APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

Tarnovskiy, I. Ya. and Ganago, O. A.

"Filling in of Annular Dies", Baschet i Konstruirovaniye Zavodskogo Oborudovaniya, Trudy 48 (Sbornik Statey), Ural'skiy Politekhnicheskiy Institut, Sverdlovsk-Moscow, 1953, pp 83-99.

TARNOVSKIY, I. Ya.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 523 - I

Call No.: AF644053

BOOK

Author: TARNOVSKIY, I. YA., Dr. of Tech. Sci., Prof.
Full Title: ALTERATION OF FORM IN PLASTIC WORKING OF METALS (FORGING AND ROLLING)
Transliterated Title: Formoizmeneniye pri plasticheskoy obrabotke metallov (kovka i prokatka)

PUBLISHING DATA

Originating Agency: None
Publishing House: State Scientific and Technical Publishing House of Literature on Ferrous and Nonferrous Metallurgy (Metallurgizdat)
Date: 1954 No. pp.: 524 No. of copies: 5,000
Editorial Staff: None

PURPOSE: The book is intended for engineers and technicians and also for college students specializing in plastic working of metals.

TEXT DATA

Coverage: This is a study of the deformation of metals during forging and rolling operations. In discussing forging problems, the author explains the uniform and the non-uniform (with external friction and external zones) upsetting process. Transverse and longitudinal deformations resulting from rolling metals in smooth rollers are examined. Alterations of the shapes of profiled sections in pass rollers are also discussed. According to the author, the Soviet theory of the

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Formoizmeneniye pri plasticheskoy obrabotke metallov (kovka i prokatka) AID 523 - I

plastic working of metals has been successfully developed in the last 20-30 years, but further investigations are necessary for its practical application. The book is provided with illustrations, tables and diagrams.

No. of References: 37 Russian, 1917-1951

Facilities: Works of I. M. Pavlov, S. I. Gubkin, A. F. Golovin, A. I. Tselikov, A. P. Chekmarev, E. P. Unksov and others. Investigations of A. A. Il'yushin, V. V. Sokolovskiy, K. N. Shevchenka and others.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya., prof.; POZDEYEV, A.A., inzh.; KRASOVSKIY, N.N., inzh.

Force determination in metalworking by pressure. Obr.met.davl. no.3:5-22 '54. (MIRA 12:10)

1. Ural'skiy politekhnicheskiy institut im. S.M.Kirova.
(Rolling (Metalwork)) (Forging)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, L. F.

"Improvement of the Technological Process of Printing of General Geography Educational Wall Maps." Cand Tech Sci, Moscow Inst of Engineers of Geodesy, Aerial Photography, and Cartography, Ministry of Culture USSR, 6 Feb 54. Dissertation (Vechernyaya Moskva Moscow, 16 Feb 54)

SO: SUM 186, 19 Aug 1954

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya., prof.; LYASHKOV, V.B., inzh.

Analysis of experimental data on rolling. Obr.met.davl. no.3: 116-131 '54. (MIRA 12:10)
(Rolling (Metalwork)) (Deformations (Mechanics))

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

Tarnovskiy, I. Ya., Pozdeyev, A. A. and Krasovskiy, N. N.

"Problem of Determination of Stresses During the Working of Metals by Pressure", Obrabotka Metallov Davieniyem, Moscow, 1954, Nr 3, pp 5-22.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

GANAGO, O.A.; TARNOVSKIY, I.Ya; DUGINA, N.A., tekhnicheskiy redaktor.

[Seamless drop hammer forging] Bezobloinaia shtampovka na molotakh. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1955 84 p. (MLRA 8:8)

(Forging)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

Tarnovskiy, I. Ya. and Ganago, O. A.

"Bezoblaynaya Shtampovka na Molotakh" (Flashless Forging on Hammers), Mashgiz, Moscow, 1955, 86 pp. (See also: Sbornik - Progress Tekhnologiya Kuznechno-Shtampovochnogo Proizvodstvo, Mashgiz, 1954.)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, L.Ye., doktor tekhnicheskikh nauk, redaktor; GANAGO, O.A., kandidat tekhnicheskikh nauk, redaktor; VSHIVKOV, P.P., inzhener, redaktor; DUGINA, N.A., tekhnicheskiy redaktor

[Ural forge operators in the struggle for technical progress; a collection of articles] Ural'skie kuznetsy v bor'be za tekhnicheskii progress; sbornik statei. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1955. 197 p. (MLRA 9:12)

1. Ural'skiy politekhnicheskiy institut imeni S.M.Kirova (for Tarnovskiy, Ganago)
(Ural Mountain region--Forging)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I. Ya.

PAVLOV, I.M. professor, doktor tekhnicheskikh nauk; FEDOSOV, N.M., SEVERDENKO, V.P.; TARNOVSKIY, I.Ya., redaktor; LANGE, B.L. OKHRIMENKO, Ya. M.; VALOV. N.A., redaktor; SHPAK, Ye.G., tekhnicheskiy redaktor.

[Press working of metals] Obrabotka metallov davleniem. Pod nauchnoi red. I.M.Pavlova. Moskva, Ges.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1955. 483 p. (MLRA 9:1)

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

TARNOVSKIY, I. YA.

PHASE I BOOK EXPLOITATION 500

Naumov, Vasiliy Prokhorovich

Goryachaya shtampovka (Hot Forging) Moscow, Mashgiz, 1956. 56 p. (Series: Nauchno-populyarnaya biblioteka rabochego kuznetsa, vyp. 9) 10,000 copies printed.

Ed.: Ganago, O.A., Candidate of Technical Sciences; Reviewers: Tarnovskiy, I.Ya., Doctor of Technical Scienes, Professor, and Raytses, V.I., Engineer; Tech. Ed.: Dugina, N.A.; Managing Ed. of the Ural-Siberian Branch of Mashgiz: Kaletina, A.V., Engineer.

PURPOSE: This pamphlet, issued by the Popular Scientific Worker's Library, is the ninth in a series of pamphlets which aim at improving the theoretical knowledge of workers in forging shops.

COVERAGE: This pamphlet is devoted to the theory and practice of various forging methods in current use. The author discusses the general technological aspects of forging and continues with a description of equipment and methods of operation. The principles

Card 1/4

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Hot Forging

of smith-, drop-, machine- and press forging are briefly explained. There is a short description of a horizontal press forging machine of 50,000 to 75,000 ton capacity used in the aircraft industry. Some space is devoted to the "interesting process of compression molding of molten metal which combines the advantages of forging and casting". In this method the die is filled with a measured amount of molten metal which is then compressed by a descending plunger filling the cavity of the die. The solidification of metal takes place under pressure which gives it a dense, fine-grained structure free of porosity, with good dimensional accuracy and surface quality. Compression molding is most suitable for copper, aluminum, brass and bronze castings. The author predicts a bright future and numerous applications for this method. Experiments with steel have so far been unsuccessful, as the temperature of molten steel has a destructive effect on the dies. It is further mentioned that within the scope of the Sixth Five Year Plan a new forging plant is to be built in the Ural area with a 120,000 ton annual capacity. In conclusion the author states that the trend should be toward improved methods of forging which would require little or no machining. As an example he mentions the "Krasnogvardeyets" plant in Leningrad, which is said to produce forgings with a grade 4 to 5 surface finish. This pamphlet deals more with the general aspects of forging than with the

technological details of any one forging method. No personalities are mentioned. There are 7 references all of which are Soviet.

