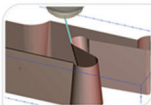
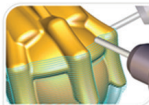
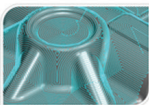
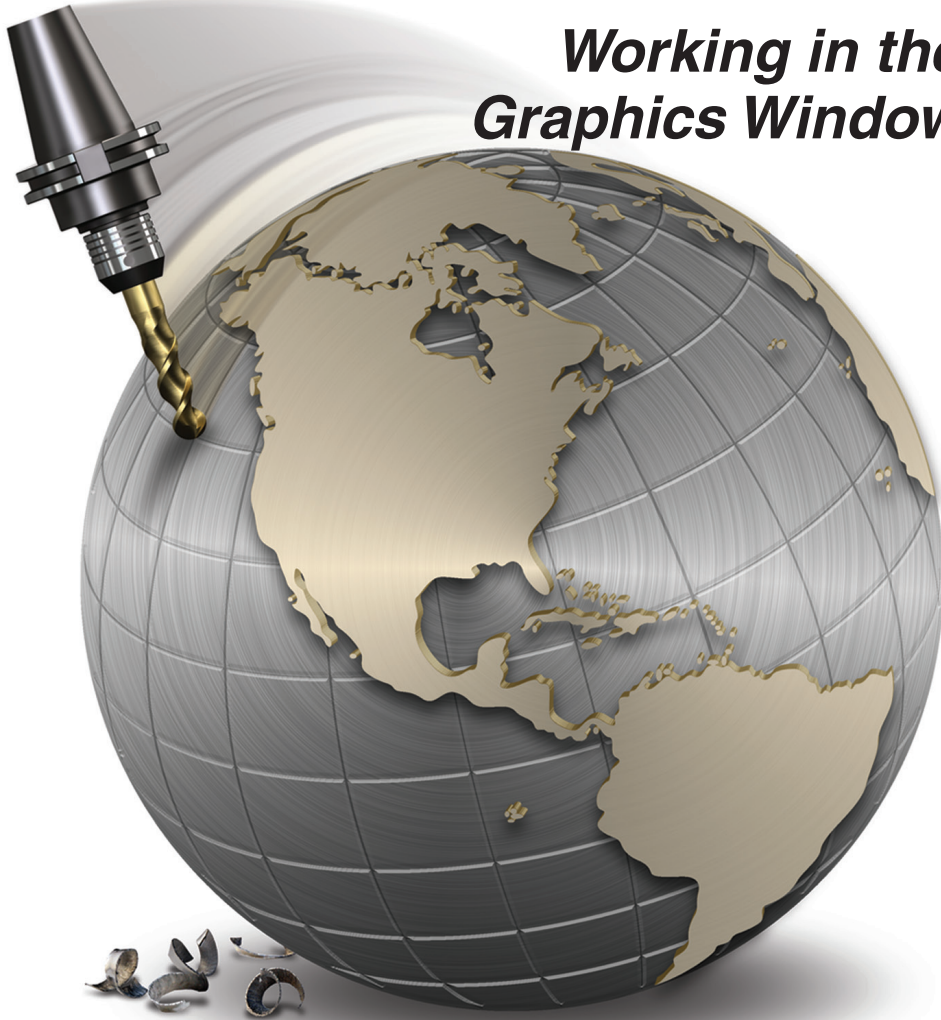


Mastercam X⁵

***Working in the
Graphics Window***



World Class Machining

Working in the Graphics Window

October 2010

Be sure you have the latest information!

Information might have been changed or added since this document was published. [Contact](#) your local Reseller for the latest information.

Mastercam® X5 Working in the Graphics Window

Date: October 2010

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www.mastercam.com/legal/licenseagreement/

Contents

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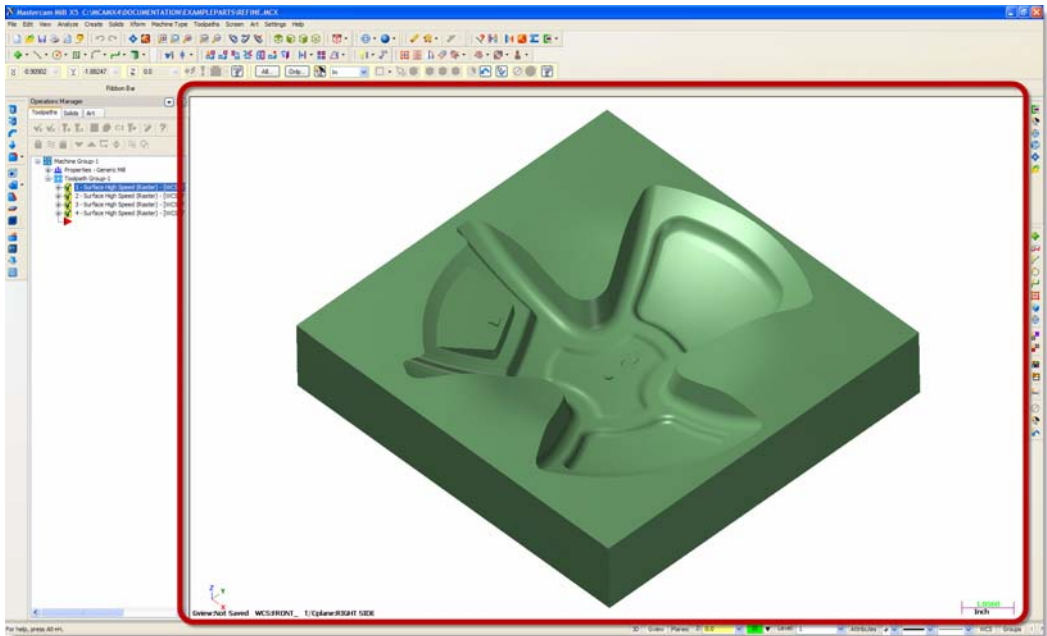
- Introduction 1**
 - ▶ Tutorial Goals1
 - ▶ Before You Begin1
 - ▶ If You Need More Help3
 - ▶ Additional Documentation4
 - ▶4
- 1. Setting Standard Graphics Views (Gviews)..... 5**
 - ▶ Lesson Goals5
 - ▶ Exercise 1: Changing Standard Gviews 5
- 2. Viewing Your Part..... 9**
 - ▶ Lesson Goals9
 - ▶ Exercise 1: Viewing All Entities 9
 - ▶ Exercise 2: Zooming 10
 - ▶ Exercise 3: Spinning 12
 - ▶ Exercise 4: Panning 15
- 3. Setting the Cplane and Creating a Named View..... 17**
 - ▶ Lesson Goals19
 - ▶ Exercise 1: Drawing in the Top Plane 19
 - ▶ Exercise 2: Drawing in the Front Plane 23
 - ▶ Exercise 3: Creating a New Named View for the Cplane 26
 - ▶ Exercise 4: Creating Geometry in the New Named View 32
 - ▶ Exercise 5: Introducing the View Manager 33
- 4. Using Levels 35**
 - ▶ Lesson Goals35
 - ▶ Exercise 1: Accessing the Level Manager 36
 - ▶ Exercise 2: Turning Level Displays On and Off 38
 - ▶ Exercise 3: Changing the Main Level..... 39

- ▶ Exercise 4: Naming and Assigning Entities to a Level..... 41
- ▶ Exercise 5: Moving and Copying Entities to a Different Level . 42

Conclusion 45

INTRODUCTION

In Mastercam, the *graphics window* is your workspace in the main Mastercam window. It is here that you view, create, and modify geometry, drafting entities, and toolpaths.



Mastercam provides many tools you can use to change the graphics window display while you work with a part. This tutorial introduces some of these tools, and teaches the basic skills you need to manage your Mastercam workspace.

Tutorial Goals

- Use standard graphics views (Gviews) to change your perspective of entities.
- Change views by dynamically zooming, spinning, and panning entities in the graphics window.
- Set construction planes (Cplanes), define a new plane, and draw geometry in a non-standard orientation.
- Use levels to manage the display of entities.

Before You Begin

This is a module of the *Mastercam Getting Started Tutorial Series*. The series [introduces general Mastercam functions and teaches basic skills for getting started with Mastercam](#). Other tutorial series include:

- [*Focus Series*: Focuses on a specific Mastercam feature—for example, Setup Sheets or FBM Drill, and teaches basic and advanced skills.](#)
- [*Exploring Series*: Explores a single Mastercam product—for example, Mill, Solids, or Wire, and teaches in-depth skills for working with the product.](#)

The Mastercam tutorial series is in continual development, and we will add modules as we complete them. For information and availability, please contact your local Mastercam Reseller.



IMPORTANT: Screen colors in the tutorial pictures were modified to enhance image quality; they may not match your Mastercam settings or the tutorial results. These color differences do not affect the lesson or the exercise results.

General Tutorial Requirements

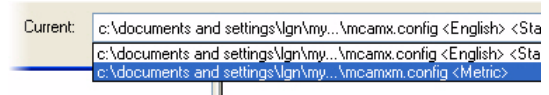
All Mastercam tutorials have the following general requirements:

- You must be comfortable using the Windows® operating system.
- The tutorials cannot be used with Mastercam Demo/Home Learning Edition (HLE). The Demo/HLE file format (EMCX) is different from Mastercam (MCX), and basic Mastercam functions, such as file conversions and posting, are unavailable.
- Each lesson in the tutorial builds on the mastery of preceding lesson's skills. We recommend that you complete them in order.
- *Focus Series* and *Exploring Series* tutorials require, at minimum, a mastery of the basic Mastercam skills taught in the *Getting Started Series* modules. A general knowledge of machining principals and practices is also required.
- [You must have a seat of Mastercam X5 Design or higher to complete most of the tutorials in the *Getting Started Series*.](#)
- [The *Basic 2D Machining* module in the *Getting Started Series* requires, at minimum, a seat of Mill Entry or Router Entry.](#)
- [The *Basic 3D Machining* module in the *Getting Started Series* requires Mill Level 3 or Router Pro.](#)
- Additional files may accompany a tutorial. Unless the tutorial provides specific instructions on where to place these files, store them in a folder that can be accessed from the Mastercam workstation, either with the tutorial or in any location that you prefer.
- The *Getting Started Series* tutorials are available in an Adobe® Flash® compatible video format. Additional tutorial videos may also be available. Contact your local Mastercam Reseller for more information.
- You must install Adobe Flash Player to display tutorial videos. You can download Adobe Flash Player from www.adobe.com.
- You must configure Mastercam to work in metric units. Complete the instructions in the following section **Preparing for a Tutorial** to set Mastercam to metric.

Preparing for a Tutorial


Before you start a tutorial, be sure you have completed the following tasks:

- 1 Start Mastercam using your preferred method:
 - ♦ Double-click Mastercam's desktop icon.
 - Or
 - ♦ Launch Mastercam from the Windows Start menu.
- 2 Select the metric configuration file:
 - a Select **Settings, Configuration** from Mastercam's menu.
 - b Choose ...\\mcamxm.config <Metric> from the **Current** drop-down list.
 - c Click **OK**.



If You Need More Help

There are many ways to get help with Mastercam, including the following:

- *Mastercam Help*—Access Mastercam Help by selecting **Help, Contents** from Mastercam's menu bar or by pressing [**Alt+H**] on your keyboard. Also, most dialog boxes and ribbon bars feature a Help button  that opens Mastercam Help directly to related information.
- *Online help*—You can search for information or ask questions on the Mastercam Web forum, located at www.emastercam.com. You can also find a wealth of information, including many videos, at www.mastercam.com and www.mastercamedu.com.
- *Mastercam Reseller*—Your local Mastercam Reseller can help with most questions about Mastercam.
- *Technical Support*—CNC Software's Technical Support department (860-875-5006 or support@mastercam.com) is open Monday through Friday from 8:00 a.m. to 5:30 p.m. USA Eastern Standard Time.
- *Documentation feedback*—For questions about this or other Mastercam documentation, contact the Technical Documentation department by email at techdocs@mastercam.com.
- *Mastercam University*—CNC Software sponsors Mastercam University, an affordable online learning platform that gives you 24/7 access to Mastercam training materials. Take advantage of more than 180 videos to master your skills at your own pace and help prepare yourself for Mastercam Certification. For more information on Mastercam University, please contact your Authorized Mastercam Reseller, visit www.mastercamu.com, or email training@mastercam.com.

