

EXPERIMENT 4

SPECIAL FEATURES

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View Tools:

You can change the magnification of a view by zooming in and out, which is similar to zooming in and out with a camera. Using ZOOM does not change the absolute size of objects in the drawing. It changes only the magnification of the view.

In a perspective view, ZOOM displays the 3DZOOM prompts. The following prompts are displayed.

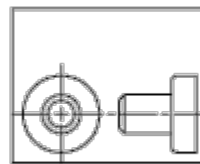
Corner of window

Specify one corner of the area to be zoomed into.

- **Opposite corner.** Specify the opposite corner of the zoom area.

All

Zooms to display all visible objects and visual aids. Adjusts the magnification of the drawing area to accommodate the extents of all visible objects in the drawing, or visual aids such as the grid limits (the LIMITS command), whichever is larger.



before ZOOM All



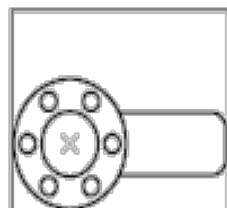
after ZOOM All

In the illustration on the right, the grid limits are set to a larger area than the extents of the drawing.

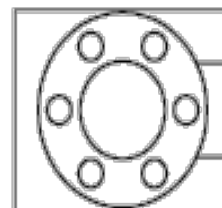
Because it always regenerates the drawing, you cannot use ZOOM All transparently.

Center

Zooms to display a view defined by a center point and a magnification value or a height. A smaller value for the height increases the magnification. A larger value decreases the magnification. Not available in perspective projection.



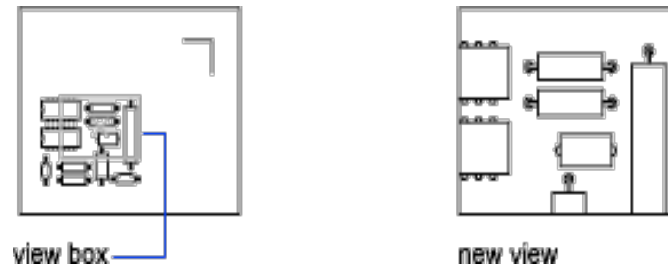
before ZOOM center



after ZOOM center,
magnification increased

Dynamic

Pans and zooms using a rectangular view box. The view box represents your view, which you can shrink or enlarge and move around the drawing. Positioning and sizing the view box pans or zooms to fill the viewport with the view inside the view box. Not available in perspective projection.



- To change the size of the view box, click, resize it, and click again to accept the new size of the view box.
- To pan with the view box, drag it to the location you want and press Enter.

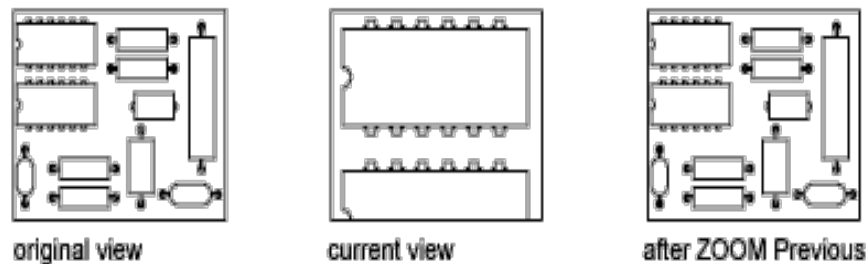
Extents

Zooms to display the maximum extents of all objects.

The extents of each object in the model are calculated and used to determine how the model should fill the window.

**Previous**

Zooms to display the previous view. You can restore up to 10 previous views.

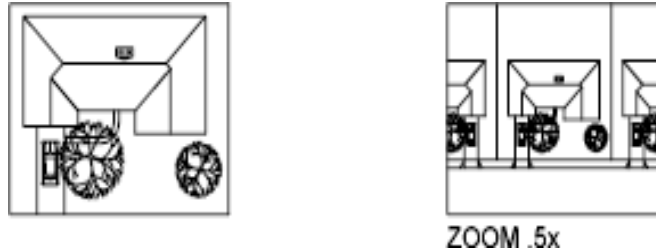
***Scale / Scale factor***

Zooms to change the magnification of a view using a scale factor.