TABLE OF CONTENTS:

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

Hot Forging 500

AVAILABLE: Library of Congress

Card 4/4

GO/ad
8-8-58

TARNOVSKIY, Iosif Yakovlevich, doktor tekhnicheskikh nauk, professor; POZDEYEV, Aleksandr Aleksandrovich, kandidat tekhnicheskikh nauk; LYASHKOV, Vladimir Borisovich, kandidat tekhnicheskikh nauk; ZAYKOV, M.A., redaktor; KEL'NIK, V.P., redaktor izdatel'stva; ZKF, Ye.M., tekhnicheskiy redaktor

[Deformation of metal in rolling] Deformatsiia metalla pri prokatke. Pod obshchei red. I.IA.Tarnovskogo. Sverdlovsk, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, Sverdlovskoe otd-nie, 1956. 287 p. (MLRA 9:11)
(Rolling (Metalwork))

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

SOV/137-57-10-19059

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 10, p 90 (USSR)

AUTHOR: Tarnovskiy, I.Ya.

TITLE: Producing S-80 Tractor Caterpillar Links by Long Deformed Rolling (O proizvodstve zvena gusenits traktora S-80 prodol'-noy periodicheskoy prokatkoy)

PERIODICAL: V sb.: Ratsionalizatsiya profiley prokata. Moscow, Profiz-dat, 1956, pp 333-337.

ABSTRACT: The roll grooving required for longitudinal, periodically recurrent-shape rolling of links for the S-80 tractor caterpillar has been developed. Despite the very complex shape, the production of a single roll stand may attain 12 to 15 times the output of a forging assembly. The designing of a special department has been begun on the basis of these studies.

S.G.

Card 1/1

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya., professor.

Tafel's rule on the "arithmetical mean". Stal' 16 no.8:742 Ag '56.
(Deformations (Mechanics)) (MLRA 9:10)

PHASE I BOOK EXPLOITATION SOV/3226

Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya na temu: "Sovremennyye dostizheniya prokatnogo proizvodstva."

Trudy...(Transactions of the Intercollegiate Scientific and Technical Conference on Recent Achievements in the Rolling Industry) Leningrad, 1958. 251 p. 1,000 copies printed.

Sponsoring Agencies: Leningradskiy politekhnicheskiy institut im. M.I. Kalinina, Nauchno-tekhnicheskoye obshchestvo mashinostroitel'ney, Leningradskoye otdeleniye, and Nauchno-tekhnicheskoye obshchestvo metallurgov, Leningradskoye otdeleniye.

Resp. Ed.: V.S. Smirnov, Doctor of Technical Sciences, Professor; Ed.: N.N. Pavlov.

PURPOSE: These proceedings of the conference are intended for specialists in the rolling industry.

COVERAGE: The articles of this collection cover various theoretical and practical problems of rolling, such as: pressure, spread, efficiency of rolls, determination of deformation, forces required, pass design, optimum conditions for rolling, experiences of various plants, modernization of equipment, aluminum-clad steel, and rolling of nonferrous metals. No personalities are mentioned. References appear after each article.

TARNOVSKIY, I. YA.

TARKHOVSKIY, Konstantin Nikolayevich; SIDOROV, A.L., prof., red.; SHILOVA, K.A., red.; YERMAKOV, M.S., tekhn. red.

[Formation of state and monopolistic capitalism in Russia during The First World War; study based on the metallurgical industry] Formirovanie gosudarstvenno-monopolisticheskogo kapitalizma v Rossii v gody pervoi mirovoi voiny (na primere metallurgicheskoi promyshlennosti. [Moskva] Izd-vo Mosk. univ., 1958. 262 p.
(Metal industries) (MIRA 11:9)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

SOV/137-58-12-24407

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 12, p 55 (USSR)

AUTHORS: Tarnovskiy, I. Ya., Trubin, V. N.

TITLE: An Investigation of Rolling Spread by Means of Variational Principles (Issledovaniye ushireniya pri prokatke s ispol'zovaniyem variatsionnykh printsipov)

PERIODICAL: Tr. Mezhvuz. nauchno-tekhn. konferentsii na temu: "Sovrem. dostizh. prokatn. proiz-va". Leningrad, 1958, pp 29-42

ABSTRACT: The most important principle of the mechanics of a deformable body, namely, the principle of minimum total energy of deformation (D), is used to derive a theoretical formula for analysis of rolling spread. After simplification, it appears as follows: $\Delta B / \Delta H = [(0.53 B_0/\ell) \cdot (H_c/\ell + 1.5\mu)]/[H_c/\ell + 0.8\mu(1+1.16) B_0^2/\ell^2 + 0.1 B_0^2/\ell^2 (2 + H_c/\ell)]$, where ΔB is the spread, ΔH is the reduction, B_0 is the billet width, ℓ is the length of the contact area, H_c is the average height of the contact area, and μ is the coefficient of friction. Tests confirm the applicability of this formula in practical calculations.

Card 1/1

V. D.

SOV/137-58-12-24408

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 12, p 65 (USSR)

AUTHORS: Tarnovskiy, I. Ya., Trubin, V. N.

TITLE: The Zones of Adhesion and Slip on the Contact Surfaces of the Contact Area in Rolling (Zony prilipaniya i skol'zheniya na kontaktnykh poverkhnostyakh ochaga deformatsii pri prokatke)

PERIODICAL: Tr. Mezhvuz. nauchno-tekhn. konferentsii na temu: "Sovrem. dostizh. prokatn. proiz-va". Leningrad, 1958, pp 43-47

ABSTRACT: Coordinate grids are applied to the lower and upper contact surfaces of Pb strip. The strip is rolled so as to produce incomplete rolling of the coordinate grid embracing the contact area. The length of the zone of adhesion (ZA) is determined by the dimensions of the coordinate grid at the center of the strip. The relative length of the ZD, l_n/l, may be considerable ($l_n/l = 0.60-0.78$) at low length-to-height ratios l/H_c. At some critical value, $l/H_c = K$, the length of the ZA is sharply reduced, and when $l/H_c > K$, there is virtually no ZA. Test data confirm the fact that when B_c/H_c ratios are high, the length of the ZA is primarily dependent upon the l/H_c, and that there is no

Card 1/2

The Zones of Adhesion and Slip on the Contact Surfaces of the Contact Area (cont.)

ZA when $\ell/H_c > K$. When narrow strip is rolled, the ZA is of virtually identical length both down the middle of the strip and along its edges. As the width of the strip increases the rigid ends cause tensile stresses to develop along the edges, with the result that the length of the ZA at the edges diminishes and the ZA outline changes. At constant $\Delta H/D$, all other conditions being equal, a diminution in B_cH_c and in $\Delta H/D$ facilitates the development of the ZA. When $\ell/H_c < K$, the length of the ZA is great and may amount to $\ell_n/\ell = 0.7\text{-}0.95$.

Ya. G.

Card 2/2

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A. SOV/163-58-1-18/53

TITLE: Variation Methods in the Theory of the Processing of Metals Under Pressure (Variatsionnyye metody v teorii obrabotki metallov davleniyem)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 93-98 (USSR)

ABSTRACT: In order to explain the theory of the metal processing under pressure a variation method was employed. The state of deformation in the metals can be determined by means of equations (9) and (10).
The variation method makes possible an approximate calculation of the function of the mixing and the deformation in the processing of metals. In a coordinate system the deformation rate is determined at a limited deformation. Numerous possibilities for the determination of the deformation in the metal processing under pressure were discovered by these equations.
There are 17 references, 17 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

Card 1/2

SOV/137-59-1-1626

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 216 (USSR)

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A., Puchkov, S. G.

TITLE: Employment of Variational Methods in an Investigation of the Deformations and Stresses Occurring During the Manufacture of Heavy Forgings (Issledovaniye deformatsiy i usiliy variatsionnymi metodami pri kovke krupnykh pokovok)

PERIODICAL: Nauchn. dokl. vyssh. shkoly. Metallurgiya, 1958, Nr 1, pp 150-156

ABSTRACT: Variational methods are employed by the author in computing the strain distribution of a metal strip with a rectangular cross section being drawn in a drawing press equipped with flat heads. The case of deformation of bodies of considerable height and possessing "rigid" outer ends is examined.

