining the red hardness of high-speed alloys

SOURCE: IVUZ. Chernaya metallurgiya, no. 1, 1967, 142-145

TOPIC TAGS: hardness, high speed alloy, dispersion hardening, iron base alloy, tungsten containing alloy, cobalt containing alloy

ABSTRACT: Methods are developed for determining the red hardness of precipitation-hardened alloys. The following alloys were studied in the Fe-Co-W system with additions of molybdenum, chromium, manganese and nickel: V27K25, V20M7K25, V27K25Kh4, V27K25G4, V27K25N3, V20M7K30 and V20M7K20. Control tests were also conducted using R18 standard high-speed steel. The results were compared with the variation in hardness after two hours of annealing in the same temperature range. The dispersion-hardened specimens were quenched after heating to 1300°C and holding for 4 minutes, and then tempered at 600°C for 2 hours. Conventional heat treatment was used on the specimens of R18 steel (quenching from 1280°C, triple annealing at 560°C). The Vickers hardness was measured under a load of 1 kg on a UIMV-1 installation with heating in a vacuum to 20, 500 and 600°C with following measurements every 50° to 850°C. The re-

Card 1/2 UDC: 669.018.25:620.172.251.222