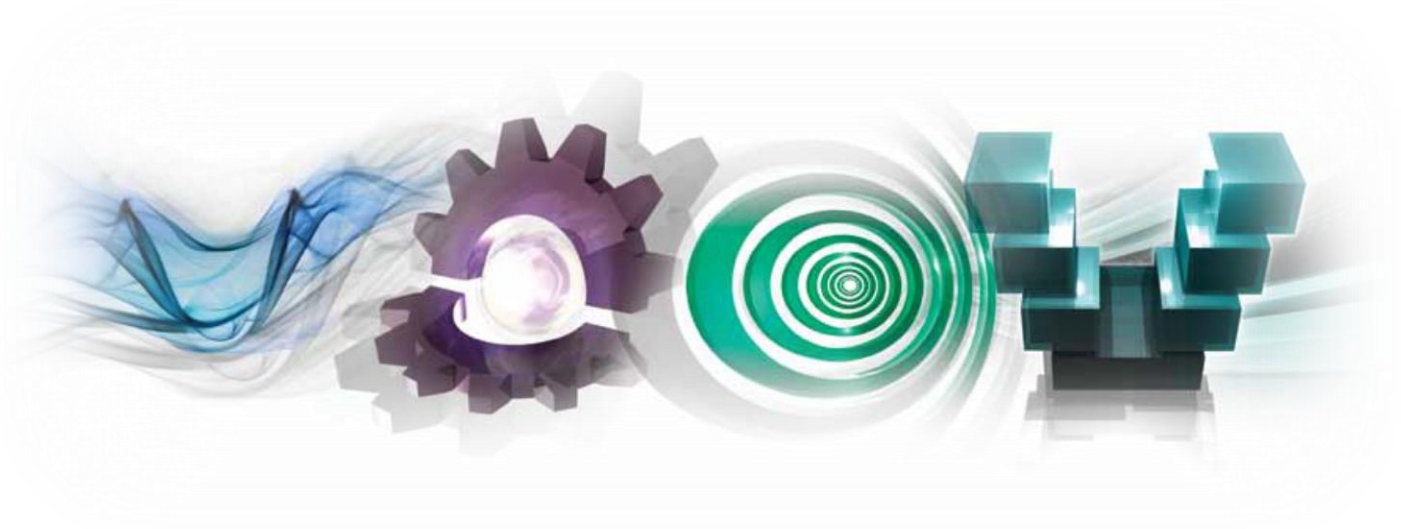

# Information for Media

An introduction to ANSYS, Inc., a leading provider and innovator of engineering simulation software

ANSYS®

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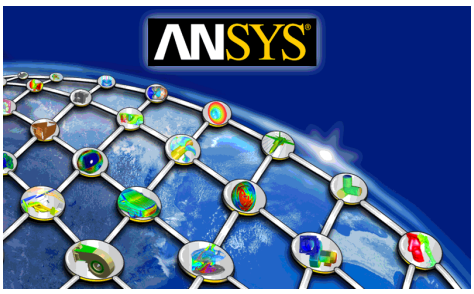


## *INTRODUCTION*

ANSYS, Inc. is one of the world's leading engineering simulation software providers. Its technology has enabled customers to predict with accuracy that their product designs will thrive in the real world. The company's focus is to offer a common platform of fully integrated multiphysics software tools designed to optimize product development processes for a wide range of industries, including aerospace, automotive, civil engineering, consumer products, chemical process, electronics, environmental, healthcare, marine, power, sports and others. Applied to design concept, final-stage testing, validation and trouble-shooting existing designs, software from ANSYS can significantly speed design and development times, reduce costs, and provide insight and understanding into product and process performance.

ANSYS software not only delivers efficiency, it drives innovation. The technology's ability to go beyond physical constraints and perform simulated tests that would otherwise not be possible is critical to exploring and expanding operational boundaries in developing leading-edge products and processes. In this way, modeling and simulation can be used to drive new solutions rather than to merely verify existing ones. ANSYS calls this process Simulation-Driven Product Development™.

## *HISTORY OF THE COMPANY*

### *Swanson Analysis Systems Inc. and the Birth of Engineering Simulation*

The company now known as ANSYS was founded in 1970 in a small town south of Pittsburgh, Pennsylvania, in the United States, thanks to the vision of John A. Swanson. He had worked during the 1960s as a manager of structural design at Westinghouse Astro-Nuclear Laboratories, where he used finite element analysis (FEA) algorithms to solve structural problems for the nuclear industry.

At that time, computer technology was in its infancy. Although the calculations that form the basis of FEA were known, they had to be laboriously worked out by hand. Swanson was aware that computer technology was advancing rapidly; he recognized the opportunity this offered for huge improvements in calculating FEA algorithms to benefit engineering. By 1970, computer technology progressed enough to be sufficiently affordable, powerful and, therefore, accessible to the general engineering community. But there was no existing software that allowed FEA simulations to be performed. Swanson took the next step to meet this need: He founded Swanson Analysis Systems Inc. (SASI) to develop and market finite element analysis software for structural physics that could simulate static (stationary), dynamic (moving) and heat transfer (thermal) problems.

### *ANSYS, Inc. Is Created*

SASI developed its business in parallel with the growth in computer technology and engineering needs. The company grew by 10 percent to 20 percent each year, and in 1994 it was sold. The new owners took SASI's leading product, called ANSYS®, as their flagship product and designated ANSYS, Inc. as the new company name.

Since that time, Swanson has been honored for his contributions to engineering, including awards such as the John Fritz Medal in 2004, the highest award in the engineering profession given for industrial or scientific achievement by the American Association of Engineering Societies, and the American Society of Mechanical Engineers (ASME) Presidents Award in 2006.

From 1994 to the present, ANSYS has continued to grow. It was listed on the NASDAQ stock exchange in 1996, where it has been consistently acknowledged as one of the fastest-growing companies in the United States, landing on many national "strong performers" lists, including *The Wall Street Journal*, *Forbes*, *Business Week*, *Business 2.0*, *Baseline*, *Software Magazine* and *FORTUNE Small Business*. Today, almost all of the top 100 industrial companies on the "*FORTUNE* Global 500" invest in ANSYS engineering simulation as a key strategy to win in a globally competitive environment. The company has maintained consistent growth year after year, reinvesting approximately 15 percent of its revenues back into research and development.

### *ANSYS Grows into a Global, Full-Spectrum Engineering Simulation Solutions Provider*

The company has grown both organically and through acquisition throughout its drive toward offering an integrated, full-spectrum portfolio of engineering simulation solutions. It has enhanced its flagship multiple physics analysis tools (including, ANSYS Multiphysics™, ANSYS Mechanical™ and ANSYS Structural™ solutions) while developing new products to meet the ever-expanding need for advanced engineering simulation. At the same time, it has executed a number of strategic acquisitions, enabling it to offer leading technology across engineering disciplines. Early expansion efforts included flow simulation — known as computational fluid dynamics (CFD) — along with pre-processing, solving and post-processing tools that together account for the process of computer-aided engineering (CAE).


ANSYS acquired ICEM CFD Engineering and its ICEM CFD pre- (meshing) and post- (visualization) processing tool in 2000. In 2001, it acquired CADOE S.A. along with its DesignXplorer tool that allows advanced and efficient interrogation of engineering simulation post-processing results. In 2003, ANSYS purchased CFX, one of the world's leading fluid dynamics tools, from AEA Technology PLC. In 2005, it acquired Century Dynamics Inc. and its specialized Autodyn CFD tool for explicit analysis (such as modeling explosions). That same year, ANSYS acquired Harvard Thermal Incorporated, giving the company tools for electronics cooling analysis.

In 2006, ANSYS acquired Fluent Inc., a provider of CFD simulation software for both expert users and design engineers. The integration of Fluent broadened the ANSYS customer base and added to its already existing CFD capacity, giving the company depth in computational fluid dynamics that is second to none. As a result of the acquisition, ANSYS gained the expert Fluent tool and FLUENT® for CATIA® V5, a solution fully embedded in the CATIA production lifecycle management (PLM) environment.

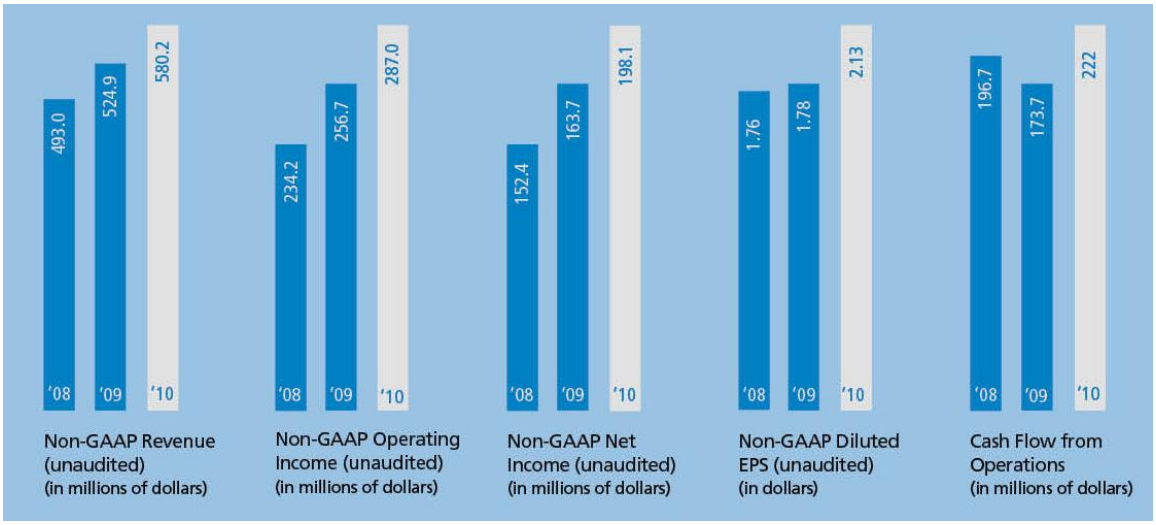
In 2008, ANSYS acquired Ansoft Corporation, a leading developer of high-performance electronic design automation (EDA) software, and added a suite of products designed to simulate high-performance electronics designs found in mobile communication and internet devices, broadband networking components and systems, integrated circuits, printed circuit boards, and electromechanical systems. The acquisition allowed ANSYS to address the continuing convergence of the mechanical and electrical worlds across a whole range of industry sectors.

In 2011, ANSYS added Apache Design Solutions to its list of acquired companies. Apache's software solves power noise and reliability challenges for chip-package-system designs, such as smart-phones, tablets and hand-held devices. The combination of Apache's chip-level power, thermal, signal and EMI modeling solutions, along with the ANSYS full portfolio (including system electro-magnetic, thermal and mechanical simulation) enables faster convergence for next-generation low-power, energy-efficient designs.

