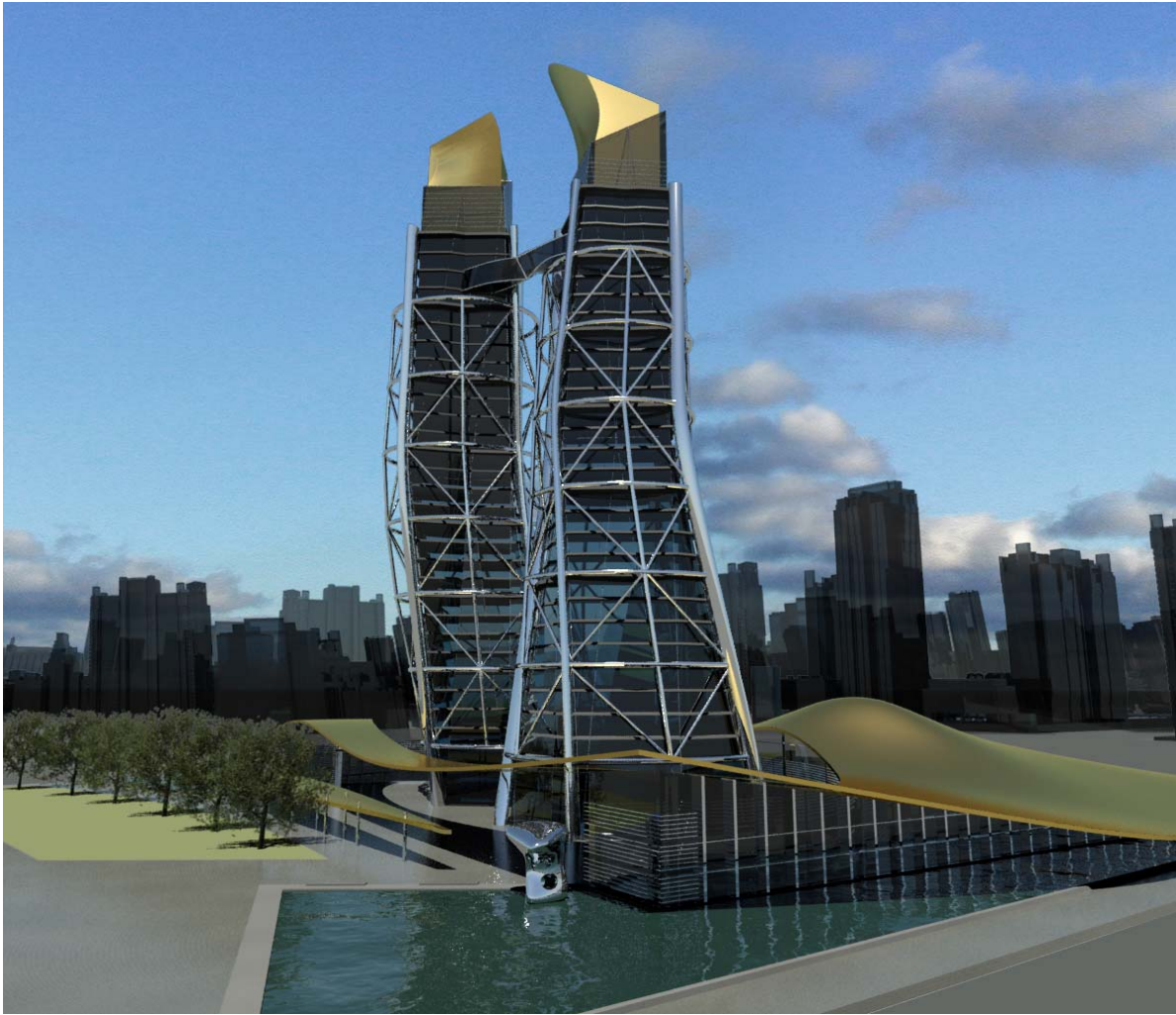


AutoCAD® 2010

# Preview Guide



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# Introduction

With AutoCAD® 2010 software, you can tackle your most challenging problems with ease. Your designs can now exist in any shape imaginable, thanks to free-form design tools. Many critical features have been automated, making your workflow more efficient and the move to 3D design even smoother. Sharing and working on projects with colleagues has never been easier, thanks to multiple upgrades to our PDF capabilities and the incredible addition of 3D printing. With these and countless other new capabilities you've been asking for, AutoCAD 2010 takes any idea and turns it into a reality faster than ever before.

## User Interface

### Initial Setup

Easily tailor the AutoCAD environment to meet your needs using Initial Setup, which is displayed the first time you launch AutoCAD. With Initial Setup you can choose your industry as well as workspace and drawing template preferences. The choices you make in the Initial Setup affect the default settings of various AutoCAD functionality, including drawing templates, Autodesk® Seek filters, Autodesk Developer Network partners, the Unified Online Experience portal, and workspaces.

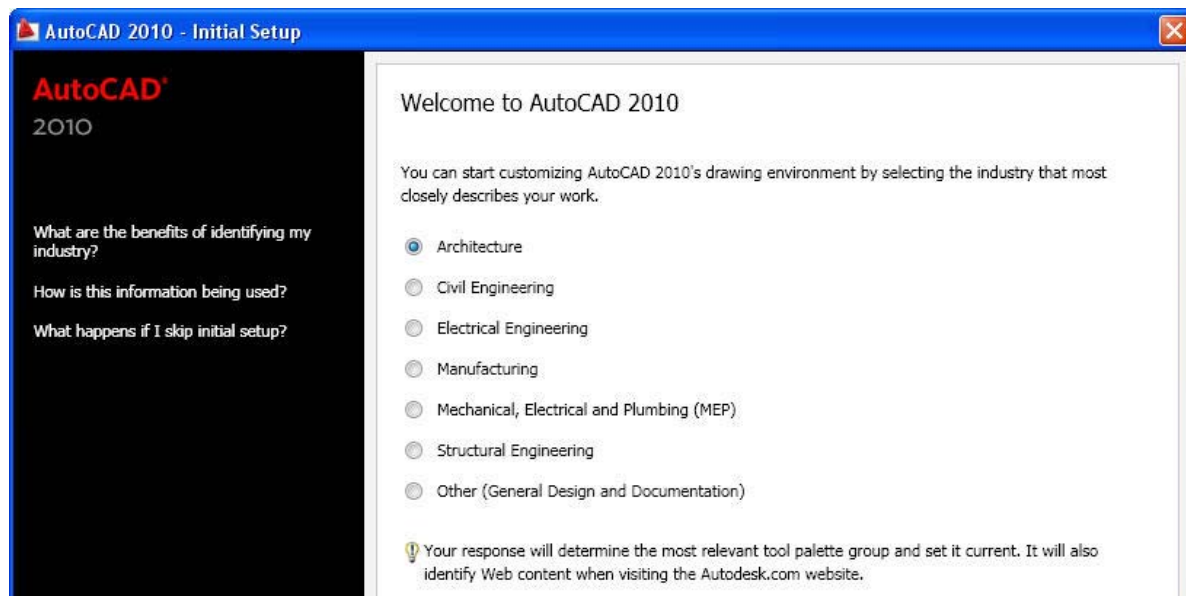


Figure 1. Initial Setup

You can access Initial Setup from the User Preferences tab of the Options dialog box.

