ANSYS®

Engineering Simulation Solutions for the
built environment Industry

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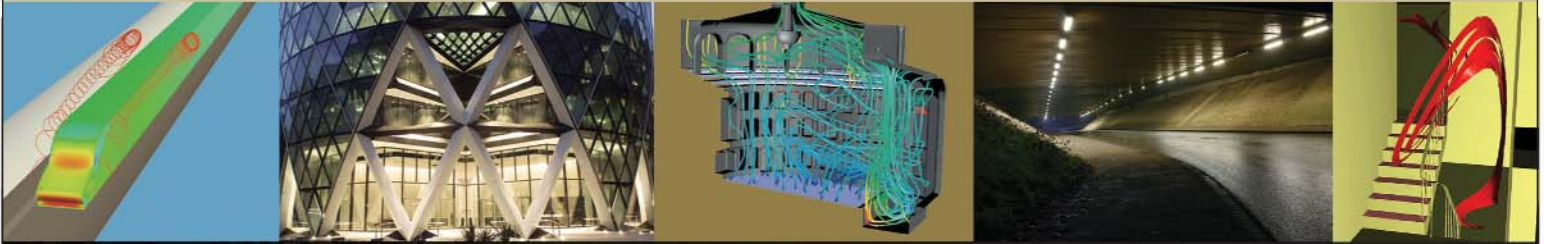
With the unequalled depth and unparalleled breadth of engineering simulation solutions from ANSYS, companies in the built environment industry are transforming their leading-edge design concepts into innovative products and processes that work. Today, 97 of the top 100 industrial companies on the "*FORTUNE* 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.
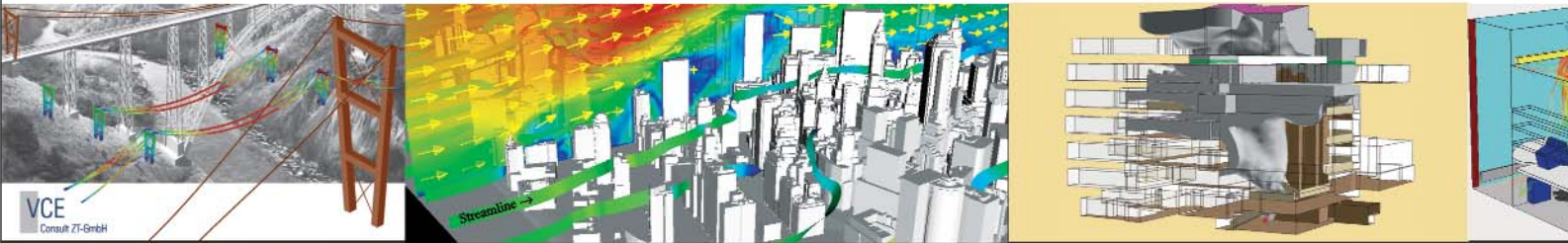
Challenges and Solutions

With more complex designs, stringent safety requirements and increasing energy concerns, designing or improving commercial buildings has become a critical engineering challenge. Comfort, safety and efficiency need to be guaranteed and able to stand up to intense scrutiny. Whatever the structure — office building, hotel, school, parking garage, mall, stadium, tunnel or concert hall — buildings must meet the rigorous aesthetic, social and environmental standards of the times.Offering a suite of powerful engineering simulation tools, ANSYS, Inc. empowers professionals to optimize building designs, especially in early stages when changes can be implemented efficiently and cost-effectively. Using these tools, architects and engineers can make informed decisions about the choice of building materials, system components and HVAC systems.

Ventilation and Comfort Modeling

Occupant thermal comfort and indoor air quality are the primary objectives of HVAC design for buildings and vehicles. Predicting room conditions (air velocity, temperature, relative humidity, thermal radiation, contaminants) which are affected by changes due to heat loss and solar gains through the structure (wall, roof, windows, doors) provides necessary information for design improvement. Using such simulation results coupled with information about an occupant's activity and clothing, designers can assess a variety of comfort criteria. This is particularly valuable in testing the effectiveness of novel strategies and concepts including natural and mixed-mode ventilation. It is also important in minimizing energy consumption through the improvement of building materials and available HVAC equipment.

