SOV/136-59-7-12/20

Stress Conditions in the Extrusion of Tubes of Type TsAM 9-1.5

shows temperatures as functions of extrusion speed for various degrees of deformation. A typical oscillogram is shown in Fig 2, while Fig 3 shows that for this, as for many other alloys (Refs 10-13), the friction force remains at its maximum value over a wide range of deformations. The variations in the friction factor and other parameters with temperature (250, 275, and 300°C) are given in Table 1. Fig 4 shows friction force for each of these temperatures as functions of the extrusion speed. The ratio of friction force to the plastic-deformation stress (true resistance to deformation) for the average temperature was found to vary within the range 0.52 - 0.66. The experiments also enabled the parameters for calculating tube extrusion forces by a simplified equation to be determined (Fig 6). The almost linear plots of minimum extrusion force (tons) vs natural logarithm of extension for temperatures of 250, 275 and 300°C are shown in Fig 5. Results calculated by the simplified equation and an analytical equation published by Perlin (Ref 9), using the authors' published

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SOV/136-59-7-12/20

Stress Conditions in the Extrusion of Tubes of Type TsAM 9-1.5

(Ref 6) graphs, are compared in Table 3. The analytical equation gives high values, especially at high degrees of deformation when a greater thermal effect arises on the production than on the laboratory scale. The authors consider the optimum extrusion-speed for tubes to be up to 8, 3 and 2 mm/sec for 250, 275 and 300 °C, respectively. There are 6 figures, 3 tables and 15 references, 12 of which are Soviet and 3 German.

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78321
SOV/89-8-3-6/32

18.5000

AUTHORS: Perlin, I. L., Nikitin, I. D., Fedorchenko, V. A., Nikulin, A. D., Reshetnikov, N. G.

TITLE: Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 3, pp 219-227 (USSR)

ABSTRACT: The choice of optimum thermomechanical conditions for working of uranium is complicated due to possibilities of allotropic transitions resulting in modifications having different plasticity and strength. Due to its high resistance to deformation and small heat capacity, uranium is often heated considerably during extrusion and rolling and changes from α into β phase. Deforming samples from 90 to 60 mm at 420° C by means of one stroke of a friction press, the temperature of the metal rises from 90 to 100° C. Strong oxidation also influences the temperature change in the metal during working. To enable the determination of conditions

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Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

for working of uranium by forces of pressure, the authors investigated the rolling, pressing, drawing, and die forging of uranium. Figure 1 shows the influence of the temperature on the maximum permissible reduction per pass of 15-mm-wide cast uranium samples. Uranium is exceptionally sensitive to nonuniform distributions of deformations during rolling. For example, fine uranium strips (0.05-0.20 mm) may be obtained without fracture; reduction per pass 80-85%. The augmented plasticity is explained as due to negligible nonuniformities in the distribution of deformation in the rolled strip. However, when rolling cold thin plates with variable rolling direction, the resulting nonuniformities in deformations cause fracture of the metal. Figure 2 shows the results of investigations of the variation with temperature of the mean specific pressure p_{cp} of the metal on the rollers. The temperature increase in the metal during rolling at $t = 630^{\circ}$ C causes a transition into

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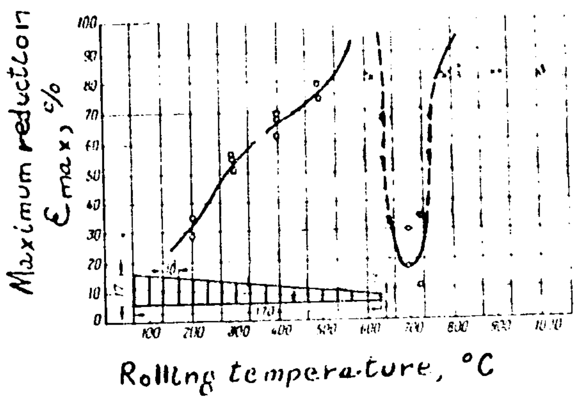

Fig. 1. Influence of temperature on rollability of uranium: (x) no fracture of samples was observed.

Some Force and Deformation Characteristics

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SOV/89-8-3-6/32

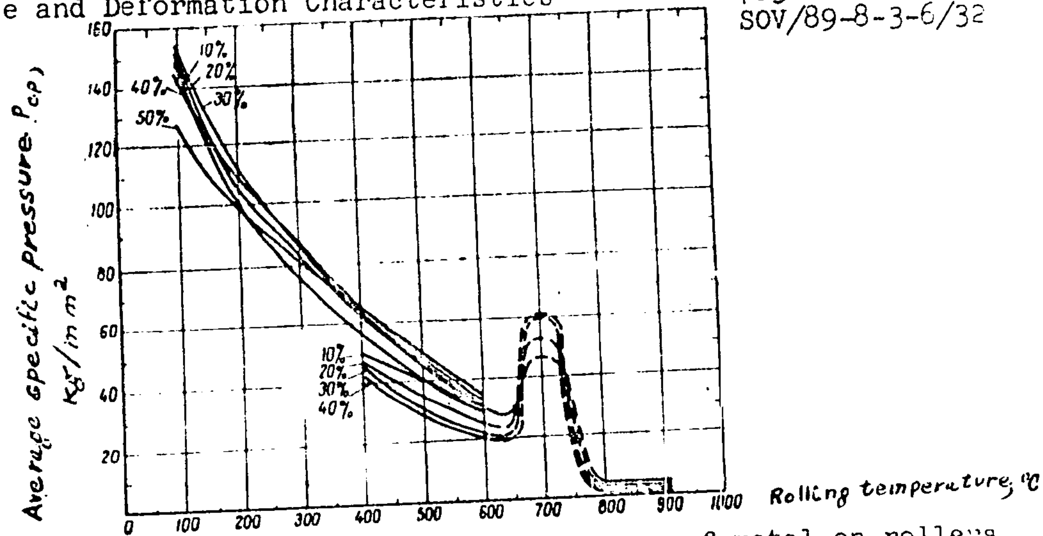

Fig. 2. Average specific pressure of metal on rollers versus the temperature: ——first series of tests; - - -second series of tests.

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the β phase which shows up as staggered oscillograms. The authors also investigated the mean specific pressure as function of the reduction at various temperatures and also as function of the initial state of uranium samples. They compared the results with the analytic equation of A. I. Tselikov (Prokatnye stany (Rolling Mills) M., Metallurgizdat, 1947) and found a satisfactory agreement:

$$p_{cp} = k\frac{2(1-\varepsilon)}{\varepsilon(\delta-1)}\left(\frac{h_H}{H}\right)\left[\left(\frac{h_H}{H}\right)^{\delta} - 1\right],$$

where $\varepsilon = (H - h)/H$ is reduction; h_H, height of strip in the neutral cross section; $\delta = \mu\sqrt{2D/\Delta h}$ (μ = coefficient of friction; D = diam of rollers); $k = 1.15\, n_y\, \sigma_s$ (n_y = coefficient of strengthening; σ_s = yield limit in case of large plastic deformations). The value of n_y is function of the reduction

Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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and temperature, and varies between 1 and 1.6. Figure 4 shows the absolute widening $\Delta b = B_1 - B$ of a square sample 21 x 21 x 180 mm with rollers 220 mm in diam as function of rolling temperature. The maximum of the curves is connected to the maximum of the friction coefficient which in the 900-950° C temperature region is equal to 0.4-0.45. The authors note that uranium can be extruded in the temperature interval between 250 and 1,000° C, and they discuss in detail the extrusion characteristics of γ- and α-uranium. They emphasize that during extrusion the uranium should not come in contact either with air or steel tools. Tools made from heat-resistant alloys, carbides, and ceramics with lubricants are used for extrusion of α-uranium. While extrusion velocities of γ-uranium are practically unrestricted, α-uranium is extruded using velocities between 1 and 400 mm/sec. The authors investigated further the extrusion stresses as function of extrusion ratio, temperature (see Fig. 6), and production mode of the sample. The extrusion stress depends linearly on

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Some Force and Deformation Characteristics of Working Uranium by Rolling

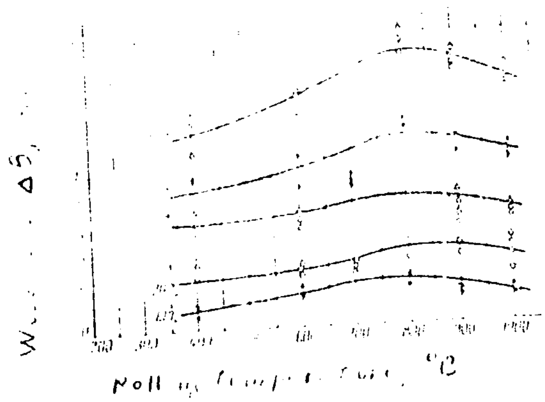

Fig. 4. Absolute widening of sample versus rolling temperature.

