

# Chapter 15

---

## Introduction to Injection Mold Design

### Learning Objectives

**After completing this chapter, you will be able to:**

- *Understand the component required in mold design*
- *Analyze the part fill*
- *Create core and cavity for the model*
- *Specify location for gates and runners*
- *Create mold base for the component*
- *Create cooling channel for mold*
- *Create ejection system for mold*

## INTRODUCTION TO INJECTION MOLD DESIGN

Injection molding is a process of manufacturing parts by injecting molten material into the mold. You can process thermoplastic as well as thermosetting polymers to create parts in injection molding machine.

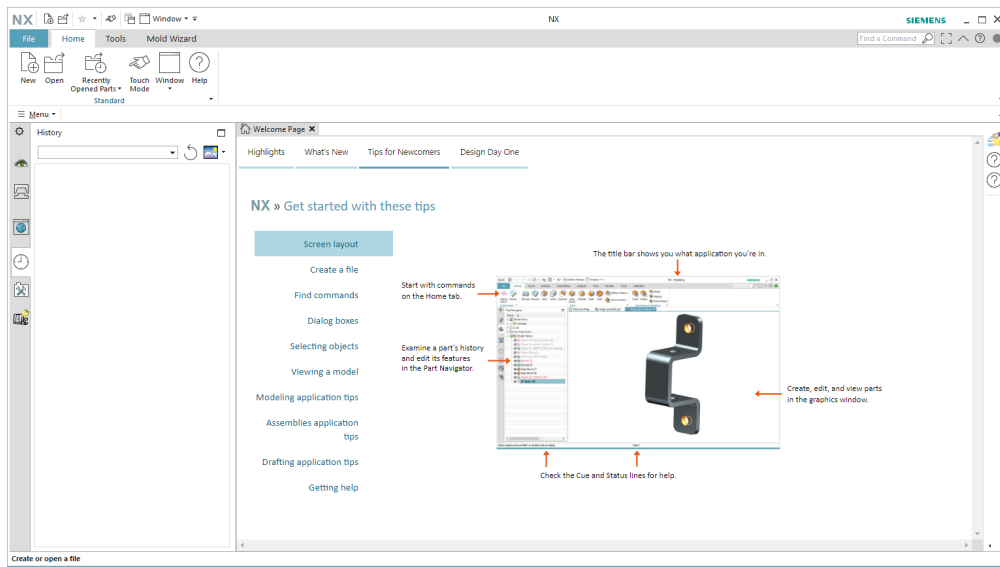
An injection mold is an assembly of parts containing an impression into which plastic material is injected and cooled. This impression is formed by two parts of the mold:

- (i) Cavity
- (ii) Core

In NX, you can design a mold by using the tools available in the Mold Wizard environment.

## INVOKING THE MOLD ENVIRONMENT

Before starting NX Mold Wizard, you need to add NX Mold Wizard library to NX. After that, you can use standard parts and material library to create a mold. Start NX by double-clicking on the shortcut icon of NX on the desktop of your computer. After the system gets loaded with all the files to start NX, the initial interface will be displayed, as shown in Figure 15-1.



**Figure 15-1** The initial interface that appears after starting NX

Next, choose **File > Open** from the **Ribbon**; the **Open** dialog box will be displayed, as shown in Figure 15-2.

Now, select the file and choose the **OK** button; the file will be opened in the Modeling Environment, as shown in Figure 15-3.

To invoke the NX Mold Wizard, choose the **Application** tab and then choose the **Mold** tool from the **Process Specific** group; the **Mold Wizard** tab will be displayed next to the **Application** tab, refer to Figure 15-4.

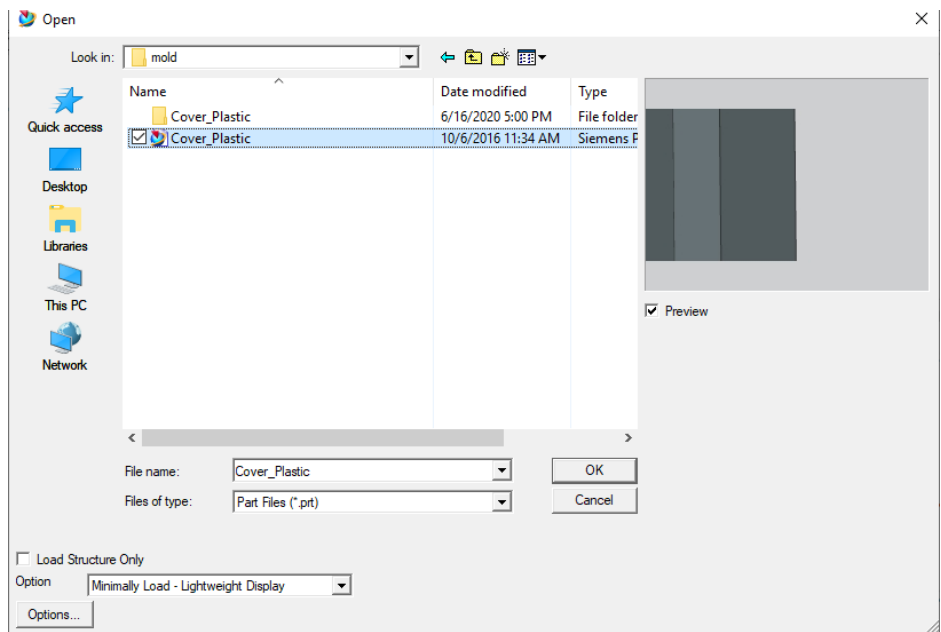


Figure 15-2 The *Open* dialog box

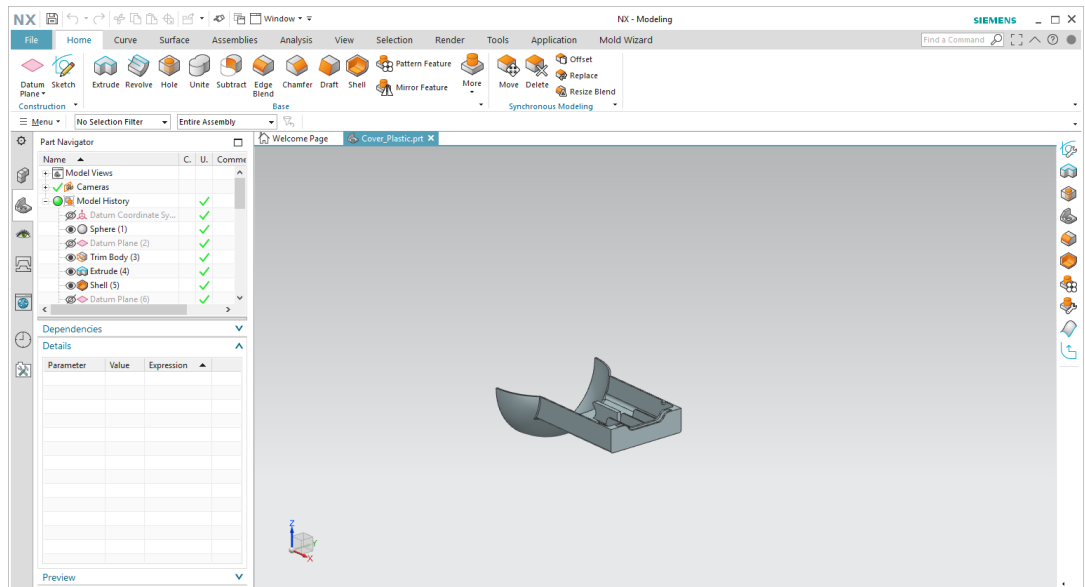
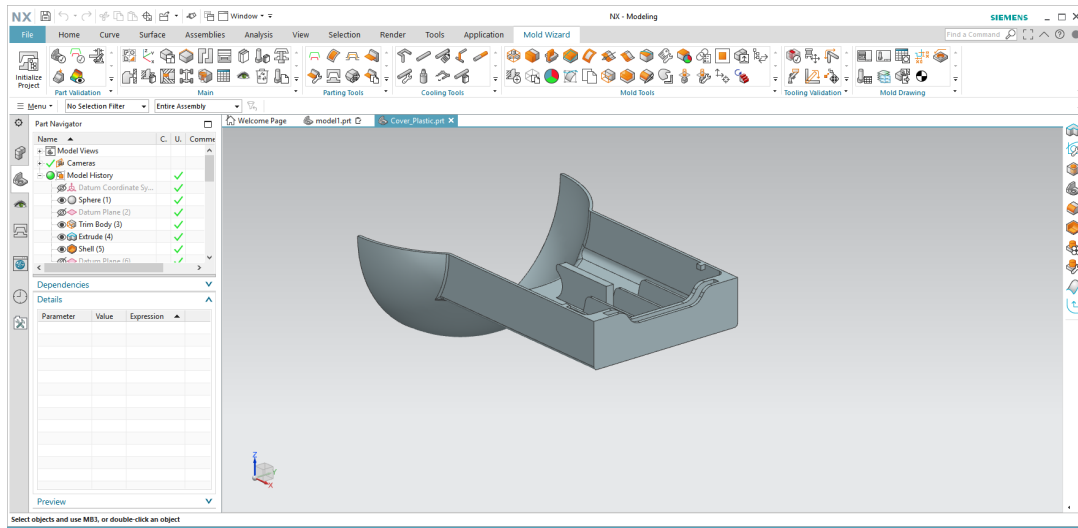


Figure 15-3 The Modeling environment displayed on screen



*Figure 15-4 The Mold Wizard environment displayed on screen*

## VARIOUS METHODS FOR CREATING MOLD DESIGN

In NX, you can use the following methods for designing an Injection Mold:

- (i) Manual
- (ii) Semi Automatic
- (iii) Automatic

These methods are discussed next.

### Manual Method

In manual method, you will not use Mold Wizard but will use Part Modeling, Surfacing, and Assembly environments.

### Semi Automatic Method

In semi automatic method, you will use a combination of Mold Wizard, Part, Surfacing, and Assembly environments.

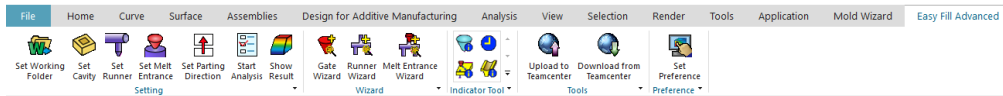
### Automatic Method

In automatic method, you will use only Mold Wizard environment for designing an injection mold.

## ANALYSIS OF PART

For analyzing the part in NX, the Easy Fill Advanced plugin is being used in this book. You can also use Run Flow Analysis for analyzing the part but due to some constraints in the results the Easy Fill Advanced plugin is preferred for analysis.

As you install the Easy Fill Advanced plugin, the **Easy Fill Advanced** tab will become available in NX interface. Figure 15-5 shows the **Easy Fill Advanced** tab.




*Figure 15-5 The Easy Fill Advanced tab*

Before analyzing the part using the Easy Fill Advanced plugin, you should check the part undercut, draft angle, and wall thickness using the **Mold Design Validation** and **Check Wall Thickness** tools.

## Mold Design Validation

**Ribbon:** Mold Wizard > Part Validation Gallery > Mold Design Validation

 This tool helps to check the quality of the molded part. To check the undercut, draft angle, and mold part quality, invoke the **Mold Design Validation** tool from the **Part Validation** gallery of the **Mold Wizard** tab; the **Mold Design Validation** dialog box will be displayed, as shown in Figure 15-6. The options in this dialog box are discussed next.

### Component Validation

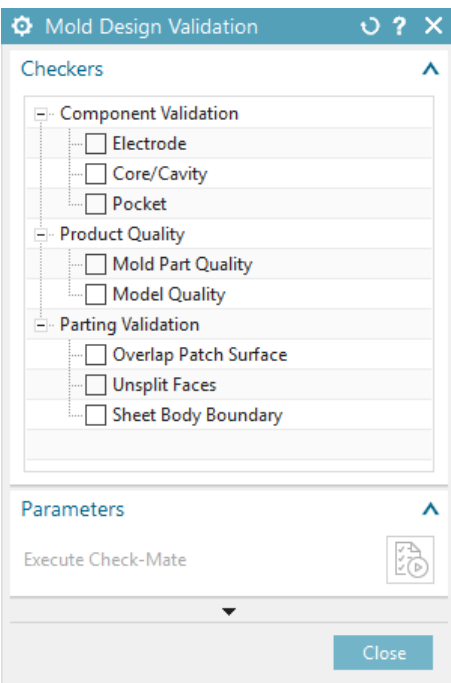
The check boxes available in this area helps to find out interference between the electrodes and the overlapping of core and cavity sheets.

### Product Quality

The check boxes available in this area helps to find out the undercut and the draft angle of the molded part.


### Parting Validation


The check boxes available in this area helps to find out the face required to split and checks overlap patch surface.




*Figure 15-6 The Mold Design Validation dialog box*

As you choose the **Execute Check-Mate** button from the **Parameters** rollout of the dialog box; the **HD3D Tools** window will be displayed, as shown in Figure 15-7. Depending upon the check box selected in the **Mold Design Validation** dialog box, the resulting parameter will be displayed in the **HD3D Tools** window. In this window, the status of the result is shown by symbols. Following are the symbols with their meanings:

 This symbol indicates that the results are passed but there is also some information about the results.

 This symbol indicates that the results are passed but there is also some warning about the results.


 This symbol indicates that the results are passed.

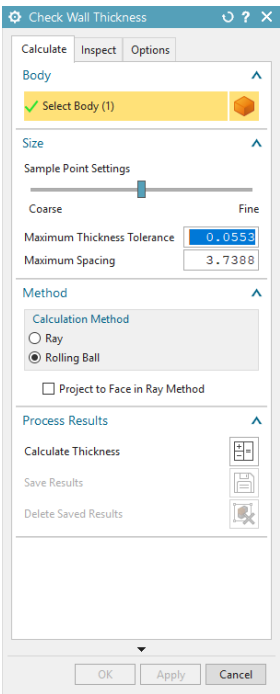
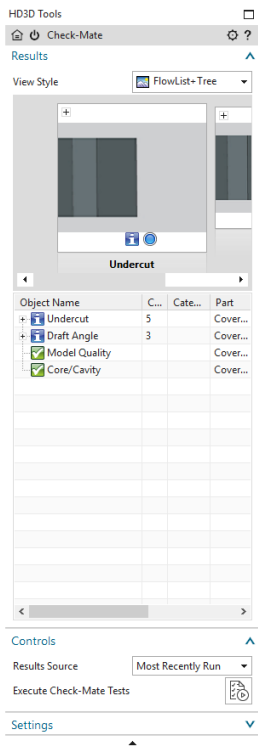


**Note**  
*Before using the **Mold Design Validation** tool, you need to activate the **HD3D Tools** tab in the **Resource Bar**.*

# Check Wall Thickness

**Ribbon:** Mold Wizard > Part Validation Gallery > Check Wall Thickness  
**Menu:** Analysis > Molded Part Validation > Check Wall Thickness

 Part with uniform thickness allows the mold cavity to fill more easily since the molten plastic does not have to be forced through varying restrictions as it fills. If the walls are not uniform then the thin section cools first as compared to thick section which leaves warpage or sink mark in part. You can analyze the thickness using the **Check Wall Thickness** tool. To analyze the thickness of part, invoke the **Check Wall Thickness** tool from the **Part Validation** gallery of the **Mold Wizard** tab; the **Check Wall Thickness** dialog box will be displayed, as shown in Figure 15-8, and solid body will be selected in the **Body** rollout. Choose the **Calculate Thickness** button from the **Process Results** rollout to analyze the solid body; the result will be displayed, as shown in Figure 15-9. Choose the **OK** button to close the dialog box.



*Figure 15-7 The **HD3D Tools** window* *Figure 15-8 The **Check Wall Thickness** dialog box*

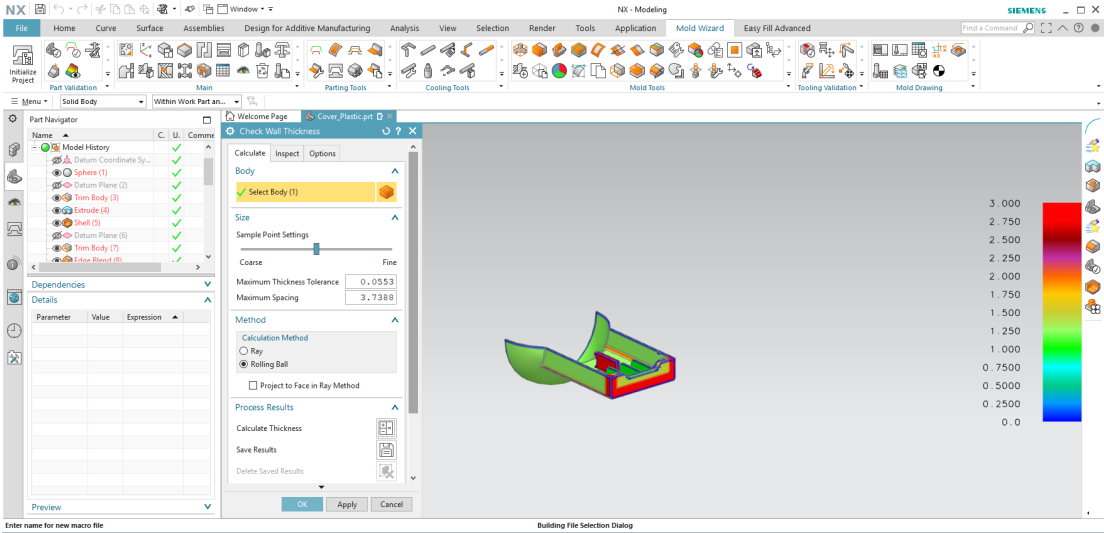


Figure 15-9 The part with thickness analysis

### Easy Fill Advanced

The tools in the Easy Fill Advanced plugin help you to simulate filling, packing and runner balancing of injection molding. Next, you need to understand why this plugin is preferred to use over NX run flow analysis.

Parameter	Easy Fill	Easy Fill Advanced
1) Simulation capabilities	Filling	Filling and Packing
2) Runner balance	N/A	YES
3) Gate Number	Multiple	Multiple
4) Results availability	10	36 (filling+packing)
5) Section Results	N/A	YES

This tab comprises of various tools which are discussed next.

## Set Working Folder

**Ribbon:** Easy Fill Advanced > Setting > Set Working Folder

**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Set Working Folder



This tool helps you to locate the analysis result in the specified folder. To set the working folder, choose the **Set Working Folder** tool from the **Setting** group of the **Easy Fill Advanced** tab; the **Working Folder** dialog box will be displayed, as shown in Figure 15-10.

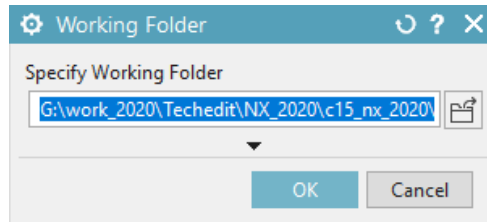


Figure 15-10 The Working Folder dialog box



### Note

If the **Easy Fill Advanced** message box appears after choosing the **Set Working Folder** tool then choose the **Yes** button to close this message box.

To locate the folder location, choose the **Browse** button from the **Working Folder** dialog box; the **Open** dialog box will be displayed, as shown in Figure 15-11. From this dialog box, you can set the directory of the analysis result. After specifying the directory of the analysis result, choose the **OK** button twice to close the dialog boxes.

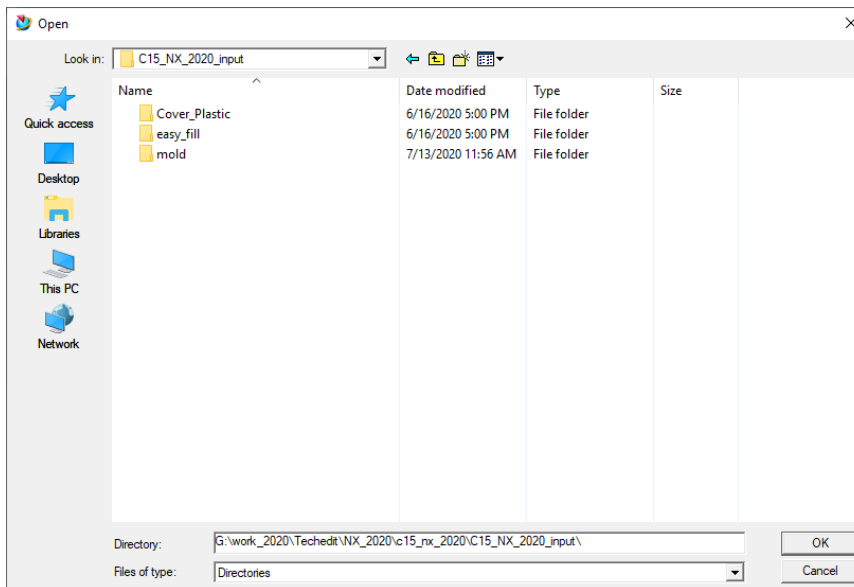


Figure 15-11 The Open dialog box



## Set Cavity

**Ribbon:** Easy Fill Advanced > Setting > Set Cavity  
**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Set Cavity



This tool helps you to specify the cavity of the component and assign material to the component. To specify the cavity, choose the **Set Cavity** tool from the **Setting** group in the **Easy Fill Advanced** tab; the **Select Cavity** dialog box will be displayed, as shown in Figure 15-12. Also, you will be prompted to specify solid body as cavity. Select the component from the drawing window. Next, choose the **Push button to select material** button from the **Material Setting** rollout; the **Moldex3D Material Wizard** dialog box will be displayed, refer to Figure 15-13. You can specify the name of material, producer name, and grade name in this dialog box. After specify the material, producer, and grade name; choose the **OK** button from the **Moldex3D Material Wizard** dialog box and next, choose the **OK** button from the **Select Cavity** dialog box.

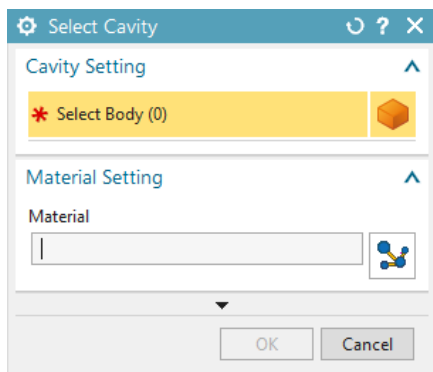


Figure 15-12 The *Select Cavity* dialog box

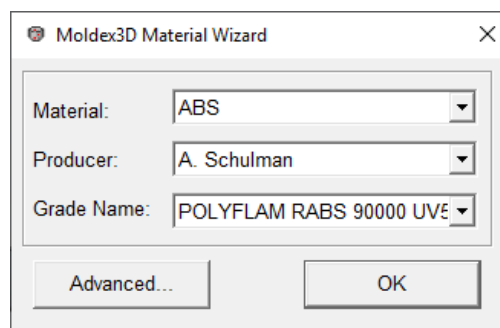


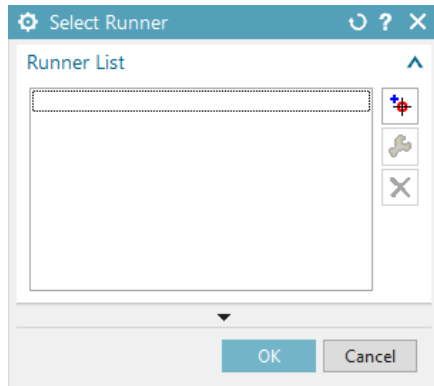
Figure 15-13 The *Moldex3D Material Wizard* dialog box

## Set Runner

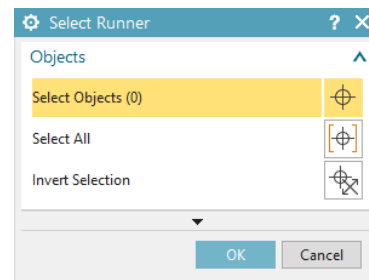
**Ribbon:** Easy Fill Advanced > Setting > Set Runner  
**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Set Runner



This tool helps you to define the runner system of the solid bodies. To set the runner system, choose the **Set Runner** tool from the **Setting** group in the **Easy Fill Advanced** tab; the **Select Runner** dialog box will be displayed, as shown in Figure 15-14. Choose the Specify Runner button from the **Runner List** rollout; the **Select Runner** dialog box will be displayed, refer to Figure 15-15. Also, you will be prompted to specify the curve or solid body to specify as Runner. Select the solid body or curve from the drawing window. Choose the **OK** button to close the dialog box; the **Settings** dialog box will be displayed. You can select type of runner from the **Type** drop-down list of the **Attribute** rollout. Choose the **OK** button to close the dialog box. You will notice that type of runner and name of runner will be displayed in the **Runner List** rollout. Choose the **OK** button to close the dialog box.



