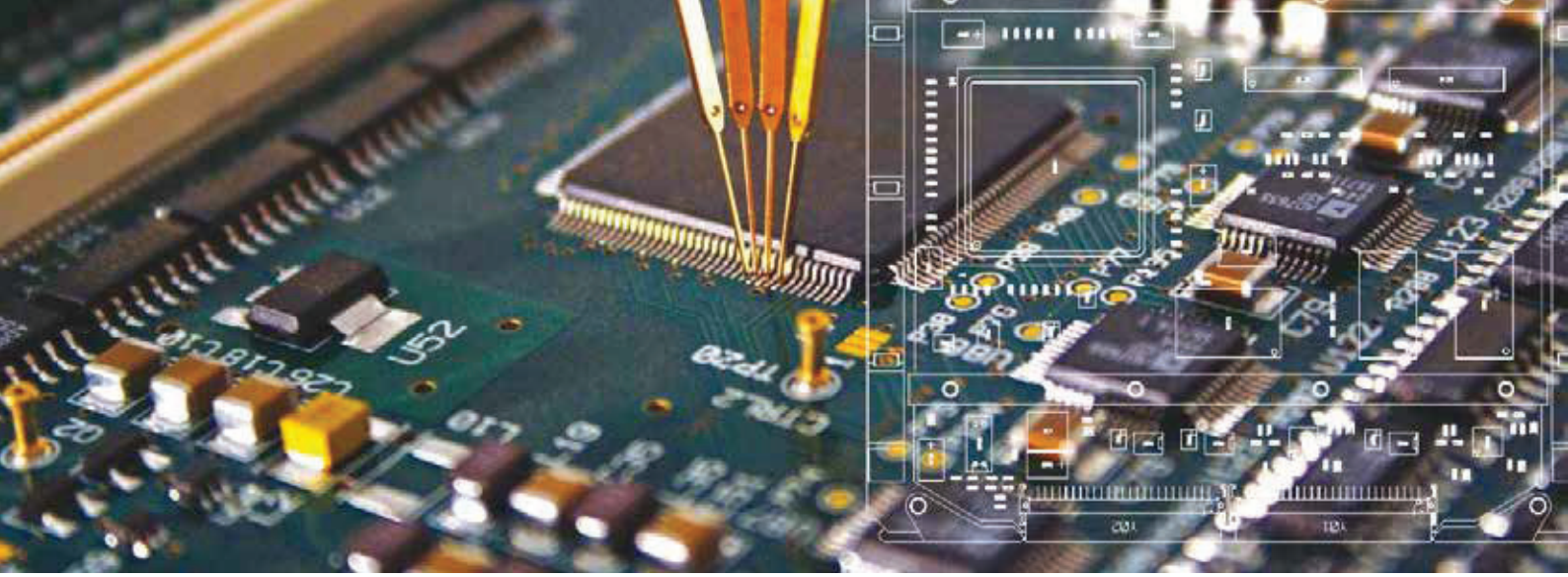

The Fundamental Role of Simulation-Based Approach in New High Technology Product Development

Selex-ES is a company distinguished by its high-technology methods and products. To be successful in this leading-edge environment, Selex-ES must carefully define its optimal design strategy, making best use of the available tools and approaches. In particular, the Finite Element Method is a central component of this whole process, playing a fundamental role from the initial scoping and costing of the project, through its technical design and on to the evaluation of product performance. This article considers specific examples to demonstrate how the various stages of the Selex-ES process are strengthened by the utilization of such simulation methods.