- Enter a value followed by x to specify the scale relative to the current view.

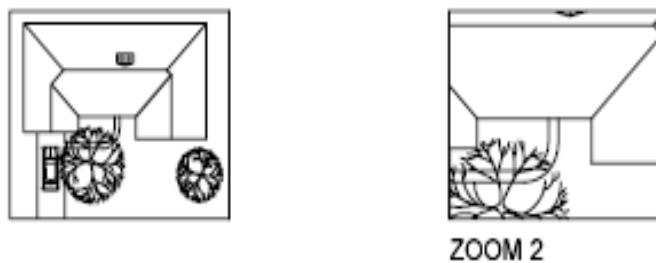
- Enter a value followed by **xp** to specify the scale relative to paper space units.

For example, entering .5x causes each object to be displayed at half its current size on the screen.



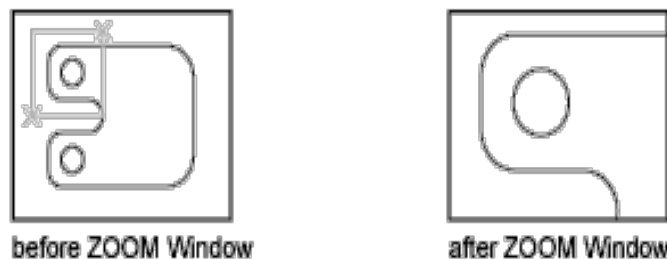
Entering **.5xp** displays model space at half the scale of paper space units. You can create a layout with each viewport displaying objects at a different scale.

Enter a value to specify the scale relative to the grid limits of the drawing. (This option is rarely used.) For example, entering **2** displays objects at twice the size they would appear if you were zoomed to the limits of the drawing.



Window: Zooms to display an area specified by a rectangular window.

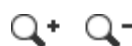
With the cursor, you can define an area of the model to fill the entire window.



Object: Zooms to display one or more selected objects as large as possible and in the center of the view. You can select objects before or after you start the ZOOM command.

Real Time: Zooms interactively to change the magnification of the view.

The cursor changes to a magnifying glass with plus (+) and minus (-) signs. See Zoom Shortcut Menu for a description of the options that are available while zooming in real time.



Holding down the pick button at the midpoint of the window and moving vertically to the top of the window zooms in to 100%. Conversely, holding the pick button down at the midpoint of the window and moving vertically to the bottom of the window zooms out by 100%.

When you reach the zoom-in limit, the plus sign in the cursor disappears, indicating that you can no longer zoom in. When you reach the zoom-out limit, the minus sign in the cursor disappears, indicating that you can no longer zoom out.

When you release the pick button, zooming stops. You can release the pick button, move the cursor to another location in the drawing, and then press the pick button again and continue to zoom the display from that location.

PAN: Shifts the view without changing the viewing direction or magnification.



Position the cursor at the start location and press the left mouse button down. Drag the cursor to the new location. You can also press the mouse scroll wheel or middle button down and drag the cursor to pan.

Layer Concepts:

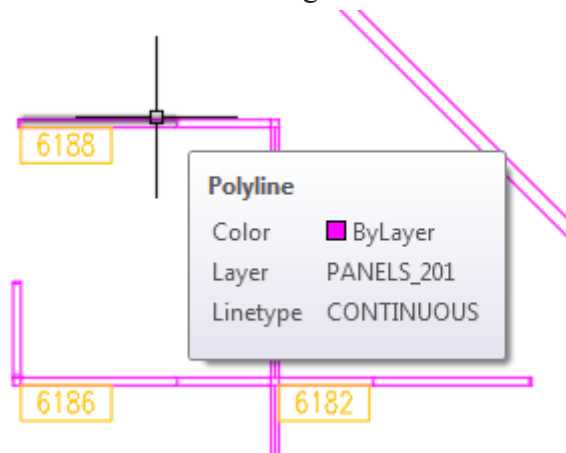
One drawing can have many layers. And depends on the complexity of the drawing, you may have a few to dozens of layers.

