

ASPECTS REGARDING THE ELECTROTHERMAL HEATING THROUGH ELECTROMAGNETIC INDUCTION

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Abstract. *The paper present the numerical modeling of the electromagnetic phenomena coupled with the thermic ones when processing the semi-finished products made up of non-ferrous alloy, through electromagnetic induction with the purpose to obtain a homogenous heating of the pieces in the shortest time. Maxwell's equations that describe the heating process through induction, show that the important quantity, basically important to determine the eddy currents induced in the piece, is the intensity of the magnetic field, resulting the electromagnetic losses, due to their transformation in thermic energy. So far the results of the experiments have show that the intensity of the magnetic field considering a long inductor is more intense in the center of the inductor and weaker at its extremes. The purpose of the numerical modeling is to render solution to homogenize the intensity of the magnetic field according to the geometry of the inductor.*

Keywords: electromagnetic field, thermic field, inductor

1. Introduction

The numerical modeling has become an important tool to reduce the manufacture cost of a product and to improve the heating quality through induction. The numerical modeling of the heating process through induction implies the calculus of the eddy and Foucault currents, which are basically the cause of the electromagnetic losses due to the development of heat in the semi-finished piece, [1].

Determining the electromagnetic losses and verifying the quantity of heat emerged in the piece is also possible by means of mathematical calculus with the help the numerical modeling by methods of approximation such as the method of the finite differences or the finite element method, [2].

The designing of the heating installation is briefly realized by means of analytical calculus that lead to errors, which are reduced later by adopting the installation to that point to fulfill the technological process's demand, which implies expensive cost for the installation. Later there has been noticed a generalization of the designing of the electromagnetic heating installation of induction with the help of the numerical modeling. The firms, which produce, electromagnetic heating

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