size between the base metal and the welds.

Cycling base metal and weld specimens from room temperature to 4.2K showed that the presence of welds made little difference in the resultant resistivity ratio.

Magnetoresistance Determination. Corrucini[4] plotted an empirical magnetoresistance curve for aluminum with resistivity ratios below 5000. The data points for the magnetoresistance determinations of the present work made on base metal and weld metal specimens correlated quite well with his predictions in Fig. 10. The data show little difference in magnetoresistance due to the presence of welds.

Eastern European Welding Research News

BY RUDOLPH O. SEITZ

CZECHOSLOVAKIA

Zvaranie 19, No. 4 (April 1970)

• Vrbensky, J.: Aspects of the weldability of rolled plates under stress in the direction of thickness (98-103).—The results of a study on the relation between plate thickness and weldability are reported. The causes of lamellar tearing are analyzed and measures of determining the presence of and the susceptibility to lamellar tearing are described.

• Ruza, V.: Proposal for a complex brazability test based on the service requirements of the brazed joint (103-07).—Methods of testing the tensile and shear properties, the electrical conductivity and the corrosion resistance of brazed joints in sheets and rods are described.

• Minarik, R., et al.: Combination of spot welding and adhesive bonding in joining aluminum sheets (107-11).—The problem of producing moisture-proof flanged seams in large decorative aluminum panels with minimum deformation was solved by the combined application of condenser discharge spot welding and epoxy resin bonding.

• Holasek, J.: Spot welding of zinc coated sheet metal (111-16).—The author discusses the problem of producing sound spot welds in zinc coated sheet metal and presents recommendations, based on the results of his investigations, for the spot welding of zinc coated sheets 0.8-2.0 mm in thickness with various thicknesses of the zinc layer applied by electroplating, dipping or metallizing.

• Plachy, A.: Designing protective shields for semiautomatic arc welding installations (116-18).—The incorporation of semiautomatic arc welding stations in a production line necessitates the protection of the operators against arc radiation. Several examples of the design of shields assuring the desired protection are described.

Zvaranie 19, No. 5 (May 1970)

• Satoh, H.: Thermal stresses in high-strength steels developed by thermal cycles simulating the heat-affected zone of the weld (129-36).—Transient thermal stresses in the HAZ were determined by means of a method in which cylindrical specimens are held in a rigid frame and subjected to a thermal cycle simulating the conditions in the weld zone. A comparison of the thermal stresses in HY80 and in mild steel showed that in the case of the HY80 steel the transformation characteristics had an effect on the transient and residual stresses.

• Jesensky, M.: Welded gear boxes (136-41).—The results of a study of welded gear boxes are reported. The design and the fabrication procedures are described and the results of stress and noise measurements on cast and welded gear boxes are given. The two types of gear boxes are compared from the technical and the cost angle.

• Plachy, A.: Solid backings for joining strips by gas-shielded butt welding (141-47).—Gas-shielded arc welding is frequently used for joining sheets or strips by straight butt welds made from one side only. This requires the use of solid backings to assure uniform joint quality. The various aspects of this problem have been studied by the author in his investigation of different backing systems.

EAST GERMANY

ZIS Mitteilungen 12, No. 6 (June 1970)

• Pluschke, W. W.: One-sided submerged arc welding with a shaped strip electrode (666-74).—A new method of submerged arc welding from one side has been developed in which a strip electrode is formed into a V-shape during the welding process. The arc moving along the bottom edge of the strip electrodes safely fuses the joint edges and produces a good root weld.

• Pluschke, E. W.: Weld pool backups for welding from one side (675-80).—At the present state of development, welding from one side is possible only with the aid of some backup to secure the weld pool. A survey of known backup systems is given.

• Weisselberg, A. and Ratzsch, H.: Deposition efficiency of the various submerged arc welding methods (681-98)—The general burn-off characteristics of the different submerged arc welding processes are discussed from the point of view of maximum permissible current load. For filler pass welding, the indirect arc method which utilizes I_2Rt heating of the free end of the electrode at high welding currents is considered particularly effective. Numerous data are presented to arrive at an objective estimate of the economics of the different processes with respect to electrode cost and productivity of labor.

• Weillelberg, A. and Ratzsch, H.: The efficiency of submerged arc filler pass welding in the case of butt and fillet welds (701-14)—The maximum attainable welding speeds for the filler pass welding of one-sided butt joints (V-edge preparation) and of filler joints are reported. The maximum deposition rates are compared with the deposition volumes required as a function of edge preparation and the data are used to determine the maximum welding speeds for different plate thicknesses and fillet sizes.

• Kruppa, M. and Weiser, G. Electromagnetic clamping bench for welding flat plates in shipbuilding (715-21).—A method is described for reducing the time and effort for determining by trial and error the optimum distance between the magnets of an electromagnetic bench for clamping flat plates at right angles to the weld

(*Continued on page* 38-s)

RUDOLPH O. SEITZ is Information Specialist with Air Reduction Co., Murray Hill, N. J.

F for 1 hr did not provide any appreciable improvement over the 1600° F for 4.5 hr treatment. Indeed, the 2150° F treatment could be detrimental in that it could tend to promote warpage and distortion in a complex structure.

3. Stress relieving the weldments at 1400° F for 6 hr lowered the tangential and radial residual stresses to about 10,000 and 4000 psi, respectively. If a 1600° F temperature is considered to be excessive, it is probable that extended times at 1400° F could provide the required relief of residual stresses. Furthermore, it is quite likely that a 10,000 psi peak tangential residual stress value is acceptable.

4. A 1200° F stress-relief treatment for 100 hr did not prove satisfactory. It lowered the peak tangential and radial residual stresses by only about 25%.

