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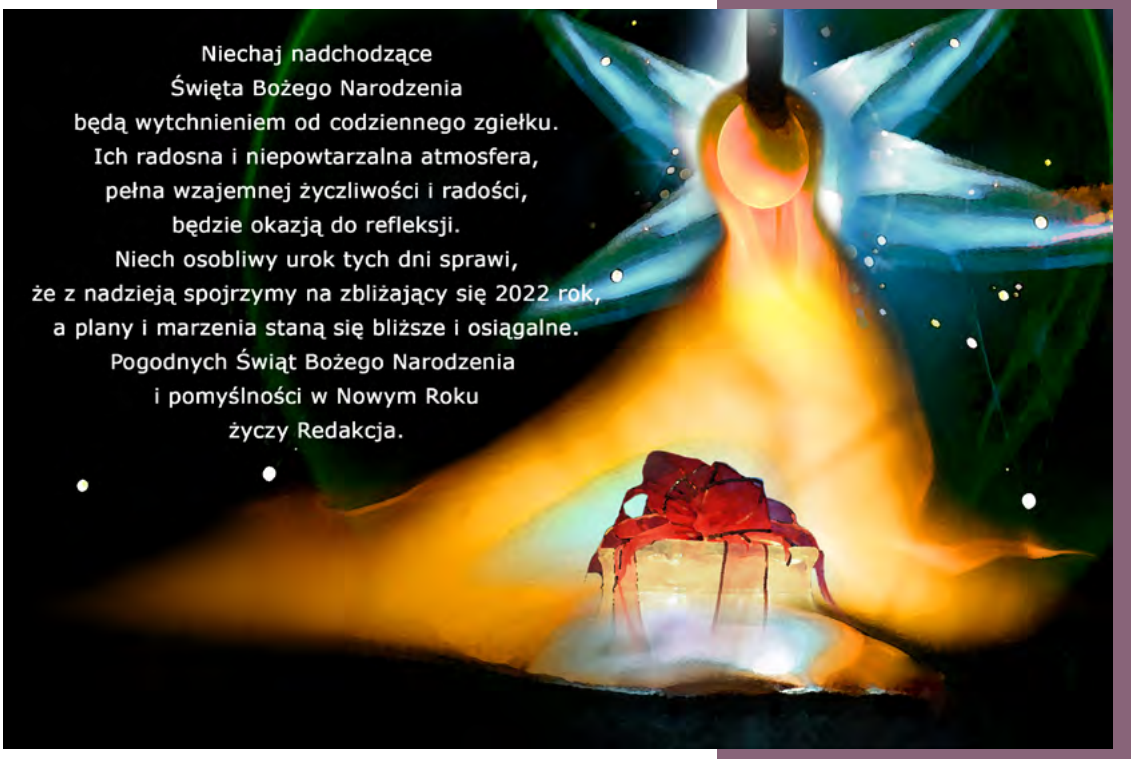

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CONTENTS

ŁUKASIEWICZ – INSTITUTE OF WELDING

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

Tomasz Pfeifer – Plasma Welding of Thermo-Mechanically Processed Steel

The article presents the course and results of tests involving the technological plasma welding of 3 mm thick butt joints made of steel S700MC using the melt-in welding technique and the key-hole welding technique. The technological tests made it possible to determine parameters enabling the obtainment of joints representing quality level B in accordance with the PN-EN ISO 5817:2014 standard. The tests discussed in the article included tensile tests, bend tests, hardness tests as well as macro and microscopic metallographic tests involving the use of light microscopy. The test results were subjected to detailed analysis performed to identify the effect of high arc energy used in plasma welding on the structure and properties of the test joints. The test results revealed that the key-hole welding technique (characteristic of the TIG method) did not ensure the obtainment of minimum tensile strength.

Mirosław Łomozik – Microstructure, Toughness and Hardness of the Simulated HAZ Area of Steel S1300QL

The introduction contains information (found in available reference publications) concerning the weldability of steel S1300QL. The introduction also presents general information concerning the effect of the microstructure and the chemical composition of filler metals used in the welding of high-strength steels on the mechanical properties of weld deposit. The subject of simulation tests (discussed in the article) was structural steel S1300QL having a yield point of more than 900 MPa S1300QL. Simulations involved both single (Tmax = 1250°C) and double welding thermal cycles (Tmax = 1250°C + 600°C, Tmax = 1250°C + 760°C and Tmax = 1250°C + 900°C) as well as cooling times t8/5 = 3 s, 5 s and 10 s. Specimens with simulated HAZ areas were subjected to impact strength tests performed at a temperature of -40°C and +20°C, Vickers hardness tests (HV10) and microscopic metallographic tests involving the use of light microscopy. The test results are presented in related diagrams and photographs. The final part of the article contains a discussion concerning test results and concluding remarks. The tests revealed that, in terms of the test steel, the number of repetitions of thermal cycles having pre-set parameters did not explicitly translated into changes of impact energy values concerning the simulated HAZ areas. The tests also revealed that recommended thermal cycles making it possible to obtain the required combination of the high toughness and hardness of the simulated HAZ area of steel S1300QL (similar to that of the base material) were double thermal cycles of maximum temperature Tmax1 = 1250°C + Tmax2 = 600°C and Tmax1 = 1250°C + Tmax2 = 900°C combined with cooling times t8/5 = 5 s and 10 s and all numbers of repeated thermal cycles.

Wioleta Rakowska, Aleksander Gwiazda – The Use of an Ishikawa Diagram in the Assessment of the Quality of the TIG Manual Welding Process

The article aims to present the practical use of an Ishikawa diagram in the quality management concerning a selected welding process. The first part of the study describes the TIG welding process and discusses the characteristic of a selected tool. The following part presents the Ishikawa diagram and the division into individual groups of elementary reasons in relation to the welding process subjected to analysis.

Denis Sacha – Microstructural Tests and Hardness of Surface Layers of Nodular Cast Iron GJS-350 Made Using the Laser Surface Alloying Process

The article presents test results concerning the microstructure and the hardness of a composite layer made on a substrate of nodular cast iron GJS-350 using the laser surface alloying method. The alloying agent used in the test was powdered titanium. The study consists of an overview of reference publications aimed to introduce the most important aspects concerning the issue subjected to analysis. The research part presents the methodology of tests as well as their results and analysis. Microscopic analysis revealed that the layer structure was fine-grained and highly homogenous, whereas hardness measurements revealed that the titanium-enriched layer was characterised by significantly higher micro-hardness than that of the base material.

Antoni Sawicki – Diagnostics of Electric Arc for the Development of Universal Mathematical Models

The article presents universal mathematical static current-voltage characteristics-based models of electric arc and indicates primary issues concerned with arc diagnostics related to the determination of the above-named models. Particular attention was paid to the experimental determination of AC-powered arc voltage. Diagnostics-related purposes involved the use of bridge systems with one or two sources of current. Computer-aided simulations involving sinusoidal and trapezoidal current-based excitations made it possible to demonstrate the possibility of obtaining minimum values of bridge unbalance voltage. Such a condition indicated the proper determination of AC-powered arc ignition voltage.

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