Autodesk® Moldflow® Insight 2012

AMI Injection-compression Analysis Results

Autodesk®

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Contents

Injection-compression analysis results

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This help topic specifies the results for an Injection-compression analysis on a thermoplastic material.

Text based results

The following table lists the text results generated for an Injection-compression analysis.

Results
Analysis Log
Results Summary
Analysis Check

Graphical results

The following table lists the graphical results that are generated for an Injection-compression analysis, and indicates whether each result is supported for the following analysis technologies:

- Midplane
- Dual Domain

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

Result	Available for mesh type
Press force:XY Plot result on page 3	
Press displacement:XY Plot result on page 4	
Press speed:XY Plot result on page 6	
Cavity volume result on page 2	

NOTE: Fill+Pack results will always be generated, however, Cool, Warp, Stress and Fiber results will be generated depending on the analysis sequence set and material selected.

Cavity volume result 2

The Cavity Volume:XY plot shows the change in volume between the moving and fixed halves of the mold.

It includes the increased volume that results from the mold halves being slightly open at the start of the Injection-compression process.

The Cavity volume result does not include the volume of material injected into the mold.

The Cavity volume result is generated by an Injection-compression analysis, and shows the change in volume (in cm^3) of the mold cavity versus time for the duration of the compression analysis.

Using this result

The Cavity Volume:XY plot can be used to visualise the effect of the moving half of the mold on the overall volume of the mold cavity.

- Compare the Cavity Volume:XY plot result against the compression settings that were set as part of the process settings. The press waiting time, compression speed(s) and press compression times should correspond to the graphical result.
- Compare the final cavity volume as reported by the Cavity Volume:XY plot, to the volume of the model mesh, as reported in the analysis log. The volumes should correspond. If the volume reported in the Cavity Volume:XY plot is larger than the model volume this may be an indication that the melt has cooled below its transition temperature before the mold had closed to the intended cavity volume.
- Look at the factors that impact melt viscosity, such as melt temperature, and look at factors that impact the ability of the press to compress the melt, such as press waiting time and compression force.

Press force:XY Plot result 3

The Press force:XY Plot result shows the force applied by the press over the duration of the analysis, displayed on an XY plot of force versus process time.

It is generated from an Injection-compression analysis.

Using this result

For the compression phase of Injection-compression molding, the press force (clamp force) is calculated by multiplying the pressure by the projected area of runners and cavities on the parting plane, at specific time instants.

If only press packing is applied, when the press force reaches the press force used, it will remain at that preset value (constant force).

NOTE: The number of time steps plotted on the XY graph is determined by the input specified for the Number of regular results in Filling phase and Number of regular results in Packing phase options.

To specify the numbers of regular results to output, click  **Home tab > Molding Process Setup panel > Process Settings** , if necessary click **Next** to access the **Compression Settings** page, click **Advanced options**, click **Edit** in the Solver parameters group, and select the **Intermediate Output** tab.

Things to look for

An example of the relationship between the Injection-compression results and how to interpret them is provided in the topic on Press displacement.

Press displacement:XY Plot result

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The Press displacement:XY Plot result shows the distance the press moved, measured from the reference (initial) location, to the final location at the end of the compression phase, when the mold-cavity space has been reduced (compressed), displayed on an XY plot of distance versus process time.

It is generated from an Injection-compression analysis.

Using this result

Because the mold open stage is not considered in this analysis, there is no backward movement of the press. The minimum value of press displacement is zero and the maximum value is the press open distance. When the press displacement reaches the maximum value, the press will not move forward any more. It will remain stationary until the end of the process.

NOTE: The number of time steps plotted on the XY graph is determined by the input specified for the Number of regular results in Filling phase and Number of regular results in Packing phase options.

To specify the numbers of regular results to output, click  **Home tab > Molding Process Setup panel > Process Settings** , if necessary click **Next** to access the **Compression Settings** page, click **Advanced options**, click **Edit** in the Solver parameters group, and select the **Intermediate Output** tab.

Things to look for

The objective is to run an Injection-compression analysis that generates a press displacement result that is equal (or as close as possible) to the value you specified as input for the press open distance. When these values are equal, the thickness of the molded part will be the same as the specified design thickness.

If the press displacement result is not close enough to the press open distance, you can adjust the input, re-run the analysis, and re-examine the results.

Use the following equation to determine how closely your final molded part thickness approximates your design thickness.

For example, suppose:

- 0.60mm = Design thickness
- 0.59mm = Press open distance
- 0.57mm = Press displacement

NOTE: Design thickness + press open distance (input) - press displacement (result) = final molded part thickness.

The final molded part thickness would be 0.62mm. The final molded part thickness is 3.3% larger than the design thickness. If this error is too great, you can try adjusting one or more of the following process settings and re-run:

- Reduce the **Press open distance**.
- Reduce the **Press waiting time** so that the press can close earlier before too much material is injected into the cavity.
- Increase the **Press speed** so that the press can close earlier.
- Increase the **Press compression force** so that the material can be further compressed.
- Keep the **injection location open after packing** so that extra material can be squeezed out.
- Reduce **Velocity/pressure switchover by %volume** so that less material will be injected into the cavity.
- Increase the **Fill time** (to reduce the flow rate).

Press speed:XY Plot result 5

The Press speed:XY Plot result shows the speed that the press moved at over the duration of the analysis, displayed on an XY plot of speed versus process time.

It is generated from an Injection-compression analysis.

Using this result

In Injection-compression molding, the compression phase consists of two segments:

Press compression under speed control	During this segment, the press follows the input specified for Press compression speed at incremental distances.
Press compression under force control	During this segment, the press speed that is required to maintain the constant press force is calculated.

NOTE: The number of time steps plotted on the XY graph is determined by the input specified for the Number of regular results in Filling phase and Number of regular results in Packing phase options.

To specify the numbers of regular results to output, click  **Home tab > Molding Process Setup panel > Process Settings** , if necessary click **Next** to access the **Compression Settings** page, click **Advanced options**, click **Edit** in the Solver parameters group, and select the **Intermediate Output** tab.

Things to look for

An example of the relationship between the Injection-compression results and how to interpret them is provided in the topic on Press displacement.