Autodesk® Moldflow® Insight 2012

AMI Injection Molding Machine

Autodesk®

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Injection molding machine 1

You can select an injection molding machine from a database to be used in the analysis so that it matches the actual manufacturing process.

By default, a generic injection molding machine is assigned, however it could have different characteristics from the one used in manufacturing, and could give different results.

By selecting the actual molding machine, you can profile parameters such as ram speed vs time or ram locations vs time, thus resulting in a more accurate analysis.

Injection molding machine

The Injection molding machine dialog allows you to set parameters to best match the injection molding machine that will be used in the actual production of the part. The more realistic the machine settings in the simulation, the closer the simulation will reflect reality.

Setting up the injection molding machine

NOTE: Typically, the solver parameters should remain at their default values.

1. Double-click  **Process Settings** to open the **Process Settings Wizard**.
2. Using the **Next** button if necessary, locate the page of the Process Settings Wizard that has a button called **Advanced options**.
3. Click **Advanced options.**
4. Click the **Edit** button associated with the **Injection molding machine** drop-down list.
5. Select the appropriate tab of interest and edit as necessary.

NOTE: You can also edit the material, process conditions and other machine parameters for the current study.

Injection molding machine

Use this dialog to specify settings for an injection unit related properties of the injection molding machine.

To access this dialog, click  **Home tab > Molding Process Setup panel > Process Settings**, select **Advanced options**, edit the **Injection Molding Machine**

The collection of property values defined on the dialog are saved to a property set with the description shown in the **Name** box.

Description tab

The **Description** tab of the **Injection molding machine** dialog is used to specify descriptive information about the injection molding machine.

Trade name	The name that the material or machine is traded under.
Manufacturer	The manufacturer of the machine or material.
Data source	Describes the origin of the selected data.
Date last modified	The time when changes were last made to the selected data.
Data status	Indicates whether the data is confidential.

Injection Unit tab

The **Injection Unit** tab of the **Injection molding machine** dialog is used to specify injection unit related properties of the injection molding machine.

Maximum machine injection stroke	Specifies the maximum allowable injection stroke that can be used on the injection molding machine.
Maximum machine injection rate	Specifies the maximum allowable injection speed that can be used on the injection molding machine.
Machine screw diameter	Specifies the size of the injection molding screw on the molding machine.
Filling control	The Ram Speed Control Method option specifies the method for controlling the injection ram during the polymer injection stage.
Ram speed control steps	Specifies the number of steps at which the ram speed is controlled.

Pressure control steps	Specifies the number of steps at which the pressure is controlled.

Hydraulic Unit tab

The **Hydraulic Unit** tab of the **Injection molding machine** dialog is used to specify hydraulic unit related properties of the injection molding machine.

Machine pressure limit	Specifies the maximum allowable hydraulic pressure that can be used on the injection molding machine.
Intensification ratio	The ratio of the material pressure in front of the screw, compared to the oil pressure in the piston of the injection molding machine.
Machine hydraulic response time	Provides a smooth transition from one packing pressure level to the next level.

Clamping Unit tab

The **Clamping Unit** tab of the **Injection molding** machine dialog is used to specify clamping unit related properties of the injection molding machine.

Maximum machine clamp force	Specifies the maximum allowable clamping force to be used in the Gate Location analysis.
Do not exceed maximum clamp force	Select this check box if you do not want simulation to exceed the clamp force listed in the Maximum machine clamp force box.

Injection settings 2

There are a vast number of injection related parameters that need to be set before running an analysis. These can all be set in these dialogs. Different tabs are available for different analysis sequences.

Each of the dialogs provides a single place to set a variety of injection-related, molding process-specific parameters.

For Thermoplastic Processes, these include:

General

- Molding material
- Process controller
- Injection molding machine
- Mold material
- Solver parameters

Design of Experiments

Process Optimization

Injection-Compression molding

Co-injection molding

- Material B
- Process controller B
- Injection molding machine B

Mold Opening Direction

Molding Window

Runner Balance

Gate Location

For Overmolding second component Processes, these include:

Additional injection controller

Injection molding machine

Mold machine

Solver parameters

For Reactive Processes, these include:

General

- Molding material
- Mold material

- Process controller
- Compression press controller
- Wire material
- Leadframe material
- Solver parameters
- Injection molding machine

Underfill

- Underfill encapsulant
- Underfill conditions

Injection settings

The injection location dialogs allow you to set up all appropriate injection-related parameters, for any of the analysis sequences, in a single dialog.

