

## **FSW – TIG Welding of Cu 99 Copper**

### **Sudarea FSW-WIG a cuprului Cu99**

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#### **Abstract**

TIG-assisted FSW welding is a development of the FSW process, causing the emergence of a hybrid welding process, in solid state, which integrates the pre-heating of plates by the TIG welding process.

This paper presents considerations on welding Cu99 copper, by the hybrid FSW-TIG process, compared to the classical FSW process.

Related to the FSW welding technique that was available and used in the experiments, by the classical FSW process of joining Cu99 copper, because of the high forces developed during the welding process, it was necessary to limit the welding speed to below 120 mm / min, to protect both the machine and welding tools.

Due to the additional heat contribution of the TIG process, the experiments have shown that by applying the FSW-TIG process to welding Cu99 copper of thickness  $s = 5$  mm, in comparison with the classical FSW process, the following advantages can be obtained with certainty: increasing the welding speed up to approximately 200%, depending on the material, obtaining welded joints with comparable characteristics to the classical FSW welding; obtaining a more stable welding regime (without vibration), which provides a better protection of the machine and welding tools. The welding tool life could be increase two times.

#### **Keywords**

Friction stir welding, TIG assisted FSW, cooper

## **Evaluation of damage caused by artificial aging on the solvent-based ink printed layer of PVC coated PES fabrics**

Evaluarea degradării produse de îmbătrânirea artificială a stratului imprimat cu cerneală pe bază de solvent din componența țesăturilor PES acoperite cu PVC

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### **Abstract**

This paper presents an experimental program developed to evaluate the damage caused by accelerated artificial aging with ultraviolet radiation on the surface and on the color quality and mechanical properties of polyvinyl chloride (PVC) coated polyester (PES) fabrics printed with solvent-based inks. The experimental program consisted of artificially aging printed and non-printed specimens with periodical monitoring of the damage to the printed surface, followed by tensile testing in order to assess the influence of artificial aging of the printed layer on the mechanical properties. The results showed that the artificially aged printed areas suffered extensive color modifications and loss of elasticity, especially the light colored or white areas. The results of the tensile tests confirmed that the analyzed material's tensile properties are also influenced by a 72 hour exposure to accelerated artificial aging using UV radiation.

### **Keywords**

PVC coated PES fabrics, solvent-based ink, artificial aging, mechanical properties

## **Examination of harmful emissions by welding with coated electrodes**

Examinarea emisiilor nocive la sudarea manuală cu electrozi înveliți

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### **Abstract**

Welding test samples were performed on plates of S235 steel, according to EN 10025-1. For a cladding test sample (test A) the following stainless-steel coated-electrodes were used: E 18 8 Mn B 53, E 25 20 B 42 and E 19 12 3 L, according to EN 1600. Then, a weld test sample (test B) was carried out, with the carbon-steel coated-electrodes E 38 0 R 12, according to EN 499.

The Apex pump, manufactured by Casella Ltd. was used for sampling air with welding fume. The Triple Plus + IR, made by Crowcon Ltd. is the applied detector that measures and displays up to four gases simultaneously. Both measurements have been done at 300 mm from the welding pool. The emission rate of the welding fume particulate in the welding zone, has been assessed: 32.26 mg/m<sup>3</sup> (test A) and 18.66 mg/m<sup>3</sup> (test B). The particulate emission rate in the breathing zone of the welder is very low.

The concentration levels of the exhaled gases, are the following: 0.14-0.16% CO<sub>2</sub>; 0.1-0.2 ppm NO<sub>2</sub>; 0 ppm H<sub>2</sub>; 0-3 ppm CO. These levels are below the exposure limits (8 hours per day, 5 days per week): 5% CO<sub>2</sub>; 1.0 ppm NO<sub>2</sub>; 0 ppm H<sub>2</sub>; 30 ppm CO. By consequence, there is neither any health risk for the welder and the personnel in the same room, nor any danger of fire.

### **Keywords**

Harmful emissions, noxious substances, welding fume, hazardous particles, toxic gases, dangerous gases, coated electrodes, exposure limits

## **Study of fatigue behaviour of Duplex treated steels using finite element analysis**

Studiul comportării la oboseală a oțelului Duplex tratat,  
folosind metoda elementului finit

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### **Abstract**

Fatigue is the most common cause of catastrophic failure in metals and can occur in other materials as well. A modern technology to improve the fatigue resistance of materials is represented by Duplex treatments, also known in literature as Duplex Surface Technology.

This paper presents the fatigue behaviour of Duplex treated specimen consisting in gas carburising followed by surface induction quenching using finite element analysis.

### **Keywords**

Finite element analysis, fatigue, Duplex treated steels