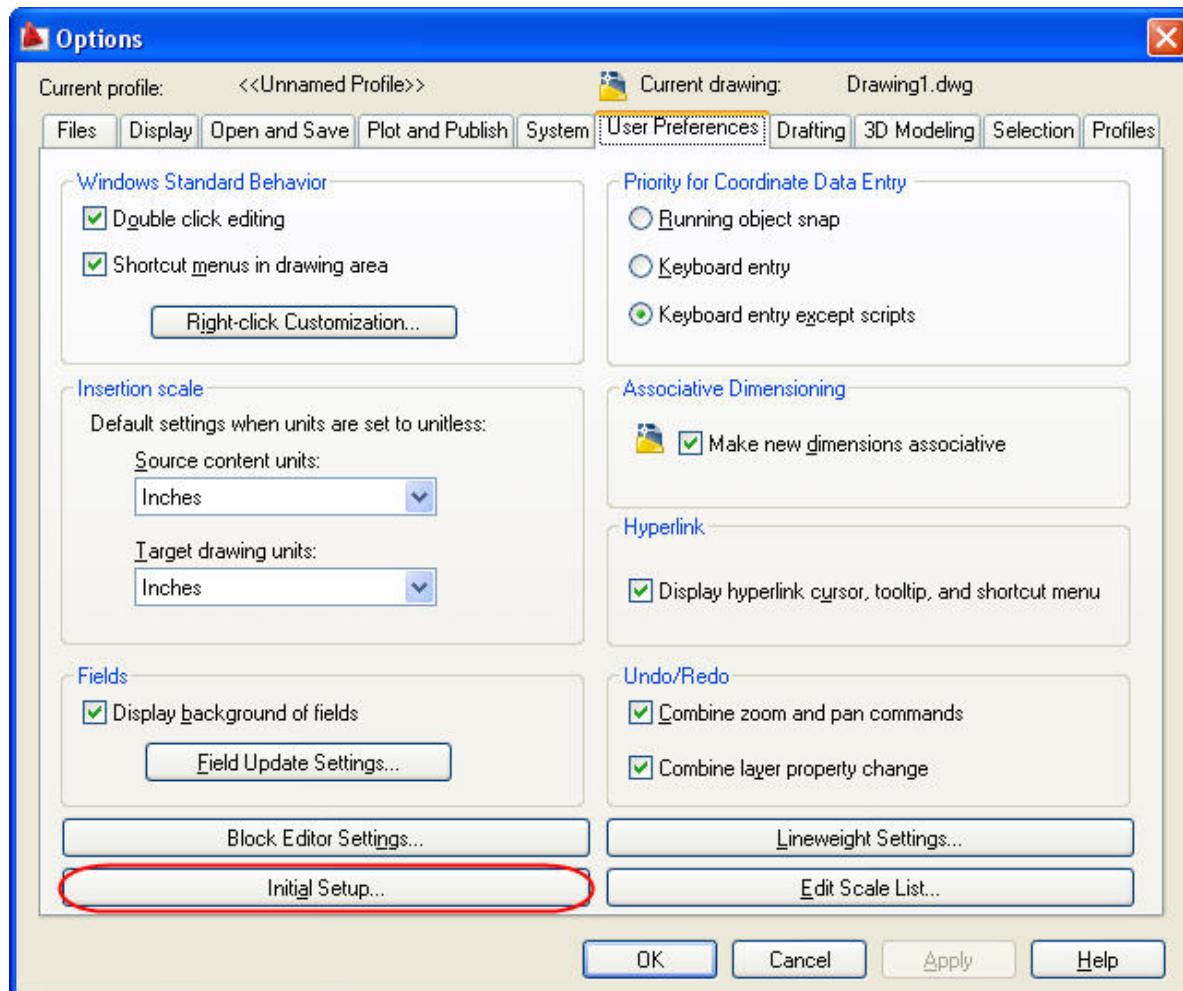


Figure 2. Initial Setup on User Preferences tab of the Options dialog box

## Workspaces

When you specify Initial Setup options, AutoCAD automatically creates a new workspace based on your choices and sets it current. The name of the current workspace is displayed in the status bar next to the Workspace Switching icon and you can select it to access the Workspace menu.

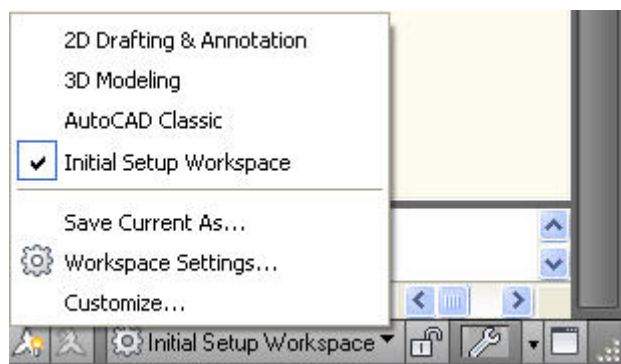


Figure 3. Workspace menu

## Application Menu

The Application menu, in the upper left corner of the AutoCAD display, has been streamlined to provide easy access to common tools. You can create, open, save, print, and publish AutoCAD files, send the current

drawing as an email attachment, and produce electronic transmittal sets. In addition, you can perform drawing maintenance, such as audit and purge, and close drawings.

A search tool at the top of the Application menu enables you to query the Quick Access toolbar, Application menu, and the currently loaded ribbon to locate commands, ribbon panel names, and other ribbon controls.

Buttons at the top of the Application menu provide easy access to Recent or Open documents and a new option in the Recent Documents list enables you to sort by access date in addition to size, type, and ordered list.

