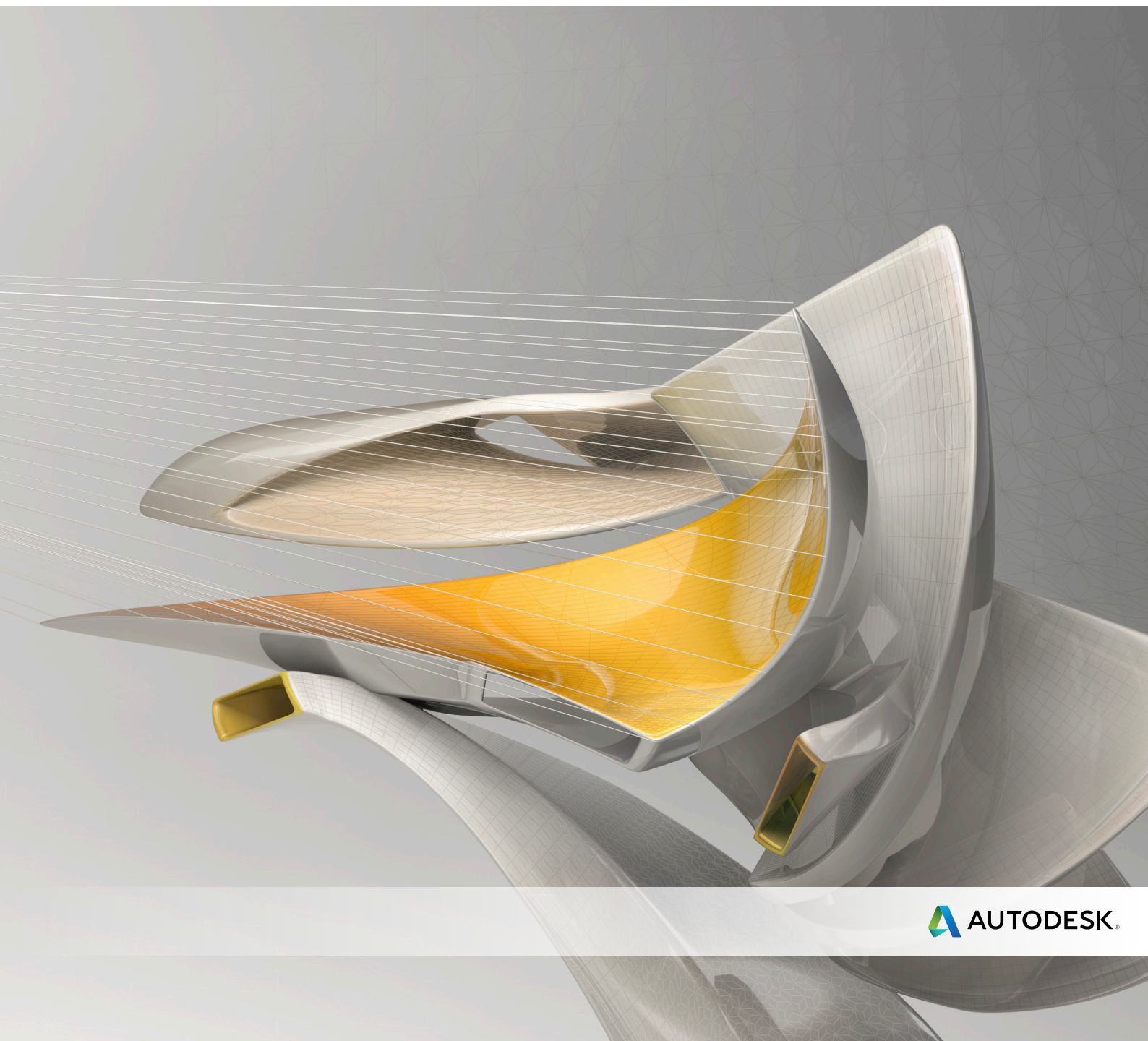


Plastics made perfect



Validation and optimization of plastic parts

Plastics are now being used to create higher quality and cheaper products and components in nearly every industry. The use of fiber-filled composite materials, and innovative manufacturing methods are answering growing pressures to help reduce cost, weight and time to market. The need for simulation tools that provide deep insight into the plastic injection molding process has never been greater.