M. Ts.

Card 1/1

SOV/163-58-1-28/53

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A., Puchkov, S. G.

TITLE: The Investigation of Deformation and the Forces Involved in Forging Larger Pieces by Means of the Variation Method (Issledovaniye deformatsiy i usiliy variatsionnymi metodami pri kovke krupnykh pokovok)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 150-156 (USSR)

ABSTRACT: The variation method and the theory of plasticity were used for the calculation and the determination of the deformation in the production of complicated pieces to be forged. Functions for the calculation of the deformation and the displacement in forging were obtained.
The value of the complete work A of the deformation is determined by the parameters a_2, a_3 and l_1. The parameter values are calculated by means of the following equations:

$$\frac{\partial \Sigma A}{\partial a_2} = 0, \quad \frac{\partial \Sigma A}{\partial a_3} = 0 \quad \text{and} \quad \frac{\partial \Sigma A}{\partial l_1} = 0$$

Card 1/2

The Investigation of Deformation and the Forces Involved in Forging Larger Pieces by Means of the Variation Method

$$a_2 = \varepsilon \frac{2{,}090 + 0{,}451 \frac{l_o^3}{h^2} + 0{,}154 \frac{h}{l_o}}{4{,}444 + 7{,}492 \frac{l_o^2}{h^2}} \; ; \quad a_3 = \frac{1{,}333 \frac{l_o}{h} + 0{,}333 \frac{G_{c_2}}{\varepsilon}}{1{,}6 \frac{l_1}{h} + 0{,}888 \frac{h}{l_1}}$$

The values of these functions are given in tables.
The theoretical conclusions obtained were compared with the corresponding experimental data and it was found that the results agreed.
There are 2 figures, 1 table, and 4 references, 4 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: October 5, 1957

AUTHORS: Tarnovskiy, I. Ya., Trubin, V. N. SOV/163-58-2-28/46

TITLE: The Problem of the Expansion in Stamping (K voprosu ushireniya pri prokatke)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 159 - 166 (USSR)

ABSTRACT: In the plasticity theory there is no uniform law determining a relation between the tension and the rate of the relative deformation. The efficiency of the internal forces depends on the tension and on the rate of relative deformation. The tension of the internal forces is expressed by the equation:

$$N_1 = \int_V \tau_S H dV,$$ where τ_S = the stretching-strain limit, H = the intensity of the rate of deformation, V = the volume of deformation. The efficiency of the internal forces of the joint is calculated by the following equation:

Card 1/4

The Problem of the Expansion in Stamping

$N_{cut} = \int_{S_1} \tau_s v_{cut} dS_1$, where S_1 = the surface through which the cut is made, v_{cut} = the rate. For calculating the above mentioned equation the selection of some new functions is necessary, especially the calculation of the rate of displacement as well as of the index of expansion β_x, $\frac{1}{\eta_x}$, taking into consideration the following ratio:

$$\frac{\lg \beta_x}{\lg \frac{1}{\eta_x}} = \frac{\lg \beta}{\lg \frac{1}{\eta}} = a = \text{const.}$$

In this equation β_x and $\frac{1}{\eta_x}$ denote the coefficients of expansion, a = the internal friction. The diagram was constructed at a = 1 and a = 0,5 for the ratio

The Problem of the Expansion in Stamping

$\frac{\lg\beta}{\lg\frac{1}{\ell}} = f\left(\frac{Bo}{\ell}; \frac{He}{\ell}\right)$. The index of expansion is calculated by the formula

$$\frac{\Delta B}{\Delta H} = \frac{\frac{Bo}{Hc}}{1{,}4 + \frac{B\delta^2}{\ell^2}}$$

; In rolling soft iron-carbon alloys the ΔB calculated is by 15% higher than the value found experimentally. There are 2 figures and 7 references, 7 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: October 5, 1957

AUTHORS: Tarnovskiy, I. Ya., Ganago, O. A., Vaysburd, R. A. SOV/163-58-2-33/46

TITLE: Theoretical Investigations in Open and Closed Dies for Annular Swage Blocks (Teoreticheskoye issledovaniye shtampovki pokovok kol'tsevoy formy v otkrytykh i zakrytykh shtampakh)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 184 - 191 (USSR)

ABSTRACT: The stages of annular swage blocks in open and closed dies were investigated. In punching in open dies the filling in of the metal into the cavities of the dies as well as the flow of the metal are determined by the position of the critical surface. In stamping in closed dies an unequal flow of the metal in the open zone is observed. This influence is explained by the different direction of the internal friction forces in those zones. The rules governing the flow of the metals in various stages of the stamping of annular swage blocks were determined. A simple formula for any moment of the depression, in the second stage of stamping was found (7). By knowing the position of the

Theoretical Investigations in Open and Closed Dies for Annular Swage Blocks SOV/163-58-2-33/46

critical surface for any moment of the depression in the second stage of stamping the height of the metal in cavity may be calculated at any single moment. Taking into account the rules governing the flow of the metal in the various cavities as well as the velocity factors in stamping an efficient construction of the dies may be reached. There are 5 figures and 2 references, 2 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: October 5, 1957

Card 2/2

SOV/137-59-1-1553

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 207 (USSR)

AUTHORS: Tarnovskiy, I. Ya., Trubin, V. N.

TITLE: Investigation of the Spread During Rolling on the Basis of Variational Principles (Issledovaniye ushireniya pri prokatke s ispol'zovaniyem variatsionnykh printsipov)

PERIODICAL: Izv. vyssh. uchebn. zavedeniy. Chern. metallurgiya, 1958, Nr 5, pp 145-161

ABSTRACT: Ref. RZhMet, 1958, Nr 12, abstract 24407

Card 1/1

81534

SOV/137-59-5-11224

18.5100

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 5, p 247 (USSR)

AUTHORS: Tarnovskiy, I.Ya., Smirnov, V.K., Kotsar', S.L., Bedin, N.A., Belyakov, V.I.

TITLE: Rolling of Track Links for Tractors

PERIODICAL: Tekhn. ekon. byul. Sovnarkhoz Chelyab. ekon. adm. r-na, 1958, Nr 7, pp 43 - 45

ABSTRACT: Information is given on technical possibilities and economical effectiveness of changing the manufacture of track links for S-80 tractors from stamping to longitudinal periodic rolling. Experimental rolling of links on a scale of 1 : 2, 1 : 3, 1 : 4, was carried out on a ChTZ test mill with rollers of 470 mm in diameter and on a UPI laboratory mill with rollers of 200 mm in diameter. Technical Specifications were developed for the design of a rolling mill and the principal scheme of the technological process was set-up for the production of links on a continuous automatic line. The rolling mill has rollers of 1,100 mm in diameter, revolving at a speed of 10 or 15 revolutions per minute,

Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

81534

Rolling of Track Links for Tractors SOV/137-59-5-11224

driven from a motor of 500 kw power. Blanks of shaped rolled metal having a simple cross-sectional shape, are heated to 1,220° - 1,240°C in an induction furnace. One blank is heated within 24 sec. The mill is equipped with a special device to supply the blank to the rollers at a given moment. Alternating rolling of left-hand and right-hand links on the same rollers is possible. After rolling the strips are transported to two lines of automated presses where cutting, piercing, trimming and straightening of the links is performed. Then the links are fed to the semi-automatic line for mechanical and thermal treatment. The described continuous line will raise the efficiency by a factor of 8 - 10 as compared to stamping on air-steam hammers. The annual economy of metal will amount to ~ 5000 tons; it will amount to more than 8 million rubles with respect to the saving in metal, power consumption and wages.

