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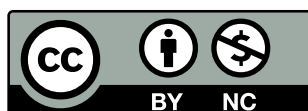
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INSTITUTE OF WELDING

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## Summaries of the articles

### **T. Pfeifer, B. Czwórnóg – The Effect of Plasma Surfacing Parameters on the Geometry and Structure of Overlay Welds**

DOI: [10.17729/ebis.2015.4/1](https://doi.org/10.17729/ebis.2015.4/1)

The article presents the course and results of tests concerning plasma-powder surfacing of steels used in the power sector. The tests, involving the use of Inconel 625 alloy-based powder, aimed to determine the effect of process variables on overlay weld geometry, penetration depth and overlay weld-parent metal stirring degree. The article presents the results of metallographic examinations obtained by light microscopy, including the structure of overlay welds and Heat Affected Zone as well as the hardness distribution in overlay welds and Heat Affected Zone.

### **A. Lisiecki, A. Majowski, T. Gorzelik, J. Jarek, P. Gorzela, A. Kurc-Lisiecka – Controlling the Quality and Life of Briquetting Machine MMA Surfaced Working Elements in the Process of Steel Briquette Manufacturing**

DOI: [10.17729/ebis.2015.4/2](https://doi.org/10.17729/ebis.2015.4/2)

The article presents the results of a study dedicated to the selection of covered electrodes applied for the surfacing of briquetting machine working elements used in the production of briquettes made of fine-grained steel scrap. The analysis of operating conditions and wear mechanisms affecting surfaces of working elements enabled the preliminary selection of four types of covered electrodes used for the surfacing of wear-resistant surfaces. The tests involved structural and chemical composition analyses, microhardness measurements and the analysis of operational properties, particularly of metal-metal abrasive wear in relation to electrode weld deposits. The selection of electrodes, whose weld deposit provides the

highest resistance to metal-metal abrasive wear were followed by operational tests of briquetting machine surfaced elements in real production conditions. The tests have revealed that the surfacing of the surfaces of briquetting machine work elements by means of EC 4119 covered electrodes extends the service life of these elements four times if compared with the life of original working elements made of tool steel intended for cold operation.

### **M. Slováček, T. Kik – Use of Welding Process Numerical Analyses as Technical Support in Industry. Part 1: Introduction to Welding Process Numerical Simulations**

DOI: [10.17729/ebis.2015.4/3](https://doi.org/10.17729/ebis.2015.4/3)

Welding, as a modern and highly efficient technology, is presently applied in practically all industrial sectors. An increase in the number of welding applications entails higher requirements related to the quality of welded joints. Numerical analyses enable welding process simulations whose results are very close to reality. The results of such analyses include distributions of temperature fields, metallurgical phases, hardness, plastic strains and stresses. The analysis of these quantities makes it possible to relatively optimise welding technologies and to obtain information about the behaviour of welded structures during the entire production process. Numerical simulations constitute very useful tools supporting production preparation processes and enabling the obtainment of high quality products. Presently, the most complex numerical simulation software programmes make up the package offered by the ESI Group including SYSWELD, PAM ASSEMBLY and WELD PLANNER. All these programmes utilise FEM-based calculations. This article is the first part of a cycle concerning the possibility of utilising numerical techniques in supporting

the design of technologies and structures using computer-aided simulations of welding processes and heat treatment.

### **O. K. Makowieckaja – Present Situation and Developmental Trends in the Global Market of Major Structural Materials and Welding Technique**

DOI: [10.17729/ebis.2015.4/4](https://doi.org/10.17729/ebis.2015.4/4)

The article presents the primary indicators reflecting the state of the global market of the most important structural materials and of welding technique in 2011-2014. The assessments performed by analytical companies and major producers of welding machines and materials were used to forecast the development of this market in the years to come.

### **R. Kaczmarek – Testing Echo Amplitude Changes in relation to an Ultrasonic Beam Angle of Incidence at a Flat-Bottomed Reflector**

DOI: [10.17729/ebis.2015.4/5](https://doi.org/10.17729/ebis.2015.4/5)

The article presents issues related to ultrasonic testing of welded joints and includes results of tests dedicated to the detectability of flat discontinuities depending on their orientation in relation to the ultrasonic beam axis. In the tests, flat discontinuities were constituted by circular flat-bottomed reflectors of DGS-45° standard having a diameter  $D_{DSR}=2$  mm. The tests were performed using a Phased Array transducer and a defectoscope with a Phased Array imaging package enabling the determination of echo amplitude for various beam insertion angle values. As a result, it was possible to obtain

the characteristics of a decibel echo drop depending on the beam angle of incidence on the flat-bottomed reflector in a range from the optimum to a disadvantageous value. The article includes a diagram “distance – amplification - beam angle of incidence on the reflector” enabling the determination of an echo amplitude drop accompanying the changes of angles at which the beam strikes a discontinuity by 5°, 10° and 15°.

### **A. Sawicki, M. Haltof – Metrological problems of experimental research welding devices.**

#### **Part 1. Errors and uncertainties in measuring current, voltage and power with application of hallotron sensors**

DOI: [10.17729/ebis.2015.4/6](https://doi.org/10.17729/ebis.2015.4/6)

The article describes the methodology used in calculating errors and uncertainty of current, voltage and power measurement channels containing Hall-effect sensors and digital measurement devices. The deliberations involved LEM-manufactured current and voltage transducers whose nominal ranges enable testing electrotechnological devices intended for welding-related applications. The recommendations of the International Organisation for Standardisation (ISO) were used to present universal dependences enabling various measurement uncertainties, i.e. absolute, relative, standard, complex and extended. For some specific cases related to the selection LEM-manufactured transducers, voltmeters or measurement cards connected to a computer, relative measurement uncertainties budgets were created.

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