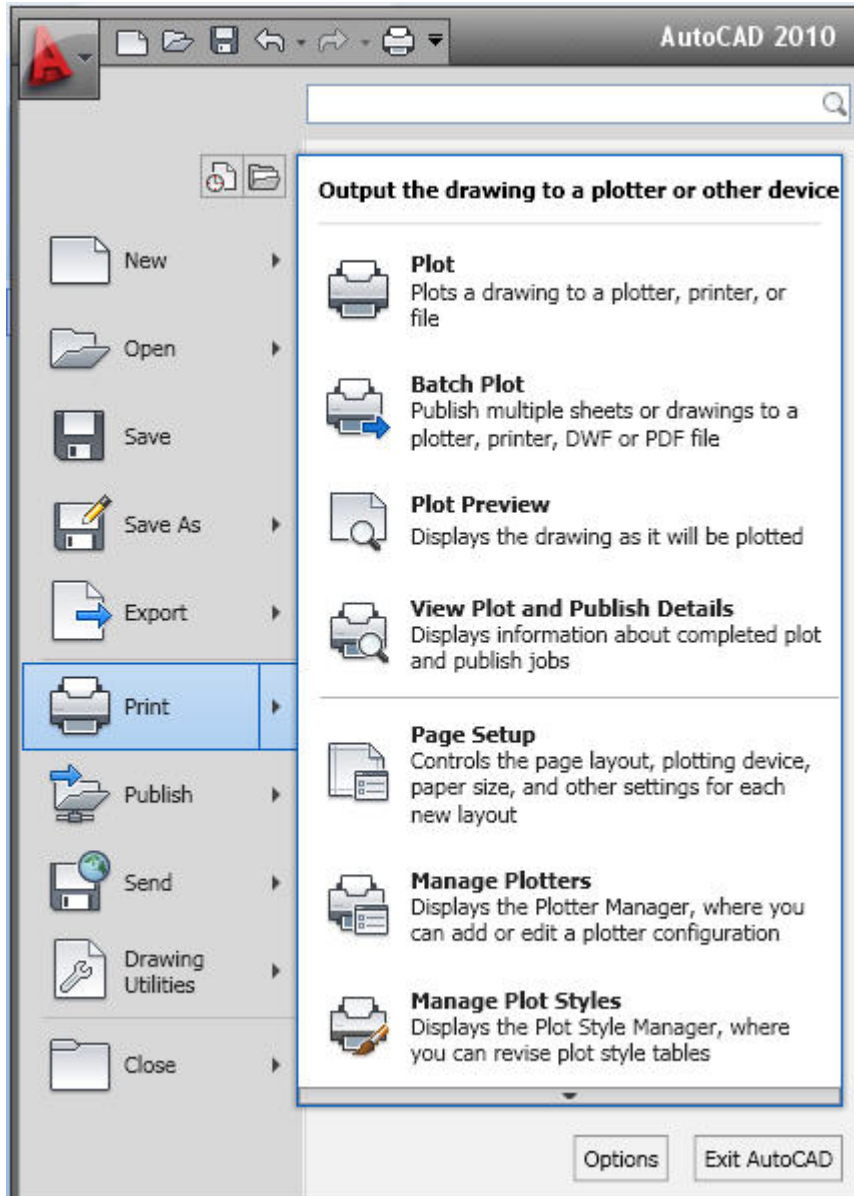


Figure 4. Application menu

## Ribbon

The ribbon has been updated to provide greater flexibility, easier access to tools, and consistency across Autodesk applications.

You can drag a ribbon panel off the ribbon to display it as a sticky panel. Sticky panels remain displayed, even when selecting a different tab, until you select the option to Return Panels to Ribbon.



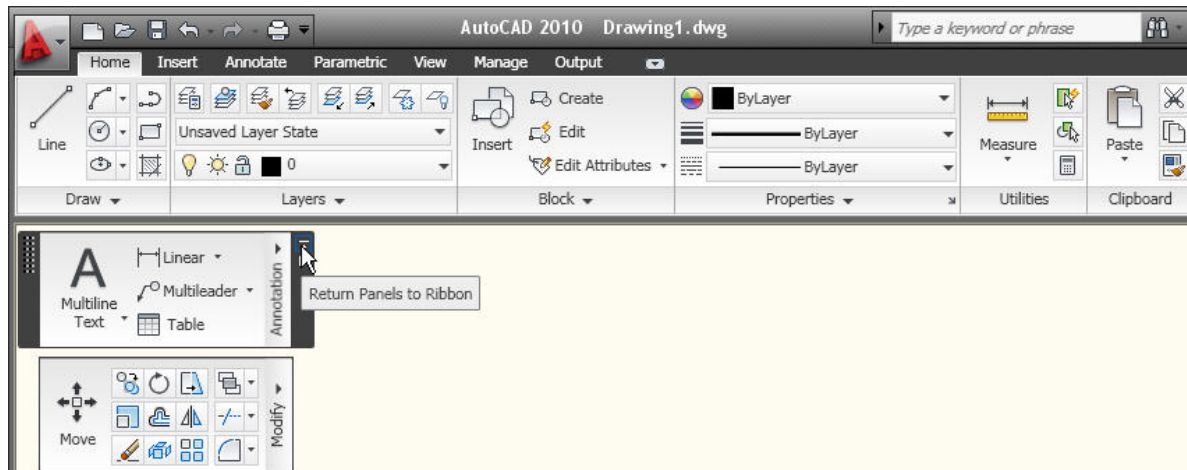


Figure 5. Ribbon and sticky panels

The vertical ribbon, which can be displayed by undocking the ribbon from its horizontal position, has been updated to show the tab names along the side. The panel titles are displayed by default and those with additional tools include slide-out panels. When resizing the vertical ribbon, buttons automatically flow to the next or previous row and other elements, such as slider bars, automatically shorten or lengthen.

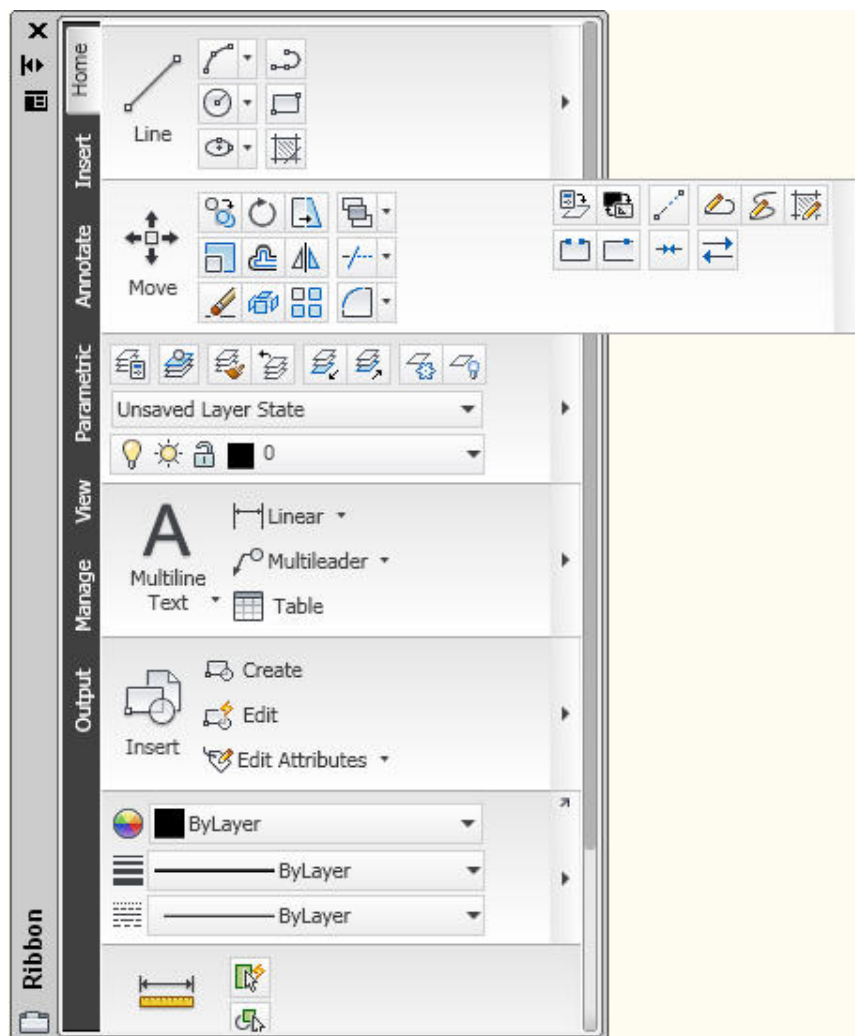


Figure 6. Vertical ribbon with slide-out panel

If you customized the Dashboard in AutoCAD 2008, you can easily convert your custom dashboard panels to new ribbon panels using the Transfer tab in the Customize User Interface (CUI) Editor. The newly converted panels are then displayed under the Ribbon Panels node in the same CUIx file as the dashboard panels. Once converted, you can add the new panels to a tab or transfer them to another CUIx file.

