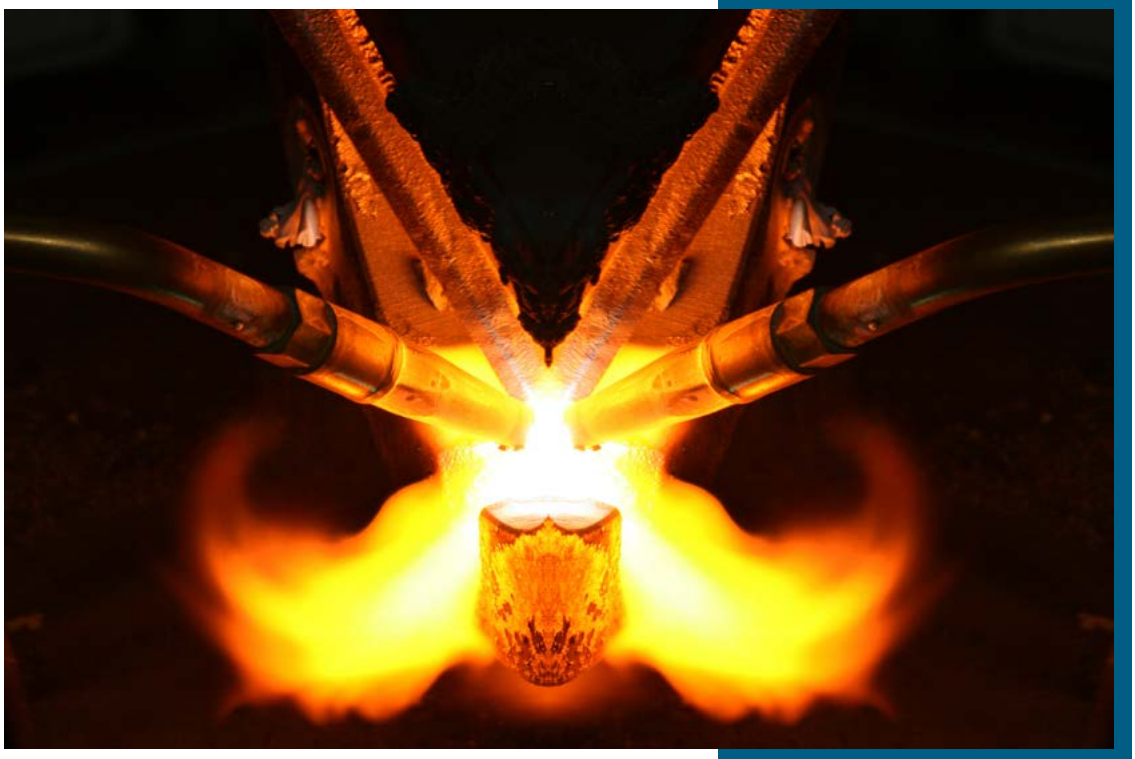
ISSN 2300-1674

BIULETYN
INSTYTUTU SPAWALNICTWA



No. 1/2018

INSTITUTE OF WELDING BULLETIN

BIULETYN INSTYTUTU SPAWALNICTWA

No. 1 BIMONTHLY Volume 62

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INSTITUTE OF WELDING

The International Institute of Welding and The European Federation for Welding, Joining and Cutting member

Summaries of the articles

T. Pfeifer – Structure and Properties of Nickel Alloy Overlay Welds Plasma Cladded on Creep-Resistant Steel Tubes

DOI: *10.17729/ebis.2018.1/1*

The article presents tests aimed to develop technological parameters of the plasma surfacing of Inconel 625 overlay welds onto boiler tubes (φ45×5 mm) made of steel 13CrMo4-5, providing the content of iron on the overlay weld surface below 5%. The research work involved macroscopic metallographic tests of overlay welds, the identification of the chemical composition of the overlay weld surface as well as microscopic metallographic tests and the microanalysis of the chemical composition across the overlay weld. It was ascertained that, under certain conditions, the use of plasma surfacing enables the obtainment of high-quality single-run overlay welds having a thickness of below 2 mm and characterised by the minimum stirring of the overlay weld metal with the substrate metal as well as the obtainment of an iron content of 2.5% on the overlay weld surface.

