PAVLOV, I.M.; USHAKOV, Ye.V.

Device for measuring friction forces during upsetting. Trudy Inst.met. no.9:72-77 '62. (MIRA 16:5)
(Forging) (Friction forces--Measurement)

USHAKOV, Ye.V.; PAVLOV, I.M.

Equipment for synchronous recording of stresses and dimensions of specimen subjected to compression and stretching. Trudy Inst.met. no.9:87-89 '62. (MIRA 16:5)

(Testing machines)

S/509/62/000/009/005/014
D207/D308

AUTHORS: Pavlov, I. M., Rastegayev, M. V. and Falaleyeva, Z. S.

TITLE: On recrystallization and grain growth at small critical deformations

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 96-104

TEXT: The available results on recrystallization of metals after deformation are contradictory mainly because non-uniform deformation usually occurring during tests complicates the physical mechanism. To avoid this complication the authors used uniform materials and M. V. Rastegayev's technique (cylindrical samples have asbestos-filled recesses in their plane ends and are compressed between plates), which produced uniform deformation. The tests were carried out on two alloys /Abstracter's note: Compositions and designations of the alloys are not specified/ which were difficult to deform. No. 1 alloy was used in the form of annealed hot-forged rods,

Card 1/2

On recrystallization and ... S/509/62/000/009/005/014
D207/D308

and No. 2 alloy in cast and annealed hot-forged states. Compression of cylinders (20 mm diameter and height) at 20 or 1200 - 1250°C produced deformations of 40 - 80%. It was followed by annealing at 1200 - 1250°C after the 20°C compression, and by quenching after the 1200 - 1250°C compression. Irrespective of the initial grain size (which ranged from 0.6 to 5.5 mm) and the temperature at which deformation was carried out, new grains appeared and grew at all stages of the treatments applied to the samples. When these new grains met, selective recrystallization (growth of some grains and not the others) took place. The experimental evidence does not support the hypothesis that selective recrystallization occurs at low values of the critical deformation (the deformation necessary to produce strong grain growth). Senior laboratory assistants R. F. Sharkova and V. M. Kondrat'yev took part in the experimental work. There are 5 figures.

Card 2/2

S/509/62/000/009/006/014
D207/D308

AUTHORS: ~~Pavlov, I. M.,~~ Sigalov, Yu. M., Gurevich, Ya. B. and Zubko, A. M.

TITLE: Conditions during hot rolling in vacuum of various pressures, in argon and in air

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 105-108

TEXT: The present work is a continuation of an earlier investigation by Ya. B. Gurevich and A. M. Zubko. The present authors studied the effect of vacuum (10^{-1} - 10^{-5} mm Hg), of pure argon and of air on the coefficient of friction, and on geometrical and force parameters of rolling. The materials subjected to rolling were pure iron and nickel. The rolling tests were carried out at 1100°C at the rate of 6.5 m/min which produced 30% deformation. The rolling mill was of the construction developed at the KhFTI AN USSR (Khar'kov Physico-Technical Institute, AS UkrSSR) which had 85 mm dia-

Card 1/2

S/509/62/000/009/006/014
D207/D308

Conditions during hot ...

meter rolls made of ШХ15 (ShKh15) steel. Vacuum was measured with a ВИТ-1 (VIT-1) gauge. Samples were 150 mm long and 10 x 12 mm in cross-section. The coefficient of friction and the resistance to deformation rose in vacuum on decrease of pressure; in argon the coefficient of friction was the same as an 10^{-1} - 10^{-3} mm Hg vacuum. In air the coefficient of friction was the lowest. There are 2 figures.

Card 2/2

40980

S/659/62/009/000/014/030
I003/I203

AUTHORS Pavlov, I. M., Danil'chenko, A. N., Rastegayev, M. V., Mezis, B. Ya., Dzugutov, M. Ya. and Vinogradov, Yu. V.

TITLE The influence of plastic deformation during rolling on the time to failure, and on the mechanical properties of heat-reisisting alloys

SOURCE Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam v. 9. 1962. Materialy Nauchnoy sessii po zharoprochnym splavam (1961 g.), 108-13

TEXT In an article published in vol. 6 of this series, the same authors (except Pavlov) concluded that the above influence should be investigated for every heat-resisting alloy individually. In the present article, a non-defined alloy designated as "Alloy B" usually used for flat forgings was investigated. As a criterion of its heat-resistance the time was taken to failure at 800°C, and its plasticity was evaluated from its shock resistance at 800°C, and at room temperature. It was concluded that the time to failure of this alloy and its mechanical properties can be increased by plastic deformation with subsequent heat-treatment. This increase is probably due to the close-packed lattice of the acicular strengthening phase. There are 3 figures.

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S/509/62/000/009/007/014
D207/D308

AUTHORS: Pavlov, I. M., Sigalov, Yu. M., Gurevich, Ya. B. and Zubko, A. M.

TITLE: On the temperature dependence of some hot-rolling parameters in vacuum and in air

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 109-114

TEXT: The present work is a continuation of an investigation by the authors reported in the preceding paper (pp. 105 - 108 in the present issue). Rolling tests were carried out on pure iron (0.01% C) and nickel at temperatures of 800 - 1200°C using a ЦНИИЧМ (TsNIIChM) rolling mill under the conditions described in the preceding paper. Temperature was measured with a thermocouple and an СПР (SPR) potentiometer. The coefficient of friction of both iron and nickel was lower in air than in 10^{-5} mm Hg vacuum. In air and in vacuum the temperature dependence of the coefficient of friction

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of iron had a maximum at 900°C, but in vacuum the friction passed also through a minimum at 1000°C and then rose with temperature. In the case of nickel the coefficient of friction fell with increase of temperature in vacuum, but in air there was a maximum at 900°C. The resistance of deformation and other rolling parameters varied with the atmosphere and temperature roughly in the same way as did the coefficient of friction. There are 6 figures.

S/509/62/000/009/008/014
D207/D308

AUTHORS: Pavlov, I. M. and Krupin, A. V.

TITLE: Investigation of stress concentration due to defects in materials

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 121-131

TEXT: The authors investigated the effect of occlusions and defects in metals acting as stress concentrators. Metals were modelled by phenol aldehyde sheet and stress distribution was investigated by the standard photoelastic method. Four types of defects were studied: (I) Circular and oval holes; (II) square and rectangular holes; (III) rhombic holes; (IV) holes of triangular, hexagonal and other shapes. The authors found that the defects (holes) which were elongated or had sharp corners produced higher stress concentrations than those of circular or oval shape. The most harmful orientation of defects was that with their long axes at right

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Investigation of stress ... S/509/62/000/009/008/014
D207/D308

angles to the applied stress. If the holes were filled with some other materials, simulating foreign bodies in a metal sheet, the stress concentration was found to depend on the geometry of the defect, elastic properties of the filler (foreign body) and on whether the filler was attached rigidly to the rest of the material or whether it was filling the defect loosely. Defects closely spaced to one another produced higher stress concentrations than those which were widely spaced. There are 10 figures and 1 table.

Card 2/2

PAVLOV, I.M.; BELOSEVICH, V.K.; Prinimali uchastiye: USHAKOV, Ye.V., inzh.; KOZLOV, V.S., laborant

Investigating the relationship between the friction coefficient and speed and pressure on a special unit. Trudy Inst.met. no.9:139-146 '62. (MIRA 16:5)

(Friction)

37691
S/509/62/000/009/010/014
D207/D308

15.6700 (4409)

AUTHORS: Pavlov, I. M., Belosevich, V. K. and Chamin, Yu. A.

TITLE: Investigating the effect of technical lubrication on the cold rolling of titanium

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 147-158

TEXT: Commercial titanium ВТ-1 (VT-1) and steel 08КП (08KP), both of 1.2 mm thickness, were cold-rolled using one of 30 lubricants of the following types: vegetable oils, animal fats, surface-active agents, mineral oils of various viscosities and purities, mineral oils with surface-active additives, and complex synthetic esters. It was found that the lubricants suitable for steel were also suitable for titanium. The most effective lubricants for cold rolling of titanium were natural animal fats, high-molecular saturated fatty acids, and complex synthetic esters. Some vegetable oils and emulsions used in ultrasonic machining were also recom-

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S/509/62/000/009/011/014
D207/D308

1.1300

AUTHORS: Pavlov, I. M., Shelest, A. Ye., Tarasevich, Yu. F. and Shakhov, V. L.