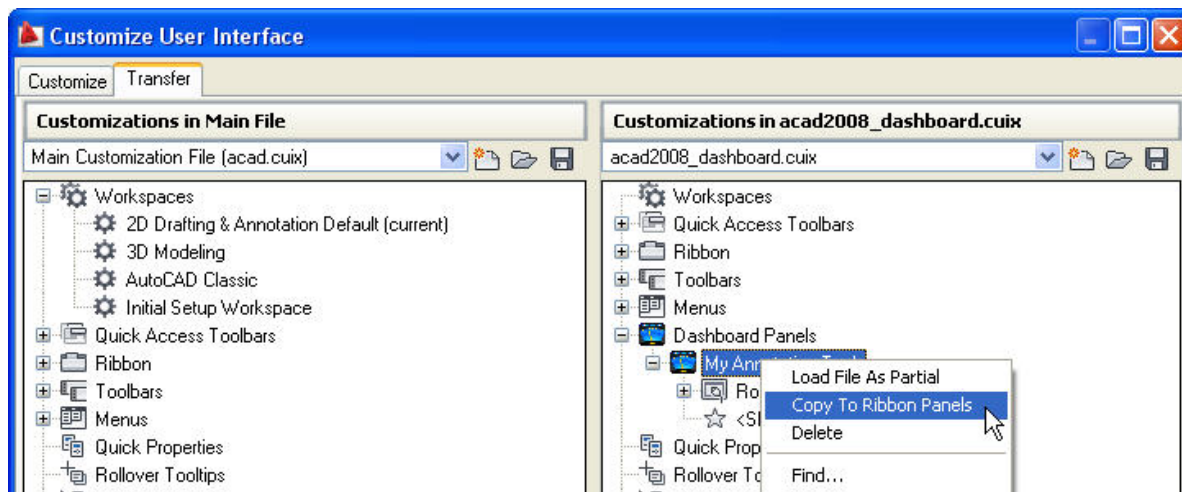


Figure 7. Dashboard conversion

Enhanced ribbon functionality in AutoCAD 2010 enables you to customize contextual ribbon tab states which control the display of ribbon tabs and panels based on either the type of object selected in the drawing window or the active command. You can display a ribbon tab that is assigned to a ribbon contextual tab state either on its own tab or with its panels merged onto each of the ribbon tabs in the current workspace. To add a ribbon tab, drag it from the Tabs node in the Customizations In pane to the contextual tab state. For example, if you want the Home tab to become active whenever you select an Arc object, drag the Home-2D ribbon tab to the Arc selected node under the Contextual Tab States. Select it and modify its display type to indicate if it should be displayed as its own tab or merged onto each ribbon tab.

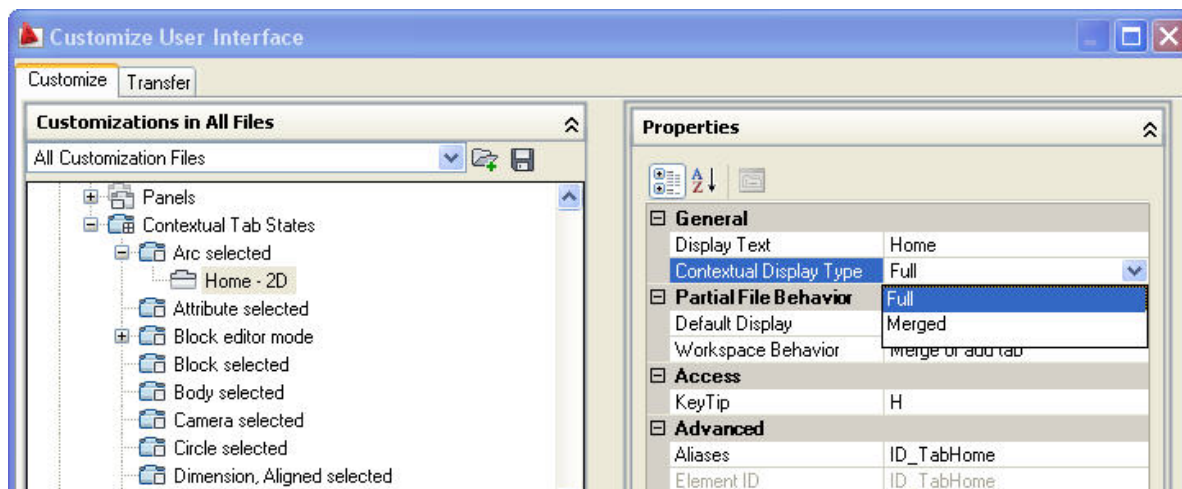
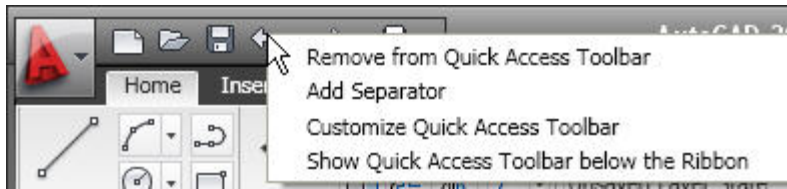


Figure 8. Ribbon Contextual Tab States

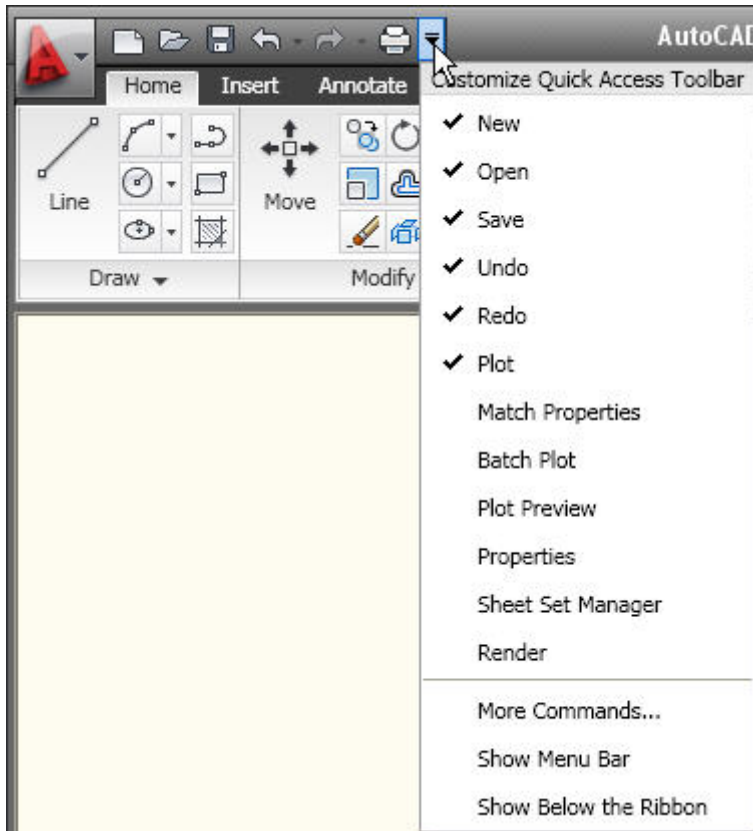
## Quick Access Toolbar

The Quick Access toolbar has been enhanced with more functionality and to ensure consistency with other Windows® applications. The Undo and Redo tools include history support and the right-click menu includes new options that enable you to easily remove tools from the toolbar, add separators between tools, and display the Quick Access toolbar above or below the ribbon.