Today, the suite of engineering simulation tools from ANSYS is a solution set of unparalleled breadth that goes well beyond FEA and CFD to include interoperative structural, fluid flow, thermal, electromagnetics and related technologies. As such, the company's products offer the ability to perform comprehensive multiphysics analysis, critical for high-fidelity simulation of real-architecture that integrates components — these capabilities make ANSYS a leading engineering simulation provider.

## *ANSYS TODAY*

Today, ANSYS has more than 60 strategic sales locations throughout the world in addition to a substantial network of channel partners. Combined with its subsidiaries, ANSYS employs over 2,000 people, making it a truly global company. The continued investment in the development of fully integrated CAE software and services has placed it at the vanguard of advances in engineering simulation and has helped build a successful company that derives its strength from consistent growth.




*2010 ANSYS, Inc. revenue, operating income, net income, diluted EPS and cash flow from operations*

## *RECOGNITION AND ACCOLADES*

Products from ANSYS are used by innovative companies all over the world in a variety of applications:

- ANSYS products are used around the world by almost all of the top 100 industrial companies on the *FORTUNE* Global 500 list.

- ANSYS products are used by 16 of the top 20 most innovative companies in the world today, according to a *BusinessWeek* report prepared by The Boston Consulting Group.

ANSYS has been recognized as a strong performer by a number of sources:

- *FORTUNE*'s **Fastest-Growing Companies** list (2010, 2009) includes profitable, publicly traded companies with at least $50 million in annual revenue and a market capitalization of at least $250 million, with yearly revenue and earnings per share growth of at least 20 percent. In 2010, ANSYS ranked number 39 overall, the only engineering simulation provider to make the list.

- *The Wall Street Journal* **Shareholder Scoreboard** (2007), an annual ranking of 1,000 companies in 75 industries based on their stock performance over the past year and other time periods. In 2007, ANSYS ranked number nine on the best performers' 10-year list, with a 36.8 percent average annual return for a decade. In addition, ANSYS was ranked number one in the Software Industry Group with a one-year return of 90.7 percent, as well as number 14 on the Scoreboard's Honor Roll, a compilation of companies that earned straight-A ratings, ranked on five-year average compound annual total returns through year-end 2007.

- Deloitte's **Technology Fast 500** (2010, 2009), a ranking of the fastest growing technology, media, telecommunications, life sciences and clean technology companies in North America based on percentage of fiscal year revenue growth during the previous five-year period. In 2010, ANSYS ranked at number 377, with GAAP revenue growth of 227 percent.

- Oliver Wyman's **Shareholder Performance Index**SM (2010, 2009, 2008), a ranking of the top 450 publicly quoted companies worldwide in the communications, media and technology sectors. In 2008, with an overall SPI score of 317 — three times the average — ANSYS placed 21st out of the 450 CMT companies on the list. In the technology sector, ANSYS ranked fifth, just behind well-known computer and consumer electronics manufacturers.

- *Software Magazine's* **Software 500** (2011, 2010, 2009, 2008, 2007), a ranking of the world's largest software and service providers. In 2010, ANSYS ranked number 92. With software revenue of $516.9 million, ANSYS led the list's primary business sector of engineering.

- **Software Top 100**™ (2011, 2010, 2009, 2008, 2007), the leading and independent online overview of the world's largest software companies compiled by the Netherlands-based Top 100 Research Foundation. Companies are ranked according to their revenues coming from "prepackaged'" software sales. In 2009, ANSYS ranked number 75.

- CIOZone list of 40 **Fastest-Growing Big Software Vendors** (2007), based on revenue and profit of publicly held software companies in the United States. Ranked fifth in 2007, ANSYS was one of only two engineering simulation software companies that made the list.

- The **CRO** (Corporate Responsibility Officer) (2009), an annual ranking of Russell 1000 companies using publically available data, considering financial, employee relations, governance, philanthropy, human rights, environment and climate change issues

- *Forbes* magazine's **Fast 15** list (2008, 2007), a compilation of attractive companies with potential to become rapidly growing technology businesses (in anticipation of qualifying for *Forbes'* America's 25 Fastest-Growing Tech Companies list)

- *Forbes* magazine's 200 **Best Small Companies** (2010, 2009, 2007, 2005, 2004, 2003, 2002, 2000), for which businesses must clear a series of exacting hurdles, including five-year sales and earnings-per-share (EPS) growth rates of at least 5 percent and net income of more than $1 million during the past four quarters. ANSYS ranked 63rd in 2010, the eighth time the company made the list over the past 11 years.

- *FORTUNE Small Business* **Fastest-Growing** list (2006, 2005, 2004), compiled by financial research firm Zacks by screening annual reports for public companies with annual revenue of less than $200 million and a stock price of more than $1; companies are ranked based on earnings growth, revenue growth and stock performance over the past three years. In 2006, ANSYS ranked number 63, advancing significantly from its position on the previous year's list (90). It was the third consecutive year that the company made the list.

- *Baseline* magazine's 40 **Fastest-Growing Software Companies** (2007), a survey that amounts to a health check on the enterprise software industry. In 2007, ANSYS ranked 63rd out of 84 organizations that made the list.

- 01consulting (2008), which specializes in evaluating the CAE industry in Europe, cited ANSYS as the continent's leader in engineering simulation software sales

- *Business 2.0* magazine's **B2 100** (2006, 2005, 2004, 2003, 2002), which ranks the fastest-growing technology companies based on a review of 2,000 publicly traded companies. In 2006, ANSYS made the list for the fifth consecutive year, ranked 61st overall.

- *BusinessWeek* magazine's list of 100 **Best Small Hot Growth Companies** (2004, 2003, 2001, 2000, 1999), which evaluates organizations based on sales growth, earnings growth and return on invested capital

Stock indexes

- Effective 2008: **Russell 1000 Index**; membership is determined by market cap and current index membership

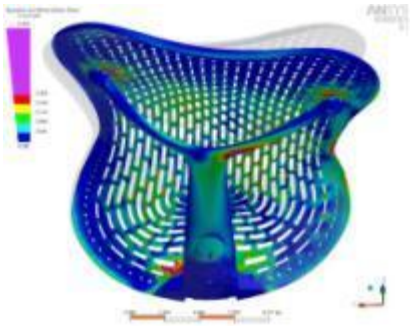
- Effective 2008: Cleantech Group's **Cleantech Index**, which is the first stock market index to reflect the global demand for clean technology products and services

- Standard & Poor's **MidCap 400**, a market capitalization-weighted benchmark index made up of 400 securities with market values between $200 million and $5 billion

- Standard & Poor's prestigious annual **Global Challengers List™**, a roster of mid-sized companies that show the "highest growth characteristics." The list designates mid-size companies that show growth characteristics along dimensions encompassing intrinsic and extrinsic growth, which are expected to emerge as challengers to the world's leading companies.

## *WHAT IS ENGINEERING SIMULATION?*

Engineering simulation is one of the fastest-growing branches of engineering worldwide. In simple terms, it is the application of engineering software tools to the design process, enabling the ability to virtually test operational performance of either existing or potential designs for products or processes.



*A chair back analyzed through virtual prototyping to determine the coupled response of the back and its supporting spine*

Without engineering simulation tools, physical prototypes for each design candidate must be built and tested through physical experimentation. Small amendments to a design may require manufacturing and testing an entire new prototype, delaying development and increasing costs. Furthermore, a test may yield final results that show a design to be successful but without any indication or explanation as to how and why it is so.

By applying engineering simulation tools to the design process, the need for substantial physical prototyping and experimentation is reduced. Instead, multiple design candidates can be tested quickly and efficiently under a wide range of scenarios, some of which may be impossible to replicate experimentally. Results can be displayed in data formats or via three-dimensional still images or animations, which allow an engineer to visualize and understand exactly how and why a design performs in any given scenario. This knowledge enables an R&D team to rapidly optimize products and processes, speeding design and development times, reducing costs, and contributing to product efficacy.

The process required to perform an engineering simulation — whether multiphysics, structural (FEA), fluid flow (CFD), thermal or electromagnetics — consists of three steps:

- Pre-processing
- Solving/processing
- Post-processing

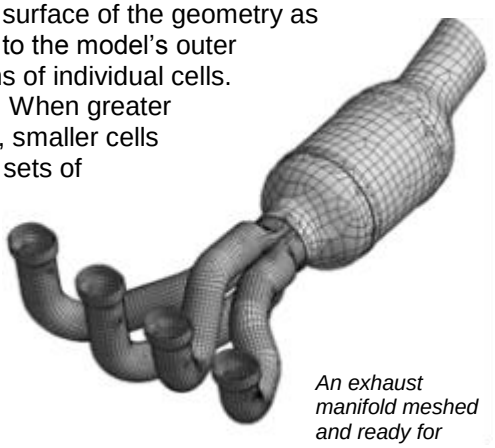
Products within the simulation software portfolio from ANSYS enable these three steps.


*Simulation of air flow pathlines and pressure contours around a Formula One car* Courtesy BMW F1 Team.

### *Pre-Processing*

To start pre-processing, a computer representation of the object or process is required; typically, this is a computer-aided design (CAD) geometry imported into the engineering simulation software. It is possible to construct a representative geometry from scratch using software tools from ANSYS. The CAD files sometimes import with rough, inaccurate edges that must be cleaned up, or they will render a simulation inaccurate. Tools from ANSYS can address this as well. The outer boundary for the model is set, which limits simulation to a defined area to speed the solving process.

Next, a computational mesh is created that covers every surface of the geometry as well as all volumes of space in and around the geometry to the model's outer boundary. In some cases, the mesh can comprise millions of individual cells. The complexity of the mesh is a significant factor as well. When greater accuracy of results is required, such as a boundary layer, smaller cells must be used in localized mesh. The computer will solve sets of fundamental mathematical equations for each individual cell to arrive at an overall simulated prediction for the model.



*An exhaust manifold meshed and ready for solving*

Known parameters are then assigned, such as flow velocities, temperature, pressure, stress loads and other factors, that will influence the operational performance of a product or process-system being studied. This prepares the model for solving.

