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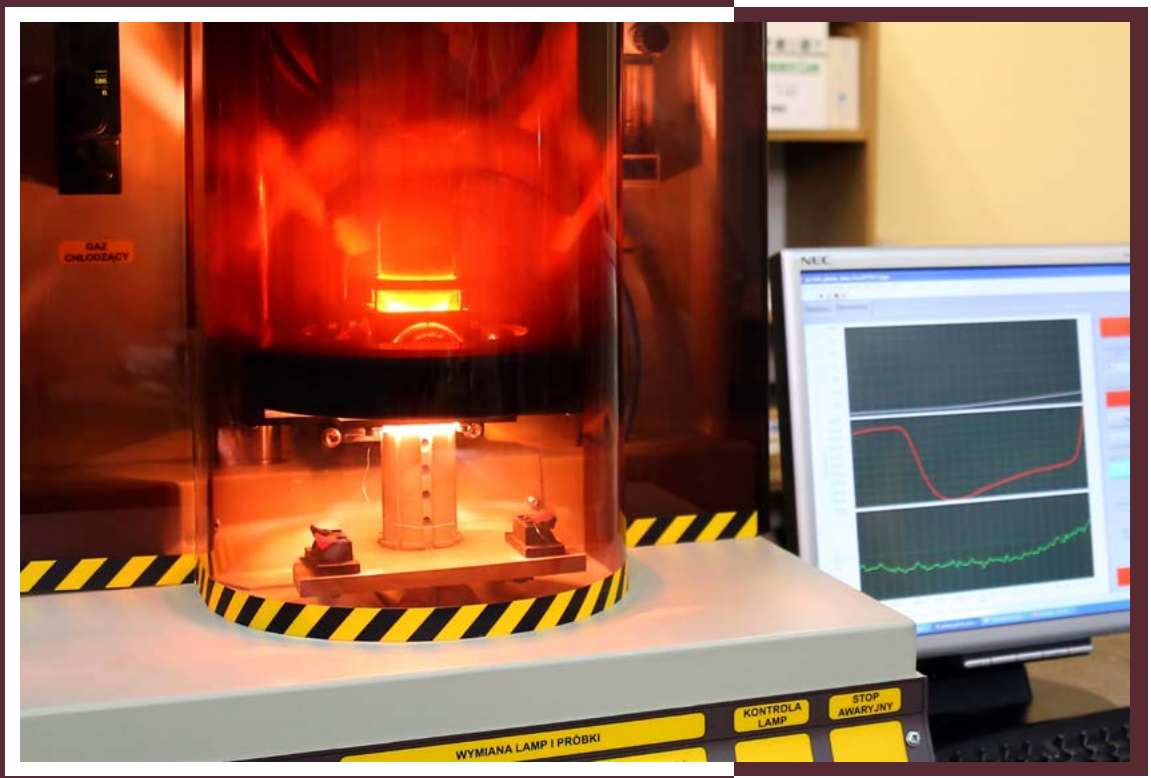

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INSTITUTE OF WELDING

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Summaries of the articles

J. Matusiak, J. Wyciślik, A. Pilarczyk – I-EcoWelding - Internet system of guidance supporting calculations of welding fumes emissions in welding and allied processes

DOI: *10.17729/ebis.2016.4/1*

The article presents a new tool for environmental analyses concerning pollutant emissions, i.e. the I-EcoWelding software programme. This Internet guidance system is an innovative tool supporting the decision-making related to health and safety in production processes and supporting calculations of pollutant emissions into work environment during welding and allied processes. The Internet guidance system helps determine emissions and compositions of welding fumes during fusion welding, resistance welding, vibration welding of thermoplastics, brazing as well as thermal gas and plasma cutting. In addition, the system enables calculating emissions in relation to the entire welding production of a given company, taking into consideration the duration of a technological process or the declared weight of filler metal used.

