High-Tech

ELECTRONICS INNOVATION THROUGH SIMULATION

Four Ways to Accelerate and Improve Development of Consumer Electronics Products

Inceptra

DASSAULT SYSTEMES

INTRODUCTION

In today's competitive consumer electronics marketplace, innovation happens fast. A globalized marketplace—and widely varying demand and regulatory requirements in global markets—create the need for greater numbers of product variants while making it imperative that designers "get it right the first time." This is particularly difficult when considering the complexity of smart, connected products, in which software, hardware and electronic components must interoperate seamlessly.

Companies also face pressure from both entrenched global competitors and up-and-coming startups, fueling a relentless drive to push prices down, even as most costs hold firm. The viability and profitability of products and companies is often contingent upon their ability to accelerate and streamline the product development process while delivering the reliability and quality that customers demand.

In the face of these pressures, companies are increasingly emphasizing the need for a shortened time-to-market, which necessarily mandates an optimally efficient and essentially error-free product development process from concept to completion.

While enabled by technology, the digital transformation of organizations is based upon key principles of human interaction. The front-loading and capitalization of diverse knowledge types, effective and frictionless collaboration, and the striving for high performance are some of the principles fueled by simulation.

High-tech companies are increasingly turning to simulation to help meet the challenges innovation presents, as well as to rein in costs and accelerate development timelines.

Historically, simulation has been the province of highly-trained specialists and a select range of companies with the resources to afford sophisticated, highly specialized technologies—and the internal expertise to configure and apply them effectively. Today's simulation solutions are more versatile, more accurate, more affordable and easier to use, extending their utility beyond the testing lab into even the earliest stages of engineering—and for use by occasional users. Assessments of structural integrity, electromagnetic effects, thermal performance, and other critical aspects of ultimate product quality and performance can begin in early design stages and continue through the entire development cycle, providing an accurate forecast of real-world behaviors and performance.

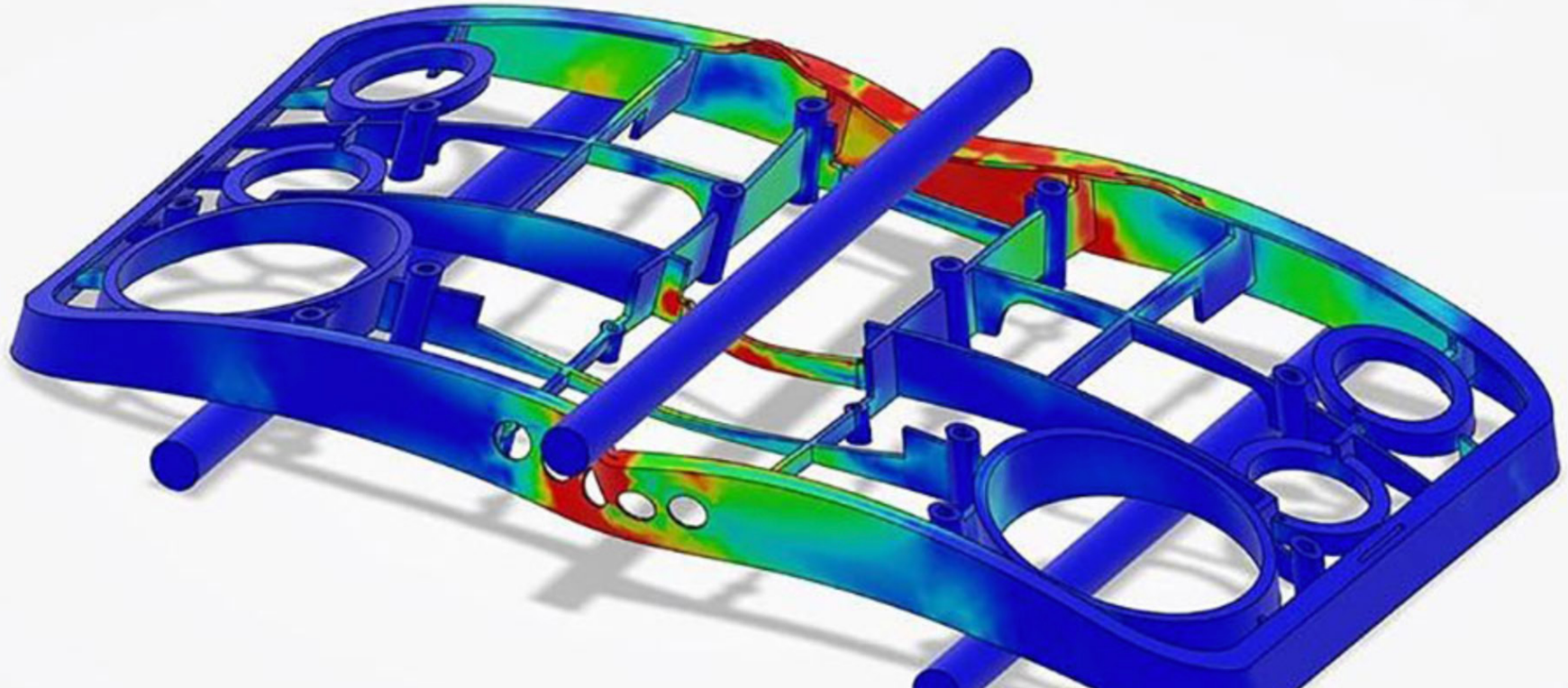
The result: more reliable, more affordable, more successful electronic products.

