

# A NEW ERA IN SIMULATION

Combining real-time operational data from working products with digital information about those products enables the digital twin and promises to take simulation into a new era.



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For over 40 years, engineering simulation has helped product development teams around the world deliver game-changing innovations, accelerate product launches and reduce the costs associated with design and development

While the process of creating highly engineered products has never been easy, today's product development organizations are faced with challenges that could not have been imagined 40 years ago. Existing products are growing in complexity, with smart functionality and more embedded software. Disruptive products are operating in design spaces that have not been explored before. These products are expected to perform in more extreme physical conditions.

Consumers are demanding bigger and more frequent innovations that are delivered affordably. And, in some cases, customers no longer demand just a product such as a wind turbine, they demand an outcome like kilowatt hours.

The good news is that simulation technology improvements provide answers to these growing challenges. Simulation software has expanded in depth and breadth, enabling the modeling of multiple physical forces — electromagnetic, structural and fluid

teams to collaborate. Digital prototypes and digital exploration are easier and faster to employ than ever before.

But it does not end there. The Internet of Things (IoT) brings with it technology and practical cost models to install sensors on a vast array

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— as well as embedded software and systems using an integrated simulation platform. Semiconductors can now be designed with simulation leveraging full chip–package–system models so that deficiencies are discovered long before prototyping and sign-off. Improvements in computing capability and the advent of the cloud have led to the emergence of high-performance computing (HPC) capabilities that streamline and accelerate even the largest simulations and empower diverse global engineering

of products and to stream the huge amounts of real-time data generated. The emergence of IoT software platforms empowers the integration of real-time operational data with all of an organization's digital information for that specific product. This enables the realization of a digital twin.

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Field product performance data (and other relevant information) can be merged with the results of

engineering simulation to predict the future performance of that product within its operating environment. This predictive capability could, for example, optimize maintenance schedules and reduce unplanned asset downtime, as well as significantly enhance operational performance.

But digital twins have an even more important strategic benefit: Product development teams can apply insights from the twin directly to their ongoing product development efforts. Future versions of the product or process can be designed with new features, new shapes and new materials that directly address any shortcomings identified through the digital twin process. This promises to radically accelerate new product innovation and insertion.

Already in use by leading companies, digital twins represent the future across many industry sectors.

The use of digital prototypes and digital exploration for increasing product complexity, ever-expanding design spaces and the emergence of the digital twin propel the use of simulation into the hands of new users and develop links with operational products. We are on the cusp of a new era that will take us beyond simulation-driven product development and into simulation-driven engineering.

I hope this issue of *ANSYS Advantage* will help you learn more about the potential of digital twins — and begin to imagine the enormous impact they may have on your business in the not-so-distant future. 



Creating a Digital Twin Video  
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