*Figure 9. Quick Access toolbar right-click menu*

In addition to the right-click menu, the Quick Access toolbar includes a new flyout menu, which displays a list of common tools that you can select to include in the Quick Access toolbar. The flyout menu provides easy access to additional tools using the Command List pane in the CUI Editor. Other options enable you to show the menu bar or display the Quick Access toolbar below the ribbon.



*Figure 10. Quick Access toolbar flyout menu*

You can further customize the Quick Access toolbar using the new Quick Access toolbars node in the CUI Editor. Create multiple versions of the Quick Access toolbars and then add them to the appropriate workspaces.



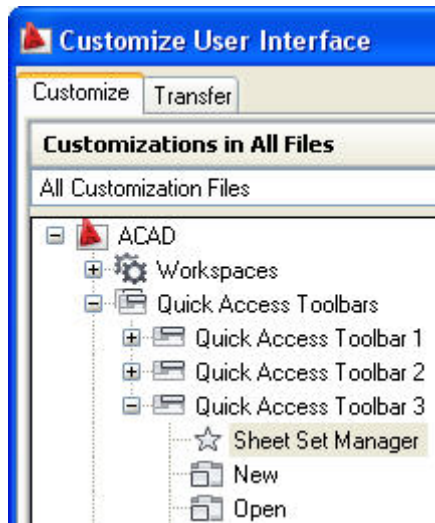


Figure 11. Quick Access toolbar customization

## New Features Workshop

The New Features Workshop has been updated to include AutoCAD 2010 functionality. This interactive learning tool helps you discover the newest functionality with minimal effort. You can access the New Features Workshop from the drop-down menu on the InfoCenter toolbar, to the right of the Help button.

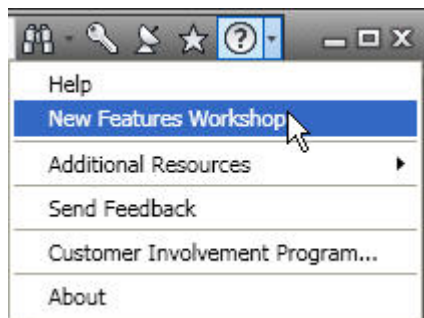


Figure 12. Access to the New Features Workshop

# Document

AutoCAD is synonymous with documentation for good reason. Drive your projects from concept to completion with the powerful documentation tools in AutoCAD 2010. Work faster with automation, management, and editing tools that minimize repetitive tasks and speed your time to completion. No matter your project's size or scope, you can meet the challenge with AutoCAD—continuously leading and innovating documentation for over 25 years.

## Parametric Drawing

Powerful new parametric drawing functionality in AutoCAD 2010 enables you to dramatically increase productivity by constraining drawing objects based on design intent. Geometric and dimensional constraints help ensure that specific relationships and measurements remain persistent even as objects are modified. The tools for creating and managing geometric and dimensional constraints are available on the Parametric ribbon tab, which is automatically displayed in the 2D Drafting and Annotation workspace.

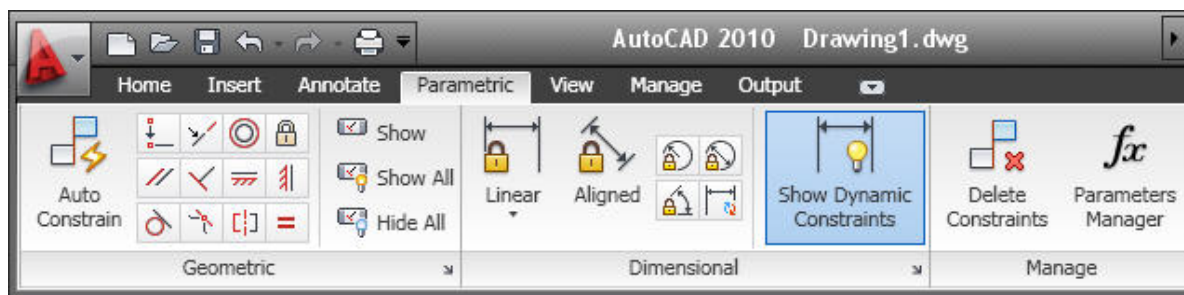


Figure 13. Parametric ribbon tab

## Establishing Geometric Relationships

Geometric constraints establish and maintain geometric relationships between objects, key points on objects, or between an object and the coordinate system. Pairs of key points on or between objects can also be constrained to be vertical or horizontal relative to the current coordinate system. For example, you could specify that two circles must always be concentric, that two lines are always parallel, or that one side of a rectangle is always horizontal.

### Applying Geometric Constraints

Geometric relationships are defined with GEOMCONSTRAINT, located on the Geometric Panel of the Parametric tab of the ribbon, or with the GEOMCONSTRAINT command. When applying constraints, an icon appears next to the cursor to help you remember which constraint you selected.

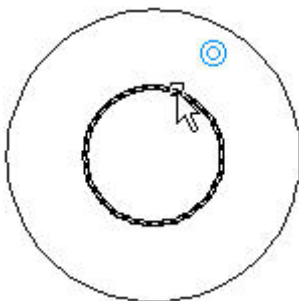


Figure 14. Concentric geometric constraint icon

When applying a constraint to points, a temporary marker identifies the closest valid point when rolling over an object. It generally corresponds with points that can be used as object snaps.

Whether selecting objects or points on objects to constrain, the order and pick location affects how the objects update: the second object selected updates to satisfy the constraint. After the constraint is applied, though, either object will update when the other is modified.