Selex ES
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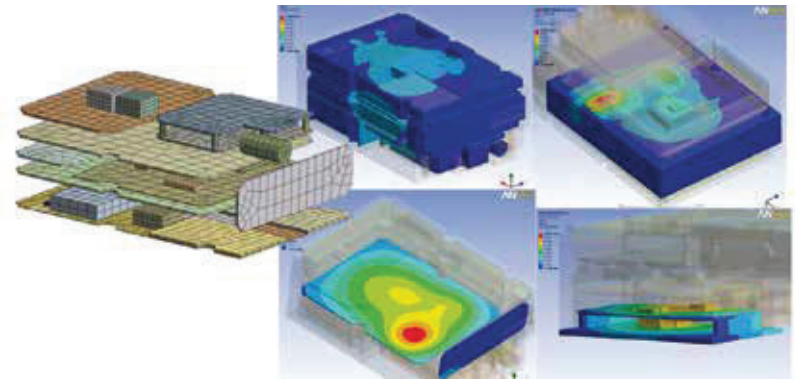

Introduction

Simulation is nowadays strongly connected to new product development in most high-technology industries; a trend accelerated by the growth in high-performance computing and improvements in simulation tools made possible by innovations in computer hardware, software and the conceptual understanding of the underlying physics of the simulated processes. As a result, simulation technology is now deeply-rooted in all our product development: in fact, it constitutes an essential component of our tenders, is central to our design process and in many cases may be embedded in our product itself or form part of our end-user technical report.

The support of simulation in the preparation of tenders

Companies such as Selex-ES will often use simulation support during the preparation of Technical Tenders. At this stage it is extremely important to evaluate the relationship between technical performance requirements and global design costs. In many cases simulation support helps the Bid Team to correctly estimate the necessary costs in order to satisfy the technical requirements. In extreme cases, the simulation approach may be able to identify economic and technical reasons that can produce an insight into whether the project is worth pursuing due to high cost of delivering the stated technical requirements.

The support of simulation during preliminary design phase

A simulation-driven approach is usually fundamental to the preliminary design phase. It is an important process in the thorough definition of all the technical requirements to each subsystem that forms part of the final product. Making good quality early design decisions for each subsystem is central to the management of the design process, enabling the early identification of issues that, if missed, could result in corrections later in the design process: typically, the later an issue is identified, the more expensive will be its correction. For example if early simulation is used to correctly calculate the thermal or structural

requirements between a mechanical box and the PCB of an item of electronic equipment intended for an avionics application, accurate final results can be forecasted. If a methodical simulation approach has been defined, this typically leads to better project decisions at this stage than the alternative approach of solely relying upon experience-driven ideas of "best practice." The figures illustrate the results from some preliminary Finite Element models aimed at identifying any critical issues related to the thermal requirements between the mechanical chassis and the PCB substrates.

The support of simulation during detailed analysis

Detailed Design is characterized by a huge use of simulation in various different fields:

- Thermal
- Structural
- Fluid-dynamic
- Electromagnetic

The goal of all these calculations is to address the mechanical packaging of the product; providing the designer with the necessary guidance to:

a) Achieve the requested technical requirements.

b) Prepare for the experimental tests that will be necessary to verify the simulation results, having in mind the reduction in cost of this essential phase of the project – typically, experimental test will be costly and should not be more extensive than strictly necessary.

The support of simulation during the engineering test phase

At this stage, the physical properties and behavior of the test equipment itself becomes very important and so its various attributes (stiffness, mass etc.) must be accurately represented in the simulation environment. For example, in a durability (shaker) test it will be necessary to represent:

- The anchorage chassis to the shaker table.
- The presence of any air channels (assuming the product is tested in a wind tunnel).
- The movement of the shaker table.

All these activities are carefully represented by simulation to verify that the best (most representative) simulation and, therefore, test results are obtained.

Conclusions

Today, the simulation approach has come a long way and it is not possible to develop a new product without efficient calculation support. Today's rapidly-developing software tools are optimized to make the best use of our rapidly-advancing computational hardware. However, it is also necessary to have in the company a human technical team able to manage this computational power and ensure that it is able to contribute optimally to product knowledge and performance at all stages of product development.

