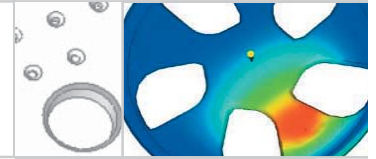


# MPI/Stress



MPI/Stress is a structural analysis product for optimizing the structural integrity of plastic injection molded parts.

MPI/Stress considers the effects of plastic flow during injection molding and the resultant mechanical properties on the component's structural integrity, ensuring it is fit-for-purpose and will not fail in use, well before mold trials or production, when the cost of change is high.

## Capabilities

MPI/Stress allows you to:

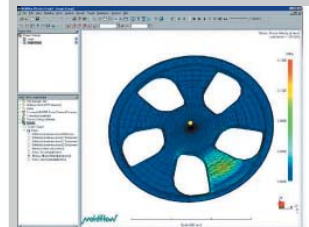
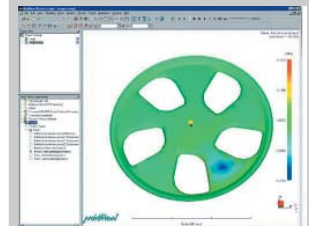
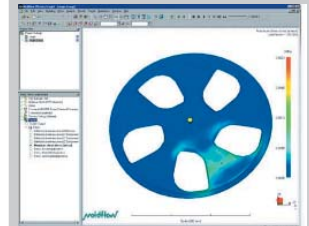
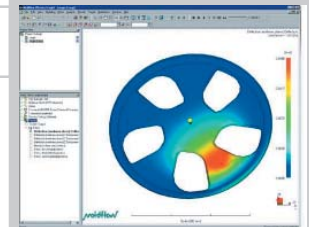
- Predict stresses and product deflections that result from external loads and temperatures
- Account for the effects of processing on mechanical properties of the part and the orthotropic (direction dependent) properties of injection molded components
- Evaluate whether a structural part, previously made from metal or other materials, can be successfully made from plastic
- Enable iterative optimization of part design to ensure the molding will meet final product strength and stiffness specifications
- Eliminate the need to over-engineer parts, using unnecessary costly engineering materials and thicker wall sections to achieve structural requirements

Supported Model/Mesh Types:

- Finite-element midplane models

Supported Analyses:

- Standalone
- MPI/Flow
- Links to MPI/Fiber
- Links to MPI/Warp





## Linear Static Structural Analysis:

- Linear analysis is ideal to quickly check whether an initial concept design will meet basic structural requirements
- Differing external loads are applied to the constrained component to determine resulting stress and deformation, and from this, the performance of the part.
- Both isotropic and orthotropic material properties may be used
- Results indicate whether the proposed design will meet strength and stiffness specifications and give basic assessments of wall thickness, rib bracing and material choice

## Modal Frequency Analysis:

- Determine the natural frequencies at which structures will vibrate
- Provides the frequency of interest as well as the associated mode shapes at these frequencies
- By looking at the mode shape, it is possible to assess whether vibrations could be minimized by the use of extra stiffening

## Linear Buckling Analysis:

- Calculates the load required to cause buckling and predicts the final buckled shape
- Results can be used to break symmetry for nonlinear analysis
- Both isotropic and orthotropic material properties may be used

## Large Deflection Analysis (Non-linear):

- Used to fully assess part performance under loadings, while accounting for deformation and residual stresses from the molding process
- The structure stiffness is updated with each load or displacement increment by automatic or manual control
- The solution strategy is automatically changed to best suit the level of non-linearity at a particular stage of a problem, removing much of the difficulty inherent in non-linear analysis

## Creep Analysis (Non-linear):

- Used to examine part performance when subjected to a constant load over a period of time
- Four isochronous stress/strain curves are used as input:
  - Tensile
  - Parallel and perpendicular
  - For unfilled materials: compression, parallel and perpendicular to flow direction
  - For fiber-filled materials: fiber direction

## Results:

- Deflections in x,y,z directions
- First and second principal stress/strains and directions
- Von-Mises stresses
- Deformed shape
- Mode shape (modal frequency), from modal frequency analysis
- Mode shape (all effects), from linear buckling analysis
- Node deflection versus applied load

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