Additional Documentation

You can find more information on using Mastercam in the following materials, located in the \Documentation folder of your Mastercam installation:

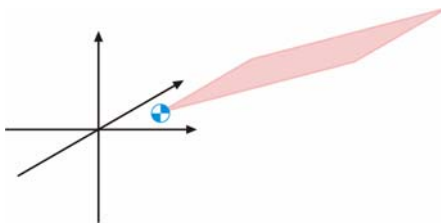
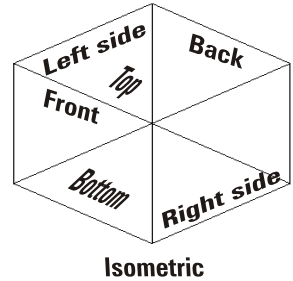
- *Mastercam X5 Installation Guide*
- *Mastercam X5 Administrator Guide*
- *Mastercam X5 Quick Start*
- *Mastercam X5 Reference Guide*
- *Mastercam X5 Transition Guide*
- *Mastercam X5 Quick Reference Card*
- *Mastercam X5 Wire Getting Started Guide*
- *Version 9 to X Function Map*
- *Mastercam X5 NCI & Parameter Reference*
- *Mastercam X5 Post Debugger User's Guide*

LESSON 1

Setting Standard Graphics Views (Gviews)

This lesson shows how to change the display of a Mastercam part in the graphics window using standard *graphics views (Gviews)*. Gviews determine the angle from which you are looking at your part. Selecting different Gviews makes it easier to work on different faces of your part.

Every Mastercam part includes standard views that correspond to the six faces of a cube (*Top*, *Front*, *Back*, *Right side*, *Left side*, *Bottom*) plus an *Isometric* view. The names and coordinates of standard views cannot be modified. However, you can define and name your own custom views. Standard and custom views are saved with the part information, making them portable.



Gviews are a type of *named view* that you use to work with a part. In Mastercam, named views comprise a 2D plane with an origin and a specific orientation.

Other types of named views include *construction planes (Cplanes)*, *tool planes (Tplanes)*, and *work coordinate systems (WCS)*. You will learn more about setting Cplanes and creating custom views in Lesson 3, “Setting the Cplane and Creating a Named View” on page 17.

Lesson Goals

- Use Mastercam’s standard Gviews to manipulate your graphics window display.

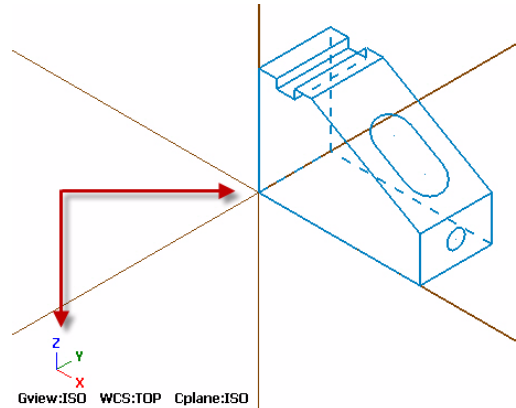
Exercise 1: Changing Standard Gviews

In this exercise, you change your Gview using Mastercam’s standard views.

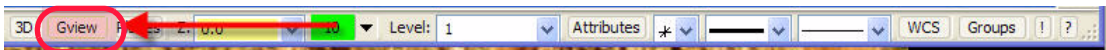
- 1 From the Mastercam menu bar, choose **File, Open**.

6 • WORKING IN THE GRAPHICS WINDOW

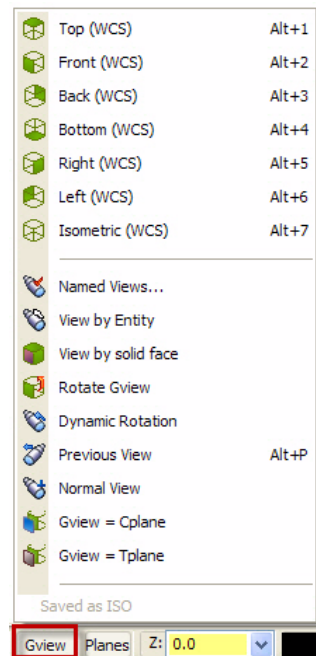
- 1 Open ANGLEBLOCK-MM.MCX-5, which was provided with this tutorial. The part opens in an **Isometric (ISO)** Gview.
- 2 Press **[F9]** to toggle the display of the XYZ axes on and off. The coordinate axes show the origin and the part orientation to help you visualize the part in 3D space.



- 3 In the **Status bar**, located along the bottom of the Mastercam window, click **Gview** to open the **Gview Status bar menu**.

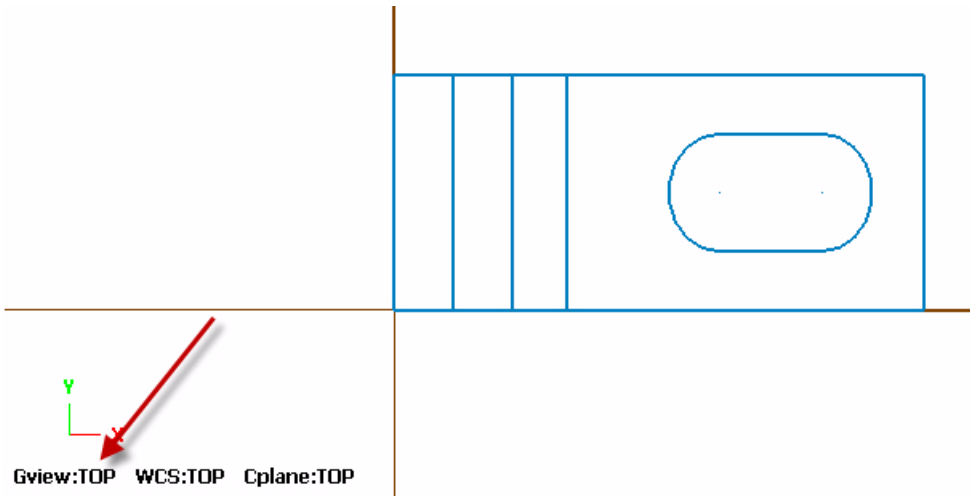


This menu provides access to Gview functions and other functions you can use to manipulate the part display in the graphics window.



- 4 Select **Top (WCS)** from the menu.

Now you are viewing the part as if you were above it looking down.

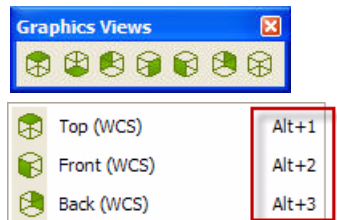


- 5 Practice switching to other Gviews by choosing options from the **Gview** Status bar menu.



TIP: You can also use **Graphics Views** toolbar functions or *shortcut keys* to change between standard Gviews.

In Mastercam menus, shortcut key assignments appear to the right of their corresponding functions.



- 6 When finished, return the part to an **Isometric** view, and continue with the next lesson.



LESSON 2

Viewing Your Part

Mastercam provides several tools and methods for changing the appearance of the geometry and toolpaths in the graphics window.

Lesson Goals

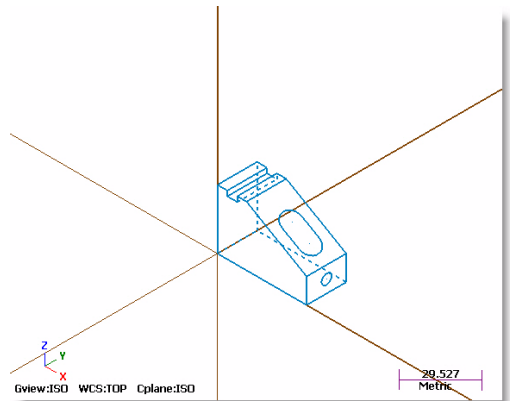
- Fit all entities in a Mastercam part in the graphics window.
- Use zoom functions to expand your view of selected entities.
- Use the middle mouse button or wheel and other functions to dynamically spin and pan entities in the graphics window.

Exercise 1: Viewing All Entities

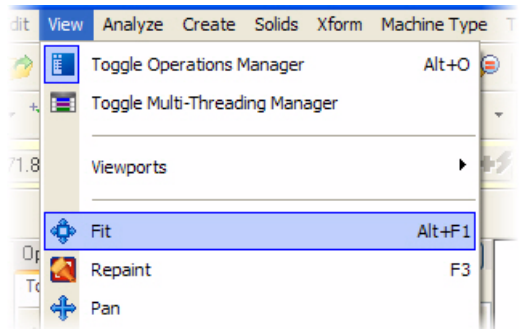
In this exercise, you set up your graphics window to view all entities in a Mastercam part file.

- 1 If you have not already done so, open the tutorial part `ANGLEBLOCK-MM.MCX-5`, and change your Gview to **Isometric**.

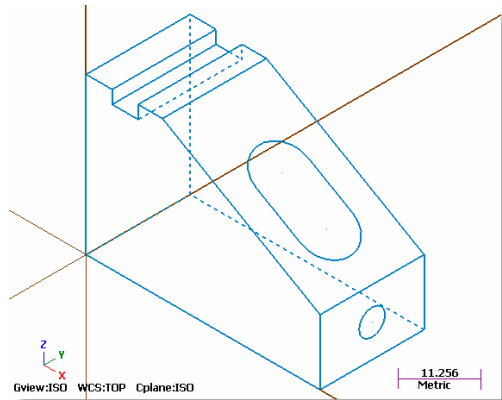
Note: See Lesson 1, “Setting Standard Graphics Views (Gviews)” on page 5 to review how to complete this step.



- 2 Choose **View, Fit** or press **[Alt+F1]**.

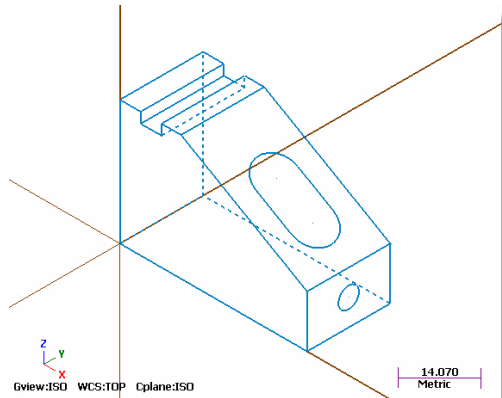


The part now fills the entire graphics window.



- 3 Choose **View, Un-zoom .8** to decrease the size of the display to 80%. This creates a border of free space around part.

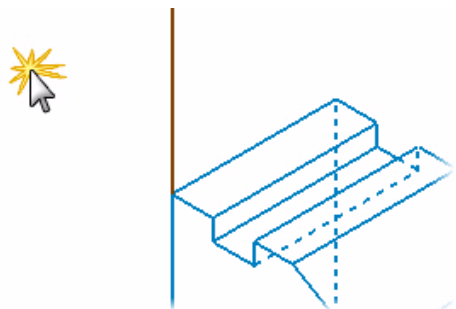
TIP: Un-zoom previous / .5—also available from the **View** menu—restores zoom to its previous setting. If the zoom “queue” contains no previous setting, this function reduces the size of the displayed geometry to 50% of its current size.



Exercise 2: Zooming

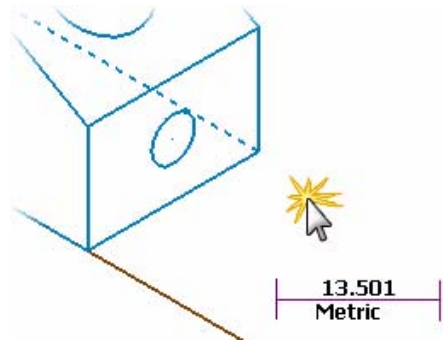
In this exercise, you practice different techniques for viewing specific areas of detail in a Mastercam

- 1 Place the cursor in the upper left quadrant of the graphics window, and click the left mouse button.
- 2 If your mouse has a middle mouse wheel, spin it back and forth to dynamically zoom in and out. Mastercam uses the point you clicked to anchor the center of your zoom area.

