Autodesk® Moldflow® Insight 2012

AMI Pack Analysis

Autodesk®

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Pack analysis predicts the thermoplastic polymer flow inside the mold in the packing phase. This analysis is run as the second part of a Fill+Pack analysis sequence and can be used to determine whether a cavity will be completely filled.

A Pack analysis calculates a flow front that grows from the locations in the model the flow front had filled when the velocity/pressure switch-over point was reached. The analysis continues until the flow front has expanded to fill the last location in the model.

A Pack analysis accepts a minimum of 8 and a maximum of 20 laminates across the part thickness to calculate results. The default number of laminates across the thickness is 12. You can change this value by editing the solver parameters.

If symmetrical thermal boundary conditions exist (Cool analysis results are not available), the analysis is based on a half-gap calculation and the actual number of laminates used in the calculation is half of the specified number, reflected symmetrically across the part. Running a Cool analysis prior to running a Fill+Pack analysis provides asymmetrical cooling information, and the full specified number of laminates is used to calculate results.

Before running a Fill+Pack analysis, pay close attention to the edge length of the mesh around high curvature areas on your model, and make sure the mesh in these areas is not too coarse. It is recommended that you mesh with a smaller edge length so the mesh approximates the corners correctly.

Pack analysis

The Pack analysis is used to predict the polymer flow inside the mold during the filling and packing phases.

Setting up a Pack analysis

The following table summarizes the setup tasks required to prepare a Pack analysis.

The setup tasks below are for non fiber-filled, or fiber-filled thermoplastic materials.

Pack analysis are used in analysis sequences, such as Fill + Pack.

Setup task	Analysis technology
Analysis sequence	

Setup task	Analysis technology
Fill analysis	

Optional setup tasks

Setup task	Analysis technology
Packing profiles	

Pack analysis

Use this dialog to specify settings for a Pack analysis.

Process Settings Wizard dialog—Pack analysis

This page of the **Process Settings Wizard**, which can be accessed by clicking  (**Home tab > Molding Process Setup panel > Process Settings**), is used to specify the process settings for the standalone packing analysis.

NOTE: Some of the items listed below may not be available on the current dialog. This is dependent on the analysis technology, molding process and analysis sequence selected.

Mold surface temperature	The temperature of the mold at the plastic-metal interface, where the plastic touches the mold.
Melt temperature	The temperature of the molten plastic, or melt, as it starts to flow into the cavity.
Pack/holding control	Specifies the method by which the pressure phase of the molding process is controlled.
Cooling time	Specify a cooling time, or have it calculated automatically during the Fill+Pack analysis.

Standalone Pack analysis 2

The Standalone Pack analysis is used for molds that are not expected to have any difficulty in filling. This analysis is generally used for very thick parts, where the packing phase is a higher priority.

Running a Standalone Pack analysis can reduce the time needed to run an analysis on a very large 3D model.

Several assumptions are made at the beginning of a Standalone Pack analysis:

- The entire part is at melt temperature. Only the outside elements have a mold temperature.
- There is no initial pressure—the entire cavity has the initial pressure of the packing profile.
- There is no initial velocity.

NOTE: The Standalone Pack analysis does not consider a molding window when analyzing the part.

You would use this analysis when you have a part that will fill with a low pressure, and when you want to see the effect of the packing pressure on volumetric shrinkage and other results from the packing phase. You can run multiple Standalone Pack analyses with different packing profiles to compare results.

Parallel solution method for 3D Flow (Coupled 3D) analysis

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Parallel solution (multi-threaded) technology is implemented as an option in the process settings for 3D Flow (Coupled 3D solver only) analysis to improve solution speed.

It allows major computational tasks to be computed simultaneously by a team of threads on a processor or many processors when running an analysis. Parallel solution is set to **Automatic** by default.

Supported systems

The parallel solution method is available on all supported Windows operating systems, for both 32-bit and 64-bit systems.