Contents

Validation and optimization of plastic parts.....	2
Part layout simulation.....	3
Injection molding process simulation	4
CAD interoperability and meshing.....	6
Results evaluation and productivity tools	7
Feature comparison.....	8

The standard for injection molding simulation

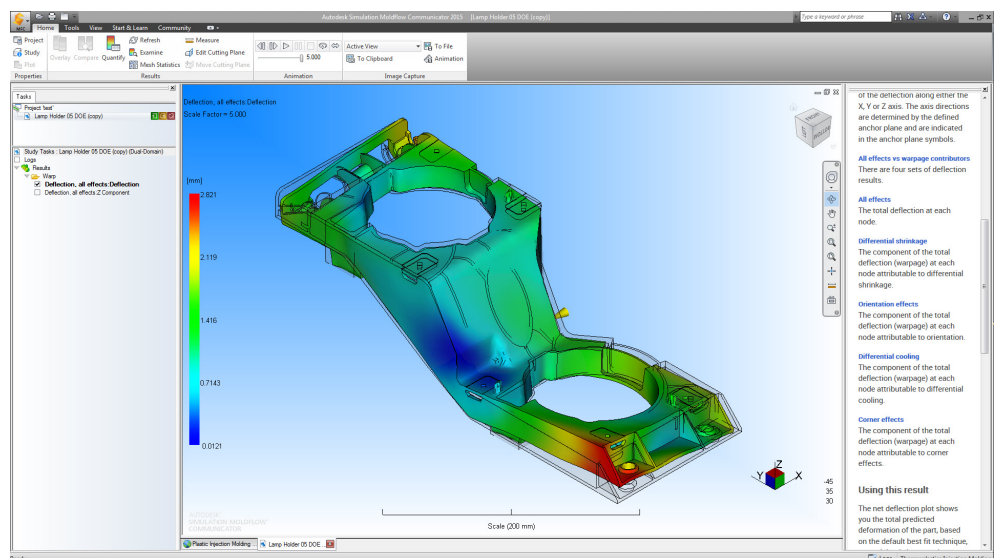
Autodesk® Moldflow® plastic injection molding simulation software, provides tools that help manufacturers predict, optimize, and validate the design of plastic parts, injection molds, and molding processes. Industry leading companies worldwide use Autodesk® Moldflow® Adviser and Autodesk® Moldflow® Insight software to help optimize part and mold designs, reduce potential manufacturing defects, and get innovative products to market faster.

Autodesk Moldflow product line

Autodesk is dedicated to providing a wide range of purpose built injection molding simulation tools to help CAE analysts, designers, engineers, mold makers, and molding professionals create designs of the parts' injection molding process, and bring better products to market at less cost.

Autodesk flexible cloud solving options

The extended solving options of Autodesk® Moldflow® Insight software allows you to simulate on your local machine, a remote server, or in the cloud, depending on your needs. If you are testing the setup of an analysis, use your local machine to iterate and optimize. When analyses are more computationally intense, or you need some extra compute power to complete a job on time, use the power of the cloud, saving local resources for other tasks.



Part layout simulation

Validate and optimize plastic parts, injection molds, resin selection, and the injection molding process

