

Powering a Revolution



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The increasing electrification of the world around us — from transportation to industrial machines — is changing the nature of energy production, distribution and consumption. And these changes significantly impact traditional product development processes. The use of electronic systems and components can mean a new degree of engineering complexity and introduce design considerations that did not exist before. Yet product development teams still must meet ambitious delivery schedules, aggressive cost targets and stringent regulatory requirements. Given these challenges, engineering simulation is a competitive imperative for those engineering teams participating in the next electrification revolution.

When you think of product electrification, possibly the first example that comes to mind is the electric car. The majority of the world's leading automakers are already pivoting from the combustion engine to hybrid and fully electric vehicles. But electrification is affecting almost every industry, as product development teams search for new ways to achieve higher levels of performance with improved energy efficiency and reduced environmental impact.

In the aerospace industry, more electric aircraft initiatives drive the replacement of hydraulic and mechanical systems with electric equivalents — and companies envision propulsion systems that are hybrid or fully electric, reducing noise, emissions, weight and fuel burn while improving safety and reliability. In the global energy industry, there is a transition from large centralized power plants to smaller distributed power generation systems and microgrids that are often based on low-carbon or renewable sources of electricity. And, in the face of growing electricity demand, millions of electricity-driven pumps and other industrial machines must become more and more efficient.

There are multiple drivers behind this electrification revolution. As the demand for energy accelerates, the

cost of new enabling technologies is falling — batteries, for example. Geopolitical concerns over energy security — coupled with a growing awareness of the environment and government mandates — encourage investment in local, sustainable sources of electrical energy generation. Electric energy is becoming more trendy and attractive, leading to increased demand from consumers. One thing is certain: Electrification is going to impact your products and many aspects of your business model very soon.

Meeting the Challenges with Simulation

Adding electrical systems or components to existing systems within products, or replacing traditional technologies entirely, means introducing an incredible new degree of complexity — or completely rethinking the traditional design process.

In a recent survey by Ansys and SAE, three-quarters of executives confirmed that electrification is driving a fundamental change in their design processes. This will increase the amount of virtual prototyping they perform, which requires a more model-based engineering approach. The executives cited lower development costs, reduced physical testing costs, faster development times, and an increased

level of innovation as their primary reasons for embracing engineering simulation. The majority of those surveyed expect at least a two-times acceleration in their design and development cycle thanks to a simulation-based approach.

This shift is partly because electrical components cannot be studied in isolation. Design of electrified products must incorporate multiple design considerations such as thermal and mechanical robustness, while also considering the performance of the overall system and all its components.

Organizations need to accomplish all this quickly, before competitors master these challenges and seize market share with their own game-changing products. This is why simulation will play such a fundamental role in enabling the electrification revolution.

The Future Is Electric — and It Begins Now

This issue of *Ansys Advantage* showcases some of the innovative ways engineering simulation is supporting the electrification revolution. I hope this magazine will help you envision how your company can lead the global drive toward product electrification. 