

Simulation Solutions for the Marine and Offshore Industry

MARINE

In hostile environments well known by companies producing products for the marine and offshore oil and gas industries, there is no such thing as an acceptable failure. Consequences range from loss of production to loss of life. There are few second chances in the turbulent seas home to vessels and structures designed and built by man.

The world's leading companies rely on ANSYS products to help ensure their products won't break, sink or explode. Solutions such as ANSYS ICEM CFD, (a technological powerhouse for fluid dynamics modeling), ASAS and AQWA, (leading structural hydrodynamic solutions), AutoReaGas and ANSYS CFX (for modeling events such as gas mixing, explosions and fluid structure interactions) are used to develop breakthrough designs in order to meet some of the most difficult product development program requirements.



Meeting 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 used for:

- ▶ Recreational, commercial and military ship hull design
- ▶ Propulsion systems for conventional, amphibious and hybrid vessels
- ▶ Launch mechanics for offshore drilling rigs
- ▶ Fire safety and suppression in vessels
- ▶ Explosion studies on oil and gas platforms

The ANSYS Advantage

ANSYS software provides customers with a competitive advantage:

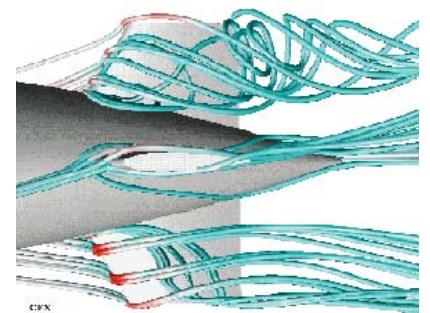
- ▶ State-of-the-art solvers that deliver accurate, robust and fast solutions
- ▶ Superior parallelization capabilities to save time and resources
- ▶ Single supplier of a number of marine industry applications, such as hydrodynamic wave loading and fire safety
- ▶ Integrated coupled fluid structural analysis capability for rapid multiphase solutions

ANSYS Simulation Solutions

- ▶ ANSYS® ICEM CFD™
- ▶ ANSYS® ASAS™
- ▶ ANSYS® AQWA™
- ▶ ANSYS® AutoReaGas™
- ▶ ANSYS® CFX®

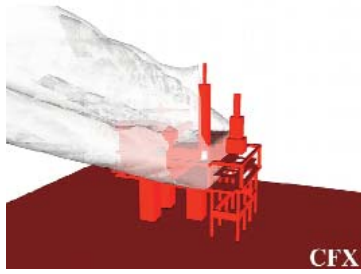


Pressure distribution on a nozzle propeller



In simulating marine vehicles such as ships and submarines, ANSYS CFX offers improved understanding of performance characteristics, such as drag and powering requirements.

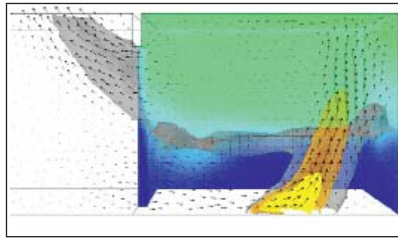
Marine and Offshore Fire Safety



When surrounded by water, marine and offshore personnel don't always list fire danger as their main safety concern. However, danger is inherent in fuels used to power ships and in undersea gas and oil that is extracted via offshore platforms. When elements catch on fire or explode, there is nowhere to run to escape the danger. To mitigate such dangers, compa-

nies designing ships and platforms use tools from ANSYS to simulate:

- ▶ Burning of spilled fuel pools, such as kerosene, in open and semi-confined areas
- ▶ Smoke formation and visibility loss from pool fires on offshore platforms
- ▶ Gas cloud ignition and the resulting blast pressures on nearby structures
- ▶ Flammable cloud ignition (flame-front), deflagration overpressures and blast generation
- ▶ Fire growth and suppression using fine water spray in ship engine compartments



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

Offshore Platform Design and Analysis

The easy-to-reach oil and gas fields have mostly been tapped, so petroleum companies must focus on other locations — usually in hostile environments. Significantly more engineering effort is now required even before the first drilling rig arrives. Engineers increasingly rely on advanced simulation tools to design safe and financially viable systems. ANSYS tools have been used for more than a decade to help engineers design structures that will withstand severe conditions.

ANSYS products have been used in the offshore industry for design and analysis of:

- ▶ Floating production storage and offloading vessels (FPSOs)
- ▶ Mooring systems and buoys
- ▶ Tension leg platforms (TLPs)
- ▶ Semi-submersibles
- ▶ Cable dynamics and structure interaction
- ▶ Frame, panel and concrete structure code checks
- ▶ Wave-structure interaction for regular and irregular waves



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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