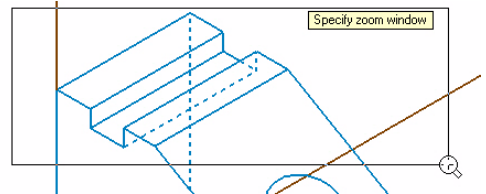


TIP: You can also press the **[Page Up]** and **[Page Down]** keys to zoom in and out.

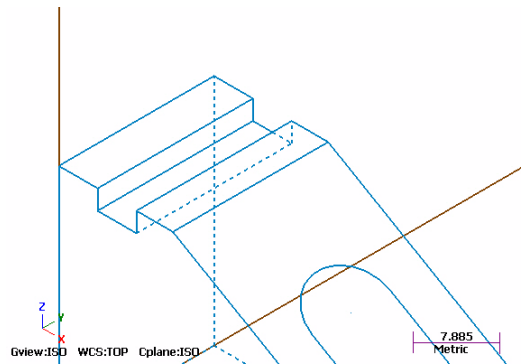
- 3 Fit the part to the screen (press **[Alt+F1]**).
- 4 Move the mouse to the lower right quadrant. Click, and then spin the mouse wheel back and forth to see the function in another area of your screen.



- 5 Fit the part to the screen. Then choose **View, Zoom Window**. Click and drag a diagonal window as shown.

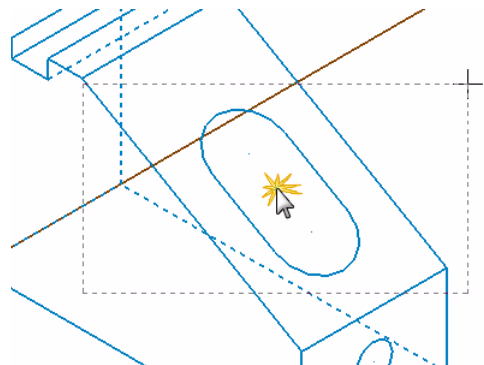


- 6 Click again to set the zoom window. Mastercam scales the selected area to fit the entire graphics window.

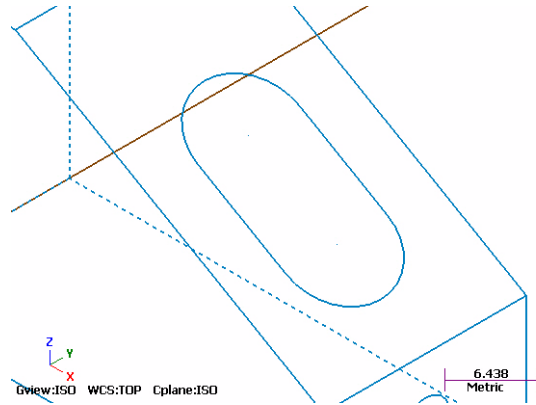


- 7 Fit the part to the screen. Then choose **View, Zoom Target**, and click where indicated to anchor the center of your selection window. As you move your mouse, Mastercam draws a rectangular window outward in all directions from the center point you selected.

The shape of the window changes when you move the mouse vertically and horizontally.



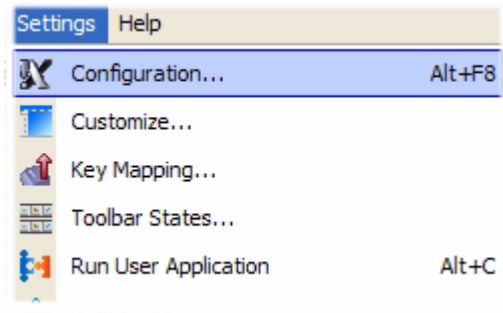
- 8 Click to set the target area. Mastercam scales the selected area to fill the entire graphics window.



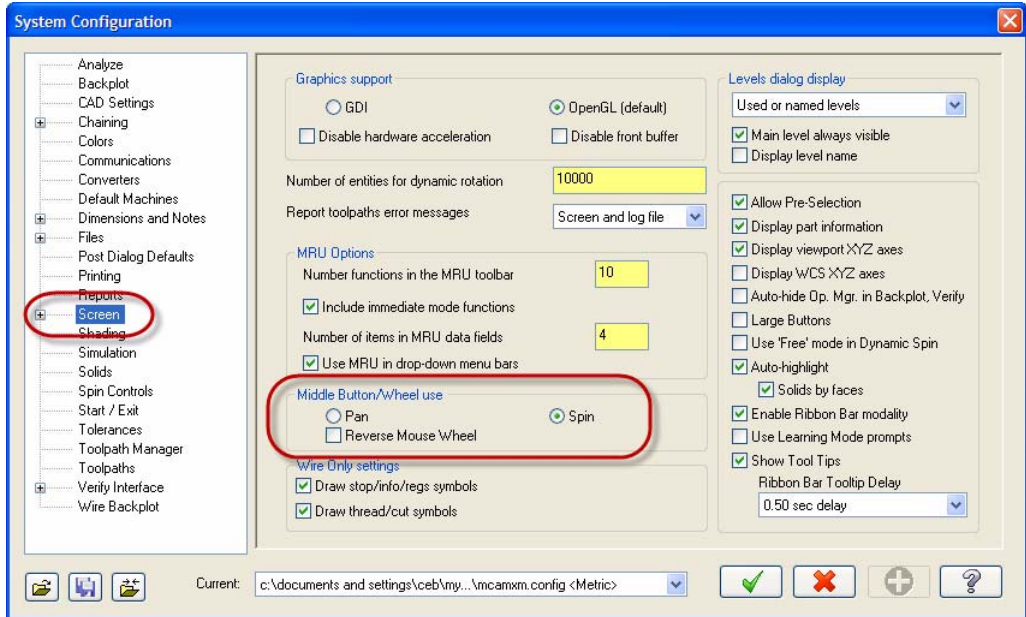
Exercise 3: Spinning

This exercise shows how to set a preference for the action your middle mouse button or wheel performs in the graphics window (spin or pan). You also learn to dynamically spin entities in the graphics window so that you can see them from any angle.

- 1 Choose **Settings, Configuration**.



- 2 Open the **Screen** property pane and, if necessary, set the **Middle button/wheel use** to **Spin**.

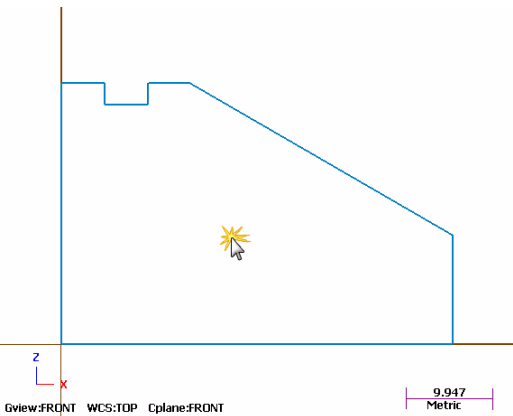


- 3 If you changed the setting, click **Apply**.
- 4 Click **Yes** to save the changes to your configuration file.
- 5 Click **OK** to close the dialog box.
- 6 Set up the ANGLEBLOCK-MM.MCX-5 display in the graphics window:
- a Set the Gview to **Front**.
 - b **Fit** the part to the screen
 - c **Un-zoom to .8**.



- 7 Middle-click in the graphics window where indicated and continue to hold down the middle mouse button or wheel as you move the mouse slowly in a circular motion.

This action spins the part in space about the selected position and lets you see it from any angle.



- 8 When you finish spinning the part around, let go of the middle mouse button/wheel to exit the function.

The axes symbol (gnomon) that displays the XYZ axes in the graphics window changes as you rotate the part. Also, the Gview name in the graphics window changes to “Not Saved.” During dynamic rotation, Mastercam creates temporary non-standard views.



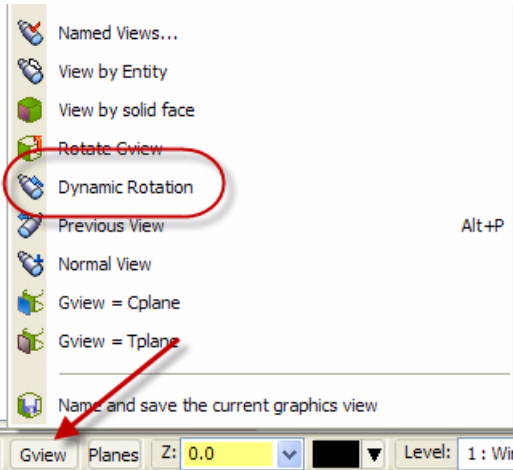
- 9 Return to an **Isometric** Gview, and fit the part to the screen.

Note: You will learn more about working with non-standard views in Lesson 3 , “Setting the Cplane and Creating a Named View” on page 17.



TIPS:

- You can also choose **Dynamic Rotation** from the Status bar **Gview** menu or from Mastercam’s default right-click mouse menu.
- You can temporarily override the middle mouse wheel/button configuration setting and switch its behavior between spinning and panning. To do this, hold down the **[Alt]** key at the same time you press the middle mouse button/wheel in the graphics window.

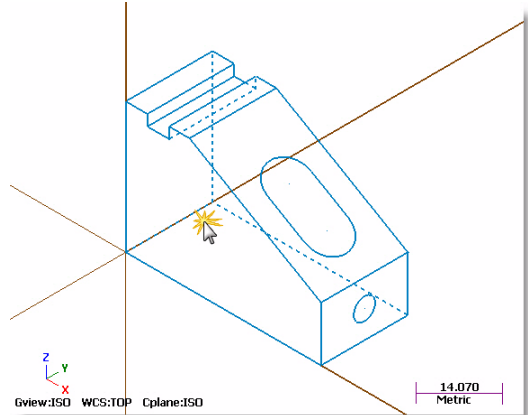


Exercise 4: Panning

In this exercise, you change your view in the graphics window as if you were moving a camera lens to the left or right, and up and down over the geometry.

- 1 Hold down the **[Alt]** key, middle-click in the graphics window where indicated, and continue to hold down the button/wheel while you move the mouse up, down, side to side, and around.

It appears that you have picked up the part and are moving it in the direction of the mouse. However, the entities are not physically moved in space, only the display changes.



Note: The Gview does not change as you pan the entities.

- 2 When you finish panning, release the **[Alt]** key and the middle mouse button/wheel at the same time to exit the function.
- 3 To complete this exercise, use the keyboard arrow keys to pan up, down, left and right.

LESSON 3

Setting the Cplane and Creating a Named View

This lesson introduces ways to use Mastercam views. Views are used for three main functions:

- **Graphics views (Gviews)**—A Gview determines the angle from which you are looking at your part in the graphics window.
- **Construction planes (Cplanes)**—When you draw geometry, the Cplane is the plane in which the geometry is created. The Cplane is independent of the Gview. For example, you can look at your part in an Isometric Gview, while drawing geometry in the Front Cplane. Lathe users can select Cplanes that let them work in diameter or radius values.
- **Tool planes (Tplanes)**—This is the plane that is typically normal to the tool axis. Tplanes are used only when creating toolpaths. They determine the tool orientation. In almost all cases, your Cplane will be the same as your Tplane (the most common exceptions are mill/turn operations).
- **Work coordinate systems (WCS)** - The WCS is the active coordinate system in use by Mastercam at any given time. The WCS contains the orientation of the XYZ axes plus the location of the zero point (the origin). When selecting a standard view from the Gview or Planes menus, the plane you set is relative to the current WCS. The plane you set as the WCS typically equals the Top, or XY, plane of the part and tells the software how your part is positioned or oriented in the machine tool.

Once you create a view, you can use it with Mastercam's drawing and toolpathing functions.

Most of the tools for working with views are located on the Status bar at the bottom of the Mastercam window. Each of the three view menus is selected from a different Status bar option: **Gview**, **Planes**, and **WCS**.