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Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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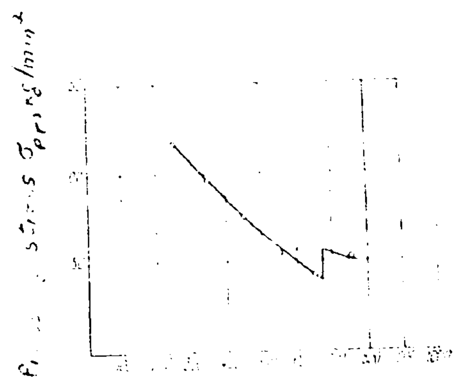

Fig. … Pressing stresses of uranium versus temperature.

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the integral index of the degree of deformation $i = \ln \mu$, and Figure 8 represents a nomogram whose cross-hatched region shows the influence of the scale-factor on the pressing stress when the ratio of the container diameters equals 5. The tests also showed that one can neglect the forces of contact friction. As seen from the nomogram, the lines pass through the coordinate origin, and therefore, the extrusion stresses σ_{pr} can be determined from the equation:

$$\sigma_{pr} = \frac{P_N - T_N}{F_n} = M_{pr}\, i.$$

In analogy with Young's modulus the authors call the coefficient M_{pr} the modulus of the extrusion stress. Figure 9 shows the variation of this modulus with temperature. Extrudability i_{pr} of the uranium metal is defined as:

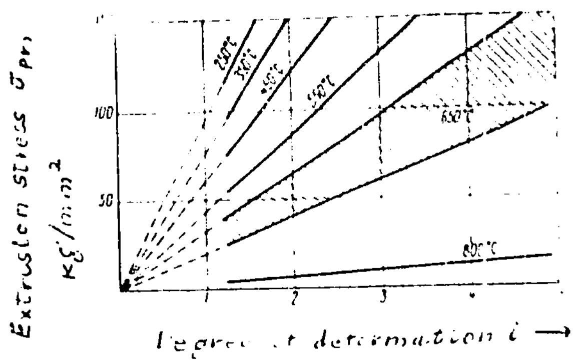

Fig. 8. Nomogram for determination of extrusion stresses.

Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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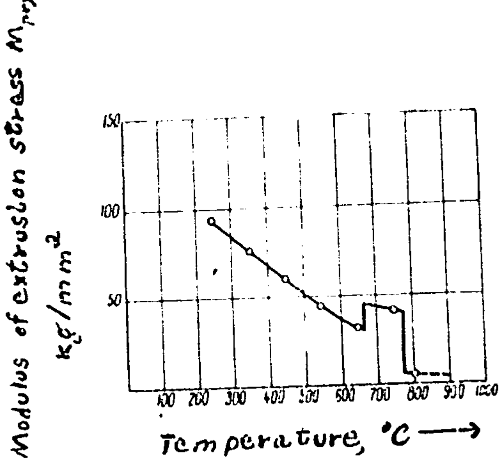

Fig. 9. Modulus of extrusion stress of uranium versus temperature.

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Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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$$\lambda_{pr} = \frac{\sigma_{pr}}{M_{pr}}.$$

is shown in Fig. 10, where the upper curve is the variation of the maximum extrudability under a pressure of 150 kg/mm^2, and the lower curve is obtained using σ_{pr} = 15 kg/mm^2. γ-Uranium has extrudability above 35. The authors discuss further the structure of the products and Table 2 exhibits the mechanical properties of the extruded uranium. The authors discuss various lubricants used during drawing, and present in Table 3 and on Fig. 11 some results concerning drawing of uranium. With heating one can obtain uranium wires 2 mm in diam and less. Modification of heating conditions allows the production of 0.1-mm uranium wires. Uranium can be die-forged in the α and γ temperature regions with ram velocities up to 6,000-7,000 mm/sec. Any transition into the β region due to overheating will cause

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Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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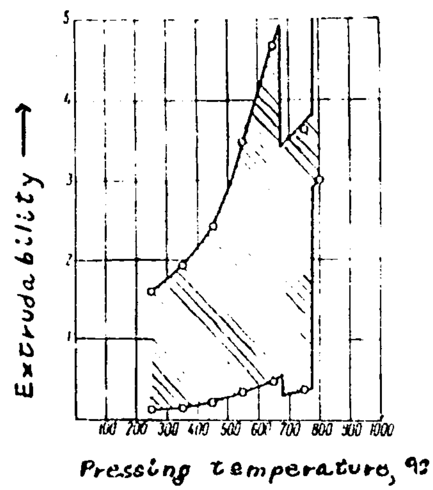

Fig. 10. Extrudability of uranium versus temperature.

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Table 2. Mechanical properties of extruded uranium. (a) Initial state of uranium; (b) tensile strength; (c) elongation; (d) reduction of area; (e) extruded at; (f) extruded in α -phase with subsequent hardening from β-phase.

a	b σ_b, kg/mm²	c δ, %	d ψ, %
e, 350° C . . .	143,0	9,2	8,9
e, 730—750° C .	61,3	9,2	4,1
e, 900° C . . .	80,9	7,6	4,0
f . . .	75,0	7,0	6,0

Note: (1) Each figure represents the arithmetic m[illegible] value from three measurements. (2) Small Gagarin-[illegible]e samples were used during tests.

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Table 3. Drawing stress versus drawing ratio. (a) Initial state of [illegible] bar; (b) initial diam; (c) final diam; (d) drawing ratio per pass; (e) pulling force of drawing; (f) drawing stress; (g) annealed; (h) preliminarily deformed.

a	b, d_H (mm)	c, d (mm)	d, δ (%)	e, P_{dr} (kg)	f, σ_{dr} (kg/mm^2)
g	11,45	10,7	12,7	1950	21,7
h	10,3 9,5	9,8 8,5	10,0 20	1700 2650	22,5 47

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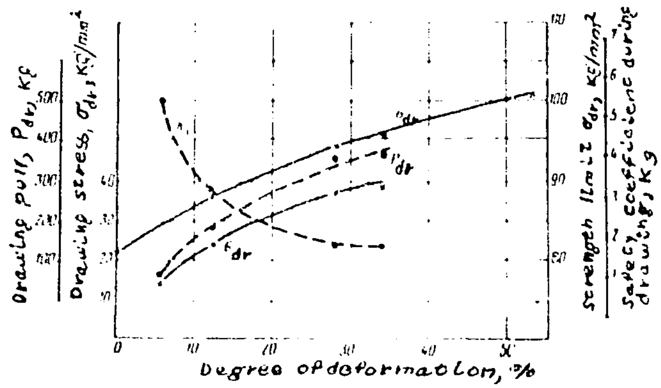

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Fig. 11. Relationship between drawing parameters and drawing ratio per pass.

Some Force and Deformation Characteristics of Working Uranium by Forces of Pressure

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SOV/89-8-3-6/32

crack formation. The authors also discuss briefly the conditions for flat die forging of α and γ uranium. There are 11 figures; 4 tables; and 9 Soviet references.

SUBMITTED: February 23, 1959

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18.8200

75397
SOV/149-2-5-23/32

AUTHORS: Korol', V. K., Perlin, I. L.

TITLE: Deformation Resistance of TsAM 9-1.5 Alloy Within Temperature Range of Hot Working by Pressure

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Tsvetnaya metallurgiya, 1959, Vol 2, Nr 5, pp 159-166 (USSR)

ABSTRACT: Zinc alloys are now used by railroads and other industries as a good substitute for antifriction bronzes. Such an alloy is TsAM 9-1.5, consisting of 8 to 10% Al, 1 to 2% Cu, and 0.03 to 0.06% Mg, the balance being zinc. This alloy corresponds to state standard GOST 7117-56. Previous studies were conducted by German authors (Beier, W., Wolf, V., Z. Metallkunde, Nr 8, 1939; Weiss, E., Metallkunde, Nr 4, 1940), and by Vinogradov, S. V., Dnestrovskiy, N. Z., "Special Bronzes and Brasses," Metallurgizdat, 1945; they cover, however, only slow rates of deformation (10 to 120 mm/min), while hot working by pressure involves a high rate of deformation. The authors studied the latter using a tension-testing machine with a pendulum dynamometer

Deformation Resistance of TsAM 9-1.5 Alloy Within Temperature Range of Hot Working by Pressure

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with a ram speed of 0.2, 1.6, 2.5, and 168 mm/sec, a drawing bench with an attachment for tensile tests, and a recording device for preparing a primary diagram by means of an oscillograph. Specimens were rods of 8-mm OD and a length of 40 to 80 mm (GOST 1497-42). The installation is shown in Figs. 1 and 2. The deformation of the specimen can be recorded simultaneously on the photographic plate and by the oscillograph. The results of tests are given in Table 2. From Table 2 it appears that the TsAM 9-1.5 alloy acquires a considerable strengthening only at the beginning (up to 10% reduction), then softens rapidly at deformation speeds of $2.5 \cdot 10^{-3}$; $2.07 \cdot 10^{-2}$, and $6.25 \cdot 10^{-2}$ 1/sec. However, at a deformation speed of 21 1/sec a certain increase in the stress of plastic tension is observed, even at 300 to 350°. One can conclude that at slow speeds the rate of deformation does not influence substantially the resistance of the alloy. The maximum value of the speed factor (6.4, which is the ratio of the stress of plastic tension at any speed and any