4

A.G.

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya., doktor tekhn.nauk, prof.; POZDEYEV, A.A., dots.

Investigating the deformed state in upsetting parallelepipeds with the use of variation methods. Izv. vys. ucheb. zav.; chern. met. no.7:123-133 Jl '58. (MIRA 11:10)

1. Ural'skiy politekhnicheskiy institut.
(Forging) (Calculus of variations)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TRUBIN, V.N.; TARNOVSKIY, I.Ya.

Conditions on contact surfaces in rolling on smooth rolls.
Trudy Ural.politekh.inst. 73:246-250 '58. (MIRA 12:8)
(Rolling (Metalwork)) (Surfaces (Technology))

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I. YA.

25(1) PHASE I BOOK EXPLOITATION SOV/2727

Obrabotka metallov davleniyem; sbornik statey, vyp. 5 (Metal Forming; Collection of Articles, No. 5) Moscow, Metallurgizdat, 1959. 197 p. 3,000 copies printed.

Scientific Ed.: L.Kh. Al'shevskiy, Candidate of Technical Sciences; Ed. of Publishing House: N.A. Valov; Tech. Ed.: A.I. Karasev.

PURPOSE: This collection of articles is intended for technical personnel and scientific workers in the metallurgical and machinery-construction industries.

COVERAGE: This collection of articles deals with problems of rolling and tube manufacture. Results of research done on roll design and new methods of determining basic manufacturing parameters in the production of tubes and other rolled shapes are presented. Methods of analyzing the kinematics of processes in helical piercing mills and rolling mills by means of motion pictures are discussed. Also discussed are several phenomena associated with tube rolling. No personalities are mentioned. References follow several of the articles.

TABLE OF CONTENTS:

Card 1/7

Metal Forming (Cont.)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

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25(1) PHASE I BOOK EXPLOITATION SOV/3283

Tarnovskiy, Iosif Yakovlevich, Aleksandr Aleksandrovich Pozdeyev, and Oleg Aleksandrovich Ganago

Deformatsii i usiliya pri obrabotke metallov davleniyem (Deformations and Forces in Metal Forming) Moscow, Mashgiz, 1959. 303 p. Errata slip inserted. 5,000 copies printed.

Reviewer: Ye.P. Unksov, Professor, Doctor of Technical Sciences; Ed.: V.N. Vydrin, Docent, Candidate of Technical Sciences; Tech. Ed.: N.P. Yermakov; Exec. Ed.(Ural-Siberian Division, Mashgiz): A.V. Kaletina, Engineer.

PURPOSE: This book is intended for engineers and scientific workers as well as students of higher technical schools specializing in metal forming.

COVERAGE: The authors describe a method of investigating deformations in metal forming using the principle of the minimum of the total energy of deformation, and one of the direct (Ritz's) methods of variational calculus. The method of determining

Card 1/5

forces, required for the plastic deformation, from the condition of the conservation of energy is also presented. Besides the general method, the solution of a series of problems of open die forging and stamping, and the experimental check of the obtained theoretical formulas, are also given. The authors mention A.A. Il'yushin, S.A. Khristianovich, V.V. Sokolovskiy, A.D. Tomlenov, L.A. Shofman, Ye.P. Unksov, G.A. Smirnov-Alyayev, A.F. Golovin, and V.B. Lyashkov, as contributors in the theory of deformation. The authors thank V.N Trubin, S.G. Puchkov, R.A. Vaysburd, and G.A. Yeremeyev. There are 47 references: 46 Soviet and 1 German.

TABLE OF CONTENTS:

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

AVAILABLE: Library of Congress

VK/jb
4-11-60

18(5)

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A.

TITLE: Mechanics of the Drawing Process of Solid Profiles Taking Into Account Consolidation (Mekhanika protsessa volocheniya sploshnykh profiley s uchetom uprochneniya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 1, pp 97 - 104 (USSR)

ABSTRACT: At first there is demonstrated that the determination of the optimum drawing angle α and of the corresponding minimum pressure is a typical problem of variation calculation, if the conditions of the process are given (degree of stretching, conditions of external friction and the mechanical properties of the metal worked) . 2α is the main characteristic of the reducing cone of the drawing pass. The problem is approached from the following variation principle of the mechanics of continua: The actual equilibrium shape of a body is distinguished from all other possible shapes by a minimum of the total deformation energy. The investigation is limited to a stabilized (steady) process of drawing. Hence it is more

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

convenient to solve this problem by using the velocities at which deformation occurs. As drawing usually proceeds with a cold deformation, the consolidation is taken into account by introducing a coefficient of consolidation K. Formula (9) for $\alpha_{optimum}$ is derived. The calculations showed that $\alpha_{optimum}$ exhibits almost no dependence upon K. The curves obtained show that $\alpha_{optimum}$ increases with greater stretching and with a greater coefficient of internal friction, which is in agreement with the information gained by references 2 and 3. Formula (11) is derived for the calculation of the drawing pressure which can be simplified to formula (12), the application of which, however, is limited to certain conditions given in this paper. The diagrams obtained show that with in increase of α the external friction force at the conical part of the drawing pass varies considerably. There are 5 figures and 6 Soviet references.

Mechanics of the Drawing Process of Solid Profiles Taking Into Account Consolidation

SOV/163-59-1-20/50

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural'skiy Polytechnical Institute)

SUBMITTED: April 7, 1958

Card 3/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

18(5)

AUTHORS: Tarnovskiy, I. Ya., Ganago, O. A., Vaysburd, [illegible] A. SOV/163-59-1-24/30

TITLE: Determination of the Forces in Swage Forging of Axially Symmetrical Forgings (Opredeleniye usiliy pri shtampovke osesimmetrichnykh pokovok)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 1, pp 126 - 132 (USSR)

ABSTRACT: In the articles cited by references 1,2,3,4,and 5 the statement is found that in any kind of drop forging a certain amount of surplus metal is pressed from the swage into the fin groove, after the swage has been completely filled. This stage, termed "pre-forging" stage, of the forging process is distinguished by requiring the maximum forging force which must be determined in order to ascertain the required press or hammer weight. It has been found that in the pre-forging stage not the total metal volume contained in the swage is subjected to deformation, but only that part of the volume being near the swage surface. If ways and means would be found of determining the actual deformation zone in the pre-

Card 1/4

forging stage a determination of the force required could be achieved with a sufficient accuracy. There is no necessity of taking into account the complicated shape of the swage and thus the number of variables is reduced. Only the diameter of the swage at the inside perimeter of the fin groove, the dimensions of this groove and the ratio between the fin thickness and the dimensions of the actual deformation zone of the forging in the pre-forging stage must be taken into account. The accuracy in solving this problem depends upon the accuracy with which the boundaries of the actual deformation zone of the metal in the swage can be determined and upon the simplifying restrictions placed upon some of the formulas. Various methods of determining these boundaries are found in publications (Refs 1,2,3,4,5). In this article the shape of the deformation zone is for the sake of simplicity assumed to be conical. For the purpose of determining the actual plastic deformation in the pre-forging stage the law of the minimum of total deformation energy was applied. This allows a theoretical deformation of the boundaries of the deformation

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

zone. This problem was solved by applying the Ritz variation method. Its application to the upsetting deformation of metals has been described in earlier articles (Refs 6,7). Comprehensive experimental information was used in establishing formula (1) which describes the curve expressing the actual propagation of the deformation zone in drop forging. This formula only describes the shape of the boundary between the rigid and the plastic zone of the forging. The volume of the deformation zone depends upon the varying parameter a_1 which is determined by the law of the minimum of the total deformation work and is specified by formula (15). a_1 determines the propagation of the zone of plastic deformation. Formula (15) for $\frac{p}{\sigma_s}$ is obtained, where p denotes the average specific pressure and σ_s the yield point at given temperatures and velocities. The experimental checking of formula (15) yielded satisfactory

