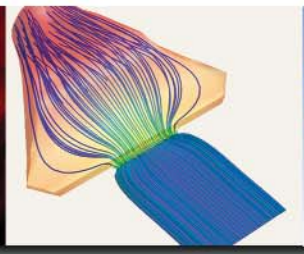
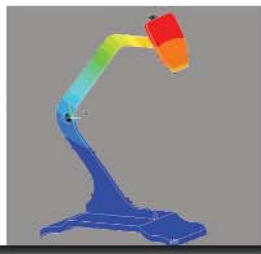
ANSYS®

Engineering Simulation Solutions for the plastic and rubber Industry

With the unequalled depth and unparalleled breadth of engineering simulation solutions from ANSYS, polymer processing companies 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.

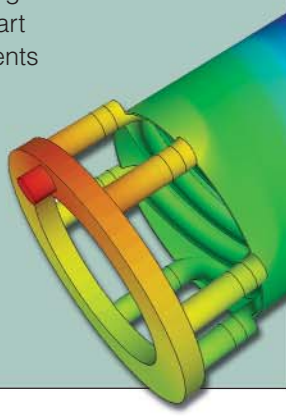
Challenges and Solutions

The demand for plastic and rubber parts remains strong despite surging oil prices and competition from alternatives such as metals and glass. The main reasons for the continued demand for polymers are their light weight, higher impact strength compared to glass, and processibility at relatively low temperatures. At the same time, global competition continues to put pressure on profit margins and time to market, pushing manufacturers to constantly innovate in the areas of product performance and production efficiency. Additionally, designers need to satisfy a growing list of constraints related to safety, sustainability and environmental protection.

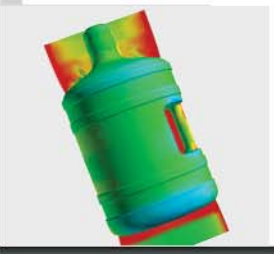
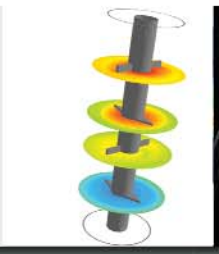
Virtual Versus Physical Prototyping

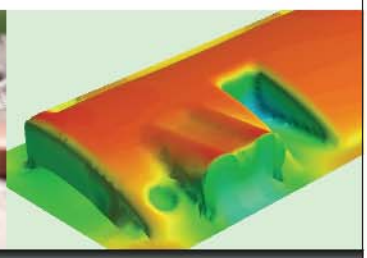
To ensure that a polymer part meets its performance criteria — drop test, sealing capacity or dimensional stability requirements, for example — the part typically undergoes extensive physical testing. A weakness of this approach, in addition to high cost, is that defects are often detected only after the die or mold is cut and the part is manufactured. In addition, it is not always possible to look inside the equipment to understand the origins of part defects.

Virtual prototyping, the combination of the virtual production of a part followed by its virtual testing, does not interrupt existing production. Engineers can simulate the production process, obtain a detailed model of the part, and test it on their personal computers. This process dramatically reduces the amount of physical testing required. Performing approval testing on a virtually manufactured part often reveals potential weaknesses that could have led to part rejection. Virtual prototyping allows for the quick and effective study of numerous adjustments of the design and process operating conditions.



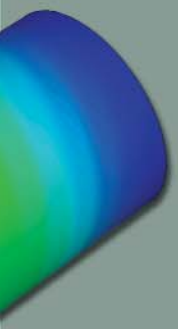
polymers

“ A second die was built to match the latest simulation prediction. When it was tested on the extrusion line, it produced a profile that perfectly matched the desired geometry. The new dual-cavity die designed using ANSYS POLYFLOW software has reduced the cost of producing the part by approximately 50 percent. ”

Adnan Saeed
Derby Cellular Products



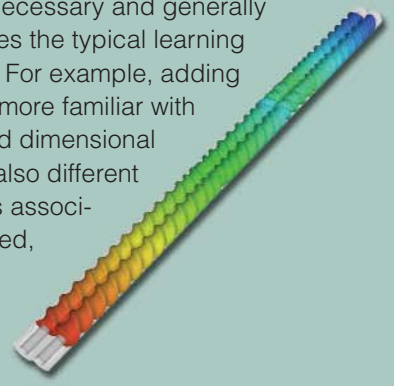
Cost-Effectiveness

Because production margins for plastic and rubber parts can be small, minimizing the number of design iterations for high-end products with tight tolerances is a continual concern for both small and large enterprises. Traditional build-and-test methods often necessitate new equipment, cause production line interruptions, waste material, and require considerable time and energy. Engineering simulation technologies provide detailed virtual production processes that help minimize the number of design cycles, troubleshoot product imperfections, optimize equipment performance and test design modifications rapidly.

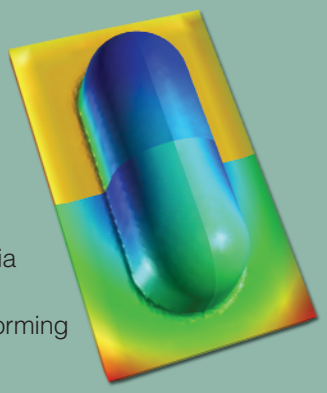
Innovation

In a highly competitive world, a leading-edge material quickly becomes the standard. Newly engineered polymers with modified material properties are continually developed. In some sealing applications, for example, thermoplastic elastomers (TPEs) that reduce the weight of parts are replacing traditional rubber material. Innovation is key to stretching the rules and boundaries for producing existing plastic and rubber parts using new and more cost-effective processes.

With new materials, process adjustments become necessary and generally require new expertise. Virtual prototyping accelerates the typical learning curve when dealing with a new material or process. For example, adding a co-extrusion line poses new challenges for those more familiar with single-material extrusion. The structural, thermal and dimensional behaviors of fiber-filled, injection-molded parts are also different than those of traditional non-filled plastics. The risks associated with using these different processes are reduced, making it easier and more systematic to develop innovative solutions.



Capabilities



- **Structural Solutions:** static; dynamic; nonlinear material properties; fatigue; thermal; advanced nonlinear contact and other analysis capabilities for mechanical and material systems
- **Fluid Simulation Solutions:** laminar and turbulent flow; generalized Newtonian and viscoelastic models; nonlinear material properties; chemical reaction; heat transfer; multiphase flow; melting and solidification; VOF free surface calculation; porous media
- **Multiphysics:** fully integrated two-way fluid structure interaction including moving/deforming domains; virtual prototyping through seamless transfer between manufacturing and testing simulation solution
- **Impact Analysis:** nonlinear drop test modeling; high-speed impact modeling
- **Geometry and Meshing:** flexible CAD import and cleanup; automatic meshing; adaptive meshing; ALE deforming mesh
- **Engineering Knowledge Management Systems:** centralized storage of simulation; archive and retrieve previous simulation work; integrate with current engineering work-flow

injection molding • bottles • single screw extruders • seals • window profiles • thermoforming • packaging • gas tanks • food trays • film casting • film blowing • coextrusion • spiral dies • mold cooling • shrinkage • containers • drop tests • **polymers** blow molding • mechanical testing • melt spinning • coat hanger dies • twin screw extruders • mixing • chemical reactions •

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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