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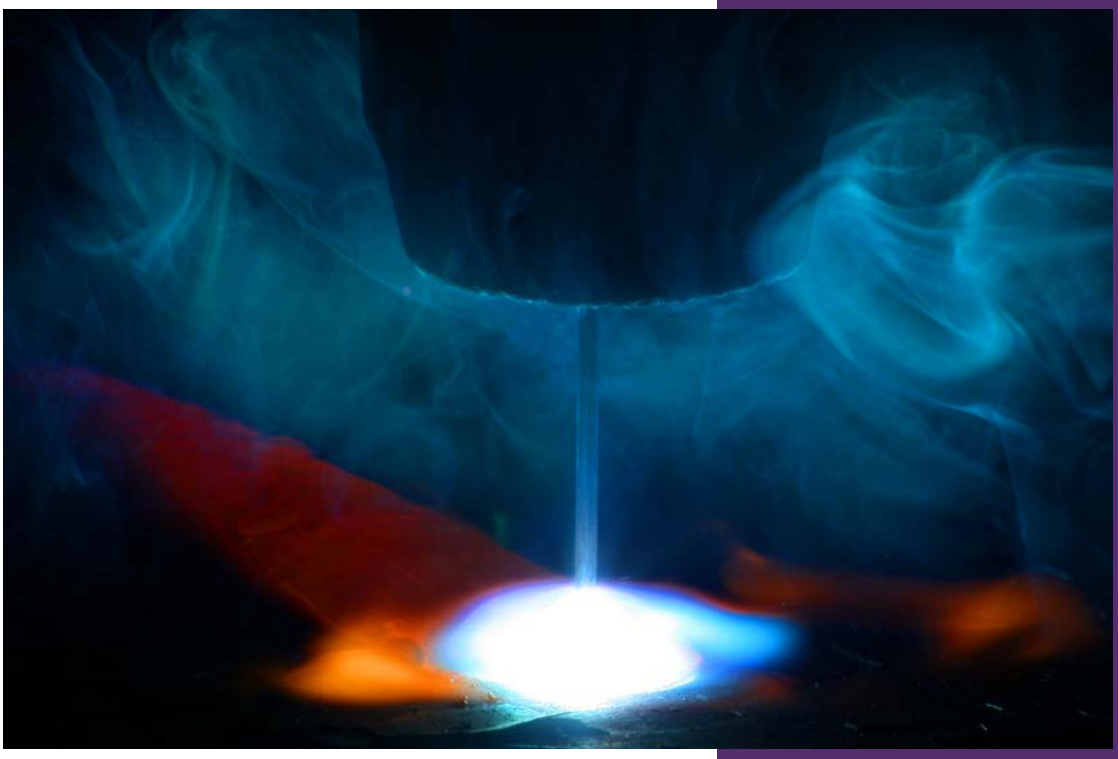

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CONTENTS

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INSTITUTE OF WELDING

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Summaries of the articles

M. Banasik, M. Urbańczyk – Laser + MAG Hybrid Welding of Various Joints

DOI: *10.17729/ebis.2017.1/1*

The article presents the possibilities of hybrid welding (laser + MAG arc), particularly as regards the welding of butt joints. The article discusses technological conditions and equipment configurations when welding sheets having the same and different thicknesses both in PA and PC positions. In addition, the article presents exemplary welding of multipart joints (nodes of three sheets) and angle joints using the hybrid method as well as the possibilities of combining the HLAW method with other methods.

J. Rykała – Use of Plasma Method Variants When Welding Sheets Made of Steel X6CrNi18-10

DOI: *10.17729/ebis.2017.1/2*

The article presents the course and results of tests aimed to identify the effect of the PAW (plasma welding) method variant (with cold wire and without the filler metal) or PPAW method (flux-cored) on the shape of the weld, the tensile strength and the aesthetics of butt joints made of 2.0, 4.0 and 6.0 mm thick sheets in steel X6CrNi18-10. The research involved bend tests, macro and microscopic metallographic tests as well as the tensile tests of joints. The tests revealed that the use of various variants of the plasma welding method enabled the obtainment of welded joints representing the same quality, yet varying significantly in terms of aesthetics and mechanical properties.

S. Stano, M. Różański, A. Grajcar – Effect of Braze Welding Process Parameters on the Structure and Mechanical Properties of Joints Made of Steel CPW 800. Part II: Laser Braze Welding

DOI: *10.17729/ebis.2017.1/3*

Presently, the reduction of the kerb weight of products is obtained by replacing previously used structural materials with new materials characterised by more favourable operating parameters. Significant mechanical properties of steels elements are primarily obtained through the precise heat treatment following cold rolling or, in cases of hot-rolled products, by using thermo-mechanical treatment. The problems related to the joining of the above-named materials using welding methods are connected with their high sensitivity to intense thermal cycles accompanying welding processes. The first part of the article presented the results of technological tests concerning the effect of arc braze welding processes. The second part of the article presents the effect of laser braze welding on the mechanical and structural properties of joints made of complex phase steel CPW 800.

Ł. Rakoczy, A. Zielińska-Lipiec, L. Tuz, T. Góral – Nd-YAG Laser Beam-Induced Liquation Cracking in Selected Nickel-Based Superalloys

DOI: *10.17729/ebis.2017.1/4*

MAR-M247 and Rene 77 belong to intermetallic phase $Ni_3(Al, Ti)$ precipitation hardened nickel alloys widely used in the aerospace and power engineering industries. Because of their susceptibility to cracking, the above-named alloys are characterised by limited weldability. In the tests described in this article, the surfaces of the above-named superalloys were affected by a laser beam having identical parameters. Afterwards, the test results concerning the individual susceptibility to Nd-YAG laser beam-induced liquation cracking were compared. The stereoscopic microscopic observations revealed differences indicating the significantly greater

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crack susceptibility of superalloy MAR-M247. The characteristics of the materials indicated that the above differences were connected with the significantly more complex microstructure resulting from the segregation of alloying elements during crystallisation. The scanning microscopic examination revealed the presence of liquation cracks in the HAZ located along partially melted interdendritic areas.

T. B. Majdanczuk, W. M. Iljuszenko, A. N. Bondarenko – Effect of Modifying and Alloying Elements on the Structure and Properties of Surfaced Layers Made of High-Tin Bronze

DOI: *10.17729/ebis.2017.1/5*

The article discusses the effect of some modifying and alloying elements on the structural, mechanical and operational properties of high-tin bronze used for the submerged arc surfacing of steels. The research-related tests enabled the determination of optimum contents of the above-named elements ensuring the improvement of mechanical and operational properties through changes in the shape and structural constituent dimensions of the metal subjected to surfacing. In addition, the research revealed the favourable effect of a nickel addition (up to 2%) on the reduction of high-tin bronze penetration, on grain boundaries, in the steel base.

A. Sawicki – Integral Method Enabling the Determination of the Parameters of the Mayr and Generalised Mayr Models of Electric Arc Excited in the Circuit Using the Sinusoidal Current Source

DOI: *10.17729/ebis.2017.1/6*

The article presents the primary properties of the Mayr mathematical models, the generalised Mayr model and the Pentegov model of electric arc as well as indicates the limited possibilities of the Mayr model in the accurate representation of arc dynamic characteristics in areas where current passes through the zero. The above-named difficulties can be eliminated using the generalised Mayr model. The article describes an integral method enabling the experimental identification of parameters of the generalised Mayr model and of the Mayr model of arc powered by a source having a sinusoidal wave. The above-named method was verified numerically by simulating processes in a simple electric circuit with macromodels of undisturbed arc.

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