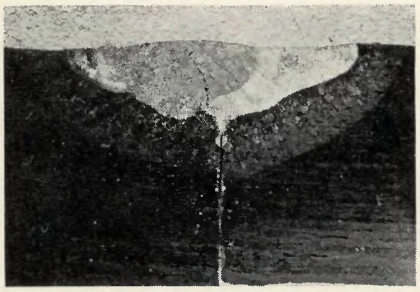

Fig. 15—Cross section of a weld containing 2,158 ppm iron

cracking provided joints are designed to eliminate high restraint.

3. Uranium weld metal with iron contents exceeding 6,000 ppm (0.6 wt-%) are not prone to hot cracking at moderate strain levels.

4. Weld metal intermediate in iron content is very susceptible to hot cracking. The intermediate range is defined by the threshold curve in Fig. 11.

5. Actual welds on uranium butt joints exhibited cracking tendencies similar to that of Varestraint test specimens.

6. The spot-Varestraint test proved to be a useful means of quickly evaluating the thermomechanical effects in the heat-affected zones. The alpha, beta, and gamma phases of uranium were revealed by surface markings characterizing the properties of these phases.

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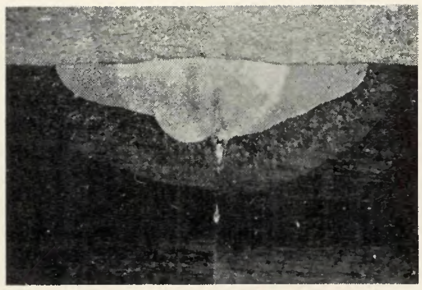

Fig. 16—Cross section of a weld containing 6,785 ppm iron

USSR Welding Research News

By Rudolph O. Seitz

Avtomaticheskaya Svarka 22, No. 4 (April 1970)

• Bel'chuk, G. A. et al.: On the selection of weld sizes in the development of new standards.—The geometric shape and the dimensions of the weld bead were studied. It is shown that a modification of the standards on the size and permissible deviations of the welds is advisable. (47-50).

• Khudonogov, V. N. et al.: A system of recording the operating parameters in friction welding.—A system of recording the operating parameters of friction welding applicable to type Ts MST-75 machines and the principle of operation of this system are described (51-52).

• Subbotovskii, V. P.: Durability of hardfaced Pilger mill rolls.—After a brief outline of existing methods of increasing the wear resistance of Pilger mill rolls by hardfacing a newly developed mechanized process of submerged arc hardfacing is described. Data on the cost of labor for preparing, hardfacing and finishing the rolls and of their durability in service are given (53-56).

• Chvertko, A. I. and Timchenko, V. A.: Equipment with programmed controls for the automation of welding operations.—A brief description is given of source experimental equipment with digital and kinematic program controls of the moving operating organs which has been developed at the E.O. Paton Institute of Electric Welding (57-61).

• Glebov, L. V. and Gorlov, Yu, I.: Heat calculation of welding transformers potted with epoxide compound.—The problems associated with the heat calculation of epoxide potted transformers for resistance welders are discussed. A method of heat calculation with the use of a reduced coefficient of thermal conductivity of the combined insulation between the primary and secondary winding is described (62-64).

• Cherednichok, V. T. et al.: Machine for resistance welding of the foundation members of prefabricated ferroconcrete.—The design of the K-333 machine for the flash butt welding of the T-joints of foundation members of ferroconcrete structures and the welding procedure which has been developed are described (65-69).

Avtomaticheskaya Svarka 23, No. 6 (June 1970)

• Paton, B. E. et al.: Automation of experimental investigations of welding processes (1-6).—The authors describe a system for the automatic collection and processing of experimental data whose application to the study of resistance spot welding has resulted in greater effectiveness of the investigation.

• Okada, K.: The effect of alloying elements on crack formation in the welding of a heat-resistant nickel-base alloy (7-13). — The formation of cracks during the welding of Inconel 713C has been studied. It was found that the cracking resistance is improved by reducing the aluminum content of the alloy.

• Forostovets, B. A. and Kirdo, I. V.: The effect of high-temperature deformation of steel on the presence of a liquid phase on the structure and the properties of welded joints (14-17).—An experimental study has been made

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a gas-tungsten arc.