Plastic flow simulation

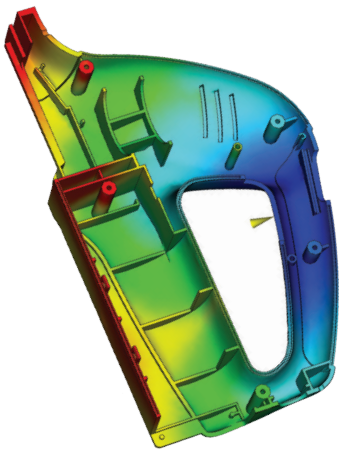
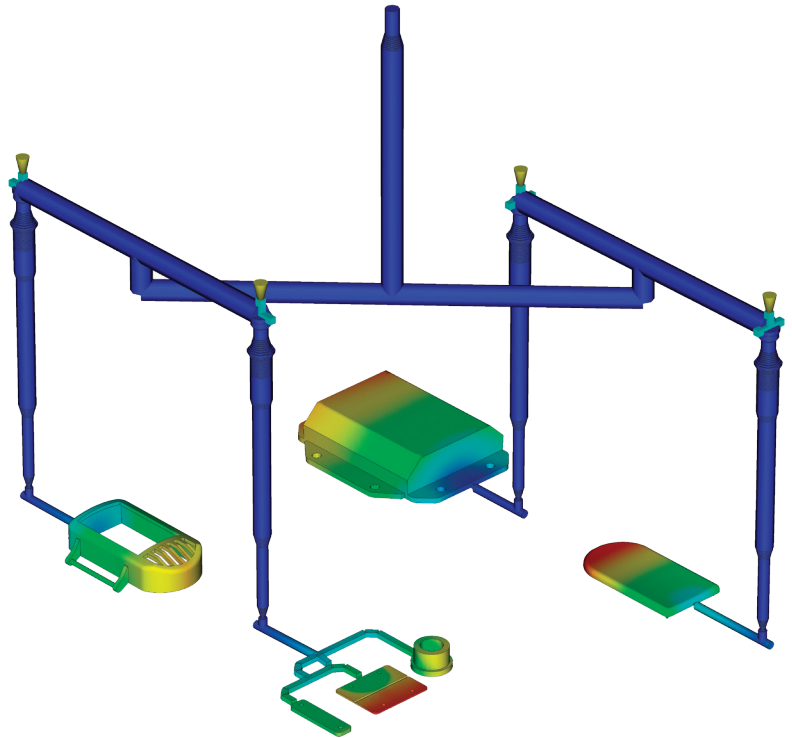
Simulate the flow of melted plastic to help optimize plastic part and injection mold designs, reduce potential part defects, and improve the molding process.

Part defects

Determine potential part defects such as weld lines, air traps, and sink marks, then rework designs to help avoid these problems.

Mold filling

Simulate the filling phase of the plastic injection molding process to help predict the flow of melted plastic and fill mold cavities uniformly; avoid short shots; and eliminate, minimize, or reposition weld lines and air traps.



Feed system simulation

Model and optimize hot and cold runner systems and gating configurations. Improve part surfaces, minimize part warpage, and reduce cycle times.

Gate location

Identify up to 10 gate locations simultaneously. Minimize injection pressure and exclude specific areas when determining gate location.

Runner design wizard

Create feed systems based on inputs for layout, size, and type of components, such as sprues, runners, and gates.

Balancing runners

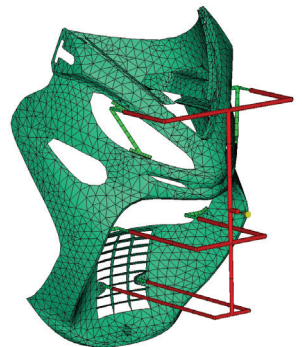
Balance runner systems of single-cavity, multicavity, and family mold layouts so parts fill simultaneously, reducing stress levels and improving consistency.

Hot runner systems

Model your entire hot runner system, and set up sequential valve gates to help eliminate weld lines and control the packing phase.

Packing

Optimize packing profiles and visualize magnitude and distribution of volumetric shrinkage to help minimize plastic part warpage



Injection molding process simulation

Mold cooling simulation

Improve cooling system efficiency, minimize part warpage, achieve smooth surfaces, and reduce cycle times.

Cooling system modeling

Analyze a mold's cooling system efficiency. Model cooling circuits, baffles, bubblers, heating elements, and mold inserts and bases.

Cooling system analysis

Optimize mold and cooling circuit designs to help achieve uniform part cooling, minimize cycle times, reduce part warpage, and decrease manufacturing costs. Capture advanced cooling techniques and layouts, such as conformal cooling, induction heating, as well as transient heat calculations.

