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INSTITUTE OF WELDING

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Summaries of the articles

M. Łomozik, E. Turyk – Mechanical Properties of Welded Joints in Steel S1100QL after Multiple Repair Welding

DOI: *10.17729/ebis.2018.3/1*

The article presents the use of high-strength toughened steels in various industries and the chronological development of various grades of the above-named steels. In addition, the article discusses the repair of defective fragments of welded joints by means of grinding, grooving or machine cutting followed by the making of a repair weld. Occasionally, the repair process must be repeated or performed many times. An issue of particular importance is the repair welding of steels having a yield point of above 700 MPa. Typically, in structures made of high-strength steels the process of repair consist in the removing of an imperfection (primarily having the form of cracks or porosity) followed by the making of another joint in the area of the previously removed imperfection. The tests described in the article were concerned with flat butt joints made of 18 mm thick toughened steel S1100QL using the MAG method and metallic flux-cored wire grade STEIN-MEGAFIL 1100 M (process 138). The tests involved the making of three welded joints, i.e. one production joint and two joints subsequently subjected to three and four-fold repair welding. In addition, the article presents the methodology and results of transverse tensile tests, transverse bend tests, impact strength tests and hardness tests.

Z. Mirski, T. Wojdat, A. Margielewska – Braze Welding of Dissimilar Materials

DOI: *10.17729/ebis.2018.3/2*

The article presents issues related to the braze welding process, discusses primary methods applied in industry as well as indicates characteristic features of the process, discusses the structure of joints most commonly used in industry and advanced braze welding methods enabling the obtainment of joints satisfying strict quality requirements. In addition, the article assesses the possibility of using the braze welding technology when repairing casts made of various casting alloys, discusses application areas for braze welded joints of materials characterised by different mechanical and physicochemical properties as well as presents metallographic and mechanical test results concerning brazed welded joints made using a robotic CMT (Cold Metal Transfer) braze welding station.

M. St. Węglowski, J. Marcisz, B. Garbarz – Technological Properties and Applications of High-Carbon Nanobainitic Steels

DOI: *10.17729/ebis.2018.3/3*

Steels belong to the most popular structural materials. Depending on their chemical compositions and applied heat or thermo-mechanical treatment, steels are characterised by various microstructures as well as diverse mechanical and functional properties. Recent years have seen the significant development related to the design of chemical compositions and manufacturing technologies used in the production of nanostructural steels. The article describes the methods used when manufacturing nanostructural steels and presents characteristics of selected i.e. high-strength nanobainitic steels in terms of their microstructure as well as mechanical and functional properties. The second part of the article is concerned with the present and prospective applications of nanobainitic steel products as well as summarises information found in related reference publications regarding the above-named steels.

J. Górka, M. Żuk – MMA Repair Welding of Nodular Cast Iron GJS 350-22

DOI: *10.17729/ebis.2018.3/4*

The article presents results of the MMA repair welding of nodular cast iron GJS 350-22. Casting defects were simulated mechanically (through milling), whereas repair welding was performed using selected filler metals (low-carbon filler metal, austenitic filler metal, Monel alloy and nickel alloy) and the manual metal arc welding method (MMAW). Test welds were subjected to visual, penetrant, macro and microscopic tests as well as hardness measurements and were compared in terms of the colour with that of the base material. The tests made it possible to identify the effect of the repair welding process on structural changes in the HAZ area and the susceptibility to crack generation both in the HAZ and in the weld. The tests also enabled the determination of structures of repair welds and their usability when repairing iron casts. The hardness measurements confirmed effects related to structural changes triggered by repair welding in the HAZ and in the weld. In turn, the comparative tests concerning the colour of the weld and that of the repaired cast iron enabled the selection of a filler metal satisfying the above-named criterion. The tests revealed that the highest properties of the repair weld in terms of structural changes were obtained using nickel-based filler metals.

R. Krawczyk - Evaluation of the Effectiveness of High-Density Couplants in Ultrasonic Tests

DOI: *10.17729/ebis.2018.3/5*

The article presents the analysis of the effectiveness of acoustic feedback required in ultrasonic contact tests. The analysis included high-density couplants, the use of which aimed to provide the most effective transfer of the beam of ultrasonic waves from the probe to an element subjected to an ultrasonic test. The tests involved the use of standard specimens nos. 1 and 2 and special steel specimens having various test surfaces. The tests were performed using a normal probe emitting longitudinal waves and an angle probe emitting transverse waves.

J. Pikuła, M. St. Węglowski, J. Dworak, G. Ziobro, A. Szafron – FEM-Based Numerical Analysis of the Laser Welding of Air Conditioner Components

DOI: *10.17729/ebis.2018.3/6*

The article presents the FEM-based numerical model of the laser beam welding process. The modelling aimed to identify the effect of technological conditions of the laser welding of elements on the heating dynamics and the maximum temperature of elements being joined. The numerical modelling was performed using the SYSWELD software programme. The elements to be joined were a connector and a ring-like crimped conduit made of corrosion resistant steel grade 316L and 304.

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