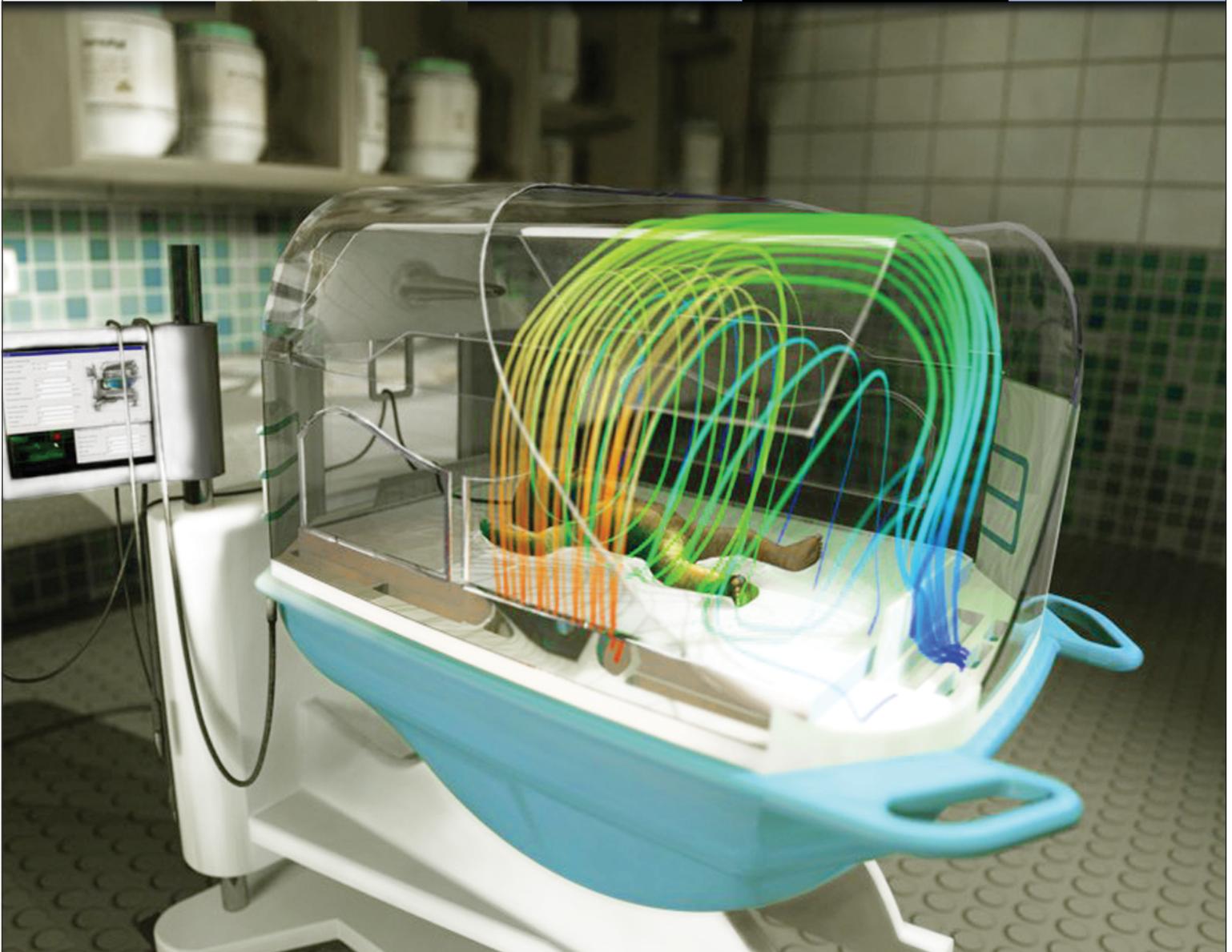
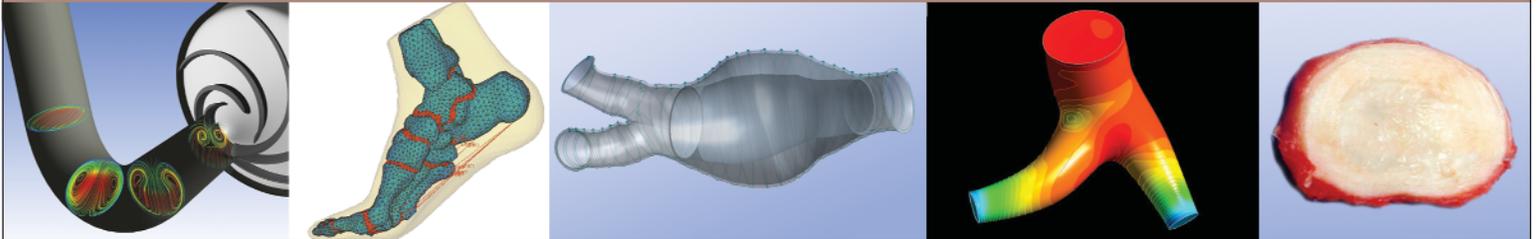
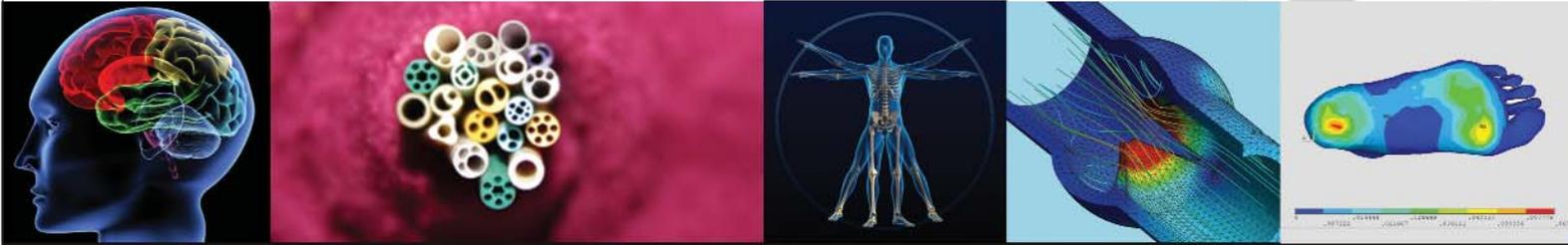




