ISSN 2300-1674

BIULETYN
INSTYTUTU SPAWALNICTWA

No. 2/2018

INSTITUTE OF WELDING BULLETIN

BIULETYN INSTYTUTU SPAWALNICTWA

No. 2 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

M. St. Węglowski – Ultrasonic Tests of FSW Joints of Thicknesses Below 8 mm

DOI: *10.17729/ebis.2018.2/1*

The article presents results of ultrasonic tests concerning 6 mm thick FSW joints made of aluminium grade 2017. The tests were performed using joints with artificial post-weld welding imperfections and joints characterised by internal imperfections. The test results revealed that the use of the ultrasonic technique enabled assessments of the quality of 6 mm FSW joints. However, it should be noted that the characteristic geometry of welded joints made using the above-named method is responsible for the fact that an ultrasonic wave undergoes transformation, reflection and damping after entering a tested object. In addition, it is necessary to use specialist tandem-type probes applied when testing thin-walled elements.

M. Restecka, R. Wolniak – Comparison of Costs and Efficiency of MAG Manual and Robotic Welding for Quality and Social Factors

DOI: *10.17729/ebis.2018.2/2*

The article is concerned with the implementation of robotic welding processes taking into consideration economic, quality-related and social factors. The robotisation of welding processes has been and ongoing process in the global market for many years, yet social and economic factors, particularly in Poland, continue to be responsible for a relatively small number of robotic welding implementations. The study presents the comparative analysis related to welding costs and efficiency.

K. Pańcikiewicz – Assessing the Susceptibility of Welded Joints to Cold Cracking in the CTS Test

DOI: *10.17729/ebis.2018.2/3*

The article presents the CTS tests used when assessing the susceptibility of welded joints to cold cracking as well as test results related to steel 7CrMoVTiB10-10. The research work involved macro and microscopic metallographic tests performed using light and scanning electron microscopy. The macro and microscopic metallographic tests were used to assess the nature of cracking. It was demonstrated than an increase in thermal intensity was accompanied by an increase in the average length of cold cracks.

A. Kiszka, A. Czupryński, E. Baszczyńska – Effect of Shielding-Gas Nitrogen Content on the Properties of TIG and A-TIG Orbital-Welded Tubular Joints Made of Duplex Steel

DOI: *10.17729/ebis.2018.2/4*

The article discusses tests results concerning the joining of duplex steel pipes performed using the TIG and A-TIG (with the addition of activating flux) orbital welding technology. The shielding gas used in related tests contained pure argon as well as argon with an addition of nitrogen. Technological welding tests were performed using a closed head without the feeding of a filler metal. The research work included visual and penetrant tests as well as macro and microscopic observations and ferrite meter-aided measurements of the ferrite content in welds.

L.I. Markaszowa, W.D. Poznjakow, E.N. Berdnikowa – Effect of Welding Parameters on the Structure, Mechanical Properties and Crack Resistance of Welded Joints Made of Steel 14HGN2MDAFB

DOI: *10.17729/ebis.2018.2/5*

The article presents test results concerning the structure and the phase composition of the

weld and HAZ metal of welded joints made of high yield point (above 700 MPa) steel 14HGN2MDAFB using the mechanised welding method. The tests involved the analytical assessment of the effect of structural parameters on the mechanical properties (R_e, K^*_{1c}) of welded joints as well as the determination of the role of structural factors (phase composition, grain structure, subgrain structure and dislocation) in terms of changes in local internal stresses (τ_j), i.e. crack formation concentrators. The tests enabled the identification of optimum technological conditions ensuring the obtainment of high quality and reliable welded joints of structures characterised by high mechanical properties and crack resistance.

P. Prochenka, K. Makowska, J. Janiszewski – Assessment of Mechanical Properties of Laser Beam Welded Joints Made of Steel Strenx S700MC Subjected to High Impact Load

DOI: *10.17729/ebis.2018.2/6*

The article assesses the strength and ductility of laser welded joints made of steel Strenx S700MC. The assessment was based on tests results concerning the material structure, hardness as well as quasi-static and dynamic tensile tests. The dynamic tests were performed using the tensile split Hopkinson pressure bar technique and strain rates of 10^3 s^{-1}. The obtained results revealed that the strength of joints under quasi-static and dynamic tensile test conditions were high and similar, yet their ductility significantly deteriorated under the impact load.

A. V. Moltasov, I. N. Kloczkov, S. I. Motrunicz, V. V. Veruszkin – Effect of Plastic Strains in the Shunting Zone on Force Parameters in the Butt Welding of Chain Links

DOI: *10.17729/ebis.2018.2/7*

The article presents the development of a method enabling the calculation of force necessary to bend a chain link during butt welding, taking into consideration a plastic strain in the shunting zone. The study also discusses technological peculiarities concerned with the welding of singe-contact chain links characterised by high bending rigidity and describes principles of the elastic-plastic strain of chain link shunting zone during bending. The work also contains the theoretical justification of the possibility of calculating the value of bending force based on the ultimate limit state and presents an analytical formula identifying the mathematical correlation between ultimate force, geometrical parameters and physico-chemical properties of the welded chain link material. Using an anchor chain as an example, the above-named analytical formula and the Finite Element Method were used to calculate the value of bending force, thereby confirming the reliability of the proposed method. It was ascertained that taking plastic strains into consideration significantly affected calculations results concerning the value of bending force during the butt welding of products having a closed shape and characterised by significant bending rigidity. The value of bending force calculated on the basis of the ideal elasticity of the anchor chain link material was higher (by more than an order of magnitude) than the value of the above-named force calculated taking into consideration plastic strains in the chain shunting zone.

Biuletyn Instytutu Spawalnictwa
ISSN 2300-1674

Publisher:
Instytut Spawalnictwa (The Institute of Welding)

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