TITLE: A study of the hot and warm rolling conditions for some titanium alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 159-163

TEXT: Conditions of rolling, at 500 - 1100°C, of pure BT-1 (VT-1) titanium and alloys 1, 2 and 3 were studied at the Laboratoriya obrabotki metallov davleniyem Instituta metallurgii AN SSSR (Laboratory for Pressure Treatment of Metals, Institute of Metallurgy, AS USSR) /Abstracter's note: Compositions of the alloys not specified_7. Samples of 10 x 15 x 150 and 13 x 65 x 180 mm dimensions were rolled in a laboratory mill "duo 200" with polished steel rolls. The rate of rolling was 0.5 m/sec and the reduction of thickness was 20, 40 and 60% for samples of 10 x 15 mm cross-section, 18

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and 13 or 35% for samples of 13 x 65 mm cross-section. The titanium alloys showed high plasticity: 60% reduction of thickness was reached at 800°C without fracture. The temperature dependence of the lateral spread is shown graphically for various degrees of deformation. The allotropic transformation at about 800°C produced a sudden decrease of the average pressure of the metal on the rolls. The displacement of the resultant pressure was investigated as a function of deformation and temperature. There are 5 figures.

37692

S/509/62/000/009/012/014
D207/D308

18.8200

AUTHORS: Pavlov, I. M. and Ushakov, Ye. V.

TITLE: On determining the true resistance to deformation by shock compression of samples with recesses in their ends

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 164-168

TEXT: M. V. Rastegayev's method was used to study the resistance to deformation (plasticity) of Armco iron cylinders 12 mm in diameter and 15 mm high. The purpose was to find the conditions which produced the most uniform compression on dropping a hammer on the sample. The optimum conditions were obtained when cylindrical recesses of 0.5 mm depth and 11 mm diameter were cut in the two plane ends of a sample and filled with stearic acid, or palmitic acid or with Wood's alloy. Filling the recesses with other lubricants produced less uniform deformation. Under optimum conditions fric-

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On determining the true... S/509/62/000/009/012/014 D207/D308

tion between the compressing plates and the sample ends was practically eliminated and uniform compression was obtained up to deformations of 30%. Even for deformations of 70% the central (nearest to the axis) portion of the cylinder exhibited uniform compression. The authors followed V. G. Isopov's suggestion and used the ratio D/D_0 as the measure of plasticity: Here D_0 is the initial diameter in the plane at right angles to the cylinder axis and situated at an equal distance from the two plane ends; D is the final diameter. D/D_0 values were found to be more reliable than h/h_0 (h = height) which is normally employed. There are 6 figures.

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PAVLOV, I.M.; USHAKOV, Ye.V.

Determining effective resistance to deformation by upsetting specimens having face grooves. Trudy Inst.met. no.9:164-168 '62. (MIRA 16:5)

(Deformations (Mechanics))

S/509/62/000/009/013/014
D207/D308

1,1300

AUTHORS: Pavlov, I. M., Tarasevich, Yu. F. and Shelest, A. Ye.

TITLE : Determining specific pressures during cold rolling of aluminum

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 169-176

TEXT: Strips of АД-1(AD-1) aluminum, 4.5 mm thick and 32 - 34 mm wide, were cold-rolled on an experimental mill "200" at 0.5 mm/sec. The reduction of thickness was 0.5 mm per pass. The "specific pressure" (defined as the average force, exterted over unit area, by the metal on the rolls) was measured with instruments developed by A. I. Grishkov. A d.c. amplifier ЭТ-4-55 (ET-4-55) and an oscillograph МПО-2(MPO-2) were used to record variations of pressure at several points across the width of the strip. The oscillograms were corrected using Yu. F. Tarasevich's technique. The specific pressures were peaked at the center of the strip; they were always

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PAVLOV, I.M.; MEKHED, G.N.

Relationship between resistance to deformation and temperature and speed conditions. Trudy Inst.met. no.9:177-184 '62. (MIRA 16:5)

(Deformations (Mechanics))

PAVLOV, I.M.; BELOSEVICH, V.K.

Relationship between the friction coefficient during upsetting and the sliding track, and the role of surface-active substances in lubrication. Trudy Inst.met. no.9:202-208 '62. (MIRA 16:5)
(Forging) (Lubrication and lubricants)

PAVLOV, I.M.; BELOSEVICH, V.K.

Value of the friction coefficient during cold rolling. Trudy Inst. met. no.9:209-213 '62. (MIRA 16:5)

(Rolling (Metalwork))

PAVLOV, I.M.

Terminology in rolling. Trudy Inst.met. no.9:214-234 '62.
(MIRA 16:5)

(Rolling (Metalwork)--Terminology)

PAVLOV, I. M.; MEKHED, G. N., kand. tekhn. nauk; SUVOROV, V. A.

Production and use of iron-aluminum alloys abroad. Biul. tekh.-ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform. no.12:75-7 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).

(Iron-aluminum alloys)

PAVLOV, I. M.

Equating characteristic angles , the torque and the work of rolling with irregular distribution of pressure and friction forces. Sbor. Inst. stali i splav. no.40:7-14 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR.

(Rolling(Metalwork))

PAVLOV, I. M.

Concept of the resultant force of rolling. Sbor. Inst. stali i splav. no.40:15-24 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR.

(Rolling mills)

PAVLOV, I. M.; BRINZA, V. N., inzh.

Lamination during the rolling of bi-metal. Sbor. Inst. stali i splav. no.40:152-158 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR(for Pavlov).

(Laminated metals—Defects)
(Rolling(Metalwork))

S/848/62/000/040/003/005
E193/E483

AUTHORS: Pavlov, I.M., Corresponding Member AS USSR,
Brinza, V.N., Engineer

TITLE: Contribution to the problem of the bond of titanium to steel in the solid state

SOURCE: Moscow. Institut stali i splavov. Sbornik. no.40, 1962. Protsessy prokatki. 160-164

TEXT: The behaviour of the contact zone between titanium and steel bi-metal components under common plastic deformation was studied by the authors with particular reference to the formation of a diffusion zone and the properties of the transition zone. The experimental methods have been previously described by the same authors (Tsvetnyye metally, no.10, 1961). It is now found that with increasing pressure the thickness of the diffusion inter-layer diminishes. Beyond a critical pressure, the diffusion inter-layer thins out and may even vanish. The change in the thickness of the diffusion layer is associated with the phenomenon of its being squeezed out by the less pliable layers of titanium and steel. As the diffusion inter-layer becomes thinner its microhardness approaches that of titanium and steel. The

Card 1/2

PAVLOV, I. M.; OSADCHIY, V. Ya., kand. tekhn. nauk

Nature and mechanism of metal sticking during sliding friction. Sbor. Inst. stali i splav. no.40:173-180 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).

(Rolling(Metalwork)) (Friction)

PAVLOV, I. M.; MAKEYEV, D. I., inzh.

Effect of the working direction on the recrystallization process of 08 steel. Sbor. Inst. stali i splav. no.40:181-199 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).

(Steel—Cold working)
(Crystallization)

PAVLOV, I. M.; OSADCHIY, V. Ya., kand. tekhn. nauk; SUVOROV, I. K., kand. tekhn. nauk

Increasing the resistance pf passes on 250 mills to sticking and wear. Sbor. Inst. stali i splav. no.40:225-234 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).

(Rolling mills)

PAVLOV, I. M.; POLUKHIN, P. I., prof., doktor tekhn. nauk;
ZHELEZNOV, Yu. D., inzh.; POLUKHIN, V. P., inzh.

Photoelastic method for the investigation of stresses in rolls and in the strip during rolling. Sbor. Inst. stali i splav. no.40:264-276 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).

(Rolling(Metalwork)) (Photoelasticity)

MUSIKHIN, A.M., kand. tekhn. nauk; PAVLOV, I.M.; OSADCHIY, V.Ya., kand. tekhn. nauk

Roll grooving for three-high reeling mills of diagonal rolling. Sbor. Inst. stali i splav. no.40:327-329 '62. (MIRA 16:1)

1. Chlen-korrespondent AN SSSR (for Pavlov).
(Rolls(Iron mills)) (Pipe mills)

PAVLOV, I. M.; MUSIKHIN, A. M., kand. tekhn. nauk; OSADCHIY, V. Ya.

Metal pressure on the rolls of a three-high reeling mill of diagonal rolling. Sbor. Inst. stali i splav. no.40:335-337 '62. (MIRA 16:1)

(Pipe mills) (Pressure)

PAVLOV, I.M.; OSADCHIY, V.Ya.