Engineering Simulation Solutions for the
biomedical Industry

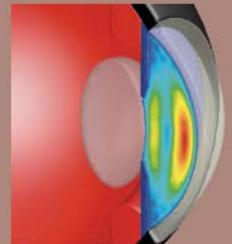


With the unequalled depth and unparalleled breadth of engineering simulation solutions from ANSYS, companies in the biomedical industry are transforming their leading-edge design concepts into innovative products and processes that work. Today, 97 of the top 100 industrial companies on the "FORTUNE Global 500" invest in engineering simulation as a key strategy to win in a globally competitive environment. They choose ANSYS as their simulation partner, deploying the world's most comprehensive multiphysics solutions to solve their complex engineering challenges. The engineered scalability of our solutions delivers the flexibility customers need, within an architecture that is adaptable to the processes and design systems of their choice. No wonder the world's most successful companies turn to ANSYS — with a track record of almost 40 years as the industry leader — for the best in engineering simulation.



Challenges and Solutions

The medical device industry is continually pushed to develop new devices that improve the quality of medical care and the way treatments are delivered. This growth is driven primarily by the quality of life demands of an aging population. The resulting escalating costs call attention to the need for process understanding, rapid innovation and solution efficiency. The ANSYS vision of Simulation Driven Product Development™ ensures that these goals are achieved.

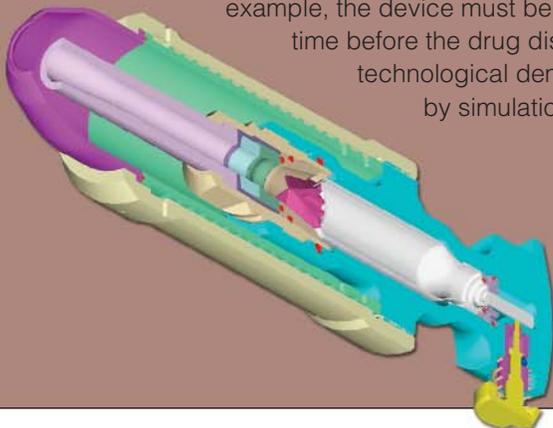


Rapid Innovation

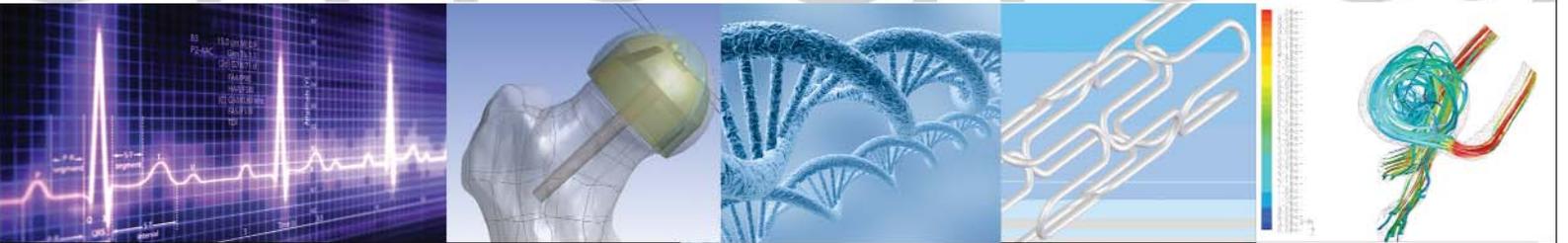
Being first to market is a clear competitive advantage. Research, development and manufacturing must work together to bring new products to market without compromising patient safety or quality. Each design iteration delays product launch, making a clear case for tools that can aid innovation. Engineering simulation offers a new approach to addressing this challenge. Combining design, manufacturing and performance testing in an integrated engineering simulation environment enables large-scale optimization of a candidate device, from development to production to regulatory testing. Simulation offers the additional benefit of reduced experimentation and animal testing required to evaluate each design.