### *Solving/Processing*

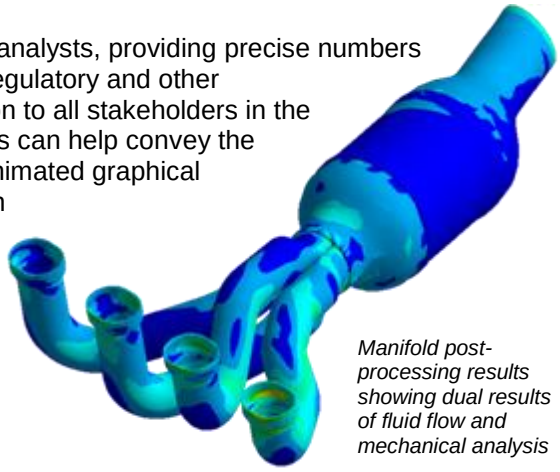
Engineering simulation software uses a series of computational procedures involving applied forces and the properties of the elements to produce a model solution. Solving can be instigated at the click of a mouse button. The software and hardware work together to assert their power, performing millions of complex calculations per second.

The physics equations upon which such simulations are based have been known by science for more than 100 years. Up until the 1940s, they were calculated by hand, with a number of engineers working in tandem to arrive at the solution. Today, one computer can conduct this work on far more complex problems, and, depending on the size and complexity of the model being simulated, a solution is possible in as little as a few minutes. Generally, the more cells there are in a simulation, the longer it will take a computer to arrive at a solution. The solution speed can be increased with greater compute power.

### *Post-Processing*

Simulation results can be studied to fully identify implications of the analysis. Quantitative (numerical or tabular) and qualitative (graphical) tools allow the engineer to pinpoint the precise location of data, such as stresses and deflections.

Tabular data is especially useful to engineers and analysts, providing precise numbers that can be used to meet design, manufacturing, regulatory and other requirements. To help communicate this information to all stakeholders in the design process (engineer or not), visualization tools can help convey the simulation outcome quickly. A variety of still and animated graphical representations of the results can prove valuable in revealing problems and determining where further study work should be concentrated.



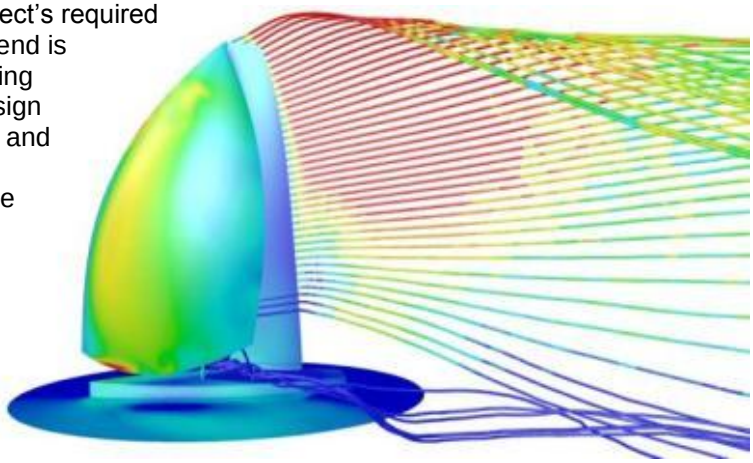
*Manifold post-processing results showing dual results of fluid flow and mechanical analysis*

### *High-Performance Computing*

High-performance computing, or HPC, refers to the use of high-speed processors (CPUs) and related technologies to solve computationally intensive problems. In recent years, HPC has become much more widely available and affordable, primarily due to the use of multiple low-cost processors that work in parallel on the computational task. Today, clusters of affordable compute servers make large-scale parallel processing a very viable strategy for ANSYS customers. In fact, the new multi-core processors have turned even desktop workstations into high-performance platforms for single-job execution.

This wider availability of HPC systems is enabling important trends in engineering simulation. Simulation models are getting larger — using more computer memory and requiring more computational time — as engineers include greater geometric detail and more-realistic treatment of physical phenomena. These higher-fidelity models are critical for simulation to reduce the need for expensive physical testing. HPC systems make higher-fidelity simulations practical by yielding results within the engineering project's required time frame. A second important trend is toward more simulations — enabling engineers to consider multiple design ideas, conduct parametric studies and even perform automated design optimization. HPC systems provide the throughput required for completing multiple simulations simultaneously, thus allowing design decisions to be made early in the project.

By partnering with key hardware vendors, ANSYS delivers on its commitment to engineered scalability and in providing customers with the best engineering simulation solutions available.



*Large-scale simulation of the surface pressures on the sail of an America's Cup racing yacht. Such analysis has the potential to include some of the most complex physics effects possible, with hydrodynamic and aerodynamic fluid flow and stiffness among the structural physics involved. Resolving large problems requires the use of high-performance computing.*

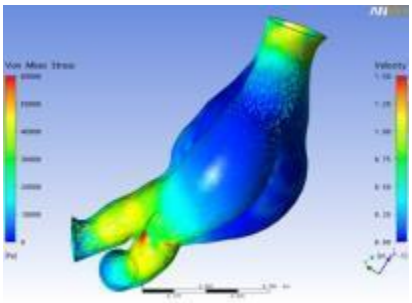
Courtesy I.M. Viola.

### *Partnerships*

ANSYS works with a number of independent software vendors to provide interoperability and integrated solutions that extend the functionality and efficiency of the simulation process. For example, since engineering design and development uses a multiplicity of CAD products, ANSYS partners with leading CAD/PLM developers to ensure an efficient workflow. Other areas that involve software partnerships include acoustics, aeroelasticity, chemical reaction, composites, electronics, fatigue, materials data, mold design, radiation and turbomachinery, among others.

## *MULTIPHYSICS ANALYSIS*

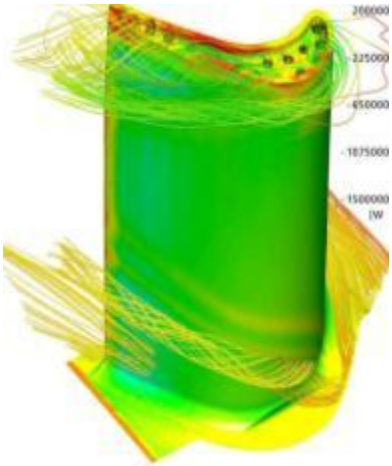
To help ensure that products are successful, engineering and design teams must accurately predict how complex products will behave in a real-world environment — one that changes continuously and involves the interaction of multiple types of physics. High-fidelity multiphysics simulation software allows users to create virtual prototypes of their designs operating under such real-world conditions, predicting the interactions between structural mechanics, heat transfer, fluid flow and electromagnetics. A single, unified engineering simulation environment harnesses the core physics and enables their interoperability, which is critical for a quality solution. It also provides common tools for interfacing with CAD, repairing geometry, creating meshes and post-processing results.



*Fluid–structure interaction of an aortic aneurysm*

.A common multiphysics solution is fluid structure interaction (FSI). In such a coupled scenario, the flow of fluid causes deformation of a solid structure; this deformation, in turn, changes the behavior of the fluid. For example, the flow of air around an airplane wing causes the wing to deform. As the wing deforms, it causes the air pattern around it to change. By strongly coupling the physics, the analysis evolves as a system to produce an accurate solution.

Another multiphysics scenario is thermal–mechanical coupling, in which structures deform and their material properties change according to temperature. In electric–thermal interaction, current flowing in conductors generates resistive/Joule heating.



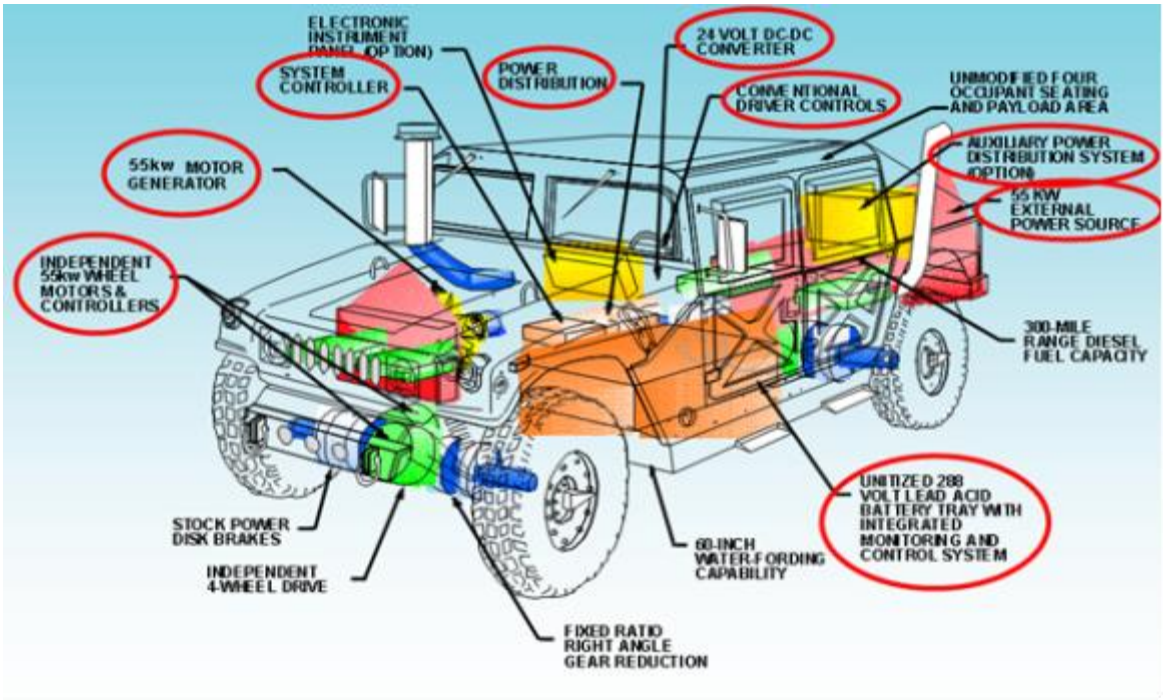
*Multiple physics analyses used to determine heat flux distribution of a turbine blade*
Courtesy Wood Group Heavy Industrial Turbines AG.

Multiphysics engineering simulation offers solutions for single-physics analysis as well. Two of the main branches are mechanical or structural finite element analysis and computational fluid dynamics.

Mechanical or structural analysis simulates how structures perform under external forces or the effects of temperature. It is based on finite element analysis, or FEA, a numerical method often used to model structures. CFD analysis is the simulation of fluid flow (liquids, gases and combinations of the two) as well as chemical reactions and heat transfer (temperature). It also is referred to as airflow modeling or fluid dynamics. Using an example of a jet plane wing, mechanical analysis could be used to predict how the wing holds up in flight under various air pressures and temperatures. The stiffness of the wing can be assessed and its operational performance thresholds identified. CFD could be used to predict air flows around the wing along with the resultant lift and drag.