Effect of the speed of rolling in automatic rolling mills on pipe quality. Izv. vys. ucheb. zav.; chern met. 5 no.1:121-123 '62. (MIRA 15:2)

1. Moskovskiy institut stali.
(Pipe mills)

PAVLOV, I.M.; LITOVCENKO, N.V. [Litovchenko, N.V.]

Rolling process for the periodic profiles of armture steel. Analele metalurgie 16 no.1:64-87 Ja-Mr '62.

PAVLOV, I.M.; OSADCII, V.I. [Osadchiy, V.I.]

Influence of the lamination speed in the automatic mills on the quality of pipes. Analele metalurgie 16 no.4:130-132 O-D '62.

S/032/62/028/002/026/037
B124/B101

AUTHORS: Pavlov, I. M., and Ushakov, Ye. V.

TITLE: Determination of the true resistance to compressive deformation

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 2, 1962, 224-226

TEXT: The mean values of stresses and deformations along the height of the sample on contraction are generally used to plot compression diagrams which give, however, no true values for the resistance to plastic deformation in any part of the non-uniformly strained sample. A method also used by V. G. Osipov (Zavodskaya laboratoriya 21, 9 (1957); ibid., 24, 6 (1958)) was suggested for eliminating the effect of friction. The sample was placed between two auxiliary samples of the same diameters, which transmitted the pressure obtained from pressure plates to the sample, and absorbed irregular deformation due to friction. This method is, however, inaccurate, particularly at medium and high deformations. When high samples of regular shape are studied, and deformation and stresses are determined from the change of diameter in the central part of the

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sample, most of the defects of this method can be overcome. The true deformation e can be calculated from $e = 2 \ln(D_2/D_1)$, where D_1 is the diameter of the initial sample, and D_2 is that of the strained sample, measured at half the height from the faces. A series of experiments were performed by the authors to verify the possibility of determining the true resistance to deformation from the stress and deformation measured in the central part of the high sample (Fig. 1). There are 2 figures and 7 references: 4 Soviet and 3 non-Soviet.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy imeni A. A. Baykov)

Fig. 1. Compression diagrams of Armco iron plotted with measured sample diameters at a distance of half the height from its faces, compared with data on the contraction of lathe-worked samples: (1) - (4) D/H equal to 0.36; 0.57; 0.8; and 2, respectively. Legend: (a) kg/mm^2.

PAVLOV, I.M.; GUREVICH, Ya.B.; ORZHEKHOVSKIY, V.L.; SHELEST, A.Ye.;
BASHCHENKO, A.P.

Effect of conditions of titanium heating on the indices of hot rolling. TSvet. met. 35 no.7:75-79 Jl '62.
(MIRA 15:11)

(Titanium)
(Rolling (Metalwork))

FINKOVSKIY, Viktor Yaklevich, kand. tekhn. nauk, dots.; ANTIPOV, Ivan Timofeyevich, kand. tekhn. nauk; PAVLOV, Ivan Mikhaylovich, inzh.; Prinimal uchastiye MINAYEV, G.A., inzh.; MIRKIN, A.I., inzh., retsenzent; BUROV. M.I., red.; SHURYGINA, A.I., red. izd-va; ROMANOVA, V.V., tekhn. red.

[Handbook on horizontal and vertical control for aerial photographs by the phototheodolite surveying method in making topographic maps at a 1:25,000 scale] Posobie po planovo-vysotnoi priviazke aerosnimkov metodom fototeodolitnoi s"emki pri sozdanii topograficheskikh kart v masshtabe 1:25 000. Moskva, Gosgeoltekhizdat, 1963. 150 p. (MIRA 16:7)
(Photographic surveying)

ACCESSION NR: AT4014064 S/3072/63/000/000/0097/0101

AUTHOR: Chamin, I. A.; Belosevich, V. K.; Chamin, Yu. A.; Shakhov, V. L.; Pavlov, I. M.; Pedos, I. F.

TITLE: Extract from an article on lubrication in cold sheet rolling

SOURCE: Fiz.-khim. zakonomernosti deystviya smazok pri obrabotke metallov davleniyem. Moscow, Izd-vo AN SSSR, 1963, beginning with "V SSSR na neskol'ky*kh..." on page 97 through page 101

TOPIC TAGS: cold rolling lubricant, cold rolling, lubricant, palm oil substitute, mineral oil, animal fat, vegetable fat, castor oil

ABSTRACT: In several Soviet plants investigations have been made on replacement of palm oil as lubricant in sheet rolling by domestic substitutes on the basis of vegetable and animal fats, and by lubricants on the basis of synthetic fatty acids. In one plant, the standard mineral emulsion B has been used on the rolling mill 220/600 x 650 for cold sheet rolling. On the basis of the investigations, the mineral emulsion has been replaced by more efficient technological lubricants. Palm oil, castor oil, and beef tallow were investigated. In another case, palm oil, artificial solid fat (Salomas, obtained as the result of action of chemical compounds from oils), and castor oil have been tried and compared as lubricants on the continuous

ACCESSION NR: AT4014064

rolling mill 244/600 x 650. Positive results have been obtained, resulting in a production rise of 30-40%. Similar experiments have been conducted on the four-high reversive rolling mill 180/600 x 650 for stainless steel 1 Kh 18N9T (Ya/II) cold strip rolling. In this case, water based mineral oil emulsion, B-106 stearin, B-99 table fat, and beef tallow have been used as technological lubricants. The conclusion has been made that, by applying effective lubricants, the manufacturing cycle of thin stainless strips will be considerably reduced by reducing the number of heat treatment and pickling operations. However, because of scarcity of fats of organic origin, further development has been directed toward finding synthetic compounds structurally similar to animal fats. During trial runs of a five-unit rolling mill 1200, lubricants on the base of vegetable fats have been tried out and compared with palm oil. 9000 tons of sheet, 98% of acceptable quality, have been rolled on castor oil at a specific oil consumption of 2. 8 kg/ton. More than 6000 tons have been rolled on artificial solid fat. During these tests, castor oil has been the most effective lubricant, requiring the least power. Processes of annealing, descaling, pickling, and tinning have not created difficulties during manufacture of strips, and the quality of sheet has not been impaired by the lubricant. With regard to the search for new synthetic technological lubricants in cold rolling, a substantial disadvantage exists: the lack of emulsions which are inexpensive and more efficient

Cord 2/3

ACCESSION NR: AT4014064

than such of mineral oils. From the given review it has been concluded that addition of fats to mineral emulsions has only a slight if any improving effect on the lubricating properties; and that emulsions on the basis of fats or their equivalent substitutes are either expensive or are unstable and insufficiently effective. Orig. art. has: 4 tables.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 19Dec64 ENCL: 00

SUB CODE: MM, IE NO REF SOV: 007 OTHER: 008

Card 3/3

S/279/63/000/001/001/023
E193/E383

AUTHORS: Pavlov, I.M., Orzhekhovskiy, V.L., Gurevich, Ya.B. and Shelest, A.Ye. (Moscow)

TITLE: The effect of the roll material and surface finish on some parameters of hot-rolling in vacuum

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i gornoye delo, no. 1, 1963, 14 - 17

TEXT: Cast iron and steel (ШХ15 (ShKh15) and 5Х2В8 (5Kh2V8)) rolls, 85 mm in diameter, were used in the experiments conducted in a vacuum of $\sim 10^{-5}$ mm Hg on steel 20 test pieces, preheated to 1100 °C. Various surface finishes of the rolls, corresponding to class 4, 7 and 10 of the degree of flatness (as specified in ГОСТ (GOST) 2789-59) were obtained by turning, grinding and polishing the rolls. Test pieces with various surface finishes were prepared by grinding, milling or planing in either longitudinal or transverse directions. A constant reduction of 30% per pass was used in the experiments conducted at a rolling speed of 6.5 m/min. The roll pressure, roll torque, peripheral roll speed, forward

Card 1/3

S/279/63/000/001/001/025
E193/E383

The effect of ....

slip and the speed of metal leaving the rolls were measured in each experiment. The lateral-spread coefficient was calculated on the basis of the constant-volume law. The friction coefficients were determined with the aid of a braking device and, calculated from data on the forward slip. Some of the typical results obtained on ground test pieces are reproduced in Fig. 4, where the histograms show the variation in (a) friction force τ_s, kg/mm^2, (б) roll pressure P, kg/mm^2, (B) lateral-spread coefficient a, (г) friction coefficient f and (д) forward slip S_h, blocks 1-6 relating to: 1 - ground cast-iron rolls; 2 - turned cast-iron rolls; 3 - polished steel ShKh15 rolls; 4 - ground steel ShKh15 rolls; 5 - ground steel 3Kh2V8 rolls; 6 - turned steel ShKh15 rolls. The general conclusion was that the friction coefficient in hot rolling was affected more by the material and surface finish of the rolls than by the surface condition of the metal rolled. There are 4 figures.

