Available online at www.sciencedirect.com

SciVerse ScienceDirect

Physics Procedia 22 (2011) 403 – 407

Physics Procedia

2011 International Conference on Physics Science and Technology (ICPST 2011)

Study on Thermal Conductivity of Personal Computer Aluminum-Magnesium Alloy Casing

MeiHong Liao*

Guangxi vocational college of technology and business

Abstract

With the rapid development of computer technology, micro-state atoms by simulating the movement of material to analyze the nature of the macro-state have become an important subject. Materials, especially aluminium-magnesium alloy materials, often used in personal computer case, this article puts forward heat conduction model of the material, and numerical methods of heat transfer performance of the material.

PACS: 44.05.+e; 02.10.De

Keywords: aluminum - magnesium alloy; thermal conductivity; personal computer case; computer technology; heat conduction

1. Introduction

There are two main difficulties associated with the widespread use of numerical models. First, the model results do not always agree with the experimental results because of uncertainties in the values of several model input parameters that cannot be estimated from the fundamental principles. It is very difficult to estimate the value of absorption coefficient. However, methods are not very accurate. It is very difficult to calculate the effective values in the presence of a cloud of metal composition. Finally, there may also be uncertainties in thermo-physical properties of the Al-Mg alloys material. Second, the

* Corresponding author. Tel.: +86+771-3163533.
E-mail address: liaomeih@yeah.net.

 doi:10.1016/j.phpro.2011.11.063

numerical heat transfer processes are unidirectional in nature and designed to calculate characteristics from the welding variables. However, the ability to prescribe conditions to attain a particular characteristic is often needed but not currently possible.

These major problems can be solved by combining the numerical models with a suitable optimization algorithm. First, the reliability of the calculated results can be improved by estimating uncertain input parameters from a limited volume of experimental data. By coupling a genetic algorithm (GA) based optimization method [1-4] with a three dimensional (3D) heat transfer model [5, 6], the optimized values of these uncertain parameters can be determined so that the computed weld geometry agrees well with the experimental data. Second, the GA can systematically search for multiple solution sets of welding variables [7-11], each of which can result in a specific weld geometry. Since the search involves a well tested forward heat transfer model, the estimation of uncertain parameters and multiple sets comply with the phenomenological laws.

2. Heat transfer model

A 3D heat transfer model [5, 6] is used for the calculation of temperature fields from a set of specified conditions and materials properties. Since the main goal here was to establish a methodology to estimate uncertain parameters and provide an inverse modeling capability, a simple forward model was selected. Al-Mg alloys were chosen because of its high thermal conductivity because of which convection is not very important. The main assumptions of the model are the following: A constant temperature equal to 100℃ is assumed. The model calculates weld geometry based on several parameters which include material properties, process parameters and geometrical parameters.