FEA also can be applied to electronic design automation for designing and producing electronic systems ranging from printed circuit boards (PCBs) to integrated circuits. This is sometimes referred to as ECAD (electronic computer-aided design). Engineers use these products to simulate high-performance electronics designs found in mobile communication and internet devices, broadband networking components and systems, integrated circuits, printed circuit boards and electromechanical systems.

Because electronics are now integral to many products from automobiles to coffee makers to industrial equipment, true virtual prototyping must encompass all design aspects of those products.

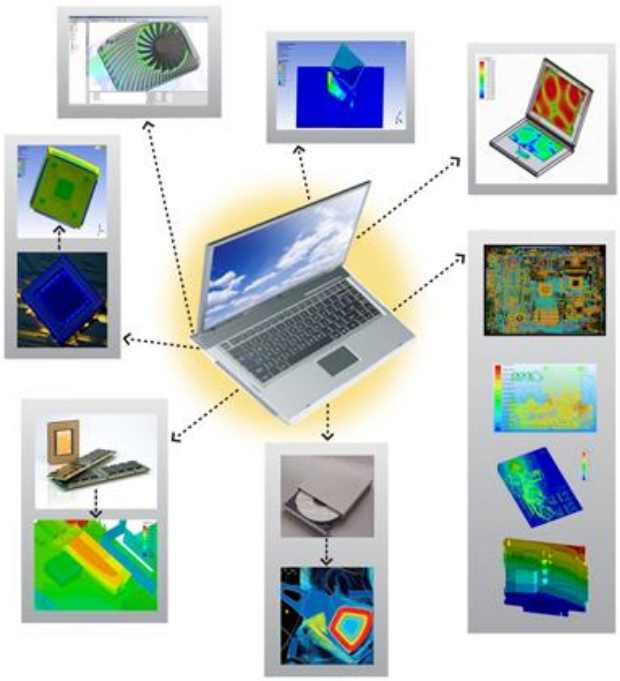



*Mechanical and electronic convergence in an automobile*

Other engineering simulation fields include electromagnetics, which enables the calculation of magnetic fields in products such as electric motors. There are specialized disciplines as well, such as explicit dynamics.

Previously, solving such coupled applications with conventional analysis programs meant going through numerous manual file transfers, data exchanges and problem setups for performing each physics analysis. Such cycles were cumbersome, error-prone and time-consuming, with the analysis often taking days or weeks to perform. Moreover, users were required to learn and maintain several different software codes.

These issues are being addressed by multiphysics solutions that automatically combine the effects of two or more interrelated physics within one unified environment. Solutions from ANSYS automatically manage data exchange between the different physics to perform coupled analysis without requiring users to spend time manually performing these tasks. As a result, coupled analyses can be performed in a fraction of the time otherwise required, providing for greater solution accuracy and allowing users to



*An integrated engineering simulation solution can help product developers meet product integrity challenges.*

explore a much broader range of engineering parameters in a given time to facilitate innovation in multiphysics designs.

The complexity being engineered into new products — such as fiber-optic and wireless networks, computers that fit into a pocket, LED screens that mimic paper and tracking chips in pets — means more capability is being crammed into smaller spaces, delivered faster at ever-lower prices. Where once it was adequate to develop a design deemed “acceptable,” product engineers look to develop an optimal design, not just a good design. All this is leading to the need for a systems approach to design problem solving, one that goes beyond simply optimizing parts or individual components.

A systems approach requires a holistic view of how subsystems of a product interact with each other and in harmony with users and complex environments. The interrelationships between facets of the system must be understood and tuned, so the system as a whole can be optimized. Finally the product must be tested against a wide range of usage scenarios, such as physical components cross talking over each other.

A key enabler to solving these problems is increased computer power coupled with advanced engineering simulation capable of accurately resolving huge amounts of information. This can help ensure that products will behave as intended in a real-world environment.


*ANSYS delivers technology that enables customers to study how products will behave in the real world, where multiple forces interact. Smart Engineering Simulation™ in a wind power application considers many facets individually and as a system, from blade design to electronic components to site selection.*

# *THE ANSYS SOFTWARE PRODUCT OFFERING*

ANSYS offers a comprehensive range of engineering simulation solution sets, giving users access to virtually any field of engineering simulation that their design process requires. ANSYS believes engineering simulation should be as easy and efficient as possible in order to ensure that users get the best value. With this in mind, the product portfolio has been developed to meet three key user requirements:

- To provide the best type of software tool for the user's needs, whatever that may be — FEA, CFD, electronics, etc.
- To provide the most suitable grade and scope of tool for the user's needs
- To provide a fully integrated engineering simulation environment, giving the user the flexibility to run multiphysics analyses within one single environment and to upgrade or downgrade their software without issues of compatibility

Together, these principles help ensure that ANSYS provides a full-portfolio engineering simulation capability that adds value to the engineering design process, rather than a solution that only partially solves problems.

A number of factors set ANSYS engineering simulation software apart from other CAE tools:

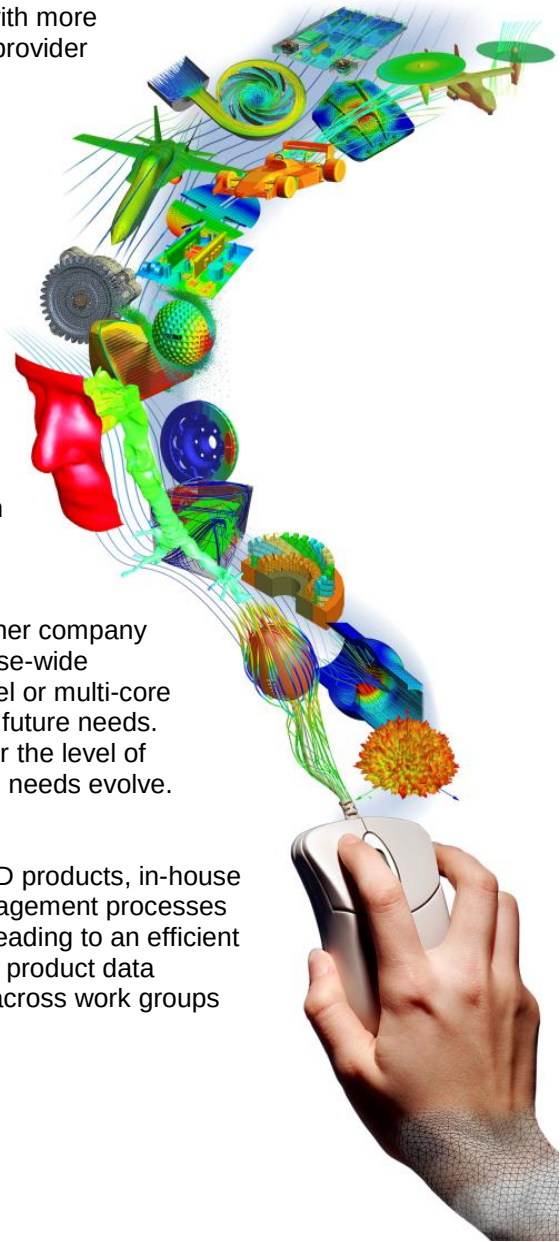
- **Unequalled depth**
  Within a specific physics discipline, software from ANSYS allows users to drill deeper to solve a wider range of problems as well as to deal with more complex scenarios. No other engineering simulation software provider offers this depth of technical capability.

- **Unparalleled breadth**
  Technology from ANSYS spans a wide range of disciplines. Whether the need is structural analysis, fluids, thermal, electromagnetics, explicit analysis, system simulation or data management — no matter the industry — products from ANSYS help businesses to succeed. ANSYS is unique in the breadth and number of engineering simulation tools it offers.

- **Comprehensive multiphysics**
  Using technologies from ANSYS in a truly coupled manner, development engineers can arrive at real-world solutions. The comprehensive multiphysics portfolio allows users to perform simulation and analysis using multiple coupled physics — all in an integrated environment.

- **Engineered scalability**
  ANSYS has designed flexibility into its suite of products. Whether company requirements call for novice or expert usage; single or enterprise-wide deployment; first-pass or complex analyses; or desktop, parallel or multi-core computation, this engineered scalability can meet present and future needs. ANSYS is the only simulation software provider that can deliver the level of capability that the customer needs, without limitations as those needs evolve.

- **Adaptive architecture**
  Engineering design and development uses a multiplicity of CAD products, in-house codes, material libraries, third-party solvers, product data management processes and other tools. Software from ANSYS is open and adaptive, leading to an efficient workflow — unlike systems that are rigid and inflexible. And its product data management allows knowledge and experience to be shared across work groups and the enterprise.



***ANSYS 14***

The latest version of engineering simulation software from ANSYS is release 14, launched late in 2011. This Smart Engineering Simulation™ solution from ANSYS empowers engineers to dramatically compress design and analysis cycles, perform parametric studies and design optimization across multiple physics, increase the accuracy and completeness of virtual prototypes, and capture and reuse simulation processes and data. The most comprehensive engineering simulation solution available, the ANSYS 14 software suite supports fast product design and validation in a complete, highly usable virtual environment that captures complex and coupled physical phenomena — providing a high degree of confidence in product designs. ANSYS 14 allows engineers to access an unequalled depth and breadth of technology to compress their design processes, and to create innovative products both rapidly and cost effectively — while reducing the time and money invested in physical prototype development and testing.

The technology builds on the foundation of previous ANSYS releases, delivering new benefits in four major areas:

- **Greater fidelity via new solver methods:** As engineering requirements and design complexity increase, simulation software must produce more accurate results that reflect changing operating conditions over time. ANSYS 14.0 features new multiphysics coupling solutions that produce higher-fidelity results in dynamic simulation environments, among other new features.

- **Higher productivity built on an adaptive architecture:** ANSYS 14.0 includes dozens of features that minimize the time and effort product development teams invest in simulation. Additional ECAD interfaces for electronics-related applications and a highly productive environment for designing products with advanced composite materials are just a few examples.

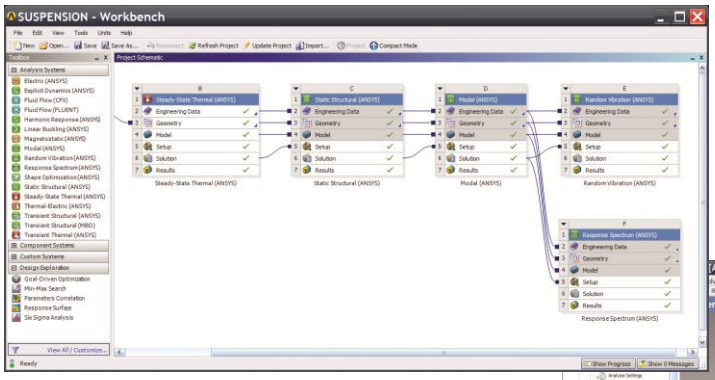
- **Performance innovation via software and computational power:** ANSYS 14.0 can provide speedup ratios that are dramatically greater than previous software releases. Complex multiphysics simulations can be accomplished more quickly and efficiently, speeding up product development and market launch initiatives.