Rapid mold heating technology

Use steam heating, heating elements or induction elements to maintain warmer temperatures during filling to achieve high quality part surfaces; reduce temperatures in the packing and cooling phases to help freeze parts and shorten the cycle time.

Shrinkage and warpage simulation

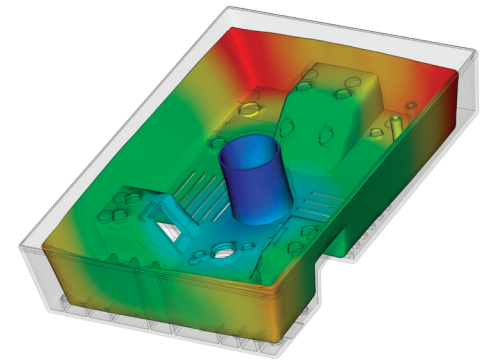
Evaluate plastic part and injection mold designs to help control shrinkage and warpage.

Shrinkage

Meet part tolerances by predicting part shrinkage based on processing parameters and grade-specific material data to determine the optimal mold cavity dimensions.

Warpage

Predict warpage resulting from process-induced stresses. Identify where warpage might occur and optimize part mold design, material choice, and processing parameters to help control part deformation.



Core shift control

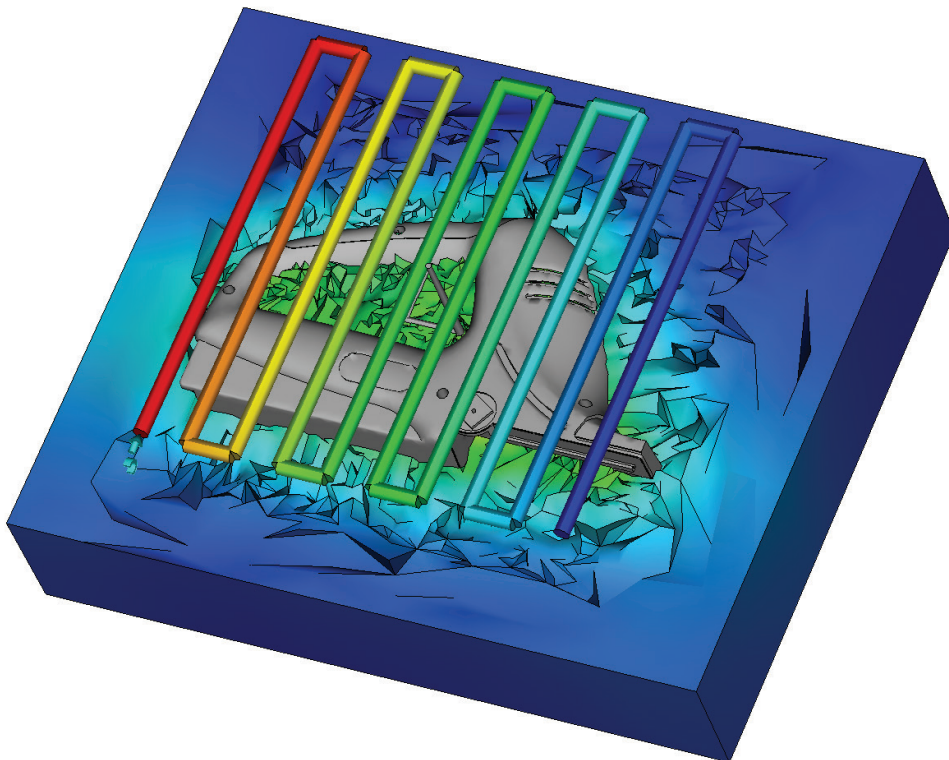
Minimize the movement of mold cores by determining ideal processing conditions for injection pressure, packing profile, and gate locations.

Fiber orientation and breakage

Control fiber orientation within plastics to help reduce part shrinkage and warpage across the molded part.