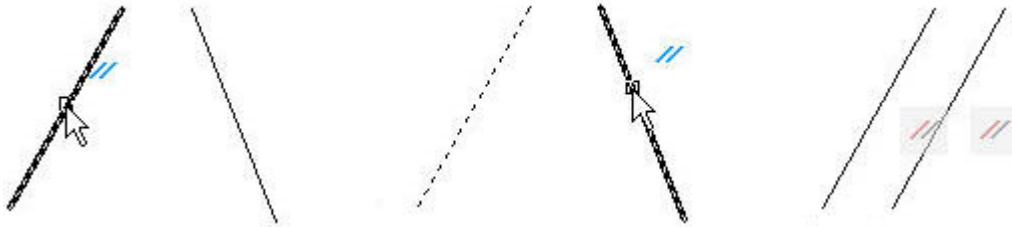


Figure 15. Applying a parallel constraint

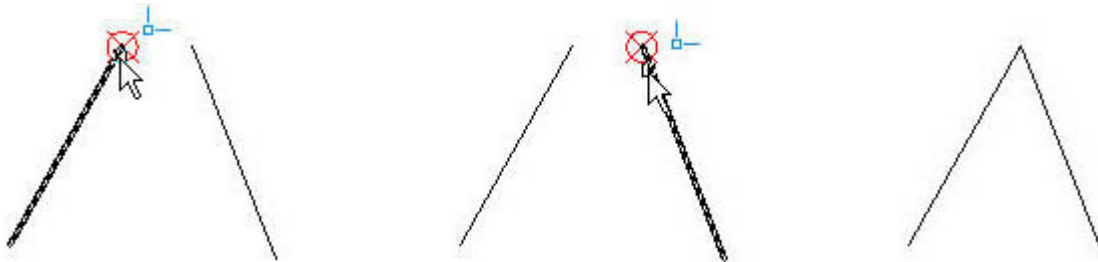


Figure 16. Applying a coincident constraint

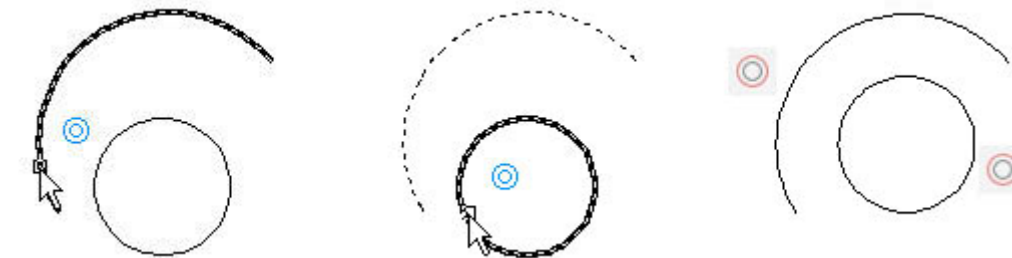


Figure 17. Applying a concentric constraint

### AutoConstrain

You can significantly automate the process of applying constraints using the AutoConstrain functionality, available on the Geometric panel of the Parametric tab. AutoConstrain automatically applies constraints to geometry that falls within specified tolerances. For example, applying AutoConstrain to a rectangle consisting of four lines generates the appropriate coincident, horizontal, parallel, and perpendicular constraints to maintain the rectangular shape through various edits. You can control which constraints are available, in what order they are applied, and a tolerance to determine whether constraints are automatically applied. These controls are available on the AutoConstrain tab of the Constraint Settings dialog box, which you can access from the Parametric tab or using the CONSTRAINTSETTINGS command.

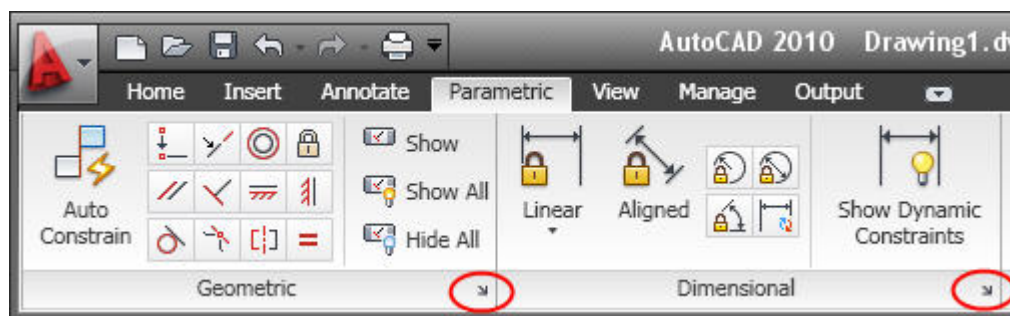


Figure 18. Access to Constraint Settings dialog box

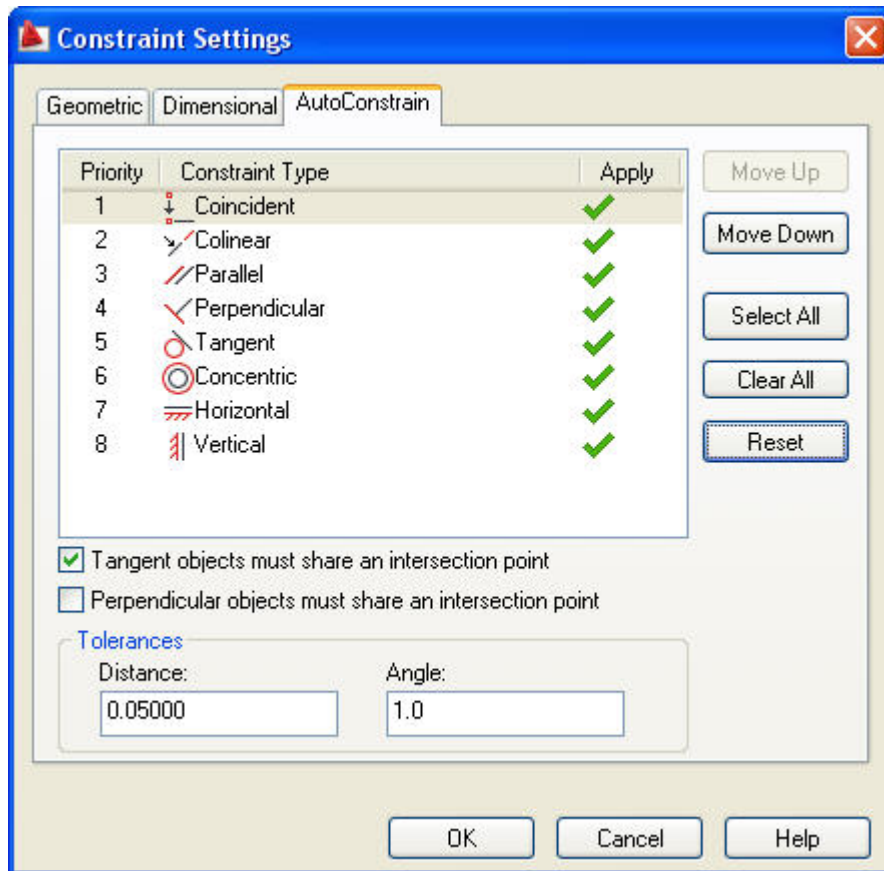


Figure 19. Constraint Settings dialog box, AutoConstrain tab

### Constraint Bars

Constraint bars show the constraints applied to an object. You can control the display of constraint bars using the CONSTRAINTBAR command or the Show, Show All, and Hide All options on the Geometric panel of the Parametric ribbon tab.

When constraint bars are displayed, you can pass the cursor over a constraint to view the constraint name and the objects that it affects.

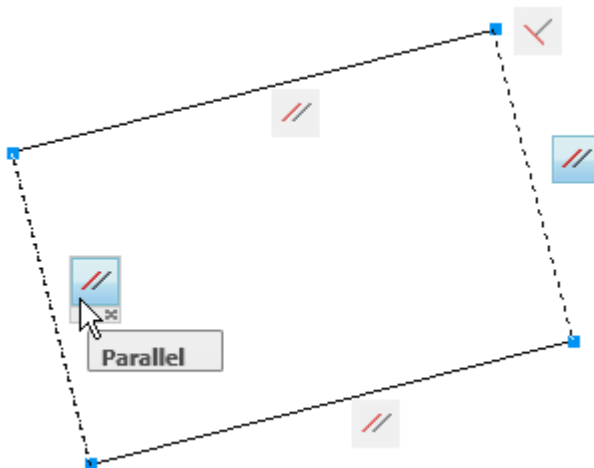


Figure 20. Constraint bar

You can further control the display of constraint bars on the Geometric tab of the Constraint Settings dialog box. Options include the ability to individually specify which types of constraints can be displayed in the constraint

bar, apply transparency, and automatically show the constraint bars after applying constraints to selected objects regardless of the current constraint bar visibility setting.

