ELECTRO-THERMO-MAGNETIC FIELD CHANGES IN CASE OF ELECTRO SLAG WELDING USING ELECTROMAGNETIC AGITATION

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ABSTRACT

The electromagnetic agitation of the melted slag affects, according to the equation of movement, the current density and finnally the temperature distribution in the slag welding pool. The slag welding pool phenomena, during the welding process, are induced by the presence and the interaction of the following fields: electrical field, magnetic field, thermal field and hydrodynamic field. The metal cast structure of the weld obtained in the slag welding pool has an anisotropy of the mechanical properties that is prooved by a minimum resistance in the seam area. The properties of this area depend very much by the nature of the structural homogeneity, produced after the crystallisation of the welding pool and by the size of the crystalline grains.

KEYWORDS: electro slag welding, electric field, thermal field, magnetic field.

REFERENCES

[1] **Mindru, Gh., Radulescu, M., M.** (1986) *Analiza numerică a câmpului electromagnetic*, Editura Dacia, Cluj-Napoca
[2] **Fireteanu, V.** (1995) *Procesarea electromagnetică a materialelor*, Editura Politehnica, Bucureşti
[3] **Fuzi, J.** (1994). Eddy Currents in a Ferromagnetic Plate Induced by an External Magnetic Field. *Optim '94, Braşov*, vol. III, p. 41-44.
[4] **Leoveanu I. S., Zgura Gh., Birsan D.** (2007). Modelling the heat and fluid flow in the welded pool. *Bulletin of the Transilvania University of Brasov*, Vol. 3, pag.363-368, ISSN 1223-9631
[5] **Visan D., Constantin E., Birsan D., Mircea O.** (2007). The Numerical Modelling by the Method of the Finite Differences of the Electroslag Welding Process in Electromagnetic Field. *Welding in the World,* Vol. 51, No. SPI, pp. 647-656, ISSN 0043-2288
[6] **Iu. Gelbfgat, O. A. Lieaisis, Z. B. Şerinin**, *Metale lichide sub acţiunea forţelor electromagnetice*, Riga, 1976.
[7] **Al. Nicula, Gh. Cristea, S. Simion**, *Electricitate si magnetism*, Editura Didactica si Pedagogica, Bucuresti, 1982.
[8] * * * - *PDEase, Reference Manual / Tutorial / Handbook, Macsyma*, U.S.A., 1994.