Editing the Injection location dialogs

To edit the Injection location dialogs:

1. Click **Tools tab > Databases panel > New** and select **Geometry/Mesh/BC** from the **Category** drop-down menu.
2. From the **Property type** list, select the **Injection location** dialog for the appropriate molding process, and click **OK**.
3. In the **Properties** dialog, click **New** to open the **Injection location for...** dialog.
4. Select the appropriate tabs and edit as necessary.

Injection settings

Use these dialogs to specify injection location settings for the analysis you are running.

Injection Location for Thermoplastics Processes dialog

The **General** tab of this dialog is used to specify values for certain inputs common to all thermoplastics processes.

Table 1: General Tab

Molding material	Select and edit the material to analyze.
Process controller	Allows you to select and edit a process controller to control the injection molding process during the analysis.

Injection molding machine	Select and edit an injection molding machine to simulate your molding machine during the analysis. You can configure the injection unit, hydraulic unit, and clamping unit.
Mold material	Allows you to select and edit the mold material to be used during the analysis. You can specify the density, specific heat, and thermal conductivity of the mold material.
Solver parameters	Allows you to select and edit the solver parameters to be used during the analysis. For example, you can configure intermediate results, mold/melt convergence criteria, and analysis restart settings.

Table 2: Design of Experiments tab

DOE control	Allows you to select and/or edit default inputs for a Design of Experiments analysis.

Table 3: Process Optimization tab

Process optimization control	Allows you to select and/or edit default inputs for a Process Optimization analysis.

Table 4: Injection-Compression tab

Compression press controller	Allows you to select and/or edit a predefined compression press controller to be used for the Injection-compression analysis.

Table 5: Co-injection tab

Material B	Allows you to select and/or edit the material used by Controller B in the analysis.
Process controller B	Allows you to select and edit a process controller to control the second-material related processing conditions of the analysis.
Injection molding machine B	Allows you to select and/or edit the injection molding machine used to inject polymer B in the Co-injection process.

Table 6: Mold Opening Direction tab

Orientation set	Specifies a direction by means of a vector, where X, Y and Z refer to the global axes and the sign of a component corresponds to the +ve or -ve direction on that global axis.

Table 7: Molding Window tab

Molding window control	Allows you to select and/or edit default inputs for a Molding Window analysis.

Table 8: Runner Balance tab

Runner balancing control	Allows you to select and/or edit default inputs for a Runner Balance analysis.

Table 9: Gate Location tab

Minimum thickness ratio	Use the Minimum thickness ratio to automatically exclude extremely thin regions from being considered as positions for injection locations.
Minimum design injection pressure	Specifies the maximum injection pressure to be used in the gate location analysis. The gate location algorithm will take this limit into consideration when searching for feasible gate locations.
Maximum design clamp force	Specifies the maximum clamp force to be used in the gate location analysis. The gate location algorithm will take this limit into consideration when searching for feasible gate locations.

Injection Location for Overmolding Second Component dialog

This dialog specifies inputs for the second component molding stage of an overmolding simulation.

Additional injection controller	Allows you to select and edit an injection controller for the second component stage of the overmolding process.
Injection molding machine	Select and edit an injection molding machine to simulate your molding machine during the analysis.
Mold material	Allows you to select and edit the mold material to be used during the analysis.

Solver parameters	Allows you to select and edit the solver parameters to be used during the analysis.

Injection Location for Reactive Processes dialog

The **General** tab of this dialog is used to specify values for certain inputs common to all reactive processes.

Table 10: General tab

Molding material	Select and edit the material to analyze.
Mold material	Allows you to select and edit the mold material to be used during the analysis. You can specify the density, specific heat, and thermal conductivity of the mold material.
Compression press controller	Allows you to select and edit a process controller to control the injection molding process during the analysis.
Wire material	Allows you to select and/or edit a predefined compression press controller to be used for the Injection-compression analysis.
Leadframe material	Allows you to select and/or edit the wire material to be used in the microchip encapsulation process.
Process controller	Allows you to select and/or edit the leadframe material to be used in the microchip encapsulation process.
Solver parameters	Allows you to select and edit the solver parameters to be used during the analysis. For example, you can configure intermediate results, mold/melt convergence criteria, and analysis restart settings.
Injection molding machine	Select and edit an injection molding machine to simulate your molding machine during the analysis. You can configure the injection unit, hydraulic unit, and clamping unit.

Table 11: Underfill tab

Underfill encapsulant	Click Edit to edit the properties of the default underfill encapsulant, or click Select to choose an alternate underfill encapsulant from the supplied database.

Underfill conditions	Allows you to select and edit a pre-saved set of processing conditions for the Underfill Encapsulation process.