ANSYS 14 takes product development to the next level by continuing the evolution of Smart Engineering Simulation. By compressing design cycles, optimizing product performance across multiple physics, maximizing the accuracy of virtual prototypes, and automating the simulation process, ANSYS is making it easier and faster than ever to bring innovative new products to market — which has become imperative in today's difficult economy.

The release especially leverages the ANSYS foundation of open and flexible architecture, resulting in customized engineering workflows that can cut time and costs from the simulation process.

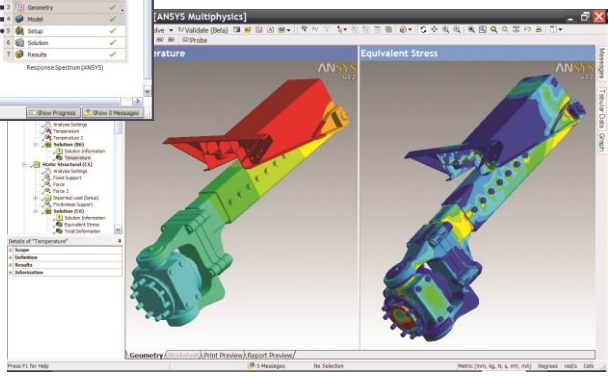
### *ANSYS Workbench*

The delivery vehicle for the ANSYS vision is the ANSYS Workbench™ environment. It is not a product but a platform that allows the user to easily and conveniently apply tools from ANSYS and other providers within one integrated environment.



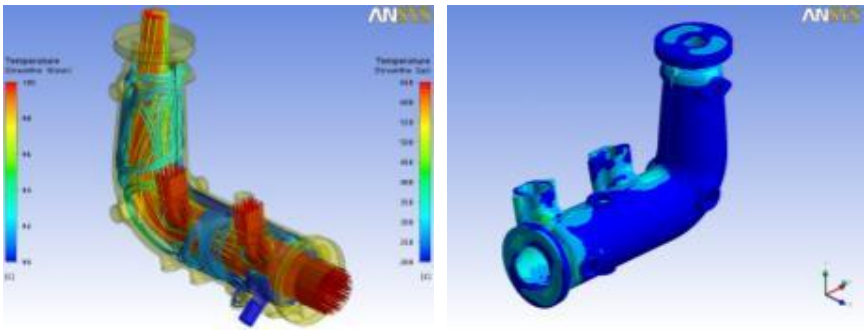

*Left: In ANSYS Workbench, more-complex analyses involving multiple physics can be built up by connecting systems. Data dependencies are indicated clearly as connections.*

*Below: Two analyses from the above schematic in a mechanical simulation application*




The Workbench platform represents a key advantage that differentiates ANSYS technology from that of others in the CAE industry. No other engineering simulation provider offers the same level of integration across such a comprehensive and powerful range of engineering simulation tools. ANSYS Workbench is an interface through which the user communicates and interacts with simulation technology. The environment is designed to make the process efficient. CAD integration, geometry and meshing tools, and combined physics allow the user to take 3-D-based processes through simulation and optimization.

In Workbench, an innovative project schematic view ties together the entire simulation process, guiding the user through even complex multiphysics analyses with drag-and-drop simplicity. With bi-directional CAD connectivity, an automated project-level update mechanism, pervasive parameter management and integrated optimization tools, the ANSYS Workbench platform delivers unprecedented productivity, enabling Simulation Driven Product Development.



*Fluid flow simulation (left) and structural mechanics simulation (right) for a gas engine exhaust header performed in ANSYS Workbench. Using the information gleaned from the FSI analysis, the user determined stresses and ultimately performed a fatigue analysis.*

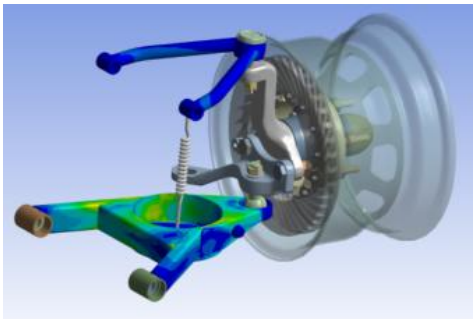
For example, a user can create geometry in ANSYS DesignModeler™, then run both fluid flow and mechancial simulations in fluid flow and structural packages from ANSYS, respectively. Without such integration, separate geometries for the CFD and FEA simulations must be created for analysis, lengthening the process and introducing potential for error, since each geometry may differ slightly. Once the fluid and mechanical simulations are iteratively solved, ANSYS Workbench enables post-processing results to be viewed concurrently, giving the user a clear idea of the interaction between the structural and fluid physics.

The ANSYS Workbench platform also provides parameter management. For example, parameters and results obtained from simulations performed by one user in ANSYS Autodyn® explicit dynamics software could then be utilized by another user as the basis for a mechanical simulation study. Uniformity of parameter units is ensured, with all data stored and available for use across all ANSYS Workbench enabled products, removing the need to laboriously transfer and input the data into each product separately.

### *The Multiphysics and Mechanical Simulation Portfolio from ANSYS*

ANSYS has long provided leading structural analysis software solutions. The company offers five main products within this portfolio:

- ANSYS Multiphysics™
- ANSYS Mechanical™
- ANSYS Structural™
- ANSYS Professional™
- ANSYS DesignSpace®



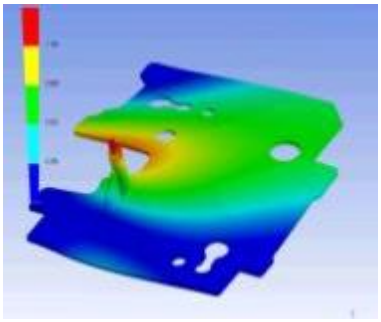
*Multibody simulation of parts that support a NASCAR racing car wheel*
*Courtesy Dale Earnhardt Engineering.*

**ANSYS Multiphysics** software provides a full spectrum of FEA functions plus some capability in CFD, acoustics and electromagnetics. It gives the user maximum flexibility and accuracy to solve complex problems. Multiphysics tools easily handle both linear (involving materials that react/deform at an equivalent, proportional and consistent rate according to a constant force exerted upon them) and nonlinear (related to materials that do not react to a force at an equivalent rate — such as rubber, which reacts to constant force by expanding at an ever-increasing rate) analyses.

*A coupled thermo–structural analysis with software from ANSYS used in developing a new design for a steel-making ladle*
Courtesy Fundacion ITMA.

**ANSYS Mechanical** technology is a comprehensive structural product for users who need the maximum power of simulation across the full range of structural linear/nonlinear, dynamics and thermal analysis. The product offers a complete set of elements behavior, material models and equation solvers for a wide range of engineering problems. In addition, the Mechanical product offers coupled-physics capabilities involving acoustic, piezoelectric, thermal–structural and thermal–electric analysis. It does not include acoustics, electromagnetic or CFD capabilities.

**ANSYS Structural** capabilities address the unique concerns of pure structural simulations without the need for additional physics. The product offers all the power of nonlinear structural capabilities — as well as all linear capabilities — to deliver the highest-quality, most reliable structural simulation results available. ANSYS Structural technology easily simulates even the largest and most intricate structures.



*Analysis of a digital printing system support pin. Software from ANSYS was used to build the simulation model and quickly predict baseplate displacement and weld stresses.*

The **ANSYS Professional** package meets the needs of customers who are looking for a low-cost, easy-to-use structural analysis tool that provides a high level of capability. It offers a first step into advanced linear dynamics and nonlinear capabilities. Containing the power of leading simulation technology, Professional tools provide users with high-level simulation capabilities without the need for high-level expertise. The package comes complete with a full contingent of linear

elements, significant nonlinearities, the ability to solve complex assemblies — including shell-to-solid — and the most requested set of solvers.

**ANSYS DesignSpace** software is an easy-to-use simulation package that provides tools for design engineers working to conceptualize, design and validate products or process equipment on the desktop. A subset of the ANSYS Professional product, DesignSpace allows users to easily perform real-world, static structural and thermal, dynamic, weight optimization, vibration mode, and safety factor simulations on all designs without the need for advanced analysis knowledge.

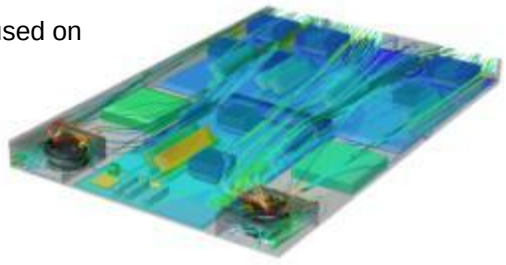
### *The Electrical and Electronics Simulation Portfolio from ANSYS*

In the electronics arena, the engineering simulation suite from ANSYS includes:

- RF and microwave tools
- Signal- and power-integrity technology
- Electromechanical tools
- Electronics cooling tools
- Advanced low-power tools

**ANSYS HFSS**™ technology is the industry-standard software for S-parameter extraction, **ANSYS Full-Wave SPICE**™ model generation and 3-D electromagnetic field simulation of high-frequency and high-speed components. Signal integrity engineers use HFSS software to evaluate signal quality, including transmission path losses, reflection loss due to impedance mismatches, parasitic coupling and radiation.

**ANSYS Icepak**® software is a vertical CFD product focused on thermal management of electronics components and equipment. It is used to predict fluid flow and heat transfer as well as to evaluate various package, board and system thermal designs. It also provides file exchange capabilities with various EDA tools to incorporate the effects of various substrate trace layout on the systems thermal design.



*Temperature and air flow in this server system with blowers and heat sinks were predicted by electronics simulation software from ANSYS.*

**ANSYS Nexxim**® software is an advanced circuit simulator that addresses the increasingly complex nonlinear and full-wave circuit behavior. It helps guarantee consistency of results across time and frequency domains by using the same circuit netlist and library models for transient and harmonic balance analyses.