*Figure 15-14 The Select Runner dialog box*



*Figure 15-15 The Select Runner dialog box*



### Note

*If you select a body for setting runner, then you can only define type of runner but if you select a curve, then you can define type of runner and its cross-section parameters.*

## Set Melt Entrance

**Ribbon:** Easy Fill Advanced > Setting > Set Melt Entrance

**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Set Melt Entrance



Melt entrance is the path through which molten material comes into the runner. To set the Melt Entrance for the runner, choose the **Set Melt Entrance** tool from the **Setting** group of the **Easy Fill Advanced** tab; the **Melt Entrance Setting** dialog box will be displayed, as shown in Figure 15-16.

Next, choose the Specify Melt Entrance Position button from the **Melt Entrance List** rollout; the **Point** dialog box will be displayed, refer to Figure 15-17. By using this dialog box, you can place the melt entrance position. Choose the **OK** button to close the dialog box; the modified **Melt Entrance Setting** dialog box will be displayed. You will notice the Melt Entrance name in the **Melt Entrance List** rollout. Choose the **OK** button to close the dialog box.

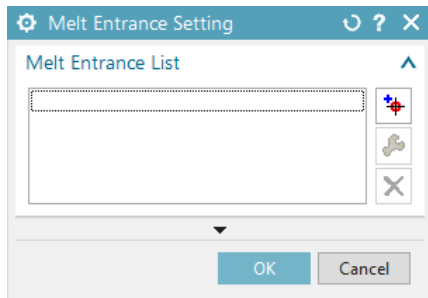


Figure 15-16 The *Melt Entrance Setting* dialog box

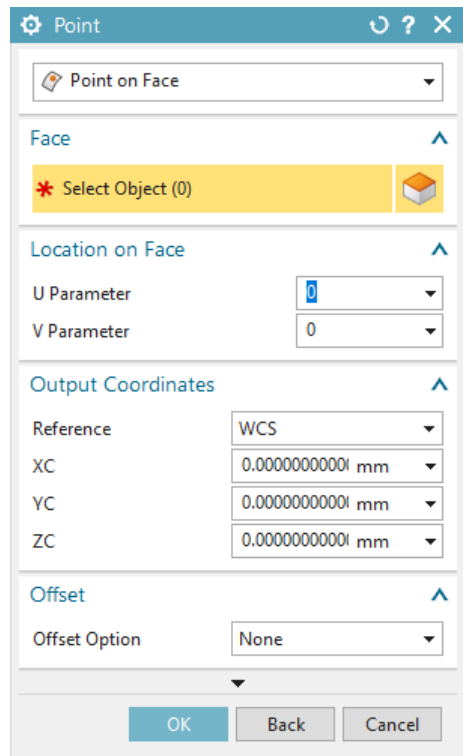


Figure 15-17 The *Point* dialog box

## Set Parting Direction

**Ribbon:** Easy Fill Advanced > Setting > Set Parting Direction  
**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Set Parting Direction



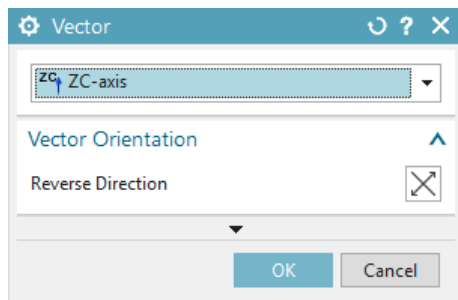
Parting direction of the component plays an important role in mold design procedure. So, you need to decide the parting direction carefully. To set the parting direction, choose the **Set Parting Direction** tool from the **Setting** group in the **Easy Fill Advanced** tab; the **Vector** dialog box will be displayed, refer to Figure 15-18. Select the direction of the partition by selecting the option from the Type drop-down list of the rollout. After specifying the correct orientation of the axis, choose the **OK** button to close the dialog box.

## Gate Wizard

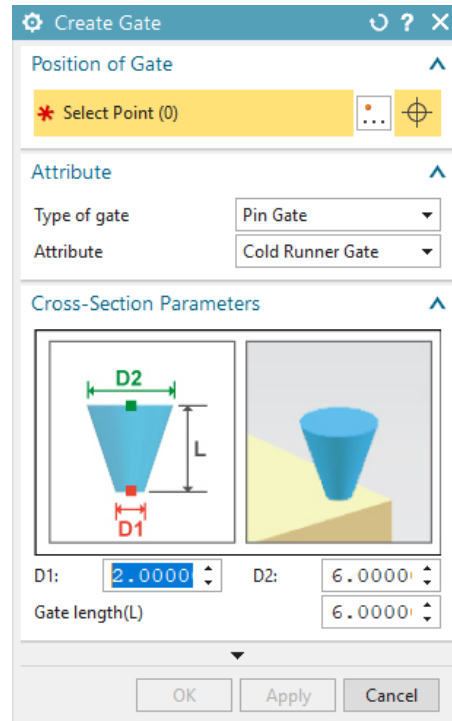
**Ribbon:** Easy Fill Advanced > Wizard > Gate Wizard  
**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Wizard > Gate Wizard



This tool helps you to create gate for analysis of flow. To create a gate, choose the **Gate Wizard** tool from the **Wizard** group in the **Easy Fill Advanced** tab; the **Create Gate** dialog box will be displayed, refer to Figure 15-19. Choose the **Point Dialog** button from the **Position of Gate** rollout; the **Point** dialog box will be displayed. Using this dialog box specify the location of the gate and then choose the **OK** button to close the dialog box. Select the type of gate from the **Type of gate** drop-down of the **Attribute** rollout. Specify the dimensions of the gate cross-section from the **Cross-Section Parameters** rollout.



**Figure 15-18** The *Vector* dialog box



**Figure 15-19** The *Create Gate* dialog box

In NX, the Easy Fill Advanced plug-in supports various types of gates:

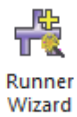
- i. Pin Gate
- ii. Sprue Gate
- iii. Edge Gate
- iv. Fan Gate
- v. Lapped Edge Gate
- vi. Tunnel Gate
- vii. Cashew Gate
- viii. Tunnel Gate with ejector pin
- ix. Cashew Gate with ejector pin

You can also set them as a Cold Runner or a Hot Runner gate. Depending upon the selection of gate, the dimension parameters of gate also gets changed. You can define the size of the gate by entering value in the edit boxes of these parameters. After entering the values, choose the **OK** button to close the dialog box.

## Runner Wizard

**Ribbon:** Easy Fill Advanced > Wizard > Runner Wizard

**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Wizard > Runner Wizard



This tool helps you to create runner system for flow analysis of material. You need to select only the location of the gate and its size in the model, as a result, the runner wizard automatically calculates its size, shape, and layout. This tool helps not only in creation of Runner but also helps in designing sprue and melt entrance. With the help of this tool, you can design runner system more efficiently. To create a Runner, choose the **Runner Wizard** tool from the **Wizard** group in the **Easy Fill Advanced** tab; the **Runner Wizard** dialog box will be displayed, refer to Figure 15-20.

### Mold Setting

This tab allows you to define the parting direction, mold plate type, and runner attribute.

The options of this tab are discussed next.

**Parting Direction:** The options in this drop-down are used to specify the orientation of the runner. The orientation may be along X-axis, -X-axis, Y-axis, -Y-axis, Z-axis, -Z-axis or customize it along any vector direction.

**Mold Plate Type:** The options in this drop-down are used to specify the type of mold. According to the selection of the mold plate type the parameters of parting line or plane gets changed. The options in this drop-down list are:

- (i) 2-Plate mold
- (ii) 3-Plate mold

**Runner Attribute:** The options in this drop-down are used to define the type of runner. The options in this drop-down list are:

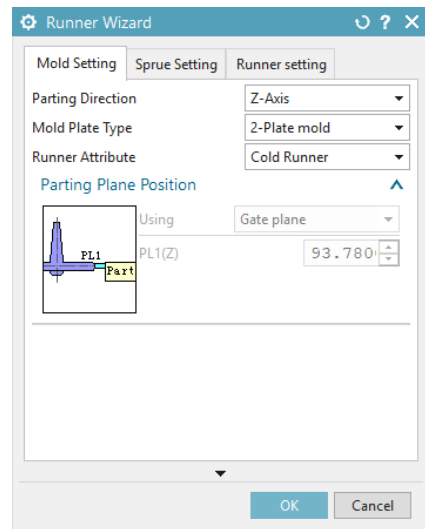
- (i) Cold Runner
- (ii) Hot Runner

### Sprue Setting

This tab allows you to define the sprue position, sprue length, and sprue diameter. The options of this tab are discussed next.

**Sprue Position Rollout:** The options in this rollout are used to position the sprue.

**Sprue Geometry Parameters Rollout:** The options in this rollout are used to specify the size parameters of sprue.



**Figure 15-20** The **Runner Wizard** dialog box

### Runner setting

This tab allows you to specify the cross-section and size parameters of runner.

After specifying the parameters of runner, choose the **OK** button to close the dialog box.

### Melt Entrance Wizard

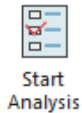
<b>Ribbon:</b>	Easy Fill Advanced > Wizard > Melt Entrance Wizard
<b>Menu:</b>	Analysis > Molded Part Validation > Easy Fill Advanced > Wizard > Melt Entrance Wizard



This tool helps you to specify from where molten material comes. To create melt entrance, choose the **Melt Entrance Wizard** tool from the **Wizard** group in the **Easy Fill Advanced** tab. As you choose this tool, the melt entrance automatically gets place in gate or runner location.

### Start Analysis

<b>Ribbon:</b>	Easy Fill Advanced > Setting > Start Analysis
<b>Menu:</b>	Analysis > Molded Part Validation > Easy Fill Advanced > Start Analysis



This tool helps you to apply the settings for the analysis of the component. To start the analysis of the component, choose the **Start Analysis** tool from the **Setting** group in the **Easy Fill Advanced** tab; the **Analysis Setup** dialog box will be displayed, refer to Figure 15-21. You can specify the process parameters, type of analysis, and the mesh level in this dialog box. Choose the **OK** button to start the analysis; the **Moldex3D SYNC Project Monitor** window will be displayed. This window shows the progress of analysis. After the analysis is complete, the **Easy Fill Advanced** message box is displayed. Choose the **OK** button to close the message box. Choose the **OK** button to exit the window.

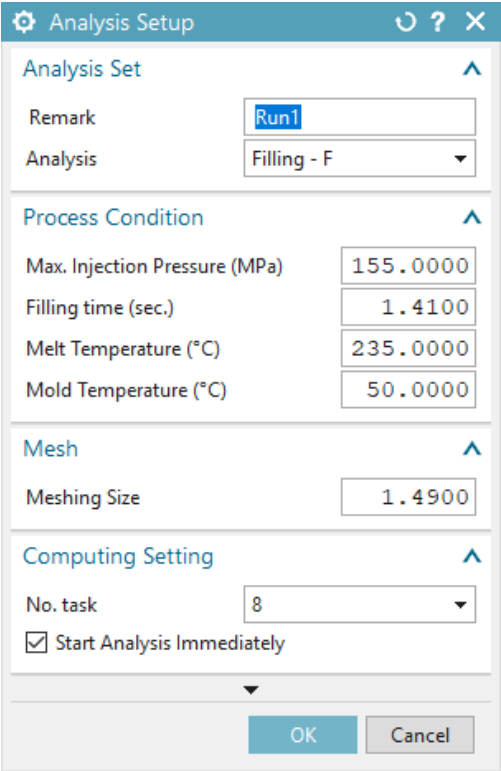

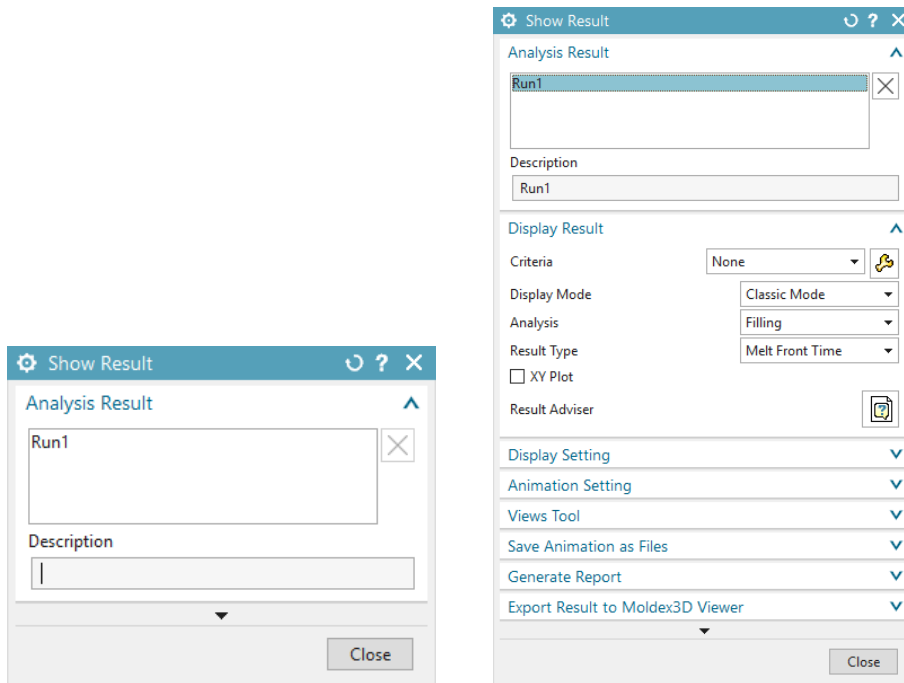


Figure 15-21 The Analysis Setup dialog box

Show Result

**Ribbon:** Easy Fill Advanced > Setting > Show Result  
**Menu:** Analysis > Molded Part Validation > Easy Fill Advanced > Show Result

 This tool helps you to visualize and analyze the result. To invoke this tool, choose the **Show Result** tool from the **Setting** group of the **Easy Fill Advanced** tab; the **Show Result** dialog box will be displayed, as shown in Figure 15-22. Select result from the **Analysis Result** rollout; the dialog box gets modified, refer to Figure 15-22. You can select the **Filling** or **Packing** option from the **Analysis** drop-down list in the **Display Result** rollout. By default, the **Filling** option is selected. You can visualize the results by selecting appropriate option from the **Result Type** drop-down list. Choose the **Close** button to close the dialog box.



*Figure 15-22 The Show Result dialog box and its modified version*

## MOLD WIZARD

The Mold Wizard tab contains tools that help you to design injection mold automatically. Before using this wizard, you should ensure that the library related to the mold is installed. The tools in this wizard are discussed next.

### Initialize Project

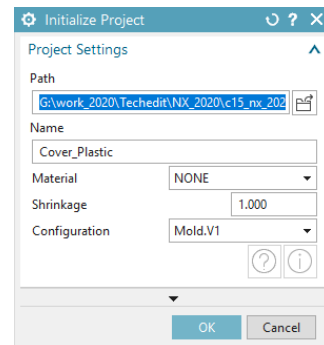
**Ribbon:** Mold Wizard > Initialize Project



The **Initialize Project** tool is used to create a new mold design project or to add new model to create a family mold. Choose the **Initialize Project** tool of the **Mold Wizard** tab, the **Initialize Project** dialog box will be displayed, as shown in Figure 15-23.

To specify the path of the project, choose the **Browse** button from the **Project Settings** rollout; the **Open** dialog box will be displayed, as shown in Figure 15-24.

Specify the path of the project and then choose the **OK** button to close the dialog box. Select the name of the material from the **Material** drop-down list of the **Initialize Project** dialog box. Next, choose the **OK** button to close the dialog box.



*Figure 15-23 The Initialize Project dialog box*



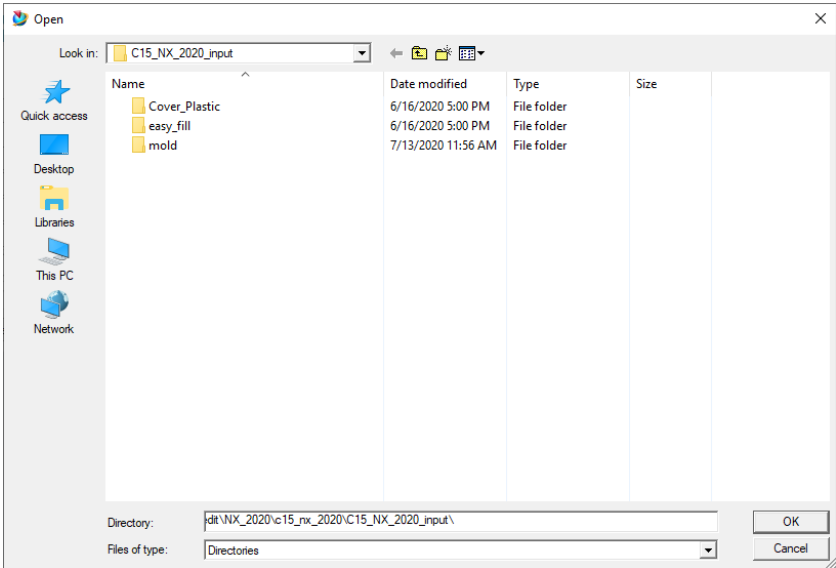


Figure 15-24 The *Open* dialog box

Mold CSYS

**Ribbon:** Mold Wizard > Main Gallery > Mold CSYS



The **Mold CSYS** tool is used to reposition the original component to the correct orientation according to the mold assembly or to the injection molding machine. While positioning the component, you should consider following points while placing the component in mold wizard:

- Orient the component so that ejection occurs in z-axis of the mold base.
- Position the component in such a way that parting plane lies on X-Y plane.

To orient the component, invoke the **Mold CSYS** tool from the **Main** gallery of the **Mold Wizard** tab; the **MOLD CSYS** dialog will be displayed, refer to Figure 15-25.

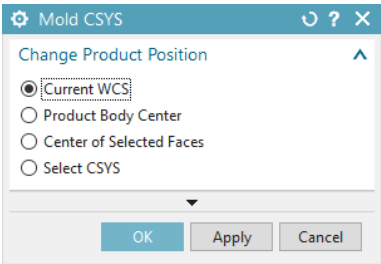


Figure 15-25 The *Mold CSYS* dialog box

In the **Change Product Position** rollout of this dialog box, there are four options to change the position of the component. These options are discussed next.

## Current WCS

Select this radio button to reposition the component from the current WCS position and orientation to the position and orientation of the mold base.

## Product Body Center

Select this radio button to reposition the WCS to the center of the component body. When you select this radio button, the **Lock XYZ Position** rollout will be displayed. The options in this rollout help you to lock the position of X,Y, and Z coordinates of the component.

## Center of Selected Faces

Select this radio button to reposition the component from the center of one or more selected faces to the origin of the mold base. As you select this radio button, the **Lock XYZ Position** rollout gets available. The options in this rollout help you to lock the position of X,Y, and Z coordinates of the component.

## Select CSYS

Select this radio button to reposition the component to the center of an existing CSYS.

## Shrinkage

**Ribbon:** Mold Wizard > Main Gallery > Shrinkage



When a molten plastic filled inside a mold is cooled, it solidifies and shrinks to some extent, this process is known as Shrinkage.

The **Shrinkage** tool helps you to apply the scale factor on the product model. While defining the scale factor, you should consider the following points:

- Type of molding material.
- Wall thickness of the molded part.
- Cavity surface temperature.
- Gate shape.
- Presence of additive material to the molding materials.

To apply shrinkage on the model, choose the **Shrinkage** tool from the **Main** gallery of the **Mold Wizard** tab; the **Scale Body** dialog box will be displayed.

## Type Drop-down List

This drop-down list is used to specify the type of shrinkage that you need to apply to the component.

### Uniform

This option is used to scale the body uniformly in all directions.

### Axisymmetric

This option is used to scale the body symmetrically with a specified scale factor about specified axis.

### General

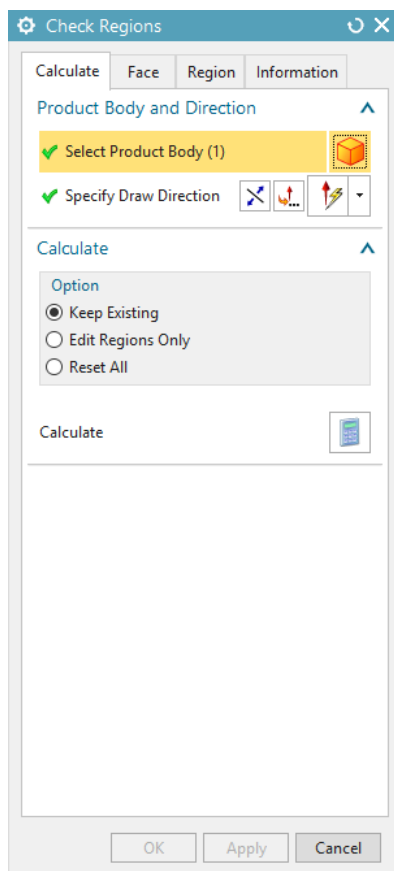
This option is used to scale the body with different scale factors along the X,Y and Z directions.

After scaling the body, choose the **OK** button to close the dialog box.

## Check Regions

**Ribbon:** Mold Wizard > Parting Tools Gallery > Check Regions

The **Check Regions** tool is used to analyze the draft angle of faces, set the color in the faces according to the draft values, and find undercut in the model. It also helps to find the core and cavity regions in the model. To analyze the core and cavity region of the model, invoke this tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Check Regions** dialog box will be displayed, refer to Figures 15-26. Choose the **Calculate** button in the **Calculate** rollout and then choose the **Region** tab. In this tab, choose the **Set Regions Color** button from the **Define Regions** rollout; the color of the model gets changed. These colors represent core, cavity, and undefined region in the model.




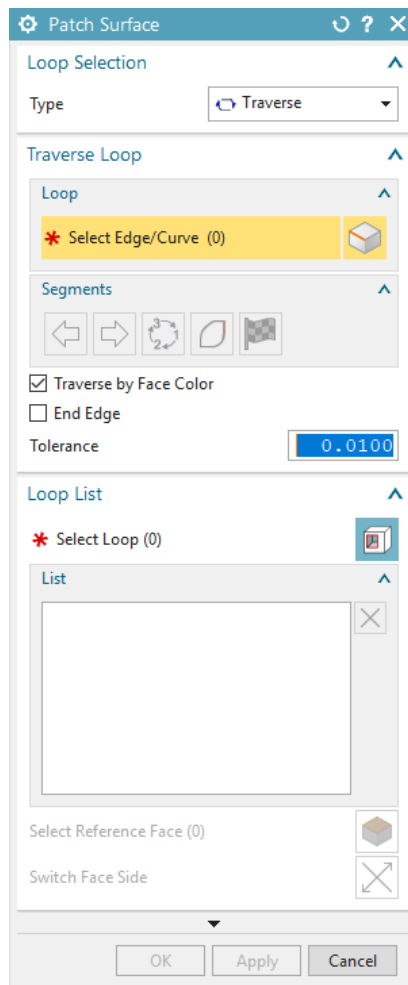
*Figure 15-26 The Check Regions dialog box*

The **Cavity Region** radio button is selected by default in the **Assign To Region** rollout. Select the undefined region of the model and then choose the **Apply** button. The undefined region gets the color of the cavity region. Choose the **OK** button to close the dialog box.

## Patch Surface

**Ribbon:** Mold Wizard > Parting Tools Gallery > Patch Surface


 This tool is used to create sheets to close openings in the model. To patch a surface, choose the **Patch Surface** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Patch Surface** dialog box will be displayed, refer to Figure 15-27. In NX Mold Wizard, you have three options in the **Type** drop-down list of the **Loop Selection** rollout: **Face**, **Body**, and **Traverse**.



*Figure 15-27 The Patch Surface dialog box*

## Define Regions


**Ribbon:** Mold Wizard > Parting Tools Gallery > Define Regions

 This tool is used to create core and cavity region sheets, parting lines, and other region sheets (for sliders and lifters). To create core and cavity region sheets, choose the **Define Regions** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Define Regions** dialog box will be displayed, refer to Figure 15-28.

