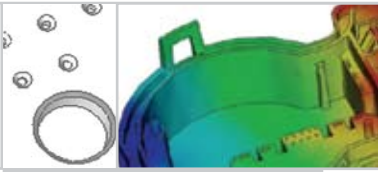
MPI/3D



MPI/3D addresses a class of problems previously unsolvable using traditional finite-element analysis techniques.

In thick parts, molten plastic can flow in all directions. Using a proven solution technique based on a solid tetrahedral, finite-element volume mesh, MPI/3D solutions allow you to perform true, three-dimensional simulations on parts that tend to be very thick and solid in nature, as well as those that have extreme thickness changes.

Capabilities

- The MPI/Synergy pre- and post-processor can be used to create a 3D solid tetrahedral mesh model for use in MPI/3D analyses
- Tetrahedral mesh models in the following file formats are also supported:
  - SDRC Universal
  - Nastran Bulk Data
  - PATRAN Neutral
  - ANSYS Prep 7
- Surface triangle mesh models in one of the formats listed above may be used, as the surface model can be remeshed with 3D tetrahedral elements
- Geometry import formats will also be meshed with 3D tetrahedral elements. Supported formats include:
  - IGES
  - Parasolid (add-on option)
  - Pro/ENGINEER (add-on option)
  - STEP (add-on option)
  - CATIA V5 (add-on option)
  - SolidWorks (add-on option)
  - STL
- Tetrahedral elements can be remeshed automatically and anisotropically for optimal analysis performance
- Mesh optimization scheme to create a homogenous mesh (uniform aspect ratios and mesh density) in the thickness direction of relatively thin sections of the part geometry
- Local mesh refinement capability to increase/decrease number of layers of elements in specific areas

FEATURES

Why Use MPI/3D?

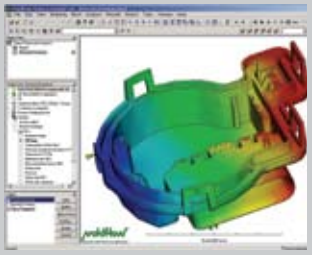
- For thick, solid geometry, true 3D simulation is required to establish exactly where weld lines will form and air traps will occur
- With MPI/3D, all velocities, pressures, temperatures, flowfront positions and heat transfer effects are computed in three dimensions

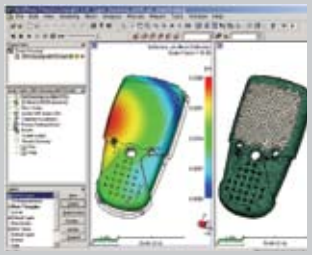
Ease of Use:

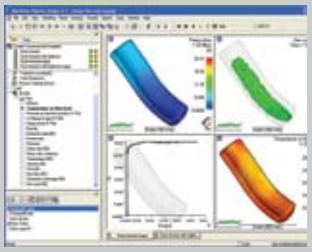
- MPI/3D simulation is based on the analysis of a 3D tetrahedral volume mesh created directly from a solid CAD model, resulting in significant model preparation time savings
- The MPI/Synergy pre- and post-processor provides one familiar and consistent environment for performing all MPI/3D tasks
- Thermoset material users can simulate reactive molding processes using MPI/3D

Filling and Packing Analyses:

- MPI/3D integrates with MPI/Flow to simulate the filling and packing stages of the injection molding process for thermoplastic materials
- Filling and packing analyses can be run sequentially, or a stand-alone packing analysis can be run







MPI/3D Features

2-Shot Sequential Overmolding Analysis:

- Simulates the process where a rigid substrate is overmolded with a flexible material
- Facilitates the evaluation of the effect of the substrate on the flow of the overmolded material
- Predicts potential thermal degradation of the substrate due to reheating as a result of the injection of the hot overmolded plastic material

Insert Overmolding Analysis:

- Analyze material flow around polymer or metal inserts
- Inserts can be imported as solid models and meshed along with the cavity using 3D tetrahedral elements
- Facility to specify temperature and material properties of the insert
- Obtain temperature variation within the insert during the entire molding cycle
- Flexibility to use an unmatched mesh along the interface of the part and inserts
- Supports both thermoplastic and thermoset applications

Fiber Analysis:

- Fibers play an important part in the design and manufacture of plastic parts; MPI/3D integrates with MPI/Fiber to accurately predict the orientation of fibers and the thermo-mechanical property distribution in the molded part

Cooling Analysis:

- MPI/3D interfaces with MPI/Cool to optimize the mold and cooling circuit design to achieve uniform component cooling of thick-walled plastics parts

Warpage Analysis:

- Estimate the part geometry's| tendency to warp
- Parallel solution option speeds-up 3D Warp analyses by a factor of 1.3 or more
- AMG Matrix Solver option reduces analysis times for large models

Reactive Molding Analysis:

- Simulate molding processes with thermoset materials on 3D solid models. Analysis capabilities include:
  - Thermoset injection molding
  - Rubber injection molding

Microchip Encapsulation Analysis :

- Simulate the encapsulation, wire-sweep and paddle shift of semicon ductor microchips using 3D tetrahedral mesh
- Accurate pressure distribution and melt front predictions are feasible for complicated lead frame geometries
- Eliminates the need for special modeling of leadframe geometry for calculation of cross flow of polymer in between the leads

Underfill Encapsulation Analysis:

- Simulate the manufacture of flip chips by the dispensing encapsulation process

Birefringence Analysis:

- Simulate Birefringence in optical lens applications

A Complete Solution:

- A true 3D analysis is the most accurate solution method for relatively thick, solid part geometry
- MPI/3D features detailed solutions for:
  - Mass, momentum, and energy conservation
  - Velocity, temperature, and pressure data at each node
  - Explicit calculation of the fountain flow at the flowfront gives the user deep insight into true plastic behavior in solids
- Analyzes filling, packing, cooling and warpage
- Predicts inertia effects, gravity effects, and shear heating
- Predicts Jetting phenomenon
- Allows detailed studies of weld-line and air-trap formation
- Studies thermal drag effects at the part surface
- Shows gate freeze-off on complex geometry

Analysis Capabilities:

- Full Navier Stokes solver:
  - Includes inertia effects
  - Includes gravity effects
  - Includes extensional viscosity effects
  - Includes pressure dependency of viscosity effects
- Stokes Solver
- Restart various packing setups from the end of a single filling analysis
- Packing stand-alone analysis allows a holding phase study without having to first perform a filling analysis

Global Headquarters
Moldflow Corporation
492 Old Connecticut Path
Suite 401
Framingham, MA 01701
USA
Tel: +1 508 358 5848
Fax: +1 508 358 5868

For further information about Moldflow®
Design Analysis Solutions, Manufacturing solutions, services and global office locations, visit www.moldflow.com.

Local office address:

MF-1301D-1106 Copyright © 2006 Moldflow Corporation. Moldflow, Moldflow Plastics Insight and MPI are trademarks or registered trademarks of Moldflow Corporation. All other trademarks are properties of their respective holders.

DESIGN ANALYSIS SOLUTIONS

www.moldflow.com