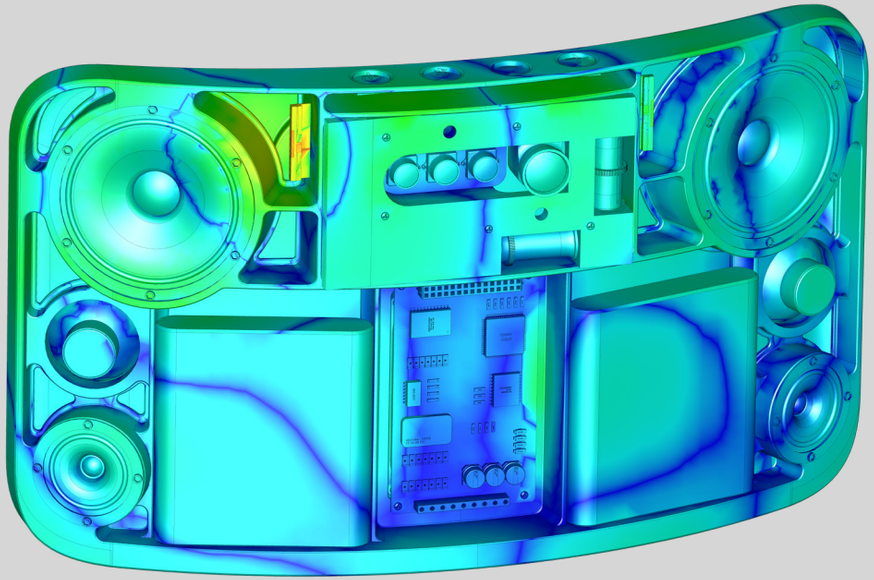
FRONT LOADING

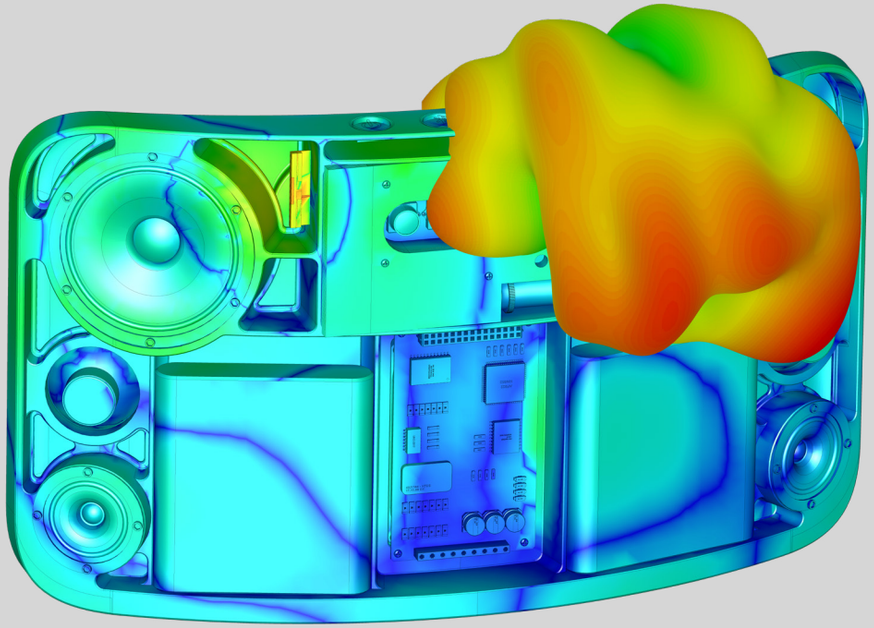
NASA estimates the cost of error remediation in the operations stage at 170 times that of the cost of an error identified during the requirements stage, and more than 40 times the cost during the design stage.

At the outset of the development process, a product's intended physical form is the consequence of numerous considerations and their related decision points. Does the product need to be handheld? Shock-resistant? Compact? Lightweight? The early employment of simulation helps to ensure that mechanical and structural design errors or omissions can be addressed early in the process, minimizing the cost of necessary changes, and that designs can be optimized for quality and the best possible performance. Typical assessments may include stiffness, shock loading, and drop tests. The use of advanced material, mechanical, fracture and failure models hone the simulation's accuracy, helping to facilitate informed design modifications to optimize durability and performance.

Wearable and portable devices in particular can benefit from mechanical simulation in the form of drop-testing and bending analysis, conducted by engineers early in the development process. It helps teams to manage the trade-off analysis between the competing needs of structural durability vs. minimization of weight and materials usage. While the illustrated example is highly specific, the same principles apply with regard to other testable characteristics such as thermal management, structural fatigue, and acoustic performance, among others.







KNOWLEDGE CAPITALIZATION

