

Case study

Computer circuit boards: shock integrity of ball grid arrays

THE CHALLENGE

Our UK telecommunications client was developing a new radio communications device intended for the Japanese automotive industry.

The device consisted of a number of components connected to a printed circuit board (PCB) via ball grid arrays (BGA). In order to comply with the Japanese quality assurance measures, our client needed to test the crash worthiness of the PCB to a much higher level than is set by current UK guidelines – which only require that a circuit must be able to withstand the shock and impact of being dropped from 1m high.

OUR SOLUTION

Frazer-Nash were asked to review the environmental vibration, shock and thermal shock requirements of a standard produced by the Electronic Industries Association of Japan (EIAJ), and compare these with the requirements of British Standards and US Military Standards. From our conclusions, we were able to extract mechanical recommendations enabling our client to make an informed and realistic agreement with their client.

We then performed a structural integrity assessment of their initial design to determine whether they would pass the stringent tests of the EIAJ. The focus of our assessment was on the bending strength of the actual board and the connection between the components and the PCB.

Using Finite Element Analysis technology, we discovered that because the main ASIC (application specific integrated circuit) connected to daughter board by a peripheral ball grid array assembly, it was certain to fail the shock and integrity test for EIAJ standard. We proposed some design changes to the mother board which alleviated the problem.

Because this study was conducted at the very start of the design process, we were able to resolve this critical issue before most of the electronic design work had begun. This saved our client considerable time and money, and they were able to create a final product which would be fit for the Japanese market.

Client

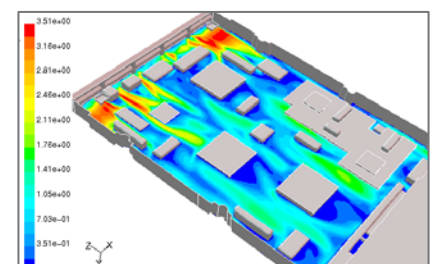
UK telecommunications client

Business need

Requirements study and structural integrity assessment of ball grid arrays

Why Frazer-Nash?

Frazer-Nash have expertise in performing structural integrity assessments as well as analysing shock and vibration



Finite Element Analysis of printed circuit board

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