Acknowledgment

The authors would like to express their appreciation to those personnel who contributed to this program. In particular, G. M. Slaughter, R. G. Gilliland, and J. E. Smith for their suggestions and technical advice, D. E. Arnurius for his computer assistance, J. E. Oliver for his contributions during machining of the specimens, and J. A. Hunt who did the welding

References

1. *Welding J. Res. Suppl.* 17(15), (1947).
2. Subcommittee on Brittle Fracture of the ASME Research Committee on Prevention of Fracture in Metals, "A Review of Engineering Approaches to Design Against Fracture," American Society of Mechanical Engineers, 1965.
3. R. Weck, "Residual Stresses Due to Welding," Symposium on Internal Stresses in Metals and Alloys, Institute of Metals Monograph, London, 1948.
4. F. W. Barton and W. J. Hall, "Brittle-Failure Tests of Six-Foot Wide Prestressed Steel Plates," Welding Journal 39(9), Research Suppl. 379-s (1960).
5. G. D. Whitman, G. C. Robinson, Jr., and A. W. Savolainen, *Technology of Steel Pressure Vessels for Water-Cooled Nuclear Reactors*, ORNL-NSIC-21 (December 1967).
6. K. Heindlhofer, *Evaluation of Residual Stresses*, McGraw-Hill, New York, 1948.
7. C. L. Adams and D. A. Corrigan, "Mechanical and Metallurgical Behavior of Restrained Welds in Submarine Steels," Final Report Contract No. Nobs-92077, Project Serial No. SR007-01-01, Task 855, Submitted to the U. S. Department of the Navy, Bureau of Ships, Washington, D. C.
8. *Metals Handbook*, 1968 Edition, The American Society for Metals, Cleveland, Ohio, p. 237.
9. G. Sachs, "The Determination of Residual Stresses in Rods and Tubes," *Z. Metallk.* 19, 352 (1937).
10. S. Timoshenko and J. N. Goodier, *Theory of Elasticity*, 2nd ed., McGraw-Hill, New York, 1951.
11. H. E. McCoy, Jr., and J. R. Weir, Jr., *Materials Development for Molten Salt Breeder Reactors*, ORNL-TM-1854, p. 19 (June 1967).
12. H. E. McCoy and D. A. Canonico, "Preirradiation and Postirradiation Mechanical Properties of Hastelloy N Welds," Welding Journal 48(5), Research Suppl. 203-s to 211-s (1969).
13. R. G. Gilliland and J. T. Venard, "Elevated Temperature Mechanical Properties of Welds in a Ni-Mo-Cr-Fe Alloy," Welding Journal 45(3), Research Suppl. 103-s to 110-s (1966).
14. K. Masubuchi, "Effects of Residual Stresses on Fracture Behavior of Weldments," *Weld Imperfections*, Addison-Wesley Publishing Company, 1968.
15. Christian H. Reinsch, "Smoothing by Spline Functions," Techmsche Hochschule München, Matematisches Institut—Rechenzentrum.

Eastern European Welding Research News

(*Continued from page* 30-s)

seam. For the type of bench tested, the quotient of the number of ampheres turns and the optimum distance transverse to the weld seam amounts to 9-10A/mm.

• Gunther, W. H.: Comparison of two methods for measuring residual stresses (722-27).—The results of measurements obtained with the X-ray method according to Stroppe and with the trepanning method according to Gunnert were compared. The X-ray method gives smoother curves and is recommended for laboratory testing. The trepanning method gives more abrupt readings but is preferred for on-site testing even though it requires considerable skill in handling the testing equipment.

• Muller, K.: Weld quality as a function of the welding process (728-31). —The author proposes a method of quality control involving control cards to arrive at a safe estimate, based on systematic data collected during the initial phase of a production run, of the weld quality to be anticipated in serial production based on a given welding process.

• Huhndorf, P.: Value-engineering applied to a welded structural component (732-38).—Value-engineering is a means of avoiding unnecessary cost in design and fabrication. By applying the principles of value-engineering, the author attempts to lower the total cost of a given welded structural component.

YUGOSLAVIA

Zavarivac 15, No. 1 (Jan.-March 1970)

• Pandrc, V.: Some factors to be considered in the introduction of semiautomatic Co_2 are welding (5-20).—The technical and economic advantages of semiautomatic Co_2 arc welding compared to other welding processes are discussed and particulars relating to the production of butt and fillet welds in different plate thicknesses are given. Data are also presented on the effect of the welding variables on the productivity of the process and on weld quality.

• Beatovic, B.: The fabrication of hydrogen reactors (20-5).—A brief outline of the most important operations in the fabrication of hydrogen reactors is given and the criteria for selecting base and filler materials from the point of weldability are discussed. Special attention is given to welding procedures and to the problem of welded pipe connections.

• Ivandic, S.: Welding of tube sheets for boiler plants (55-57).—The application of automatic submerged arc welding in the fabrication of tube sheets for large boiler units is described.

Zavarivac 15, No. 2 (April-June 1970)

• Radovic, A.: The susceptibility of low-alloy high-strength steel to cold shortness (5-14).—The conditions for the formation of cold cracks are analyzed and experimental data on the cold cracking susceptibility of two types of low-alloy steel (tensile strength > 140 kp/mm^2 (upon welding with lime ferritic and austenitic filler materials are reported.

• Millicevic, M.: Fabrication of steel jackets for blast furnaces (14-24).—A detailed description of the various stages of fabrication and field erection of a heavy blast furnace jacket. Components prefabricated in the shop are assembled at the site into larger segments before the final assembly is undertaken. The welding procedures range from manual to electroslag welding. Semiautomatic gas-shielded welding is used only for the horizontal girth welds.