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CONTENTS

INSTITUTE OF WELDING

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Summaries of the articles

M. St. Węglowski – Concrete-Reinforcement Bars Made of Corrosion-Resistant Steel

DOI: 10.17729/ebis.2019.3/1

The making of building structures entails the use of concrete-reinforcement bars (also known as rebars). Elements made of reinforced concrete have proved their unquestionable usability. However, in certain cases, the traditional approach involving the use of ribbed bars made of unalloyed steels fails to provide desirable results. The extension of the service life of structures exposed to seawater or road salt is possible through the use of concrete-reinforcement bars made of corrosion-resistant steels. The study presents mechanisms triggering the corrosion of structures made of reinforced concrete, corrosion-resistant steels used in the fabrication of reinforcement bars and exemplary applications of the above-named bars.

T. Poloczek, A. Czupryński – The Analysis of the Abrasive and Erosive Wear Resistance of Abrasion-Resistant Sheets

DOI: 10.17729/ebis.2019.3/2

The article presents results of tests concerning the assessment of the abrasive and erosive wear of abrasion-resistant plates fabricated by Polish and overseas manufacturers. Materials used in the tests, i.e. the Castolin CDP® 1001, CDP® 4666 and CeraMetal® HCCr plates were made using the automated arc welding technology. Reference materials used in the tests were both Polish and overseas abrasion-resistant plates. The analysis of the results of hardness tests performed in accordance with PN-EN ISO 6508-1:2016 as well as of the results of abrasive and erosive wear tests performed in accordance with ASTM G65-00 and ASTM G76-04 enabled the indication of materials characterised by the most favourable functional properties enabling operation under conditions of intense metal-mineral abrasive wear.

Ł. Szczepański, W. Pilarczyk, A. Ambroziak – Characteristics of Titanium Alloys used in the SLM Additive Technology

DOI: 10.17729/ebis.2019.3/3

The article presents an overview of titanium alloys presently used in the Selective Laser Melting (SLM) technology. In the article, particular attention is paid to obtained strength properties and structural transformations of materials used in the tests. The article also presents the application potential of individual alloys and discusses the SLM additive technology.

A. N. Alimov – Selection of Electrode Wires. Primary Features Affecting the Quality of Electrode Wires

DOI: 10.17729/ebis.2019.3/4

The article discusses factors affecting the technological and welding properties of electrode wires, indicates the difference in surface quality between a copper plated wire and a wire not subjected to copper plating as well as presents wire-related non-standardised quality criteria applied by wire manufacturers and packaging (reels, drums, mass packages).

A. P. Woronczuk, A. P. Żudra – Flux-Cored Strips; the Deposition and Application Range of Abrasion-Resistant Layers

DOI: 10.17729/ebis.2019.3/5

The article presents the structure and chemical composition of flux-cored electrode strips used for the deposition of abrasion-resistant layers involving the use of non-submerged arc and flux, analyses technologies used during the surfacing involving the use of flux-cored strips as well as presents exemplary applications, related

welding (surfacing) equipment and advantages resulting from the use of the above-named filler metals.

I. Lyasota, Ł. Sarniak, P. Kustra – Assessing the Condition of the Material of Pressure Vessel after Their Long-Lasting Operation in the Petrochemical Industry Using Non-Destructive Acoustic Methods and Structural Stress Field Analysis

DOI: *10.17729/ebis.2019.3/6*

The article discusses complex tests of an actual pressure vessel after its long-lasting operation in a petroleum distillation system. As a result of exposure to extreme conditions, the structural material of the vessel degraded and corroded significantly. The corrosion damage was identified and imaged using a Phased Array technique-based ultrasonic method. The subsequent stage of investigation involved hydraulic tests and the recording of acoustic emission signals. Stress concentration fields in damaged areas were identified using the FEM-based simulation method. The test results will be used to develop the complex methodology enabling the evaluation of the technical condition of pressure vessels used in the petrochemical industry. The above-named objective constitutes the primary goal of Programme LEADER VII, funded by the National Centre for Research and Development.

A. Pocica – The Development of TIG Welding

DOI: *10.17729/ebis.2019.3/7*

The article discusses the development of inert gas-shielded welding using a non-consumable electrode (TIG welding), outlines the history of shielding gases and tungsten electrodes, presents the primary accomplishments and patents related to the evolution of the TIG method worldwide and describes the first welding equipment produced in Poland and the attempted use of the TIG method.

A. Sawicki – Modelling the Effect of External Disturbances in Static Characteristics of Unspecified and Determined Ignition Voltages on Dynamic Characteristics of Arc in a Circuit with Current Excitation. Part. 2. Simulation Test Results

DOI: *10.17729/ebis.2019.3/8*

The mapping of nonlinear current-voltage characteristics of static arc with unspecified and determined ignition voltage involved the use of approximation functions (various modifications of the Ayrton and Nottingham equations). In addition, parameters of the above-named functions (power, voltage, resistance) depended on one selected disturbing parameter (length, gas mass stream, gas pressure). To this end, approximations based on power functions were used. The simulation of processes in circuits with forced sinusoidal current and electric arc involved the use of the Pentegov mathematical model. Selected parameters of created models were disturbed using specific rates of change. The study demonstrates the effectiveness of applied approximations in the form of voltage-current characteristics of dynamic arc.

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