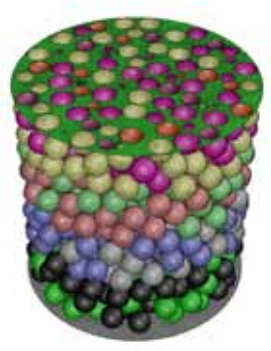
ANSYS®

Realize Your Product Promise™

in Energy

ANSYS



Fueling Innovation

As the global energy industry seeks safer, affordable and sustainable resources — at a lower risk and using more reliable technologies — engineering simulation is driving incredible innovations. Is your business ready for the energy revolution?

Power plants with aging boilers and piping systems face expensive shutdowns due to service-related damage. Structural Integrity Associates used ANSYS software to analyze thermal fatigue and creep in power plant valves, avoiding unnecessary valve replacements while keeping the plant operating safely.

Energy companies must balance global energy demands with growing regulatory and environmental concerns. With the overarching goal of locating new resources, the industry invests in broadening the current mix to include unconventional, renewable and carbon-free resources. Production and development initiatives are becoming far more complex. Products and processes are designed to increase safety and reduce risk as well as enable equipment to operate in harsh conditions reliably and cost efficiently.

How can you succeed in the face of these demands? Product and process innovation — fueled by engineering simulation — is helping many energy businesses emerge as leaders, even in this difficult climate. By designing and verifying new products and processes virtually, you can shorten your time to market, minimize the costs associated with development, and solve your most complex physics challenges to deliver true innovation.

ANSYS: Energizing Product and Process Development

For decades, ANSYS has helped energy industry leaders to improve essential technologies via advanced engineering simulation software that replicates the physical world in a cost-effective virtual environment. Our solutions not only drive

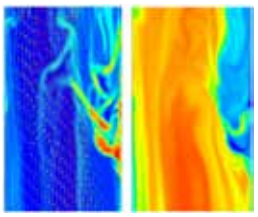
"There are more demanding challenges as we go into deeper and deeper water. As we explore different fields, we have different requirements. We have to adapt and modify. We need more robust designs. And we must address particular issues to achieve regulatory standards. ANSYS helps us meet these expectations."

Janet Wolf
Senior Research Specialist
Horton Wison Deepwater

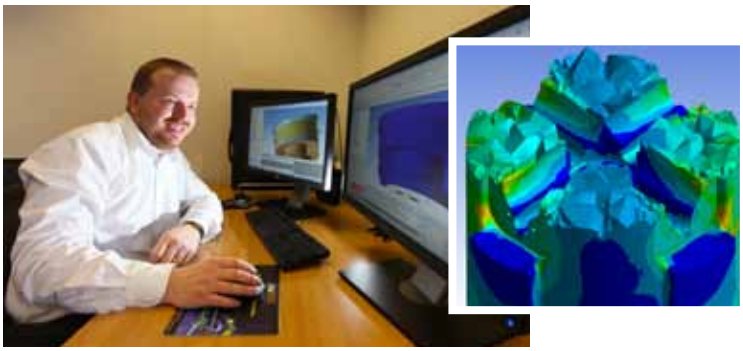
time and costs out of the development cycle, they also help to develop new technology and access new resources. Energy engineers simulate complex phenomena, including thermal hydraulic and fuel systems for nuclear energy; wind, wave, hydro and solar power equipment; and oil, gas, and clean coal production and processing.

Today, energy engineers are working smartly to create tomorrow's equipment and resources. New fuels provide less pollution, for example; other initiatives promise safer operations along with improved energy intensity and efficiency.

Because ANSYS tools enable design within a low-risk environment, your research, design and product development teams can readily conceive outside-the-box innovations that support real transformation. By replicating the physical world with outstanding accuracy and fidelity, our solutions provide a high degree of confidence that your innovation will perform as predicted — even thrive — in the real world. Therefore, you can fulfill your customer promise of delivering reliable, cleaner, eco-friendly and more cost-effective energy solutions.



Chemical-looping combustion promises reduced fossil fuel emissions at a low cost. SINTEF, an independent research organization, uses our solutions to model reactive multiphase transport in CO_2 capture. Such fundamental insights make substantial contributions toward identifying and optimizing important design parameters to accelerate process development.



