Autodesk® Moldflow® Insight 2012

AMI Gas-assisted Fill+Pack Analysis Results

Autodesk®

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Gas-assisted Fill+Pack analysis results

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This help topic specifies the results for a Gas-assisted Fill+Pack analysis on a thermoplastic material.

Text based results

The following table lists the text results generated for a Gas-assisted Fill+Pack analysis.

Results
Analysis Log
Results Summary
Analysis Check

Graphical results

The following table lists the graphical results generated for a Gas-assisted Fill+Pack analysis, and indicates that the result is supported for the following analysis technologies:

- Midplane
- 3D

NOTE: These results are specific to gas-assist only. The full list of fill and pack results are also generated.

For more information about a result, including how to interpret the display, click on the result name.

Result	Available for analysis technology
%Volume of gas:XY Plot result on page 3	Midplane, 3D
Gas core result on page 4	3D
Gas time result on page 5	Midplane, 3D
Polymer skin fraction result on page 6	Midplane
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Result	Available for analysis technology
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Thickness of polymer at end of process result on page 10	
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%Volume of gas:XY Plot result 2

The %Volume of gas:XY Plot result shows the volume percentage of gas in the cavity during the filling and packing phases of the analysis, displayed on an XY plot of percentage volume versus process time.

This result is generated from Gas-assisted Fill+Pack analysis using Midplane or 3D analysis technology.

Using this result

The %Volume of gas:XY Plot result shows how fast the gas is entering the cavity during filling, and how fast the gas is compensating for the polymer volumetric shrinkage during the packing phase of the analysis.

This plot can be used to determine the optimal gas injection time, as indicated below.

Things to look for

- When the plot levels off, or when the data points are closer together, this indicates that increasing the gas injection time would not increase the gas penetration any further.

Gas core result

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The Gas core result shows the gas-polymer boundary throughout the part at the end of filling (fill analysis) or packing (filling + packing analysis).

This result is generated from a Gas-assisted Fill+Pack analysis using 3D analysis technology.

Using this result

The Gas core result is based on the Volume of Fluid method, where a value of 0 is assigned to nodes completely filled with polymer, and 1 is assigned to nodes completely filled with gas. To provide a clear visualization of the gas-polymer boundary as it intersects through the tetrahedral elements of the mesh, the default plot shows a single contour with the value 0.5.

NOTE: Contours at values other than 0.5 have no direct physical meaning.

The default plot is an animation with respect to time, but you can also create an XY, path or probe plot of this result.

As with other 3D results, we recommend the use of the **Cutting plane** tool  to explore how much of the cross-section of the part in any given area has been cored out.

Things to look for

- Check that the gas has not penetrated to unwanted areas of the part.
- Check when the gas is penetrating. If it is penetrating too fast, you may need to vary the gas injection pressure and/or time.

Gas time result

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The Gas time result shows the position of the gas flow front at regular intervals over the gas injection phase as the cavity is filling with polymer.

The Gas time result is measured from the start of the cycle, at which the gas reached a particular element in the part.

This result is generated from a Midplane or 3D Gas-assisted Fill+Pack analysis.

Using this result

Each color contour represents the parts of the mold which were being filled at the same time.

Use the Gas time result to check how the compressed gas has filled the part, and which sections that the gas has penetrated. This result is equivalent to the fill time result for the polymer.

NOTE: In the case of Gas-assisted Fill+Pack analysis using 3D analysis technology, the Gas time result display may not give a true representation of the size of the gas core. This is because only those elements where all four nodes are filled with gas are included in the gas time result display. For a true representation of the gas core, see the Gas core result.

Things to look for

- Check that the gas has not penetrated to unwanted areas of the part.
- Check “when” the gas is penetrating. If it is penetrating too fast, you may need to vary the gas injection pressure and/or time.

Polymer skin fraction result 5

The Polymer skin fraction shows the thickness fraction of the polymer skin over the duration of the analysis.

This result is generated from a Gas-assisted Fill+Pack analysis using Midplane analysis technology.

