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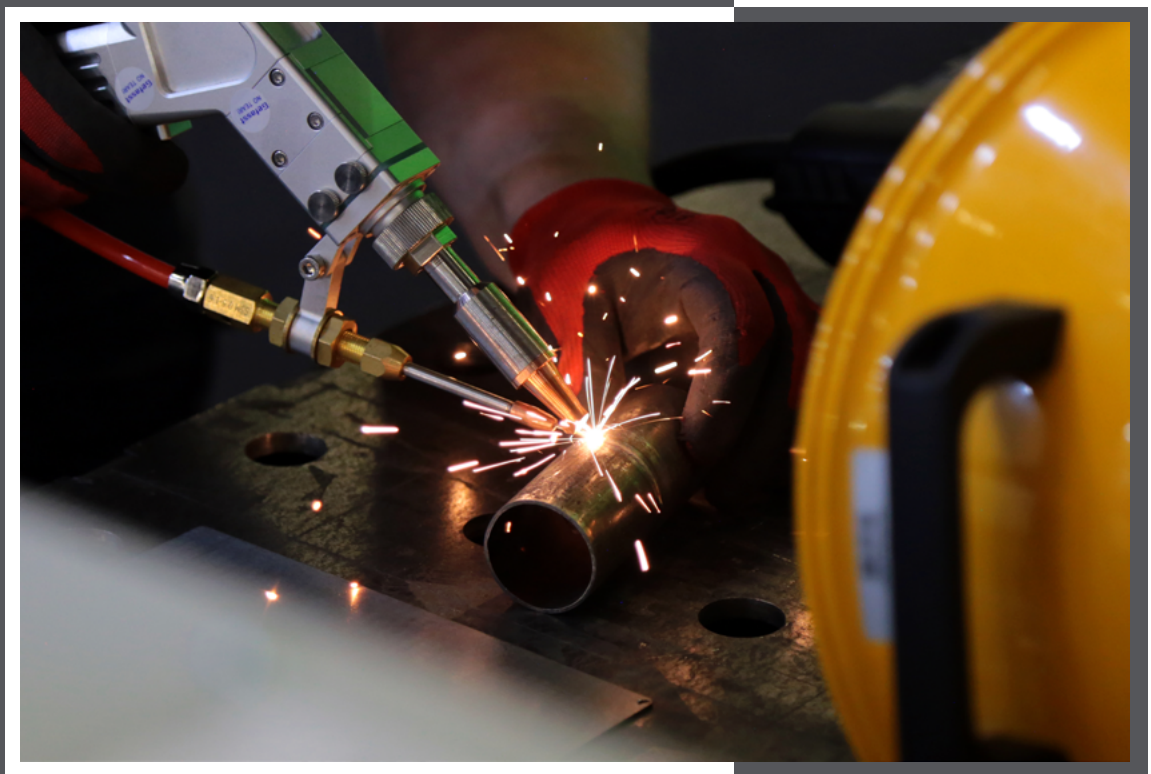

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ŁUKASIEWICZ – INSTITUTE OF WELDING

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

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Summaries of the articles

Jacek Górka, Monika Kciuk, Sebastian Stano, Szymon Domżal – Assessment of the Corrosion Resistance and the Mechanical Properties of Laser Welded Joints Made of Steel DOCOL 1200M

DOI: 10.17729/ebis.2022.2/1

The article presents test results concerning the corrosion resistance of laser beam welded joints made of steel Docol 1200m. The thickness of the joints subjected to the tests amounted to 1.8 mm. The joints were welded in the flat position (PA), without the use of the filler metal; the linear welding energy was restricted within the range of 25 J/mm to 55 J/mm. The non-destructive tests revealed that the joints represented quality level B in accordance with the ISO 13919 standard. The results of mechanical tests demonstrated the possibility of obtaining joints, the strength of which equalled that of the base material, which is unobtainable when welding such high strength steel (1200 MPa) using arc welding. The corrosion resistance tests were performed using the gravimetric method in alkaline, inert and acidic environments (0.1 M solution of sodium hydroxide (NaOH), the 3.5% solution of sodium chloride (NaCl) and the 0.1 M solution of sulphuric acid (VI) (H_2SO_4)). The material subjected to analysis was characterised by varied corrosion resistance, resulting from the test environments. The test joints contained various forms of corrosion-triggered damage including cracks, pits, swells and material losses. The above-presented corrosion resistance tests revealed that welded joints made of steel Docol 1200m were characterised by the highest corrosion resistance in the alkaline solution and the lowest corrosion resistance in the acidic solution.

Sylwester Chłopek, Grzegorz Michta – Strength Analysis of Dissimilar Adhesive-Bonded Joints

DOI: 10.17729/ebis.2022.2/2

The article discusses aspects related to material surface engineering and the strength of adhesive-bonded joints as well as presents results concerning the surface wetting angle and the free surface energy of steel S335, aluminium alloy AW7075 (T6) and the CFRP composite material in relation to three surface treatment conditions. The authors emphasize that surface preparation is of key importance as regards the obtainment of potentially high-strength joints. The article also discusses results concerning the roughness of the surface of the steel and the aluminium alloy in relation to various grades of abrasive paper granularity. The final part of the article presents test results concerning the shear strength of dissimilar adhesive-bonded joints (i.e. steel S335 – CFRP composite and aluminium alloy AW 7075 (T6) – CFRP composite) and discusses related images of ruptured joints.

Tomasz Poloczek, Waldemar Kwaśny, Artur Czupryński – The Effect of the Remelting and Laser Surface Alloying of Titanium Grade 5 (Ti6-Al-4V) on Erosive Wear Resistance

DOI: 10.17729/ebis.2022.2/3

The article presents the effect of the remelting and alloying of titanium grade 5 (Ti6-Al-4V) on erosive wear resistance (in accordance with the ASTM G76-04 standard). The study involved tests concerning the effect of graphite on the in-situ synthesis of titanium carbide during alloying performed using a Trudisk 3302 disk laser. The study also involved hardness measurements of individual beads as well as macro

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and microscopic tests. The tests involving the use of a Phenom World PRO scanning electron microscope provided with an EDS analyser as well as the X-ray phase analysis revealed the possible synthesis of titanium carbide during the laser alloying of the titanium surface with graphite. The erosive wear resistance of beads reinforced with composite particles was higher than that of the material in the as-received state, yet lower than that of the material remelted without the use of the alloying material.

Ryszard Krawczyk, Jacek Słania – Analysis of Surface Quality after Oxygen Cutting

DOI: *10.17729/ebis.2022.2/4*

The article discusses tests concerning surface quality after the oxygen cutting of steel plates of various thicknesses. The study involved visual tests, macro and microscopic metallographic tests as well as hardness measurements and the identification of hardness distribution in the cut zone and in the heat affected zone.

Antoni Sawicki – Modelling of Electric Processes in Circuits of Arc Plasma Torches, Part 1. Approximations of Static Characteristics of Arc Plasma Torches

DOI: *10.17729/ebis.2022.2/5*

The article discusses selected structural and operational properties of DC and AC arc plasma torches. References cited in the article contain generalised analytical expressions identifying experimental current-voltage characteristics of typical arc plasma torches. Values of coefficients in formulas approximating static current-voltage characteristics depend not only on the type and the polarity of the plasma torch but also on values of criterial factors. The study discusses separately DC plasma torches and single-phase AC plasma torches.

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