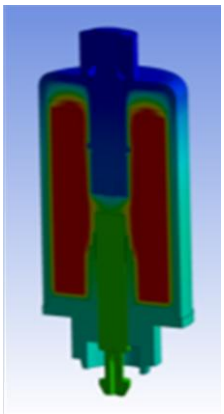
**Ansoft Designer**® technology is an integrated schematic and design-management front end linking to Nexxim, HFSS and other field simulators. Engineers can combine complex, highly nonlinear circuits with transistor-level detail and 3-D full-wave accurate component models to solve challenging high-performance, high-speed RF and microwave designs.

**ANSYS SIwave**™ software analyzes complex printed circuit boards (PCBs) and integrated circuit (IC) packages. The tool is widely used for post-layout signal integrity, power integrity and electromagnetic interference design.

**ANSYS Q3D Extractor**® software efficiently performs the 3-D and 2-D quasi-static electromagnetic-field simulation required for the extraction of resistance, inductance, capacitance and conductance (RLCG) parameters from an interconnect structure and automatically generates an equivalent SPICE sub-circuit model.

**ANSYS Turbo Package Analyzer** (**TPA**™) software automates the analysis of and produces lumped or distributed RLC models for all complex semiconductor packages.

**ANSYS Maxwell**® technology is for engineers tasked with designing and analyzing 3-D/2-D structures such as motors, actuators, transformers, and other electric and electromechanical devices.



*Temperature distribution for a valve-actuating solenoid was simulated in ANSYS Workbench using the Ansoft power loss density distribution provided by Maxwell software*

**ANSYS Simplorer**® software is used for the design of complex power electronic and drive systems. It employs a schematic approach to represent and couple electrical, mechanical, hydraulic, thermal and chemical models to rapidly and accurately simulate electromechanical systems behavior.

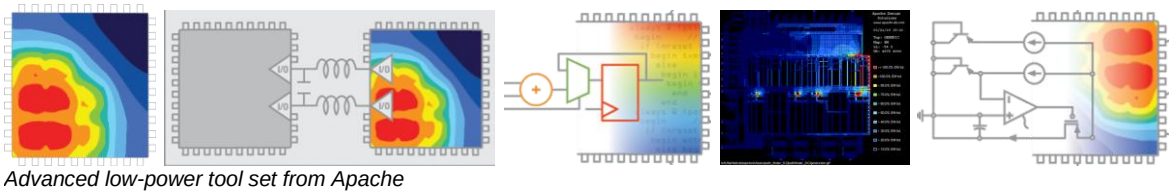
**ANSYS RMxprt**™ software speeds the design and optimization process of rotating electric machines. Users can calculate machine performance, make initial sizing decisions, and perform hundreds of what-if analyses in a matter of seconds.

**ANSYS PExprt**™ software speeds the design and optimization process of transformers and inductors for power electronics.

As products become increasingly smaller, it is critical to manage power consumption. Innovative power analysis and optimization software from ANSYS subsidiary Apache Design Solutions enables engineers to design products that meet stringent power specification limits, while still reliably and consistently delivering power to the entire system and mitigating failures or performance degradation caused by power-induced noise. For example, smartphones continually add functionality to their platforms such as high-definition video, GPS, video recording and conferencing, with consumer expectation that battery life will be extended. Apache's simulation ecosystem brings semiconductor foundry, IP providers, system-on-chip (SoC) design houses, package vendors and system integrators together.

Before the release of **RedHawk**™, chip design engineers relied on approximations and DC (static) analysis methods that could not predict fluctuations coming from the interaction of the chip with its package and board. RedHawk is now the industry-standard next-generation dynamic power integrity solution with the capacity to handle designs over five hundred million gates, while maintaining sign-off accuracy. Chip designers use the solution to simulate an entire design, along with the package and board, and predict its operation prior to manufacturing the parts.

**Sentinel**™ is a complete chip–package–system co-design/co-analysis solution that addresses system-level power integrity, I/O–SSO, thermal and EMI challenges. Chip designers apply its capabilities to create compact SPICE-compatible models of their chips that preserve time and frequency domain electrical characteristics of the chip layout.



*Advanced low-power tool set from Apache*

**PowerArtist**™ addresses the growing need to simulate designs very early during the design phase, when architectural definitions are created using register transfer level (RTL) descriptions. PowerArtist helps to identify a design's power bugs and cases of wasted power consumption.

**PathFinder**™ enables prediction of electrostatic discharge event (ESD)-induced failure that once as not identifiable until very late in the product design cycle.

**Totem**™ software meets the distinct needs of analog, IP, memory and custom-circuit design engineers for power noise and reliability analysis. It addresses the challenges associated with

global couplings of power/ground noise, substrate noise, and package/PCB capacitive and inductive noise for memory components, high-speed I/Os, and analog circuits.

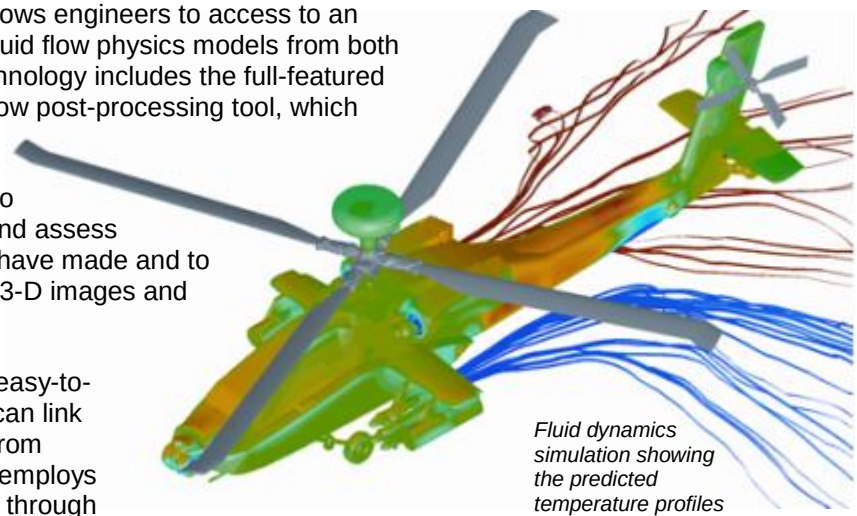
### *The CFD Solver Product Portfolio from ANSYS*

ANSYS offers one of the most comprehensive computational fluid dynamics capabilities available. Its main fluid flow analysis tools include:

- ANSYS Fluent®
- ANSYS CFX®
- ANSYS CFD™

**ANSYS Fluent** and **ANSYS CFX** software packages are powerful advanced, general-purpose fluid dynamics tools. ANSYS FLUENT is the most widely used CFD code in the world, with a particularly large user base in the automotive (commercial and Formula One racing) and aerospace industries. ANSYS CFX technology has a particularly large user base in the chemical, turbomachinery and marine industries. Both solutions are capable of performing the most complex analyses for multiphase and turbulent flows, thermal problems and chemical reactions.

**ANSYS CFD** software allows engineers to access to an unprecedented array of fluid flow physics models from both Fluent and CFX. The technology includes the full-featured ANSYS CFD-Post fluid flow post-processing tool, which provides a complete range of graphical post-processing options to allow users to visualize and assess the flow predictions they have made and to create insightful 2-D and 3-D images and animations.

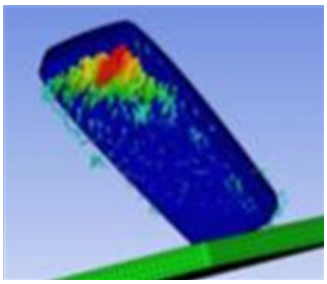


*Fluid dynamics simulation showing the predicted temperature profiles and flow path lines for two rockets on a military helicopter during launch*

**ANSYS CFD-Flo**™ is an easy-to-use, lower-cost tool that can link fluid dynamics products from ANSYS. The technology employs wizards to guide the user through the CFD setup process. Not intended to simulate complex flow physics in areas such as very complex turbulent flow and acoustics, it has been developed for use by the design engineer looking for guidance in the early stages of design development.

### *The Explicit Dynamics Portfolio from ANSYS*

ANSYS offers several tools to help in simulating short, high-deformation, large-strain, fracture or complete material failure applications — such as car crashes, airplane bird strikes, explosions, material buckling and electronics drop testing. The right tool for the job depends on user needs and applications.



*Explicit dynamics analysis of a mobile phone drop test showing relative part velocity vectors shortly after impact*

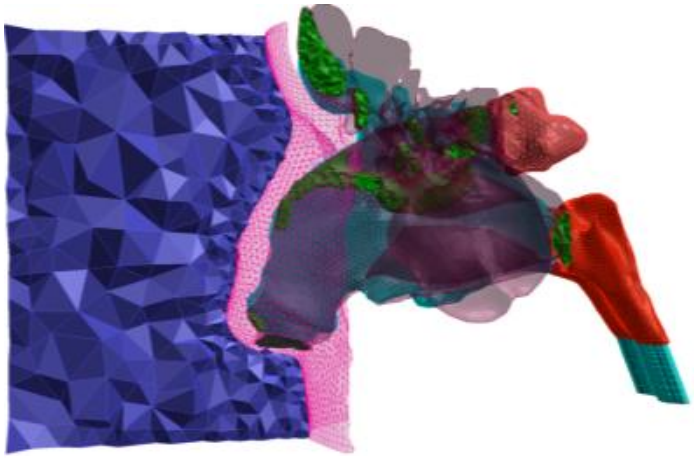
**ANSYS Autodyn**® software is a multiphysics tool that combines structural and fluids analyses for the simulation of explosions and crashes. For example, it allows the user to predict the trajectory and velocity of shrapnel or fine particles dispersed as the result of a high impact or explosion.

**ANSYS Explicit STR™** software is based on a portion of the ANSYS Autodyn product and built into the ANSYS Workbench environment. Engineers use the technology in performing drop tests for electronics and consumer goods, solid-to-solid impacts (such as with sporting goods), manufacturing processes to prevent buckling, and adhesive and spot welds.

**ANSYS LS-DYNA®** technology helps engineers better understand limited-duration events and large, permanent deformations. It can be applied to analyze the elaborate combinations of nonlinear phenomena found in crash tests, metal forging, stamping and catastrophic failures.

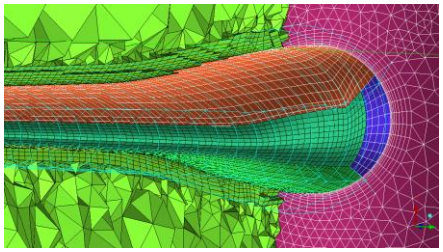
### *Other ANSYS Products*

Engineering simulation software users have been known to spend up to 90 percent of their simulation-related time working on pre-processing tasks. The suite of meshing tools from ANSYS helps simplify such tasks. The ANSYS meshing platform takes advantage of the ANSYS Workbench framework so users can access these tools in a unified environment tailored to their experience.



