Simulation Solutions for the Government and Defense Industry

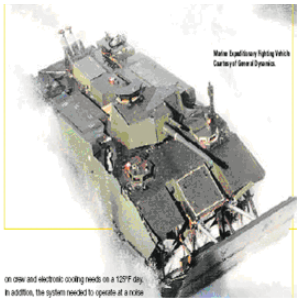
GOVERNMENT

By definition, a primary responsibility of a proactive government is defending its population from entities that might cause harm. Since new threat forms are developed regularly, effective defense mechanisms must be developed rapidly and economically — before it's too late and without bankrupting an entire economy.

Simulation-driven defense program development has become standard operating procedure for many of the most successful companies. Today's advanced military programs have extremely rigid procurement specifications — a failure to meet expectations results in rejection, rework, redevelopment costs and, sometimes, dismissal as a vendor.

Meeting program expectations is easier when simulation is utilized early in the process, rather than concurrent with testing or after a physical prototype failure. Tools from the ANSYS simulation suite have been utilized for:

- Amphibious vehicle design
- Hypervelocity impact studies
- Underwater shock analysis
- Hovercraft propulsion system analysis
- Ballistic armor and anti-armor design studies
- Explosive containment and damage assessments
- Fire suppression system design and analysis

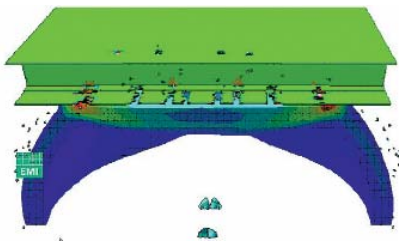


Marine expeditionary fighting vehicle courtesy of General Dynamics

CASE-IN-POINT

The Fraunhofer Institute for High-speed Dynamics, based in Germany, uses ANSYS solutions to perform experimental and numerical analysis of:

- Shock waves in solids, liquids and gases
- Fluid flow and combustion processes
- Impact and penetration processes over a wide range of velocities
- Behavior of structures under shock and impact
- Behavior of elastic medica that is highly stretched or dilatated



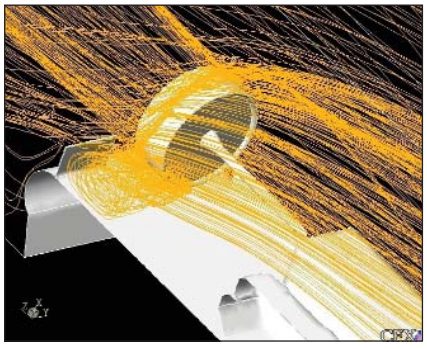
Explosion containment simulation

ANSYS Simulation Solutions

- ANSYS® AUTODYN®
- ANSYS® Multiphysics™
- ANSYS® CFX®
- ANSYS® ICEM CFD™

"The general-purpose hydrocode ANSYS AUTODYN allows us to investigate highly dynamic processes including massive deformation and failure. Based on a wide spectrum of material models and a profound validation, it has good capabilities for both research and development projects. Well-supported user subroutines allow for problem-oriented code enhancements."

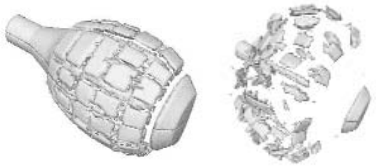
– **Dr.-Ing.habil. Stefan Hiermaier**
Deputy Director, Ernst Mach Institute



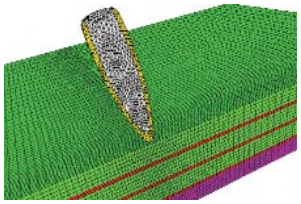
Streamline traces of airflow of hovercraft propulsion fan using ANSYS CFX software

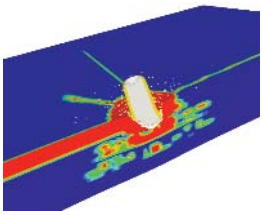
Ballistic Threats

Objects that move quickly can possess enough energy to be lethal. Simulating potential lethal threats is a challenge for even the most robust software. The general-purpose explicit dynamics hydrocode ANSYS AUTODYN is used extensively to model high-speed dynamic impact events such as:



- Meteorite and space debris impacts on spacecraft components
- Explosive blast analyses of buildings and facilities
- Intercept of ballistic missiles and lethality investigations for missile defense
- Perforation and behind-armor debris (BAD) analyses of armor configurations
- Vulnerability analyses of composite aircraft components against fragmenting warheads





Underwater Shock Threats

Naval ships and submarines are exposed to many types of shocks, both at war and during peacetime. Non-contact underwater shock, from mines or other sources, can cause severe damage to these vessels and their equipment. In many cases, precautions taken during the design stage can help minimize damage.

Non-contact underwater shocks can cause severe damage to vessels and their equipment.

The ANSYS Advantage

ANSYS software provides government and defense customers with a competitive advantage through:

- Multiphysics: advanced fluid/structure interaction analysis capabilities
- DesignModeler: parametric modeling with FEA, perfect for ANSYS® Workbench™ applications like ANSYS AUTODYN
- Multi-Field Solvers: explicit dynamic Lagrangian, Eularian, SPH solvers, working separately or closely coupled for low-end user load

About ANSYS, Inc. Solutions

ANSYS designs, develops, markets and globally supports engineering simulation solutions used to predict how product designs will behave in manufacturing and real-world environments. Its integrated, modular and extensible set of solutions addresses the needs of organizations in a wide range of industries. ANSYS solutions qualify risk, enabling organizations to know if their designs are acceptable or unacceptable — not just that they will function as designed. ANSYS helps organizations achieve:

- Innovative and high-quality products and processes
- Fewer physical prototypes and test setups
- Faster return on investment due to reduced development time
- A more flexible and responsive information-based development process, enabling the modification of designs at later stages of development
- A front-end simulation strategy that offers a superior method for bringing products to market in less time and with fewer costs

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-conscious product development, from design concept to final-stage testing and validation. Headquartered in Canonsburg, Pennsylvania, U.S.A., with more than 25 strategic sales locations throughout the world, ANSYS, Inc. and its subsidiaries employ approximately 600 people and distribute ANSYS products through a network of channel partners in over 40 countries.

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