CAE data exchange

Validate and optimize mechanical performance of as-manufactured plastic parts using tools to exchange data with mechanical simulation software. Exchange data with Autodesk® Simulation Mechanical, Autodesk® Nastran® and Autodesk® Heliu PFA software, as well as ANSYS®, and Abaqus® software to predict the real-life structural behavior of plastic parts by using as-manufactured material properties.



Injection molding process simulation

Thermoset flow simulation

Simulate the injection molding of reactive materials, including processes like RIM/SRIM, resin transfer molding, rubber compound injection molding and microchip encapsulation.

Reactive injection molding

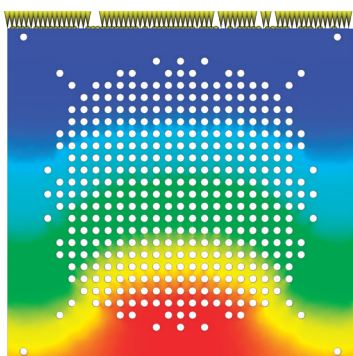
Predict how molds will fill with a reactive material, or without fiber-reinforced preforms. Help avoid short shots due to pregelation of resin, and identify air traps and problematic weld lines. Balance runner systems, select molding machine size, and evaluate thermoset materials.

Microchip encapsulation

Simulate encapsulation of semiconductor chips with reactive resins. Predict bonding wire deformation within the cavity and shifting of the lead frame due to pressure imbalances.

Underfill encapsulation

Simulate flip-chip encapsulation to predict material flow in the cavity between the chip and the substrate.

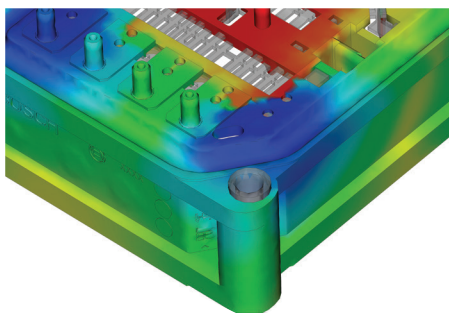


Specialized simulation tools

Solve design challenges with simulation.

Insert overmolding

Run an insert overmolding simulation to help determine the impact of mold inserts on melt flow, cooling rate, and part warpage.



Two-shot sequential overmolding

Simulate the two-shot sequential overmolding process: one part is filled; the tool opens and indexes to a new position; and a second part is molded over the first.

Birefringence

Predict optical performance of an injection-molded plastic part by evaluating refractive index changes that result from process-induced stresses. Evaluate multiple materials, processing conditions, and gate and runner designs to help control birefringence in the part.

Foaming processes

Filling processes that use chemical blowing agents, or that foam using the MuCell® process from Trexel, Inc. and other micro-cellular foaming processes are supported. Predict the cell structure and part weight savings that can be gained. And assess the effect of combining this with a core back process.

Specialized molding processes

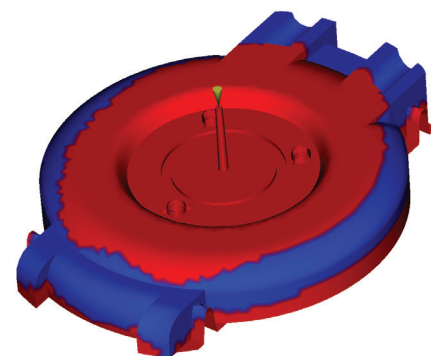
Simulate a wide range of plastic injection molding processes and specialized process applications.

Gas-assisted injection molding

Determine where to position polymer and gas entrances, how much plastic to inject prior to gas injection, and how to optimize size and placement of gas channels to achieve optimal gas penetration.

Co-injection molding

Visualize the distribution of skin and core materials in the cavity and view the dynamic relationship between the two materials as filling progresses. Optimize material combinations while maximizing the product's cost-performance ratio.



Injection-compression molding

Simulate simultaneous or sequential polymer injection and mold compression. Evaluate material candidates, part and mold design, and processing conditions.

Compression molding

Optimize the size and location of charges to be placed in an open mold, before the closing stroke fills the cavity. The simulation can help identify the fiber orientation and the location of weld lines.