G. Rogalski, M. Jurkowski, J. Łabanowski, D. Fydrych – Effect of the Post-Weld Surface Condition on the Corrosion Resistance of Austenitic Stainless Steel AISI 304

DOI: *10.17729/ebis.2018.1/2*

Surfaces of welded elements made of corrosion-resistant (stainless) steels develop temper colours. The removal of thickened oxide layers off steels exposed to temperatures below 300°C is necessary and entails the restoring of high corrosion resistance of the stainless steel. The article presents tests concerned with the effect of a method applied to remove post-weld temper on the corrosion resistance of austenitic stainless steel AISI 304. It was ascertained that the most favourable method enabling the obtainment of high corrosion resistance involved the use of an appropriate passivation process.

M. St. Węglowski – Electron Beam-Based Rapid Prototyping – State of the Art

DOI: *10.17729/ebis.2018.1/3*

Fast prototyping involving the use of an electron beam and a deposited material in the form of a wire is an efficient method enabling the making of elements having complicated shapes and made of expensive technical alloys, e.g. alloy steels, nickel or titanium alloys. The demand for fast prototyping results from the development of new technologies in the automotive, aviation and machine-building industries. The article discusses the advantages of fast prototyping methods confronted with conventional prototyping methods as well as presents ideas behind the fast prototyping and primary process parameters. The fast prototyping technology involving the use of a wire and an electron beam as the source of energy should gain recognition among Polish entrepreneurs intended to implement innovative solutions in their companies.

J. Górka – Properties and Structure of Resistance Short-Circuit Welded Joints in TMCP Steel S700MC

DOI: *10.17729/ebis.2018.1/4*

The article presents tests concerning the structure and properties of resistance short-circuit welded joints made of 10 mm thick high yield point steel S700MC. The tests revealed the significant effect of a welding thermal cycle leading to less favourable mechanical and plastic properties of the joints. The welding process led to a decrease in tensile strength from 820 MPa (base material strength) to 660 MPa in the

joint area. The welded area hardness decreased to 215 HV1, whereas that of the base material amounted to 290 HV1. The hardness in the HAZ area amounted to approximately 235 HV1. The welding process also resulted in a significant decrease in plastic properties. The toughness of the steel dropped from 50 J/cm² (testing temperature being 30°C) to approximately 6 J/cm² in the weld line, approximately 8 J/cm² in the area between the weld and the HAZ and to approximately 11 J/cm² in the HAZ area.

A. Kiszka, J. Górka, P. Kiszka – Plasma Powder Surfacing of Toughened Steel S690Q Performed Using the NiBSi Powder with a Tungsten Carbide Addition

DOI: *10.17729/ebis.2018.1/5*

The article presents results obtained during the plasma powder surfacing of steel S690Q. The tests involved the use of the NiBSi-based EuTroLoy PB 6503 powder with a tungsten carbide addition as well as the making of overlay welds on 30 mm thick plates. The tests involved the making of both simple and overlap runs with an overlap of 30÷70%. The overlay welds were subjected to hardness tests, abrasive wear tests as well as macro and microscopic tests. The tests made it possible to obtain high-quality overlay welds within a wide range of process parameters.

M. Gucwa, S. Parzych, M. Kukuryk, M. Sobala – Properties of welded joints made of cast steel GX8CrNi12-1

DOI: *10.17729/ebis.2018.1/6*

The article presents test results concerning welded joints made of cast steel GX8CrNi12-1. The above-named cast steel has a martensitic microstructure and can be used in pressure equipment operated at ambient and high temperature. The test joints were made in the horizontal position and in the vertical up position. The foregoing was dictated by the fact that the above-named positions are used in industrial conditions, e.g. when welding steel castings. The welding process performed in the above-named positions ensured that specimens were sampled from areas exposed to the lowest and highest arc linear energy. The article describes the process of manual metal arc welding (111) and the post-weld heat treatment. The test joints were subjected to destructive tests including transverse tensile tests, impact strength tests, hardness measurements as well as macro and microscopic tests. The test results revealed differences in properties of joints made in different positions, resulting from various heat inputs to joints during welding.

Biuletyn Instytutu Spawalnictwa
ISSN 2300-1674

Publisher:
Instytut Spawalnictwa (The Institute of Welding)

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