*Meshing is used in a wide range of applications, including biomedical. In this nose cavity, wrapper has been used to produce a valid high-quality mesh from CAT scan data.* *Image courtesy Materialise.*

ANSYS also offers extended meshing products that allow more controlled meshing needed by advanced users or for difficult geometries. The **ANSYS ICEM CFD™** suite supports a wide range of CAD and faceted data imports. ANSYS **TGrid®** software is a specialized pre-processor for fluid flow analysis that is used to create large meshes for highly complex geometries, such as automotive underhood and cabin models.



*MultiZone meshing combines the strength of various meshing tools. It was used to automatically generate this hybrid grid for a tidal turbine.*

In the pre-processing arena, **ANSYS DesignModeler** technology provides modeling and geometry editing functions unique for simulation that includes detailed geometry creation, CAD geometry modification and concept model creation tools. It enables a user to take CAD data from a variety of sources and create a single cohesive CAD geometry, ready for meshing.

**ANSYS SpaceClaim Direct Modeler™** software enables product development and design engineers who are not CAD experts to create and modify 3-D geometry models. It is based on SpaceClaim Engineer, a CAD-neutral 3-D direct modeler that is highly flexible, empowering a broader cross section of product development engineers to perform 3-D modeling.

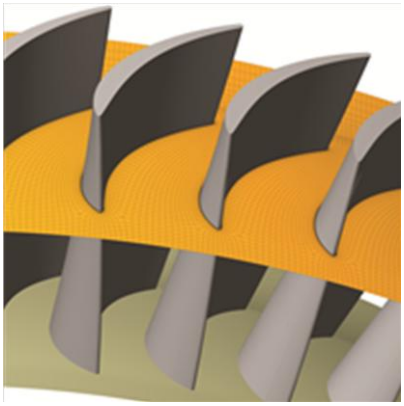
*ANSYS SpaceClaim Direct Modeler automatically finds and fixes problematic areas, creating clean geometry for meshing and analysis.*

The portfolio from ANSYS includes robust post-processing tools as well. In addition to those that are embedded in products such as ANSYS Mechanical, Fluent and CFX, the advanced post-processing **ANSYS DesignXplorer®** technology adds parametric control to predict the outcome of implementing modest changes in parameters or geometry without the need to run another simulation. The module enables engineers to perform design of experiments (DOE) analyses of any ANSYS Workbench simulation, including those with CAD parameters.

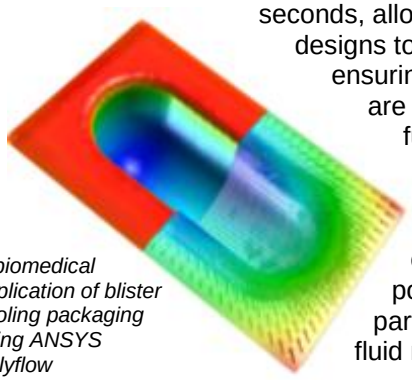
ANSYS also has a number of other engineering simulation tools that specifically address specialty applications.

**ANSYS Aqwa**® is a suite of integrated modules that addresses analysis requirements associated with hydrodynamics of many structures, including spars, mooring systems and ships. Using Aqwa, engineers can accurately simulate floating objects and the impact of wave energy on fixed structures. **ANSYS Asas**® software has industry-specific features that address the needs of those who design jackets, jack-ups, risers, offshore wind farms, and floating systems such as FPSOs, spars and semi-submersibles.

For the turbomachinery industry, a simulation-driven design process consisting of a suite of advanced simulation software coupled with a tailored CAD environment can play a critical role in impacting preliminary designs and achieving the quickest path to rotating machinery design. **ANSYS BladeModeler**™ software is an easy-to-use tool for the rapid 3-D design of rotating machinery components. **ANSYS TurboGrid**™ technology provides turbomachinery designers and analysts with mesh creation tailored specifically to the needs of bladed geometries. **ANSYS Vista TF**™ is a 2-D throughflow analysis solver that provides basic performance predictions in a matter of seconds, allowing many initial designs to be screened and ensuring that only the best are carried forward for full analysis.



*ANSYS TurboGrid software is used to create high-quality meshes for bladed components with minimal user input.*
Geometry courtesy PCA Engineers.



*A biomedical application of blister cooling packaging using ANSYS Polyflow*

In the plastics and rubber industry, **ANSYS Polyflow**® technology is an advanced general-purpose finite-element-based fluid dynamics software for the analysis of polymer processing and glass forming. The product is particularly well-known for its extensive library of viscoelastic fluid models.

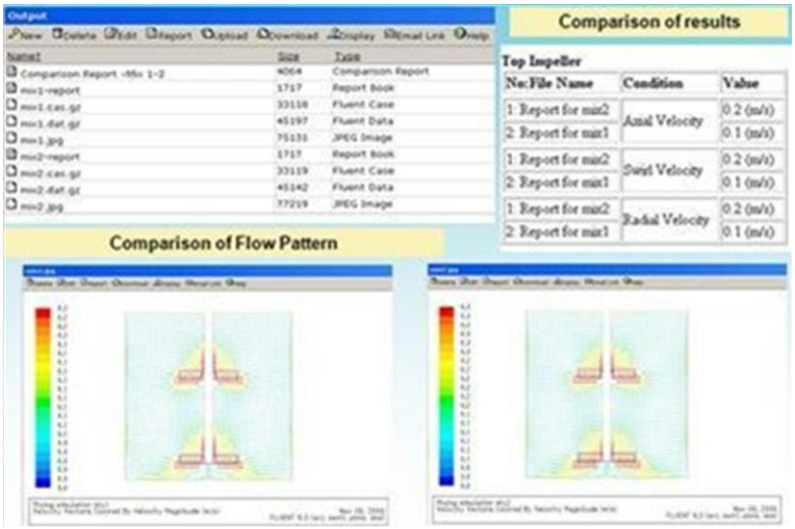
ANSYS provides engineering simulation software globally for academic teaching and research applications, used by thousands of universities and colleges in more than 60 countries, with tens of thousands of academic users. The **ANSYS Academic Teaching** products include entry-level tools intended for class demonstrations and hands-on instruction. The **ANSYS Academic Research** and **ANSYS Academic Associate** products provide flexible terms of use and unlimited numerical headroom suitable for doctoral and post-doctoral research projects. The **Ansoft Academic Product** bundle is designed for teaching and academic research related specifically to RF microwave, signal integrity (SI) and electromechanical systems engineering. All engineering simulation software provides incredible value, feature-rich products and scalability — for both universities and students alike.

High-performance computing and parallel processing with **ANSYS HPC** products add tremendous value to the use of simulation by enabling enhanced insight into product performance and improved productivity in the design process. ANSYS HPC delivers cross-physics parallel processing capability for the full spectrum of ANSYS simulation software, supporting structural, fluids, thermal, and electromagnetic simulations in a single HPC solution. There are three levels of products: **ANSYS HPC Packs**, which allow users to scale HPC to whatever level the simulation requires; **ANSYS HPC Workgroup**, which offers volume parallel to enhance the throughput of multiple simulations and improve the productivity of users within a single co-located workgroup; and **ANSYS HPC Enterprise**, which provides volume parallel to support multiple users, with complete flexibility to deploy and use the software wherever you have distributed resources.

### *Managing Simulation Processes and Data*

ANSYS addresses the challenges associated with backup of information and archiving through the **ANSYS Engineering Knowledge Manager™** (EKM™) solution. This robust data management system enables users to access and reuse historical design information and expertise for speeding the creation of new designs, providing ways to capture and leverage existing engineering knowledge, and addressing the problems of loss of engineering expertise and protection of intellectual property.

**ANSYS EKM Desktop** software is a single-user local-environment version available in the ANSYS Workbench environment.




*Custom application in ANSYS EKM: what-if study based on simulation results*

# *THE ANSYS, INC. SENIOR MANAGEMENT TEAM*

***James E. Cashman III***
President and Chief Executive Officer

Jim Cashman is president and chief executive officer of ANSYS, Inc., which develops and globally markets engineering simulation software and technologies widely used by engineers and designers across a broad spectrum of industries. Cashman joined the company as senior vice president of operations in 1997 and became president and CEO in 2000. Throughout his leadership, ANSYS has pioneered Simulation Driven Product Development, which emphasizes simulation as an early and integral part of the product development process and can lead to reduced prototype testing, faster time-to-market and improved market acceptance of innovative new products.

In his role at ANSYS, Cashman makes it a priority to focus resources and investments in providing customers with leading-edge engineering simulation solutions. His unabashed vision is that, someday, every engineer will have access to software from ANSYS on his or her desktop, laptop or hand-held device. An approachable CEO with an open-door policy, he believes that the key to building a successful team is in attracting, as well as retaining, talented and dedicated individuals.

Cashman's 30 years of experience in the areas of financial, operational and sales management has been key to the success of numerous computer-aided design, product data management, transaction processing, and computer-aided engineering companies. No matter what the job, Cashman has focused on developing clarity of vision and providing appropriate guidance to steer people in the right direction. Before joining ANSYS, Cashman was vice president for international operations, marketing, and software development at PAR Technology Corporation. Prior to that, he was a founder of Metaphase Technology, which went on to be the leader in product data management. He was also an early-stage member of Structural Dynamics Research Corporation (SDRC), a computer-aided engineering company, where he held management positions in the areas of international sales, major account and market development, and product management. His efforts helped make SDRC one of the premier CAD software suppliers, and the company grew to over $400M in revenues during his tenure.

Cashman holds B.S.M.E., M.S.M.E. and M.B.A. degrees from the University of Cincinnati in Ohio. As part of his role at ANSYS, he serves on the company's board of directors. He is an active member of the Pittsburgh Technology Council — whose mission is to grow, develop and retain the region's technology-focused business and talent — serving as vice chairman and secretary of their board of directors and its executive committee. Additionally, Cashman participates as a board member of the Carnegie Museum of Natural History, an organization founded a century ago to improve life though educational and cultural experiences.

An active volunteer in his own community, Cashman advocates corporate-sponsored citizenship at ANSYS. He has made a company commitment to improve and enrich life in the locales in which employees reside and work. A few examples of some of the corporate initiatives include a Habitat for Humanity house build in Houston, Pennsylvania, fundraising for the Washington City Mission and long-standing support of initiatives at Children's Hospital of Pittsburgh.