SUBMITTED: July 17, 1962

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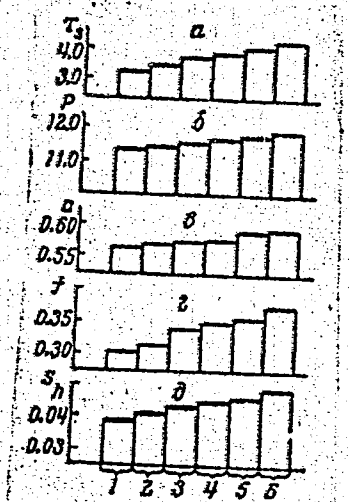
The effect of ....

S/279/63/000/001/001/023
E193/E383

Fig. 4:



Card 3/3

PAVLOV, I.M. (Moskva); OSIPOV, V.G., (Moskva)

Consecutive patterns of the strained state in a disk under impact. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.2: 112-115 Mr-Ap '63. (MIRA 16:10)

PAVLOV, I.M., assistent

Pulse synchronizer for the MZV-1 aerial camera shutter. Izv. vys. ucheb. zav.; geod. i aerof. no.3:117-120 '63. (MIRA 17:1)

1. Novosibirskiy institut inzhenerov geodezii, aerofotos"yemki i kartografii.

L 12937-63 EWP(k)/EWP(q)/EWT(m)/BDS AFFTC/ASD Pf-4 JD/HM/HW/JG
ACCESSION NR: AP3002391 S/0279/63/000/003/0123/0126

AUTHOR: Pavlov, I. M. (Moscow); Bashchenko, A. P. (Moscow); Gurevich, Ya. B. (Moscow); Orzhekhovskiy, V. L. (Moscow); Shelest, A. Ye. (Moscow)

TITLE: Dependence of the friction coefficient on temperature and ambient medium in rolling of iron, titanium, molybdenum, and niobium

SOURCE: AN SSSR. Izv. Otd. tekhnicheskikh nauk. Metallurgiya i gornoye delo, no. 3, 1963, 123-126

TOPIC TAGS: hot rolling, vacuum, inert atmosphere, argon, iron, titanium, molybdenum, n i o b i u m, friction coefficient, temperature dependence, scale formation

ABSTRACT: The temperature dependence of the friction coefficient in the hot rolling of iron, titanium, molybdenum, and niobium under different conditions has been studied. Specimens were rolled at a constant speed of 6 m/min at a temperature varying from 800 to 1200C in a vacuum, in an argon atmosphere (0.005% O_2, 0.01% N), or in the air. Test results showed that with rolling in air the friction coefficient for iron, which is about 0.38 at 800C, increases to a maximum of 0.45 at 900C and then decreases gradually to 0.22 at 1200C.

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The initial increase is explained by the decreasing resistance of iron to deformation, and the subsequent decrease, by the effect of iron scale, which softens appreciably above 1000C and acts as a lubricant. The friction coefficient of titanium increases slightly as temperature increases from 800 to 900C, probably owing to some peculiarities of the α-to-β-transformation. Increasing the temperature to 1200C increases the friction coefficient, probably because of decreasing specific pressure. Titanium scale does not soften in the temperature range investigated and hence does not act as a lubricant but rather increases the friction. The increase in the friction coefficient of molybdenum rolled in air, from about 0.35 at 1000C to 0.45 at 1200C, is probably caused by the increasing surface roughness associated with the increasing volatility of molybdenum oxides and the consequent surface cleanliness. The friction coefficient of niobium in air drops from 0.42 at 1000C at 0.37 at 1250C, owing to the action of the scale which, in this temperature range, spreads on the metal and forms a dense, smooth surface. The effect of the scale on the relationship of the rolling temperature and friction coefficient is confirmed by the data on rolling in vacuum or in argon (the latter corresponds roughly to a vacuum of 0.1 mm Hg). As atmospheric pressure decreases from 760 to 0.00001 mm Hg, the friction coefficient of titanium decreases, while those of iron, molybdenum, and

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L 12937-63
ACCESSION NR: AP3002391

niobium increase. The changing conditions of contact friction should thus be taken into account in developing the technology of the hot rolling of refractory metals in vacuum or an inert atmosphere. Orig. art. has: 3 figures and 2 formulas.

ASSOCIATION: none

SUBMITTED: 27Jul62 DATE ACQ: 12Jul63 ENCL: 00

SUB CODE: MA, ML NO REF SOV: 014 OTHER: 000

Card 3/3

S/133/63/000/003/003/007
A054/A126

AUTHORS: Zhuchin, V.N., Engineer, Pavlov, I.M., Corresponding Member of the Academy of Sciences USSR

TITLE: The friction coefficient in cold rolling

PERIODICAL: Stal', no. 3, 1963, 231 - 234

TEXT: The friction coefficient in cold rolling depends on a number of factors, including the arc of the bite. Although various methods have been established to calculate the average friction coefficient these do not account for the fact that during rolling the work rolls become flattened to some extent which also affects the arc of the bite and, consequently, the friction coefficient. From calculations and test data formulae were derived to determine the friction coefficient, allowing for the flattening of the bite arc and in accordance with the torque. The tests were carried out with Э79НМ (E79NM) soft-magnetic precision steel strips 3, 1, and 0.3 mm thick. The tests covered the effects of the flattening of the work rolls in the deformation focus, of reduction, strip thickness, rolling with and without lubrication, etc. In the case of an-

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S/133/63/000/003/003/007
The friction coefficient in cold rolling A054/A126

nealed and work-hardened (to 25%) 0.3 - 3.0 mm thick strips the friction coefficient was found to increase from 0.015 to 0.07; for strips work-hardened to a higher degree (50 - 70%) it showed an increase from 0.015 to 0.045. When the relative reduction in cold rolling was raised from 4 to 20%, the friction coefficient increased by a factor of 2. The effect is more pronounced in strips previously work-hardened, whereas in the case of 0.3-mm strips the change of relative reduction does not affect so strongly the friction coefficient. Its highest value is attained when rolling without lubrication, the lowest upon applying castor oil as lubricant; a medium value is obtained when the rolls are lubricated with an emulsion. In general, lubrication decreases the friction coefficient by a factor of 1.5 - 2.2 as compared to that for dry rolls. There are 4 figures.

L 10087-63 EWP(k)/EWP(q)/EWT(m)/BDS--AFFTC/ASD--Pf-4--JD/HM/HW/JG
ACCESSION NR: AP3000203 S/0136/63/000/005/0063/0067 66 65

AUTHOR: Pavlov, I. M.; Shelest, A. Ye.; Gurevich, Ya. B.; Orzhekhovskiy, V. L.; Bashchenko, A. P.

TITLE: Hot rolling of niobium in vacuum and in a protective atmosphere 18 27

SOURCE: Tsvetny*ye metally, no. 5, 1963, 63-67

TOPIC TAGS: niobium rolling, rolling in air, rolling in vacuum, rolling in argon, oxidation, sealing, surface hardness, spread, forward slip, friction, roll pressure

ABSTRACT: The effect of temperature and environment on the behavior of Nb in hot rolling has been studied. Specimens 10 x 10 x 150 mm of commercial grade Nb cut out of rolled plate were vacuum (approximately 10 sup -4 mm Hg) annealed at 1400C for 1 hr and rolled at 1000--1250C with a reduction of 20%. Several specimens were heated and rolled in vacuum (approximately 10 sup -5 mm Hg) or in argon, several were heated in vacuum (in ampules evacuated to 10 sup -2 mm Hg) and rolled in air, and several were heated and rolled in air. Heating in air caused

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L 10087-63
ACCESSION NR: AP3000203

intensive sealing and a sharp increase of surface hardness due to the absorption of active gases, especially oxygen. Nb held for 90 min in air at 1100C had a surface hardness of approximately 310 kg/mm sup 2 compared with an initial hardness of approximately 130 kg/mm sup 2. Heating in vacuum or in evacuated ampules under the same conditions increased the surface hardness only to approximately 140 or 160 kg/mm sup 2. Higher temperature and prolonged holding increased surface hardness and the depth of oxygen penetration. Spread, forward slip, specific friction, and the friction coefficient tend to decrease in rolling in air and are generally lower than in rolling in vacuum; specific roll pressure and torque decrease with increasing temperature but are higher than in vacuum. In vacuum, spread tends to increase with increasing temperature, while forward slip remains constant. Rolling in argon occupies an intermediate position between vacuum and air rolling with regard to the effect on rolling parameters. Intensive oxidation of specimens heated in evacuated ampules occurred during rolling in air. It is therefore recommended to heat, roll, and cool niobium in vacuum. Orig. art. has: 7 figures.

