Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

COMPUTATIONAL RELIABILITY ANALYSIS OF BLIND MICRO-VIA WITH 3D AND AXISYMMETRIC MULTI-LAYER PCB

By

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11:00 AM, Thursday, 04/28/2022

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Abstract

Electronics have become ubiquitous in our society. Micro-via are components that are used to form connections from one layer to another in most Multilayered High-Density Interconnect (HDI) Printed Circuit Boards (PCBs). The failure of Microvia has always been a concern to the electronics industry. The failures are exaggerated during the reflow process due to the high thermal loading. It is important to take some measures to reduce (or) eliminate the failures at interconnects in the Printed Circuit Board to obtain reliable Input/Output (I/O) density. This work is based on the understanding that the top layer blind microvia goes through minimum pressure and temperature cycle during the fabrication, it is assumed that the annealing of the copper is not fully achieved, and grain structure is altered. So, A finite element model of blind microvia is developed using ANSYS to meet IPC standards and incorporated into a multi-layered PCB. According to IPC 2.6.27(B) test method, the model is tested with thermal loading at upper and lower specified limits. The model is modified to simulate the heterogeneous grain boundary by changing the modulus of the blind microvia along the depth and other model by filling it with copper. Also, All the models are built in both 2D Axisymmetric and 3-Dimensional. This enables us to compare the possible way to get solutions at a faster rate which can be used to study stress behavior. Sphere of influence is verified to determine the minimum distance maintained to avoid neighboring effects on microvia around. It is found that the stress distribution in the blind microvia is higher for the heterogenous microvia and is 10.6% higher than the homogenous microvia for the same Thermal loading condition. Moreover, the stress in the microvia with the modulus increasing along the depth is higher than the modulus decreasing along the depth.