For knowledge to deliver its full value, it has to be accessible and applicable when and where it is needed. Simulation done on a common platform with product engineering makes latest and historical data commonly accessible. The platform can provide contextual information to facilitate discovery and learning. It can also enable ad-hoc and planned collaboration with relevant people in the organization or beyond. Last but not least, the platform provides critical resources like libraries and marketplaces, and even computing resources to accelerate running complex simulations.

Once applied within the design, the simulation can be templated and the information gained through the simulation process can be stored in anticipation of being applied to subsequent or competing designs, shortening their development times.

When design changes are required, this knowledge can be harnessed to inform new solutions. Teams can re-engineer antenna choices and placement in response to design changes. The antenna engineering team may be able to leverage libraries of antennas, modifying these to suit present needs rather than designing new antennas from scratch. Drawing upon antenna, architecture and materials models, engineers can rapidly predict and compare performance variations in antenna type and placement, making modifications or repositioning them in order to optimize performance.

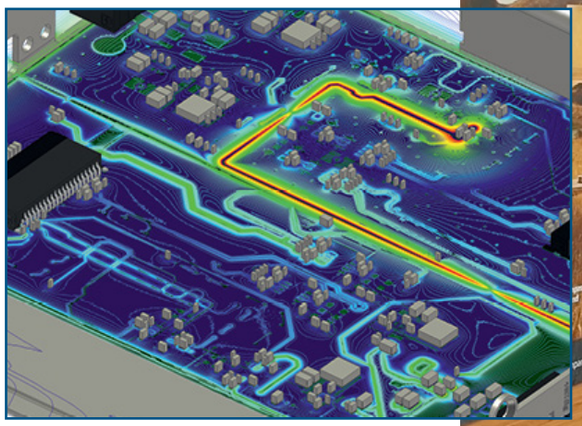
FACILITATE COLLABORATION

Historically, product development has suffered in terms of efficiency, speed, and cost from the disparities in the information available to differing teams and team members. This naturally introduces inefficiency and cost while slowing development. When simulation takes place within a silo disconnected from design, the risks of test failure and the associated time, monetary and opportunity costs are great. The solution is for development activities to take place within a data-driven, model-based environment.