Determination of the Forces in Swage Forging of Axially Symmetrical Forgings

SOV/163-59-1-24/50

results. Formula (13) on simplification gives formula (14) and formula (15) on simplification gives formula (16). These formulas can, however, only be used if the height of the deformation zone does not exceed the depth of the swage and if the temperature both of the forging and of the fin are equal. There are 4 figures and 8 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural'skiy Polytechnical Institute)

SUBMITTED: April 7, 1958

Card 4/4

25(1)

AUTHORS: Tarnovskiy, I.Ya., Professor, and Pozdeyev, A.A., Docent

TITLE: Contact Stresses and Average Specific Pressure in Setting and Rolling (Kontaktnyye napryazheniya i sredniye udel'nyye davleniya pri osadke i prokatke)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1959, Nr 2, pp 51-60 (USSR)

ABSTRACT: According to recent data friction forces on contact surfaces depend on the condition of the friction surface and on the shape of the deformed body. The distribution of friction forces on the surface depends on kinematic conditions. The author shows that functions for pressure distribution can be obtained with the use of integral equations. These are applicable to any law of distribution of contact tangential stresses. A method for the approximative computation of deformation is suggested which serves to obtain graphs of pressure and average specific pressures for different cases of rolling.

Contact Stresses and Average Specific Pressure in Setting and Rolling

There are 9 sets of graphs and 7 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute), Kafedra obrabotki metallov davleniyem (Chair of Metal Processing Under Pressure)

SUBMITTED: July 14, 1958

SOV/163-59-2-23/48

18(7)

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A., Kotel'nikov, V. P., Puchkov, S. G.

TITLE: A New Method of Experimental Investigation of the State of Stress in the Working of Metals by Pressure (Novyy metod opytnogo issledovaniya napryazhennogo sostoyaniya pri obrabotke metallov davleniyem)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 131 - 135 (USSR)

ABSTRACT: The method suggested is based on the investigation of the changes of artificial hollow spaces in metals under the influence of pressure. The signs of the stress which has acted on the metal can be determined in this way. Figure 1 gives an example. Two lead strips, one of which received a cylindric cavity bored in, were soldered up with Wood's alloy, and exposed to pressures in different directions. An expansion of the hollow space occurs by tensile stress, a narrowing by compressive stress. Lead strips with hollows were also soldered together and rolled (Fig 2). Figure 3 shows the deformations of the hollows after hammering.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

A New Method of Experimental Investigation of the State of Stress in the Working of Metals by Pressure SOV/163-59-2-23/48

There are 3 figures and 1 Soviet reference.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: August 8, 1958

Card 2/2

18(7)

AUTHORS: Tarnovskiy, I. Ya., Pozdoyev, A. A.

TITLE: The Setting of Tasks in the Theory of Metalworking by Pressure (K postanovke zadachi v teorii obrabotki metallov davleniyem)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 136 - 139 (USSR)

ABSTRACT: The authors deal with two factors determining the state of stress and the flowing of the metal in compression processes: the equation of state and the boundary conditions. The equations of state normally apply to idealized metal properties since the consideration of all factors would lead to practically useless, complicated equations. Under simplifying assumptions, a relation between deformation and stress is obtained. As the compression processing is carried out at different temperatures, at different rates and possibly with structural changes of the metal, the mathematical formulation remains a difficult problem. The boundary conditions are to be sufficient for a unique solution of the problem, and must not contradict the setting of the task. In the compression processing of metals, the boundary conditions are often the unknowns required. In many tasks of forging, compressing, rolling, not all boundary conditions are known and often they must be ascertained by experiment. Recent investigations (Refs 6 and 7)

The Setting of Tasks in the Theory of Metalworking by Pressure

SOV/163-59-2-24/48

show that the deformation much depends on the dimensions of the body to be deformed, i.e. on a form factor. Many bodies, the mechanical state of which is described by different equations of state, are deformed almost in the same way, which proves that the influence of the form factor exceeds that of the equation of state. This makes it possible to develop a unified theory of compression processing for different metals and alloys which are deformed under different temperature and rate conditions. There are 7 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: July 14, 1958

Card 2/2

S/137/60/000/011/024/043
A006/A001

Translation from: Referativnyy zhurnal, Metallurgiya, 1960, No. 11, p.134, # 26336

AUTHORS: Tarnovskiy, I.Ya., Pozdeyev, A.A.

TITLE: Drawing of Compact Round Profiles

PERIODICAL: Tr. Mezhvuz. nauchno-tekhn. konferentsii na temu: "Sovrem.dostizh. prokatn. proiz-va," Vol. 2, Leningrad, 1959, pp. 316 - 330

TEXT: The authors present a theoretical analysis of the process of drawing compact round profiles and derive formulae to determine the optimum angle of drawing and the corresponding minimum stress. A formula is derived which can be used to calculate the optimum value of angle α under any given drawing conditions.

D.T.

Translator's note: This is the full translation of the original Russian abstract.

Card 1/1

TARNOVSKIY, I.Ya., doktor tekhn. nauk; SMIRNOV, V.K., kand. tekhn. nauk

Shape of rolls and the center of deformation in rolling strips with variable cross section. Obr. met. davl. no.5:3-17 '59. (MIRA 13:3)

1.Ural'skiy politekhnicheskiy institut.
(Rolls (Iron mills))

TARNOVSKIY, I.Ya., doktor tekhn. nauk; SMIRNOV, V.K., kand. tekhn. nauk

Leading in the rolling of strip having a variable cross section. (MIRA 13:3)
Obr. met. davl. no.5:31-46 '59.

1. Ural'skiy politekhnicheskiy institut.
(Rolling (Metalwork))

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

S/137/60/000/011/013/043
A006/A001

Translation from: Referativnyy zhurnal, Metallurgiya, 1960, No. 11, p. 116, # 26126

AUTHORS: Tarnovskiy, I.Ya., Odinokov, Yu.I.

TITLE: Investigation of Metal Flow Kinematics and of the Location of a Critical Section When Entrapping and Filling With Metal the Gap Between the Rolls

PERIODICAL: Byul. nauchno-tekhn. inform. Ural'skiy, n.-i. in-t chern. metallov, 1959, No. 7, pp. 30 - 43

TEXT: The authors investigated rolling process when filling with metal the space between the rolls, i.e. under conditions of strained and deformed state changing with time at each spot of the deformation seat. The method of vertical graduation lines is used; the lines are marked on the vertical plane of the composite specimen joint. The authors determined metal flow and the location of the critical section, the angle γ, at the given filling of the gap between the rolls. Dependences are plotted of the location of the critical section on the entrapment angle α and the shape factor l_3/H_{av}, where l_3 is the mean filling of the deformation

Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

S/137/60/000/011/013/043
A006/A001

Investigation of Metal Flow Kinematics and of the Location of a Critical Section When Entrapping and Filling With Metal the Gap Between the Rolls

seat in the experiment, H_{av} is the mean height of the strip. The critical section and the advance zone appear at $l/H_{av} \geqslant 0.5 - 0.6$. Increment of the advance zone is more intensive than that of the rear zone, and is the greater, the higher the strip is. The appearance and growth of the advance zone impair entrapment conditions, in particular at low l/H_{av}. A considerable disagreement of experimental values of γ and theoretical data, calculated by I.M. Pavlov's formula $\gamma = (\alpha/2)(1 - \alpha/2\beta)$, was stated at low l/H_{av}. This indicates the inapplicability of the method of advance zone for the determination of the friction coefficient. Analogous results were obtained during upsetting of tapered strips. It is stated that γ depends on the absolute and relative reduction in as much as changes in l/H_{av} take place. It is shown that at low l/H_{av} the γ/α ratio may be >0.5.