In the **Define Regions** rollout, you can examine the number of faces selected for cavity, core, and undefined faces which help you to identify the number of faces belonging to core and cavity. The procedure to create regions for core and cavity will be discussed in Tutorial 1.

## Design Parting Surface

**Ribbon:** Mold Wizard > Parting Tools Gallery > Design Parting Surface

 This tool is used to create a parting surface of the component. To create parting surface, invoke the **Design Parting Surface** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Design Parting Surface** dialog box will be displayed, refer to Figure 15-29. You can use the tools available in the **Auto Create Parting Surfaces** rollout to create parting surfaces.

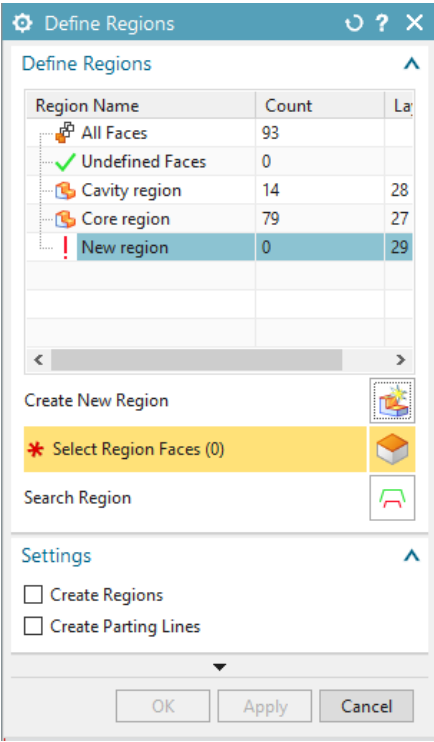


Figure 15-28 The Define Regions dialog box

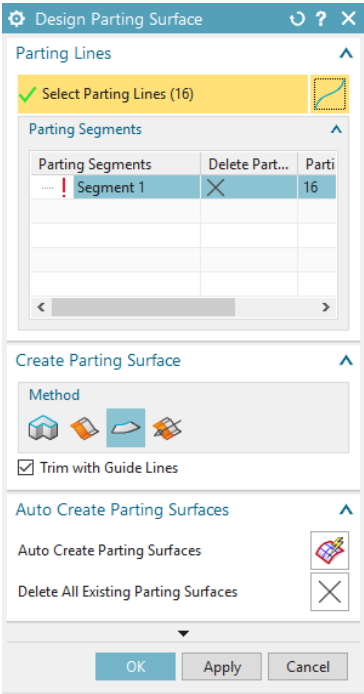


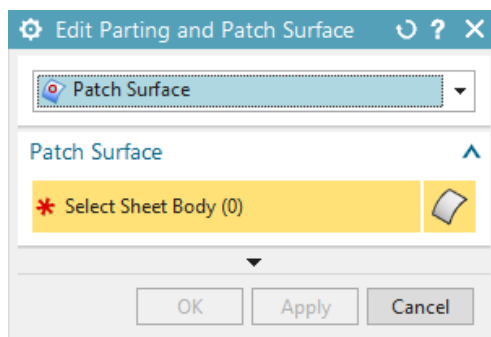
Figure 15-29 The Design Parting Surface dialog box

## Edit Parting and Patch Surface

**Ribbon:** Mold Wizard > Parting Tools Gallery > Edit Parting and Patch Surface



This tool is used to delete parting and patch sheets. To edit parting and patch surface, choose the **Edit Parting and Patch Surface** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Edit Parting and Patch Surface** dialog box will be displayed, refer to Figure 15-30. You can select the type of surface to be edited from the Type drop-down list.



*Figure 15-30 The Edit Parting and Patch Surface dialog box*

## Workpiece

**Ribbon:** Mold Wizard > Main Gallery > Workpiece



This tool helps you to define the size of core and cavity. To define the size, choose the **Workpiece** tool from the **Main** gallery of the **Mold Wizard** tab; the **New Iray+ Ray Traced Studio Rendering** window will be displayed. Choose the **OK** button from this window; the **Workpiece** dialog box will be displayed, refer to Figure 15-31. The options in this dialog box are discussed next.

### Type Drop-down List

The options in the drop-down list are used to define whether you want to create core and cavity for single component or multiple components.

#### Product Workpiece

This option helps you to create the core and cavity for single component.

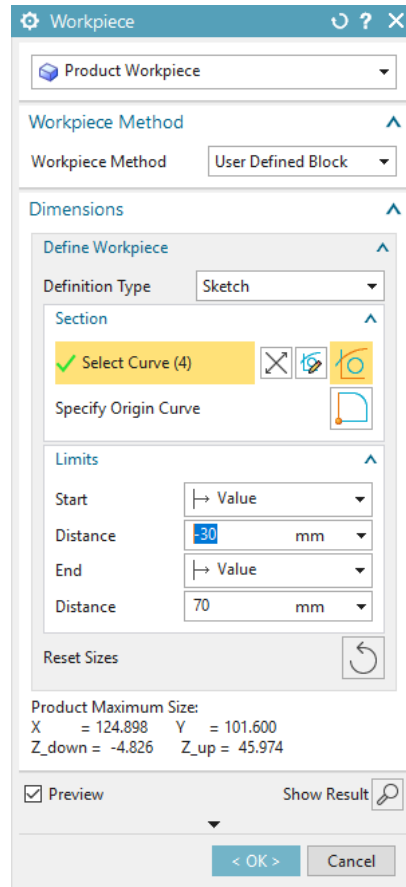
#### Combined Workpiece

This option helps you to create the core and cavity for multiple components.

### Workpiece Method Rollout

The options in the drop-down list in this rollout are used to define the way you want to create the workpiece. The options available in the drop-down list are:

- (i) User Defined Block
- (ii) Cavity-Core
- (iii) Cavity Only
- (iv) Core Only



*Figure 15-31 The Workpiece dialog box*

## Dimensions Rollout

The options in this rollout help you to define the size of the workpiece. After specifying the size of the workpiece, choose the **OK** button to close the dialog box.

## Cavity Layout

**Ribbon:** Mold Wizard > Main Gallery > Cavity Layout



This tool helps you to create the layout of core and cavity workpiece. To do so, choose the **Cavity Layout** tool from the **Main** gallery of the **Mold Wizard** tab; the **Cavity Layout** dialog box will be displayed, refer to Figure 15-32. Also, the workpiece will be selected automatically, as shown in Figure 15-33. The options available in various rollouts of the **Cavity Layout** dialog box are discussed next.

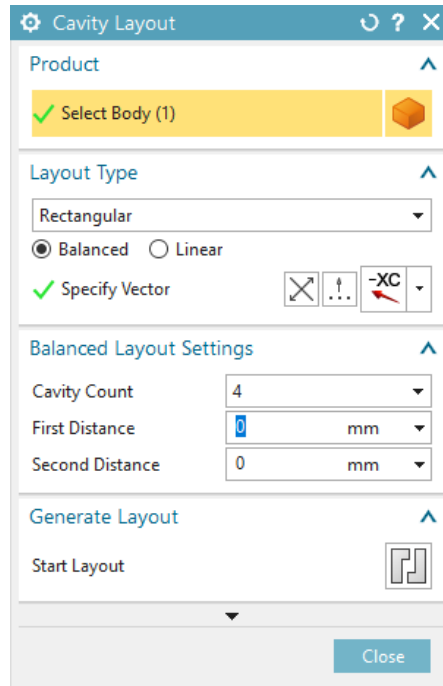


Figure 15-32 The Cavity Layout dialog box

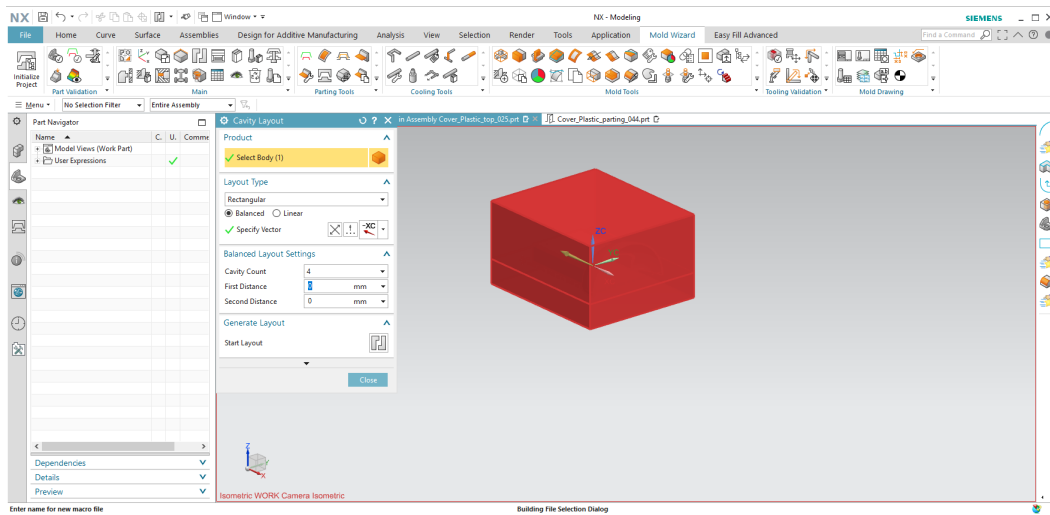


Figure 15-33 The workpiece selected automatically

## Product Rollout

The option in this rollout is used to select the workpiece.



## Layout Type Rollout

The options in this rollout are used to specify the type of orientation to be created. The options available in this rollout are discussed next.

### Layout Type

The options in this drop-down list are used to define the layout type for the cavity. The **Rectangular** option in this drop-down list is selected by default and helps you to create rectangular layout of the workpiece. You can also choose the **Circular** option from this drop-down list to create a circular layout of the component. The **Specify Vector** area in the **Layout Type** rollout helps you to define the directional placement of the component with respect to other component. Specify the parameter of the layout in the **Balanced Layout Settings** or **Circular Layout Settings** rollout. To create the rectangular or circular layout, choose the **Start Layout** button from the **Generate Layout** rollout; the preview of the layout will be displayed in the window. Next, choose the **Close** button from the **Cavity Layout** dialog box. Figures 15-34 and 15-35 show the rectangular and circular layouts respectively.

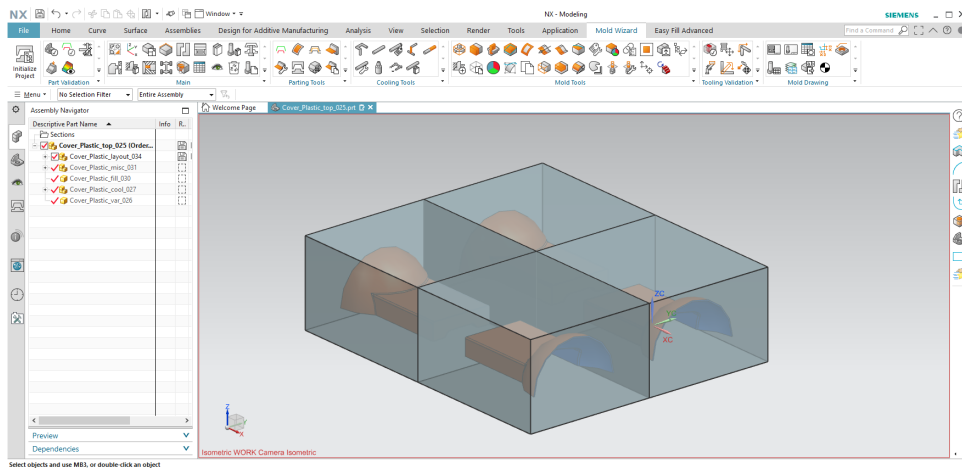


Figure 15-34 The rectangular layout of workpiece

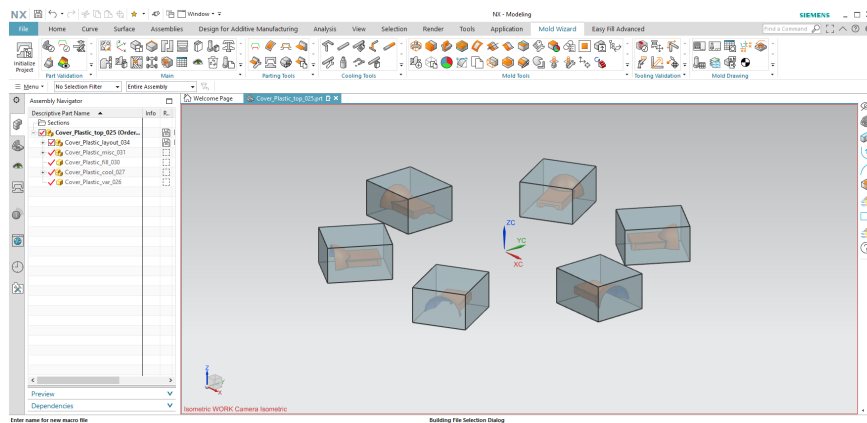

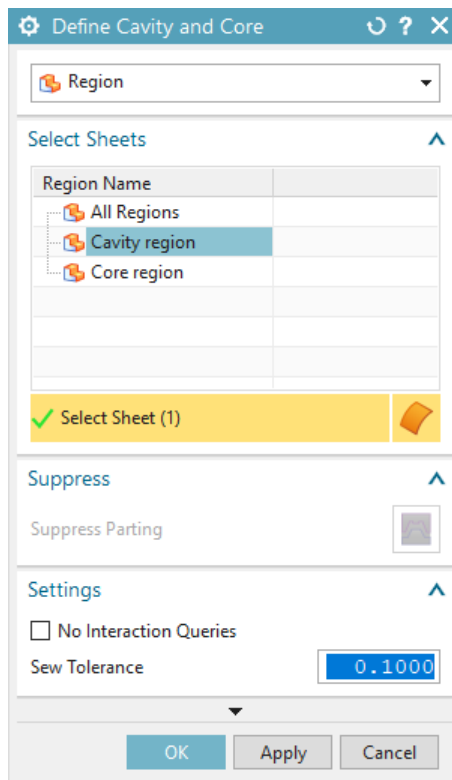


Figure 15-35 The circular layout of workpiece

## Define Cavity and Core

**Ribbon:** Mold Wizard > Parting Tools Gallery > Define Cavity and Core


 This tool helps you to create core and cavity of the component. To create core and cavity of the model, choose the **Define Cavity and Core** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Define Cavity and Core** dialog box will be displayed, refer to Figure 15-36. In the dialog box, the **Cavity region** area is selected by default in the **Select Sheets** rollout. Choose the **Apply** button; the **New Iray+ Ray Traced Studio Rendering** window will be displayed. Choose the **OK** button; the **View Parting Result** dialog box will be displayed. Check if the core or cavity is correct otherwise choose the **Reverse Normal** button. Choose the **OK** button; the **Define Cavity and Core** dialog box is displayed again. Select the **Core region** area from the **Select Sheets** rollout. Choose the **Apply** button; the **New Iray+ Ray Traced Studio Rendering** window will be displayed. As you choose the **OK** button to close the window; the **View Parting Result** dialog box will be displayed. Check the core or cavity is correct otherwise choose the **Reverse Normal** button. Choose the **OK** button to close the window; the **Define Cavity and Core** dialog box displayed again. Choose the **Cancel** button to close the dialog box. Click the left mouse button and then choose the **Switch Window** tool from the popup mini bar to check the core and cavity window.

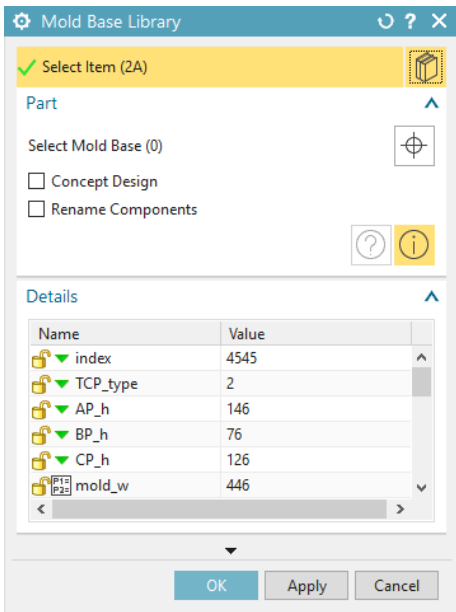


*Figure 15-36 The Define Cavity and Core dialog box*

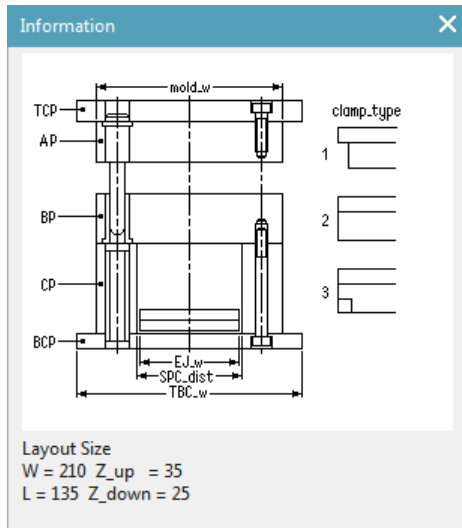
## Mold Base Library

**Ribbon:** Mold Wizard > Main Gallery > Mold Base Library

 The **Mold Base Library** tool helps you to add mold plates to the core and cavity. To add mold plates, choose the **Mold Base Library** tool from the **Main** gallery of the **Mold Wizard** tab; the **Mold Base Library** dialog box is displayed, refer to Figures 15-37. Also, the **Information** window, refer to Figure 15-38 and the **Reuse Library** navigator on the left of the window will be displayed. Select the standard of the mold base from the **MW Mold Base Library** of the **Reuse library** navigator and specify the size in the **Details** rollout of the **Mold Base Library** dialog box and then choose the **OK** button.



*Figure 15-37 The Mold Base Library dialog box*



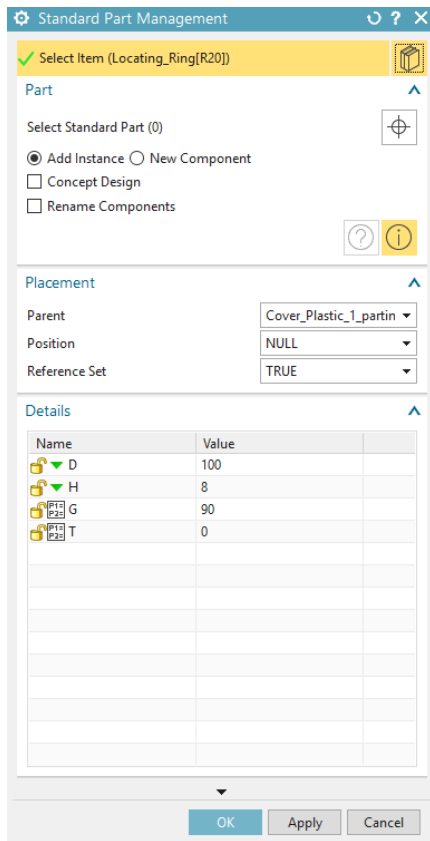
*Figure 15-38 The Information window*

## Standard Part Library

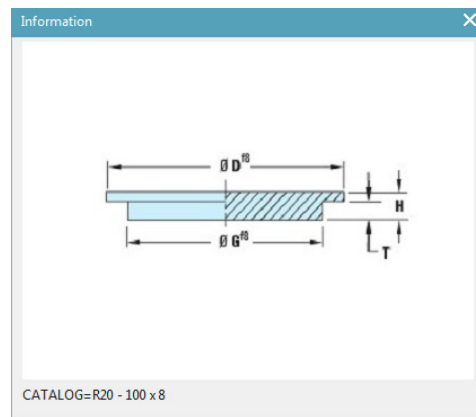
**Ribbon:** Mold Wizard > Main Gallery > Standard Part Library



The **Standard Part Library** tool helps you to add the standard parts in the mold like sprue bush, locating ring, and so on. To add a standard part, choose the **Standard Part Library** from the **Main** gallery of the **Mold Wizard** tab; the **Standard Part Management** dialog box will be displayed, refer to Figures 15-39. Also, the **Information** window will be displayed, refer to Figure 15-40 and the **Reuse Library** navigator on the left in the window will be displayed. Select the standard from the **MW Standard Part Library** of the **Reuse Library** like locating ring and sprue bush. After specifying the parameters of the parts, choose the **OK** button to close the dialog box.



*Figure 15-39 The Standard Part Management dialog box*



*Figure 15-40 The Information window*

## Design Fill

**Ribbon:** Mold Wizard > Main Gallery > Design Fill



The **Design Fill** tool helps you to create a gate which connects with core or cavity. To create a gate, choose the **Design Fill** tool from the **Main** gallery of the **Mold Wizard** tab; the **Design Fill** dialog box will be displayed, refer to Figures 15-41. Also, the **Information** window, refer to Figure 15-42 and the **Reuse Library** will be displayed on the left in the drawing window. Select the required type of gate from the **MW Standard Part Library** of the **Reuse Library** and then specify the parameters in the **Details** rollout of the **Design Fill** dialog box and then choose the **OK** button to close the dialog box.

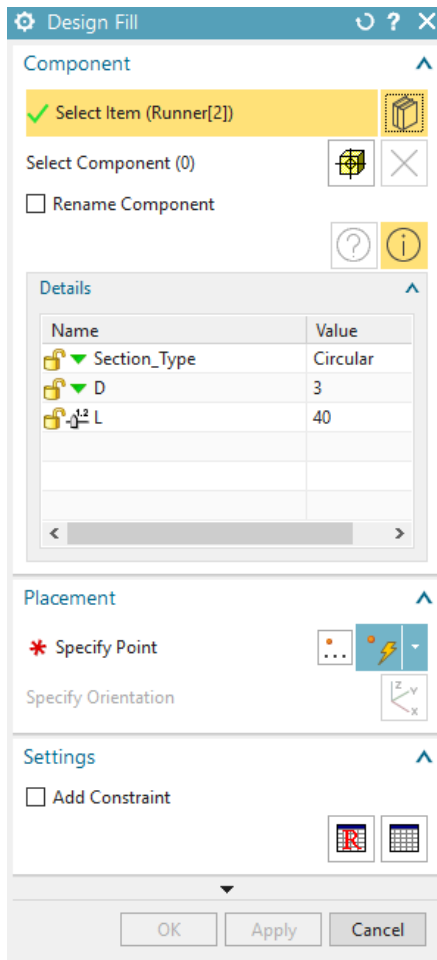


Figure 15-41 The *Design Fill* dialog box

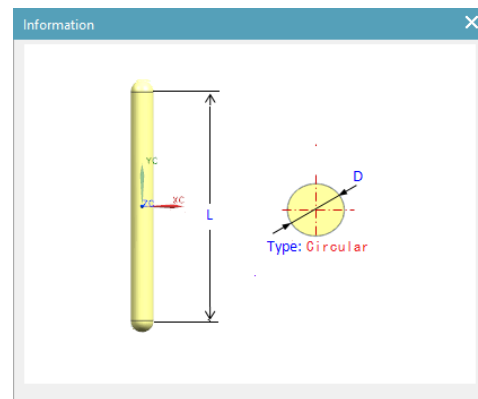


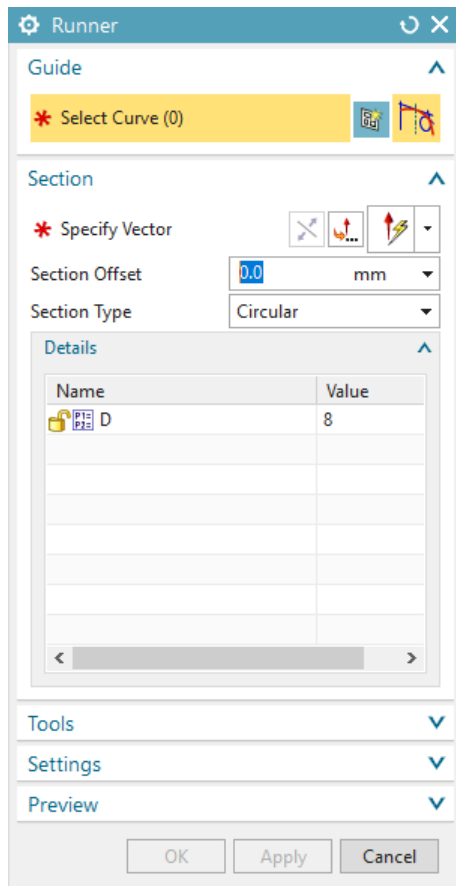
Figure 15-42 The *Information* window

## Runner

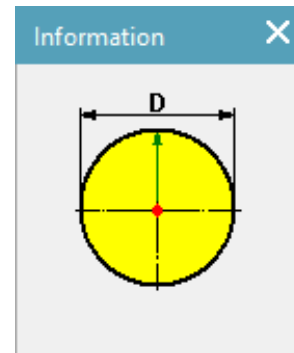
**Ribbon:** Mold Wizard > Main Gallery > Runner



The **Runner** tool helps you to create the runner which connects with sprue bush and gate. To create a runner, choose the **Runner** tool from the **Main** gallery of the **Mold Wizard** tab; the **Runner** dialog box will be displayed, refer to Figures 15-43. Also, the **Information** window will be displayed, refer to Figure 15-44 and the **Reuse Library** will be displayed on the left in the drawing window. Create the sketch of the runner layout and select the type of runner cross-section. Specify the parameters of runner and then choose the **OK** button to close the dialog box.