***Maria T. Shields***, Vice President and Chief Financial Officer

Maria T. Shields has been the chief financial officer and vice president, finance and administration at ANSYS since September 1998. Previously, she served as the company's corporate controller from September 1994 and as a vice president from May 1998. Prior to joining the company, Shields held various positions as a CPA with Deloitte and Touche LLP, including that of audit manager. She holds a Bachelor of Science degree in accounting from the Pennsylvania State University.

***Dipankar Choudhury, Ph.D.***, Vice President, Product Strategy and Planning

Since 2008, Dipankar Choudhury has been responsible for the company's product strategy and planning activities, strategic partnerships and corporate product management function. Prior to that, he served as chief technologist of the fluids business at ANSYS His career includes engineering, product management and technologist positions in Creare Inc. and Fluent Inc. Choudhury obtained his Ph.D. in computational fluid dynamics and heat transfer from the University of Minnesota in 1987. He is a member of ASME and AIAA and holds credits for technical publications in journals, conference proceedings and trade magazines.

***Brian C. Drew***, Vice President and General Manager, Central Development Unit

Brian C. Drew has been the vice president and general manager of the central development unit at ANSYS since November 2006. From 1999 to 2006, he served as vice president of product development in internal services at Fluent Inc. Prior to that, Drew was Fluent's business unit director for the power generation industry and the Icepak business unit. He also served as Fluent's sales director for North America. Drew's industrial experience includes the design of rocket engines and spacesuits at Hamilton Standard and the development of high heat flux cooling systems at Creare Inc. He holds Bachelor and Master of Science degrees in mechanical engineering from Georgia Institute of Technology.

***Shane R. Emswiler***, Vice President and General Manager, Electronics Business Unit

Shane R. Emswiler joined A NSYS in July 2008 as part of the Ansoft acquisition. Prior to becoming vice president and general manager of the electronics business unit, he was chief financial officer of Ansoft. Emswiler previously worked for Ernst & Young, where he was a senior manager in the assurance and advisory practice. He is a certified public accountant and holds a Bachelor of Science degree in accounting from Grove City College.

***Joshua Fredberg***, Vice President, Marketing

Josh Fredberg joined ANSYS in 2009, bringing a rich, diverse background in engineering and technology to the leadership team. Before joining ANSYS, Fredberg was senior vice president of product and market strategy at Parametric Technology Corporation (PTC), where he worked on industry strategy, marketing and business development. Prior to joining PTC, he held leadership roles with both ARIBA and Andersen Consulting Strategic Services. He holds a B.S. in electrical engineering from Tufts University, an M.S. in systems engineering from the University of Pennsylvania, and an M.B.A in finance from The Wharton School.

***Sheila S. DiNardo***, Vice President, General Counsel and Secretary

Sheila S. DiNardo is vice president, general counsel and secretary of ANSYS, Inc. Prior to joining ANSYS, DiNardo was general counsel and chief financial officer of Venture Beginnings, Inc. She also was a shareholder of Buchanan Ingersoll, P.C., specializing in international merger control and securities law. DiNardo is a graduate of Georget own University, the University of Pittsburgh School of Law and Carnegie Mellon's Tepper School of Business.

***Joseph C. Fairbanks, Jr.***, Vice President, Worldwide Sales and Support

Joseph C. Fairbanks, Jr. has been vice president, worldwide sales and support at ANSYS since 2001. Prior to joining the company, Fairbanks was president and chief operating officer for Black Oak Computer Services Incorporated. He served as vice president, sales and marketing for the IBM Business Unit of Avnet Hallmark, an IBM distributor, from 1997 to 2000. Prior to that, Fairbanks was the director of sales operations for Aspen Technology, a chemical engineering software company. He holds a degree in computer sciences from West Chester University.

***Joseph S. Solecki, Ph.D.***, Vice President, Physics Business Unit

Joseph Solecki was named vice president at ANSYS in 2007. He has been at the company for 22 years and, during that time, has held several positions in a number of capacities, including vice president for product development for the mechanical business unit, chief technologist, and corporate fellow. Prior to that, he worked as a senior developer in the area of structural mechanics, solvers and optimization. Solecki holds a Ph.D. in engineering from Carnegie Mellon University.

**Debra Burke**, Vice President, Human Resources

Debra Burk joined ANSYS in May 2011 as vice president of human resources, bringing extensive global HR management expertise in North America, Europe and Asia. Prior to joining ANSYS, Burk held various HR vice president positions for Thermo Fisher Scientific in various divisions, groups and regions. Prior to Thermo Fisher, she held human resources leadership roles within IBM (former Transarc, Inc.) and II-VI, Inc. Burk holds a B.S. in business administration from Robert Morris University and an M.S. in Human Resources from LaRoche College. She is a certified senior professional in human resources (SPHR) from the Human Resource Certification Institute.

***Andrew Yang, Ph. D.,*** Vice President and General Manager, ANSYS; President, Apache

Andrew Yang joined ANSYS in 2011 when the company acquired Apache Design Solutions, which Yang founded in 2001. Prior to his work at ANSYS, Yang was an active entrepreneur and EDA investor, founding Anagram and serving as chairman and CTO until its acquisition by Avant! Corporation. Yang also served as lead investor in several successful technology companies including CADMOS Design Technology (now Cadence Design Systems), InnoLogic Systems (now Synopsys), Ultima Interconnect Technology (now Cadence Design Systems), and Mojave (now Magma Design Automation). A former tenured professor at the University of Washington, Yang holds a B.S. in electrical engineering from the University of California, Berkeley and M.S.and Ph.D. degrees from the University of Illinois.

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# *ANSYS, INC. AT A GLANCE*

- More than 60 offices worldwide plus an extensive network of distributors
- Over 1,700 direct employees of ANSYS and its subsidiaries worldwide
- Listed on NASDAQ (ANSS)
- www.ansys.com

***History***

1970: John A. Swanson founds Swanson Analysis Systems Inc. (SASI) in Pennsylvania, U.S.A., to market finite element analysis software.

1970–1994: The company develops driven by growth of between 10 to 20 percent each year.

1994: SASI becomes ANSYS, Inc. (named after SASI's flagship FEA product) when it is sold to new backers. The title "ANSYS" is also retained as the name of the flagship FEA product.

1996: ANSYS, Inc. becomes a public company listed on the NASDAQ stock exchange.

1997: ANSYS moves to its current headquarters south of Pittsburgh, Pa., U.S.A. The company relocates from Houston, Pa. to a hilltop headquarters in the Southpointe business park in Canonsburg, Pa., U.S.A.

2000: ANSYS makes the first of its acquisitions, purchasing ICEM CFD Engineering. ANSYS adds the ICEM CFD meshing and post-processing tools to its product portfolio.

2001: ANSYS acquires CADOE S.A. The DesignXplorer tool enables advanced interrogation of engineering simulation post-processing results.

2003: ANSYS acquires CFX, which adds one of the three industry-leading CFD tools to the ANSYS product portfolio.

2005: ANSYS acquires Century Dynamics Inc., which adds a number of specialty engineering simulation tools including AUTODYN, an explicit dynamics tool for modeling scenarios such as explosions.

2005: ANSYS acquires Harvard Thermal, Inc. and adds TASPCB and PTD tools for electronics cooling analysis.

2006: ANSYS acquires Fluent Inc. and adds technology that includes the FLUENT tool in addition to the FloWizard fluid dynamics tool for design engineers.

2008: ANSYS acquires Ansoft Corporation, a leading developer of high-performance EDA software, and adds signal and power integrity, RF and microwave, and electromechanical systems technologies to its comprehensive suite of tools. The acquisition provides increased functionality, usability and interoperability.

2011: ANSYS acquires Apache Design Solutions, Inc., a leading simulation software provider for advanced, low-power solutions in the electronics industry. The acquisition strengthens the ANSYS commitment to open interface and flexible simulation solutions driven primarily by customer demand and choice.

2011: ANSYS builds on its position as a leading engineering simulation software provider. The company continues its strategy of offering the most comprehensive multiphysics engineering simulation software offer available via its ANSYS Workbench integrated analysis platform.

# *THE ANSYS PRODUCT PORTFOLIO*

**Platform**
ANSYS® Workbench™

**Multiphysics**
ANSYS® Multiphysics™
ANSYS® Mechanical/Emag
ANSYS® Mechanical/CFD-Flo

**Finite Element Analysis and Multiphysics**
ANSYS® Mechanical™
ANSYS® Structural™
ANSYS® Professional™
ANSYS® DesignSpace®
ANSYS® Fatigue™
ANSYS® Rigid Dynamics

**Computational Fluid Dynamics**
ANSYS® AutoReaGas™
ANSYS CFD
ANSYS CFD-Post
ANSYS® CFX®
ANSYS® Fluent®
FLUENT® for CATIA® V5
ANSYS® Polyflow®

**Robust Design**
ANSYS® DesignXplorer™
ANSYS® DesignXplorer VT™

**Explicit Analysis**
ANSYS® Explicit STR
ANSYS® Autodyn®
ANSYS® LS-DYNA®
ANSYS® Drop Test™ module

**Pre-and Post-Processing**
ANSYS® DesignModeler™
ANSYS® ICEM CFD™
ANSYS ICEM CFD Cart3D
ANSYS® Mesh Morpher™
ANSYS® SpaceClaim Direct Modeler™
G/Turbo®
TGrid™

**High-Performance Computing**
ANSYS® HPC Packs
ANSYS® HPC Workgroup
ANSYS® HPC Enterprise

**Process and Data Management**
ANSYS® Engineering Knowledge Manager™

## ELECTRONICS

***SI/PI and RF/MW***
ANSYS® HFSS™
ANSYS® Nexxim®
Ansoft Designer®
ANSYS® SIwave™
ANSYS® Q3D Extractor®
ANSYS® Turbo Package Analyzer™ (TPA)
ANSYS® Icemax®

***Electromechanical***
ANSYS® Maxwell®
ANSYS® Simplorer®
ANSYS® RMxprt™
ANSYS® PExprt™

***Electronics Design Options***
AnsoftLinks™
Distributed Analysis
ANSYS® ePhysics™
ANSYS® Full-Wave SPICE™
ANSYS® Optimetrics™
ANSYS® ParICs®

***Electronics Cooling***
ANSYS® Icepak®
ANSYS® Icepro™

***Low Power***
RedHawk™
PowerArtist™
PathFinder™
Sentinel™
Totem™

## APPLICATION-FOCUSED

***Offshore***
ANSYS® Aqwa™
ANSYS® Asas™

***Turbomachinery***
ANSYS® BladeModeler™
ANSYS® TurboGrid™
ANSYS® Vista TF™

***Plastics and Rubber***
ANSYS® Polyflow®

***Academic***
ANSYS Academic Products
ANSYS® ED™
Ansoft Academic Products