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SOV/149-2-5-23/32

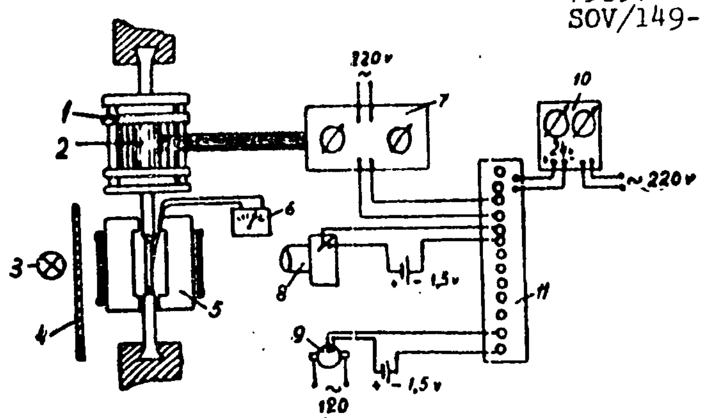

Fig. 1. Diagram of installation for simultaneous determination of applied force and cross section of the specimen during stretching. (1) Reverser; (2) dynamometer; (3) light source; (4) screen; (5) resistance heat; (6) galvanometer and thermocouple; (7) power supply; (8) photographic camera "Zenit-S"; (9) time recorder; (10) oscillograph rectifier; (11) oscillograph POB-14.

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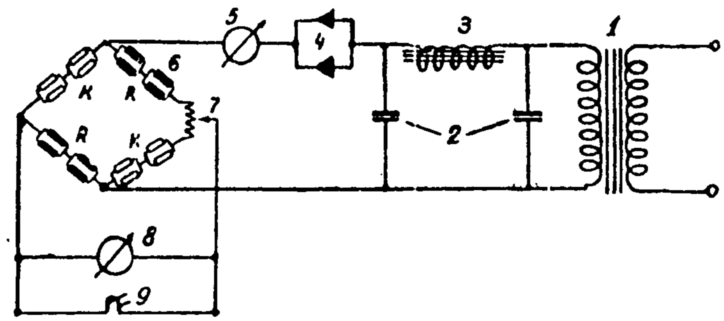

Fig. 2. Electric circuit for recording of tensile stress. (1) Transformer 220/24 v; (2) capacitors, 24 v, 50 mcf; (3) choke; (4) rectifier DGTs-24; (5) milliammeter; (6) coil resistors (R, working, K, compensation); (7) regulating rheostat 2 Ω ; (8) microammeter; (9) loop of oscillograph.

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Deformation Resistance of TsAM 9-1.5 Alloy Within Temperature Range of Hot Working by Pressure

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reduction ratio, to the stress of plastic tension at a deformation speed = 2.5 · 10^{-3} sec) corresponds to a temperature of 350°. At 200° it is down to 1.3. There are 2 tables; 7 figures; and 10 references, 6 Soviet, 2 German, 2 U.S. The U.S. references are: Gonson, Moor, Proc. ASTM, B. 40. 1940; Mendschoun, J. Appl. Mech., December, 1944.

ASSOCIATION: Krasnoyarsk Institute of Nonferrous Metals. Chair of Metal Working by Pressure (Krasnoyarskiy institut tsvetnykh metallov. Kafedra obrabotki metallov davleniem)

Card 5/6

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S/182/60/000/009/004/012
A161/A029

AUTHORS: Perlin, I.L.; Fedorchenko, V.A.

TITLE: On the Press Forging Technology for Uranium and Uranium Alloys

PERIODICAL: Kuznechno-shtampovochnoye proizvodstvo, 1960, No. 9, pp. 12 - 18

TEXT: The article presents a review of information on the technology of forging uranium. The information sources are American (A.I.M.E.), or in English language, including manuals; proceedings of two international conferences in Geneva (1955 and 1958). The two Soviet sources referred to (Refs. 5 and 15) are only mentioned. The first deals with pecularities of pressing beryllium, zirconium, uranium and thorium, and the latter with work safety. All illustrations are from foreign sources. There are 11 figures and 15 references: 9 English and 6 Soviet.

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PERLIN, I.L.; FEDORCHENKO, V.A.

Equipment and protective devices for the production of heat-releasing elements for atomic reactors. TSvet. met. 33 no.8:88-93 Ag '60.
(MIRA 13:8)

(Nuclear reactors--Materials)
(Radiation protection)

PERLIN, I.L.; SHAPIRO, V.Ya.

Comparative analysis of power conditions in pipe drawing with floating and fixed cylindrical mandrels. Sbor. nauch. trud. GINTSVETMET no.33:299-304 '60. (MIRA 15:3)
(Drawing (Metalwork))

KOROL', V.K.; PERLIN, I.L.; Prinimal uchastiye TSYUY GO-FAN [Ch'ü Kuo-fang], student

Production of bimetal tubes of TSAM9-1.5 - duralumin alloys by means of press forging. Sbor. nauch. trud. GINTSVETMET no.33: 310-317 '60. (MIRA 15:3)

(Laminated metal) (Forging)

IVANOV, A.I.; PERLIN, I.L.

Establishing the basic parameters of drawing steel-aluminum bimetal wire. Sbor. nauch. trud. GINTSVETMET no.33:324-330 '60. (MIRA 15:3)

(Wire drawing) (Laminated metal)

S/136/61/000/001/005/010
E193/E283

AUTHORS: Perlin, I. L. and Glebov, Yu. P.

TITLE: Determination of the Shape of the Plane of Contact in Extrusion with a Plastic Pressure Disc

PERIODICAL: Tsvetnyye metally, 1961, No. 1, pp. 72-75

TEXT: The problem of keeping to minimum the weight of the discard from extrusion billet becomes particularly important in extruding costly metals or alloys, and the present article describes a method of achieving this end. The method proposed is based on the application of a conical die, used in conjunction with a spacing disc of a plastic metal (with deformation characteristics similar to those of the extruded material), placed between the extrusion ram and the extrusion billet. The principle of the method is best explained by referring to Fig. 1 which shows (1) the extrusion billet; (2) plastic metal disc, and (3) extrusion ram, before (A) and after (B) extrusion. The salient feature of the method consists in that the mating surfaces of the extrusion billet and the spacing disc are not flat, but convex and concave, respectively. If the correct shape of the curved interface (line

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S/136/61/000/001/005/010
E193/E283

Determination of the Shape of the Plane of Contact in Extrusion with a Plastic Pressure Disc

D-C-E, Fig. 1,A) is chosen, it becomes flat (line D'-C'-E', Fig. 1,B) after emerging from the die, so that the tail end of the extruded rod is free from the "piping" defect and does not have to be discarded. A method of determining the correct shape of the curved interface from the co-ordinate net pattern, superimposed on the meridian face of an experimental billet, is described. Applying this method to alloy Д16 (D16), extruded at 420°C from a billet 40 mm in diameter, to an 18.4 mm diameter rod, the present authors found that the correct interface constitutes, in this case, a quadratic paraboloid. It is concluded that if this method is employed in extruding metals at relatively low temperatures (below 500°C), the extrusion process can be carried out without producing a discard from the extrusion billet. There are 4 figures and 2 Soviet references.

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S/136/61/000/001/005/010
E193/E283

Determination of the Shape of the Plane of Contact in Extrusion with a Plastic Pressure Disc

Fig. 1

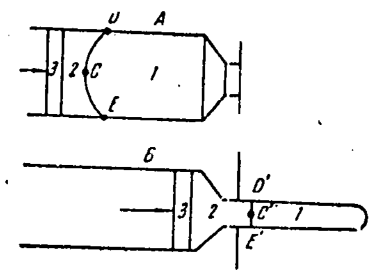

Рис. 1. Схема к процессу прессования с пластической прокладкой:
А — до начала процесса; Б — после окончания процесса; 1 — прессуемый металл; 2 — пластичная прокладка; 3 — пресс-шайба

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S/149/61/000/002/014/017
A005/A001

AUTHORS: Perlin, I.L., Glebov, Yu.P.