Efficiency

Medical devices are consistently expected to do more with less. In a drug delivery scenario, for example, the device must be able to target a drug to a desired location for a minimum treatment time before the drug disperses or is metabolized. Simulation helps address the increased technological demands placed on today's products. The deeper understanding gained by simulation can assist in reducing warranty costs and recall risks as well.



Biomedical



“The fluid structure interaction capabilities from ANSYS have enabled us to take our 3-D patient-specific modeling to the next level. Our previous models, created with another FEA/CFD package, were less flexible in terms of element libraries, geometric and material constitutive nonlinearities, and fluid and solid boundary conditions. They also took more compute time to solve.”

Kendall Hunter, Ph.D
Postdoctoral Research Fellow
Department of Pediatric
Cardiology
Colorado Health Science Center
Colorado, U.S.A.

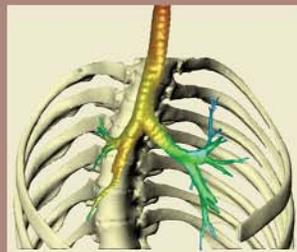
Patient-Specific Modeling

Addressing differences in parameters such as gender, age and race is the future of medicine. Simulation tools provide an avenue for testing candidate designs over a range of patient conditions. Geometries may be standardized or derived from medical scans. Material properties and boundary conditions may be tuned to represent differences in age, disease state or state of exertion, for example. Through simulation, doctors can plan a surgical procedure for a single patient or perform a virtual clinical trial based on various patient geometries and conditions. Such simulation provides a way to understand the performance and robustness of a device in a clinical setting.



Virtual Physiological Human

The human body is a remarkable and enormously complex system. The cardiovascular system, upper airway, skeleton and digestive system, as well as the organs, muscles and other soft tissues consist of complex non-Newtonian fluids and deformable nonisotropic solid porous media; their mechanics are still being discovered. Comprehensive multiphysics modeling of these integrated systems is helping to enable rapid advances in medical discovery, innovation and design.



Capabilities

- ▶ **Structural Solutions:** static; dynamic; nonlinear material properties; fatigue; thermal; advanced nonlinear contact and other analysis capabilities for mechanical and materials systems
- ▶ **Fluid Simulation Tools:** gas/fluid flow analysis including flow in porous media; chemical and biological agents transport; heat transfer; multiphase flow
- ▶ **Multiphysics:** fully integrated two-way fluid structure interaction including moving/deforming domains; electromagnetic; acoustic
- ▶ **Geometry and Meshing:** import MRI and scan image through STL format; geometry reconstruction; automatic meshing; mesh morphing
- ▶ **Engineering Knowledge Management Systems:** centralized storage of simulation; archival and retrieval of previous simulation work; integration with current engineering workflow



osteoporosis • aneurysm • inhaler • prosthesis • knee joint • pedicle screw • blood pump • dialysis • cardiovascular flow • skeleton • soft tissue • lens • insole design • **biomedical** • hearing device • ion beam treatment • multilumen tubing • drug delivery • catheter • combination products • lab-on-a-chip • needles • medical packaging • stent • cardiac valve • sensor • pain management • patient-specific modeling • ligament • dental implant • drug/particle deposition

About ANSYS, Inc.

ANSYS, Inc., founded in 1970, develops and globally markets engineering simulation software and technologies widely used by engineers and designers across a broad spectrum of industries. The Company focuses on the development of open and flexible solutions that enable users to analyze designs directly on the desktop, providing a common platform for fast, efficient and cost-effective product development, from design concept to final-stage testing, validation and production. The Company and its global network of channel partners provide sales, support and training for customers. Headquartered in Canonsburg, Pennsylvania, U.S.A., with more than 60 strategic sales locations throughout the world, ANSYS, Inc. and its subsidiaries employ approximately 1,700 people and distribute ANSYS products through a network of channel partners in over 40 countries.

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GSA Contract Holder

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MKT0000261