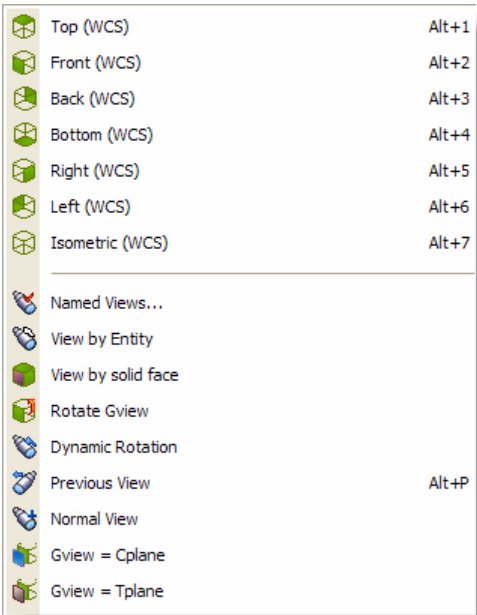


- The **Gview** menu, the **Planes** menu, and the **WCS** menu bring up similar sets of options.

Use these commands to select standard views. Standard views represent the different faces of a cube in the current working coordinate system (WCS).

This command lets you select a view from the catalog of saved views, including custom views.

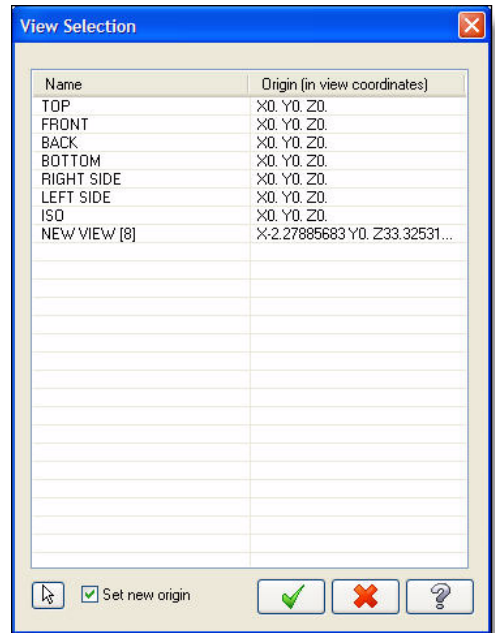
Use these commands to create new views from part geometry or by manipulating other views.



- Mastercam displays the current view selections in the status area at the bottom of the graphics window. The axes symbol (gnomon) shows the current Gview orientation.



- Mastercam maintains a catalog of views that have been saved in the current part. You can see these views by selecting **Named Views** from one of the Status bar view/planes menus (Gview, Planes, WCS).



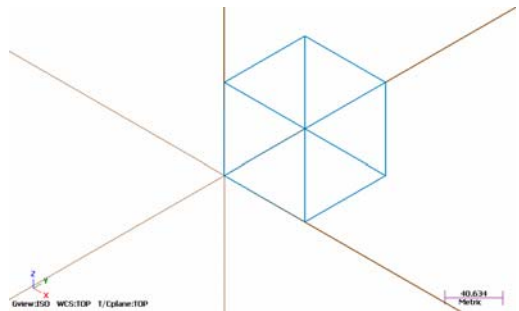
Lesson Goals

- Set the construction plane (Cplane) to standard **Top** and **Front** views and create geometry on these planes.
- Create your own named view and use it to create geometry on an angled plane.

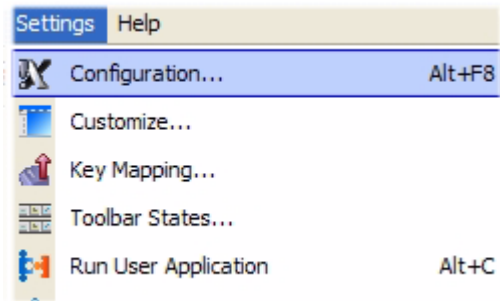
Exercise 1: Drawing in the Top Plane

In this exercise, you verify CAD configuration settings for views and planes, and draw new geometry in the Top Cplane.

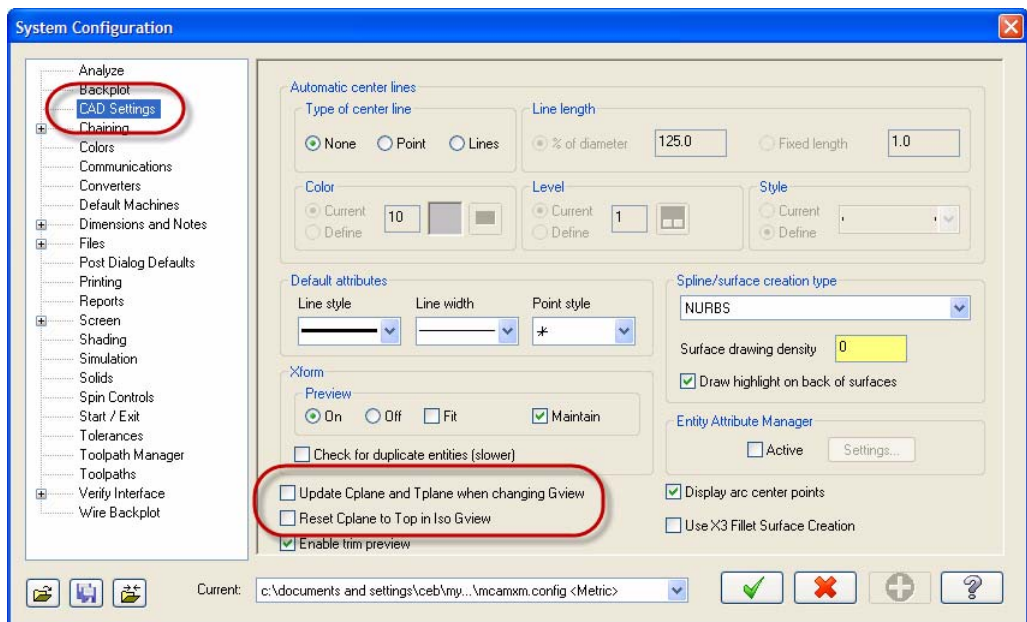
- Open the tutorial part 3DCUBE-MM.MCX-5, and display the XYZ axes in the graphics window (press **[F9]**).



2 Choose Settings, Configuration.



3 Open the CAD Settings properties page and, if necessary, *deselect* the options: **Update Cplane** and **Tplane** when changing **Gview** and **Reset Cplane to Top** in **ISO Gview**.



4 If you changed the setting, click **Apply**.



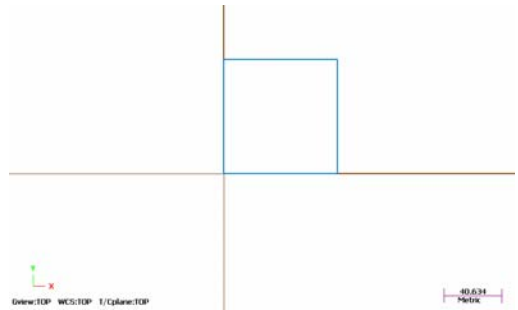
5 Click **Yes** to save the changes to your configuration file.

6 Click **OK** to close the dialog box.



7 Change the Gview to **Top**.

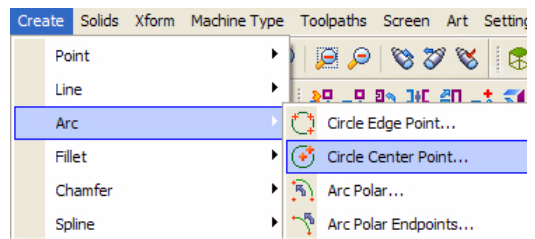
Note: See Lesson 1, “Setting Standard Graphics Views (Gviews)” on page 5 to review how to complete this step.



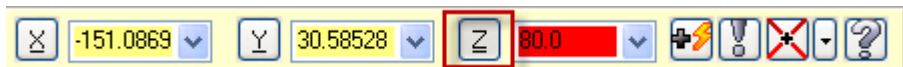
The WCS, the Tplane, and the Cplane have not changed, they are also set to **Top**.



8 To create an arc on the top of the cube, choose **Create, Arc, Circle Center Point**.



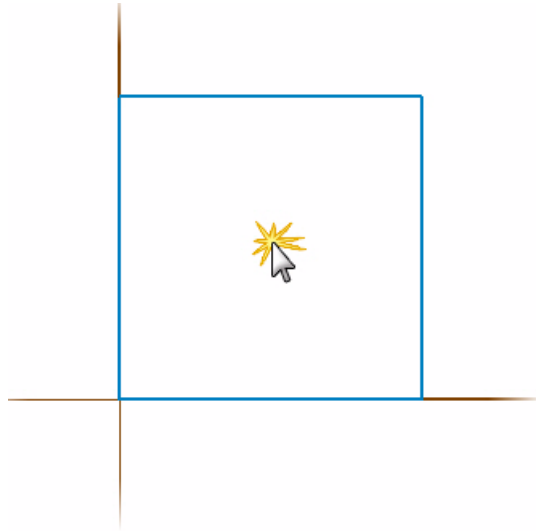
9 The top of the 3D cube is at +80.0 mm in the Z axis. In the AutoCursor ribbon bar at the top of the screen, enter a **Z** coordinate of **80.0**, and click the corresponding button to lock the field.



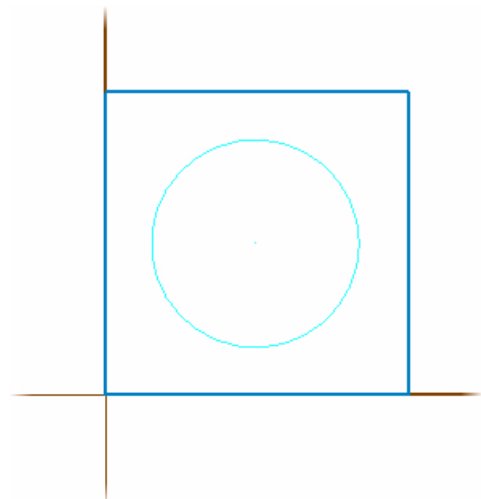
Note: This is not the Z field in the status bar at the bottom of the Mastercam screen - it is in the AutoCursor ribbon bar right above the function ribbon bar area.

- 10** Click where indicated to begin creating a circle across the top of the cube.

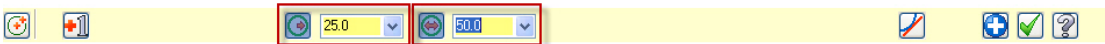
Note: The circle center point you choose here is an approximate location; you do not need to specify an exact position.



- 11** Drag and draw a circle, clicking again to set it at a size similar to that shown. The circle entity is a “live” entity, which means that its attributes can be modified.



- 12** In the **Circle Center Point** ribbon bar, enter a **Radius** of **25.0**. Press the **[Tab]** key to see how the **Diameter** field is automatically set to **50.0**.



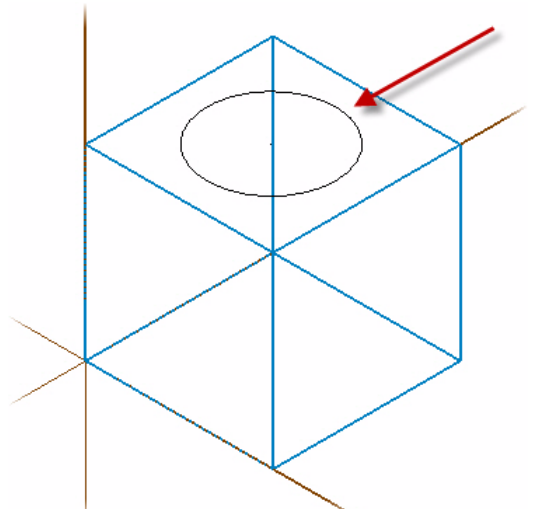
- 13** Click **Apply** to remain in the Circle Center Point function. (Do *not* click OK.)



- 14** Spin the entities in the graphics window to verify that you have drawn the new circle across the top of the cube.

Note: See Exercise 3, “Spinning” on page 12 to review how to complete this step.

