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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, K. Krasnowski – Increase in the Fatigue Strength of Aluminium Alloy Welded Joints through the Friction Processing of the Joint Surface

DOI: *10.17729/ebis.2020.1/1*

Increasingly high requirements concerning welded structures made of aluminium alloys trigger the issue of fatigue strength. Previous tests have indicated that the fatigue strength of FSW joints is higher than that of, e.g. MIG-welded joints. However, it should be noted that the use of the FSW technology may sometimes be limited or impossible. One of the methods enabling an increase in the fatigue strength of arc welded joints includes the treatment of the joint surface. The study presents results of the friction stir processing (FSP) of MIG-welded joints made of aluminium alloy EN AW-6082 and the effect of the aforesaid technique on the fatigue strength of the joints. The tests revealed that the use of the FSP method makes it possible to increase the fatigue strength of butt welded joints by approximately 50%.

T. Krakowski, H. Ruta, M. Roskosz – Application of the Magnetic Method in the Diagnostics of Wire Ropes at Tapered Sockets

DOI: *10.17729/ebis.2020.1/2*

Presently used magnetic methods for testing wire ropes leave an untested rope section located in the direct vicinity of a tapered socket. However, the aforesaid area may contain damage resulting from existing stresses and wear processes. The article discusses results of a study concerned with diagnostic equipment enabling the assessment of the above-named area in terms of its technical condition as well as presents results of the FEM-based numerical analysis of a magnetisation system and laboratory test results concerning a rope containing simulated damage.

S. Stano, R. Anioł – Applicability of Laser Welding in the Joining of Cast Elements of the Combustion Engine Manifold and Turbine. Part 1. Laser Welding of the Turbine with the Compensating Capsule

DOI: *10.17729/ebis.2020.1/3*

The article presents attempts related to the laser welding of combustion engine manifold and turbine. The study discussed in the article made it possible to identify the potential and limitations connected with the application of laser welding technologies, workmanship accuracy and the positioning of elements to be welded. The study-related tests enabled the assessment of the effect of primary welding parameters on the shape of the weld both in terms of keyhole and melt-in welding processes. The first part of the research-related article discusses results concerning the laser welding of the turbine with the compensating capsule.

M. Roskosz, J. Kwaśniewski, R. Bogacz – Preliminary Study of the Effect of Remanence on Changes of the Residual Magnetic Field during Tension

DOI: *10.17729/ebis.2020.1/4*

The development of the application of the residual magnetic field (RMF) (measured on the surface of the ferromagnetic object) as a diagnostic signal involved the analysis of the effect of initial remanence on changes of the RMF during tension. Test plate specimens made of steel P91 (X10CrMoVNb9-1) in various as-delivered states were subjected to increasing active tensile stress. The test results revealed the significant effect of the condition of microstructure and initial remanence on the process and the final values of the RMF.

A. Sawicki – Mathematical Differential and Integral Models in the Macromodelling of Electric Arc Using Voltage and Current Controlled Sources Part 2. Selected Mathematical Arc Macromodels with Explicitly Defined Current and Voltage Characteristics

DOI: *10.17729/ebis.2020.1/5*

The article justifies the application of explicitly defined static current and voltage characteristics in mathematical models of dynamic electric arc. The study involved the use of the generalised function approximating the above-named characteristics to create the differential and integral forms of the Novikov-Schellhase, Pentegov and Mayr-Pentegov mathematical models. Macromodels of arc were developed using the differential form of mathematical models and controlled voltage sources as well as using the integral form of models and controlled current sources. The effectiveness of macromodels was verified by means of simulations of processes in circuits with electric arc.

K. Kudła, K. Wojsyk, M. Gucwa – Mechanical Properties and Other Characteristics of Ultrasonic Welded Joints in Absorbers of Solar Panels in Respect of Performance Requirements

DOI: *10.17729/ebis.2020.1/6*

The study presents the geometry as well as results of the peeling, shearing and metallographic tests of copper and aluminium welded joints used in the absorber panels of flat solar collectors. The article discusses desired characteristics and mechanical properties of ultrasonic welded joints and compares the latter with laser welded joints. In addition, the study indicates prospective implementation areas of ultrasonic welding technologies.

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