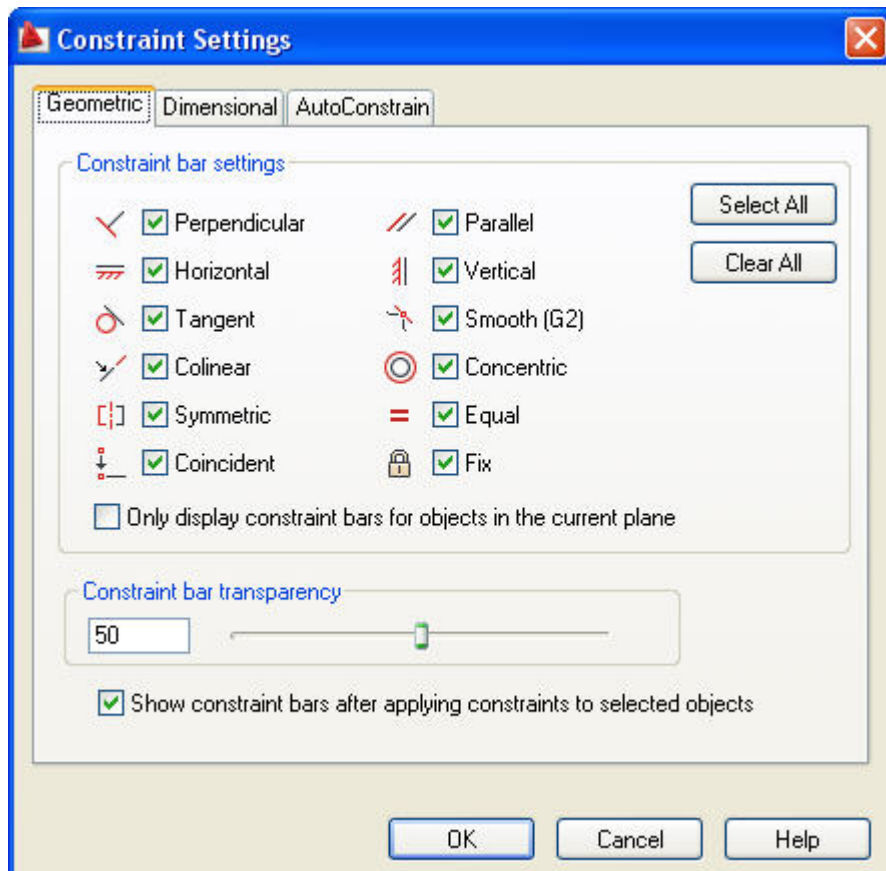


Figure 21. Constraint Settings dialog box, Geometric tab

## Establishing Dimensional Relationships

Dimensional relationships put limits on measurements of geometry. For example, you could use a dimensional constraint to specify the radius of an arc, the length of a line, or that two parallel lines are always 15 mm apart. Changing the value of a dimensional constraint forces a change in geometry.

You can create dimensional constraints from the Dimensional panel of the Parametric tab or with the DIMCONSTRAINT command. There are seven types of dimensional constraints, similar to the different kinds of dimensions: Linear, Aligned, Horizontal, Vertical, Angular, Radial, and Diameter. In fact, you can use the DIMCONSTRAINT command to convert a traditional dimension to the corresponding dimensional constraint.

Dimensional constraints are assigned a name when created. The text of a dimensional constraint can display its name, value, or its name and expression (name = formula or equation or value). A “lock” icon appears next to all dimensional constraints to help you visually distinguish them from regular dimensions. By default, dimensional constraints are displayed with a fixed system style that is zoom-invariant—it stays the same size relative to the screen when you zoom in and out so it is always readable.



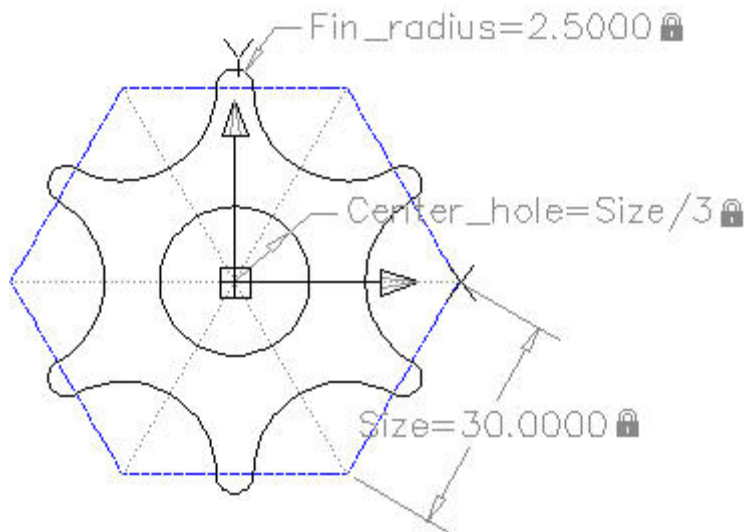


Figure 22. Dimensional constraints

You can control the display of dimensional constraints, including the visibility of the lock icon, from the Dimensional tab of the Constraint Settings dialog box.

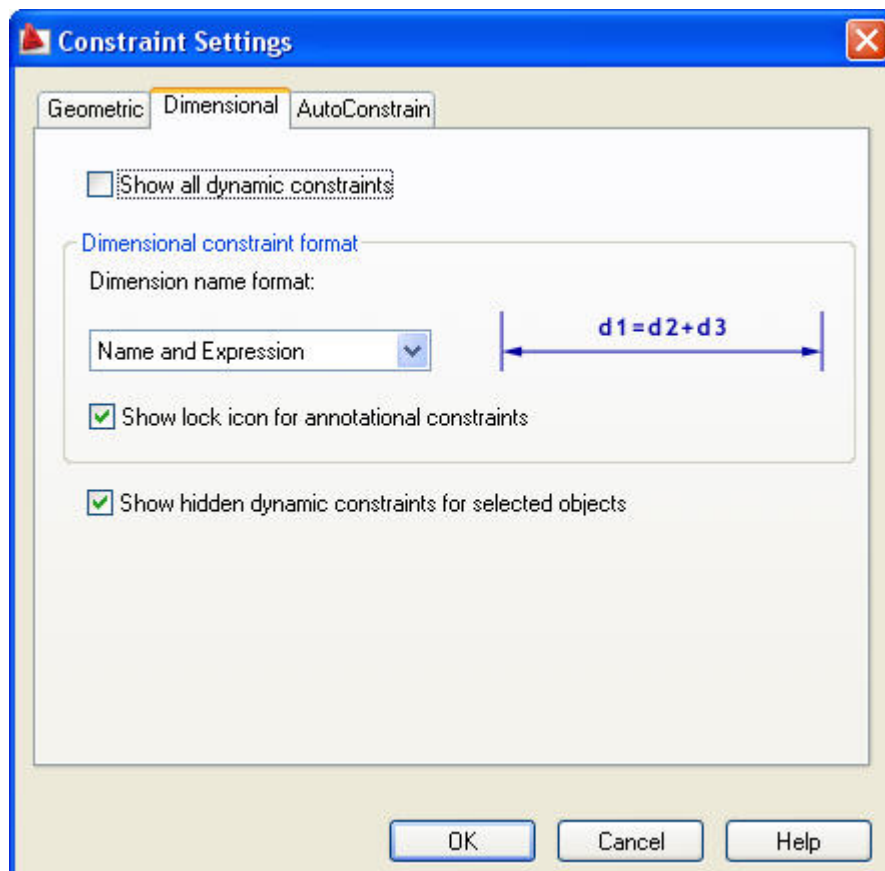


Figure 23. Constraint Settings dialog box, Dimensional tab

Easily edit a dimensional constraint using grips or by double-clicking on the dimension text to enter values. When you double-click, the constraint name and expression are automatically displayed regardless of the constraint format setting. You can enter just a value, or a name and value using the format name=value (for example, Width=1.5 or Width=Length/3). You can rename dimensional constraints, and use those names in

formulas to set the values of other constraints. For example, if you have a rectangle with constraints named “length” and “width,” you could define the value of “width” as “length/3” to constrain the rectangle’s width to 1/3 of its length.