L.M.

Translator's note: This is the full translation of the original Russian abstract.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya.; SMIRNOV, V.K.; KOTSAR', S.L.

Replacing drop forging by rolling in mills. Kuz.-shtam.proizv. 1 no.3:18-22 My '59. (MIRA 12:10)
(Rolling (Metalwork))

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I.Ya.; GANAGO, O.A.; BAGROV, I.N.; SHELEKHOV, V.A.; Prinimali uchastiye: MAKAYEV, S.V., inzh.; RYABOKON', N.K., inzh.; KOTEL'NIKOV, G.V., inzh.; PUCHKOV, S.G., inzh.; STAROSELETSKIY, M.I., inzh.; BAKHAREV, V.P., tekhnik.

Developing a technology for the manufacture of lightweight railroad car wheels. Kuz.-shtam. proizv. 1 no.9:1-4 S '59. (MIRA 12:12)

(Car wheels) (Forging)

POZDEYEV, A.A., kand.tekhn.nauk, dots.; TARNOVSKIY, V.I.

Calculation of end dislocations by their increment during the press forging of metals. Izv.vys.ucheb.zav.: chern.met. 2 no.6:43-51 Je '59. (MIRA 13:1)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy obrabotki metallov davleniyem Ural'skogo politekhnicheskogo instituta.

(Forging) (Deformations (Mechanics))

LYU KHAY-KUAN' [Liu Hai-k'uan], inzh.; TARNOVSKIY, I.Ya., doktor tekhn.nauk, prof.

Deformation and stress in forge drawing. Izv.vys.ucheb.zav.; chern.met. 2 no.7:41-50 Jl '59. (MIRA 13:2)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy obrabotki metallov davleniyem Ural'skogo politekhnicheskogo instituta.
(Drawing (Metalwork)) (Deformations (Mechanics))

TARNOVSKIY, I.Ya., prof., doktor tekhn.nauk; GANAGO, O.A., dots.; VAYSBURD, R.A., inzh.

Investigating deformations and forces in forging on ring pads. Izv.vys.ucheb.zav.; chern.met. 2 no.8:55-67 Ag '59. (MIRA 13:4)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy obrabotki metallov devleniyem Ural'skogo politekhnicheskogo instituta.
(Deformations(Mechanics)) (Forging)

PHASE I BOOK EXPLOITATION SOV/4653

Tarnovskiy, Iosif Yakovlevich, Aleksandr Aleksandrovich Pozdeyev, Lev Vyacheslavovich Meandrov, and Gersh Aronovich Khasin

Mekhanicheskiye svoystva stali pri goryachey obrabotke davleniyem (Mechanical Properties of Steel During Hot Pressworking) Sverdlovsk, Metallurgizdat Sverdlovskoye otd-niye, 1960. 263 p. Errata slip inserted. 6,200 copies printed.

Ed.: V.B. Lyashkov; Ed. of Publishing House: N.N. Tsymbaliat; Tech. Ed.: M.Ya. Yepimakhova.

PURPOSE: This book is intended for technical personnel at rolling mills and forge shops, scientific workers, and students specializing in the pressworking of metals.

COVERAGE: The authors view steel being hot-pressworked as a substance having visco-plastic properties. They describe the results of investigations dealing with the dependence of steel resistance to deformation on temperature and the degree and speed of deformation. The book contains experimental data on the plasticity and strength properties of 16 grades of steels. From the experimental

Card 1/4

Mechanical Properties of Steel (Cont.)

data, equations are derived for the physical state of the metal or the relation of stress to deformation in hot working of steel. A method is set forth for using these equations in analyzing the stress-strain state of a metal, particularly by means of variational methods used in the mechanics of continuous media. No personalities are mentioned. There are 73 references: 72 Soviet, 1 English.

TABLE OF CONTENTS:

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

Mechanical Properties of Steel (Cont.) SOV/4653

AVAILABLE: Library of Congress (TS307.T3)

Card 4/4

VK/dwm/gmp
1-10-61

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

ZAYKOV, Mark Andreyevich; TARNOVSKIY, I.Ya., prof., retsenzent; POLUKHIN, P.I., prof., retsenzent; LYASHKOV, V.B., dotsent, red.; SYRCHINA, M.M., red.izd-va; MATLYUK, R.M., tekhn.red.

[Deformations and forces in hot rolling] Rezhimy deformatsii i usiliia pri goriachei prokatke. Sverdlovsk, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, Sverdlovskoe otd-nie, 1960. 299 p. (MIRA 14:3)
(Rolling mills) (Deformations (Mechanics))

S/137/61/000/007/012/072
A060/A101

AUTHORS: Tarnovskiy, I. Ya.; Pozdeyev, A. A.

TITLE: Problems of mechanics of strain seat during rolling

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 7, 1961, 2, abstract 7D11 ("Tr. Konferentsii: Tekhn. progress v tekhnol. prokatn. proiz-va". Sverdlovsk, Metallurgizdat, 1960, 3-16)

TEXT: The hypothesis of plane sections according to which transverse vertical sections which are plane before the deformation remain plane at every instant of rolling and after it, and undergo no bending and distortion, probably describes the rolling process with an accuracy sufficient for practical purpose when the ratio of the length l of the geometrical strain seat to its mean thickness H is equal to 1.5 - 2.0. The conditions at the Magnitogorsk metallurgical combine are: in the blooming mills $l/H < 0.8$, in the continuous billet mills $l/H <$ 1.2, in the section mills $l/H < 1.5 - 1.6$. At $l/H < 1.5$ the nonuniformity of the metal strain is very marked, the deviations from the hypothesis of plane sections are sufficiently appreciable and they have to be taken into account while solving definite problems.

Yu. Manegin

[Abstracter's note: Complete translation]

Card 1/1

S/137/61/000/007/031/072
A060/A101

AUTHORS: Tarnovskiy, I. Ya.; Smirnov, V. K.; Kotsar', S. L.

TITLE: Main results of the study of longitudinal rolling of varying section profiles

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 7, 1961, 11, abstract 7D75 ("Tr. Konferentsii: Tekhn. progress v tekhnol. prokatn. proiz-va". Sverdlovsk, Metallurgizdat, 1960, 381-394)

TEXT: The authors consider the elements of the theory of longitudinal periodic rolling determination of the limiting conditions for obtaining varying-section profiles on the basis of the analysis of metal flow, determination of the limiting conditions for obtaining varying section profiles on the basis of the analysis of force conditions in the strain seat, the production of links for the caterpillar track of the tractor C-100 (S-100), replacement of stamping and machining by rolling in the production of various tractor parts, manufacture of varying section blanks on forging rolls after their stamping in mechanical stamping presses. The possibility of applying longitudinal periodic rolling in the manufacture of tractor parts is demonstrated. A. Bulanov

[Abstracter's note: Complete translation]

Card 1/1

18.5000

176-3
SOV/133-60-1-11/24

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A., Meandrov, L. V.