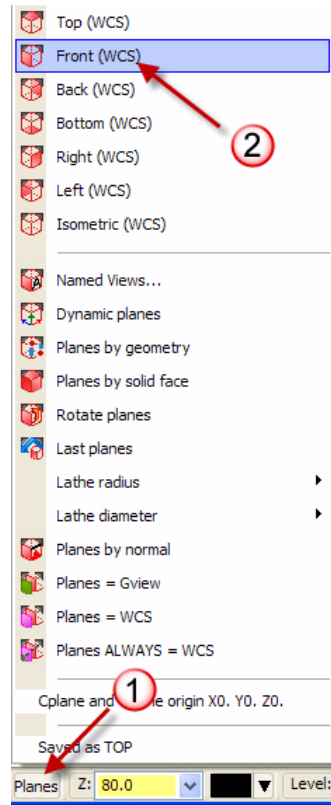
- 15** Remain in the Circle Center Point function as you advance to the next exercise:
Exercise 2, “Drawing in the Front Plane”.



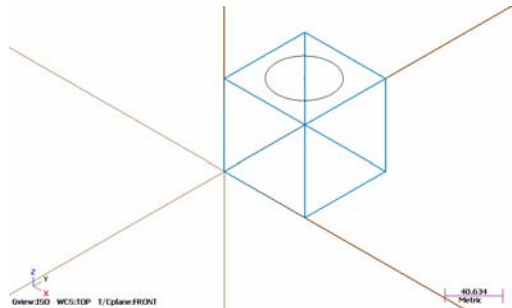
Exercise 2: Drawing in the Front Plane

This exercise demonstrates Mastercam's flexibility with changing views and planes when you are in a drawing function. While in the Create Circle Center Point function, you change your Cplane to the Front plane, change your Gview to a different orientation, and draw new geometry in the Front plane.

- 1 While you are still in the Circle Center Point function, choose **Planes**, **Front (WCS)** from the Status bar.



- 2 Change your Gview to **Isometric**.

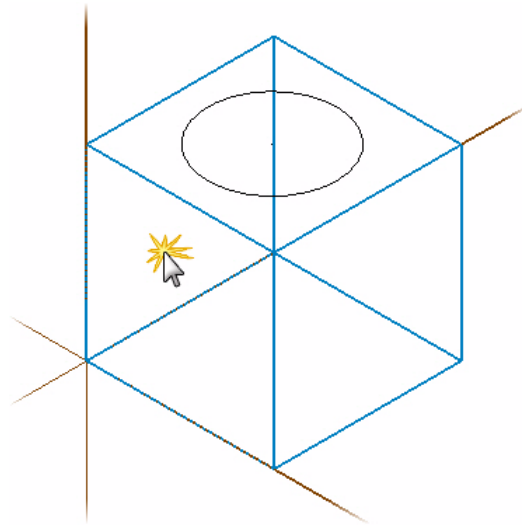


The Gview, Tplane, and the Cplane have changed based on your selections.

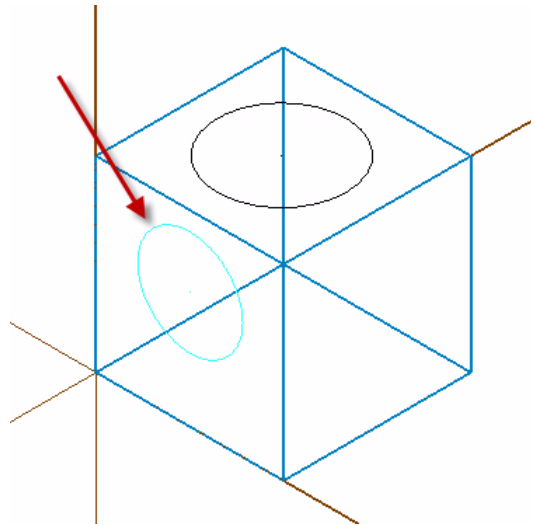


- 3 Select where indicated to begin creating a circle across the front of the cube. Be careful to click *above* the line entity that forms the bottom side of the cube.

Note: The Z coordinate in the AutoCursor is no longer locked at 80.0. It is reset to Z0.0, which is the correct value for this exercise.



- 4 Drag and draw a circle across the front of the cube, clicking again to set it at a size similar to that shown.
- 5 In the **Circle Center Point** ribbon bar, enter a **Radius** of **25.0**.
- 6 Click **OK** to accept your new geometry and exit the Circle Center Point function.
- 7 For a challenge, use the skills you have learned to draw new geometry on other faces of the cube.

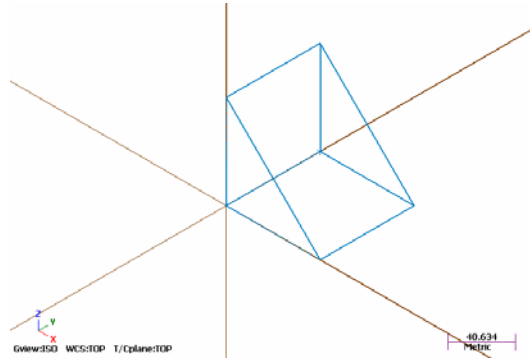


Exercise 3: Creating a New Named View for the Cplane

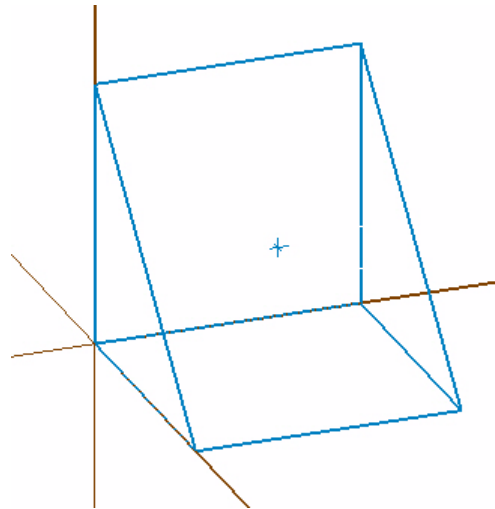
In this exercise, you create a custom view aligned with the slanted face of the part, and add it to the list of system views.

- 1 Open the tutorial part
ANGLEDFACE-MM.MCX-5.

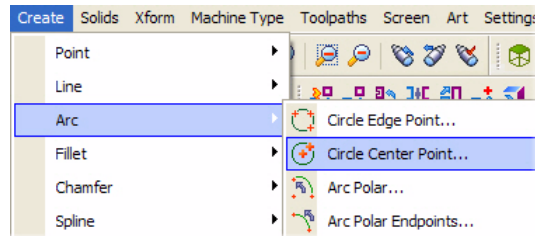
The default orientation is an **Isometric** Gview. The WCS, the Tplane, and the Cplane are set to **Top**.



- 2 Rotate the Gview slightly (use spin) to get a better view of the single point that displays in the angled face of the part.

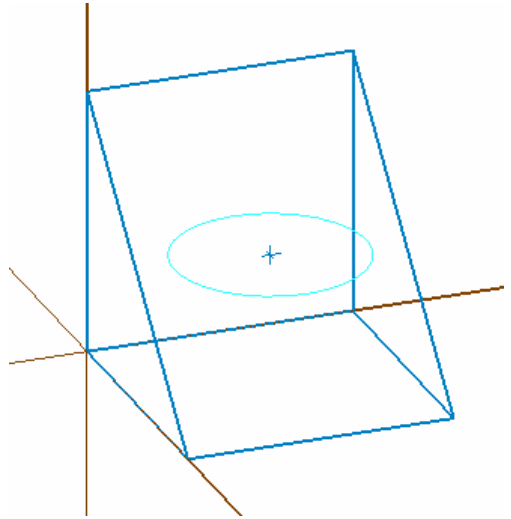


- 3 Choose **Create, Arc, Circle Center Point**.

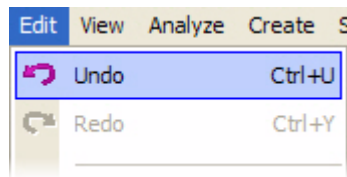


- 4 Select the point, and then drag and draw a circle, clicking again to set it at a size similar to that shown.
- 5 Spin the part slightly to verify that the circle is drawn in an orientation that is not aligned with the front plane of the part.

To draw a circle in the angled plane, you must first create a new view.
- 6 Press **[Esc]** to exit the Circle Center Point function.



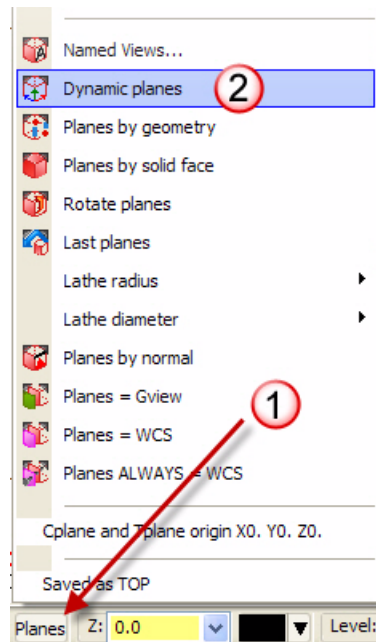
- 7 Choose **Edit, Undo** to remove the circle geometry.
- 8 Change your Gview to **Isometric**.



Setting a Dynamic Plane

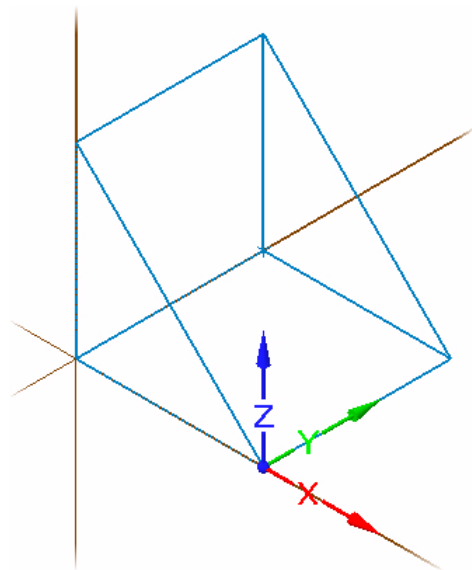
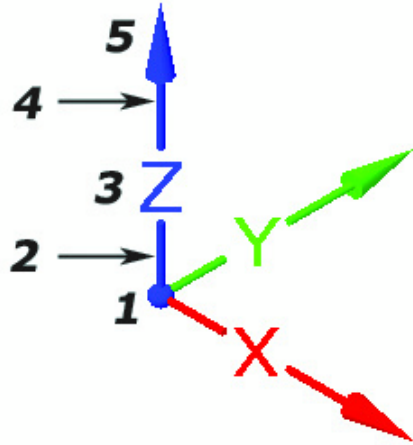
- 1 Choose **Planes, Dynamic planes** from the Status bar.

The Dynamic Planes dialog box and gnomon display in the graphics window.



The Dynamic Plane function lets you create your own planes using an interactive gnomon in the graphics window. The gnomon is made up of three axes connected at the origin. There are five selection points along each axis. Each segment of the axis line is used to produce a different type of transform motion.

- 1** *Axis Origin* - Places the origin of the gnomon in 3D space.
 - 2** *First Leg* - Moves the gnomon along the selected axis.
 - 3** *Axis Label* - Rotates around a perpendicular axis.
 - ♦ X axis label rotates around Y
 - ♦ Y axis label rotates around X
 - ♦ Z axis label rotates around X
 - 4** *Second Leg* - Rotates around the opposite perpendicular axis.
 - ♦ X axis label rotates around Z
 - ♦ Y axis label rotates around Z
 - ♦ Z axis label rotates around Y
 - 5** *Axis Arrowhead* - Aligns the gnomon with existing geometry.
- 2** Move the dynamic gnomon to the bottom left corner of the angled face and click once to place the gnomon.