TITLE: On the Shape of Elastic Zone in a Die During Pressing Through a Single-Channel Flat Die

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1961, No. 2, pp. 131 - 133

TEXT: The shape of the deformation seat in pressing through flat dies is determined by the elastic zone. The effect of various factors on the magnitude of elastic zones has been dealt with in a number of publications (Ref. 1 - 4). However, they do not explain the causes of a constantly equal shape of the surface separating the elastic zone from the deforming metal volume. The shape of this boundary represents a trajectory of the motion of peripheral layers of the pressed metal. Investigations of this boundary provide data on: regularities in metal flow during pressing; characteristics of the surface of slip in the deformation seat, and on the effect of the aforementioned boundary on force conditions. The authors attempt to explain the causes determining the surface shape of the elastic zone. For this purpose it is suggested to use the principle of the least work and the least time for the trajectory of motion of metal particles

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S/149/61/000/002/014/017
A006/A001

On the Shape of Elastic Zone in a Die During Pressing Through a Single-Channel Flat Die

(Fig. 1). The trajectories of particles from point A to B can be determined analogous to the solving of Bernoulli's problem of the brachistochrone which shows (Ref. 6) that the given curve is a cycloid (Fig. 3) which is concave in the motion direction of the point and resembles by its shape the boundary of the elastic zone. Another method of demonstrating the concave shape of the curve formed by the trajectory of a point moving at high speed and minimum time is shown in Figure 4. The straight line m - m, parallel to axis x, crosses the possible trajectories in points c, d, f. Time is gained when the shorter section is passed at a lower speed and the longer section at a higher speed. Sections of the course, passed by a point at the same level and by different trajectories, are in the relation Ac < Ad < Af, i.e. at the beginning of motion at lower speed, the concave trajectory provides for a shorter course, and for a longer course at the end of motion at maximum speed, since the section of the trajectory below m - m are in relation Bc > Bd > Bf. Thus the shape of the elastic zone surface during pressing through flat dies, corresponds directly to the principle of the least work. This is important when developing methods of determining force conditions for pressure working of metals by the least work principle, using variational calculus. Data ob-

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S/149/61/000/002/014/017
A006/A001

On the Shape of Elastic Zone in a Die During Pressing Through a Single-Channel Flat Die

tained may be used for designing pressing tools.

Figure 1:

Schematic drawing of an elastic zone during pressing with a flat die.

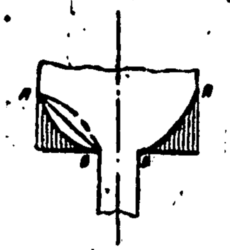
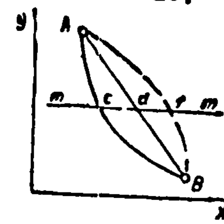


Figure 4:

Schematic drawing explaining the shape of the boundary between the elastic and plastic zones during pressing through a flat die.



There are 4 figures and 6 references: 5 Soviet and 1 non-Soviet.

ASSOCIATIONS: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Non-Ferrous Metals). Kafedra obrabotki metallov davleniyem (Department of Pressure Working of Metals)

Card 3/3

SUBMITTED: October 5, 1960

S/149/61/000/005/005/008
A006/A101

AUTHOR: Perlin, I. L.

TITLE: On force conditions and metal flow rates during the last stage of pressing

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 5, 1961, 170-173

TEXT: An investigation was made for the purpose of analyzing and making more precise the concepts of the effect of friction forces during the last stage of pressing and of the nature of changes in the strained-stressed state of the deformation seat at this stage. The investigation was carried out with direct extrusion of a round rod through a plane die. Factors were studied affecting basically the slide speed of the pressed metal over the contact surfaces of the pressing tool during the last stage of pressing when the press plate begins to enter the reduction section of the deformation seat. Formulae are given to calculate the volume feeding the pressed work piece, the decrease per second of the feeding volume and the rate of sliding and flow through the cylindrical surface. It was found that the mean sliding rate of the pressed metal over the

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contact surfaces of the press plate and the die, and the flow rate of the metal in the plane which is perpendicular to the pressing axis, are inversely proportional to the current height of the ingot in the containers; these rates increase sharply with a rapid decrease of the height. This increase in the flow rate of the pressed metal and its sliding rate along the press plate end surfaces and the die, when the press plate enters the reduction section of the deformation seat, and the less marked increase of these rates prior to this, are explained as follows: before the press plate enters the deformation seat, the volume of the latter does practically not decrease, and the same amount of metal is supplied as is delivered to the pressed work piece. After the press plate enters the deformation seat, its volume decreases inevitably. This entails an increase in the flow rate of the metal and its sliding over the contact surfaces of the press plate and the die, at an unchanged volume supplied to the pressed work piece per second. Thus the basic cause of the sharp increase of the pressing force during the last stage of the process, is the increased sliding rate of the pressed metal along the contact surfaces of the press plate and the die. There are 2 figures and 1 Soviet-bloc reference.

On force conditions and metal flow rates ... S/149/61/000/005/005/008
A006/A101

ASSOCIATIONS: Krasnoyarskiy institut tsvetnykh metallov (Krasoyarsk Institute of Non-Ferrous Metals); Kafedra obrabotki metallov davleniyem (Department of Pressure Working of Metals)

SUBMITTED: March 9, 1961

Card 3/3

S/180/61/000/006/001/020
E193/E383

AUTHORS: Berman, S.I. and Perlin, I.L.

TITLE: Scientific and technical problems of plastic-working of nonferrous metals by the operations of the squeezing group

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 6, 1961, 3 - 7

TEXT: Rapid expansion of the national economy envisaged in the new programme of the Communist Party of the Soviet Union will necessitate a corresponding increase in the production capacity of the nonferrous metal-working industry and in the range of the materials produced. This, in turn, will necessitate the introduction of new techniques, agglomeration of various fabricating processes and their intensification attained mainly by wider application of electrical heating and by increasing the speed of deformation. Some of the problems created by these developments and means of their solution are discussed briefly in the present paper.

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1) It is suggested first that the quantity of rolling stock produced can be increased by incorporating the melting, casting and rolling operations in one continuous line. This system is at present applied on a small scale in the production of aluminium foil and wire, and work is in progress on the development of a similar process for the production of copper-wire and rod. The main difficulty in applying this process to melting two-phase alloys is their tendency to segregate during casting, as a result of which, lengthy homogenizing treatment, difficult to incorporate in a continuous line, is necessary. In this connection, it would be desirable to search for alloying additions and/or methods of casting which would ensure homogeneity of the billets.

2) The output of tubes could be increased by changeover from extruded to seam (straight or helical) welded tubes fabricated by a continuous process. The results of tentative investigations have shown that this technique could be successfully employed on an industrial scale for fabricating copper, brass, nickel, aluminium, duralumin and other nonferrous-metal tubes. However,

before this technique can be usefully adopted, problems will have to be solved of producing consistently high-quality welds which will possess practically the same mechanical properties and corrosion-resistance as the material outside the weld. A reliable method of continuous testing of the quality of the welded seam would have to be developed.

3) The efficiency of extrusion processes could be increased by reducing the percentage of waste material; this could be attained by extruding without the formation of extrusion discards, by increasing the extrusion speeds and by the application of extrusion techniques similar to those used in cable-sheathing.

3) It would seem desirable to explore the possibilities of using ultrahigh pressures in extrusion, wire-drawing, rolling and forging processes. In addition to other benefits, solution of this problem would bring about an increase in the strength of the finished product and a corresponding reduction in the quantity of metal consumed.

Scientific and technical S/180/61/000/006/001/020
E193/E383

The difficulties associated with the shortage of some metals can be overcome by wider application of clad materials. In this connection, there is a need for development of new methods of thermal and mechanical treatment which would ensure the formation of a high-strength bond between the core and the cladding materials.

5) High priority should be given to research and development work on powder-metallurgy techniques, particularly as applied to dispersion-hardened materials.

6) Friction between the tool and the fabricated metal is an important aspect of all metal-working processes. A search should be instigated for more efficient and cheaper lubricants and more attention should be paid to the problem of pressure-feeding the lubricant into the deformation region.

7) More attention should be paid to process-control and inspection at every production stage. Work should continue on the development of reliable and accurate testing methods, and the statistical methods of process control should be more widely used.

Card 4/5

Scientific and technical S/180/61/000/006/001/020
E193/E383

8) There is an urgent need to develop the theory of plastic working of complex shapes or difficult materials (titanium. tantalum, niobium, germanium, uranium, thorium, beryllium, etc.).
9) Since the number of nonferrous semi-fabricated and finished articles of different shapes and sizes, made by plastic-working processes, exceeds 20 000 positions, more attention should be paid to specialization of new plants whose location should be chosen in a less haphazard manner.

Card 5/5

1.1300 also 1413 1454 1496

26798
S/136/61/000/007/002/002
E111/E480

AUTHORS: Berez, A.A., Korol', V.K., Perlin, I.L.