Z. Mikno, Sz. Kowieski, W. Zhang – Simulation and optimisation of resistance welding using the SORPAS® software programme

DOI: *10.17729/ebis.2016.4/2*

The implementation of new materials such as dual phase (DP) steels, TRIP steels (Transformation Induced Plasticity Steel) and aluminium alloys or joining more complex dissimilar materials (three sheets/plates) having various thicknesses and various chemical compositions pose serious challenges in terms of resistance welding technologies. The article presents the possibilities of the professional SORPAS® software programme used for simulating and optimising resistance welding processes. This software programme assesses the weldability of materials by simulating welding processes and forecasting the final result, including the size of the weld nugget. In addition, the software enables the optimisation of welding processes, the simulation of post-weld joint properties, the assessment of weld quality in terms of microstructural transformations, hardness distribution and strength in specific load conditions as well as makes it possible to determine the field of welding parameters. Available versions of the software are designated as 2D and 3D. The latter version enables the modelling of complex phenomena, e.g. shunting or multi-projection welding.

M. Restecka, R. Jachym – IT systems used for welding process simulations and simulators of thermal-strain cycles

DOI: *10.17729/ebis.2016.4/3*

The first part of the article presents an overview of software programmes assisting welding-related engineering works as well as discusses possibilities and advantages related to the use of such programmes. Software programmes available today enable, among other things, the monitoring of welding processes, calculations of temperature distribution, the determination of mechanical and plastic properties, simulations of distributions of residual stresses as well as simulations of transformations triggered by welding thermal cycles. The second part of the article is dedicated to simulators enabling physical simulations of welding processes as well as describes principles of simulations tests and presents advantages related to the use of this technique.

E. Turyk – Qualifying the technology of the aluminothermic welding of tramway rails on the basis of quality assurance system requirements in welding engineering

DOI: *10.17729/ebis.2016.4/4*

The article discusses the issue of demonstrating the correctness of a technology dedicated to the aluminothermic welding of tramway rails, recommends that the technology be qualified in accordance with standard PN-EN ISO 15613:2006 concerning the pre-production testing of technologies used when welding atypical joints, proposes the scope of qualification tests and presents test results concerning defective welded joints.

M. Różański, S. Stano, A. Grajcar – Laser welding and heat treatment of steel 0H15N7M2J

DOI: *10.17729/ebis.2016.4/5*

The article presents the results of tests concerning the mechanical and structural properties of single-spot and twin-spot laser beam welded joints made of a steel strip, the chemical composition of which corresponds to that of steel 0H15N7M2J. In addition, the article presents the comparison concerning the geometry of joints made using the single and twin-spot laser beam. The test joints were subjected to heat treatment involving austenitisation, cold treatment and ageing. The study also involved the comparison of the mechanical and structural properties of the joints subjected and those not subjected to the above named heat treatment.

R. Kaczmarek, K. Kaczmarek, J. Słania, R. Krawczyk - Performing of ultrasonic inspection using TOFD technique in terms of the requirements of related standards

DOI: *10.17729/ebis.2016.4/6*

The article concerns the time of flight diffraction testing technique (TOFD), which is, next to the simultaneous TOFD + Phased Array testing, one of the most effective methods of volumetric non-destructive tests. The article discusses the advantages of the TOFD technique as well as the basis of diffraction phenomenon and the formation of imaging signals. In addition, the article presents a TOFD image of a welded joint and describes its characteristic elements. Also, the article discusses the TOFD-related testing standards and analyses their requirements related to welded joints and their acceptance criterion, i.e. the quality level according to PN-EN ISO 5817. The target readers of the article include NDT personnel, inspectors, welding engineers and welding equipment manufacturers wishing to implement an effective tool enabling the detection of welding imperfections.

P. Irek, Ł. Rawicki, K. Kaczmarek – Dye penetrant testing of welded joints made of nickel and its alloys

DOI: *10.17729/ebis.2016.4/7*

The article presents tests involving natural cracks, including measurements of the width of cracks and the profile of their surface roughness. The investigation also involved tests performed in order to observe how a given factor affects development times in penetrant tests as well as to determine what time of development is recommended for nickel and its alloys in order to detect unacceptable welding imperfections (cracks). The article also discusses the effect of penetration times on the duration of development times and sizes of indications in penetrant tests.

R. Krawczyk, J. Kozłowski – Analysing the effect of changes in overlay weld geometry on test SEP 1390

DOI: *10.17729/ebis.2016.4/8*

The article presents issues related to the assessment of the weldability of thick-walled materials used when making welded steel structures. The article also discusses the analysis of test results based on the technological test concerning the weldability of thick-walled structural materials according to the guidelines of SEP 1390. The tests took into consideration the effect of the change in overlay weld geometry on the technological test, and, as a result, the final result of weldability assessment.

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