It is supported for shared memory multi-processor (SMP) systems, also known as multiple core systems. In SMP systems, all physical processors (cores) are in the same computer and access the full system memory, so data sharing is fast.

NOTE: Distributed-memory machines, i.e., clusters, are not supported.

Enabling the parallel solution

Access the parallel solution option from the **Solver Parameters (Coupled 3D)** dialog.

Click  **Home tab > Molding Process Setup panel > Process Settings** and then click **Next** if necessary until you are on the **Fill+Pack Settings** page. Click **Advanced options**, and in the **Solver Parameters** section, click **Edit**. On the **Fill+Pack Analysis** tab, click **Solver parameters**. Parallel solution options are available in the **Number of threads for parallelization** section.

NOTE: This option is available only if you have specified an analysis sequence that includes Fill, Pack, or Fill+Pack.

To check if you are using Coupled 3D solver

By default, the solver is set to **Coupled 3D solver**. To check the solver setup, click

 **Home tab > Molding Process Setup panel > Process Settings** and then click **Next** if necessary until you are on the **Fill+Pack Settings** page. Click **Advanced options**, and in the **Solver Parameters** section, click **Edit**. Check the setting in the **Solver setup** section on the **Fill+Pack Analysis** tab.

Single thread solution for DOE analyses

If you are running a DOE analysis, the parallel solution causes the analysis to take longer than if the analyses were run individually. In DOE, all the analyses must finish before any results can be written. If single threaded jobs are run, each job can run at maximum speed. If all the threads are running simultaneously, each one impacts the speed of the next, slowing them down. Since the results cannot be written until all the analyses are complete, it is best to turn this option off for DOE analyses.

Watertight CAD Model

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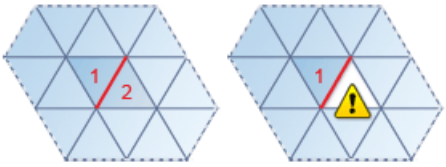
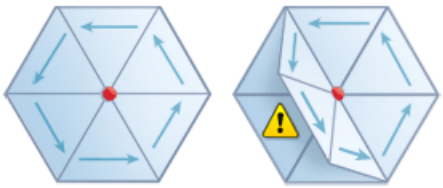
To perform a 3D analysis on an STL model, it is essential that the model is watertight before it is imported.

A watertight model is defined as:

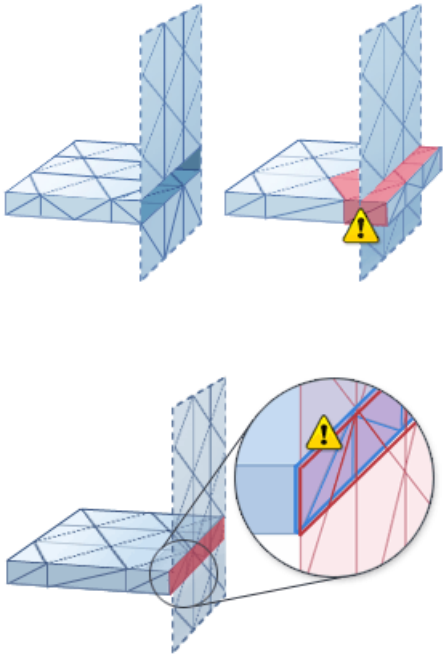
1 Every triangle edge in the STL has exactly two neighbors. This implies that there are no holes or non-manifold edges.



2 Every node in the triangle is connected to only one “fan” of triangles around it. That is, for a given node, every triangle that shares that node must be accessible from any other triangle that shares the same node by moving across triangle edges. This is a further condition on the domain being a proper manifold.



3 There are no geometric overlaps or intersections in the model. This condition is independent of definition (1) above. An STL may be properly manifold but may still have overlaps and/or intersections due to triangles intersecting or overlapping with each other geometrically.



4 There are no geometric errors that produce unrealistically thin areas. This is essentially similar to an overlap, but may not be severe enough to be picked up as an overlap.