*Figure 15-43 The Runner dialog box*



*Figure 15-44 The Information window*

## Slider and Lifter Library

**Ribbon:** Mold Wizard > Main Gallery > Slide and Lifter Library



The **Slide and Lifter Library** tool helps you to create a slider in mold design. To create the slider, choose the **Slide and Lifter Library** tool from the **Main** gallery of the **Mold Wizard** tab; the **Slide and Lifter Design** dialog box will be displayed, refer to Figure 15-45. Also, the **Information** window will be displayed, refer to Figure 15-46 and the **Reuse Library** navigator will be displayed on the left in the drawing window. Select the type of slider from the **Member Select** panel of the **Reuse Library** and specify the parameter in the **Details** rollout of the **Slide and Lifter Design** dialog box. Choose the **OK** button to close the dialog box.

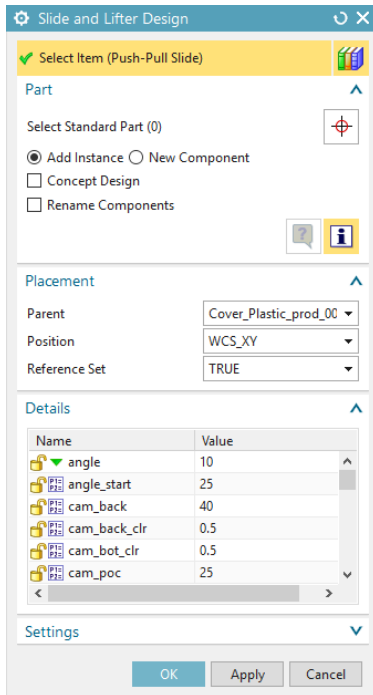


Figure 15-45 The Slide and Lifter Design dialog box

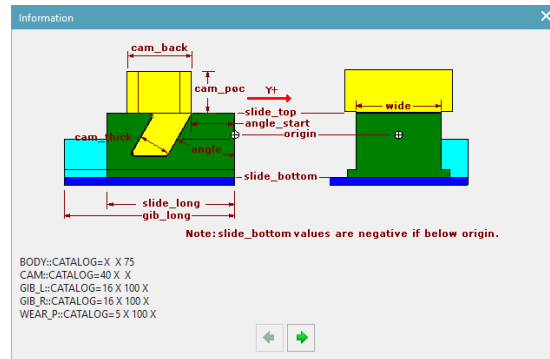


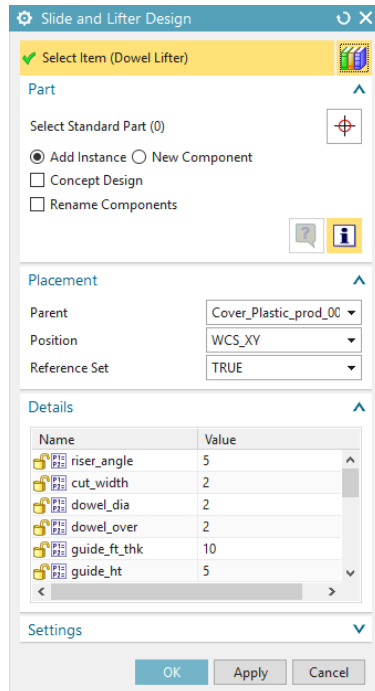
Figure 15-46 The Information window

## Slider and Lifter Library

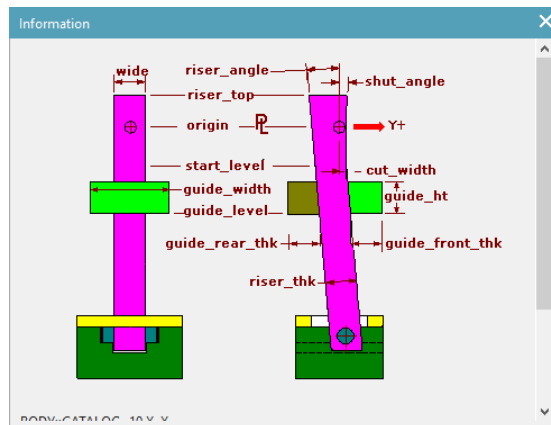
**Ribbon:** Mold Wizard > Main Gallery > Slider and Lifter Library



The **Slide and Lifter Library** tool helps you to create lifters in mold design. To create a lifter, choose the **Slide and Lifter Library** tool from the **Main** gallery of the **Mold Wizard** tab; the **Slide and Lifter Design** dialog box will be displayed, refer to Figures 15-47. Also, the **Information** window, refer to Figure 15-48, and the **Reuse Library** navigator will be displayed on the left in the drawing window. Select the **Lifter** from the **SLIDE\_LIFT** sub-tree of the **MW Slide and Lifter Library** tree in the **Reuse Library**. Select the type of lifter from the **Reuse Library** and specify the parameters in the **Details** rollout of the **Slide and Lifter Design** dialog box. Choose the **OK** button to close the dialog box.



*Figure 15-47 The Slide and Lifter Design dialog box*



*Figure 15-48 The Information window*

## Design Ejector Pin

**Ribbon:** Mold Wizard > Main Gallery > Design Ejector Pin



This tool helps you to create ejector pins that are used for ejection of the component. To create an ejector pin, choose the **Design Ejector Pin** tool from the **Main** gallery of the **Mold Wizard** tab; the **Design Ejector Pin** dialog box will be displayed, refer to Figure 15-49. Also, the **Information** Window, refer to Figure 15-50 and the **Reuse Library** navigator will be displayed on the left in the drawing window. Select the type of ejector pin from the **Member Select** panel of the **Reuse Library** and specify the parameters in the dialog box. Position the pin so that the ejection takes place and then choose the **OK** button to close the dialog box, refer to Figure 15-51.



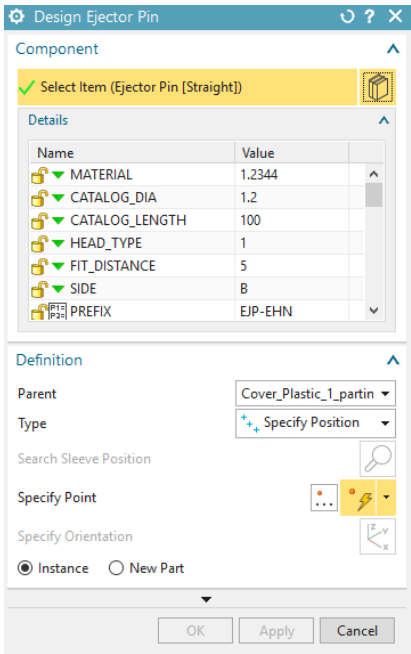


Figure 15-49 The Design Ejector Pin dialog box

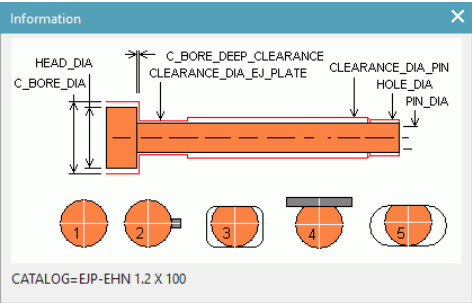


Figure 15-50 The Information window

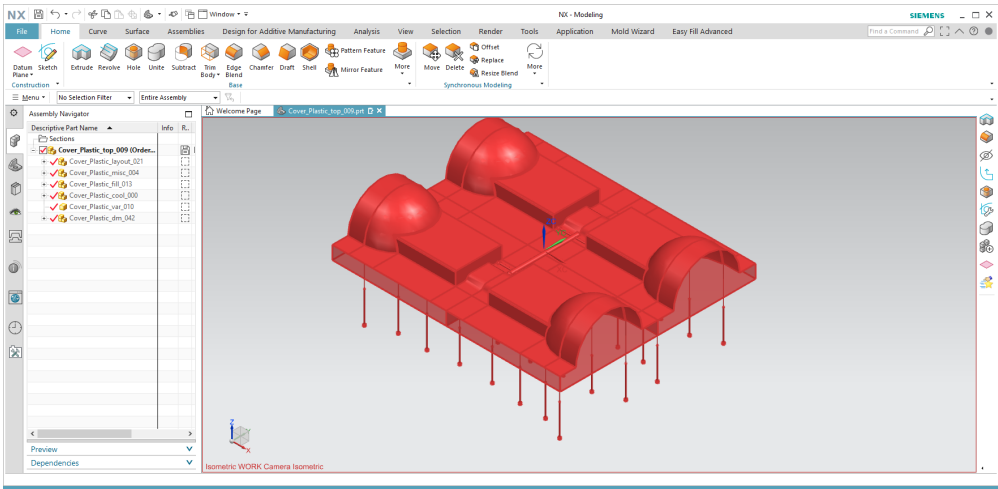



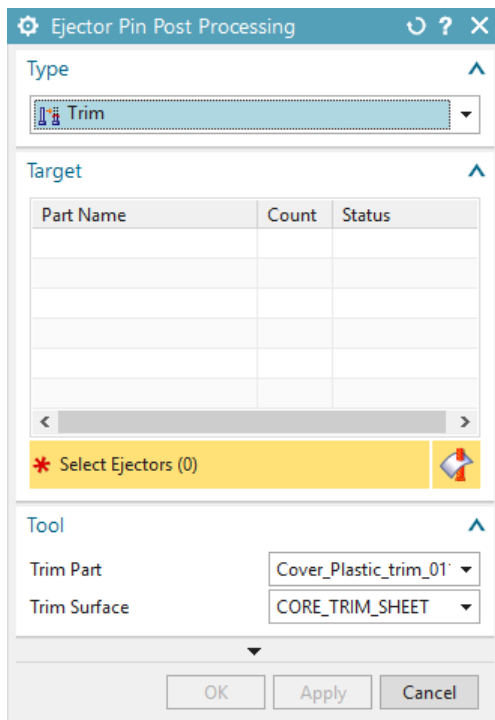
Figure 15-51 The placement of ejector pin

# Ejector Pin Post Processing

**Ribbon:** Mold Wizard > Main Gallery > Ejector Pin Post Processing

 This tool helps you to trim the ejector pin. To trim the ejector pin, choose the **Ejector Pin Post Processing** tool from the **Main** gallery of the **Mold Wizard** tab; the **Ejector Pin**

**Post Processing** dialog box will be displayed, refer to Figure 15-52. Also, you will be prompted to select the target ejector pins. Select the ejector pins that you need to trim and then choose the **OK** button; the pins will be trimmed and the dialog box will be closed.



*Figure 15-52 The Ejector Pin Post Processing dialog box*

## Sub-Insert Library

**Ribbon:** Mold Wizard > Main Gallery > Sub-Insert Library



This tool helps you to create and insert those components that go through wear and tear regularly or need regular replacement. Generally, the material of the insert is P20 or H13. To create the sub-insert in the core and cavity, choose the **Sub-insert Library** tool from the **Main** gallery of the **Mold Wizard** tab; the **Sub-insert Design** dialog box with the **Information** window will be displayed, refer to Figures 15-53 and 15-54. Specify whether you need **CORE SUB INSERT** or **CAVITY SUB INSERT** from the **Member Select** area of the **Reuse Library** navigator and then specify the parameters of the insert from the **Details** rollout of the dialog box. Choose the **OK** button to close the dialog box; the **Point** dialog box will be displayed. Specify the parameter in dialog box and then choose the **OK** button. Choose the **Cancel** button to close the dialog box.

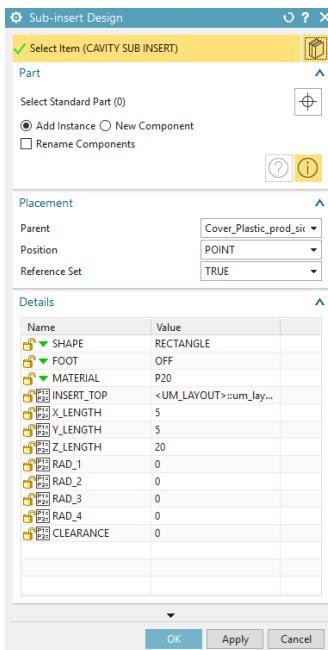


Figure 15-53 The Sub-insert Design dialog box

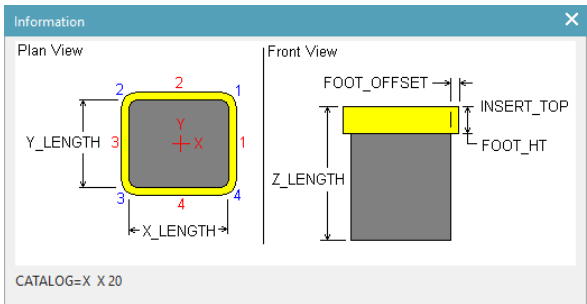



Figure 15-54 The Information window

## Pocket

**Ribbon:** Mold Wizard > Main Gallery > Pocket

 This tool helps you to create pocket in the mold plates and inserts. To create a pocket, choose the **Pocket** tool from the **Main** gallery of the **Mold Wizard** tab; the **Pocket** dialog box will be displayed, refer to Figure 15-55. Also, you are prompted to select the target bodies, select the required mold plates or insert. By default, the **Subtract Material** option is selected in the **Mode** rollout of the dialog box. After selecting the body, click the **Select Object** area of the **Tool** rollout. Select the tool parts that are to be subtracted like ejector pin and then choose the **Apply** button from the dialog box. Repeat this step until the required subtraction has been done. Choose the **OK** button to close the dialog box.

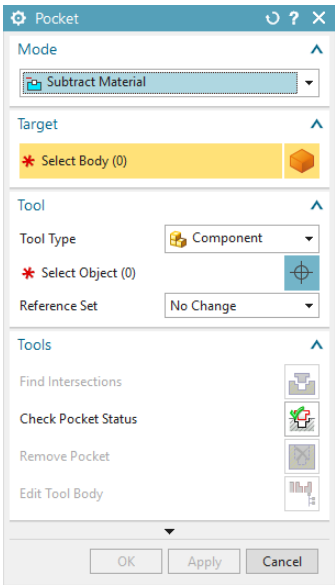



Figure 15-55 The Pocket dialog box

## View Manager

**Ribbon:** Mold Wizard > Main Gallery > View Manager

 This tool helps you to manage the display of the mold model components. As you choose this tool, the **View Manager** navigator will be displayed, refer to Figure 15-56. The functioning of this navigator is similar to assembly navigator.

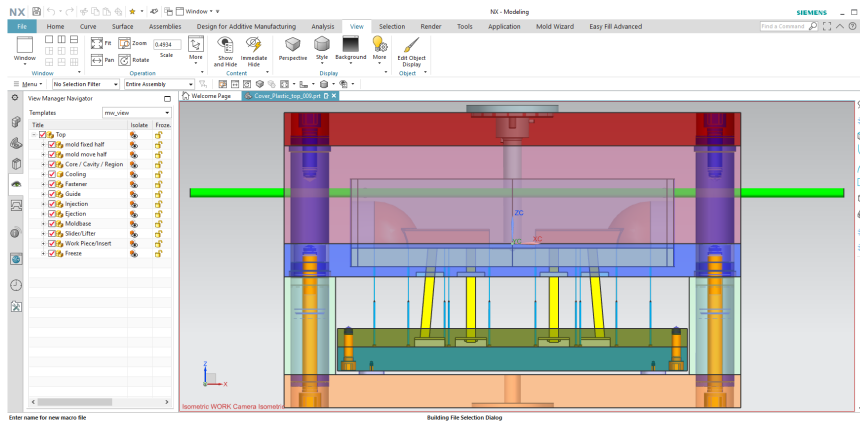


Figure 15-56 The View Manager navigator

## Cooling

Cooling is a process required to cool the component. The cycle time of cooling plays an important role in mold costing. NX provides you the **Cooling Tools** gallery in which all the tools related to cooling are available. The procedure to create cooling channel are discussed next.

## Pattern Channel

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Pattern Channel



This tool is used to create the cooling channels using sketches or curves. To create a channel, choose the **Pattern Channel** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Pattern Channel** dialog box will be displayed, refer to Figure 15-57. Also, you will be prompted to create the sketch or select the section geometry. After creating the sketch, specify the channel diameter in the **Setting** rollout and then choose the **OK** button from the dialog box.

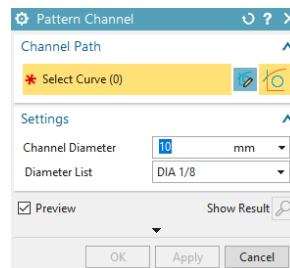


Figure 15-57 The Pattern Channel dialog box

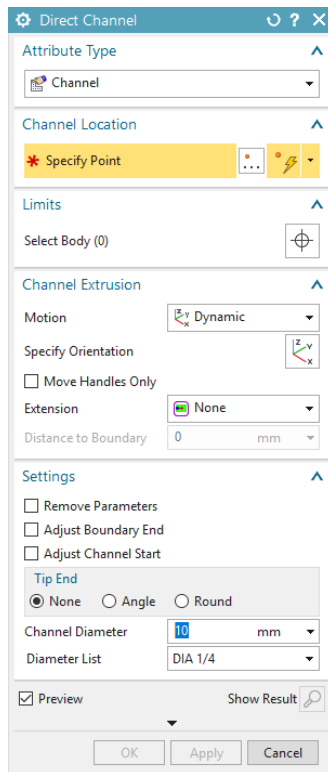
## Direct Channel

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Direct Channel



This tool is used to create the cooling channel or baffle by specifying a specified point. To create a channel, choose the **Direct Channel** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Direct Channel** dialog box will be displayed, refer to

Figure 15-58. Also, you will be prompted to select infer point. Select the start point of the channel. Next, select the **Distance** option from the **Motion** drop-down list of the **Channel Extrusion** rollout; you will be prompted to specify the vector direction and then enter the length of the channel in the **Distance** edit box. Choose the **OK** button to close the dialog box.



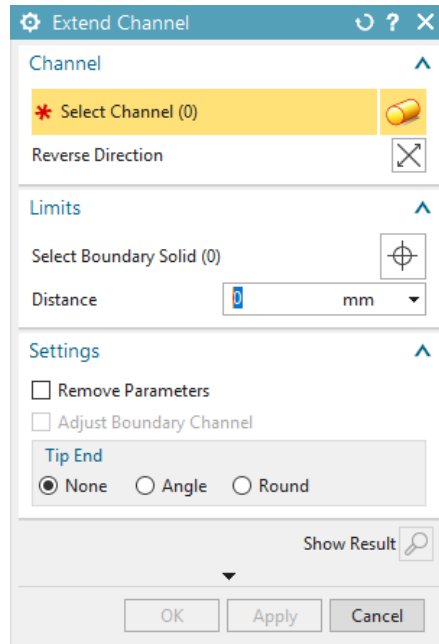
*Figure 15-58 The Direct Channel dialog box*

## Extend Channel

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Extend Channel



This tool is used to extend the length of the cooling channel. To extend the length, choose the **Extend Channel** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Extend Channel** dialog box will be displayed, refer to Figure 15-59, and you will be prompted to select the cooling channel. Select the cooling channel and specify the length of the cooling channel in the **Distance** edit box. Choose the **OK** button; the length will be extended and the dialog box will be closed.



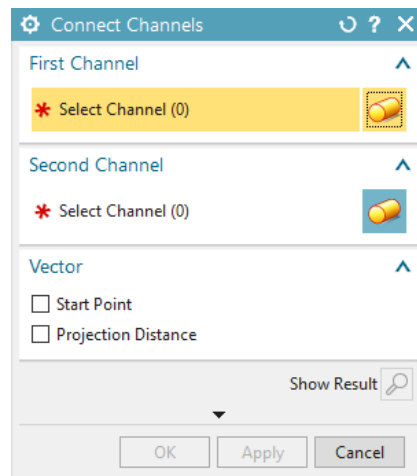
*Figure 15-59 The Extend Channel dialog box*

## Connect Channels

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Connect Channels



This tool is used to connect the cooling channel. To do so, choose the **Connect Channels** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Connect Channels** dialog box will be displayed, refer to Figure 15-60. Also, you will be prompted to select the first cooling channel. Select the first cooling channel; you will be prompted to select the second cooling channel. Select the second cooling channel and then choose the **OK** button to close the dialog box.



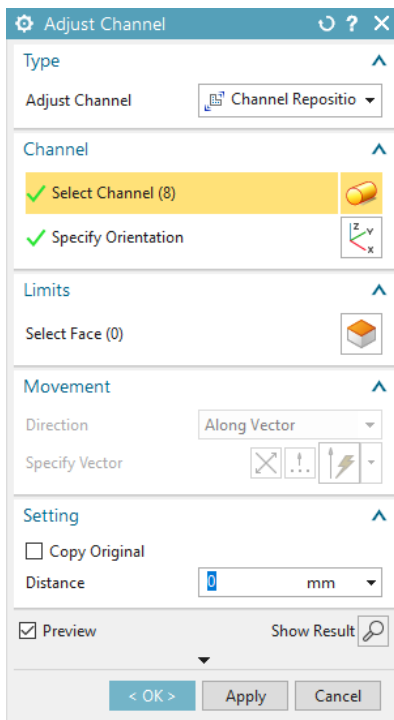
*Figure 15-60 The Connect Channels dialog box*

## Adjust Channel

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Adjust Channel



This tool is used to adjust the position of the cooling channel. To do so, choose the **Adjust Channel** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Adjust Channel** dialog box will be displayed, refer to Figure 15-61. Also, you will be prompted to select the cooling channel. Select the cooling channel which you want to adjust; a dynamic triad will be displayed on the channel. Move the channel by using handles and angular handles of the triad. After positioning the channel, choose the **OK** button to close the dialog box.



*Figure 15-61 The Adjust Channel dialog box*

## Cooling Fittings

**Ribbon:** Mold Wizard > Cooling Tools Gallery > Cooling Fittings



This tool is used to add cooling fitting components to cooling channels. To add the components, choose the **Cooling Fittings** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Cooling Fittings** dialog box will be displayed, refer to Figure 15-62, and you will be prompted to select the channel. Select the cooling channel and then choose the **OK** button; the dialog box will be closed and you will notice the o-rings in the mold cooling channel.

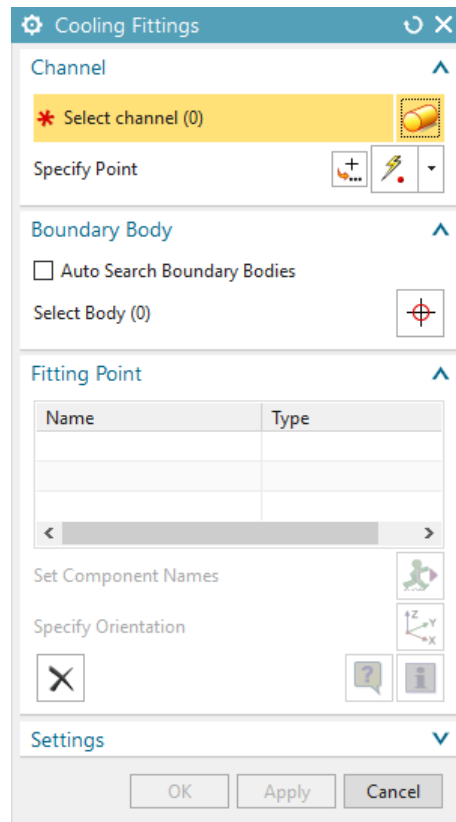


Figure 15-62 The Cooling Fittings dialog box

## Assembly Drawings

**Ribbon:** Mold Wizard > Mold Drawing Gallery > Assembly Drawing



This tool helps you to create the drawing of the mold assembly. To create the drawing, choose the **Assembly Drawing** tool from the **Mold Drawing** gallery of the **Mold Wizard** tab; the **Assembly Drawing** dialog box will be displayed, refer to Figure 15-63. By default, the **Visibility** option is selected in the **Type** rollout. This option helps you to select the parts of the mold you want to show in the drawing. Select the component from the drawing area and then select the **Drawing** option from the drop-down list of the **Type** rollout. Select the **Self Contained** drawing type from the **Drawing Type** rollout and select the type of template from the **Templates** rollout. Choose the **Apply** button. Select the **View** option from the drop-down list of the **Type** rollout and then select the predefined views from the **View Control** rollout. Specify the scale value in the **Scale** edit box of the **View Control** rollout. Choose the **OK** button to close the dialog box.