L 10087-63
ACCESSION NR: AP3000203

0

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 14Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 008 OTHER: 001

ph/04
Card 3/3

ZHUCHIN, V.N., inzh.; PAVLOV, I.M.

Analyzing some methods of the experimental determination of deformation resistance in cold rolling. Izv.vys.ucheb.zav.; mashinostr. no.7:214-220 '63. (MIRA 16:11)

1. Zavod "Elektrostal'". 2. Chlen-korrespondent AN SSSR (for Pavlov).

ACCESSION NR: AT4007047 S/2598/63/000/010/0245/0250

AUTHOR: Shelest, A. Ye.; Falaleyeva, Z. S.; Pavlov, I. M.

TITLE: Effect of cold working and annealing on the mechanical properties of AT-3 titanium alloy

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavy*, no. 10, 1963. Issledovaniya titanovy*kh splavov, 245-250

TOPIC TAGS: titanium alloy, AT-3 titanium alloy, AT-3 titanium alloy property, cold worked AT-3 alloy, annealed AT-3 alloy, strain hardening effect, annealing effect, titanium aluminum chromium alloy, iron containing alloy, silicon containing alloy, boron containing alloy

ABSTRACT: The authors investigated the effect of annealing temperature and the % deformation during cold working on the structure and mechanical properties of titanium alloy AT-3 (2.8-2.9% Al, 0.3% Fe, 0.41 Si, 0.78-0.80% Cr, 0.01% B) by means of X-ray analysis and tests of ultimate strength and relative elongation. Roentgenograms of samples annealed under various conditions are presented, as well as graphs relating the mechanical properties to % deformation during cold rolling and to annealing temperature following varying degrees of deformation. Before

ACCESSION NR: AT4007047

annealing, the cold worked specimens showed a deformed structure; recrystallization began after annealing at 750C for 1 hr. followed by quenching in air, and was complete in samples annealed at 800C for 1 hr. and quenched either in air or in the furnace. In general, the strength increased and plasticity decreased with increasing deformation during cold rolling, while an increase in the annealing temperature had the opposite effect. The relationship between relative elongation and ultimate strength of AT-3 alloys shown in Fig. 1 of the Enclosure may be important in selecting the proper conditions for the manufacture of pipe from these alloys. Orig. art. has: 11 graphs and 4 roentgenograms.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

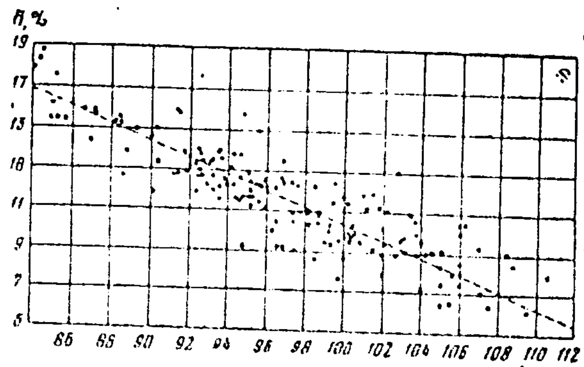
SUBMITTED: 00 DATE ACQ: 27Dec63 ENCL: 01

SUB CODE: MM NO REF SOV: 004 OTHER: 000

Cord 2/3

ACCESSION NR: AT4007047

ENCLOSURE: 01



Relationship between relative elongation and ultimate strength of titanium alloy AT-3. Ordinate in %, abscissa in kg/mm^2.

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ACCESSION NR: AT4007049 S/2598/63/000/010/0262/0264

AUTHOR: Gulyayev, A. P., Sholest, A. Ye.; Mishin, V. I., Kossakovskaya, N. N., Pavlov, I. M.

TITLE: Effect of furnace atmosphere on notch toughness of commercial grade titanium

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavy*, no. 10, 1963. Issledovaniya titanovy*kh splavov, 262-264

TOPIC TAGS: titanium, titanium property, titanium notch toughness, titanium embrittlement, titanium heat treatment, heat treating furnace, furace atmosphere, oxidizing atmosphere, protective atmosphere, protective coating

ABSTRACT: Specimens of hot-rolled titanium sheet with an initial impact toughness of 6 kg-m/cm^2 were heated in quartz ampules in an atmosphere of air, oxygen or nitrogen or in a vacuum (0.01 mm Hg) at temperatures of 700-1200C for 10, 60 or 120 minutes, after which the specimens were tested for impact toughness, microhardness and weight of oxide film formed. Heating in a vacuum had no significant effect on either weight or impact toughness. Determination of sample weight after removal of the scale showed that oxidation increases with time and increasing temperature, and is markedly decreased in a

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ACCESSION NR: AT4007049

nitrogen atmosphere, especially at high temperatures. However, as shown in Fig. 1 of the Enclosure, prolonged heating in nitrogen at 900C or above reduces the impact toughness, so that nitrogen atmospheres also cannot be recommended. The impact toughness, which increased somewhat on heating at low temperatures due to recrystallization, decreased sharply at 800-1200C in all media. Measurements of the depth of the gas-saturated layer, evaluated from the microhardness, showed that the depth increased uniformly with time and temperature in all media. In alpha-titanium (below 900C), however, nitrogen diffused less rapidly than oxygen, while after transformation to beta-titanium (above 900C) the opposite was true. Orig. art. has: 3 figures.

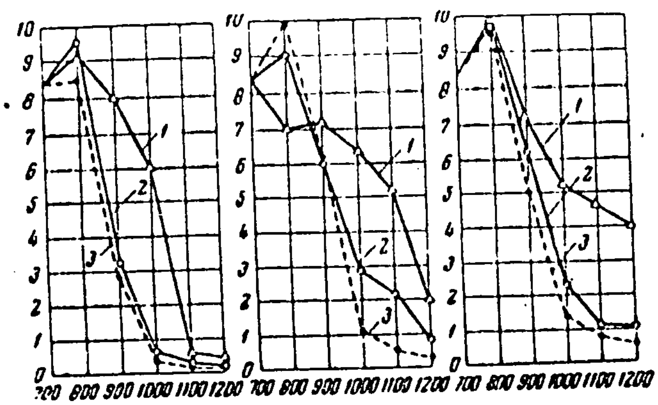
ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00 DATE ACQ: 27Dec63 ENCL: 01

SUB CODE: MM NO REF SOV: 006 OTHER: 000

ACCESSION NR: AT4007049

ENCLOSURE: 01



a b c

Fig. 1. Effect of temperature, duration of heating and furnace atmosphere on the impact toughness of commercial grade titanium. a. heating in air, b. heating in oxygen, c. heating in nitrogen; 1 - heated for 10 min.; 2 - heated for 60 min.; 3 - heated for 120 min. Ordinate = impact toughness in kg-m/cm^2; abscissa = temperature of heating in °C.

L 10711-65 EWT(m)/EWP(k)/EWP(b) Pf-4 AFWL/ASD(m)-3/ASD(f)-2 MJW/JD/HW

S/2509/63/000/014/0090/0100

ACCESSION NR: AT4009497

AUTHOR: Pavlov, I. M.; Rastegayev, M. V.; Zharov, V. M.

B

TITLE: Deformation of brittle materials

SOURCE: AN SSR. Institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody* issledovaniya, 90-100

TOPIC TAGS: brittle material, brittle metal, brittle alloy, brittle material deformation, compression transmission medium, uniform deformation technique, deformation, hydrostatic pressure

ABSTRACT: Previous work on the plasticity of brittle materials such as rock salt, marble or sandstone suggested that significant degrees of deformation could be produced by means of high omnilateral pressure, but failed to take into consideration the effects of the rigidity of the compressing medium and the uniformity of the stress. In order to clarify the other factors affecting plasticity of such materials, the present authors carried out three series of experiments on the plastic deformation of cylindrical samples of non-plastic materials (marble, alloy steel, pig iron) under the influence of pressure applied in various ways to the faces and sides of the cylinder via compressing media which were either soft, equipliable or rigid compared to the sample. In the first series of experiments,

L 10711-65

ACCESSION NR: AT4009497

compression by means of rigid facial and soft lateral pressure transmitting media (e.g., bands of steel-20 and liquid paraffin, respectively, in the case of marble samples) resulted in non-uniform deformation and cracks. In the second series, compression of a non-plastic alloy by means of equipliable facial and lateral media (bands and face-plates of alloy steel EI435) also produced non-uniform deformation, but crack formation was prevented by equilibration of the surface stresses. In the third series, the authors studied the effect of uniform deformation by means of linear compression in relation to the properties of the facial compression medium, and found that a soft facial medium resulted in longitudinal cracks; furthermore, chemical inhomogeneities produced secondary stresses and consequent microcracks (intercrystalline defects), preventing formation of a dense plastic structure. The conclusion that plastic deformation of brittle materials necessitates triaxial compression by equipliable media (as in the second series) was confirmed by successful deformation of marble samples (60-80%), and was then tested under industrial conditions in three variants (all involving omnilateral compression of alloy B by bands of steel-35): a) facial compression was by means of equipliable disks of alloy EI435; b) facial compression was by soft disks of steel-35, compressed by a 7-mm thick layer of equipliable alloy EI602; c) facial compression was by 35-mm thick disks of steel-35. Only the first variant guaranteed a high degree of plastic deformation without crack formation. Orig. art. has: 2 tables and 5 illustrations.