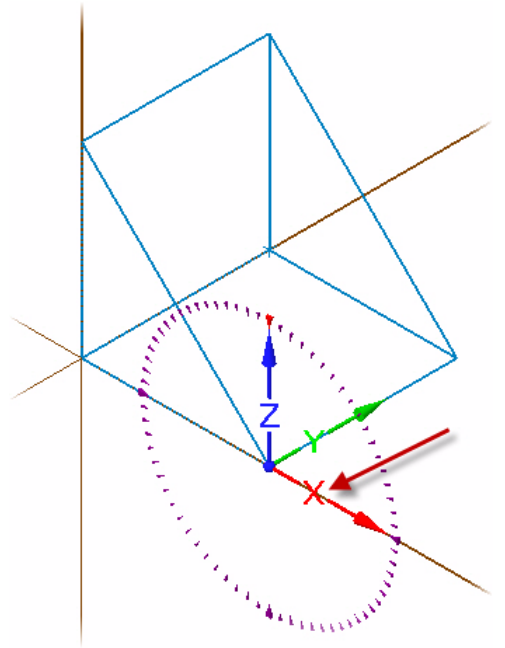


- 3 Click on the label of the X axis to rotate around the Y axis. Do not hold down the mouse button.

A dial displays to indicate rotation increments.



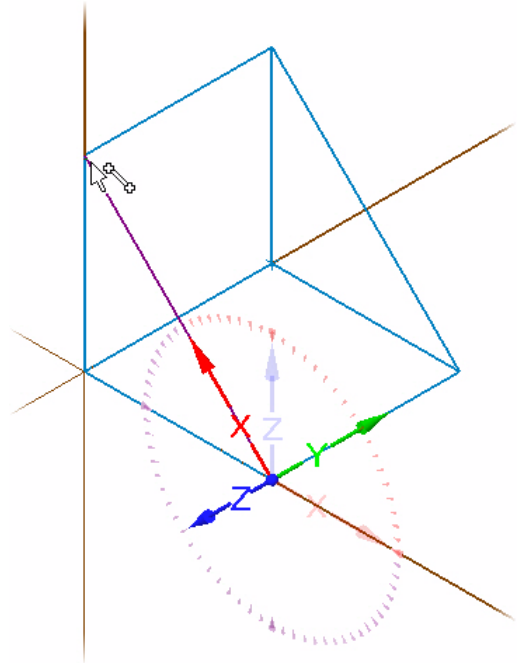
TIP: You can change the increments on the dial by pressing the **[Ctrl]** key and right-clicking. This displays the Gnomon Settings dialog box, where you can adjust alignment and snap increments.



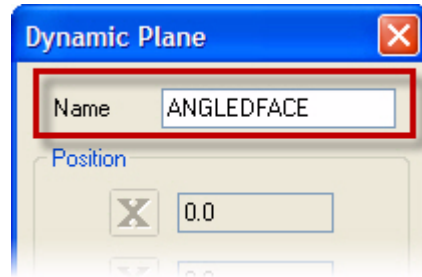
- 4 Rotate the X axis to point at the upper left corner of the angled face and click once to set the X axis position.



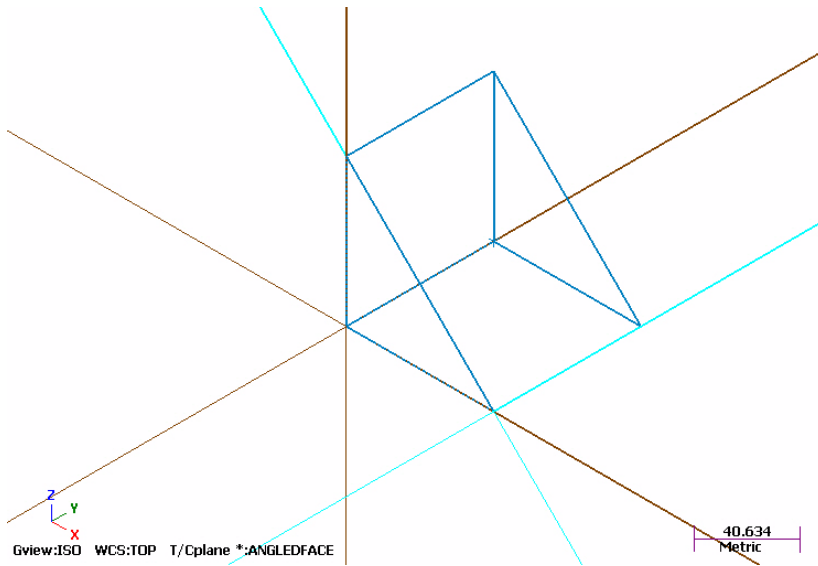
TIP: As you get close to the end of the line, the cursor automatically snaps to the endpoint and shows a Visual Cue indicating an endpoint. This is part of the AutoCursor functionality. To learn more about AutoCursor, click the Help button on the AutoCursor ribbon bar.



- 5 On the Dynamic Plane dialog box, type **AngledFace** in the Name field and click **OK** to finish creating the new view.



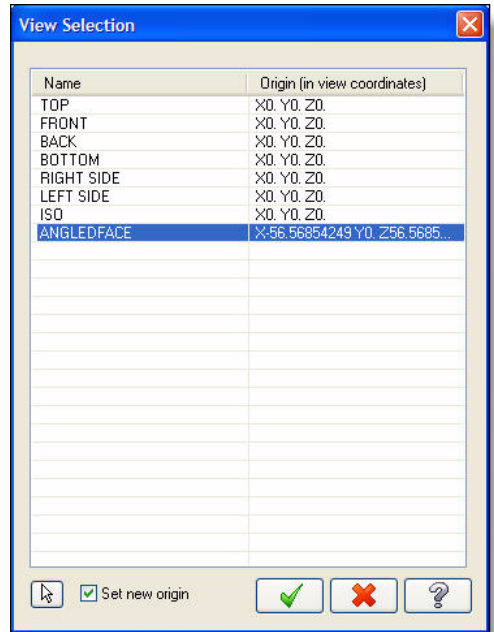
- 6 In addition to the brown coordinate axes and origin that display when you press **[F9]**, Mastercam now displays in blue the Cplane axes and origin for the new view you defined.



*Note: Because you created the view from the **Planes** menu, Mastercam automatically aligns the Cplane and Tplane with the new view.*

- 7 Choose **Planes, Named Views** from the Status bar.

- 8 Verify that the **AngledFace** view appears in the View Selection list. Close the dialog box to complete this exercise.



IMPORTANT: If you will not be advancing to the next exercise in this session, choose **File, Save as** and save the tutorial part file *to a different file name*, such as **ANGLEDFACE-MM-YOURINITIALS.MCX-5**. Saving the part at this point in the lesson also saves the new view you created in this exercise. You use this view in the next exercise.

Exercise 4: Creating Geometry in the New Named View

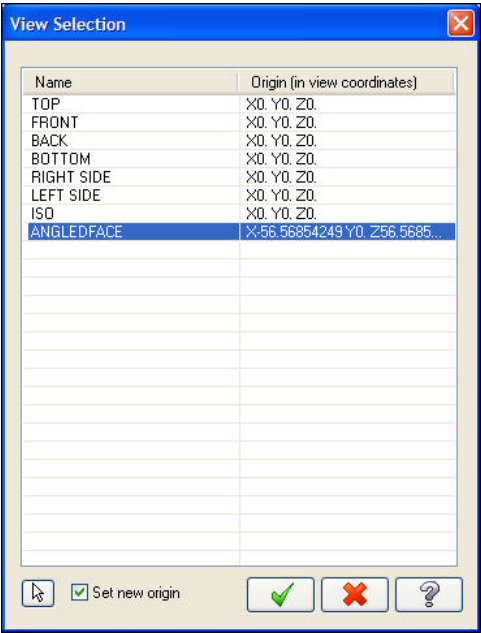
In this exercise, you create geometry aligned with the named view, **AngledFace**.

- 1 If you are continuing from Exercise 3, “Creating a New Named View for the Cplane”, skip this step.

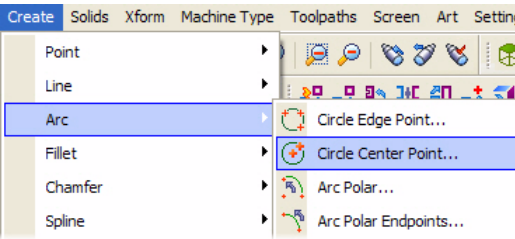
Otherwise, open the tutorial part file you saved in the previous exercise.

- 2 Choose **Planes, Named Views** from the Status bar.

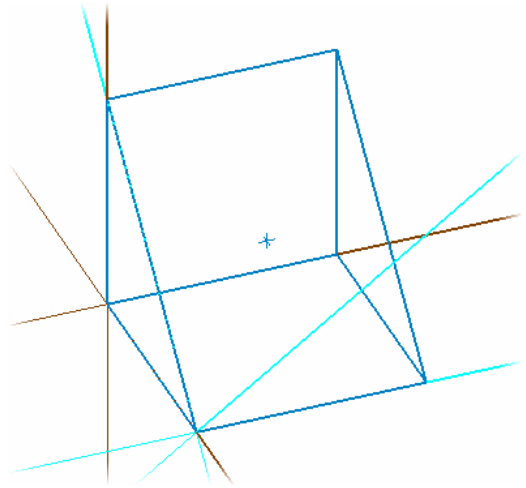
- 3 In the View Selection dialog box, verify that the **AngledFace** view is selected in the list, and click **OK** to close the dialog box.



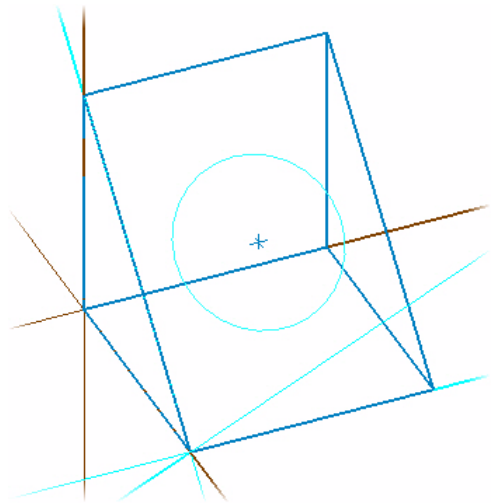
- 4 Choose **Create, Arc, Circle Center Point**.



- 5 Rotate the Gview slightly (use spin) to get a better view of the single point that displays in the angled face of the part.



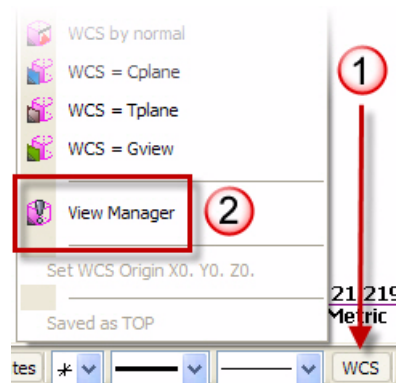
- 6 Select the point, and then drag and draw a circle, clicking again to set it at a size similar to that shown.
- 7 In the **Circle Center Point** ribbon bar, enter a **Radius** of **25.0**.
- 8 Click **OK** to accept your new geometry and exit the Circle Center Point function.
- 9 Spin the entities in the graphics window to verify that you have drawn the new circle in the desired orientation. If it is correctly aligned with the **AngledFace** view, you have successfully completed this exercise.




Exercise 5: Introducing the View Manager

This exercise introduces the **View Manager**, a central place to see all of the views saved in a Mastercam part and their properties. Use the View Manager to create new views, select different views for each plane, customize their origins, and assign work offsets.