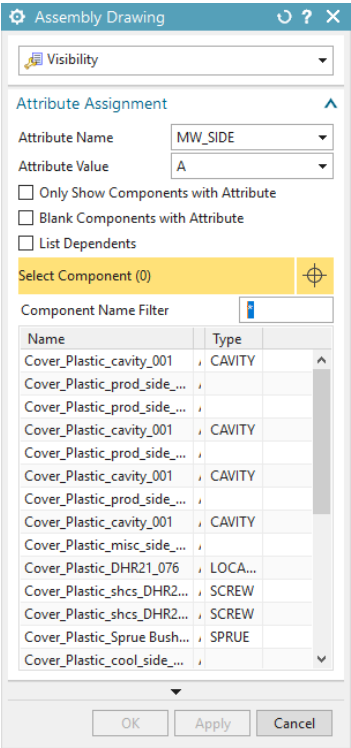

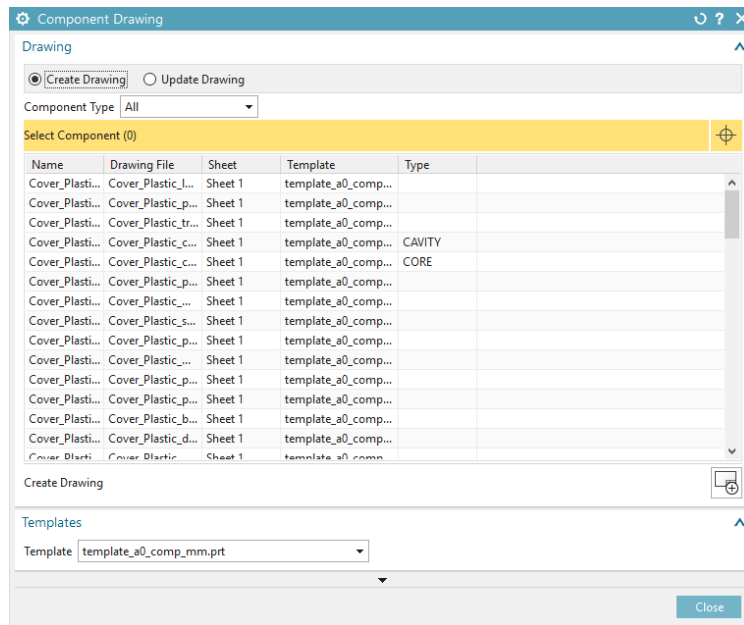


Figure 15-63 The Assembly Drawing dialog box

## Component Drawing

**Ribbon:** Mold Wizard > Mold Drawing Gallery > Component Drawing

 This tool helps you to create and manage the drawing for components of the mold assembly. To create a drawing, choose the **Component Drawing** tool from the **Mold Drawing** gallery of the **Mold Wizard** tab; the **Component Drawing** dialog box will be displayed, refer to Figure 15-64. Select the component from the list in the **Drawing** rollout and then choose the **Create Drawing** button from the **Create Drawing** area of the **Drawing** rollout; the drawing will be generated.



**Figure 15-64** The *Component Drawing* dialog box

## TUTORIAL

To perform the tutorial, you need to download the zipped file named as *c15\_NX\_2020\_input* from the Input Files section of the CADCIM website. The complete path for downloading the file is:

*Textbooks > CAD/CAM > NX > Siemens NX 2020 for Designers > Input Files*

After the file is downloaded, extract the folder to the location *C:\NX 2020\* and rename it as *c15*.

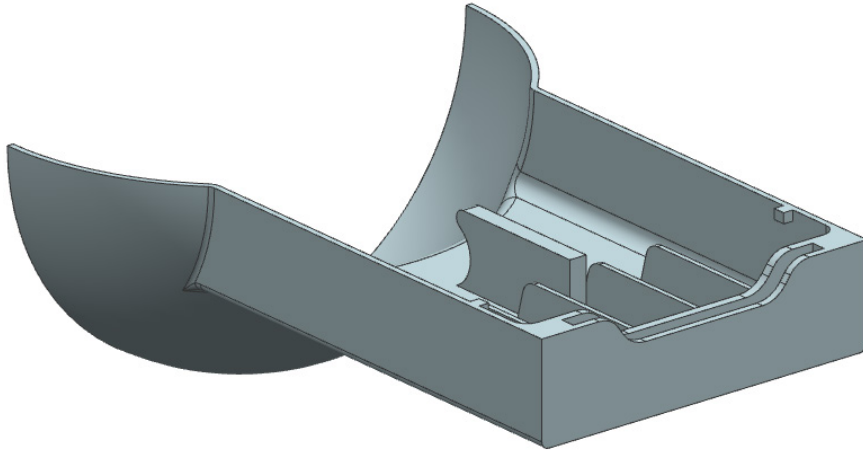
### Tutorial 1

In this tutorial, you will create mold design of the plastic cover part which is shown in Figure 15-65. Here, you will analyze the model and add mold base to it. Also you will create core and cavity, runner and gate, and add lifter, ejector pin, and cooling channels to the model.

After creating the mold design, save the mold design with the name *c15tut1.prt* at the location given below:

*\NX\c15*

**(Expected time: 3 hr)**



*Figure 15-65 Plastic part for Tutorial 1*

The following steps are required to complete this tutorial:

- a. Start NX and open the model.
- b. Create a gate for analyzing the model.
- c. Create runner and sprue for analyzing the model.
- d. Set Parting direction.
- e. Start analysis and analyze the result.
- f. Initialize the project.
- g. Orient the model.
- h. Create Parting surface.
- i. Create Core and Cavity.
- j. Add Mold Base.
- k. Add lifter for ejection and part shape.
- l. Add Register ring and sprue bush in mold.
- m. Add Ejector Pin for ejection of component.
- n. Create gate and runner.
- o. Create cooling channel for cooling the component.

### Starting NX and Opening the Model

First, you need to start NX and then open a new file.

1. Double-click on NX shortcut icon on the desktop of your computer to start NX.
2. Choose the **Open** button from the **Standard** group of the **Home** tab or choose **Menu > File > Open** from the **Top Border Bar**; the **Open** dialog box is displayed.
3. Select **Cover\_Plastic.prt** from the **Name** list; **Cover\_Plastic** is displayed in the **File name** drop-down list. Then choose the **OK** button; the model is displayed, refer to Figure 15-66.



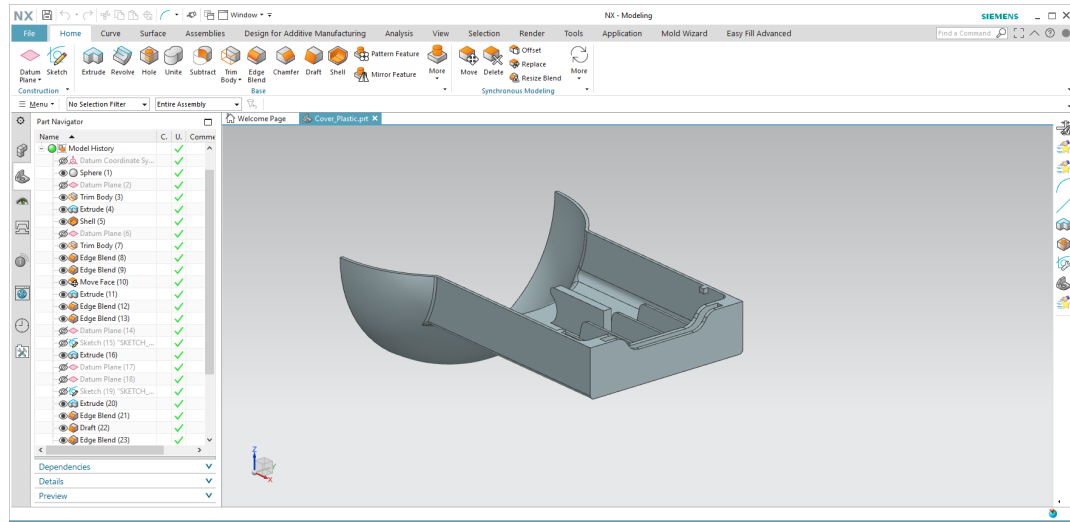


Figure 15-66 Plastic part in Modeling environment

## Analyzing the Model by Easy Fill Advanced

Now, use the tools in the **Easy Fill Advanced** tab for analyzing the model. It is a continuation process; if material does not fill properly then you need to do more and more iterations by changing the gate, runner, coolant size, shape, or orientation.

1. Click on the **Easy Fill Advanced** tab and choose the **Set Working Folder** tool from the **Setting** group of the tab; the **Working Folder** dialog box is displayed.
2. Choose the **Browse** button; the **Open** dialog box is displayed where you can set the working folder, refer to Figure 15-67.

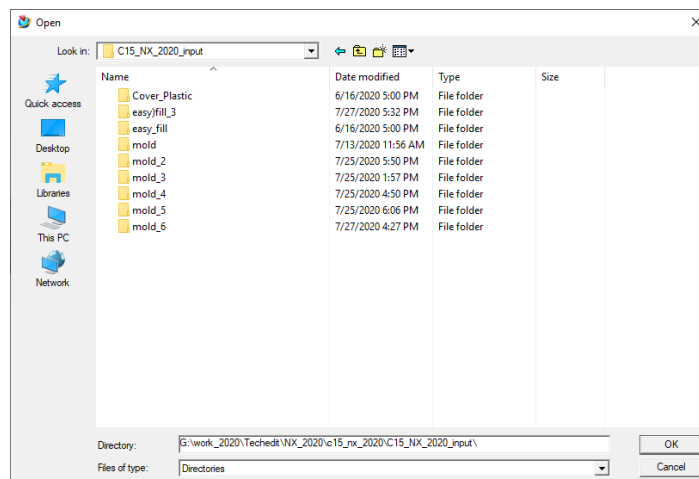


Figure 15-67 The Open dialog box

**Note**

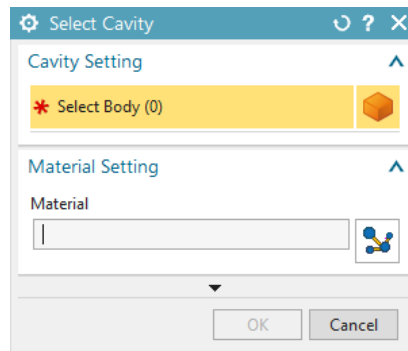
*If the **Easy Fill Advanced** message box appears after choosing the **Set Working Folder** tool then choose the **Yes** button to close this message box.*

3. Choose the **OK** button from the **Open** dialog box and then from the **Working Folder** dialog box.

**Creating Gate for Analyzing Model**

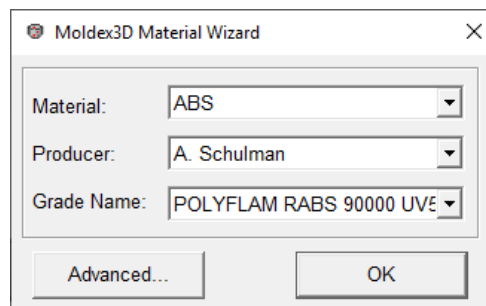
To analyze the model, you need to create a gate.

1. Choose the **Set Cavity** tool from the **Setting** group of the **Easy Fill Advanced** tab in the **Ribbon**; the **Select Cavity** dialog box is displayed, refer to Figure 15-68.



*Figure 15-68 The **Select Cavity** dialog box*

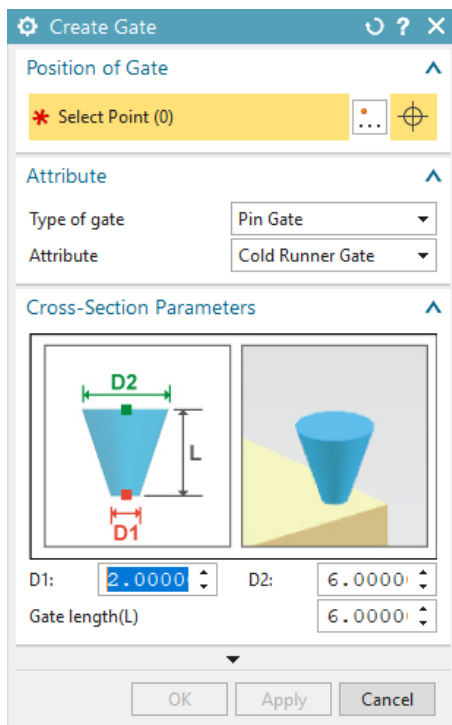
2. Select the solid body from the **Select Body** area of the **Cavity Setting** rollout to specify solid body as cavity.
3. Choose the **Push button to select material** button in the **Material Setting** rollout; the **Moldex3D Material Wizard** dialog box is displayed, refer to Figure 15-69.



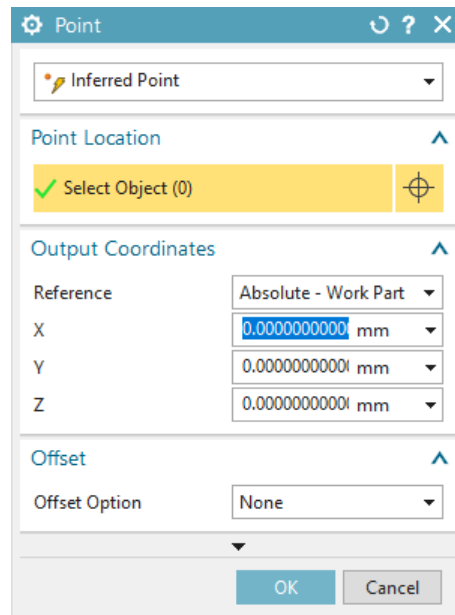
*Figure 15-69 The **Moldex3D Material Wizard** dialog box*

4. Select **ABS+PA6** from the **Material** drop-down list if it is not already selected.
5. Select **Styrolution** from the **Producer** drop-down list if it is not already selected.

6. Select **Terblend N NG-06** from the **Grade Name** drop-down list.
7. Choose the **OK** button from the **Moldex3D Material Wizard** and then choose the **OK** button from the **Select Cavity** dialog box.
8. Choose the **Gate Wizard** tool from the **Wizard** group; the **Create Gate** dialog box is displayed, refer to Figure 15-70.
9. Select **Edge Gate** from the **Type of gate** drop-down list to select the type of gate.
10. Select **Cold Runner Gate** from the **Attribute** drop-down list if not already selected.
11. Choose the **Point Dialog** button; the **Point** dialog box is displayed, refer to Figure 15-71.



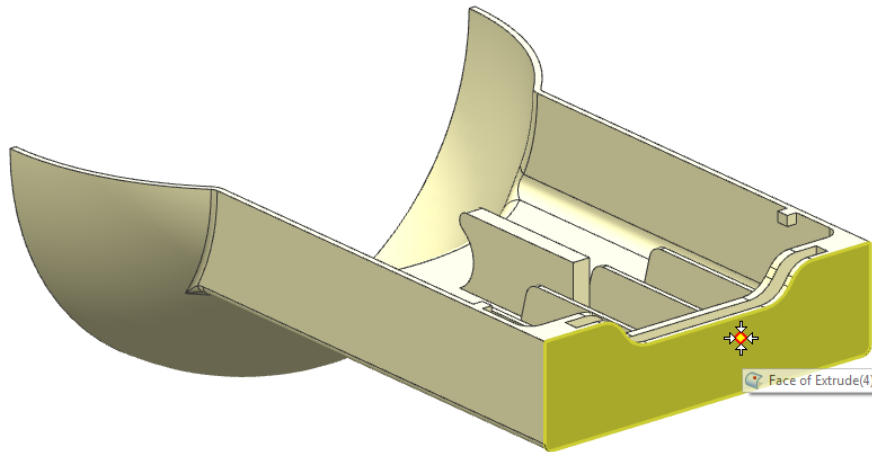
*Figure 15-70 The Create Gate dialog box*



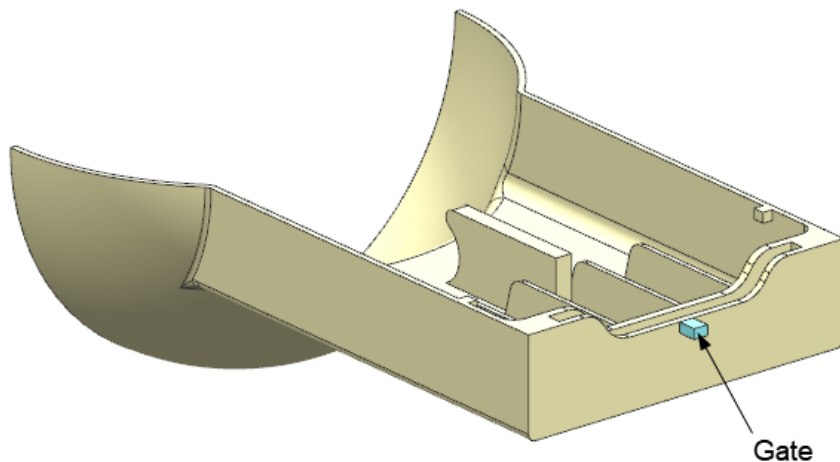
*Figure 15-71 The Point dialog box*

12. Select the **Point on Face** option from the Type drop-down list; you are prompted to select the face at point location, refer to Figure 15-72, for face selection.
13. Enter **0.308** and **0.5** in the **U Parameter** and **V Parameter** edit boxes respectively, of the **Location on Face** rollout and choose the **OK** button from the **Point** dialog box to exit the dialog box.
14. Enter **90** and **5** in the **Angle** and **Gate length(L)** edit boxes respectively, of the **Cross-Section Parameters** rollout.

15. Choose the **OK** button to close the **Create Gate** dialog box. Refer to Figure 15-73 for model with gate.



*Figure 15-72 The face selected for gate placement*

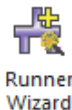


*Figure 15-73 The model with Fan gate*

## Creating Runner and Sprue for Analyzing Model

To analyze the model, you will now create a runner and sprue.

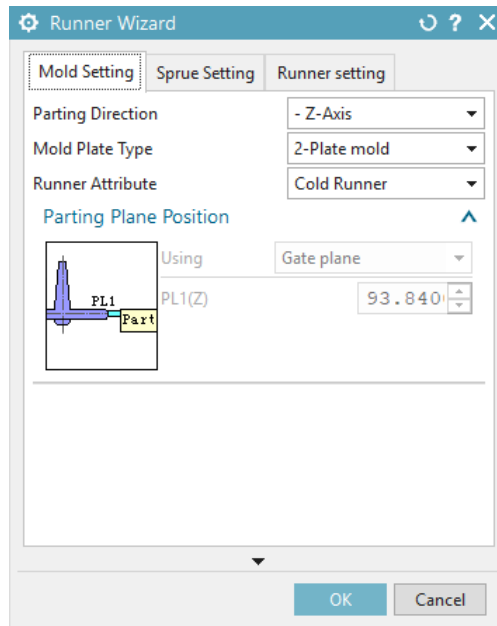
1. Choose the **Runner Wizard** tool from the **Wizard** group; the **Runner Wizard** dialog box is displayed, refer to Figure 15-74.



Runner  
Wizard

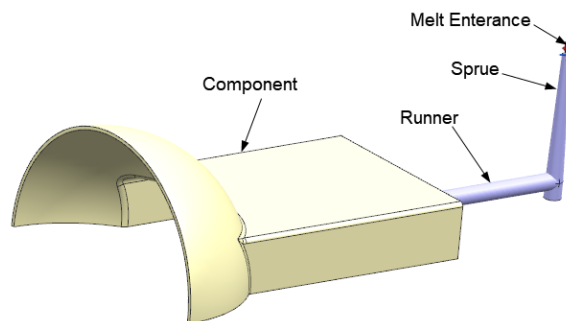
By default, the **Mold Setting** tab is chosen.

2. Select **- Z-Axis** from the **Parting Direction** drop-down list, **2-Plate mold** from the **Mold Plate Type** drop-down list, and **Cold Runner** from the **Runner Attribute** drop-down list.
3. Choose the **Sprue Setting** tab and enter **6**, **3**, and **45** in the **D1**, **D2**, and **SH** edit boxes respectively, of the **Sprue Geometry Parameters** rollout.



*Figure 15-74 The Runner Wizard dialog box*

4. Choose the **Runner setting** tab and then select the **Circular** type of cross section for runner from the **Type** drop-down list and enter **6** in the **D** edit box.
5. Choose the **OK** button to close this dialog box.
6. The gate, runner, and sprue are now attached to the model, refer to Figure 15-75.



*Figure 15-75 The runner and sprue with model*

## Setting the Parting Direction

To analyze the model, you will now set the direction of ejection.

1. Choose the **Set Parting Direction** tool from the **Setting** group to set the parting direction of the model; the **Vector** dialog box is displayed, refer to Figure 15-76.



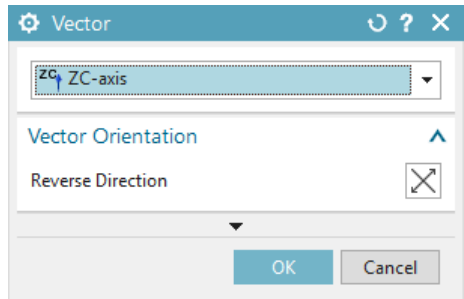


Figure 15-76 The *Vector* dialog box

2. Select the **ZC-Axis** option from the Type rollout if it is not already selected and choose the **OK** button to close the dialog box.

### Starting Analysis and Analyzing the Result

The **Start Analysis** and **Show Result** tools help to analyze and show results.

1. Choose the **Start Analysis** tool from the **Setting** group to start the analysis of the model; the **Analysis Setup** dialog box is displayed, refer to Figure 15-77.
2. Select the **Filling & Packing - F P** option from the **Analysis** drop-down list of the **Analysis Set** rollout.
3. Enter **220**, **0.25**, **4.20**, **250** and **60** in the **Maximum injection pressure**, **Filling time**, **Packing time**, **Melt Temperature**, and **Mold Temperature** edit boxes respectively, of the **Process Condition** rollout.
4. Choose the **OK** button; the dialog box closes and the **Moldex3D SYNC Project Monitor** window showing filling and packing analysis progression is displayed, refer to Figure 15-78. After the completion of analysis, the **Easy Fill Advanced** window gets displayed, refer to Figure 15-79.
5. Choose the **OK** button from the **Easy Fill Advanced** window and the **Close** button in the **Moldex3D SYNC Project Monitor** window.