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L 10711-65

ACCESSION NR: AT4009497

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

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

NO REF SOV: 009 OTHER: 006

Card 3/3

L 25368-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) IJP(c) MJW/JD

ACCESSION NR: AR5005074 S/0277/64/000/011/0019/0020

SOURCE: Ref zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Otd. vyp., Abs. 11.48.125 28 B

AUTHOR: Pavlov, I. M.; Konstantinov, Ye. G.; Shelest, A. Ye.; Tarasevich, Yu. F.

TITLE: Force conditions for deformation of some titanium alloys 27

CITED SOURCE: Tr. Mosk. in-ta metallurgii, Mosk. energ. in-ta i Mosk. in-ta stali i splavov, vyp. 44, 1963, 22-28

TOPIC TAGS: allotropic transformation, metal mechanical property, titanium alloy/ VT1 alloy, OT4 alloy, VT6 alloy, VT14 alloy 18 18 18 18

TRANSLATION: The resistance to deformation of VT1, OT4, VT6 and VT14 titanium alloys was determined as a function of the temperature at relative reductions of 20, 40 and 60%. It is established that there is a stepwise change in the specific pressure in the allotropic transformation temperature interval. For OT4 alloy (at rolling temperatures lower than 600°) and for VT6 and VT14 alloys (at rolling temperatures lower than 800°), a decrease in resistance to deformation is observed with an increase in rolling reduction. This is explained by the formation of

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L 25368-65

ACCESSION NR: AR5005074

cracks in the metal. Industrially pure VT1 titanium has good ductility throughout the entire range of temperatures and rolling reductions studied; titanium alloys have less ductility. At temperatures of 1100-900°, the specific pressures for all alloys studied are low. With a reduction in temperature, there is a sharp increase in the difference between the specific pressures for VT1 and the remaining alloys.

SUB CODE: MM ENCL: 00

Card 2/2

PAVLOV, I.M.; OSADCHIY, V.Ya.; GETIYA, I.G.

Investigating the transverse rolling process by means of a roller-torsiometer. Izv. vys. ucheb. zav.; chern. met. 6 no.3: 117-120 '63. (MIRA 16:5)

1. Moskovskiy institut stali i splavov.
(Rolling (Metalwork)) (Strain gauges)

PAVLOV, I.M.

Physical nature of tensor representations in the plasticity theory. Izv. vys. ucheb. zav.; chern. met. 6 no.6:68-72 '63. (MIRA 16:8)

1. Institut metallurgii im. A.A.Baykova.
(Rolling (Metalwork)) (Plasticity)

ORZHEKHOVSKIY, V.L.; PAVLOV, I.M.; GUREVICH, Ya.B.; ...

Investigating conditions of high-temperature deformation of high-melting metals. Izv. vys. ucheb. zav.; chern. met. 6 no.9: 88-91 '63. (MIRA 16:11)

1. Moskovskiy institut stali i splavov, TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii i Institut metallurgii im. A.A.Baykova.

PAVLOV, I.M., prof. dr.; DRAGAN I.

Research on the influence of reduction working conditions, by cooled rolling process, on electric, magnetic properties and textural degree of the transforming sheets. Studii cerc metalurgie 8 no.4:443-459 '63.

1. Membru corespondent al Academiei de Stiinte a U.R.S.S. (for Pavlov).

ZHUCHIN, V.N., inzh.; PAVLOV, I.M.

Coefficient of friction during cold rolling. Stal' 23 no.3: 231-234 Mr '63. (MIRA 16:5)

1. Chlen-korrespondent AN SSSR (for Pavlov).
(Rolling (Metalwork)) (Friction)

ZHAROV, V.M.; PAVLOV, I.M.

Punch apparatus for setting samples. Zav.lab. 29 no.2:242-243 '63.
(MIRA 16:5)

1. Institut metallurgii imeni A.A.Baykova.
(Testing machines)

PAVLOV, I.M.; ZHAROV, V.M.

[redacted] Methods of plotting the diagrams of actual compressive stresses for large and small strains. Zav. lab. 29 no.6: 754-758 '63. (MIRA 16:6)

1. Institut metallurgii imeni A.A. Baykova.
(Strains and stresses)

PAVLOV, I.M.; GUREVICH, Ya.B.; SHELEST, A.Ye.; ORZHEKHOVSKIY, V.L.; BASHCHENKO, A.P.

Investigating certain conditions for the hot rolling of molybdenum, in vacuum, in an argon atmosphere, and in air. TSvet.met. 36 no.2:68-71 F '63. (MIRA 16:2)

(Molybdenum) (Rolling (Metalwork)) (Protective atmospheres)

ZHAROV, V.M.; PAVLOV, I.M.

Method of interpolation and extrapolation for plotting true normal stresses during tension. TSvet. met. 36 no.3:66-69 Mr '63. (MIRA 16:5)

(Strains and stresses—Graphic methods)

PAVLOV, I.M.; SHELEST, A.Ye.; GUREVICH, Ya.B.; ORZHEKHOVSKIY, V.L.; BASHCHENKO, A.P.

Hot rolling of niobium in vacuum and in a protective atmosphere. TSvet. met. 36 no.5:63-67 My '63. (MIRA 16:10) [illegible], I.M., otv. red.

[Plastic deformation of metals] Plasticheskaia def[illegible]-tsiia metallov. Moskva, Nauka, 1964. 180 p.

(MIR[illegible] 17:[illegible])

1. Mos[illegible] - Institut metallurgii. 2. Ch[illegible] [illegible] AN SSSR.

AGEYEV Nikolay Vladimirovich, nagrazhden ordenom Lenina, dvumya ordenami Trudovogo Krasnogo Znameni, medal'yu za doblestnyy trud v Velikoy Otechestvennoy voyne, otv. red.; KURDYUMOV, G.V., akademik, red.; ODING, I.A., red. [deceased]; PAVLOV, I.M., red.; ZUDIN, I.F., kand. tekhn. nauk, red.

[Study of steels and alloys] Issledovaniia stalei i splavov. Moskva, Nauka, 1964. 390 p. (MIRA 17:8)

1. Moscow. Institut metallurgii.2.Chlen-korrespondent AN SSSR (for Odin, Ageyev, Pavlov).

L 13057-65 EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pf-4 ASD(m)-3 JKT/
MJW/JD/HW/JT/MLK

ACCESSION NR: AT4047717 S/0000/64/000/000/0003/0018

AUTHOR: Pavlov, I.M., (Corresponding member AN SSSR), Mekhed, G.N., Wang, Yu-ming

TITLE: Modern methods of increasing the strength of steel and alloys

SOURCE: AN SSSR. Instut metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals). Moscow, Izd-vo Nauka, 1964, 3-18

TOPIC TAGS: cold working, alloy heat treatment, alloy strength, thermomechanical working, hardening, tempering, thermomechanical magnetic working, steel strength

ABSTRACT: The development of aviation and rocketry requires new high-strength steels and alloys. Lately, high-strength alloys containing titanium, molybdenum, tungsten, tantalum, niobium and other refractory metal bases are being widely employed. However, common steel should not be forgotten. The following methods are known for increasing the strength of metals and alloys: plastic [illegible]

working. In relation to steel, a high ultimate strength is obtained by creating a finely [illegible] by thermomechanical