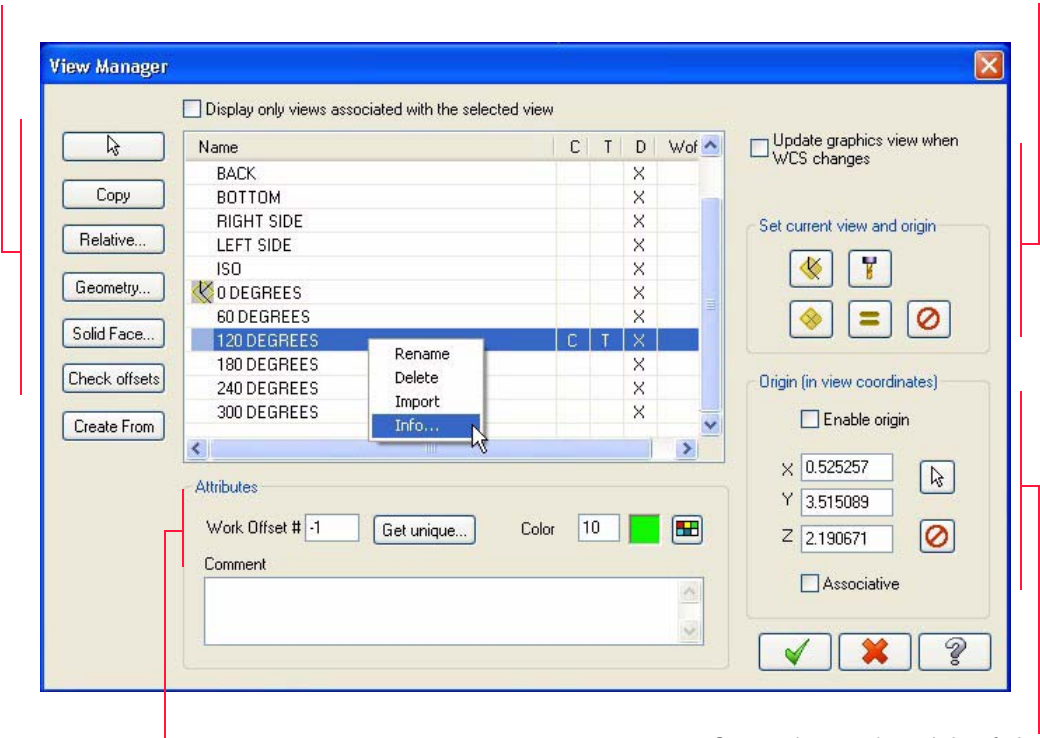
- 1 Choose **WCS, View Manager** from the Status bar.



- 2 Click the Help button on the dialog box  to access the Mastercam Help for the View Manager, and use the information to experiment with the available options. The following picture points out some important areas on the View Manager dialog box.

Use these functions to create new views.

Set Cplanes, Tplanes, and WCS to selected views.



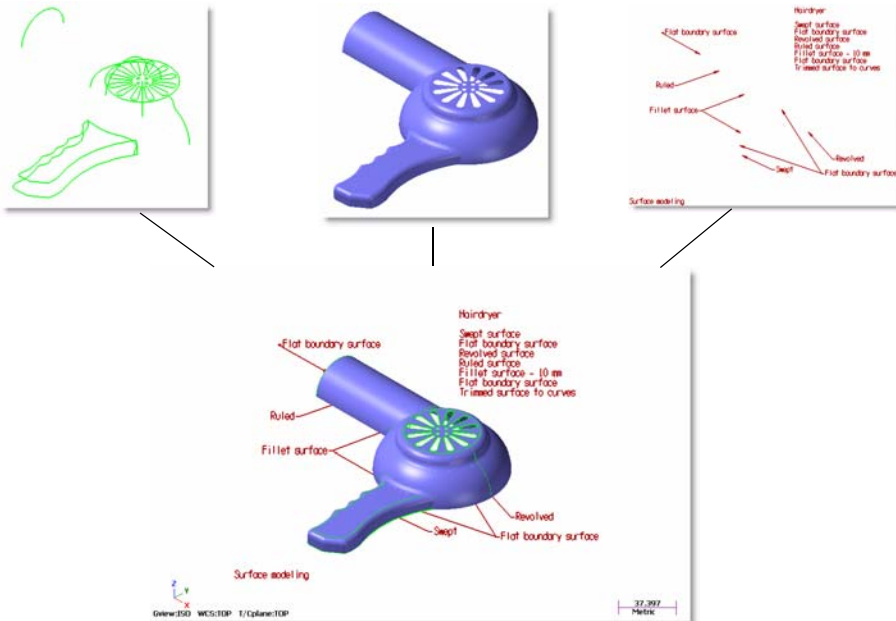
Assign work offsets to views.

Set or change the origin of views.

LESSON 4

Using Levels

A Mastercam file can contain separate **levels** for wireframe, solids, surfaces, drafting entities, toolpaths, and other part data. Organizing your file data by levels lets you control the areas of the drawing that are visible at any time and the entities you can select in the graphics window.



This control makes it easier to work with the file and helps prevent you from affecting areas of the drawing you do not want to change.

In Mastercam, you can create and name up to *2 billion levels* and set any one to be the main level. The **main level** is the current working level. For each level you create, you assign a unique number and, optionally, a name. Mastercam's **Level Manager** provides a central location where you view and create levels, and set their properties.

Lesson Goals

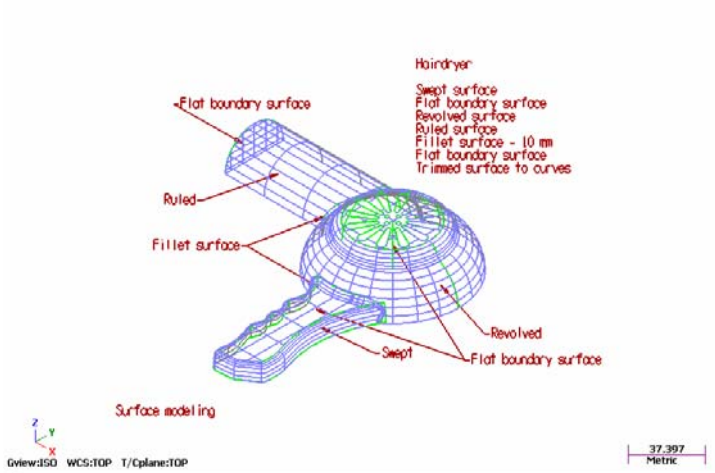
- Open the Level Manager.
- Turn level displays on and off.
- Change the main level.
- Name and assign entities to a level.
- Move selected entities to a different level using the Status bar Level right-click option.

Exercise 1: Accessing the Level Manager

When first opening a Mastercam file, you may not be aware of all entities in the part because they may exist on levels that are not displayed in the graphics window. It is a good practice to first access the Level Manager and view all of the levels in the file.

In this exercise, you access the Level Manager.

- 1 Open the tutorial part HAIRDRYER-MM.MCX-5.



- 2 In the Status bar, left-click on the **Level** option.



TIPS:

- The number of the current main level displays in the Status bar **Level** field.
- The tool tip that displays when you hold the mouse over the **Level** field tells you the name of the current main level. (In this example, level 2 is named *Wireframe*.)
- The mouse icon indicates that a right-mouse button function is available for the option.
- You will learn more about these features in “Changing the Main Level” on page 39 and “Moving and Copying Entities to a Different Level” on page 42.

The Level Manager shows all levels that exist in the current part file, their display status, and the number of entities per level. Continue with the next exercise to learn how to turn level displays on and off.

Use any column heading to sort the level list.
To sort, click the column heading.
To change the sort order (ascending or descending), click again.

The yellow highlight indicates the current main level setting.

Main level parameters display in this section.

Enables or disables the display of all entities on all levels.

Number	Visible	Name	# Entities	Level Set
1	X	Surfaces	19	
2	X	Wireframe	30	
3	X	Notes	8	

Main Level

Number: Name:

Level Set:

☒ Make main level always visible
☐ Only display geometry on main level

List Levels

☐ Used
☐ Named
☒ Used or named
☐ Range

1
1000

Visible Levels

Use these options to filter the level list.

Notes:

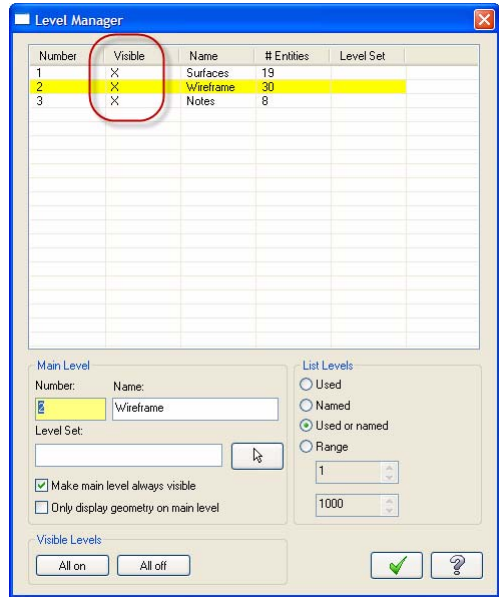
- Level Manager is a modeless dialog box. This means that you can leave the Level Manager on the screen as you work in Mastercam's main window. You can even move the Level Manager to another monitor in a multi-monitor system.
- When you first open the Level Manager, the levels are listed by number from lowest to highest. If you change how levels are listed and close the Level Manager, Mastercam remembers the list method and restores it the next time you open the Level Manager.

Exercise 2: Turning Level Displays On and Off

In this exercise, you change the graphics window display by turning level displays on and off. To select or otherwise work with an entity in the graphics window, you must first make its level visible.

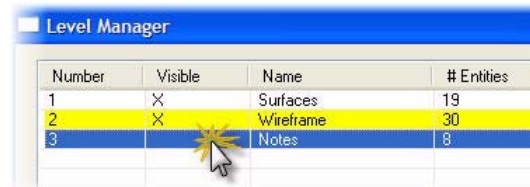
- 1 Open the HAIRDRYER-MM.MCX, if necessary. Then access the Level Manager from the Status bar.

The **X** in the **Visible** column indicates that all levels in this file are set to display in the graphics window.



- 2 In the **Visible** column for level **3**, click once to turn off the display of **Notes** (dimensions). The change is immediate in the graphics window.

You do not have to close the Level Manager to see the effect of turning off a level display. If necessary, drag the Level Manager window to a position that gives you a better view of the graphics window.



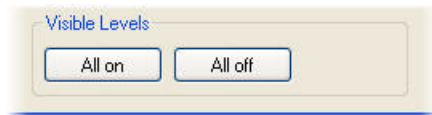
- 3 Click again in the **Visible** column for level **3** to toggle the level display on.
- 4 Repeat Steps 2 – 3 for level **1** (**Surfaces**).
- 5 Turn off the display of levels **1** and **3**.

- 6 Try turning off the display of level 2. When the Level Manager option **Make main level always visible** is selected, you cannot turn off the main level display in the graphics window.



WARNING: Turning off the display of the main level while you are working in that level is not recommended. However, it may occasionally be necessary.

- 7 Use options in the lower left corner of the Level Manager to turn the display of all levels on or off. Continue with the next exercise to learn how to change the main level.



Exercise 3: Changing the Main Level

Any geometry that you create is always placed on the main level. There can be only one main level at a time, but you can change the main level as often as necessary to work with the part.

Use the Status bar **Level** field to verify the current main level setting. The name of the current main level displays when you hold the mouse over the Level field.

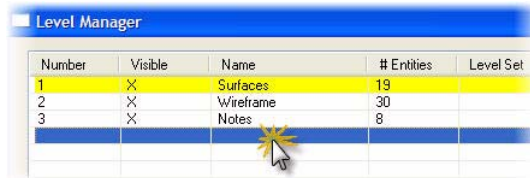


In this exercise, you change the main level.

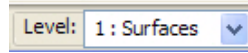
- 1 If necessary, open the tutorial part HAIRDRYER-MM.MCX, and access the Level Manager.
- 2 In the **Number** column for level 1 (**Surfaces**), click once to set it as the new main level.

Level Manager				
Number	Visible	Name	# Entities	Level Set
1	X	Surfaces	19	
2	X	Wireframe	30	
3	X	Notes	8	

- 3 Move the mouse away from the Number column, and click on a blank row to verify that level **1 (Surfaces)** is set as the main level.

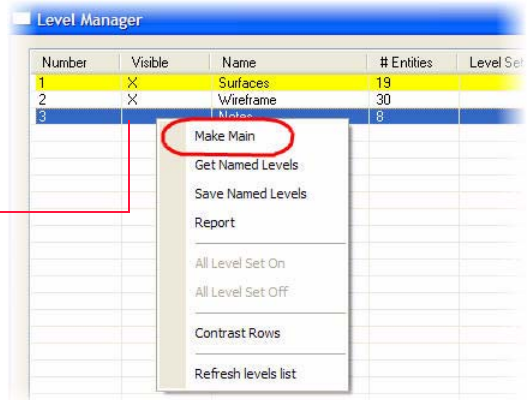


The Status bar **Level** field also changes to show that level **1** is the main level.