TITLE: Experiments on the industrial production of zinc alloy - armco iron bimetal strip

PERIODICAL: Tsvetnyye metally, 1961, No.7, pp.65-69

TEXT: Laboratory investigations by the authors (Ref.1: Korol' B.K., Bushe N.A. VNII zheleznodorozhnogo transporta, Transzhellorizdat, Moscow, 1959 and Ref.2: Korol' B.K., Perlin I.L. Byull, TsIIN TsM, 1961, No.3) showed that, in principle, bimetal strip of alloy ЦАМ9-1.5 (TsAM9-1.5) with armco iron could be produced by rolling: subsequent tests on bearings of the material were successful. For wider service tests a batch of the bimetal strip produced under industrial conditions was needed. Its production served also as a check of the proposed (Ref.2) rolling conditions consisting, essentially, in the production of an aluminium-clad billet of TsAM9-1.5 alloy and its combined rolling with armco iron. The aluminium was of АД1 (AD1) or AO grade and served as the binder. It was clad onto the alloy by hot rolling (250 to 270°C) on a two-high mill (650 mm dia rolls)

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at 1.3 m/sec rolling speed with 22 to 30% reduction per pass. Rolling was continued to a clad-billet thickness of 5.5 to 6 mm, the ingot being 30 and the aluminium 1.3 to 10 mm initially. The aluminium and TsAM9-1.5 ingot surfaces were wire-brushed. Only aluminium blanks thicker than 8.6 mm showed signs of creeping off, but still to a very small extent. The work confirms results obtained previously (Ref.2) on thinner ingots. To find the aluminium thickness giving the best adhesion, 5.5 to 6 mm thick alloy strips clad with various thicknesses of aluminium were levelled and cut into 235 to 420 mm sheets; these were annealed at 250°C and pack cold-rolled with a pickled 7.2 x 235 x 500 mm billet of armco iron. A two-high mill (700 mm roll diameter) was used with paraffin as the lubricant. The iron and aluminium surfaces were wire-brushed. Satisfactory adhesion of the alloy with iron occurred only with aluminium cladding originally 8.6 and 10 mm thick. Unsatisfactory adhesion was due to high residual stresses (Ref.3: Aynbinder, A.B. Izd-vo AN Latviyskoy SSR, Riga, 1957) and irregularities of the contacting surfaces. Since thicknesses of base and cladding in bimetal strip are required to

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S/136/61/000/007/002/002
Experiments on the industrial ... E111/E480

very close tolerances, the authors studied factors influencing distortion of the individual layers. Pack rolling of different alloy/iron thicknesses and ratios was carried out with pack thicknesses of 12.9 to 16.86 mm (approximating to industrial practice). The two-high mill was used, 52 to 54% reduction being effected per pass. After rolling, the thickness of individual layers was measured by a published method (Ref.8: Gostev, B.I., Zil'berg, Yu.Ya. Aluminium Alloy АСМ (ASM) for Heavily Loaded Bearings, GITI mashinostroitel'noy literatury, Moscow, 1959). Neither pack thickness nor thickness rations had any effect on deformation. The final and initial thickness h_o and H_o of the pack and the final and initial thicknesses h_F and H_F of the iron were found to be related by the expression

$$h_o/h_F = (H_o/H_F)^{0.81}$$

Recommended rolling conditions for bimetallic strip of 3.6, 4.6 and 6.2 mm thickness are shown in Table 3. Shear-strength investigation of bimetal specimens taken after each pass showed that generally this rises with increasing degree of deformation; however, heat treatment after reductions of over 50% is essential
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Experiments on the industrial ... S/136/61/000/007/002/002
E111/E480

for highest strength. Resistance strain gauges were used to measure rolling pressure. Because of the different mechanical properties of the layers, the equation for the average working stresses P_{av} for each deformed layer assumes the form

$$P_{av} = \frac{P_{tot}}{B_{av}\sqrt{D\Delta h}}$$

where P_{tot} is the total roll force in kg; B_{av} is average strip width before and after rolling, mm; Δh is absolute reduction of one of the layers, mm; D is roll diameter, mm. Calculations show that with 4.6 and 6.2 mm thick strip, a decrease in average specific pressure in the first pass is also a factor leading to poor adhesion. R.A.Peskina and A.S.Gulyayev participated in the work. There are 2 figures, 4 tables and 10 Soviet references.

ASSOCIATIONS: Mikhaylovskiy zavod po obrabotke tsvetnykh metallov (Mikhaylov Non-Ferrous Metals Treatment Works) A.A.Berez; Institut tsvetnykh metallov im. M.I.Kalinina (Non-Ferrous Metals Institute imeni M.I.Kalinin) V.K.Korol' and I.L.Perlin

Card 4/5

PERLIN, I.L.

Indices of specialization and continuity of industrial processes in the press forging of metals. Izv. vys. ucheb. zav.; tsvet. met. 4 no.3:148-152 '61. (MIRA 15:1)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra obrabotki metallov davleniyem.

(Forging)
(Industrial organization)

BOCHVAR, A.A.; BELYAYEV, A.I.; PAVLOV, I.M.; PLAKSIN, I.N.; CHIZHIKOV, D.M.; PERLIN, I.L.

Petr Stepanovich Istomin; on his 80th birthday. Izv. vys. ucheb. zav.; tsvet. met. 4 no.4:161-163 '61. (MIRA 14:8)
(Istomin, Petr Stepanovich, 1881-)

PERLIN, I.L.; GLEBOV, Yu.P.

Determining the shape of contact surfaces in press working with plastic spacing. TSvet. met. 34 no.1:72-75 Ja '61. (MIRA 14:3)

PERLIN, I.L.

Pressure determination in tube extrusion with use of pointed stepped-cone mandrels. TSvet.met. 34 no.10:77-79 O '61.
(MIRA 14:10)

(Metal-working machinery)

PERLIN, I.L., doktor tekhn. nauk, prof., otv. red.; KUDRYAVTSEVA, L.V., ved. red.; SUSHKOVA, L.A., tekhn. red.

[Metalworking by pressure; drawing. Terminology] Obrabotka metallov davleniem; volochenie. Terminologiia. Moskva, Izd-vo Akad. nauk SSSR. 1962. 15 p. (Its; Sborniki rekomenduemykh terminov, no.61) (MIRA 16:3)

1. Akademiya nauk SSSR. Komitet nauchno-tekhnicheskoy terminologii.
(Drawing (Metalwork))--Terminology)

PERLIN, I.L.

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PHASE I BOOK EXPLOITATION SOV/5985

Rokotyan, Ye. S., Doctor of Technical Sciences, ed.

Prokatnoye proizvodstvo; spravochnik (Rolling Industry; Handbook) v. 1. Moscow, Metallurgizdat, 1962. 743 p. Errata slip inserted. 9250 copies printed.

Authors of this volume: B. S. Azarenko, Candidate of Technical Sciences; V. D. Afanas'yev, Candidate of Technical Sciences; M. Ya. Brovman, Engineer; M. P. Vavilov, Engineer; A. B. Vornik, Engineer; K. A. Golubkov, Engineer; S. I. Gubkin, Academician, Academy of Sciences BSSR; A. Ye. Gurovich, Engineer; V. I. Davydov, Candidate of Technical Sciences; V. G. Drozd, Engineer; N. F. Yermolayev, Engineer; Ye. A. Zhukovich-Stosha, Engineer; N. M. Kirilin, Candidate of Technical Sciences; M. V. Korynov, Engineer; A. N. Kogos, Engineer; A. A. Korolev, Professor; M. Ye. Kugayenko, Engineer; A. V. Laskin, Engineer; B. A. Levitanskiy, Engineer; V. M. Lugovskoy, Engineer; I. M. Meyerovich, Candidate of Technical Sciences; M. S. Ovcharov, Engineer; V. I. Pasternak, Engineer; I. L. Perlin, Doctor of Technical Sciences; I. S. Pobedin, Candidate of Technical Sciences; Ye. S. Rokotyan, Doctor of Technical Sciences; M. M. Saf'yan, Candidate of Technical Sciences; V. V. Smirnov, Candidate of Technical Sciences; V. S. Smirnov, Corresponding Member, Academy of Sciences USSR; O. P. Sokolovskiy,

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Engineer; O. P. Solov'yov, Engineer; M. A. Sidorkovich, Engineer; Ye. M. Tret'yakov, Engineer; I. S. Trishovskiy, Candidate of Technical Sciences; G. N. Khenkin, Engineer; and A. I. Tselikov, Corresponding Member, Academy of Sciences USSR. Introduction: A. I. Tselikov, Corresponding Member, Academy of Sciences USSR; Ye. S. Rokotyan, Doctor of Technical Sciences; and L. S. Al'shevskiy, Candidate of Technical Sciences.

Eds. of Publishing House: V. M. Gorobinchenko, R. M. Golubchik, and V. A. Rymov; Tech. Ed.: L. V. Dobuzhinskaya.

PURPOSE: This handbook is intended for technical personnel of metallurgical and machine-building plants, scientific research institutes, and planning and design organizations. It may also be useful to students at schools of higher education.

COVERAGE: The fundamentals of plastic deformation of metals are discussed along with the theory of rolling and drawing. Methods of determining the power consumption and the forces in rolling with plane surface or grooved rolls are

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240110004-8"

PERLIN, I.L.

Determining the capacity of a rolling mill drive and metal pressure when rolling on smooth rolls. Izv. vys. ucheb. zav.; tsvet. met. 5 no.2:124-128 '62. (MIRA 15:3)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra obrabotki metallov davleniyem.