You can use each layer to draw a specific object type. For example, you can use *Wall* layer to draw walls on it. *Furniture* layer to draw furniture on it, and so on. AutoCAD supports tens of thousands layers in a single drawing, which is virtually unlimited. Changing active layer regularly to draw objects might seem tedious and takes longer to complete a drawing. However, you will find it very useful during the design process and the drawing presentation.

The layering system is an essential drawing management in AutoCAD, and you should use layers in every drawing. The common usage of layers is to draw objects on a layer based on their function. Create all dimensions on a specific layer. Create walls, doors, windows on separate layers, and so on.

If you follow a particular CAD layering standard, you can use the standard layer names.

Layer useful: First, because you draw objects on separate layers, it is easier for you to understand the drawing. You can quickly know an object type by checking the layer. AutoCAD drawings are just lines and arcs. Using layers can make the drawing easier to understand.



Second, you don't have to set properties for each object. You only need to set the properties for the layers. When you draw an object on a particular layer, it will have the same line weight, color, line type, and the other properties. It gives you a better control to plot your drawing.

Third, you can hide/show or lock/unlock a layer. It means you can have greater control of your drawing. You can lock several layers to prevent they are accidentally modified. You can hide objects when the drawing becomes too complicated.

Fourth, using layers adds a better control to select and modify objects. Let's say you want to select all partition walls in your drawing and copy them to the next typical floor. AutoCAD doesn't understand which lines are partition walls. However, we can tell AutoCAD to select lines on the *Partition Wall* layer.

DIMENSIONING

Create Horizontal, Vertical, or Aligned Dimensions

1. Click Annotate tab ► Dimensions panel ► Dimension.  Find
2. Select a line or specify the first and second extension line origin points.
3. Move your pointing device to the desired position and orientation of the dimension.
4. Before specifying the dimension line location, you can edit or rotate the text.
5. Click to place the dimension line.
6. Repeat steps to continue dimensioning or press Enter to end dimensioning.

Continued, baseline, and ordinate dimensions can be created using the options in this command.

Create a Linear Dimension with Angled Extension Lines

1. Click Annotate tab ► Dimensions panel ► Linear.  Find
2. Specify the first and second extension line origin.
3. At the prompt, enter r (Rotated).
4. Enter an angle for the dimension line.
5. Click to place the dimension line.

Create a Continued or Chain Dimension

1. Click Annotate tab ► Dimensions panel ► Continue.  Find
2. If prompted, select the dimension to continue.

Note: This prompt is skipped if the first extension line origin can be assumed from the origin of the second extension line of the last created linear or angular dimension.

3. Use object snaps to specify additional extension line origins.
4. Press Enter twice to end the command.

Create a Baseline Dimension

1. Click Annotate tab ► Dimensions panel ► Baseline.  Find
2. If prompted, select the base dimension.
Note: This prompt is skipped if the first extension line origin can be assumed from the last created linear or angular dimension.
3. Use an object snap to select the second extension line origin, or press Enter to select any dimension as the base dimension.
The second dimension line is automatically located at the distance specified by the Baseline Spacing option in the Dimension Style Manager, Lines tab.
4. Use an object snap to specify the next extension line origin.
5. Continue to select extension line origins as needed.
6. Press Enter twice to end the command.

Modify a Dimension to Specify Oblique Extension Lines

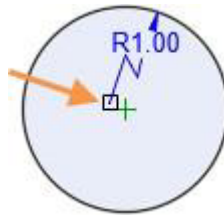
1. Click Annotate tab ► Dimensions panel ► Oblique.  Find
2. Select a linear dimension.
3. Enter a value for the angle of obliqueness, or specify two points.

