

I-DEAS® MPI/Warp enables industry to understand the causes of warpage in plastic injection molded parts, predict where it will occur, and optimize design, material and processing to control part warpage before mold building.

With I-DEAS MPI/Warp, even the most demanding application requiring high dimensional stability, excellent visual appearance and accurate fit with mating components, can be produced to quality, time and budgetary specifications.

I-DEAS MPI/Warp Analysis

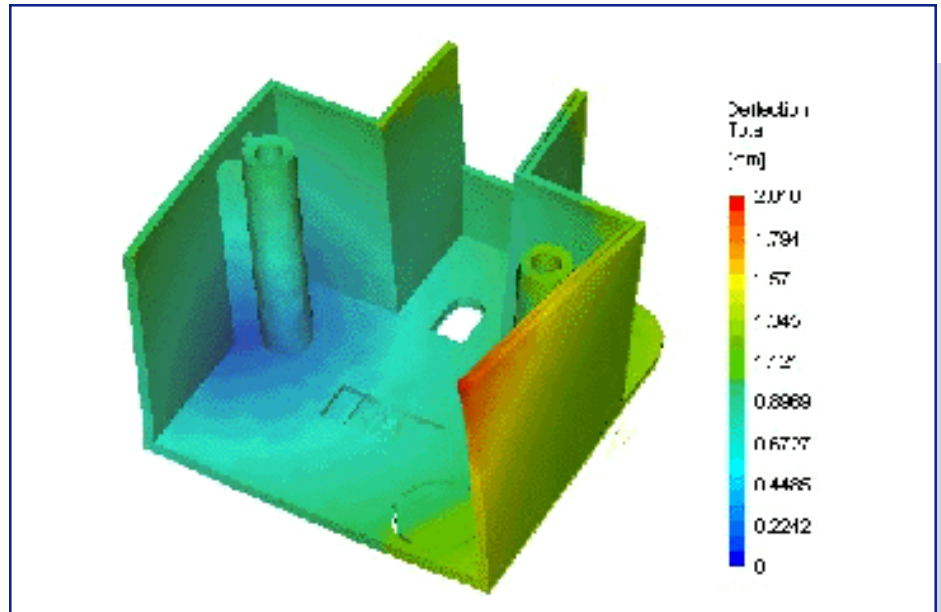
I-DEAS MPI/Warp is part of the Moldflow Plastics Insight, a suite of integrated analysis tools that work together to optimize the total process of producing a plastic part. It features a range of shrinkage and warpage analyses.

Shrinkage Analysis

Shrinkage variations in the part cause molding warpage. I-DEAS MPI/Warp is the only commercial package that calculates polymer shrinkage parallel and perpendicular to flow, using grade specific orthotropic material shrinkage data from the Moldflow material data base.

The material shrinkage data is used to calculate molding warpage, and accounts for all the major factors contributing to warpage, including crystallization kinetics, which ensures accurate results for crystalline materials. The accuracy, reliability and superiority of this approach has been proven in numerous benchmarks undertaken around the world.

Moldflow's Center for Polymer Testing and Research offers a material testing service for non standard, standard and confidential materials.



Part warpage due to injection molding process.

Fiber Option

Moldflow's fiber option links to the warpage analysis to enable the accurate prediction of shrinkage and warpage of complex geometry for fiber filled materials. This link is critical as shrinkage, and subsequent warpage, of fiber filled materials are dominated by fiber properties and fiber orientation, rather than the behavior of the base polymer.

The fiber option provides data on all fiber filled materials on the materials database and uses a shrinkage model that works with or without grade specific shrinkage data.

Moldflow's fiber option also links to MF/STRESS, where it is used to predict mechanical properties of the material and so the structural performance and tolerances of fiber filled plastic parts.

3D Warpage Analyses

I-DEAS MPI/Warp inputs the calculated shrinkage values into the structural analyses to calculate product warpage. A range of analyses is used to determine likely warpage.

Linear Buckling Analysis:

Plastic moldings are typically thin walled and can buckle easily. Linear buckling analysis predicts the likelihood of buckling and indicates the analysis type that should be used to determine the final shape.

Small Displacement Analysis

This analysis determines product warpage if linear buckling analysis shows the part is unlikely to buckle. It is fast to run and is used for design iterations.

Large Deflection Analysis

This analysis predicts the deformed shape after buckling. It features load or displacement control including automatic selection of algorithm type and automatic step sizing. Large displacement analysis is commonly used as a final check when the design is considered satisfactory.

Importantly, both the large deflection and small displacement analyses account for “corner effects”, the extra bending movement occurring at a corner of a molded box caused by 3D thermal effects and resulting in high residual stresses. This significantly affects the accuracy of the analysis and the deflection trend.

Single Variate Analysis

Unique to I-DEAS MPI/Warp, the single variate analysis isolates and predicts the effects on warpage of molecular/fiber orientation, cooling and shrinkage variation throughout the component. The dominant cause of warpage can be quickly diagnosed, and remedied on computer.

Other Capabilities

- Graphical Results Display & Animation
- Context Sensitive On line Hypertext Help
- Industry Standard GUI

Graphical Results Display

- Volumetric Shrinkage
- Elemental parallel/perpendicular shrinkage (top/bottom)
- Elemental principal stresses and strains (top/bottom)
- Material orientation direction
- Fiber orientation direction
- Elemental Von-Mises stresses (top/bottom)
- Total deformation
- Deformation and deflection in the x,y,z axes
- Deflection history at any node
- Direction of principal strains
- Deflected component shape with exaggeration factor
- Buckling mode shape
- Mechanical properties

Benefits:

Time to Market

I-DEAS MPI/Warp significantly reduces time to market, providing results that show the effects of material choice, processing conditions and part geometry on component warpage. It eliminates the need to wait for mold trials to see if there are problems with molding warpage. This avoids lengthy mold trials, extensive mold rework and delays in production.

Quality

Plastics are being used for demanding applications where dimensional stability, appearance and accurate fits with mating parts are critical. I-DEAS MPI/Warp ensures that the component will meet these “fit-for-purpose” criteria, by allowing the user to identify and control the causes of warpage. Reject rates are reduced and post-molding reshaping is eliminated.

Cost Savings

Many companies use expensive materials for their application because they have had success with these materials in the past. I-DEAS MPI/Warp enables customers to find a less expensive material grade that does the job required. I-DEAS MPI/Warp also determines warpage for different cooling times and enables possible trade offs between cooling time and deflections. By optimizing the part design, cycle times are reduced and production costs lowered.

Prerequisites

Core Simulation
I-DEAS MPI/Flow
I-DEAS MPI/Cool

For More Information

For more information, contact your local SDRC representative or call 1-800-848-7372.