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## MATERIALS SCIENCE RESEARCH AND DEVELOPMENT

### SOLID SAMPLES FROM EAF ELECTROFILTER DUST FOR X-RAY FLUORESCENCE ANALYSIS.

Cristiana RIZESCU, Zorica BACINSCHI

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**Key words:** solid samples, steel industry, heavy metals, environment, XRF spectrometer.

**Abstract:** The *Axios* is a fully integrated wavelength-dispersive XRF analyzer, consisting of a spectrometer, X-Y sample handler and software. Designed to provide accuracy, precision and sub-ppm detection limits for many elements, the *Axios*, coupled with the unique *Pro-Trace* software and standards, provides the highest quality trace element analysis (U to Sc), and targets a wide range of materials of geological and environmental significance. This paper provides an overview of XRF technology as it is applied to steel industry for determining heavy metals, the effectiveness and limitations of XRF methods as a screening, and the contributing factors in obtaining accurate measurements.

### THE INFLUENCE OF THE MOULD WALL THICKNESS ON THE RESULTS OF CASTING SOLIDIFICATION SIMULATION

Vlad MONESCU, Ioan CIOBANU, Sorin Ion MUNTEANU, Aurel CRISAN

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**Key words:** solidification, simulation, casting.

**Abstract:** The paper presents the results of a study about the solidification simulation of cast iron parts cast in silica sand moulds. It was studied the influence of mould wall thickness  $bf$  and of the  $bf/M$  ratio (mould wall thickness/ casting solidification module) on the solidification simulation results. It was established that at 2D simulation as well as at 3D simulation, if the ratio  $bf/M \geq 3$ , the solidification simulated remain constant. The results are significant in the case of simulating the solidification of parts cast in foundry ground or in moulds with thick walls. These results show how much can be reduced the mould wall thickness, in function of casing solidification module so to reduce the simulation time, without affecting the results precision.

### DETERMINATION OF THE SOLID FRACTION VARIATION FUNCTION IN THE SOLIDIFICATION OF ALLOYS WITH SOLID STATE SOLUBILITY OF COMPONENTS

Ioan CIOBANU, Daniel FERARU, Ciprian SZABO, Iuliana LICHIOIU

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**Key words:** solidification, simulation, casting.

**Abstract:** The paper presents the method used for determining the variation function of the solidified alloy fraction within the solidification interval ( $T_L \div T_S$ ) for alloys with solid state solubility of components. Further the authors discuss three possible variants of analytical

function based approximation of the modelling of this process.

### GALVANIZED PLATES BEHAVIOUR DURING THE EXPLOITATION TEMPERATURE VARIATIONS

Mihaela POPESCU, Georgeta Emilia MOCUȚA, Ioan PĂDUREAN

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**Key words:** galvanized plate, thermo gravimetric analyses, thermo differential analyses.

**Abstract:** The paper shows that the utilization of galvanized plates has grown in importance, especially in the automobile construction field. Their increasing applicability, as well as the problems that arise during the service life, are related with the elaboration technologies, welding technologies, control problems and the elaboration of standards to regulate different aspects.

### MODELING AND NUMERICAL SIMULATION OF START-UP REGIME OF A HOT WATER BOILER

Sorin DIMITRIU, Dorin STANCIU, Tudor PRISECARU

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### PERFORMANCES OF AN ORIGINAL POST – COMBUSTION BURNER DESIGNED FOR A COMBINED STEAM – GAS CYCLE

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**Key words:** flame stabilizers, numerical simulation, industrial post-combustion chambers

**Abstract:** This paper presents the performances of a post-combustion burner using as fuel the natural gas and as oxidizer a poor oxygen mixture. This burner, with a fuel flow rate of  $100 \text{ Nm}^3/\text{h}$ , represents a module in the construction of others high fuel flow rate burners. It is well known that the burner performances depend on the flame stabilization solution. As a result, three kinds of flame stabilizers with incorporated cooling system were considered: a) semicircle shape, with enlargement contrary to the flow direction; b) semicircle shape, with enlargement in the flow direction; c) "V" shape type, with enlargement in the flow direction. The numerical simulation revealed that, among them, the last one represents the best choice from the point of view of flow, combustion, irreversibility and carbon monoxide emissions. The experimental tests were performed at U.P.B. on a pilot boiler of 1 MW, whose burner was equipped with "V" shape type flame stabilizer. They showed that a stable and a reduced length flame were obtained. Experimental data have also revealed that the presence of cooling air reduces the emissions of CO.