One of the biggest challenges in offshore drilling is accurate placement of the conductor casing. Cognity used ANSYS to develop a steerable conductor for enhanced oil recovery.

"We were able to complete the design in only five months, approximately 70 percent less time compared to using conventional methods."

Rae Younger
Managing Director
Cognity

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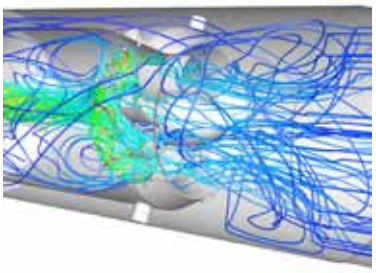


Courtesy Forschungszentrum Jülich GmbH.

Applying New Energy to Pressing Industry Challenges

In diverse applications, ANSYS helps energy companies address environmental and market pressures — while minimizing R&D investments.

For the Korea Institute of Nuclear Safety to maintain and continually improve nuclear safety, engineers need increasing technology depth for prediction, analysis, and experimental and remedial measures.

"Software from ANSYS allowed our team to successfully perform a coupled thermal hydraulic–stress analysis of the reactor's feeder pipe to verify integrity estimates. By performing a unified simulation, the combined effects of the interrelated physical phenomena could be investigated efficiently, reducing both the time and cost of independent simulations."

Myung Jo Jhung
Principal Researcher
Korea Institute of Nuclear Safety

In today's environmentally conscious — and cost-aware — business climate, energy companies grow and win market share by increasing capital investments and leveraging technology. Best-in-class companies look beyond everyday problems, applying engineering simulation to investigate all design and process aspects, early and often during development.

Solutions from ANSYS foster a culture that drives and accelerates product development and innovation. Through virtual engineering, you can develop clean-sheet solutions and effectively manage risk in an industry fraught with uncertainties.

Because ANSYS software simulates the real world accurately with high fidelity, engineers can develop game-changing energy innovations. By replicating complex interactions and advanced physics, we can help your engineering team get it right the first time, minimizing physical prototypes and design iterations along with developing and leveraging intellectual property.

ANSYS: Generating a High Level of Innovation

From developing oil/gas fields to creating offshore wind turbines and equipment that captures tidal, solar and geothermal energy to advancing fuel cell technology to launching revolutionary new concepts, energy leaders are leveraging the breadth and depth of our tools.

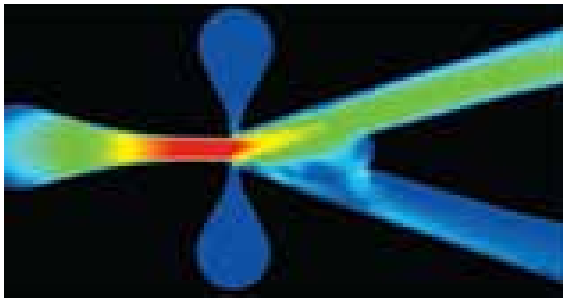
"The impact of introducing ANSYS direct modeling was much greater than expected. The larger and more complex the model, the more significant the time savings. Schramm can now reap a number of benefits from higher engineering analysis throughput, including reduced time to market and more reliable equipment."

Thomas Ronge
Senior Design Engineer/Analyst
Schramm Incorporated

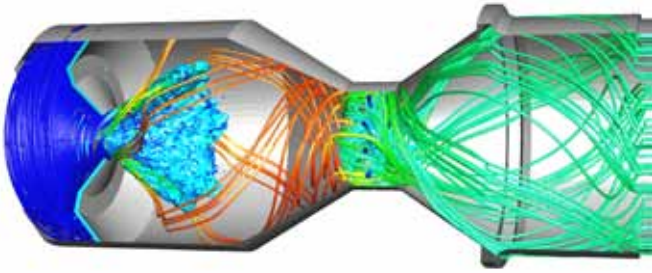
Every day, customers looking to complement, enhance and replace energy equipment and processes benefit from our advances in simulation and compute power. These companies apply proven ANSYS solutions in traditional energy applications — for example, combustion and emission control devices, drilling equipment, wind turbine blade design — as well as in pioneering technologies in subsea oil production, ocean energy, gasification, biofuel, energy storage and even fusion reactors.