(Rolling mills)

PERLIN, Il'ya L'vovich

[Theory of the extrusion of metals] Teoriia pressovaniia metallov. Moskva, Metallurgiia, 1964. 343 p. (MIRA 17:12)

ACCESSION NR: AP4015111 S/0136/64/000/002/0062/0065

AUTHOR: Perlin, I.L.; Glebov, Yu.P.; Yermanok, M.Z.

TITLE: Effect of temperature, degree and rate of deformation on the deformation strength of aluminum alloys.

SOURCE: Tsvetny*ye metally*, No.2, 1964, 62-65

TOPIC TAGS: aluminum alloy, D16 aluminum alloy, V95 aluminum alloy, AD31 aluminum alloy, deformation strength, deformation rate, deformation temperature, deformation strength temperature function

ABSTRACT: The effect of different temperatures (360, 420, 480C) and various deformation rates (0.19, 0.8, 220 and 880 mm/sec) on the deformation strength S_δ was investigated for D16, V95, and AD31 aluminum alloys. The deformation rate w affects S_δ ; and with increased degree of deformation ψ, the intensity of the growth of S_δ is decreased and in some cases even lowered (for AD31 S_δ is lower at a rate of 14 $sec.^{-1}$ than at 4 $sec.^{-1}$). The curves which show the dependence of S_δ on degree of deformation have a maximum, and it is also shown that

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ACCESSION NR: AP4015151.1

the degree of deformation depends on temperature and rate of deformation. As temperature increases the maximum on the curve is shifted in the direction of smaller deformation values; and with increasing rate of deformation, it is shifted in the direction of larger deformation values. Working diagrams (fig.1) of the $S_k = f(t^{\circ})$ relationship were constructed by extrapolation from experimental data for the 3 temperatures investigated. Curves are also included for the most probable deformation periods encountered in extruding the given alloys. The lower curves S_{kw} show the initial values corresponding to S_k for ψ = 3-6% and minimum rate of deformation w = 0.03 sec^{-1}. Orig. art. has: 3 figures

ASSOCIATION: None

SUB CODE: ML DATE ACQ: 12Mar64 ENCL: 01

SUBMITTED: 00 NO REF SOV: 009 OTHER: 003

Card 2/3

L 13760-65 EWT(m)/EWP(k)/EWA(d)/EWP(t)/EWP(b) Pf-4 ASD(m)-3 JD/HW

ACCESSION NR: AP4047494 S/0149/64/000/004/0135/0141

AUTHOR: Perlin, I. L.; Glebov, Yu. P.; Yermanok, M. Z.

B

TITLE: Nature of the relationship between strain resistance and the degree of strain in recrystallization processes during pressure working of metals

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 4, 1964, 135-141

TOPIC TAGS: strain resistance, stress strain curve, pressure working, metal recrystallization

ABSTRACT: It has been proven that for pressure working of metals the strain resistance S (yield point at high strain) should be selected with consideration of the effect of the rate and degree of strain. The value of S_d may be found correctly for relative strains up to 60% (rarely to 70%). Fig. 1 of the Enclosure shows the value of S_d depending on the rate and degree of strain. As the temperature increases, the maximum S_d is shifted toward lower relative strain values. In the present paper, the authors derive methods for finding S_d depending on the degree and rate of stress at high degrees of strain. It was found that the hardening process changes along a damped curve as the degree of strain increases, showing that the accumulated internal energy of deformation approaches a certain maximum. Two types of strain are considered in the paper. In the first, at a constant temperature, the

L 13760-65
ACCESSION NR: AP4047494

effect of heat is not considered, while the stress rate is varied from sample to sample but is constant for each sample. The second type is at various temperatures, but at a constant strain rate. On the basis of these tests, it was found that S_d increases at first and then decreases after reaching a certain maximum. A method is given in the paper which makes possible an approximate estimation of the lowering of S_d at degrees of strain exceeding those which may be found at present experimentally. Orig. art. has: 4 figures, 2 tables, and 5 formulas.

ASSOCIATION: NONE

SUBMITTED: 18Nov63 ENCL: 01 SUB CODE: MM

NO REF SOV: 008 OTHER: 003

L 13760-65
ACCESSION NR: AP4047494

ENCLOSURE: 01

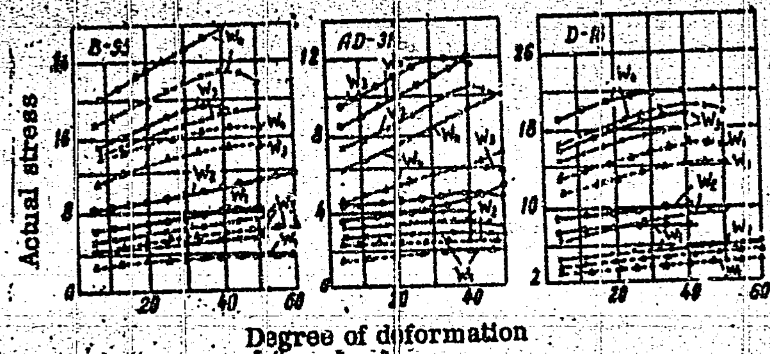

Fig. 1. Relationship between strain resistance and the degree and rate of strain: solid lines - 360C; dashed line - 420C; dash-dot line - 480C.
Ordinate = actual stress in kg/mm^2;
abscissa = degree of strain in %.

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L 43017-65 EPA(s)-2/EWT(m)/EWP(w)/EWP(v)/EPR/T/EWP(t)/EWP(k)/EWP(b)/EWA(c) P1-4
ACCESSION NR: AP5008843 S/0136/65/000/003/0080/0083 JD/HM/EM

AUTHOR: Perlin, I. L.; Kirpa, I. G.

TITLE: Method of calculating stresses during the tearing of welded strips

SOURCE: Tsvetnyye metally, no. 3, 1965, 80-83

TOPIC TAGS: weld seam strength, stress rupture strength, stress calculation, welded strip, bimetallic strip, heat exchanger

ABSTRACT: The purpose of the study was to develop an analytical method of determining the tearing stresses at the welding spots of bimetallic strips. The simplest case was considered - that of strips with square cross sections. The study was of interest because of the necessity of establishing the maximum permissible stresses tending to "tear apart" such strips and sheet products with channels (tubular panels) used in heat exchangers. An expression was derived for the dependence of the expanding force P on the width, thickness and strength characteristics of the strip, the weld strength, and the reciprocal of the bend radius. It can be widely used to determine, with sufficient accuracy, the weld strength of metal joints obtained by joint rolling as a function of the conditions of welding, dimensions, and properties of the sheets being welded; to determine

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L 43017-65

ACCESSION NR: AP5008843

the necessary hydraulic pressure in the expansion of channels of rolled and welded heat exchangers; and to establish the permissible pressures in the channels under operating conditions. Orig. art. has: 4 figures and 9 formulas.

ASSOCIATION: None

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

NO REF SOV: 002 OTHER: 000

Card 2/2

PERLIN, I.L.; GLEBOV, Yu.P.; YERMANYUK, M.Z.

Character of the dependence of the resistance to deformation on the degree of deformation in recrystallization processes following the pressure working of metals. Izv. vys. ucheb. zav.; tsvet. met. 7 no. 4:135-141 '64 (MIRA 19:1)

L 43713-66 EWT(m)/EWP(k)/EWP(e)/EWP(t)/ETI IJP(c) JH/JD

ACC NR: AP6030501 (A) SOURCE CODE: UR/0149/66/000/004/0114/0116

AUTHOR: Perlin, I. L. (Professor); Shelamov, V. A.

ORG: none

TITLE: Notch toughness of SAP (sintered aluminum powder) and Duralumin-type alloys

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 4, 1966, 114-116

TOPIC TAGS: sintering, metal powder aluminum alloy, dispersion strengthened metal, metal property/SAP aluminum alloy, D-16 aluminum alloy

ABSTRACT: In order to evaluate the behavior of SAP alloys under conditions of plastic working, a new criterion is proposed. The author introduces "specific notch toughness" (b_k), which is a ratio of notch toughness in mkg/cm^2 to tensile strength in kg/mm^2. The temperature dependence of b_k was determined for five alloys: SAP-1 (6—9% aluminum oxide), SAP-2 (9—13% aluminum oxide), SAP-3 (13—17% aluminum oxide), SAP-4 (17—23% aluminum oxide), and D-16 (see Fig. 1). A significant increase of b_k begins at different temperatures, depending on the aluminum oxide content of alloys. The pattern of the b_k—temperature curve reflects the actual behavior of the alloy under conditions of plastic deformation and its actual toughness. For

Card 1/2 UDC: 669.71:621.762.002.62

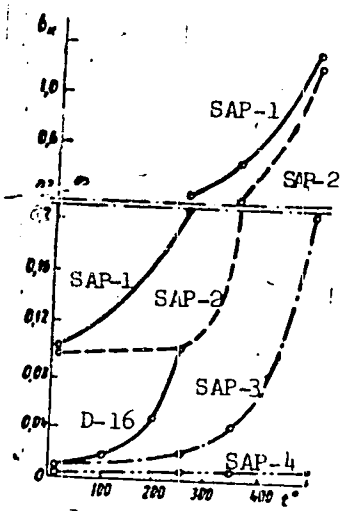

Fig. 1. Temperature dependence of b_k for SAP and D-16-type alloys.

instance, the b_k of SAP-3 at 500C has a magnitude identical to that of SAP-1 at 250C, which means that the former alloy requires a higher temperature of plastic deformation than the latter. Orig. art. has: 3 figures. [TD]

SUB CODE: 11/ SUBM DATE: 29Mar65/ ORIG REF: 003/ ATD PRESS: 5075

[illegible], T.M.; [illegible], [illegible]; YERMAKOV, N.I.