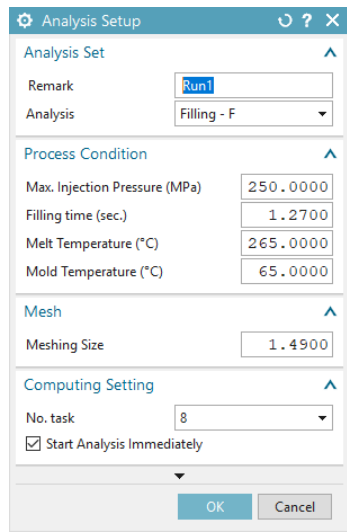


Figure 15-77 The *Analysis Setup* dialog box

Moldex3D SYNC Project Monitor [Cover\_Plastic]

Run	Analysis	Progress	Remaining Ti...	Status
Run1	Filling	28.1 %	00: 23: 36	RUNNING
Run1	Packing	0.0 %	-- : -- : --	PENDING

Information

106	5.262e-02	63.03	133.07	15.704	2254
107	5.518e-02	63.25	133.07	16.833	2306
108	5.773e-02	63.44	133.07	17.958	2362
109	6.064e-02	63.73	133.07	19.239	2417
110	6.350e-02	63.97	133.07	20.497	2475

-----

No (sec)	Time(sec)	Pres(MPa)	Q(cc/sec)	Fill(%)	CPU
-----					
111	6.630e-02	64.21	133.07	21.732	2536
112	6.918e-02	64.45	133.07	23.002	2595
113	7.264e-02	64.71	133.07	24.525	2658

Remove

Start

Stop

Close

Figure 15-78 The Moldex3D SYNC Project Monitor window

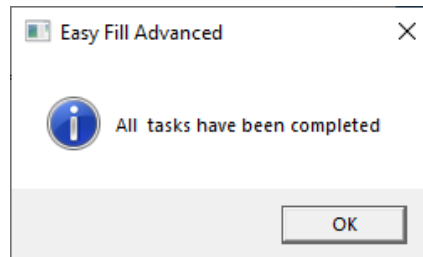


Figure 15-79 The Easy Fill Advanced window

- Choose the **Show Result** tool from the **Setting** group; the **Show Result** dialog box gets displayed, refer to Figure 15-80.

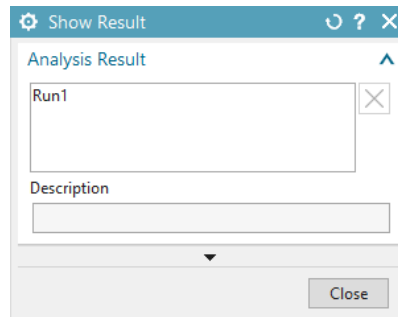
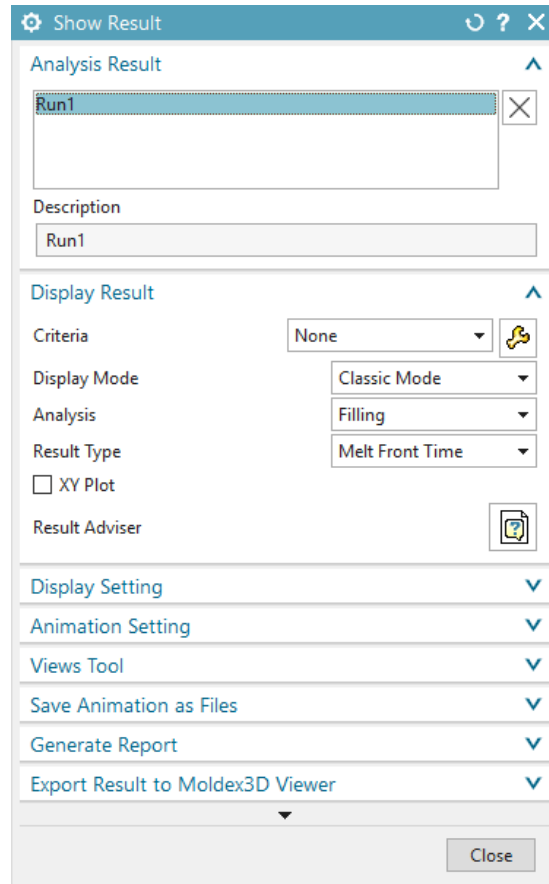


Figure 15-80 The Show Result dialog box

7. Select result from the **Analysis Result** rollout; the dialog box gets modified, refer to Figure 15-81.



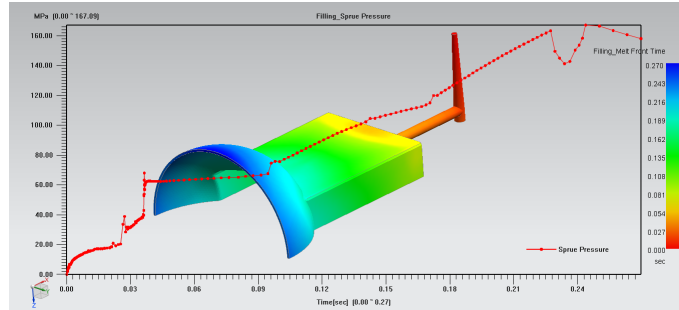
*Figure 15-81 The modified Show Result dialog box*

You can select the **Filling** or **Packing** option from the **Analysis** drop-down list in the **Display Result** rollout. By default, the **Filling** option is selected.

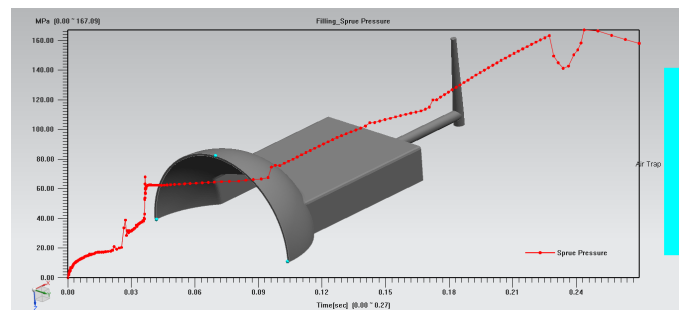
In this tutorial, you can visualize the results by selecting appropriate option from the **Result Type** drop-down list.

The options which can be selected for results are **Melt Front Time**, **Air Trap**, **Weld Line**, **Volumetric Shrinkage**, **Maximum Shear Stress**, and **Temperature**.

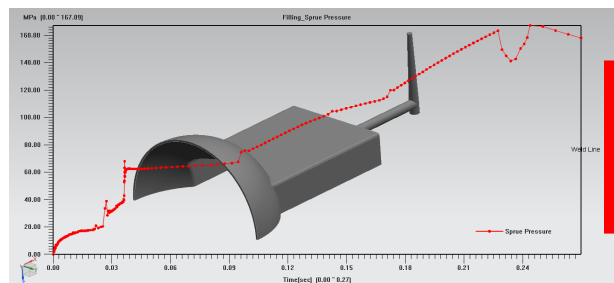
8. Select the **XY Plot** check box to activate the **XY Curve Type** drop-down list. Next, select the **Sprue Pressure** or **Clamping Force** option from this drop-down list; the resultant graphs are shown, refer to Figure 15-82 through Figure 15-87.



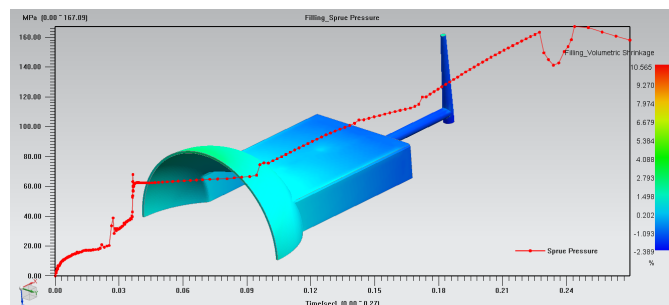
**Figure 15-82** The Sprue Pressure vs Melt Front Time graph



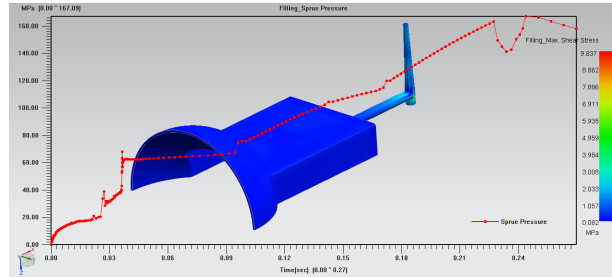
**Figure 15-83** The Sprue Pressure vs Air Trap graph



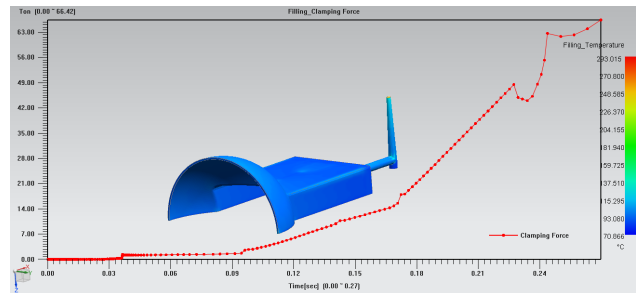
**Figure 15-84** The Sprue Pressure vs Weld Line graph



**Figure 15-85** The Sprue Pressure vs Volumetric Shrinkage graph



*Figure 15-86 The Sprue Pressure vs Max. Shear Stress graph*



*Figure 15-87 The Clamping Force vs Temperature graph*

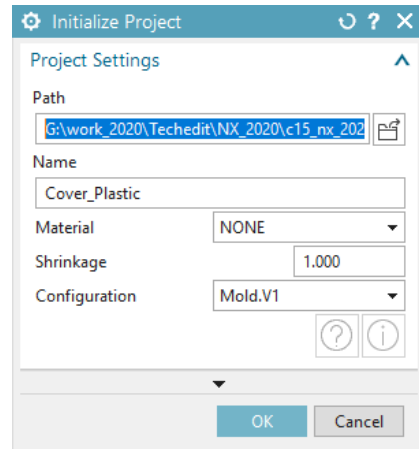
9. Choose the **Play** button from the **Animation Setting** rollout. Next, choose the **Close** button to close the dialog box.
10. Save the file to the specified folder by choosing the **Save All** button. Close NX.

Next, you need to open the model again. To open a file, choose the **Open** button from the **Standard** group of the **Home** tab or choose **Menu > File > Open** from the **Top Border Bar**; the **Open** dialog box is displayed. Select **Cover\_Plastic.prt** from the **Name** list; **Cover\_Plastic** gets displayed in the **File name** drop-down list. Then choose the **OK** button; the model is displayed.

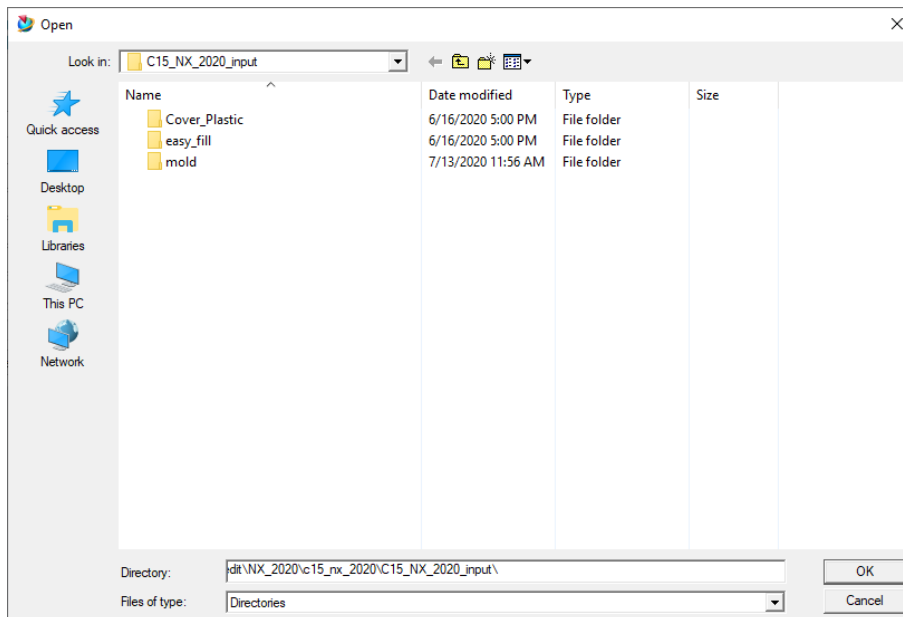
## Initializing the Project from Mold Wizard Tab

Now use the **Initialize Project** tool to define the material and the path for saving the project.

1. Choose the **Mold Wizard** tab.
2. Choose the **Initialize Project** tool from the **Mold Wizard** tab; the **Initialize Project** dialog box is displayed, as shown in Figure 15-88.
3. Choose the **Browse** button from the **Path** area of the **Project Settings** rollout; the **Open** dialog box is displayed, as shown in Figure 15-89. After setting the path of the project, choose the **OK** button to close the dialog box.
4. Select the **Nylon** material from the **Material** drop-down list; the **Shrinkage** edit box gets updated automatically depending upon the type of selection of material. Next, select the desired template from the **Configuration** drop-down list. By default, the **Mold.V1** template is selected. Choose the **OK** button to close the dialog box.



*Figure 15-88 The Initialize Project dialog box*

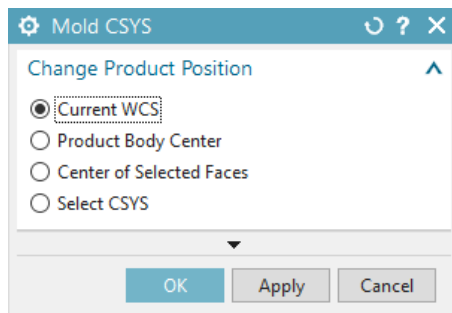


*Figure 15-89 The Open dialog box*

## Reorienting the Model

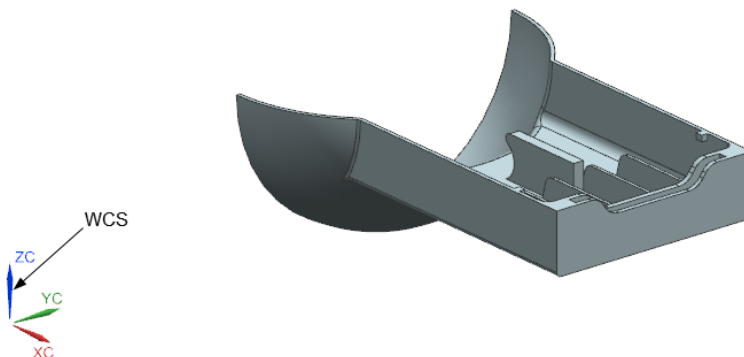
Now use the **Mold CSYS** tool to reorient the model.

1. Choose the **Mold CSYS** tool from the **Main** group of the **Mold Wizard** tab; the **Mold CSYS** dialog box is displayed, as shown in Figure 15-90; you are prompted to double-click on WCS.



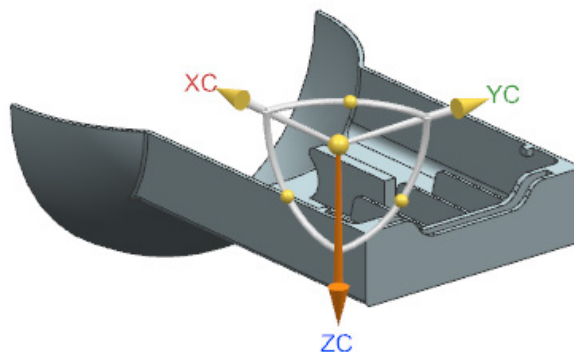
*Figure 15-90 The Mold CSYS dialog box*

2. Double-click the WCS, refer to Figure 15-91; you are prompted to drag a handle or select a handle. Select the handle of WCS; the **WCS Dynamics** dialog box is displayed.



*Figure 15-91 The WCS (work coordinate system)*

3. Position the WCS as shown in Figure 15-92.



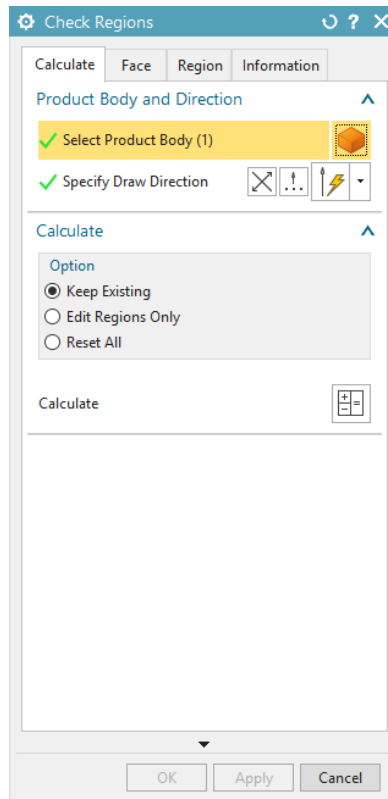
*Figure 15-92 The WCS after positioning*

- Click the middle mouse button to close the **WCS Dynamics** dialog box.
- Select the **Product Body Center** radio button from the **Change Product Position** rollout of the **Mold CSYS** dialog box. Next, choose the **OK** button from the **Mold CSYS** dialog box to close the dialog box.

## Check Regions

You can use the **Check Regions** tool to check regions of core and cavity.

- Invoke the **Check Regions** tool from the **Parting Tools** gallery; the **Check Regions** dialog box is displayed, refer to Figure 15-93. 



*Figure 15-93 The Check Regions dialog box*

- Choose the **Calculate** button from the **Calculate** rollout of the **Calculate** tab and then choose the **Region** tab. Choose the **Set Regions Color** button from the **Define Regions** rollout.

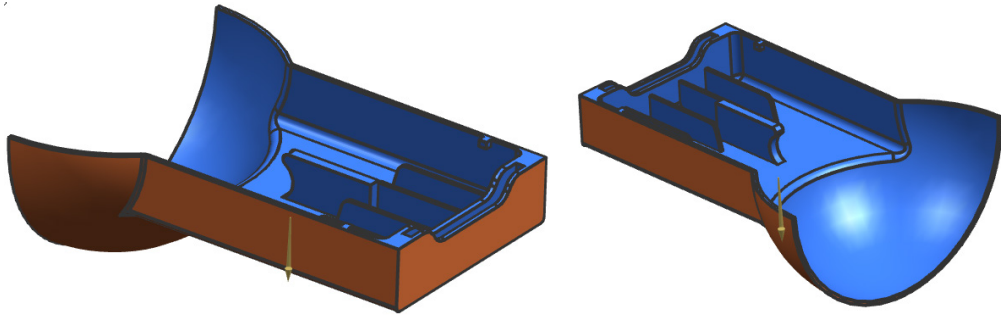
Note, the color of the model gets changed. These colors represent core, cavity, and undefined region in the model.

- The **Cavity Region** radio button is selected by default in the **Assign To Region** rollout. Select the undefined region (back face) of the model and then choose the **Apply** button. Select the



**Core Region** radio button and select the undefined region (front face) of the model and then choose the **Apply** button; the undefined regions gets the color of the core and cavity region.


4. Choose the **OK** button to close the dialog box. Modified model after using the **Check Region** tool is shown in Figure 15-94.



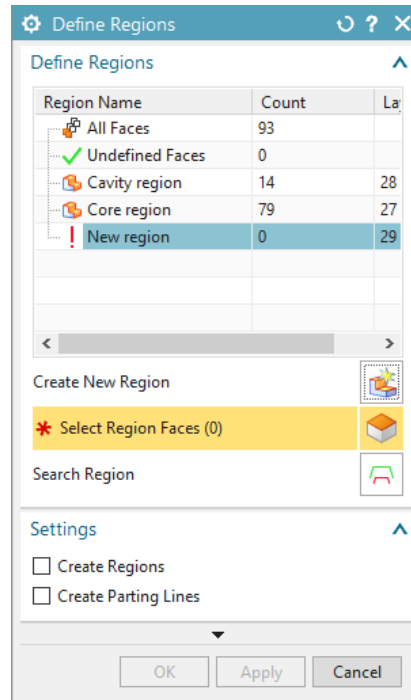
*Figure 15-94 The modified model after using the **Check Region** tool*

### Creating Core and Cavity Region Sheets

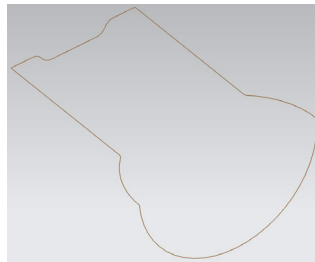
To create a parting lines, core, and cavity regions, you need to use the **Define Regions** tool.

1. Choose the **Define Regions** tool from the **Parting Tools** gallery of the **Mold Wizard**  tab; the **Define Regions** dialog box is displayed, refer to Figure 15-95.
2. Select **Cavity region** in the **Define Regions** rollout and then select **Create Regions** and the **Create Parting Lines** check boxes from the **Settings** rollout.
3. Choose the **Apply** button; a green tick mark appears beside the cavity and core region.
4. Choose the **Cancel** button to close the **Define Regions** dialog box.

Refer to Figure 15-96 for the parting lines.



*Figure 15-95 The Define Regions dialog box*

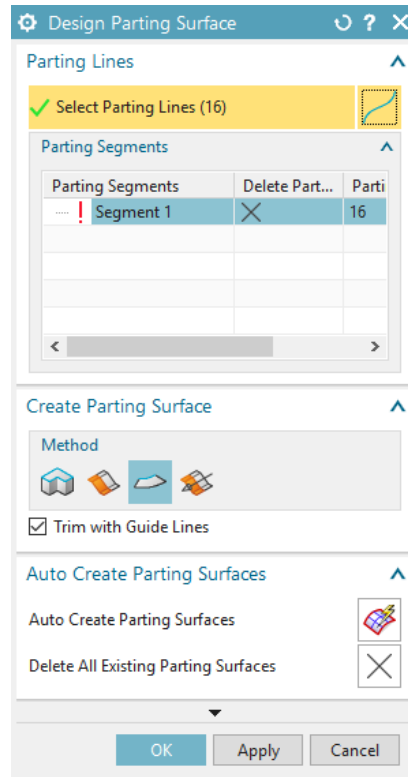


*Figure 15-96 Parting lines of the component*

## Creating Parting Surface

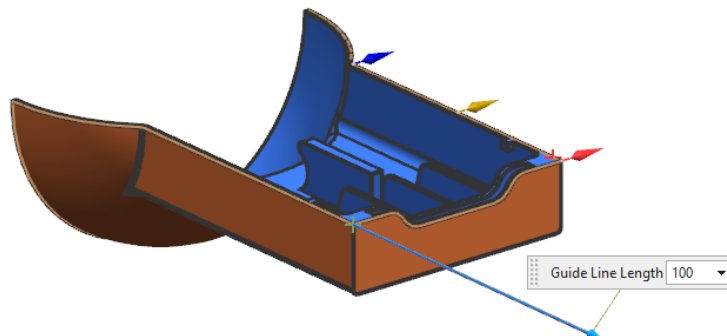
To create parting surface, you need to use the **Design Parting Surface** tool.

1. Choose the **Design Parting Surface** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Design Parting Surface** dialog box is displayed, refer to Figure 15-97.
2. Choose the **Guided Extension** button from the **Method** area of the **Create Parting Surface** rollout.

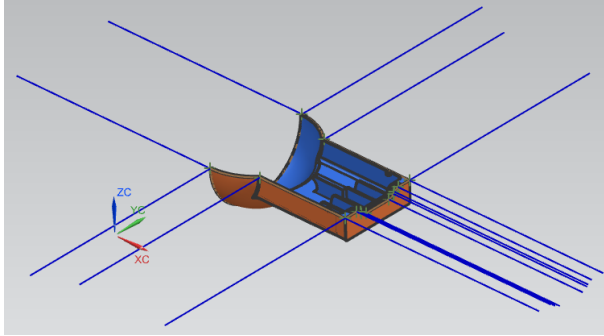


*Figure 15-97 The Design Parting Surface dialog box*

- Expand the **Edit Parting Segments** rollout and choose the **Edit Guide Lines** button; the **Guide Line** dialog box is displayed. Enter **200** in the **Guide Line Length** edit box. Next, select the parting line; a guide line is created, refer to Figure 15-98. Similarly, create other guide lines, refer to Figure 15-99. Choose the **OK** button from the **Guide Line** dialog box; the **Design Parting Surface** dialog box is displayed.

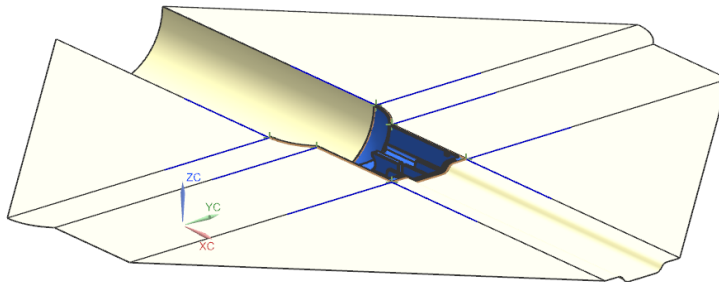


*Figure 15-98 The guide line created*



*Figure 15-99 The guide lines created*

4. Select **Segment 1** from the **Parting Segments** sub-rollout of the **Parting Lines** rollout. Next, choose the **Swept** button from the **Method** area of the **Create Parting Surface** rollout. Specify first and second direction. Enter **250** as the value in the **Extend Distance** dynamic edit box and choose the **Apply** button. Similarly, create parting surface for rest of the portion of the part, refer to Figure 15-100.
5. Choose the **Cancel** button to close the dialog box and the **Save All** button to save the file.