CAD interoperability and meshing

Use tools for native CAD model translation and optimization. Autodesk Moldflow provides geometry support for thin-walled parts and thick and solid applications. Select mesh type based on desired simulation accuracy and solution time.

CAD solid models

Import and mesh solid geometry from Parasolid®-based CAD systems, Autodesk® Inventor® and Autodesk® Alias® software, CATIA® V5, Creo® Parametric, Pro/ENGINEER®, Siemens® NX®, Rhino®, and SolidWorks® software, as well as ACIS®, IGES, JT, STL and STEP universal files.

Autodesk SimStudio Tools

Quickly simplify and edit your geometry for simulation in Moldflow. SimStudio Tools reads in multiple CAD file formats and enables you to quickly simplify models, eliminate unnecessary detail, perform basic repair, or easily make design changes so you can explore various design ideas faster.

Error checking and repair

Scan imported geometry and automatically fix defects that can occur when translating a model from CAD software.

Centerline import/export

Import and export feed system and cooling channel centerlines from and to CAD software, to help decrease modeling time and avoid runner and cooling channel modeling errors.

CADdoctor for Autodesk Simulation

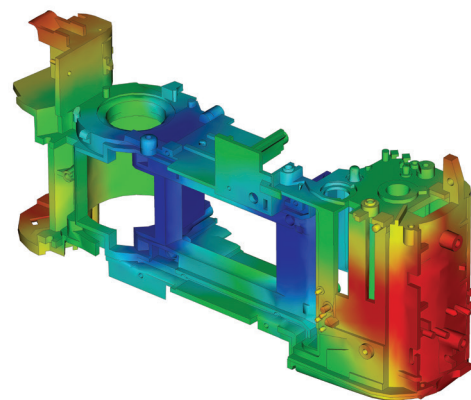
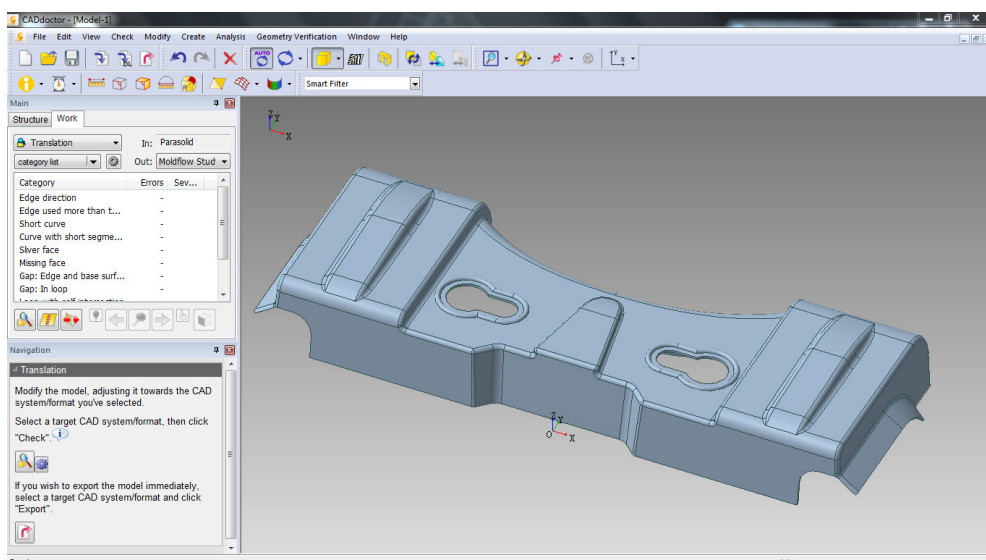
Check, correct, heal, and simplify solid models imported from 3D CAD systems to prepare for simulation.

3D simulations

Perform 3D simulations on complex geometry using a solid, tetrahedral, finite element mesh technique. This approach is ideal for electrical connectors, thick structural components, and geometries with thickness variations.

