ANSYS 17.0: An Innovation Platform to Achieve Simulation-Driven Product Development

CIMdata Commentary

Key takeaways:

- *Global market leaders in multiple industries are rapidly expanding their strategic use of virtual prototyping and simulation starting early in the product development process to gain a competitive advantage via innovation, quality, and time to profit*
- *Product innovation platforms are emerging to meet the needs of next generation systems and product development in Industry 4.0- and the Internet of Things (IoT)-enabled environments*
- *ANSYS® is successfully integrating a spectrum of multi-physics analysis solutions across the domains of mechanical, electronics, and software engineering to enable systems-level conceptual design and optimization*
- *ANSYS 17.0 enhancements are focused on improving the productivity of global distributed engineering product teams of simulation, analysis, and design engineers*

Virtual prototyping and simulation tools have increasingly become an indispensable element of the engineering product development process. Simulation technologies in areas such as mechanical (e.g., structural analysis, thermal analysis, thermo-fluid, and computational fluid dynamics), electrical (power characteristics, electromagnetics analysis), and embedded software let engineers quickly and cost-effectively investigate "what-if" scenarios, explore new ideas, evaluate more alternatives, and gain deeper insights into how a product will behave throughout its lifecycle given its design requirements. When used early in the conceptual design, and then throughout the product lifecycle, these tools have become powerful enablers for developing high quality products as well as enabling innovative and cost-effective design processes. Virtual prototyping and simulation have now moved well beyond just being design check tools or an alternative to minimize physical testing and validation cycles. Leading manufacturers and their extended supply chains now utilize virtual prototyping as a strategic element of their product development process that, if effectively deployed and managed, can provide a significant competitive advantage in today's highly competitive global markets.

As product complexity continues to grow and industry moves rapidly towards smart products with ever-higher levels of electronics and embedded software content in the Industry 4.0 and Internet of Things environments, the need for open and standards-based product innovation platforms that can connect data, processes, and knowledge across functional domains will be critical. To achieve the vision and business benefits of model-based engineering initiatives, integrated virtual modeling and simulation (M&S) capabilities must be at the core of engineering IT platforms and related software solutions to enable innovative product ideation and quality-centric product realization in a highly profitable and timely manner.

CIMdata forecasts that as advanced M&S tools are integrated across major engineering disciplines (i.e., mechanical, electrical/electronics, software, chemical, materials, etc.) within the context of a product innovation platform, significant business benefits will be realized by the extended enterprise. For additional information on the emergence and impact of product innovation platforms, see www.engineering.com.

The ANSYS 17.0 Workbench Platform™

The ANSYS 17.0 release represents a major step forward in providing a unified multi-physics, multi-domain, and multi-scale platform for behavior modeling and simulation of complex products and systems. This release illustrates how the ANSYS Workbench is rapidly evolving from a portfolio of simulation and analysis software tools into an integrated behavior modeling and simulation environment that supports and enhances the ability of engineers across multiple domains to collaborate in the design and optimization of innovative products and systems.

The integration of a number of new technologies developed and acquired by ANSYS (most notably the technologies acquired from ANSOFT Technologies, Apache Design, Delcross Technologies, Esterel Technologies, Evolutionary Engineering, Fluent, Newmerical Technologies, Reaction Design, and SpaceClaim) have significantly extended the breadth and depth of behavior modeling, simulation, and design optimization capabilities available within ANSYS 17.0 for developing today's complex systems, especially in the cyber-physical realm. For more information on ANSYS 17, please visit http://ANSYS.com/17.

In addition to integrating these acquired simulation technologies, the ANSYS 17.0 release provides enhanced functionality for complex systems modeling of large-scale assemblies. High performance computing (HPC) solutions with 10X+ performance improvements have been made across the platform and include fluids, structures, and electromagnetic simulation. Organizations can leverage this power on any IT configuration from desktops to cloud environments to obtain their simulation results sooner.

In particular, ANSYS has focused their 17.0 research and development efforts on providing more complete and integrated multi-physics and multi-domain solutions for targeted industry applications such as:

- Comprehensive chip to package to system design capabilities for ever smaller yet higher power density devices needed in electronics and semiconductors
- Improved power integrity, thermal cooling, and reliability of printed circuit board and electronic component designs
- Transient and start-up electromagnetic field simulation of electric motors and generators
- Modeling antennas in detail as a critical component of on-board cyber-physical systems and simulating the complete system to ensure superior signal integrity
- Modeling of fabricated and composite structures to enable "lightweighting" for cost reduction and energy efficiency
- Enabling additive manufacturing processes with new processes and materials
- Development, testing, and certification of embedded software used in safety-critical applications in aircraft, space, automotive, and rail systems
- Turbomachinery multi-stage blade configuration and design analysis across an ever wider array of in-service operating conditions yet requiring much less compute cycle time and IT resources

Democratization of simulation via capturing computer-aided engineering analyst best practices and simulation process workflow automation can enable a broader range of engineers and designers to effectively use simulation tools in the context of their daily product

development activities. This “Holy Grail” of simulation has been an elusive goal of engineering software providers for several decades, but now real progress is being made in the area of robust simulation applications that can be effectively deployed in global organizations and safely leveraged by engineers who are not experts in the underlying simulation tools and technologies, further democratizing their use.

To address this industry need, ANSYS AIM is a new integrated 3D solution for single physics analysis (e.g., linear structural) or multi-physics simulations (e.g., coupled structural-thermal) that provides access to the breadth of ANSYS tools in an easy to use environment, built from the ground-up on the ANSYS Workbench platform. AIM’s intuitive user environment allows a spectrum of engineers and designers to perform engineering simulations from start to finish using task-based simulation workflows in a single, simplified user environment.

ANSYS is also working to protect its customers’ investments in modeling and simulation by embracing industry standards for data and model interoperability across engineering domains and supply chains such as: ARINC 664/661, FACE, AUTOSAR, SysML, VHDL-AMS, and the Modelica system modeling language and the related FMI/FMU standard (Functional Mockup Interface/Functional Mockup Unit).

CIMdata forecasts that no single PLM software provider will be able to provide all the required enterprise innovation platform functionality in the near to medium term. As such, viable modeling and simulation platform providers will need to have an open partnering strategy with the major PLM, ALM, MCAD, ECAD, and systems engineering platforms as well as other modeling and simulation environments and tools. The ANSYS Workbench platform has been developed with this strategy in mind and is interoperable with all the major computer-aided design and product lifecycle management solutions, as well as with a multitude of modeling and simulation solutions from ANSYS’ partner eco-system.

CIMdata believes the ANSYS 17.0 release is compelling evidence that ANSYS has succeeded at creating an M&S innovation platform infrastructure that is open and extensible based on industry standards. ANSYS is well positioned to provide comprehensive and high performance systems modeling and simulation capabilities for a wide range of engineers in globally distributed enterprises—throughout the product development process. As a result, CIMdata believes that the ANSYS platform should be given strong consideration as a core M&S environment for use by global organizations, particularly where innovative electronics content and software functionality are the key competitive differentiators.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise’s ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata services, visit our website at http://www.CIMdata.com or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.