Fire, Smoke Movement and Explosions

Fire and smoke propagation represents a significant risk for public safety in buildings, tunnels and underground rail systems. Smoke management systems are critical life-saving devices, and their expected performance must be evaluated in the design stage. Fire suppression systems must also be understood and optimized. Material resistance to explosion, fire and extreme heat, as well as structural deterioration from catastrophic events, must be analyzed accurately. Simulating explosions and fire scenarios is an important stage of a performance-based design cycle. The results can demonstrate that smoke/fire management system designs maintain both safe conditions for occupants and the structural integrity of the building.
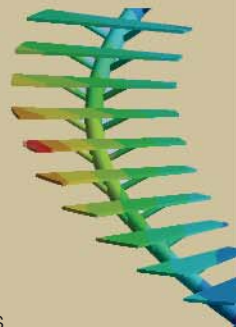
buildings

Building Structure Analysis

The design quality of any building and the subsequent safety of its users or neighbors depend on the structural performance of the building's individual components, as well as their combined performance under service and extreme conditions. For example, the safety of the building and its occupants relies on the long-term performance of the numerous joints, pre-stressed concrete pillars or metal structures. Software from ANSYS can address all these aspects. Furthermore, simulation of extreme conditions such as heavy wind, earthquake, tsunami, explosion or intense fire can be used to investigate structural integrity during such disasters.

Simulation of Airflow Around Buildings

With more complex skyscrapers, bridges and historical landmarks being built around the world — some in places with hostile weather conditions — it is becoming increasingly important to analyze the behavior and stability of these innovative constructions under various conditions. Airflow around a building and its impact on the structure, occupants and surroundings can be predicted using software from ANSYS. As an example, planning-stage simulation studies are routinely performed to demonstrate that proposed urban construction will not adversely affect pedestrian comfort and safety. To address environmental and safety issues, dispersion of gases and aerosols in urban and non-urban settings can be investigated.

Capabilities

▶ Structural Solutions: static; dynamic; nonlinear material properties; vibration, modal and harmonic analysis; fatigue; thermal; advanced nonlinear contact and other analysis capabilities for mechanical and materials systems

▶ Fluid Simulation Tools: flow analysis; fire and smoke propagation; chemical and biological agents transport; heat transfer; air quality and other flow problems

▶ Multiphysics: electromagnetic; acoustic; fluid structure interaction

▶ Explicit Dynamics: impact of objects and vehicles on buildings; deformation of structure under explosion

▶ Specialized Solutions: dedicated solution for airflow modeling; data center cooling; civil engineering

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ASSOCIATES
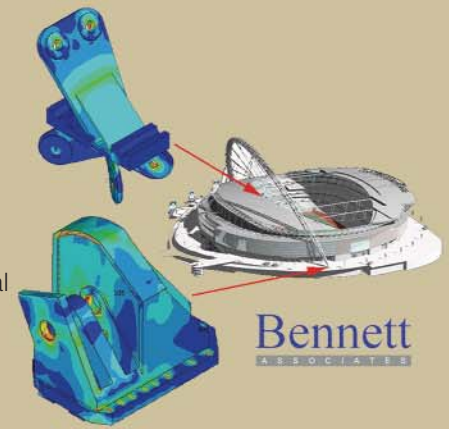
fire propagation and suppression • smoke movement • wind engineering • structural analysis • pedestrian comfort • explosions • pollutant dispersion • air conditioning • comfort modeling • earthquake safety measure • prestressed concrete • suspension bridges • green buildings • built environment • fatigue analysis • ventilation equipment • soil mechanics • vehicle impact • sport and concert arenas • tunnel and underground rail systems • stadiums • office buildings

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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