

ENABLING THE FUTURE FOR ELECTRONICS

As electronics become more and more pervasive in our lives and businesses, the complexity of design increases exponentially, requiring advanced electronics simulation to develop the reliable products we can no longer flourish without.



By **Lawrence Williams**,
Director of Product
Management Electronics,
ANSYS

Electronics are everywhere! Of course, the smartphone and computer are pervasive examples in our lives, but there is no shortage of electronics in automobiles, banking, aircraft, retail and countless other applications. With the emergence of the Internet of Things (IoT), even household appliances are now under electronic control and becoming connected. As we benefit from the convenience and productivity that electronics provide, we become increasingly reliant on embedded electronic systems. If those systems were to fail, it would be not only inconvenient, it could become a business problem, a productivity problem and in some cases a personal safety problem. It is increasingly important to produce systems that are robust and reliable. Advanced simulation of electronics enables exploration of designs, not only for the nominal ability to perform, but to perform reliably over the life of the product.

Modern electrical simulation delivers digital prototyping and design exploration for electronics and electromechanics. With simulation, engineers can deliver reliable, high-performance and lower-cost products that have been thoroughly scrutinized so that there are no electrical, thermal or structural surprises in production or deployment. The most advanced simulations combine real physics modeling with circuits and systems for high-speed, high-density printed circuit boards and assemblies, antennas and wireless systems, power conversion, and electromechanical devices. The digital prototype can be leveraged to establish virtual compliance with design requirements and provide engineers insight to deliver not only today's products but tomorrow's even more automated, mobile and innovative inventions.

Our Wireless World

5G connectivity promises a faster, more robust mobile computing experience for everyone. These applications have particularly strong

design challenges that benefit from simulation. The promise of millimeter-wave technologies will be preceded by extending sub-6 GHz systems to leverage band-aggregation to obtain 5G speeds using existing infrastructure. This requires multiple radios to operate simultaneously, which can lead to crosstalk and thermal issues that can be addressed upfront with simulation. As millimeter-wave technology emerges, engineers will leverage simulation to solve sensitivity to temperature, efficiency and circuit density challenges.

There will be tremendous need for antennas and wireless for 5G and IoT product connectivity. Electromagnetic simulation enables engineers to select, design and integrate antennas for IoT systems and environments. IoT suppliers will require more integrated and programmable subsystems to streamline adoption for system integrators, and making solutions easier to adopt is key. Simulation with automated design flows, accelerates adoption of simulation within organizations.

Transforming Business and Breaking Down Barriers

Advanced simulation is a critical driver for the most pioneering companies. Industry leaders adopt multiphysics simulation to bridge the gap that exists between engineering disciplines, and enable the products to be designed from a true systems perspective. Electronic devices must perform across electrical, thermal and mechanical domains. Electronic systems get hot. They get dropped. They sometimes operate in harsh environments. Multiphysics simulation methods aid businesses in addressing these challenges across high-frequency, high-speed electronics and electromechanical systems. Adopting a multiphysics system engineering approach can make the difference between a nominal design and a truly robust design.

Future Considerations

Future electronic product innovations will require a platform on which engineers can simulate and design entire electrical and electronic products while including all the necessary physics and system effects. This can include the minute details of a complex integrated circuit up to a full product like an automobile. Industry-leading companies rely on simulation, and the most advanced engage with ANSYS to automate processes so that more engineers can leverage the richness of real physics. With a single platform, electrical engineers can deliver a faithful representation of electrical, thermal and structural performance, while sharing models with mechanical engineers for even more rigorous examination.

This issue of *ANSYS Advantage* demonstrates some remarkable advances in electromagnetic field simulation that can help you drive design innovation. 