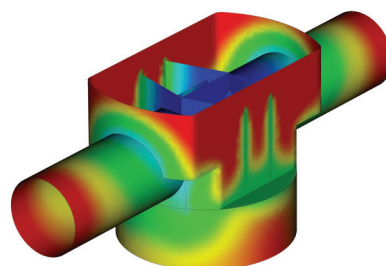
Dual domain technology

Simulate solid models of thin-walled parts using Dual Domain™ technology. Work directly from 3D solid CAD models, leading to easier simulation of design iterations.



Midplane meshes

Use midplane meshes to run analyses on thin-walled parts, and run fast and accurate simulations.



Autodesk® Moldflow® 2017 feature comparison

Feature comparison matrix

Validate and optimize plastic parts, injection molds, resin selection, and the injection molding process using Autodesk® Moldflow®. Compare the features of Autodesk Moldflow products to learn how Autodesk® Moldflow® Design, Autodesk® Moldflow® Adviser and Autodesk® Moldflow® Insight software can help meet the needs of your organization.

	Moldflow Design	Moldflow Adviser			Moldflow Insight		
		Standard	Premium	Ultimate	Standard	Premium	Ultimate
SOLVER CAPACITY							
Simultaneous local solving (max)	Unlimited	Unlimited	Unlimited	Unlimited	1	3	3
Cloud Solving					✓	✓	✓
MESHING							
Dual Domain		✓	✓	✓	✓	✓	✓
3D			✓	✓	✓	✓	✓
Midplane					✓	✓	✓
CAD INTEROPERABILITY							
CAD Solid Models	✓	✓	✓	✓	✓	✓	✓
Parts	✓	✓	✓	✓	✓	✓	✓
Assemblies					✓	✓	✓
SIMULATION ADVISERS							
Design advice	✓						
Design adviser		✓	✓	✓			
Results adviser		✓	✓	✓			
Cost adviser		✓	✓	✓			

	Moldflow Design	Moldflow Adviser			Moldflow Insight		
		Standard	Premium	Ultimate	Standard	Premium	Ultimate
SIMULATION CAPABILITIES							
Filling	✓	✓	✓	✓	✓	✓	✓
Packing				✓	✓	✓	✓
Fiber orientation				✓	✓	✓	✓
Sink marks and weld lines	✓	✓	✓	✓	✓	✓	✓
Molding window		✓	✓	✓	✓	✓	✓
Venting analysis					✓	✓	✓
Crystallization analysis						✓	✓
Gate location		✓	✓	✓	✓	✓	✓
Cold & hot runners			✓	✓	✓	✓	✓
Runner balancing			✓	✓	✓	✓	✓
Design of experiments (DOE)						✓	✓
Cooling				✓	✓	✓	✓
Transient mold cooling or heating					✓	✓	✓
Conformal cooling						✓	✓
Rapid temperature cycling						✓	✓
Induction heating						✓	✓
Heating elements					✓	✓	✓
Warpage				✓	✓	✓	✓
Insert overmolding					✓	✓	✓
In-mold label					✓	✓	✓
Two-shot sequential overmolding					✓	✓	✓
Core shift						✓	✓
Wire sweep, paddle shift						✓	✓

Autodesk® Moldflow® 2017 feature comparison

Feature comparison matrix

Validate and optimize plastic parts, injection molds, resin selection, and the injection molding process using Autodesk® Moldflow®. Compare the features of Autodesk Moldflow products to learn how Autodesk® Moldflow® Design, Autodesk® Moldflow® Adviser and Autodesk® Moldflow® Insight software can help meet the needs of your organization.

	Moldflow Design	Moldflow Adviser			Moldflow Insight		
		Standard	Premium	Ultimate	Standard	Premium	Ultimate
MOLDING PROCESSES							
Thermoplastic injection molding	✓	✓	✓	✓	✓	✓	✓
Gas-assisted injection molding							✓
Injection-compression molding							✓
Co-injection molding							✓
Bi-injection molding							✓
Chemical Blowing Agent (CBA)							✓
Microcellular injection molding with and without core back							✓
Birefringence							✓
Resin transfer (RTM) and structural reaction injection molding (SRIM)					✓	✓	✓
Rubber, liquid silicone injection molding					✓	✓	✓
Multiple-barrel reactive molding					✓	✓	✓
Reaction injection molding					✓	✓	✓
Microchip encapsulation						✓	✓
Underfill encapsulation						✓	✓
Compression molding							✓
DATABASES							
Thermoplastic materials*	✓	✓	✓	✓	✓	✓	✓
Thermoset materials					✓	✓	✓
Molding machines					✓	✓	✓
Coolant materials				✓	✓	✓	✓
Mold materials				✓	✓	✓	✓