- 4 Turn off the display of level **3 (Notes)** using skills you learned in “Turning Level Displays On and Off” on page 38.
- 5 Position the cursor anywhere in the row for level **3**. Right-click and choose **Make Main**.

*Although you turned off the display of level 3, the Level Manager option **Make main level always visible** is selected. The main level is made visible, regardless of its prior display setting.*



- 6 Click **OK** to close the Level Manager dialog box.
- 7 In the Status bar **Level** field, type **2** and press **[Enter]** to change the main level from level 3 to level 2.

When you know in advance the level you want to work in, typing the number in the **Level** field is the most direct way to set that level as the main level.

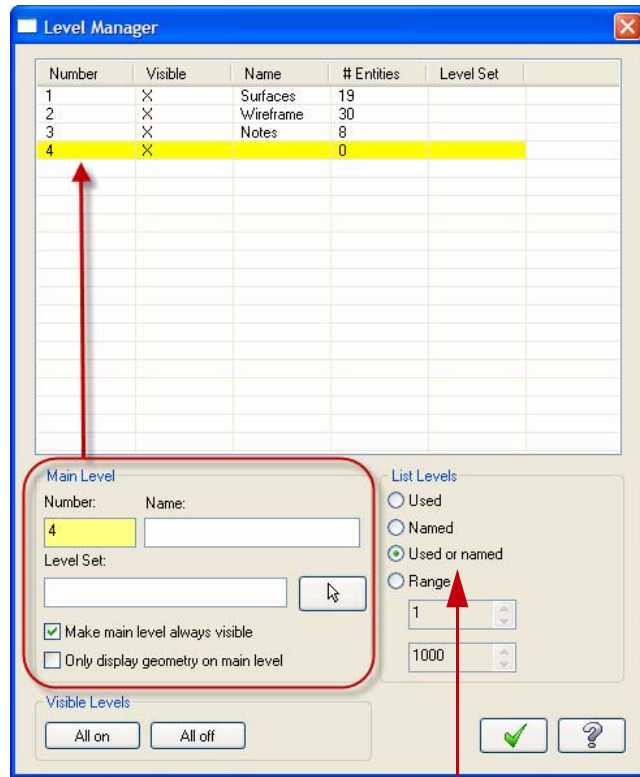
Continue with the next exercise to learn how to create a new level.

Exercise 4: Naming and Assigning Entities to a Level

In this exercise, you name a level and assign entities to that level.

- 1 Open the tutorial part HAIRDRYER-MM.MCX if necessary, and access the Level Manager.
- 2 In the **Main Level** section, type **4** in the **Number** field and press **[Tab]**.

Mastercam adds it to the Level Manager list, and sets it as the main level.

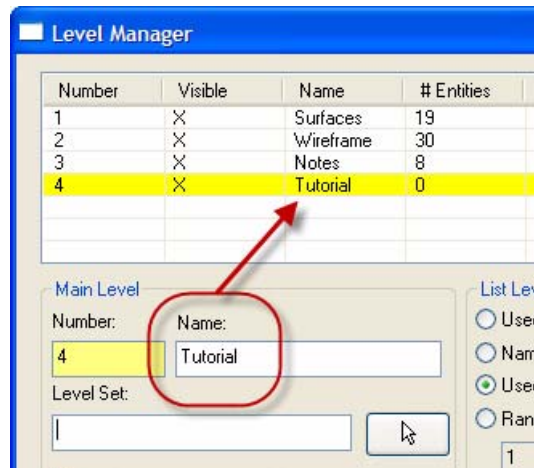


The default List Level setting, **Used or named**, is used in this lesson.

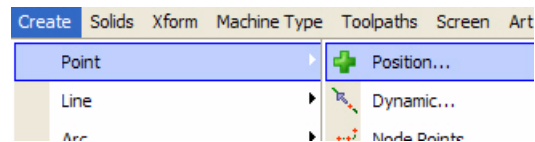


TIP: Use **List Level** options to control the display of levels in the Level Manager. You can list only *used levels* (those assigned to entities), entities that are *named*—regardless of whether they are used, both used and named levels, or limit the display to a range of level numbers.

- 3 In the **Name** field, type **Tutorial** and press **[Tab]**. The Level Manager list updates to show the new name. Although level names are optional, descriptive names are helpful.



- 4 Click **OK** to exit the Level Manager.
- 5 Choose **Create, Point, Position** from the Mastercam menu.
- 6 Click a few times in different places in the graphics window to create some points.
- 7 Click **OK** on the Point ribbon bar to exit the function.
- 8 Access the Level Manager and verify that the new geometry was created on level 4 (**# Entities** is not 0).
- 9 Practice turning level displays on and off and changing the main level.

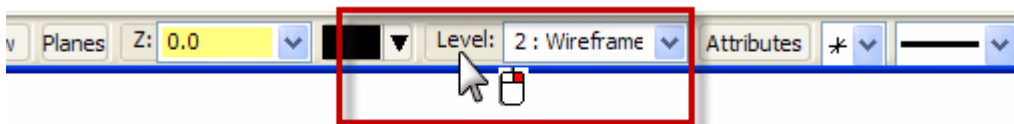


When you are ready, continue with the next exercise.

Exercise 5: Moving and Copying Entities to a Different Level

In this exercise, you move entities from one level to another using the right-click option in the Status bar **Level** field. You can use the same basic procedure to copy entities to a different level.

- 1 Make level 2 the main level and make all levels visible in the graphics window.
- 2 In the Status bar, right-click to select **Level**.



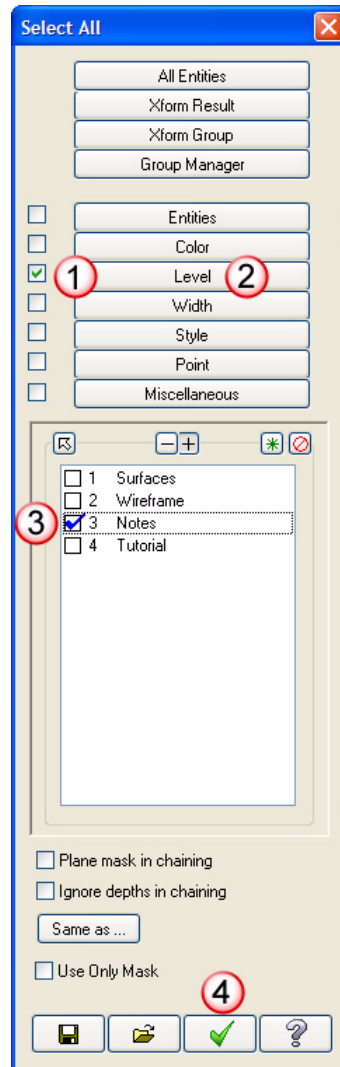
- 3** Mastercam prompts you to select entities. Use the following steps to select all of the dimensions on level **3**.

- a** In the General Selection ribbon bar, choose **All**.

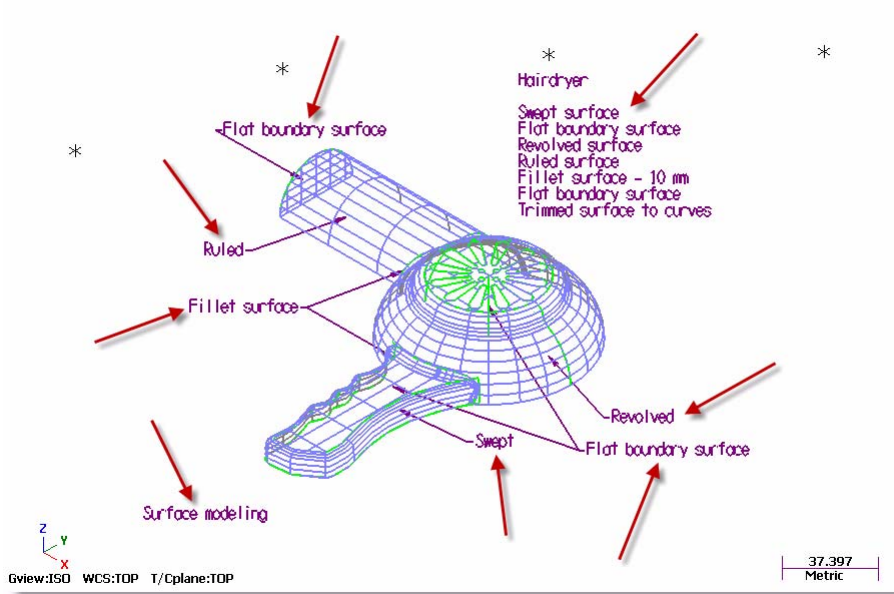


- b** In the **Select All** dialog box, create a selection mask for all entities on level **3**. To do this:

- ♦ Select the **Level** check box, and
- ♦ Click the **Level** button.
- ♦ Select level **3** in the list.
- ♦ Click **OK**.

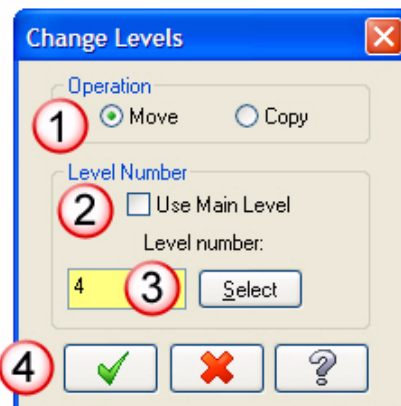


- 4 In the graphics window, Mastercam highlights all the notes, indicating that they are selected. Press **[Enter]** or choose **End Selection** in the General Selection ribbon bar.



TIP: Alternatively, you can use General Selection methods to pre-select entities before choosing the **Level** right-click option. When you pre-select entities, Mastercam does not prompt you to select additional entities for the level move or copy. After right-clicking **Level**, you advance directly to the **Change Levels** dialog box.

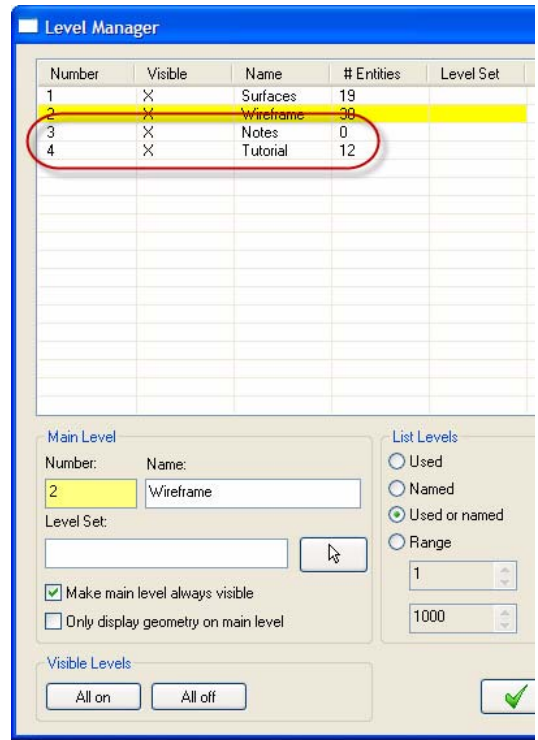
- 5 In the Change Levels dialog box, complete the following steps:
- Choose **Move**.
 - Under **Level number**, deselect the **Use Main Level** check box.
 - In the **Level number** field, type 4.
 - Click **OK**.



- 6 In the Level Manager, verify that level 4 now contains the entities that were on level 3 (notes).

Level 3 no longer contains entities.

You have completed this exercise and the lesson on working with Mastercam levels.



Conclusion

Congratulations! You have completed the *Working in the Graphics Window* tutorial. Now that you have mastered the skills in this tutorial, we encourage you to explore Mastercam's other features and functions. Additional tutorials may be available in this or other series. Please contact your authorized Mastercam Reseller for further training.

**Attention! Updates may be available.
Go to Mastercam.com/Support for the latest downloads.**



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