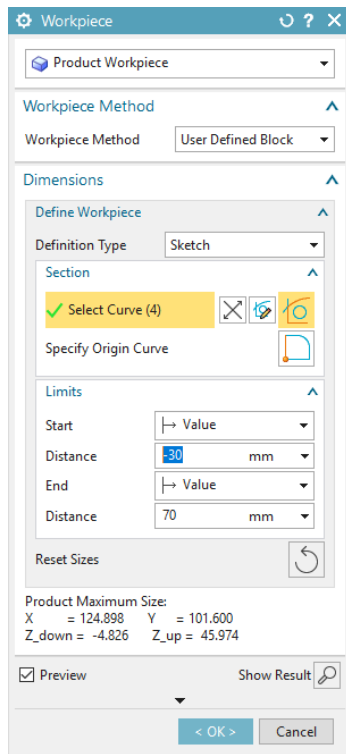


*Figure 15-100 Parting surface of the component*

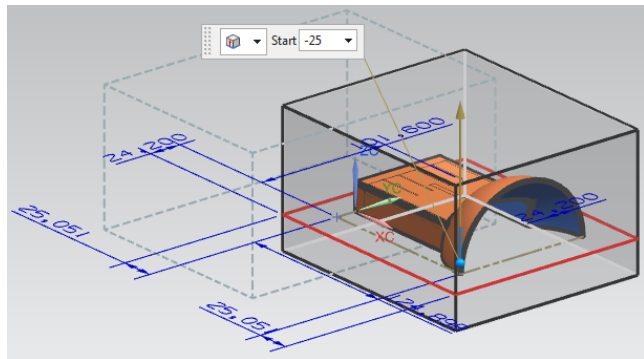
## Creating Workpiece

The **Workpiece** tool helps you to decide the size of the core and cavity insert.

1. Choose the **Workpiece** tool from the **Main** gallery of the **Mold Wizard** tab; the **New Iray+ Ray Traced Studio Rendering** window is displayed. Choose the **OK** button, the **Workpiece** dialog box is displayed, refer to Figure 15-101. By default, the **Product Workpiece** option is selected in the Type drop-down list and the **User Defined Block** option is selected in the **Workpiece Method** drop-down list. Refer to Figure 15-102 for core and cavity insert size.



**Figure 15-101** The *Workpiece* dialog box



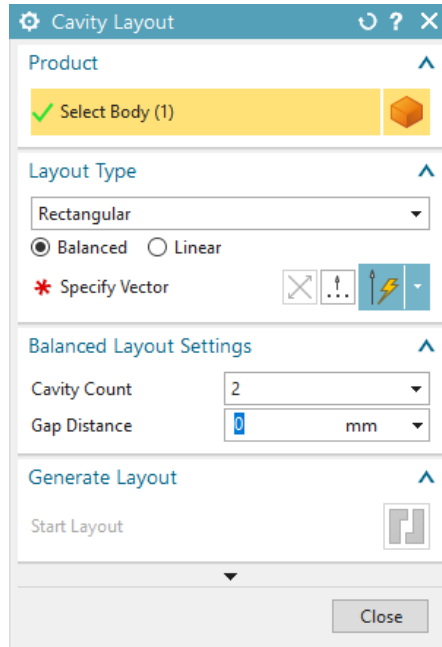
**Figure 15-102** The *Core and Cavity insert*

Note, the size of insert is automatically defined. Choose the **OK** button to exit the **Workpiece** dialog box.

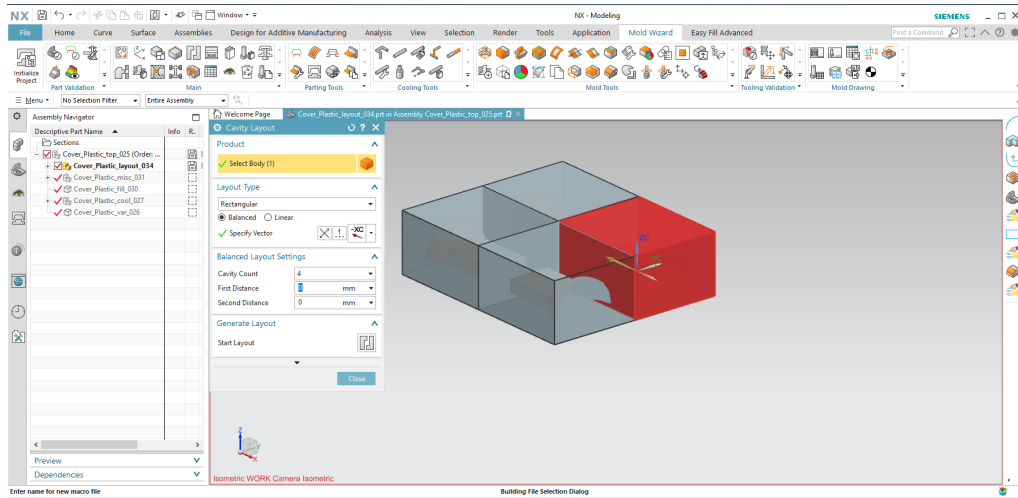
## Creating Layouts of the Workpiece

Now, use **Cavity Layout** tool to create the layout of the core and cavity insert.

1. Choose the **Cavity Layout** tool from the **Main** gallery of the **Mold Wizard** tab; the **Cavity Layout** dialog box is displayed, refer to Figure 15-103. The body of the core and cavity is automatically selected and a green tick mark becomes visible in the **Select Body** area of the **Product** rollout.
2. Enter **4** in the **Cavity Count** edit box of the **Balanced Layout Settings** rollout.
3. Click in the **Specify Vector** area of the **Layout Type** rollout and select **-XC-axis** from the **Inferred Vector** drop-down list. Choose the **Start Layout** button from the **Generate Layout** rollout; the layout gets created, refer to Figure 15-104.
4. Choose the **Auto Center** button from the **Edit Layout** rollout to center the layout with mold base center.



*Figure 15-103 The Cavity Layout dialog box*



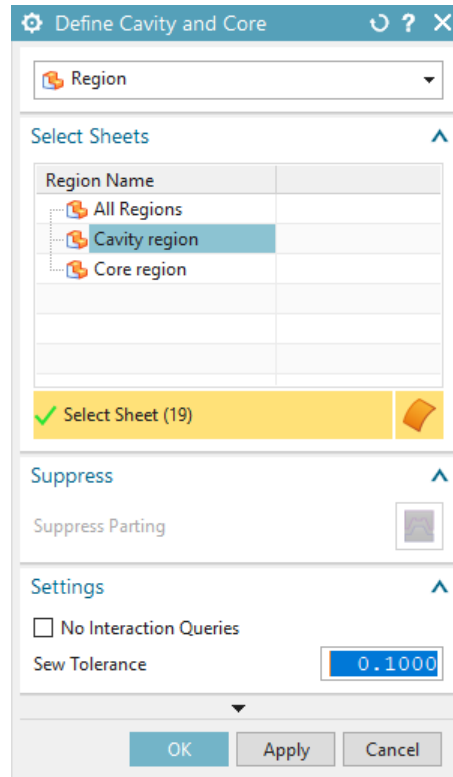
*Figure 15-104 The cavity layout of the workpiece*

5. Choose the **Close** button to close the **Cavity Layout** dialog box.

## Creating Core and Cavity

Now, use the **Define Cavity and Core** tool to create the core and cavity.

1. Choose the **Define Cavity and Core** tool from the **Parting Tools** gallery of the **Mold Wizard** tab; the **Define Cavity and Core** dialog box is displayed, refer to Figure 15-105.

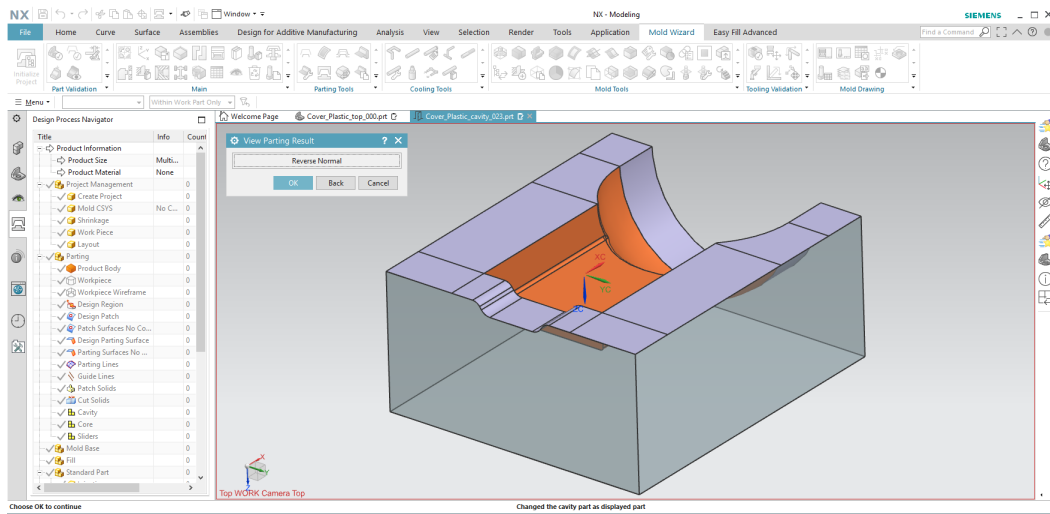


*Figure 15-105 The Define Cavity and Core dialog box*

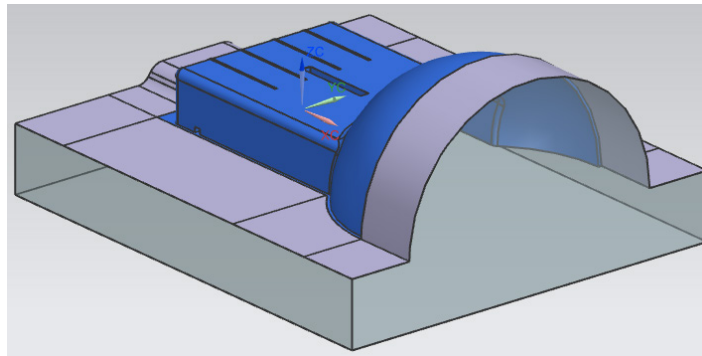
By default, the **Region** option is selected in the Type drop-down list and the **Cavity region** is highlighted in the **Select Sheets** rollout.

2. Choose the **Apply** button, the **New Iray+ Ray Traced Studio Rendering** window is displayed. Choose the **OK** button; the **View Parting Result** dialog box and the cavity of the model get displayed, refer to Figure 15-106. Choose the **Reverse Direction** button to create other half of the cavity. Choose the **OK** button to close the dialog box; a green tick mark is displayed in front of **Cavity region** in the **Select Sheets** rollout of the dialog box. Now, select **Core region** in the **Select Sheets** rollout of the dialog box and repeat the same procedure as for the cavity; the core gets displayed, refer to Figure 15-107.
3. Choose the **Cancel** button to close the dialog box.
4. Select **Cover\_Plastic\_parting\_xxx** in the assembly navigator and right-click on it; a shortcut menu is displayed. Choose **Cover\_Plastic\_top\_xxx** from the **Open Parent in Window**

drop-down list in the shortcut menu.



*Figure 15-106 The View Parting Result dialog box and cavity of the model on screen*



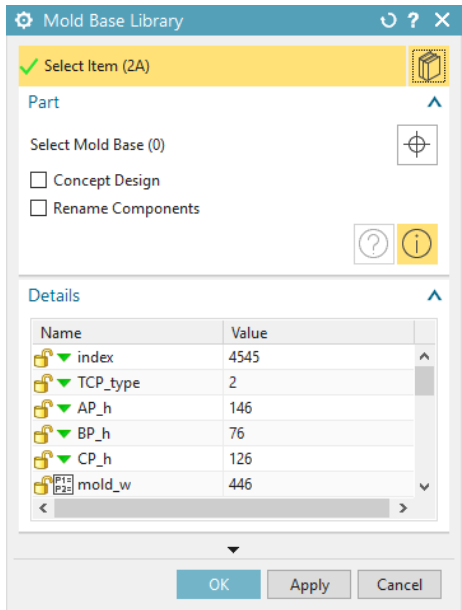
*Figure 15-107 The core of the model*

## Adding Mold Assembly

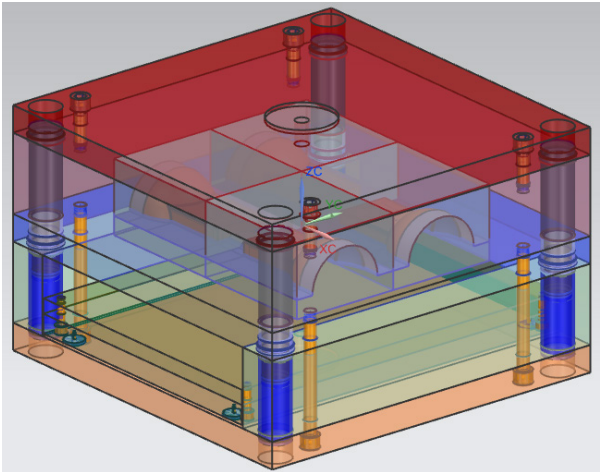
Now, use the **Mold Base Library** tool to create the plates for the mold assembly.

1. Choose **Mold Base Library** tool from the **Main** gallery of the **Mold Wizard** tab; the **Mold Base Library** dialog box, refer to Figure 15-108 and the **Information** window is displayed.
2. Select **5050**, **2**, **106**, **36**, and **106** from the **index**, **TCP\_type**, **AP\_h**, **BP\_h**, and **CP\_h** drop-down lists respectively in the **Details** rollout. Next, choose the **OK** button to close the dialog box; the Mold plates are added to the assembly, refer to Figure 15-109.





*Figure 15-108 The Mold Base Library dialog box*



*Figure 15-109 The Mold Plate assembly*

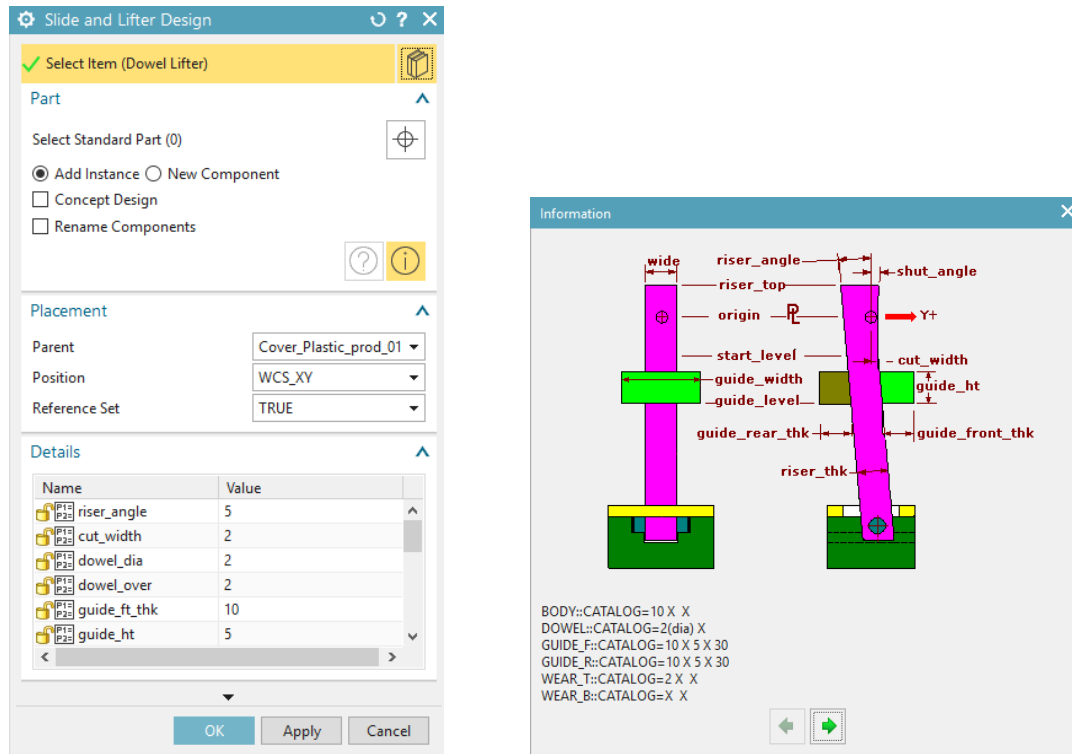
3. Choose **File > Save > Save All** to save the file.

### Adding Lifter in Mold Assembly

Now, use the **Slide and Lifter Library** tool to create the lifter for mold assembly.

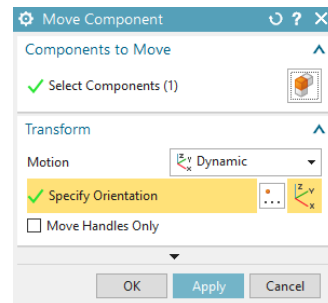
1. Choose the **Slide and Lifter Library** tool from the **Main** gallery; the **Slide and Lifter Design** dialog box is displayed with the **Information** window.
2. Choose **Lifter** folder in Main Panel and **Dowel Lifter** in the **Member Select** panel of the **Reuse Library**; the **Slide and Lifter Design** dialog box gets modified with the **Information** window, refer to Figure 15-110.





*Figure 15-110 The Slide and Lifter Design dialog box and the Information window*

- Specify the parameter of the Lifter in the **Details** rollout and choose the **Apply** button.
- You can position the lifter to place it in a correct way. Choose the **Select Standard Part** area of the **Part** rollout and then select the lifter which you want to place.
- Choose the **Reposition** button in the **Part** rollout, the **Move Component** dialog box is displayed, refer to Figure 15-111.
- You can place the lifter position using this dialog box, choose the **OK** button after placing the lifter to close the dialog box.
- Choose the **OK** button to close the **Slide and Lifter Design** dialog box. Refer to Figure 15-112 for arrangement of lifter and repeat the same procedure for other lifters.

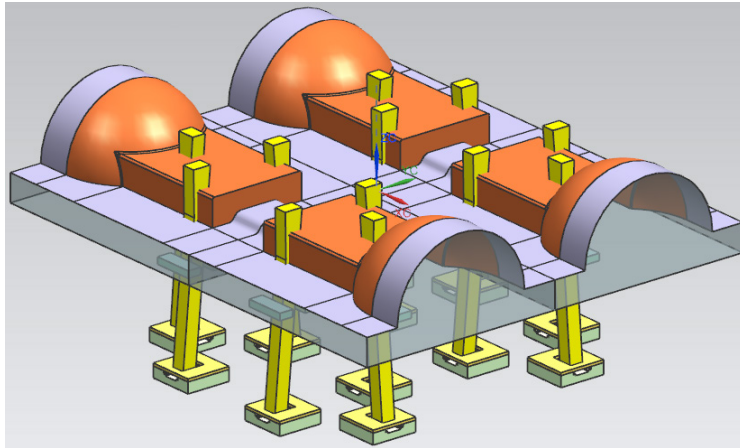


*Figure 15-111 The Move Component dialog box*



### Note

*If you create lifter for one component then other lifters automatically will be placed.*

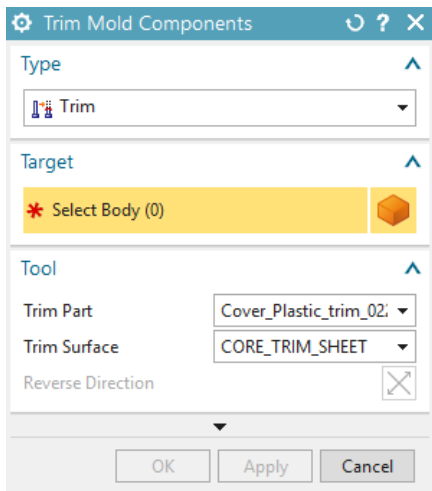


*Figure 15-112 The arrangement of lifter*

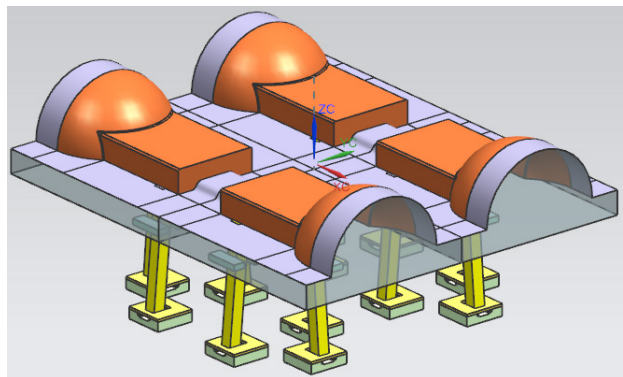
### Trimming the Lifters

Now, trim extra part of the lifters.

1. Choose the **Trim Mold Components** tool from the **Mold Tools** gallery of the **Mold Wizard** tab; the **Trim Mold Components** dialog box will be displayed, as shown in Figure 15-113.
2. Select the lifters from the mold assembly and choose the **OK** button to trim the lifters. Refer to Figure 15-114 for the modified lifters.



*Figure 15-113 The Trim Mold Components dialog box*

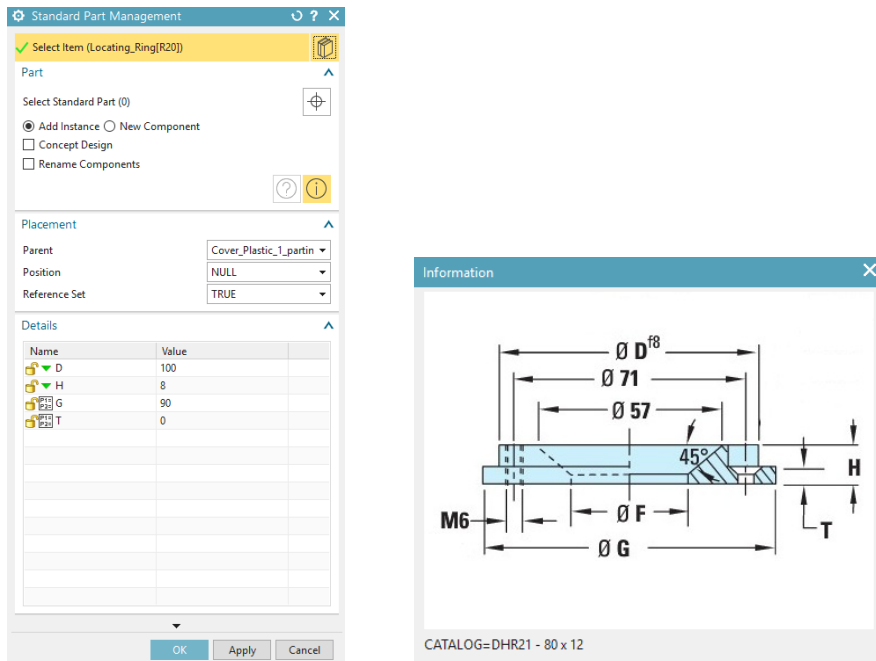


*Figure 15-114 Modified lifters*

## Adding Register Ring to the Mold Assembly

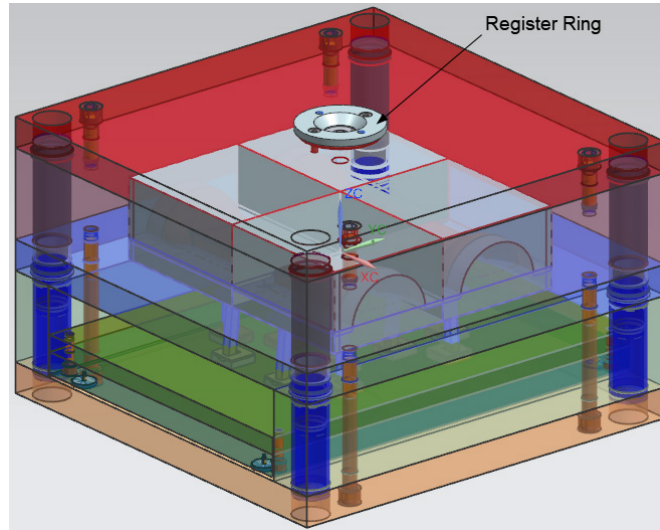
Now, add Register ring in the mold assembly.