Our software supports innovation across the entire energy life cycle, including energy generation, collection, storage, control, transportation, distribution, certification and regulatory compliance. Whatever the energy source — and whatever the stage, from upstream/downstream to recovery technologies/emissions treatment systems — ANSYS delivers the broad simulation capabilities and deep industry expertise to help your business establish itself as a leader.

If your product promise includes a commitment to conduct business with integrity and find more sustainable ways to use resources, we can help you arrive at the optimal energy product or process.



The University of Sheffield is exploring ways to reduce CO_2 emissions through algae-derived biofuels. Researchers applied our software to create an oscillator that produces microbubbles. The system provides greater mass transfer rates, which might translate into higher yields and lower costs in biofuel production.



ANSYS solutions are an ideal platform to evaluate new energy concepts. At Forschungszentrum Jülich GmbH, researchers developing diesel fuel processing units for fuel cells found some tasks too complex to be solved by trial-and-error design. They added ANSYS software to their toolkit, hoping to introduce the first diesel- or kerosene-powered fuel cells to the market by 2015.

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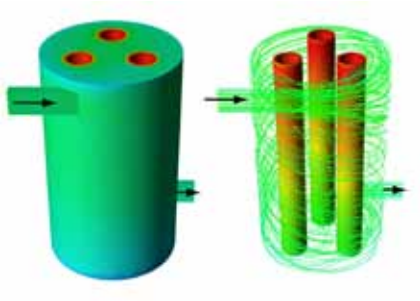
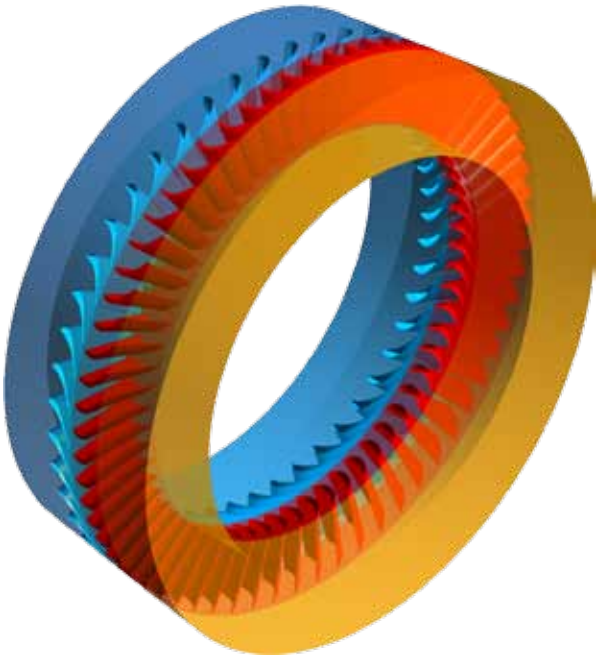


Courtesy Colorado School of Mines.

Powered by the Industry's Broadest, Deepest, Most Coupled Physics

ANSYS resolves the complex challenges of the energy industry — with proven multiphysics capabilities and a system-level perspective that drives innovation.



Courtesy Mechanical Solutions Inc.

Our advanced turbomachinery tools can help engineers to improve longevity for rotating equipment that must operate in harsh conditions, such as in fluid catalytic hot-gas expanders.

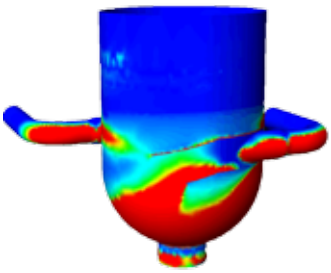
Energy applications can bring together an incredible range of physics. Consider complex problems such as hydrodynamics–structure interaction on an offshore oil rig, vibration and stress resulting from drilling operations, EMI in generators and converters, vortex formation in oil pipelines, and seismic effects on a nuclear plant.