Effect of temperature, degree, and duration of deformation on the resistance of magnesium alloys to metal forming processes. Tsvet. met. 38 no. [illegible] [illegible]. (MIRA 18:8)

PERLIN, I.L.; KIRPA, I.G.

Methods of rating forces needed for the tearing apart of welded strip. TSvet.met. 38 no.3:80-83 Mr '65. (MIRA 18:6)

L 63779-65 EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b)/EWA(c) LJP(c) JD/HM

ACCESSION NR: AP5017609 UR/0136/65/000/007/0087/0089
669.721-126 30
B

AUTHOR: Ilina, T. M.; Perlin, I. L.; Yermanok, M. Z.

TITLE: Effect of the temperature, degree, and duration of deformation on the deformation resistance of magnesium alloys

SOURCE: Tsvetnyye metally, no. 7, 1965, 87-89

TOPIC TAGS: deformation effect, deformation resistance, magnesium alloy, metalworking by pressure, tensile test, true yield point, neck deformation

ABSTRACT: One of the major parameters required to determine the thermomechanical regime of the processes of metalworking by pressure, as well as to properly design the deforming tool, is resistance to deformation (true yield point) S_d. The authors present the results of an experimental investigation of the S_d of magnesium alloys under conditions corresponding to the pressing process. Three most commonly used industrial magnesium-base alloys were selected for the investigation; their content of alloy elements (Mn, Al, Zn, Zr, Ce, Al, Fe, Si, Be) ranged from 0.01 to 1.78%. The specimens were subjected to tensile tests, since this type of tests, as opposed to compressive tests, involves the absence of friction which affects markedly the deforming stress. The tests were performed at temperatures of 300-400°C, corresponding to those employed in normal pressing, the tensile stresses exerted ranging

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ACCESSION NR: AP5017609

from 5 to 10 tons. Analysis of the curves of S_d plotted on the basis of the test results showed that in the presence of a fixed degree of deformation the values of S_d increase with increasing deformation rate (from 6 to 180 mm/min). The maximum in most curves coincides with degrees of deformations amounting to 40 and 50%. As the test temperature increases, the geometry of the specimens makes it possible to determine S_d for higher degrees of deformation. The reason for this may be that the increase in temperature is accompanied by an increase in the plastic characteristics of the materials and decrease in the proportion of concentrated deformation in the neck. The obtained values of S_d may be used for dynamic calculations of the pressing processes. To facilitate the determination of S_d it is expedient to construct diagrams of $S_d = f(t, °C)$ for different test durations, on the basis of the values of $S_{d_{max}}$. This, of course, provides only the upper bound of the estimate; a sufficiently rigorous method for determining the lower bound of S_d in the presence of high degrees of deformation has not, however, been developed so far. Orig. art. has: 3 figures, 1 table.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NR REF SOV: 009 OTHER: 000

Card 2/2

PERLIN, I.I.

Form of the curve of tangential contact stresses during upset forging of cylinders and during rolling with smooth rolls. Izv. vys. ucheb. zav.; tsvet. mat. 8 no.3:145-147 '65. (MIRA 18:9)

1. Moskovskiy vecherniy metallurgicheskiy institut, kafedra obrabotki metallov davleniyem.

[illegible], M.S.; [illegible], [illegible], prof., rukovoditel' raboty

Investigating the flow of metal in the initial stages of the extrusion of [illegible] alloy tubes with external and internal aluminum cladding. [illegible] vys. ucheb. zav.; tsvet. met. [illegible] [illegible]-[illegible] [illegible]

[illegible]

[illegible] Gosudarstvennyy institut legkikh splavov.

GIL'DENGORN, M.S.; PEFLIN, I.L., prof., doktor tekhn. nauk, rukovodite[illegible] raboty

Cold extrusion of bimetal pipe. TSvet. met. 38 no.5:73 My '65. (MIRA 18:6)

PERLIN, I.L.; KAL'MENEV, A.A.; KOVALEVA, N.M.

Selection of rolling speed for zinc. "Svet. met. 3[illegible]
65-67 D '64 (MIRA [illegible])

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240110004-8"

PERLIN, M.S.; DOZORETS Yu.L.. POPOVA, L.I.

Radioactive iodine I^{131} in the treatment of thyrotoxicosis; results of a 6-year study. Med. rad. 8 no.9:16-20 S'63. (MIRA 17:4)

1. Iz kafedry rentgenologii i meditsinskoy radiologii (zav.- dotsent M.S. Perlin) i gospital'noy terapii (zav. - dotsent Yu.L. Dozorets) Vitebskogo meditsinskogo instituta.

PERLIN, M.S.

Work of the Vitebsk Roentgenological and Radiological Society.
Zdrav.Bel. 7 no.8:74 Ag '61. (MIRA 15:2)
(VITEBSK—RADIOLOGY, MEDICAL)

PERLIN, P.I. (Moskva)

Solution of the first fundamental axisymmetric problem in the theory of elasticity for an area limited by an ellipsoid and a sphere. Inzh. zhur. 4 no.1 [illegible] '64 [illegible]

1. Institut mekhaniki AN SSSR.

PERLIN, P.I. (Moscow)

Solution [illegible] theory [illegible] theory of [illegible] bodies. Inzh. zhur. [illegible]
666 [illegible]
(MIRA [illegible])

27798

S/508/60/028/000/011/022
D251/D305

24.4200 (1103, 1327) 1191

AUTHOR: Perlin, P. I. (Moscow)

TITLE: Approximate method of solving the elastic-plastic problem

PERIODICAL: Akademiya nauk SSSR. Otdeleniye tekhnicheskikh nauk. Inzhenernyy sbornik, v. 28, 1960, 145 - 150

TEXT: A method is proposed for solving the elastic-plastic problem with planar deformation and planar stress. A solution is then obtained for the case of a plate, weakened by a circular hole with stresses at infinity. The case of complete enclosure of the plastic zone of the hole L_1 is considered. (See Fig. 1). L_2 is the boundary of the central part of the zone. A circle L_3 is drawn with radius ρ through the point a, ($\rho = |a|$, $|b| > |a|$). Kolosov-Muskhelishvili functions $\varphi(z)$ and $\psi(z)$ are introduced which are analytic in the stresses zone, in the region between L_2 and L_3. If

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27798

Approximate method of ... S/508/60/028/000/011/022
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the expansions of $\varphi(z)$ and $\psi(z)$ have no singular points, then a solution is obtained for the auxiliary elastic problem of a plate with a hole L_3 with boundary conditions $\varphi(t) + \overline{\varphi'(t)} + \overline{\psi(t)} = f(t)$. Expanding f(t) in a Fourier series with a finite number of terms gives

$$f(t) = \sum_{k=0}^{n} \alpha_{2k+1}\left(\frac{\rho}{t}\right)^{2k+1} + \beta_{2k+1}\left(\frac{t}{\rho}\right)^{2k+1}$$

[Abstractor's note: t not defined]. Determination of the coefficients α and β leads simultaneously to finding the intermediate points of the boundary. A pencil of straight lines is considered, commencing from the center of the circle and making angles (π/2)(1/m+1) with the coordinate axes (m is the number of the line). By the approximate solution of the elastic-plastic problem of order m is understood the totality of points ℓ_i situated on the lines of the pencil and the points a and b, satisfying the conditions sta-

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ted below. It is assumed that the boundary passes through some totality of points l_i. Obtaining the components of stress for a, b, and the l_i, a relationship is obtained between the components, having 3m + 4 solutions. The l_i will be correctly chosen if the equations satisfy conditions arising from 2m + 2 of the unknown coefficients of the expansion of f(t) and the coefficients α_0 and β_0 given by

$$\alpha_0 = \frac{X + Y}{4}, \quad \beta_0 = \frac{Y - X}{2}.$$

Where the boundary differs from a circle, the analytic continuation of $\varphi(z)$ and $\psi(z)$ right up to L_3 is not possible. The ellipse L_4 passing through a and b is considered (Fig.3). In this case (1) L_2 may lie outside L_4; (2) L_2 may lie inside L_4; (3) L_2 and L_4 may intersect. In case (1) application of the method is possible if in the analytic continuation of $\varphi(z)$ and $\psi(z)$ to L_4 there are no singular points. In case (2) the conformal transformation