Using this result

The Polymer skin fraction result provides you with a good approximation of the extent of gas permeation through the part. The maximum value is 1, which corresponds to a region of solid polymer.

A value of less than 1 indicates a region hollowed out by injected gas.

NOTE: It is recommended that you deselect the **Nodal averaged** option when viewing this result. A plot will be shown where each element is assigned a single color, however, elements where gas permeation has occurred are easier to identify.

Things to look for

- A value of 1.0 indicates that the element is completely filled with polymer. Regions with a value of less than 1 indicate a region hollowed out by gas, possibly due to a large gas injection pressure.

Polymer skin fraction at end of process result

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The Polymer skin fraction at end of process result shows the thickness fraction of the polymer skin at the end of the cycle.

The Polymer skin fraction at end of process result is generated from a Gas-assisted Fill+Pack analysis using Midplane analysis technology.

Using this result

The Polymer skin fraction at end of process result provides you with a good approximation of the extent of gas permeation through the part.

The maximum value is 1, which corresponds to a region of solid polymer. A value of less than 1 indicates a region hollowed out by injected gas.

This result is equivalent to the last frame of the Polymer skin fraction result.

NOTE: It is a good idea to deselect the **Nodal averaged** option when viewing this result. A plot will be shown where each element is assigned a single color, however, elements where gas permeation has occurred are easier to identify.

Things to look for

- A value of 1.0 indicates that the element is completely filled with polymer. Regions with a value of less than 1 indicate a region hollowed out by gas, possibly due to a large gas injection pressure.

Polymer skin, half gap thickness (bottom) result

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The Polymer skin, half gap thickness (bottom) result provides you with a measure of the polymer skin thickness on the bottom side of the elements.

This result is generated from a Gas-assisted Fill+Pack analysis using Midplane analysis technology.

Using this result

For solid polymer sections where no compressed gas has penetrated, the value is equal to the half gap thickness of triangular elements, or radius of 1D (runner elements).

For hollowed sections where gas has penetrated, this variable is equal to the half gap thickness or radius multiplied by the polymer skin fraction value.

Things to look for

- There should be an even polymer skin thickness.

Polymer skin, half gap thickness (top) result

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The Polymer skin, half gap thickness (top) result provides you with a measure of the polymer skin thickness on the top side of the elements.

This result is generated from a Gas-assisted Fill+Pack analysis using Midplane analysis technology.

Using this result

For solid polymer sections where no compressed gas has penetrated, the value is equal to the half-gap thickness of triangular elements, or radius of 1D (runner elements).

For hollowed sections where gas has penetrated, this variable is equal to the half gap thickness or radius multiplied by the polymer skin fraction value.

Things to look for

- There should be an even polymer skin thickness.

Thickness of polymer at end of process result

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The Thickness of polymer at end of process result shows the thickness of the polymer at the end of the cycle.

This result is generated at the end of a Gas-assisted Fill+Pack analysis using Midplane analysis technology.

Using this result

The Thickness of polymer at end of process result is defined as the polymer-skin fraction at end of process multiplied by the full-gap thickness.

The Thickness of polymer at end of process result is used to verify that the polymer thickness meets the design specifications of the part.

Things to look for

- Check that the polymer thickness meets the requirements for the part. Smaller than required thicknesses can cause part defects and might lead to a fragile part.

Total design weight:XY Plot result

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The Total design weight:XY Plot result shows the weight of polymer used to create the part, displayed on an XY plot of weight versus process time.

This result is generated at the end of a Midplane Gas-assisted Fill+Pack analysis.

Using this result

The part weight is calculated by multiplying the filled volume at a time step by the polymer density. The analysis provides the weight of the polymer being injected into the cavity as a function of time. After gas injection, the part weight will remain constant, since the weight contributed by the gas is negligible.

The Total design weight:XY Plot result is used to verify whether the amount of material used to create the part meets the design specifications of the part.

Things to look for

- Run separate analyses with different process settings to compare the effect this has on the amount of material used to create the part.