With simulation being seamlessly integrated on a companies innovation platform, all teams and members have access to the same accurate, up-to-date information—and the same "Single Source of Truth" working model. As all teams work together within a single unified environment, there is no need for data translation—or the delays and inaccuracies it can create. This is of particular significance when it is necessary to "design to compliance," as in the case of devices subject to electromagnetic capability and interference regulations.

When development activities have taken within a data-driven, model based environment, every modification to the model is automatically propagated to all relevant stakeholders, and traceability is maintained since every simulation is automatically associated with the right model.

As a result, there can be no mismatch between the final model version and the final tested version. By being able to draw upon simulation data generated throughout the development process and to count upon the integrity and accuracy of library models and template information, EMC compliance simulations can generate highly accurate and precise data that forecasts testing outcomes. This provides the opportunity for any necessary remediation prior to formal testing.



ENABLE HIGH PERFORMANCE

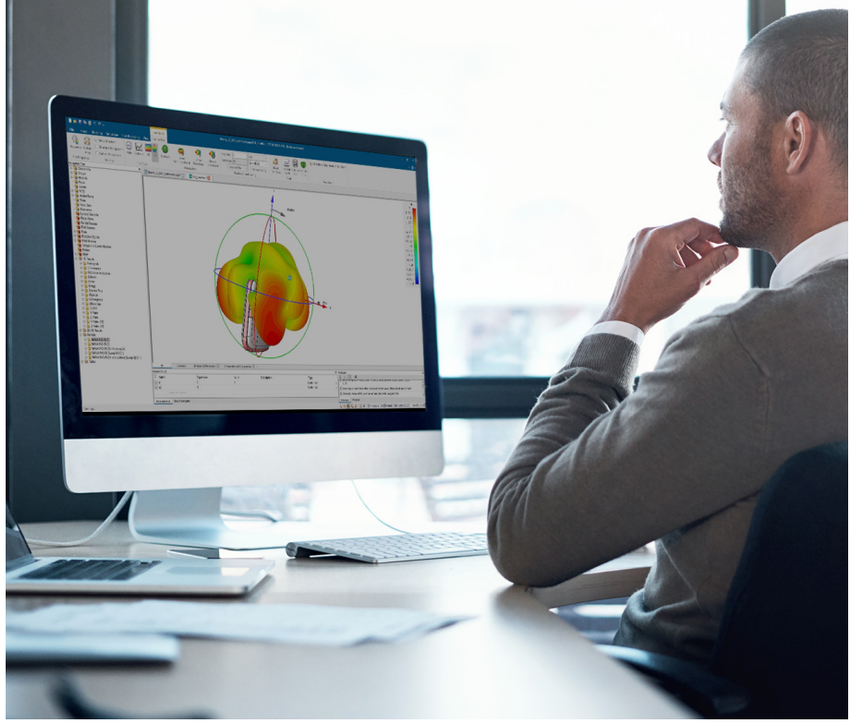
Complex simulations can place incredible demands upon computing resources. Running simulations on-premise and in the cloud provides the ability to harness vast computing resources beyond those available in most company environments, giving engineers the ability to conduct more complex simulations, and achieve quality results more rapidly.

Complex simulations which may have consumed several hours or days when conducted in-house can often be executed in mere minutes, improving decision-making and product performance.

This expanded capability enables engineers to generate more usable data in a shorter amount of time without incurring inordinate additional costs in terms of time or resources; this in turn provides a foundation for improved decision-making, and improved product performance.

By virtue of their ability to deliver heightened computing power as needed, rather than relying on on-premise hardware, cloud-based simulation empowers users to achieve both quality gains and shortened development timelines without the need for extensive investment in on-premise resources.

Simulation has experienced significant development and today it's not just a niche discipline for a few experts anymore. When integrated on a common platform with all product engineering disciplines, simulation can reduce a broad range of innovation risks and it can significantly support the competitiveness of high-tech companies. Find out more: https://www.3ds.com/products-services/simulia/solutions/



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