With decades of specialized energy experience, we bring the industry's broadest, deepest physics to bear on sophisticated problems — streamlining even the largest simulations. Industry-leading structural, thermal, electromagnetics and fluids physics from ANSYS power your energy product or process. Our set of solutions also addresses the specialized requirements for optimal hydrodynamics, explicit and rotating machinery design.

Our various physics tools don't exist in a vacuum. ANSYS software helps engineers solve complicated problems at both the component and systems levels, examining the complex interaction of multiple moving parts and forces — visible or not. HPC options empower your engineers to quickly solve even the most complex and numerically large simulations.

"We use ANSYS to model the global structure and mechanical behavior of our turbines and to calculate the stiffness, frequencies and deformations, as well as how all structural components react with each other. We also use ANSYS to calculate even small details, such as connections with preloaded bolts, to find a solution to such problems."

Michael Schuld
Team Leader, Structural Engineering
PowerWind



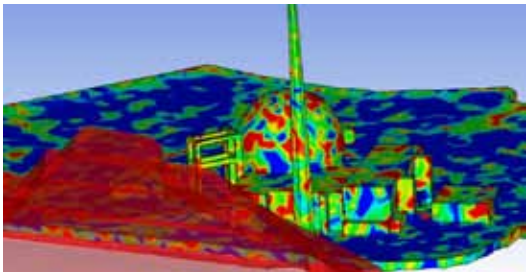
State-of-the-art research at Petrobras studies heat and mass transfer that occurs in refining processes. The energy giant chose ANSYS because of our advanced technology, which includes important physical models and excellent parallel performance to solve very complex industrial multiphase flows in a reasonable time.

ANSYS: A Platform for Global Collaboration

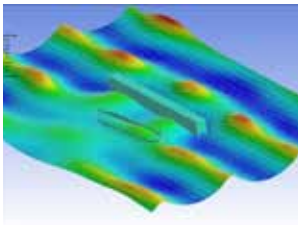
Within the global energy supply chain, design, engineering and manufacturing groups span multiple geographies and involve teams engaged in discovery, generation, collection, storage, transportation, distribution and more. Each works on a broad set of challenges, solving problems that involve different physics, scale and components. Because of industry regulations, the supply chain must follow established quality assurance processes. We offer a technology platform built to support this level of global design collaboration — and our quality program is acknowledged as the industry standard.

Beyond simulation, we provide engineering knowledge management capabilities and highly automated workflows to help you manage the analysis process. These web-based tools help you and your global supply chain partners to collaborate, communicate and share critical performance data throughout the development process.

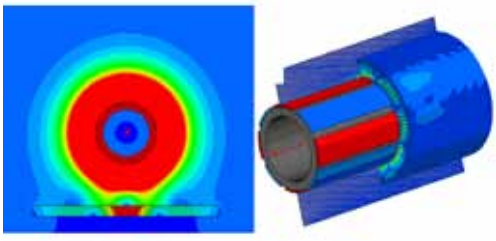
We designed ANSYS software to help you accelerate innovation and increase confidence that new products and processes will perform as expected. The end result is that you realize the ultimate customer promise: safe, reliable, environmentally responsible and cost-effective energy.



Eletronuclear S.A. simulated potential damage from a hypothetical external explosion at a nuclear plant. Using ANSYS explicit tools, the team gained insight on how to mitigate damage; it also obtained required clearances for plant licensing and construction without performing expensive experiments.



ANSYS hydrodynamics tools investigate the effects of wave, wind and current on floating and fixed offshore and marine structures.



One rising trend in wind turbine generation is permanent magnet generators, offering higher efficiency and design flexibility. Indar Electric used our tools to reach the ambitious target of 97.7 percent level efficiency at rated load in converting mechanical to electrical energy.

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ANSYS, Inc.
www.ansys.com
ansysinfo@ansys.com
866.267.9724

ANSYS is dedicated exclusively to developing engineering simulation software that fosters rapid and innovative product design. Our technology enables you to predict with confidence that your product will thrive in the real world. For more than 40 years, customers in the most demanding markets have trusted our solutions to help ensure the integrity of their products and drive business success through innovation.

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