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INSTITUTE OF WELDING

The International Institute of Welding  
and The European Federation for Welding,  
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## Summaries of the articles

### **K. Madej, R. Jachym – Welding of High Strength Toughened Structural Steel S960QL**

DOI: [10.17729/ebis.2017.2/1](https://doi.org/10.17729/ebis.2017.2/1)

The article discusses the effect of the thermal conditions applied during the MAG welding of steel S960QL and the mutual annealing of runs on the mechanical properties as well as on the macro and microstructure of welded joints made using various values of cooling time  $t_{8/5}$ . The research described in the article also involved the comparison of the above-named results with those obtained during a thermal simulation. In addition, the article presents the test results concerning the examination of the coarse and fine-grained areas of the HAZ of welded joints. The test results made it possible to optimise the value of cooling time  $t_{8/5}$  when welding steel S960QL.

### **M. Banasik, M. Urbańczyk – Laser + MAG Hybrid Welding of T-Joints**

DOI: [10.17729/ebis.2017.2/2](https://doi.org/10.17729/ebis.2017.2/2)

The article presents the possibilities of the hybrid welding (laser + MAG) of T-joints, discusses primary technological conditions of the HLAW process as well as discusses the possibilities of using the HLAW method when making various types of T-joints in various configurations of interface preparation, joint positioning and laser beam-MAG welding torch alignment.

### **J. Czuchryj – Effect of Excessively Wide Welds on the Fatigue Service Life of Welded Joints**

DOI: [10.17729/ebis.2017.2/3](https://doi.org/10.17729/ebis.2017.2/3)

Many a time, welded joints contain a welding imperfection having the form of an excessively wide butt weld with reference number 5212 in PN-EN ISO 6520-1. The fact that the effect of the above-named imperfection on the service life of welded joints had not been identified

before inspired research aimed to fill the above-named gap. The study discusses the results of fatigue tests of welded joints having excessively wide welds and contains conclusions based on the test results. In general, the presence of welding imperfection 5212 in welded joints is highly undesirable.

### **S. Parzych – Results of Non-Destructive and Destructive Tests of Welded Joints Made of Heat-Resistant Cast Steel GX40NiCrSiNb35-25 in Welding Procedure Qualification**

DOI: [10.17729/ebis.2017.2/4](https://doi.org/10.17729/ebis.2017.2/4)

The article presents test results concerning the welding procedure qualification of the production welding of heat-resistant cast steel GX40NiCrSiNb35-25 (1.4852) performed using filler metal WZ 25 35 Zr according to PN-EN ISO 14343. The welding procedure qualification test was performed in accordance with PN-EN ISO 11970. The test joint made using the TIG method (141) was subjected to non-destructive and destructive tests enabling the identification of the mechanical properties of the joint. The test results satisfied the requirements contained in PN-EN ISO 11970 and constituted the basis enabling the preparation of a related welding procedure qualification report.

### **A. Sawicki – Hybrid Models of Electric Arc with Improved Dynamic Characteristics in Wide Ranges of Changes in Bipolar Current Value**

DOI: [10.17729/ebis.2017.2/5](https://doi.org/10.17729/ebis.2017.2/5)

The article discusses the limitations of the Mayr and Cassie linear models and of the Mayr generalized model accompanying the precise mapping of electric arc column within a wide range of changes in bipolar current. The research involved the development of new non-linear hybrid models of arc by the association of linear

and non-linear models, the creation of arc hybrid macromodels and the verification (utilising the MATLAB-Simulink software programme) of the efficiency of dynamic voltage-current characteristics through simulations of processes in a simple circuit with electric arc.

### **R. Kaczmarek – Joint Geometry Indications in Conventional Ultrasonic Tests and Phased Array Tests**

**DOI:** [10.17729/ebis.2017.2/6](https://doi.org/10.17729/ebis.2017.2/6)

The article presents issues concerning the formation of root geometry indications in conventional ultrasonic tests and in the Phased Array tests. In addition, the article describes the manner enabling the verification of sources of indications allowing their proper classification both in classical and Phased Array tests. The article contains results of T-joint-related tests performed using the Phased Array technique and depicting the scale of geometry indications when testing welded joints. The article is addressed to NDT personnel performing ultrasonic tests.

### **V.V. Knysz, S.A. Solovej, L.I. Nyrkova, S.A Osadczuk – Effect of High Humidity and Neutral Salt Mist on the Fatigue Service Life of T-Joints**

**DOI:** [10.17729/ebis.2017.2/7](https://doi.org/10.17729/ebis.2017.2/7)

The article concerns the experimental testing of the long-lasting effect of surrounding environmental conditions (high air humidity and neutral salt mist) on the characteristics of the fatigue service life of T-joints in structures made of low-alloy steel 15HSND. The article-related research involved metallographic tests of the weld and of the heat affected zone (HAZ) of welded joints subjected to the 1200-hour long effect of humidity (in the G4 humidity chamber) and salt mist (in the KST-1 salt mist chamber). The metallographic tests made it possible to calculate the degree of corrosive effect and the entire area affected by corrosion, the depth of corrosion stain and corrosion pit penetration in the surface layer of the metal of the fillet welds and the HAZ of T-joints. The research also involved the identification of the characteristics of the fatigue service life of welded joints subjected to the long lasting effect of a corrosive environment.

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### Editor-in-chief: Prof. Jan Pilarczyk

Managing editor: *Alojzy Kajzerek*

Language editor: *R. Scott Henderson*

### Address:

ul. Bł. Czesława 16-18, 44-100 Gliwice, Poland

tel: +48 32 335 82 01(02); fax: +48 32 231 46 52

[biuletyn@is.gliwice.pl](mailto:biuletyn@is.gliwice.pl);

[Alojzy.Kajzerek@is.gliwice.pl](mailto:Alojzy.Kajzerek@is.gliwice.pl);

[Marek.Dragan@is.gliwice.pl](mailto:Marek.Dragan@is.gliwice.pl)

<http://bulletin.is.gliwice.pl/>

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