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L 13057-65

ACCESSION NR: AT4047717

dispersed martensitic structure in the metal. Depending on the quantity of dislocations, the strength of annealed steel is many times lower than the theoretical value. One method of strengthening such metals is to lower the number of defects in the metal. The second method is to relocate the dislocations in a certain order by thermal or thermomechanical working consisting of a combination of plastic deformation and heat treatment. Under high temperatures, this type of working can be performed with lower pressure on the machine. At low temperatures and in a vacuum chamber, the ultimate strength and yield point of steel increases by 16%. It is known that steel consists of a solid solution of carbides. Lowering the carbon diffusion in iron aids supercooling of the austenite, which is required for low temperature thermomechanical working. Increasing the carbon content above 0.6% increases the ultimate strength and yield point, but sharply lowers the plasticity. Considering various alloying elements, it is noted that the increase in steel and alloy strength after thermomechanical working depends both on the steel melting process and on the purity of materials used. Melting in a vacuum increases steel and alloy strength. Tests showed that the ultimate strength and yield point of 30KhNMA steel, for example, increase when the deformation temperature varies between 500 and 900C, while the elongation and resilience decrease. Tests also showed that increasing of the compres-sion of steel with supercooled austenitic structure leads to improvement of the mechan-ical properties during thermomechanical working. Steel cooled in [illegible] during hardening

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ACCESSION NR: AT4047717

contains more non-martensitic products located along the slip plane with lower mechanical properties than when the steel is cooled in oil. Tempering affects the properties of steel and alloys during low temperature thermomechanical working. Tempering lowers the residual stress remaining in the steel after thermomechanical working, and increases the yield point, at the same time lowering the ultimate strength. As the temperature rises in this case, the ratio of the yield point to the ultimate strength increases. It was noted that the strength of steel also increases when the quantity of remaining austenite is lowered. A new method of steel working known as "thermomechanical magnetic working" is also used for increasing steel strength. When the steel is being hardened, at the moment of transformation from austenite into martensite, a strong electromagnetic field is applied to the steel, followed by low-temperature tempering. When the resistance of the magnetic field is increased to 5000 or the effect of thermal magnetic working is found to be significant. Other methods noted in the paper for working of rocket engines are turning-pressure working, thermomechanical working with explosion deformation, shot peening and others. However, there are either few or no publications on these methods. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

SUBMITTED: 01Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 043 OTHER: 017

Card 3/3

L 13058-65 EWT(d)/EWT(m)/EWA(d)/EWP(v)/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)
Pf-4 ASD(m)-3 JD/HW/MLK

ACCESSION NR: AT4047718 S/0000/64/000/000/0019/0021

AUTHOR: Pavlov, I.M., (Corresponding member AN SSSR), Mekhed, G.M., Ganin, N.P., Suvorov, V.A., Wang, Yu-ming

TITLE: Rolling mill for metals and alloys of low plasticity

SOURCE: AN SSSR. Institut Metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals). Moscow, Izd-vo Nauka, 1964, 19-21

TOPIC TAGS: rolling mill heating, rolling mill cooling, rolling mill design

ABSTRACT: Electrical, high-strength, heat resistant, acid-proof and other special alloys and metals must have high-quality surfaces. During working under pressure in rolling mills or during thermomechanical working, the machinery employed must therefore be heated to eliminate ~~surface defects; this heating~~ is known as technological tool heating. For rolling mills, the rolls are heated either by the hot metal, by gas or by electricity (resistors and induction coils). For the last two methods, the rolls are heated to 100-350C either in the mill or on a special stand. In factories the rolls can be heated in special gas chambers, by gas burners (either in the mill or on the stand), by electrical resistors or by induction coils. Of these methods the simplest is gas heating. Besides heating, cooling is of great importance. The rolls are cooled either by pouring water, blowing air,

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L 11058-65

ACCESSION NR: AT4047718

4

steam or water, or by a flow of water through the roll. A special 250 rolling mill was used by the authors for testing. The mill had two gas burners located 40 mm apart. The length of the heated part of the roll was 120 mm, while the diameter was 240 mm. The bearing spacing was 640 mm. The rolls had two grooves at both sides of the working part for water. The burner design insured proper adjustment of heating intensity both before operation and while rolling. Thermocouples were placed on the mill to measure the temperature of the working surfaces of the rolls. "Mechanics A. Ye. Borisov and S. Aynetdinov and Senior laboratory assistant S. L. Vasyukov took part in the work." Orig. art. has: 2 figures.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

SUBMITTED: 01Jul64 ENCL: 00 SUB CODE: MM, IE

NO REF SOV: 013 OTHER: 000

Card 2/2

L 13059-65 EWT(d)/EWT(m)/EWA(d)/EWP(v)/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)
Pf-4 JD/HW/MLK

ACCESSION NR: AT4047719 S/0000/64/000/000/0022/0027

AUTHOR: Pavlov, I.M. (Corresponding member AN SSSR), Mekhed, G.N., Suvorov, V. A.

TITLE: Methods of heating rolling mill rolls

SOURCE: AN SSSR. Institut metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals). Moscow, Izd-vo Nauka, 1964, 22-27

TOPIC TAGS: rolling mill, roll heating, rolling mill design

ABSTRACT: In a general review of the literature, the authors point out that rolling mill rolls for both hot and cold rolling are heated by plastic deformation of the metal, 90% of the work utilized for metal deformation being transformed into heat, of which 6% heats the rolls. The roll temperature thus depends on the rolled metal temperature, rolling rate, compression, duration of contact of the metal and roll and the coefficient of friction. Sometimes, artificial heating is also used. The roll temperature for hot rolling reaches 300-350C with water cooling and 350-600C with partial or no cooling, while for cold rolling the roll working surface temperature does not exceed 100-150C. Due to unequal heating along their length, the rolls become barrel-shaped, so that to obtain uniform sheets

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the roll shape must be changed in successive mills. The heating of rolls may be divided into three stages: heating of the roll surface with a cold core, uniform heating of the roll across the entire section, and roll cooling. Sheets are usually rolled with cast iron rolls which work satisfactorily at temperatures up to 450C. At higher temperatures, the rolls are fractured due to unequal temperature distribution. Several methods have been proposed for pre-heating rolls, thus lowering the thermal stress. These methods are divided according to the heat source (gas, fuel oil and electricity). The oldest method is heating by the rolled metal. In the thirties, fuel oil heaters began to be used, and later this method was substituted by gas burners either in the rolling mill or on a special stand. The exhaust gases of a heating furnace can be used for heating the rolls of a duo mill. Electrical resistance can also be used for heating. In 1936, N. D. Krupnik proposed electrical heating coils for rolling mills with 655 mm diam. rolls. The electrical current was 110 amp, 30 v. Internal heating of rolls is now being used in the USA, using induction coils which encircle the rolls in a special housing. N. V. Zhukov has proposed using a solenoid around the rolls. During 4-5 hours, 750 mm diam. rolls are heated to 300-350C at 1000 amp, 100 v with 10-12 solenoid turns. Oval induction coils are used in factories in the district near the Ural Mountains, but cylindrical

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induction coils are cheaper. Pre-heating of rolls outside the rolling mill makes it possible to increase production by 450-600 tons/day. Water or steam is also used, e.g., in the Zhdanov factory. In olden times, an open fire was used, and it is also possible to use friction for heating, but the efficiency of this method is low. The choice of the heating method must be determined separately in each case, considering the available equipment.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

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L 13060-65 EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pf-4 IJP(c)/ASD(m)-3/ASD(f)-2 MJW/JD/HW/MLK

ACCESSION NR: AT4047720 S/0000/64/000/000/0028/0031

AUTHOR: Pavlov, I. M., (Corresponding member AN SSSR), Konstantinov, Ye. G., Shelest, A. Ye

TITLE: Investigation of strain resistance during plastic deformation of titanium alloys

SOURCE: AN SSSR. Institut metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals). Moscow, Izd-vo Nauka, 1964, 28-31

TOPIC TAGS: titanium alloy, titanium alloy strain resistance, titanium alloy plastic deformation/alloy VT1, alloy OT4, alloy VT6, alloy VT14

ABSTRACT: Solution of the problems connected with the design and operation of rolling mills requires knowledge of metal strength characteristics which are needed for calculation of the metal pressure on the rolls and the rolling torque. The present paper considers the determination of strain resistance and compares the strain resistance of several titanium alloys during rolling and when testing under static and impact tensile loads. The samples were rolled on a 200 rolling mill (roll diameter 212 mm, rolling rate 0.5 m/sec, polished steel rolls, Rockwell hardness 50) with dynamometers for measuring the total metal pressure on the rolls and torque meters for measuring the total rolling torque. VT1, OT4, VT6 and BT14 titanium alloys were tested,

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the samples being heated for 15-35 minutes for 500-1100C rolling intervals (every 100C). Static tests were performed on a R-5 machine with electric drive and a strain rate of 0.003-0.0045 sec^{-1}. The samples were heated in a special furnace with temperature deviations not exceeding over ±10C. The heating time was 15-35 minutes. The method for finding the strain resistance (proposed by S.I. Gubkin) on the basis of strain equilibrium under static and impact tensile loads consists of calculating the indicator diagram coefficient under ultimate static tension as the ratio of the areas of the diagram and the inscribed rectangle. The ultimate impact toughness was tested on the MK-30 machine with an initial impact speed of 5.6 m/sec and a strain rate depending on the degree of deformation of 150-190 sec^{-1}. The samples were preheated and tested in an asbestos packing. The tests demonstrated the strength and plasticity of VT1, OT4, VT6 and VT14 titanium alloys. Comparison of data for these alloys showed that the static ultimate strength may be used in equations for hot pressure working at 700-1000C. The ultimate impact toughness determined experimentally in the same temperature range is higher than the actual and theoretical strain resistance, this being explained by the high strain rates during impact elongation. The plastic properties of these alloys are lowered as the strain rate increases. Orig. art. has: 4 figures and 3 equations.