TITLE: Complex Media in the Theory of Working Metals by Forces of Pressure

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1960, Nr 1, pp 66-71 (USSR)

ABSTRACT: This is an analytical study of the possibility of using the equations of state of complex medium in the theory of working metals by forces of pressure. For investigation of the stressed-deformed state the author applies variation equations of the theory of ductile-plastic flow. In this article the author adopts the definitions of L. M. Kachanov (Mechanics of Plastic Media, Gostekhteorizdat, 1948). The author assumes that the "deviator" of stresses is bound to the "deviators" of deformation and the speeds of deformation as follows:

$$D_\sigma = 2\left(\frac{\tau_s}{H} + \mu'\right) D_\varepsilon + \varphi D_{d\sigma} \qquad (1)$$

Card 1/4

where $\varphi = 4g(\Gamma^2)$ sets the relationship between the stresses and the degree of deformation; and $2\left[\frac{\tau_S}{H} + \mu^1\right]$ is coefficient corresponding to ductile-plastic medium. On the basis of the above, the author finds a connection between the stresses and deformations:

$$\sigma_x - \sigma = 2\left(\frac{\tau_S}{H} + \mu'\right)\xi_x + \varphi d\,\varepsilon_x$$

. . . . . (2)

$$\tau_{xz} = \left(\frac{\tau_S}{H} + \mu'\right)\eta_{xz} + \frac{\varphi}{2} d\,\gamma_{xz}.$$

and derives altogether 16 equations. He states that the energy of deformation of the medium under consideration is:

$$N_A = \iiint_V (\sigma_x \xi_x + \ldots\ldots + \tau_{xz}\eta_{xz})dV. \qquad (3)$$

Complex Media in the Theory of Working Metals by Forces of Pressure

TY(68)
SOV/143-60-1-11/34

The author concludes that in calculations of energy of deformation at a given moment of time the value of strengthening is taken into account only by the value of shear yield point. He adds that, by solving equations of energy by direct methods of calculus of variations, it is possible to calculate a field of speeds for any moment of time if the shear yield point τ_s is known (at the given moment of time) as well as the coefficient of ductility μ^1. For a wide range of speeds and for a large number of steel types, the relationship between the stress and the speed of deformation in the linear stressed state can be expressed by:

$$\sigma = \sigma_0 + k \ln \frac{\xi}{\xi_0}, \qquad (7)$$

Card 3/4

Complex Media in the Theory of Working Metals by Forces of Pressure

77538
SOV/148-60-1-11/34

where k = a coefficient depending on type of metal, temperature, and degree of deformation. For simplification the author considers the processes which can be best investigated by the theory of plastic flow, which studies the very small increments of displacements, deformations, and stresses, and also the correlation between these values. The flexibility of the theory of plastic flow permits an expansion of the results to any degree of deformation and, by this, the taking into account of the strengthening in the initial stage of the process. The author concludes that by the determined field of speeds it is possible to find, by integration in respect to time, the ultimate displacements and the path, but that this problem will be the subject of another article. There is 1 figure; and 7 Soviet references.

ASSOCIATION: Ural Polytechnic Institute (Ural'skiy politekhnicheskiy institut)

SUBMITTED: November 30, 1958

Card 4/4

TARNOVSKIY, I.Ya.; KOTEL'NIKOV, V.P.

Theoretical investigation of specific pressure and force during rolling on blooming mills with use of variation principles. Izv. vys. ucheb. zav.; chern. met. no.2:47-52 '60. (MIRA 15:5)

1. Ural'skiy politekhnicheskiy institut.
(Rolling mills)

TARNOVSKIY, I.Ya.; SMIRNOV, V.K.

Leading in longitudinal periodic rolling. Izv.vys.ucheb.zav.; chern.met. no.3:51-58 '60. (MIRA 13:4)

1. Ural'skiy politekhnicheskiy institut.
(Rolling(Metalwork))

S/148/60/000/004/001/006
A161/A029

AUTHORS: Tarnovskiy, I.Ya, Ganago, O.A., Vaysburd, R.A.

TITLE: Deformations and Stresses in Closed Piercing Process

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Chernaya metallurgiya, 1960, No. 4, pp. 99-108

TEXT: The "closed piercing, i.e., forcing the punch into a billet held in a shell (or die), is widely used for production of cupped parts, thick-walled containers, etc., and comes into use for cold extrusion of thin-walled aluminum, brass and steel. The process is analyzed in its three stages: the first stage when metal fills the space, the second stage in which metal is forced out from under the punch and flows upward, plastic deformation under the punch remaining at a certain depth, and the third stage, when all metal under the punch takes part in plastic deformation. The calculation of efforts necessary for the operation is of practical importance. The calculation method had been published previously (in Refs. 5,6, etc.). This article gives a practical calculation of a problem with analysis of the second and third stage of the process. A formula is derived (27) for determining the $\frac{P}{\sigma_s}$ value, i.e.,

Card 1/3

Deformations and Stresses in Closed Piercing Process

the pressure divided by the punch face area. For approximate practical calculations of pressure simplified formulas (28 and 29) are recommended for the second and third stage, respectively. The equation for $h_{u_2} = h_\chi$ (see figure) corresponding to the transfer from the second stage to the third stage is easily found from the equations (28) and (29). The following final equation is obtained:

$$\frac{h_\chi}{D} = 0.11 \frac{1 - \frac{D_{u_1}}{D^2}}{1 - 0.85 \frac{D_{u_2}}{D}}, \qquad (30)$$

There are 7 figures and 8 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: May 25, 1959

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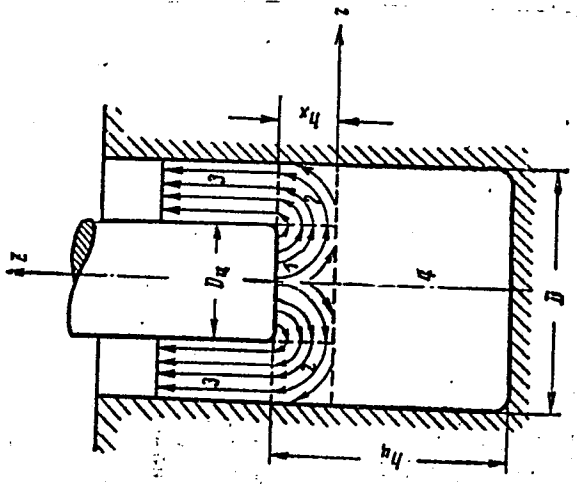
A161/A029

Deformations and Stresses in Closed Piercing Process

Figure 1:



Card 3/3

TARNOVSKIY, I.Ya.; GANAGO, O.A.; VAYSBURD, R.A.

Investigating metal flow during upsetting with backing rings by means of the variations method. Izv.vys.ucheb.zav.; chern. met. no.5:55-60 '60. (MIRA 13:6)

1. Ural'skiy politekhnicheskiy institut.
(Forging) (Deformations (Mechanics))

S/182/60/000/009/001/012
A161/A029

AUTHORS: Lyu Khay-kuan'; Tarnovskiy, I.Ya.; Trubin, V.N.

TITLE: Metal Deformation in Draw-Forging of Large Billets on Flat Dies

PERIODICAL: Kuznechno-shtampovochnoye proizvodstvo, 1960, No. 9, pp. 1 - 5

TEXT: A theoretical investigation of the deformation distribution in metal through the billet cross section area in the forging process on a flat die in a single pass had been made previously (Refs. 3 and 4). The present article gives information on the results of a systematical laboratory investigation with lead billets forged by different schedules beginning with the simplest case of drawing in a single pass to drawing with high reduction of area. Certain deformation laws were derived and practical recommendations are given. The billets were made of two halves, a coordinate grid was traced on the parting surfaces and the halves were joined by Wood alloy. Deformation observed on the grid in the center, in different layers and along the billets is illustrated by photographs and curves. The following facts were noted: 1) The relation of feed to the billet thickness has the highest effect on the deformation distribution in billet cross section and length. Within the studied $\frac{l}{h}$ range (from 0.25 to 1) the non-

Metal Deformation in Draw-Forging of Large Billets on Flat Dies

uniformity of deformation increased with growing $\frac{l}{h}$ ratio and was highest from 0.4 on. Still, to avoid longitudinal tension stresses that had been revealed in a previous investigation (Ref. 3) it is advised to take $\frac{l}{h}$ between 0.5 and 0.7, and take a higher $\frac{l}{h}$ ratio for less plastic metal which might develop internal ruptures. If metal is sufficiently plastic and the center must be well forged through, lesser $\frac{l}{h}$ values are to be chosen. For hammer forgings, that usually are taken with length/height ratio above 1, the optimum feed must be chosen for other reasons that are not considered here. 2) The more frequent is the displacement of the feed limit in forging with several passes, the more uniform is the deformation in metal. It is therefore advised to use more passes with less deformation in each, and change the feed boundaries frequently. This is particularly important in forging with a low degree of deformation, i.e., when the unevenly forged structure spoils the metal quality. In case of forging with a high deformation degree it is better not to increase the number of passes at the cost

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A161/A029

Metal Deformation in Draw-Forging of Large Billets on Flat Dies

of swaging degree in a pass, for a lower number of passes will be sufficient. There are 7 figures and 4 references: 3 Soviet and 1 English.