*Limited database

	Moldflow Design	Moldflow Adviser			Moldflow Insight		
		Standard	Premium	Ultimate	Standard	Premium	Ultimate
SOFTWARE INTEROPERABILITY							
Autodesk Heliux PFA (Advanced Material Exchange)					✓	✓	✓
Simulation Mechanical (FEA)					✓	✓	✓
Autodesk Nastran (FEA)					✓	✓	✓
Abaqus (FEA)					✓	✓	✓
ANSYS (FEA)					✓	✓	✓
LS-DYNA (FEA)					✓	✓	✓
CODE V (Birefringence)							✓
VRED (defect visualization)		✓	✓	✓	✓	✓	✓
Showcase (defect visualization)		✓	✓	✓	✓	✓	✓
CADdoctor for Autodesk Simulation		✓	✓	✓	✓	✓	✓
SUPPORTED LANGUAGES							
English	✓	✓	✓	✓	✓	✓	✓
Chinese (Simplified)	✓	✓	✓	✓	✓	✓	✓
Chinese (Traditional)		✓	✓	✓	✓	✓	✓
French		✓	✓	✓	✓	✓	✓
German	✓	✓	✓	✓	✓	✓	✓
Italian		✓	✓	✓	✓	✓	✓
Japanese	✓	✓	✓	✓	✓	✓	✓
Portuguese		✓	✓	✓	✓	✓	✓
Spanish		✓	✓	✓	✓	✓	✓
Korean		✓	✓	✓	✓	✓	✓
INCLUDED SOFTWARE & SERVICES							
Moldflow Communicator		✓	✓	✓	✓	✓	✓
SimStudio Tools		✓	✓	✓	✓	✓	✓
Vault		✓	✓	✓	✓	✓	✓

Learn more or purchase

Access specialists worldwide who can provide product expertise, a deep understanding of your industry, and value that extends beyond your software purchase. Contact an Autodesk Premier Solutions Provider or Autodesk Authorized Reseller. Locate a reseller near you at www.autodesk.com/products/moldflow/buy/contact-me.

Autodesk Education

Autodesk offers students and educators a variety of resources to help ensure students are prepared for successful design careers, including access to free* software, curricula, training materials, and other resources. Anyone can get expert guidance at an Autodesk Authorized Training Center (ATC®) site, and validate skills with Autodesk Certification. Learn more at www.autodesk.com/education.

Subscribe to Autodesk

Subscribing to Autodesk products is the most flexible and cost-effective way to access the latest design, engineering, and entertainment software and services you need to help grow your business. Autodesk subscribers get access to the latest releases and product enhancements, flexible licensing rights, cloud services, and technical support. Learn more at www.autodesk.com/subscription.

Autodesk 360

The Autodesk® 360 cloud-based framework provides tools and services to extend design beyond the desktop. Streamline your workflows, effectively collaborate, and quickly access and share your work anytime, from anywhere. Learn more at www.autodesk.com/autodesk360.

*Free products are subject to the terms and conditions of the end-user license agreement that accompanies download of this software.

**All Subscription benefits are not available for all products in all languages and/or regions. Flexible licensing terms, including previous version rights and home use, are subject to certain conditions.

Autodesk, the Autodesk logo, Alias, ATC, Autodesk Inventor, Inventor, Moldflow, Showcase, VRED, and 3ds Max are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. Nastran is a registered trademark of the National Aeronautics and Space Administration. SolidWorks is a registered trademark of Dassault Systèmes SolidWorks Corporation. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product offerings and specifications at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document. © 2016 Autodesk, Inc. All rights reserved.