Create a Radius or Diameter Dimension

1. Click Annotate tab ► Dimensions panel ► Dimension.  Find
2. Select an arc or a circle.
3. At the prompt, enter r (Radius) or enter d (Diameter).
4. Before specifying the dimension line location, you can edit or rotate the text.
5. Click to place the dimension line.
6. Repeat steps to continue dimensioning or press Enter to end dimensioning.

Create a Jogged Radius Dimension

1. Click Annotate tab ► Dimensions panel ► Dimension.  Find
2. Hover over an arc or a circle.
3. At the prompt, enter j (Jagged).
4. Select the arc or circle.
5. Click to specify a point for the false-center dimension origin, called the *center location override*.



6. Click to specify a point for the dimension line angle.
7. Click to specify the location of the dimension jog.
8. Repeat steps to continue dimensioning or press Enter to end dimensioning.

To create Angular Dimension:

1. Click Annotate tab ► Dimensions panel ► Dimension.  Find
2. At the prompt, enter a (Angular).
3. Select one of the following:
 1. An arc
 2. A circle and two points
 3. Two nonparallel lines
 4. A vertex and two points
4. Before specifying the dimension line location, you can edit or rotate the text.
5. Click to place the dimension line.
6. Repeat steps to continue dimensioning or press Enter to end dimensioning.

To create Arc Dimension:

1. Click Annotate tab ► Dimensions panel ► Dimension.  Find
2. Hover over an arc or an arc segment in a polyline.
3. At the prompt, enter L (Arc Length).
4. Select the arc or the arc segment in a polyline.
5. Click to place the dimension line.
6. Repeat steps to continue dimensioning or press Enter to end dimensioning.

HATCHING: It fills an area with a pattern.

1. Click Home tab ► Draw panel ► Hatch.  Find
2. On the Properties panel ► Hatch Type list, select the type of hatch that you want to use.
3. On the Pattern panel, click a hatch pattern or fill.
4. On the Boundaries panel, specify the how the pattern boundary is selected:

5. **Pick Points.** Inserts the hatch or fill within a closed area that is bounded by one or more objects. With this method, you click within the boundaries to specify the area.
6. **Select Boundary Objects.** Inserts the hatch or fill within a closed object, such as a circle, closed polyline, or a set of objects with endpoints that touch and enclose an area.

The selection method is retained until you change it.

6. Click an area or object to be hatched.
7. On the ribbon, make any adjustments as needed:
 1. On the Properties panel, you can change the hatch type and colors or modify the transparency level, angle, or scale for the hatch.
 2. On the expanded Options panel, you can change the draw order to specify whether the hatch and its boundary are displayed in front of or behind other objects.
8. Press Enter to apply the hatch and exit the command.

Note: Enclosed areas can be hatched only if they are in a plane parallel to the *XY* plane of the current UCS.

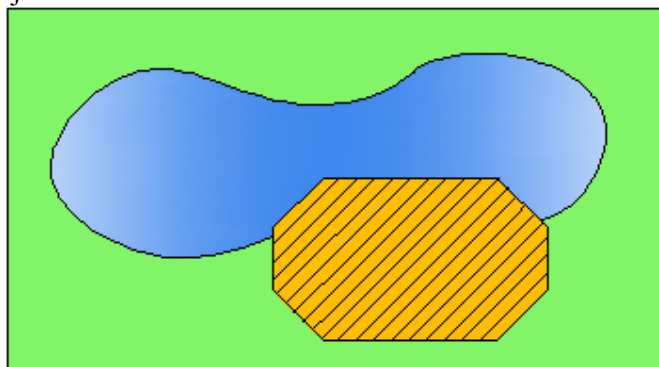
To Hatch or Fill a Large Number of Closed Objects

1. Use a window, crossing, or fence selection method to select all the closed objects to hatch or fill. Alternatively, select a closed object, right-click, and choose Select Similar from the shortcut menu.
2. Start the Hatch (or -Hatch) command and choose any options or settings.
3. If necessary, specify the Select Objects option.
4. At the prompt, enter **p** (Previous) and press Enter.