Card 3/3

S/148/60/000/012/005/020
A161/A133

AUTHORS: Tarnovskiy, I. Ya.; Khasin, G. A.; Pozdeyev, A. A., and Meandrov, L. V.

TITLE: Plasticity of some steel grades at high temperatures

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 12, 1960, 63 - 69

TEXT: The conventional laboratory methods can only give indirect data on the plasticity in relation to one of the multitude of factors existing in real pressure working processes. It is therefore often better to use the simplest test methods - tension and impact bending. Eighteen alloy steel grades of different structure groups and applications have been tested using these common heat tests. The results are presented in tables and graphs. The 18 grades are divided into two groups - "a" and "b". (The chemical compositions are not included). The "a" includes: "45"; У12А (U12A); 60С2 (60S2); 18ХНВА (18KhNVA); ШХ15СГ (ShKh15SG); 1Х18Н9Т (1Kh18N9T); 4Х13 (4Kh13); Х17Н2 (Kh17N2); Х18Н12М2Т (Kh18N12M2T); Х18Н25С2 (Kh18N25S2); Х25105 (Kh25105); and the "b" - Р18 (R18); Х23Н18

Card 1/6

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S/148/60/000/012/005/020
A161/A133

Plasticity of some steel grades at...

(Kh23N18); 1X13 (1Kh13); 4X14H14B2M (4Kh14N14V2M); ЭИ-481 (EI-481). Relative elongation (δ, %) follows two different laws: a continuous rise from 800 to 1,200°C (Fig. 1, a), and a rise to a maximum and drop after it (Fig. 1, b). A common feature of the "b" group, except for Kh23N18, is the high carbide content. In the Kh9S2 grade δ changes peculiarly (Fig. 1, c) - drops to almost a half and rises rapidly after the minimum at 900 - 1,100°C. Reduction of area (ψ, %) follows the same law but with less varying absolute values. In the "a" group grades the ψ grows continually (or stays at 100%), and in the "b" group it reaches the maximum at 1,000 - 1,100°C and goes down. An intense grain growth in the 900 - 1,100°C range is characteristic for silchrome steel. In most of the steel grades ψ reached 100% at 1,200°C or earlier, and in some cases it did not exceed 80-90%. Consequently, the trend of the plasticity indices δ and ψ at high temperatures is practically the same, and they are equivalent until the formation of the neck on specimens, but after it the ψ value gives a more complete plasticity characteristic. Nevertheless, both factors should be considered in combination. The "a" group steel has the highest plasticity through the whole temperature range of hot pressure working, but it must be born in mind that in complex

Card 2/6

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Plasticity of some steel grades at...

stress conditions (e.g., tube piercing), the properties might be different, as well as that the obtained δ and ψ values might not be true for 1Kh18N9T, Kh18N12M2T and Kh17N2 in the case of a high ferrite content. Particular care is recommended in selecting the process parameters (temperature in particular) for the "b" group, for a large part of these grades contains a high quantity of primary carbides and includes low-melting eutectics in the cast structure. The impact strength (a_K) drop with raising test temperature from 800 to 1,250°C was common for all investigated steel grades (Fig. 2). All grades (except Kh23N18) with a_K varying as 1 were the most plastic, the specimens bent without rupture; grades with an impact strength varying as 2 broke in tests with only few exceptions; they belonged to the group "b" in tension tests. The conclusion is that impact strength variation is opposite to the plasticity variation at a high temperature range and cannot be used for the plasticity indices in this case. It must always be evaluated jointly with deformation resistance test results in equal test conditions. The obtained data can be used to determine the optimum temperature range for different steel grades, as well as for subdividing the grades into groups for similar technological treatment. A further systematization of test data is advised. There are 3 tables and 2 figures.

Card 3/6

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S/148/60/000/012/005/020
A161/A133

Plasticity of some steel grades at...

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: March 22, 1960

Card 4/6

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I. Ya., prof.; MEANDROV, L.V., aspirant

Mechanical properties of alloyed steels at high temperatures.
Trudy Ural.politekh. inst.no.78:24-37 '60. (MIRA 14:5)
(Metals at high temperatures)
(Steel alloys--Testing)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

TARNOVSKIY, I. Ya.; POZDEYEV, A.A.; PUCHKOV, S.G.

Deformation and stresses in drawing. Kuz.-shtam. proizv. 2 no.6: 6-10 Je '60. (MIRA 13:10)
(Drawing (Metalwork)) (Strains and Stresses)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001755020003-8"

MEANDROV, L.V.; TARNOVSKIY, I.Ya.; POZDEYEV, A.A.

Methods for a rapid testing of steel at high temperatures. Zav. lab. 26 no.2:201-203 '60. (MIRA 13:5)

1. Ural'skiy politekhnicheskiy institut imeni S.M.Kirova.
(Steel--Testing)

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S/148/61/000/001/002/015
A161/A133

AUTHORS: Tarnovskiy, I. Ya.; Vaysburd, R. A.; Levanov, A. N.; Pozdeyev, A. A.; Ganago, O. A., and Kotel'nikov, V. P.

TITLE: Selection of suitable functions for the utilization of the Ritz method in the theory of working metal by pressure

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 1, 1961, 73 - 83

TEXT: The article deals with the application of the Ritz method (Ref. 11: W. Ritz. Ueber eine neue Methode zur Loesung gewisser Variationsprobleme der mathematischen Physik. Journ. f. d. reine und angewandte Mathematik, Bd. 135, H. 1, 1908) for the calculation of different practical problems of pressure working. Such problems consist in determining the functions of displacement components, and the searched for functions are written in a series:

$$U_k = a_1 \cdot f_1(x,y,z) + a_2 \cdot f_2(x,y,z) + \ldots + a_n f_n(x,y,z), \qquad (5)$$

where U_k is any of the coordinate axes; a_1 - are indefinite (variable)

Card 1/2

S/148/61/000/001/002/015
A161/A133

Selection of suitable functions for the...

parameters; $f_1(x,y,z)$ - "suitable" functions reflecting qualitatively the displacements pattern and satisfying the boundary zone conditions. The problems discussed as examples are: upsetting of cylindrical billets between flat plates; a parallelepiped between flat plates; a case where the purpose is to determine the propagation of plastic deformation, with a simple axisymmetrical forging used as an example. The mathematical analysis of the individual cases ends with recommendations: 1) If the Ritz method is used, the suitable functions must be selected so as to reflect more or less completely the boundary conditions corresponding the purpose of investigation. 2) The system of suitable functions describing the deformed state in technological problems can be selected with a series of rough assumptions (uniform deformation, the hypothesis of flat sections, etc.). 3) When the propagation of displacements and deformation within the body has to be determined in detail, the suitable functions will be more complex and contain two or three variable parameters, and at the same time satisfy the boundary conditions more completely. There are 8 figures and 13 references: 12 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: April 30, 1960