Spotlight on Engineering Simulation
Products and Technology

Engineering **Simulation** for the **21st** Century

Five key principles guide the development of simulation products and technology at ANSYS.

By Chris Reid, Vice President, Marketing, ANSYS, Inc.

Technology is the lifeblood of ANSYS, Inc., and the basis for everything we offer our customers. For more than 35 years, ANSYS has been a pioneer in the application of finite element methods to solve the engineering design challenges our customers face. During that time, the evolution of our industry, products and technology has been nothing short of amazing. Fueled by a corresponding increase in the power-to-price ratio of the computing world, the problem size and complexity of simulations have grown to impressive dimensions. The net effect of this is evident in almost every

facet of life — from the cars we drive to the energy we use, the products we buy, the air we breathe and even the devices we insert into our bodies to maintain our health.

How have we accomplished this near 40-year run of groundbreaking achievement in engineering simulation and modeling? Staying true to our vision and strategy has certainly been a major factor. Unlike others, ANSYS has never wavered from its core business of engineering simulation software. Instrumental to that vision is our commitment to advanced technology — the cornerstone of our business and

value to our customers. After all, it is our products and technology that enable companies to create the most innovative and globally competitive products for their industry.

Also instrumental to our vision are five principles that guide the development of our products and technologies. The first is *unequalled depth*. Simply stated, for each of the key areas of simulation and modeling technologies — whether it be mechanical, fluid flow, thermal, electromagnetics, meshing or others — we offer a depth of capability that is second to none. This depth has been created over time by reinvesting in the research and development of new technologies, and supplemented by key acquisitions and partnerships along the way. Today, the results speak for themselves in the richness of what we offer our customers, regardless of their specific simulation requirements.

The second guiding principle is *unparalleled breadth*. In this regard, ANSYS has assembled a complete range of simulation capabilities — from preprocessing to multiple physics to knowledge management. Our customers see this as a tremendous benefit, because they know we can provide a solution for each specific area of analysis and that we provide rich depth across our entire portfolio of products and technologies. Some companies, perhaps, can lay claim to this in one or two areas, but we offer this depth and breadth for the full range of simulation and modeling techniques.

In offering both technological depth and breadth, our customers are able to run simulations that are more sophisticated, more complex and more representative of the real world. Utilizing such a *comprehensive multiphysics* approach — our third guiding principle — enables engineers to simulate and analyze complete systems or subsystems using true virtual prototyping. Increasingly, companies realize that a multiphysics approach is essential to attain the most accurate and realistic simulation of a new product or process design. At ANSYS, we not only provide the technologies to do this, but we make them all interoperable within the unified ANSYS Workbench environment. Thus, the user can configure a multiphysics analysis and avoid the need for cumbersome file transfers or intermediate third-party software links. Our technology inherently provides the

infrastructure, saving implementation time while providing measurable benefits in speed and robustness as well.

The old adage "one size fits all" is certainly not the case in the world of engineering simulation. Despite the common threads that appear everywhere simulation is used, there are also real differences. Some industries, such as automotive and aerospace, are mature in their use of these tools, while others, such as healthcare, are relative newcomers. Companies within the same industry can be at markedly different stages of adoption, and users within any one company may have vastly different needs or experience with simulation tools. There is a need for flexibility. Customers must be able to adopt the appropriate level of simulation and know they will have latitude in how they move forward.

At ANSYS, we call this *engineered scalability* — guiding principle number four. Why "engineered"? Our scalability is by design and is specifically engineered into the technology we have developed. The depth of our technology allows customers to choose the appropriate level of technology for their needs yet scale upward as their requirements evolve and grow. If the customer is a small company with just a desktop or modest compute resources, or if it is large with hundreds of machines in large-scale compute clusters, our software runs efficiently and brings value. In a similar vein, if the number of users is very small or in the hundreds, scalable deployment has been factored in. Likewise, if the customer is an infrequent user, a designer who wants to perform a simple simulation or an expert analyst, we have the appropriate level of tool for each of those levels of experience. Underpinning this seamless range of capability — from the automated to the most sophisticated and customizable — is the same advanced technology, scaled up or down accordingly.

Technology isn't of much use to the customer if it's extremely inflexible to apply, scalable or otherwise. All of it must be usable in a way that makes sense for the company and its design and development processes, as well as alongside other programs it may have selected for their engineering systems strategy. The vision needs to be flexible and adaptive, not rigid and constraining. In this regard, ANSYS adheres to a fundamental tenet of *adaptive architecture* — the fifth

guiding principle. We recognize the mission-critical nature of what we provide and also how crucial it is that our technology fits within the customer's overall system. There can be CAD systems, selected third-party codes for niche applications, or legacy and in-house software, all of which remain critical components of the overall process. We need to coexist with these and, in fact, enable them to be included in the overall workflow as painlessly as possible.

Many companies are investing in product lifecycle management (PLM) systems. These constitute a major investment and require data exchange with the simulation software. The ANSYS Workbench platform and the new ANSYS Engineering Knowledge Manager (EKM) technology are designed to provide functional coexistence with PLM systems, which actually improves their value to the customer. *Adaptive architecture* means what it says — ANSYS products and technology can adapt to the customer's specific situation. We can be the backbone, coexist peer-to-peer or be a plug-in, whatever the need may be.

Five simple phrases — *unequalled depth, unparalleled breadth, comprehensive multiphysics, engineered scalability and adaptive architecture*. These five tenets are what drive our product development strategy with every dollar we invest. We also think they are the reason that 96 of the top 100 industrial companies on the *FORTUNE* Global 500 list, as well as another 13,000 customers around the world, use technology from ANSYS. The ANSYS simulation community today is the world's largest, and by continuing to pursue our strategy of Simulation Driven Product Development and adhering to these five guiding principles, we see no reason why our vision of placing simulation tools in the hands of every engineer shouldn't become a reality in the near future. ■