1. Choose **MW Standard Part Library** from the **Reuse Library**. Expand the **MW Standard Part Library** and then choose the type of locating ring from the **Injection** folder of **DME\_MM** Standard.
2. Double-click on the **Locating\_Ring\_With\_Mounting\_Holes[DHR21]** from the **Member Select** panel, the **Standard Part Management** dialog box is displayed with the **Information** window, refer to Figure 15-115.



*Figure 15-115 The Standard Part Management dialog box and the Information window*

3. Select **M8** and **12** in the **Type** and **H** drop-down lists. Enter **100** in the **D** edit box of the **Details** rollout and then choose the **OK** button; the **Information** window and the **Standard Part Management** dialog box is closed and another **Information** window is displayed. Choose the **Close** button to close the window. Refer to Figure 15-116 for arrangement of Register ring.



*Figure 15-116 The arrangement of Register ring in the Mold assembly*

### Adding Sprue Bush in the Mold Assembly

Now, add the sprue bush to the mold assembly. Sprue bush helps to connect the molten flow channel between runner and Register ring.

1. Choose the **MW Standard Part Library** from the **Reuse Library**. Expand the **MW Standard Part Library** and then choose type of sprue bush from the **Injection** folder of **DME\_MM** Standard.
2. Double-click on the **Sprue Bushing(DHR74)** from the **Member Select** panel; the **Standard Part Management** dialog box is displayed with the **Information** window, refer to Figure 15-117.
3. Enter **18, 4, 116, 36,** and **24** in the **D, O, N, H,** and **K** edit boxes respectively, of the **Details** rollout.

If the size of sprue bush is not appropriate then you can change it by double-clicking on the **Sprue Bushing(DHR74)** from the **Member Select** panel; the **Standard Part Management** dialog box is displayed. Select the **Select Standard Part** area in the **Part** rollout and then select the sprue bush in the mold assembly. Now, you can change the size parameters or reposition the sprue bush. Refer to Figure 15-118 for arrangement of sprue bush in the mold assembly.

4. Choose the **OK** button to close the dialog box.

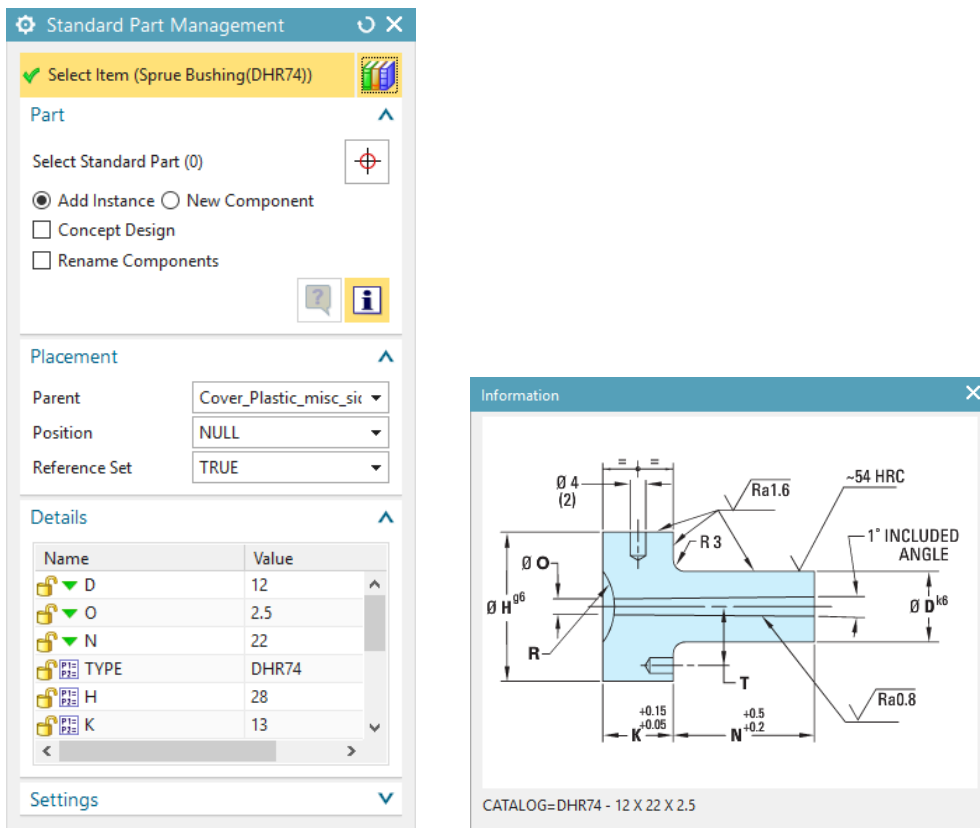


Figure 15-117 The Standard Part Management dialog box and the Information window

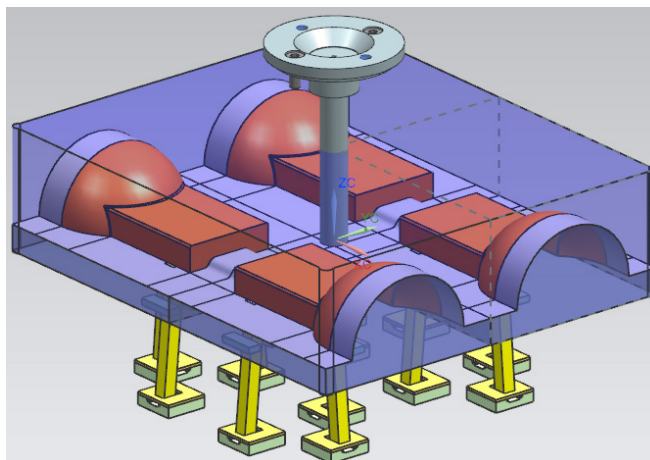
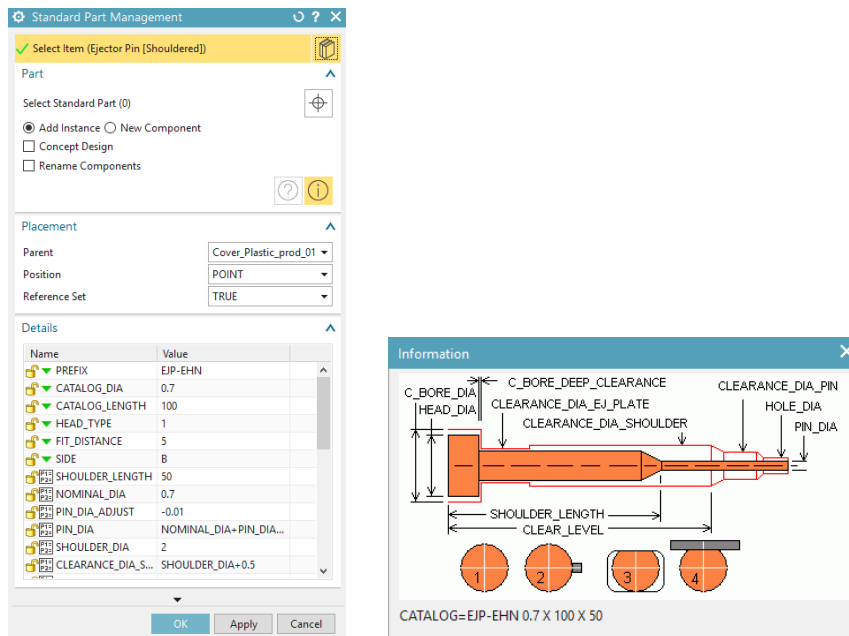


Figure 15-118 The arrangement of sprue bush in the Mold assembly

## Adding Ejector Pin in the Mold Assembly

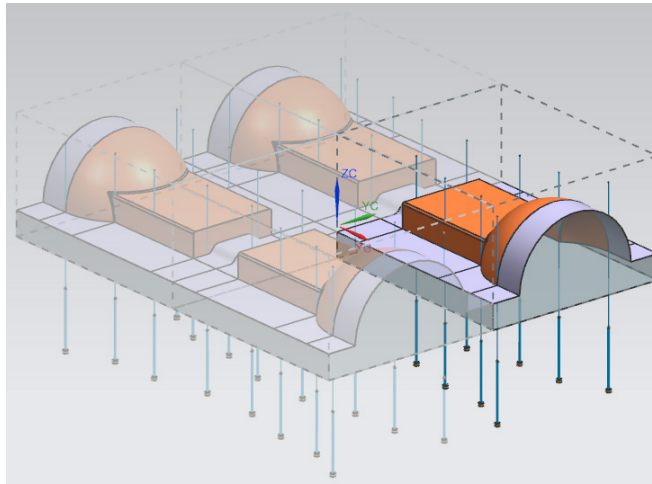
Now, add Ejector Pin to the mold assembly. Ejector Pin helps you to eject the component from the mold.

1. Choose **MW Standard Part Library** from the **Reuse Library**. Expand the **MW Standard Part Library** and then choose the type of ejector pin from the **Ejection** folder of the **DME\_MM** standard.
2. Double-click on the **Ejector Pin [Shouldered]** from the **Member Select** panel; the **Standard Part Management** dialog box is displayed with the **Information** window, refer to Figure 15-119.



*Figure 15-119 The Standard Part Management dialog box and the Information window*

3. Select **1** and **160** from the **CATALOG\_DIA** and **CATALOG\_LENGTH** drop-down lists in the **Details** rollout. Choose the **Apply** button; the **Point** dialog box is displayed. Specify the position of the ejector pin by placing the point. Choose the **Cancel** button to close the dialog box. Next, choose the **OK** button to close the **Standard Part Management** dialog box and the **Information** window. Refer to Figure 15-120 for the arrangement of ejector pin.



*Figure 15-120 The arrangement of ejector pin in the mold assembly*

### Trimming the Ejector Pin

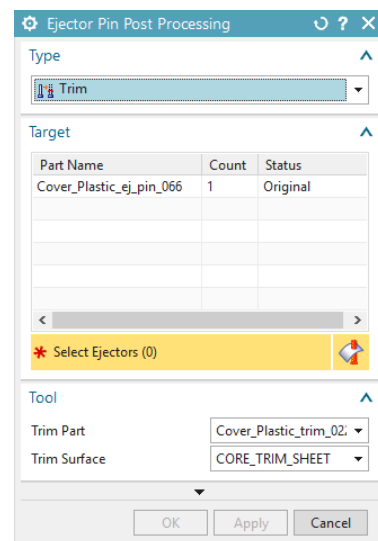
Now, trim the ejector pin which is larger in size.

1. Choose the **Ejector Pin Post Processing** tool from the **Main** gallery of the **Mold Wizard** tab; the **Ejector Pin Post Processing** dialog box is displayed, refer to Figure 15-121.
2. Select the ejector pins which need to be trimmed.
3. Choose the **Apply** button to trim the ejector pin. Choose the **Cancel** button to close the dialog box.

### Creating the Pocket

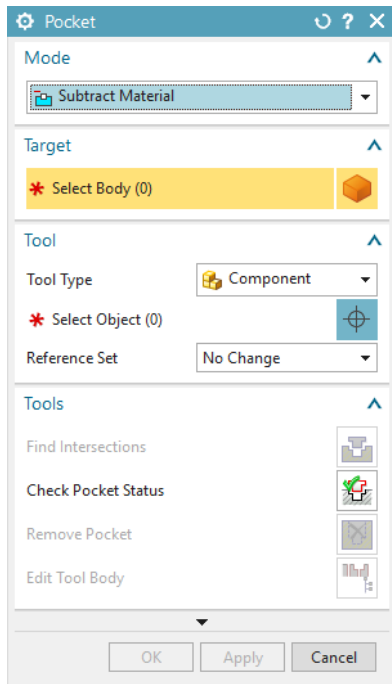
Now, create pocket for components to be placed or moved.

1. Choose the **Pocket** tool from the **Main** gallery of the **Mold Wizard** tab; the **Pocket** dialog box is displayed, refer to Figure 15-122. Also, you are prompted to select the target bodies. Select the target bodies from the mold assembly.
2. Select the **Select Object** area in the **Tool** rollout and then choose the tool body for which you need to create the pocket. Next, choose the **Apply** button to create the pocket and the **Cancel** button to close the dialog box. Refer to Figure 15-123 for pocket in the core plate.

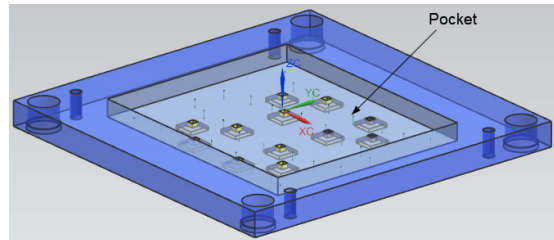


*Figure 15-121 The Ejector Pin Post Processing dialog box*






*Figure 15-122 The Pocket dialog box*

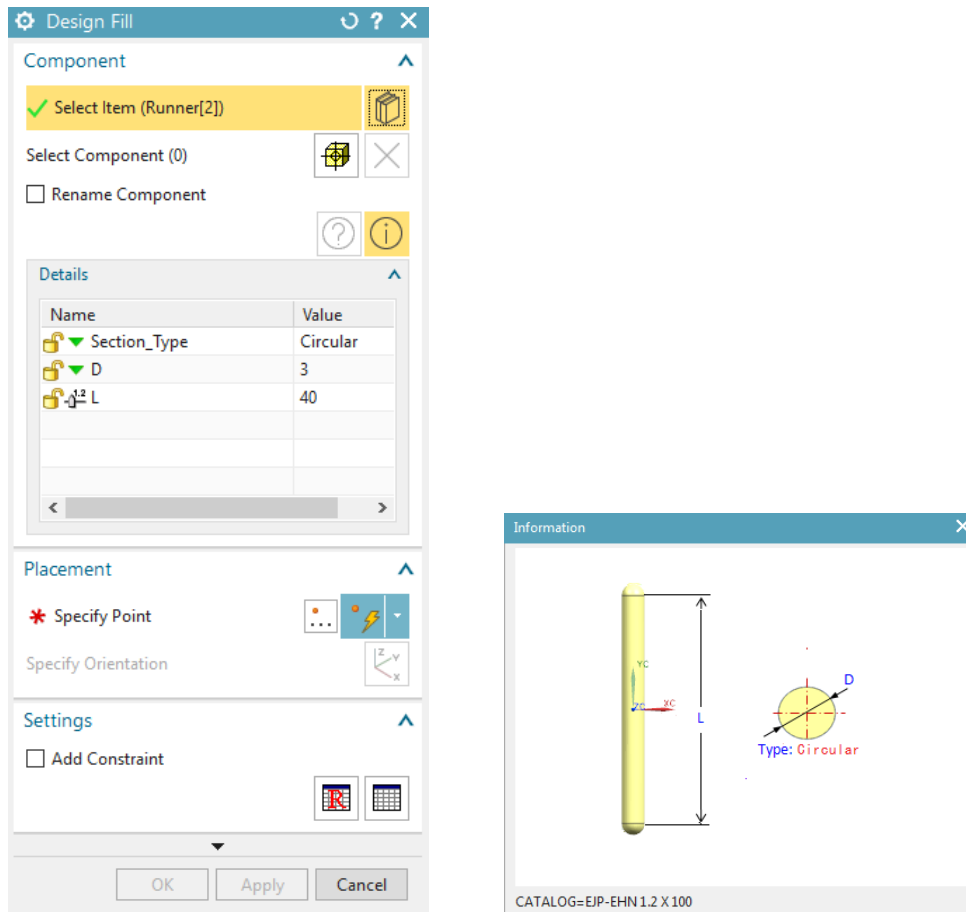


*Figure 15-123 The pocket in the core plate*

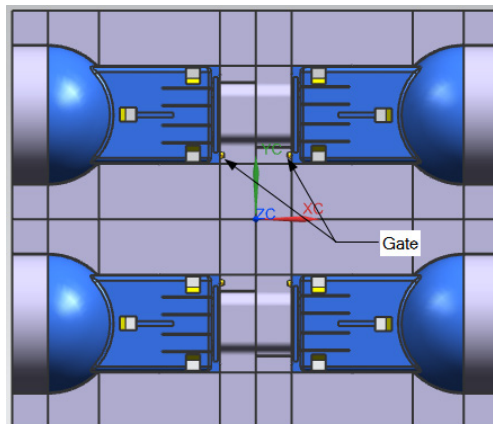
## Creating the Gate

Now, you need to create gate. Gate is a channel which directly connects runner and part for molten flow of material.

1. Choose the **Design Fill** tool from the **Main** gallery of the **Mold Wizard** tab; the **Design Fill** dialog box is displayed with the **Information** window, refer to Figure 15-124. 
2. Select the type of gate from the **Member Select** panel in the **Reuse Library**. For this component, use the Fan gate.
3. Specify the parameters of the gate in the **Details** rollout of the dialog box. Select the **Select Object** area in the **Placement** rollout and specify the gate position and orientation, refer to Figure 15-125.
4. After placing the gate, choose the **OK** button to close the dialog box.




**Figure 15-124** The *Design Fill* dialog box and the *Information* window

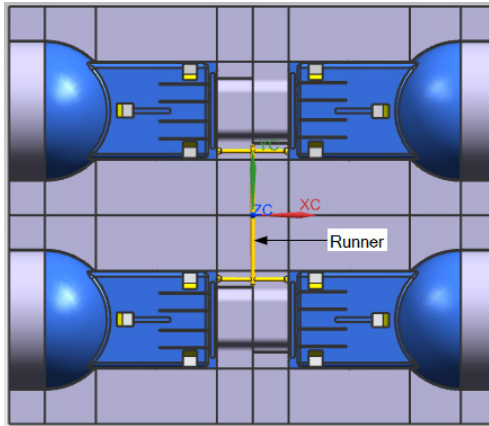


**Figure 15-125** The gate position and orientation in the model

## Creating the Runner

Now, you need to create runner. Runner is a channel which directly connects the gate and sprue bush for molten flow of material.

1. Choose the **Design Fill** tool from the **Main** gallery of the **Mold Wizard** tab, the **Design Fill** dialog box is displayed. 
2. Select the type of Runner from the **Member Select** panel in the **Reuse Library**. For this component, use **Runner[4]**.
3. Select **6.5** from the **D1** drop-down list and enter **92** and **50** in the **L1** and **L** edit boxes in the **Details** rollout of the dialog box. Select the **Specify Point** area in the **Placement** rollout and position the runner, refer to Figure 15-126.




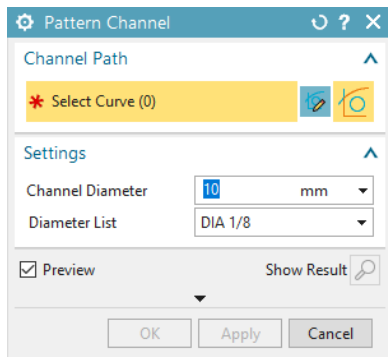
*Figure 15-126 The runner position and orientation in the model*

4. After placing the runner, choose the **OK** button to close the dialog box.

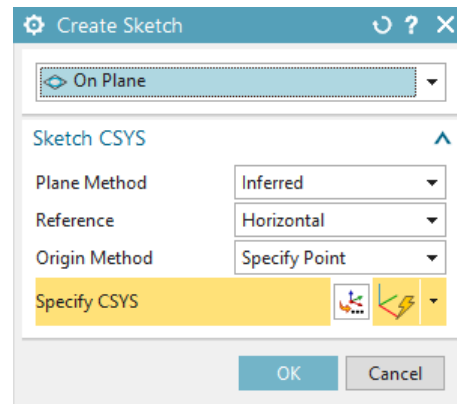
## Adding Cooling Channel

Now, add cooling channel. Cooling channel helps to solidify the material. Effective cooling channel helps you to reduce the cycle time.

1. Choose the **Pattern Channel** tool from the **Cooling Tools** gallery of the **Mold Wizard** tab; the **Pattern Channel** dialog box is displayed, refer to Figure 15-127. 
2. Select the **Sketch Section** button in the **Channel Path** rollout; the **Create Sketch** dialog box is displayed, refer to Figure 15-128.

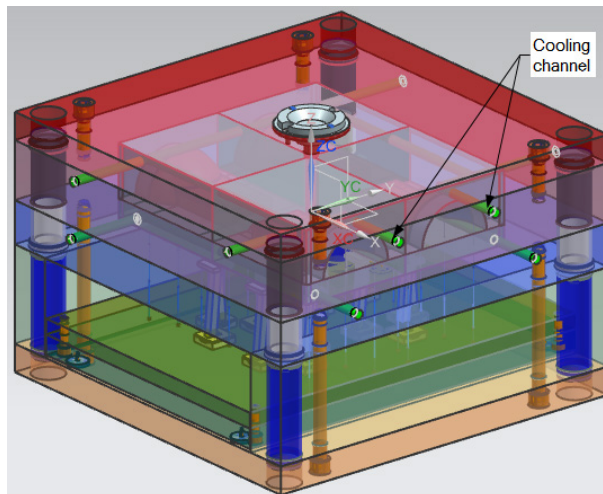


*Figure 15-127 The Pattern Channel dialog box*



*Figure 15-128 The Create Sketch dialog box*

3. Create a sketch for cooling channel on a plane and choose the **Finish** button to exit the sketch environment; the **Pattern Channel** dialog box is displayed. Specify the diameter of channel in the **Channel Diameter** edit box of the **Settings** rollout. Choose the **OK** button to close the dialog box. Refer to Figure 15-129 for the position and orientation of the cooling channel.



*Figure 15-129 The orientation and position of cooling channel*

## Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. The \_\_\_\_\_ tool is used to define the path of the mold project.
2. The \_\_\_\_\_ tool is used to assign the core and cavity regions in the model.

3. There are \_\_\_\_\_ types of Configuration in the **Initialize Project** dialog box.
4. You can change the orientation of the model by using the \_\_\_\_\_ tool.
5. The \_\_\_\_\_ tool is used to apply a material to a model.
6. Gate is a channel which connects sprue bush to the component. (T/F)
7. Runner is a channel which connects sprue bush to the gate. (T/F)
8. Shrinkage is used to apply scale factor to the component. (T/F)
9. The **Patch Surface** tool is used to create the sheet to close the openings in the model. (T/F)
10. The **Design Fill** tool is not used to create gate. (T/F)

## Review Questions

Answer the following questions:

1. Which of the following dialog boxes is displayed when you choose the **Patch Surface** tool from the **Parting Tools** gallery of the **Mold Wizard** tab?
  - (a) **Patch Surface**
  - (b) **Edge Patch**
  - (c) **Patch**
  - (d) **None**
2. Which of the following tools in NX Mold Wizard is used to create core and cavity regions?
  - (a) **Check Regions**
  - (b) **Define Regions**
  - (c) **Patch Surface**
  - (d) **None**
3. Which of the following dialog boxes is displayed when you choose the **Set Cavity** button from the **Easy Fill Advanced** tab to specify the cavity of the component?
  - (a) **Set Cavity**
  - (b) **Select Cavity**
  - (c) **Cavity**
  - (d) **Set**
4. The \_\_\_\_\_ tool is used to create a parting surface of the model.
5. The \_\_\_\_\_ tool is used to add cooling fitting components to cooling channels.
6. The \_\_\_\_\_ tool is used to adjust the position of the cooling channel.
7. You can select the material from the **Select Cavity** dialog box. (T/F)
8. The **Design Gate** tool is used to create the runner. (T/F)

9. The **Assembly Drawing** tool helps you to create the drawing of the mold assembly.
10. The **Slider and Lifter Library** tool helps you to create slider in mold design.

## EXERCISE

To perform the exercise, you need to download the zipped file named as *c15\_NX\_2020\_input* from the Input Files section of the CADCIM website. The complete path for downloading the file is:

*Textbooks > CAD/CAM > NX > Siemens NX 2020 for Designers > Input Files*

After the file is downloaded, extract the folder to the location *C:\NX 2020\* and rename it as *c15*.

### Exercise 1

Create the Mold Design of the model shown in Figure 15-130.



**Figure 15-130** *The Trimetric view of the Phone Case cover*

### Answers to Self-Evaluation Test

1. Initialize Project, 2. Check Regions, 3. three, 4. Mold CSYS, 5. Initialize Project, 6. F, 7. T, 8. T, 9. T, 10. F