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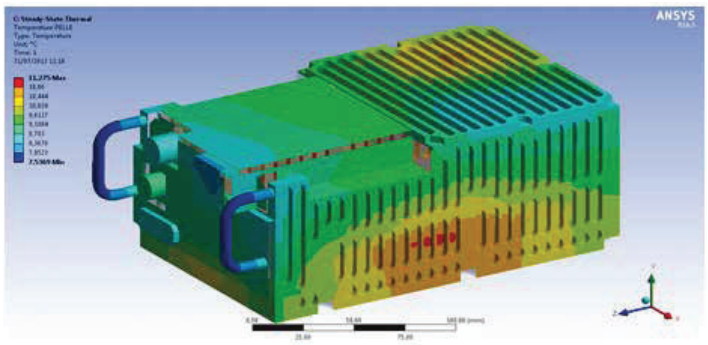

Fig. 1 - Electronic Equipment :Thermal Map on external surface

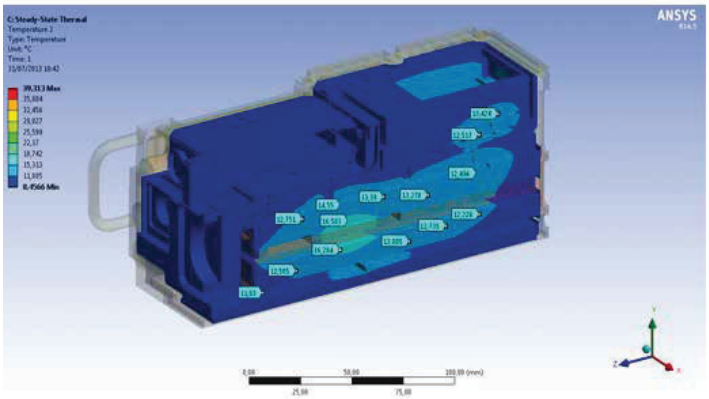

Fig. 2 - Temperature increase of inside air

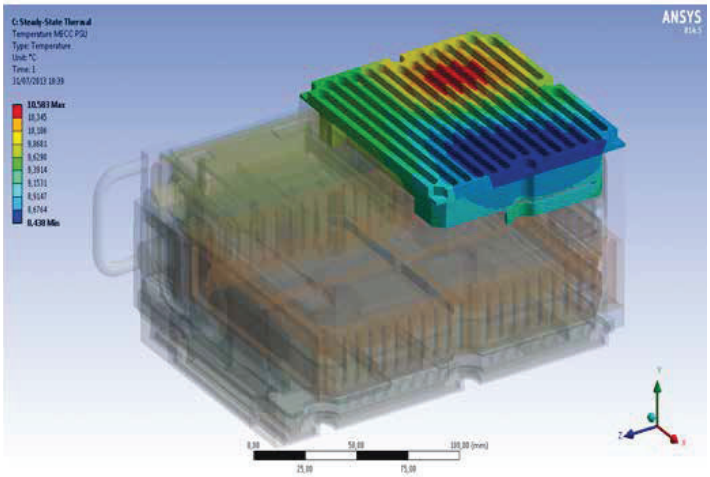

Fig. 3 - Temperature increase of Metallic part of Power Supply

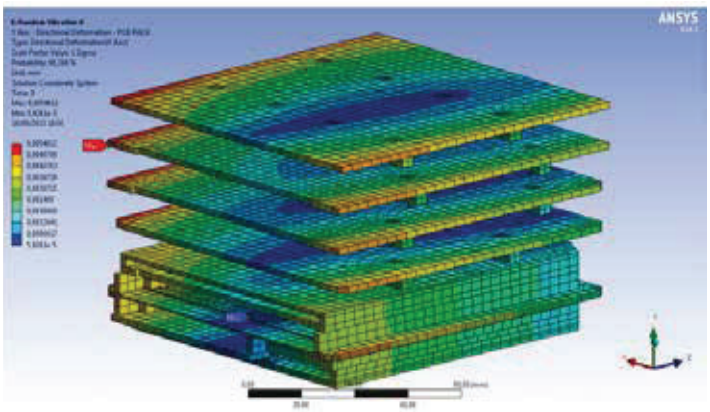

Fig. 4 - PSD - Endurance Analysis - Excitation along X Results along Y