Acknowledgments

The results presented in this paper are part of a thesis submitted by T. W. Petrie to the faculty of the Graduate School of the University of Minnesota in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Construction of and supplies for the apparatus used in this study were financed by the Welding Research Council of the AMERICAN WELDING SOCIETY and the National Science Foundation under Grant GK-1728. Free access to their digital computer facilities was granted by the University of Minnesota Computer Center. The authors gratefully acknowledge this assistance.

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(*Continued from page* 587-s)

of the structural changes of the metal in the weld region due to the upset in the flash butt welding of steel parts. It was found that severe upsetting has a deleterious effect on the weld metal properties.

• Kakhovskii, N. T. et al.: Lowering of the carbon content in the weld metal in the manual welding of stainless steels (18-21).—It is shown that the introduction into the electrode coating of metal oxides with a melting point in excess of 2000° C makes it possible to obtain a substantial burnout of carbon from the welding rod. By introducing these oxides together with iron oxides, silicon may also be burned out.

• Yakobashvili, S. B.: Interphase tension of Armco iron at the boundary with ANF-1P flux (22-24).—Using the sessile drop method, the interphase tension at the separation boundary between a drop of liquid flux and the molten surface of Armco iron (σ_{m-s}) was measured. From the surface tension σ and from σ_{m-s}, the values for the cohesion, the adhesion and the coefficient of wetting were calculated. The surface tension and the density of the ANF-1P flux and the Armco iron were measured by the method of maximum gas bubble pressure.

• Kravchenko, E. L.: Cold welding of metals with a clean surface (25-27).—The results of a study of the cold welding of metals under vacuum are reported. The degree of deformation necessary for the cold welding of 24 pairs of dissimilar metals was determined. It is shown that the cold welding of metals is affected by the type and the crystal lattice of the metals, by their mutual solubility and by the ratio of their atomic diameters.

• Prokhorenko, V. M. and Zhdanov, I. M.: Brittle fracture of welded joints at room temperature (28-31).—The characteristics of welded joints at higher temperature are discussed and a two-stage mechanism for the growth of brittle-ductile cracks is suggested.

The energy relationships of this form of brittle fracture were analyzed.

• Demyanchuk, A. S. et al.: The chemical composition of the cut surface in the plasma arc cutting of metals (32-35).—The distribution of carbon acid of other alloying elements at the cut surface after the plasma arc cutting of metals has been studied.

• Lysov, V. S.: The static strength of a single row of resistance spot welds in AMg5M alloy (36-38).—The effect of the operating diameters and of the distance between the spots on the static strength of single rows of spot welds in AMg5M alloy 1.0 and 1.5 mm in thickness has been studied.

• Kasatkin, B. S. et al.: Welding of low-alloy high-strength 14Kh2GMR and 14KhMNDFR steel (39-42).—A welding procedure for these two grades of steel has been developed and recommendations are given for welding with coated electrodes, with the submerged arc and with the CO_2 shielded arc.

• Tsygan, B. G. et al.: Automatic welding of clad steel with metal powder addition (43-45).—Operating conditions for the automatic submerged arc welding of clad steels in two passes using metal powder additions have been worked out.

• Buchinskii, V. N. et al.: Pulsed arc overlay welding in argon with a powder wire (57-58).—An argon-shielded welding process with a powder electrode and its use for cladding the internal surface of a chemical reactor with a corrosion-resistant alloy is described.

• Shvartser, A. Ya. et al.: Electroslag surfacing and casting with a constant slag bath (60-63).—Electroslag surfacing and casting with the repeated use of the same slag bath have been studied. It was found that the consumption of flux is reduced significantly and the efficiency of the process is improved while the composition of the metal is changed only slightly.

• Veretnik, L. D. et al.: Removal of the risers of aluminum castings by plasma arc cutting (64-65).—The experimental use of plasma arc cutting for removing the risers of aluminum castings is described. It is shown that in order to improve the quality of the cuts it is necessary to change the location of the risers on the castings.

• Umanets, B. F.: Economic efficiency of pulsed arc welding with a consumable electrode (66-68).—The expediency and economic advantage of introducing pulsed arc welding with a consumable electrode in place of manual argon arc welding with a tungsten electrode in the fabrication with aluminum magnesium alloys has been demonstrated. An analysis of the relative cost of welding is also given.