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ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

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L 14967-65 EPA(s)-2/EWT(m)/EPF(n)-2/EWA(d)/EWP(k)/EWP(b)/EWP(t) Pf-4/Pt-10/ Pu-4 ASD(a)-5/ASD(m)-3 JD/WW/HW/JG/JT/MLK
ACCESSION NR: AT4047721 S/0000/64/000/000/0032/0035

AUTHOR: Pavlov, I. M. (Corresponding member AN SSSR); Zharov, V. M. B

TITLE: The problem of thermoplastic metal working 18

SOURCE: AN SSSR. Institut metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals). Moscow, Izd vo Nauka, 1964, 32-35

TOPIC TAGS: metal working, metal plastic deformation, hot pressing, cold pressing

ABSTRACT: This paper is a general discussion and review of the literature on one of the most progressive tendencies in metal working: the rejection of mechanical cutting and the substitution of pressure working to obtain precise products. This tendency includes both cold and hot pressing techniques. The advantages of these methods are the elimination of metal losses and a lower time consumption during working. Besides, the properties of the metal are improved. Plastic deformation is currently being carried out in temperature ranges not involving metal recrystallization. During the last few years, two branches of metallurgical science have gradually merged, those dealing with the stamping of liquid metal and with pressure casting. Other methods described in the paper relate to "warm" metal working, this being at temperatures between cold and hot working of metals.

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An example is the combination of heat treatment and plastic deformation in one technological process for obtaining high-strength steel wires. The term "thermal mechanical working" has been used in the literature, but this term should be replaced by "thermal plastic working", since it includes pressure working together with heat treatment. Further development of the thermal plastic working of metals and alloys will require the combined research efforts of scientists in adjoining fields of knowledge.

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L 16467-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EPR/EWP(k)/EWP(b) Pf-4/Ps-4 IJP(c)/ ASD(f)-2 JD/HW/MLK

ACCESSION NR: AT4047728 S/0000/64/000/000/0100/0107

B+1

AUTHOR: Zharov, V.M., Pavlov, I.M. (Corresponding member AN SSSR)

TITLE: Autodiagrams of the compression of metals 14

SOURCE: AN SSSR. Institut metallurgii. Plasticheskaya deformatsiya metallov (Plastic deformation of metals) Moscow. Izd-vo Nauka, 1964, 100-107

TOPIC TAGS: plastic deformation, metal compression, compression autodiagram, upsetting, yield point, aluminum upsetting, cold processing

ABSTRACT: The authors briefly discuss the uses of tension autodiagrams and their application in the case of testing for mechanical properties. The difficulties normally encountered in carrying out tensile tests are mentioned, and compression tests for metals and alloys are discussed as a supplementary technique, useful in the determination of material characteristics. The advantages of the compression test are outlined and attention is called to the relatively small body of information available on the subject of the compression testing of metals and alloys and, in particular, compression autodiagrams. The authors of this article carried out a series of tests of various metals and alloys for compression (reduction through upsetting), with the stress-strain curve auto-

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matically recorded in a system of coordinates planed onto the sample. The tests were conducted on an R-5 universal test instrument with the lower (active) grip moving at a rate of 10 mm/min. Upsetting was effected between plane-parallel polished blocks, installed in a specially-designed guide mechanism (described elsewhere), at room temperature and with no lubrication of either the blocks or the samples themselves. The results of this experimentation are discussed in the article. Autodiagrams of various metals and alloys are presented and analyzed, and certain terms, frequently encountered in the technical literature on this subject, are defined more closely by the authors. The relationship which exists between the compressing force and deformation is studied in detail, and a principle is proposed for the approximate determination of the force of the onset of plastic deformation in a manner analogous to the determination of the limit of proportionality according to the tensile autodiagram. The yield point, found in this fashion on the basis of a compression autodiagram, is called by the authors the "technological yield point". The latter is shown to indicate with a rather high degree of accuracy that stress under which the first perceptible signs of residual deformation are observed. It is noted that a more precise determination of the yield point of the basic metal is possible if the anticipated value of the force at the beginning of the metal's plastic flow is not much smaller than the maximum possible force at the selected load stage of the test

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instrument. The results of a study of the force conditions in the upsetting of pure aluminum are reported in the article and it is noted that, in addition to the elastic-plastic deformation of the sample itself, compression testing is always accompanied by elastic deformation of the stamp and a number of parts of the test machine. Among the general conclusions that may be drawn from this article are the facts that metals and alloys which yield a flow area in tension autodiagrams also show this area in compression diagrams, while metals which have no flow area under extension, similarly do not have one when subjected to compression. It has also been demonstrated that the force - absolute compression function has the form of a smooth curve (in the region of plastic deformation) in the case of the butt reduction of cylindrical samples cut from aluminum with a coarsegrain cast structure. Pressure treatment of coarse-grained metal may be used to obtain articles of special configuration. Orig. art. has: 12 figures and 4 formulas.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

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JD/HJ/WB/MLK

ACCESSION NR: AT4048061 S/0000/64/000/000/0128/0131

AUTHOR: Pavlov, I.M., Shelest, A. Ye., Konstantinov, Ye. G. B+1

TITLE: Characteristics of the oxidation of several titanium alloys when heated prior to plastic deformation 14 18 27

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 128-131

TOPIC TAGS: titanium alloy, titanium alloy rolling, titanium alloy oxidation, plastic deformation/alloy OT, alloy VT

ABSTRACT: At high temperatures, the scale formation and gas saturation taking place at the surface of titanium alloys depend on the rate of chemical reactions at the border between the liquid and solid phases, as well as on the diffusion rate. The present paper considers the results of a study of the kinetics of oxidation of several Ti alloys under conditions of plastic deformation. The most precise method of testing is the continuous weighing process. However, intermediate samples cannot be taken. Therefore, separate samples were taken for each testing temperature. The samples (10-16 mm cubes) were placed in porcelain crucibles with access to air ensured from all sides and heated to 800-

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1200C (every 100C) for durations of 15, 30, 60, 120 and 240 minutes. The samples were then weighed both with and without the crucibles and with the scale removed. The change in weight was related to sample area prior to oxidation. Fig. 1 of the Enclosure illustrates the kinetic curves of oxidation of the tested Ti alloys. The tests showed that the oxidation rate depends on the oxygen concentration gradient in the surface layer of the metal. The value of the oxidation rate was determined by graphic differentiation of the kinetic curves for prolonged oxidation. Generally, the rate changes gradually and reaches a constant, known as the characteristic rate. This rate changed from 0.17 for VT-1 at 800C to 12.00 at 1200C, from 0.03 for OT4-1 at 800C to 16.00 at 1200C, from 0.33 for OT4 at 800C to 18.00 at 1200C, from 0.10 for VT6 at 800C to 13.00 at 1200C, and from 0.10 for VT14 at 800C to 10.25 at 1200C. Attention should be paid to the fact that for the $\alpha + \beta$ and β alloys VT6, VT14 and VT15, the oxidation rate increases with the temperature at a constant rate, while for VT1 and OT4-1 alloys a sharp increase in oxidation rate is observed. Fig. 2 of the Enclosure shows the kinetic oxidation curves and variations in scale formation. The data obtained in this paper may be used to compare the heat resistance of Ti alloys and estimate the effect of alloying elements on this important property. Orig. art. has: 2 figures and 1 table.

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