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$$z(\xi) = A\xi + \frac{m}{\xi}$$

is used to transform the interior of the unit circle in the ξ plane onto the interior of L_4. Let L_2' be the greatest contour corresponding to a circle in the ξ-plane described inside L_2. The application of the method is possible if $\varphi(z)$ and $\psi(z)$ have no singular points inside L_2'. The conditions for applying the method in case (3) are similar to those for (2). The solution of the problem of a plate with an elliptical hole, may be carried out as for a circular hole, by means of a conformal transformation. In the case of large plastic zones, it is not possible to use the elastic solution to satisfy exactly the boundary conditions on arcs of the circumference. In such cases (Fig. 4) an ellipse L_4 passing through a and b is used. The boundary conditions for arcs of the circumference will be satisfied for certain points. A contour L_5 passing through the points i, a, b is to be found [Abstractor's note: i not defined. Presumably the points at which the boundary conditions hold]. L_4

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will be found from the condition that the conformal transformation which maps the inside of the unit circle in the ζ-plane onto the inside of L_5 is of the form

$$\chi(\zeta) = A(\zeta + \frac{m_1}{\zeta} + \frac{m_2}{\zeta^3}).$$

The method given may be extended to the case of non-circular, but symmetric holes. The best case of satisfaction of control equations takes place when the intermediate points lie on an ellipse corresponding to the solution of L.A. Galin (Ref. 3: PMM, v. 10, no. 3, 1946). There are 4 figures and 3 Soviet-bloc references.

SUBMITTED: January 20, 1959

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P[illegible]LIN, P.I., [illegible] nd Phys-[illegible] th Sci -- [illegible] "Di[illegible]tribution [illegible] tensions round [illegible]rtures in certain elastic and elastic-pl[illegible]tic [illegible]." [illegible]es, 19[illegible]. 1 pp ([illegible] of [illegible] and Second[illegible] Sp[illegible] [illegible]tion [illegible]SSR. [illegible] Phys-Tech Inst). 200 c[illegible] ([illegible], 3[illegible]-[illegible], 11)

PERLIN, P.I., kand.fiz.-matem.nauk

Elastoplastic distribution of stresses around apertures. Trudy MFTI no.5:30-40 '60. (MIRA 13:10)

(Elasticity)

PERLIN, P.I., kand.fiz.-matem.nauk

Properties of infinite systems of equations in problems on the theory of elasticity of doubly connected bodies. Trudy MFTI no.5: 125-133 '60. (MIRA 13:10)

(Elasticity)

ACCESSION NR: AP4037101

S/0258/64/004/002/0275/0280

AUTHOR: Perlin, P. I. (Moscow)

TITLE: Solution of the first basic axisymmetric problem in elasticity theory for a region bounded by an ellipsoid and a sphere

SOURCE: Inzhenerny*y zhurnal, v. 4, no. 2, 1964, 275-280

TOPIC TAGS: axisymmetric problem, elasticity theory, stretched surface, elastic equilibrium, shift modulus, Poisson coefficient

ABSTRACT: The author solves an axisymmetric problem for a region bounded by an ellipsoid and a sphere by a method which is a modification of a method given by him in a previous paper for solving the first basic problem in elasticity theory for a region bounded by two surfaces. He effects his solution by deriving an infinite system of equations for the unknown coefficients in his proposed representation. The system can be solved by successive approximations. He treats the case where the normal component is equal to 1 and the tangential component is equal to 0. Orig. art. has: 12 formulas.

ASSOCIATION: Institut mekhaniki AN SSSR (Institute of Mechanics, AN SSSR)

Card 1/2

ACCESSION NR: AP4037101

SUBMITTED: 20Apr63 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: AS, MA NO REF SOV: 002 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240110004-8"

PERLIN, P. I. (Moskva)

Approximate solution of elasoplastic problems. Inzh. sbor. 28:145-150 '60. (MIRA 13:10)
(Elasticity) (Plasticity)

NIKONOV, M.N.; PERLIN, S.I.

Nature of changes in the composition of organic substances of peats as related to the degree of their decomposition and type. Pochvovedenie no.3:77-82 Mr '63. (MIRA 16:3)

1. TSentral'naya torfo-bolotnaya opytnaya stantsiya.
(Peat)

GIL'MAN, T.P.; PERLIN, S.M.; LEYTES, A.Z.

Electro consistometer for determining the processing time, gelatinization, and hardening of resins. Plast.massy no.11:68-71 '60. (MIRA 13:12)

(Resins, Synthetic)

PERLIN, S.M.; TUROK, M.M.; GRINBLAT, V.N.

Processing of polyvinyl chloride into articles by molding under pressure. Plast.massy no.6:26-30 '60. (MIRA 13:11)
(Ethylene) (Plastics--Molding)

PERLIN, S.M.; SOBOLEV, D.Ya.

Instrument for determining the coefficient of slip friction.
Zav.lab. 26 no.12:1406-1408 '60. (MIRA 13:12)

1. Vsesoyuznyy nauchno-issledovatel'skiy i proyektno-tekhnologicheskiy institut ugol'nogo mashinostroyeniya.
(Testing machines) (Friction)

S/191/60/000/010/01[illegible]/0[illegible]
B004/B060

AUTHORS: Perlin, S. M., Gil'man, T. P., Leytes, A. Z.

TITLE: Study of the Completeness of Hardening of Unsaturated Polyester Resins by the Dilatometric Method

PERIODICAL: Plasticheskiye massy, 1960, No. 10, pp. 64-66

TEXT: The authors studied the hardening degree of ПН-1 (PN-1) resin by the use of different initiators and catalysts. The previously performed tests for Rockwell heat, bending strength, and water absorption showed that no clear knowledge can be obtained concerning the hardening on the basis of physicomechanical tests. An investigation was therefore conducted with a Schevenaar differential dilatometer of the firm Amsler. Dilatation curves displayed breaks with insufficient hardening of the resin. The following optimum values were obtained for the addition of initiator and catalyst: 3% cumene hydroperoxide (initiator) and 6-8% cobalt naphthenate (catalyst). At 1.5% benzoyl peroxide and 0.6% dimethyl aniline a complete hardening was attained only after repeated heating. Dilatometric curves of the following glass reinforced plastics were also taken: 1) 30%

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Study of the Completeness of Hardening of Unsaturated Polyester Resins by the Dilatometric Method

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B004/B060

phenol formaldehyde resin with 70% epoxy resin and gla[illegible]; polyester resin with glass reglet; 3) polyester resin with gl[illegible]; 4) polyester resin with glass mat. The hysteresis of heating an[illegible] curves showed that in all specimens hardening was incomplete. Th[illegible] 8 figures, 4 tables, and 6 references: 2 Soviet, 2 US, and 2 German.

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S/032/60/026/012/024/036
B020/B056

AUTHORS: Perlin, S. M. and Sobolev, D. Ya.

TITLE: Device for Determining the Coefficient of Sliding Friction

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 12, pp. 1406-1408

TEXT: The device suggested permits determination of the coefficient of friction in the wearability test of plastic and other materials in the case of dry friction, with water, with lubricants, and in the presence of abrasive material. The coefficient of friction is determined by ascertaining the friction torque produced in the pair of specimens tested, one of which rotates with motor drive, whereas the other is firmly fastened to the axis which is connected with the measuring part of the device. The device consists of three main parts, viz., the operating, measuring, and damping devices. By means of this device, the coefficients of sliding friction of several pairs were determined. The friction losses in the device itself are determined by the losses in the ball bearings during rotation of the indicator and the blocks. Taring of the device is described. There are

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Device for Determining the Coefficient of Sliding Friction

S/032/60/026/012/024/036
B020/B056

1 figure and 1 table.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy i proyektno-tekhnologicheskiy institut ugol'nogo mashinostroyeniya (All-Union Scientific Research, Design, and Planning Technological Institute of Coal Machinery)

Card 2/2

GUBKIN, Sergey Ivanovich [deceased]. Prinimal uchastiye STOROZHEV, M.V.. PERLIN, I.Ya., retsenzent; SMIRNOV, V.S., red.; ULANOVSKAYA, I.A., red.izd-va; ISLENT'YEVA, P.G., tekhn.red.

[Plastic deformation of metals] Plasticheskaia deformatsiia metallov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii. Vol.1. [Physicomechanical principles of plastic deformation] Fiziko-mekhanicheskie osnovy plasticheskoi deformatsii. 1960. 376 p. (MIRA 13:2)
(Deformations (Mechanics)) (Physical metallurgy)

[illegible], ... S.

[illegible] and [illegible], Teplovyye seti (Thermal Networks), [illegible] and supplemented. [illegible] Gosenergoizdat.

The booklet [illegible] transmission and distribution, [illegible] installations. [illegible] in detail.

The book is intended for the [illegible] of thermal networks [illegible] operating on subscription.

SO: Sovetskiye Knigi (Soviet Books), [illegible], Moscow, (U-[illegible])