The objects in the previous selection set are hatched or filled.

Hatching patterns and fills:

You can fill existing objects or enclosed areas with hatch patterns, solid color fills, or gradients, or you can create new hatch objects.



Choose from:

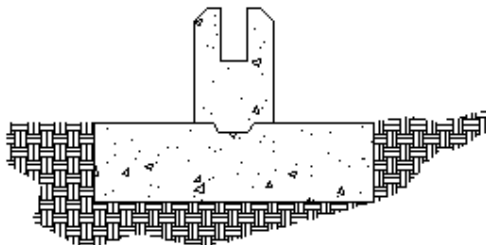
- **Predefined hatch patterns.** Choose from over 70 ANSI, ISO, and other industry-standard hatch patterns, or add hatch pattern libraries supplied by other companies.
- **User-defined hatch patterns.** Define your own hatch patterns based on the current line type, with spacing, angle, color, and other properties you specify.
- **Custom hatch patterns.** Hatch patterns are defined in the *acad.pat* and *acadiso.pat* (*acadlt.pat* and *acadltiso.pat* for AutoCAD LT) files. You can add custom hatch pattern definitions to these files.
- **Solid fill.** Fill an area with a solid color.
- **Gradient fill.** Fill an enclosed area with a color gradient. A gradient fill can be displayed as a *tint* (a color mixed with white), a *shade* (a color mixed with black), or a smooth transition between two colors.



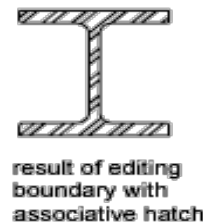
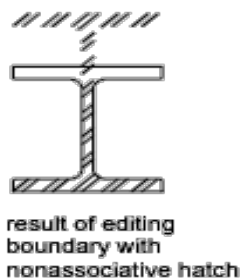
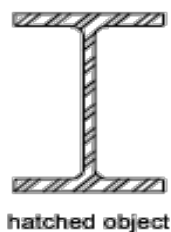
Gradients that mimic colors displayed on a cylinder, a sphere, or other shapes are available.

Hatch Boundaries and Associativity

In the following illustration, the concrete hatches are *bounded*, while the earth hatches are *unbounded*.



By default, bounded hatches are *associative*, which means that the hatch object is associated with the hatch boundary objects: changes to the boundary objects are automatically applied to the hatch.



Non associative hatches are not updated when their original boundary is changed.

Hatch associativity is turned on by default and is controlled by the HPASSOC system variable. You can change hatch associativity using the Associate button on the Options palette, the Properties palette, or the Hatch Edit dialog box.

Note: The OSOPTIONS system variable controls how object snaps work with hatch objects.

Customizing the Tools:

1. Click Manage tab ► Customization panel ► Tool Palettes.  Find
2. Drag a command from a toolbar to the tool palette. The horizontal line indicates the location of the tool.
3. On the tool palette, right-click the tool and select Properties.
4. In the Tool Properties dialog box, enter a name and description.
5. Under Command, in the Command String box, enter a string of commands or a script.

Working with multiple drawings

You can create multiple drawing views from Inventor linked models, within the same command session.

Note: Inventor Link is available only on 64-bit systems, and it is not installed by default.

1. In the Browser, choose the Drawing tab.
Note: If the Mechanical Browser is not visible turn it on using the AMBROWSER command.
2. Double-click a Layout to make it the active layout.
3. Right-click the Layout icon, and then choose New View.
4. In the Create Drawing View dialog box,
 1. View Type: Multiple
 2. Data Set: Select
 3. Choose OK.
5. Select the location of the projected view.
6. Continue placing as many views as desired.
7. Press ENTER to exit the command.