### User-Defined Parameters

The Parameters Manager, available from the ribbon, enables you to manage dimensional parameters as well as create and manage user-defined parameters. You can provide a meaningful name for the parameter and then assign a numeric value or formula as its expression. A parameter’s expression can reference other parameters so that its value automatically updates when the other parameter values change.

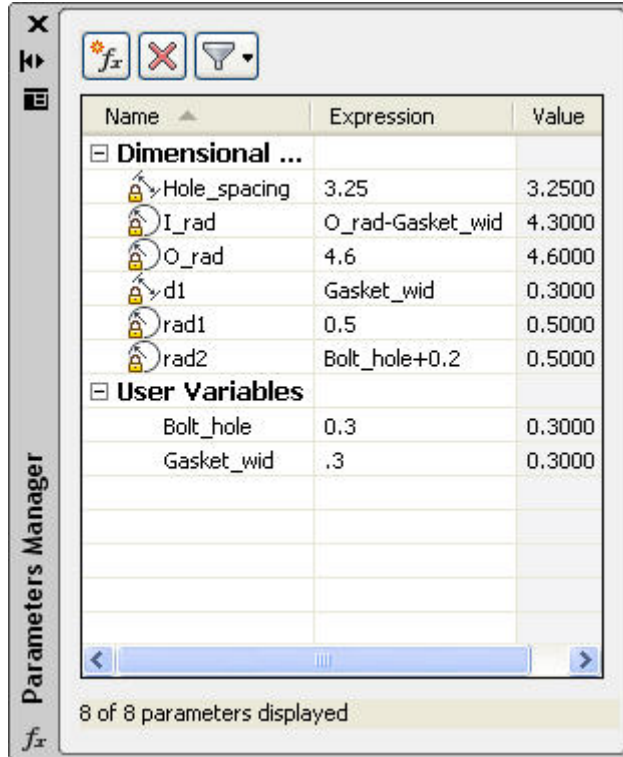


Figure 24. Parameters Manager

### Constraint Forms

Dimensional constraints can take one of two forms: Annotational or Dynamic. Both forms control geometry in the same way, but they differ in their appearance and the way they are managed.

Dynamic dimensional constraints are not intended to be used as plotted annotation and they have a predefined style that cannot be modified. The display height is controlled by the BPARAMETERSIZE system variable. The visibility of dynamic constraints can be controlled in a variety of ways. First, you can show or hide all dynamic constraints with two icons on the ribbon. Second, even if dynamic constraints are hidden, you can choose to display them when a constrained object is selected, by using the checkbox in the Constraint Settings dialog or the DYNCONSTRAINTMODE system variable. Finally, even if dynamic constraints are set to “Show All,” they will only appear if at least one of the constrained objects is visible (on a layer which is On and Thawed).

Annotational constraints look just like dimension objects, and are managed the same way. They have all the same properties as regular dimensions, including Style. Annotational constraints are intended to be used for plotted dimensional constraints.

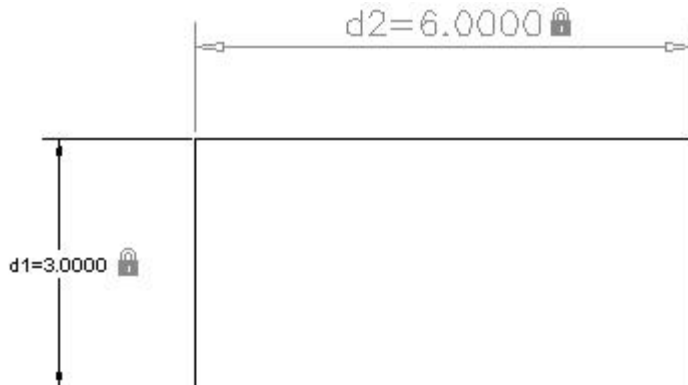


Figure 25: Rectangle with one annotational and one dynamic dimensional constraint

You can specify which constraint form is applied by default using the CCONSTRAINTFORM system variable. Additionally, you can specify the constraint form when using the DIMCONSTRAINT command to create a new dimensional constraint. Even after you have created a dimensional constraint, you can easily change its constraint form using the Properties palette.

## Dynamic Blocks

Dynamic blocks have been enhanced to support geometric and dimensional constraints. They also support the ability to define a table of variations of the dynamic block, and some general enhancements have been made to the block editing environment.

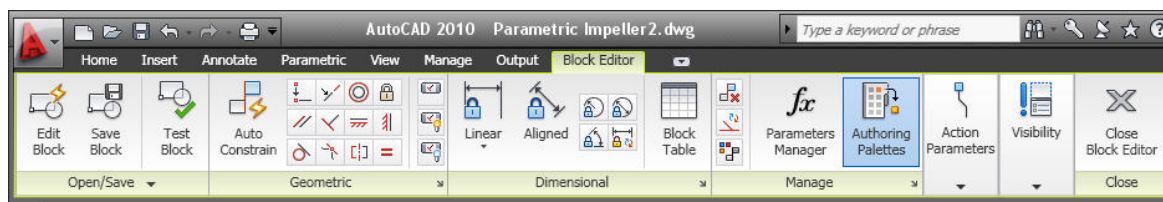


Figure 26. Block Editor ribbon tab

## Geometric Constraints

You can apply geometric constraints to objects in the Block Editor in the same way as in the Drawing Editor. Constrained geometry in the Drawing Editor that is copied into the Block Editor, or selected when creating a block with the Block command, will remain constrained in the Block Editor.

## Constraint Parameters

You can apply dimensional-type constraints, called constraint parameters, to objects within a block. Constraint parameters behave like dimensional constraints but they also expose their name as a property for the block reference similar to dynamic block parameters. You can access constraint parameters from the Dimensional panel of the Block Editor tab in the ribbon or with the BCPARAMETER command. Constraint parameter options include Linear, Aligned, Horizontal, Vertical, Angular, Radial, and Diameter.

## Construction Geometry

Sometimes it is helpful to add construction geometry when constraining geometry to achieve the behavior you desire. The Block Editor provides a construction geometry tool (BCONSTRUCTION command) that enables you to convert existing objects to construction geometry. The construction geometry is visible in the Block Editor and can be constrained, but it does not display or plot in the block reference.

## Parameters Manager

A Parameters Manager is available in the Block Editor. It lists user parameters, legacy action parameters, block constraint parameters, and attributes. Using the Parameters Manager, you can control whether or not a parameter is displayed in the Properties palette for a selected block reference and you can specify the order in which the parameters appear.

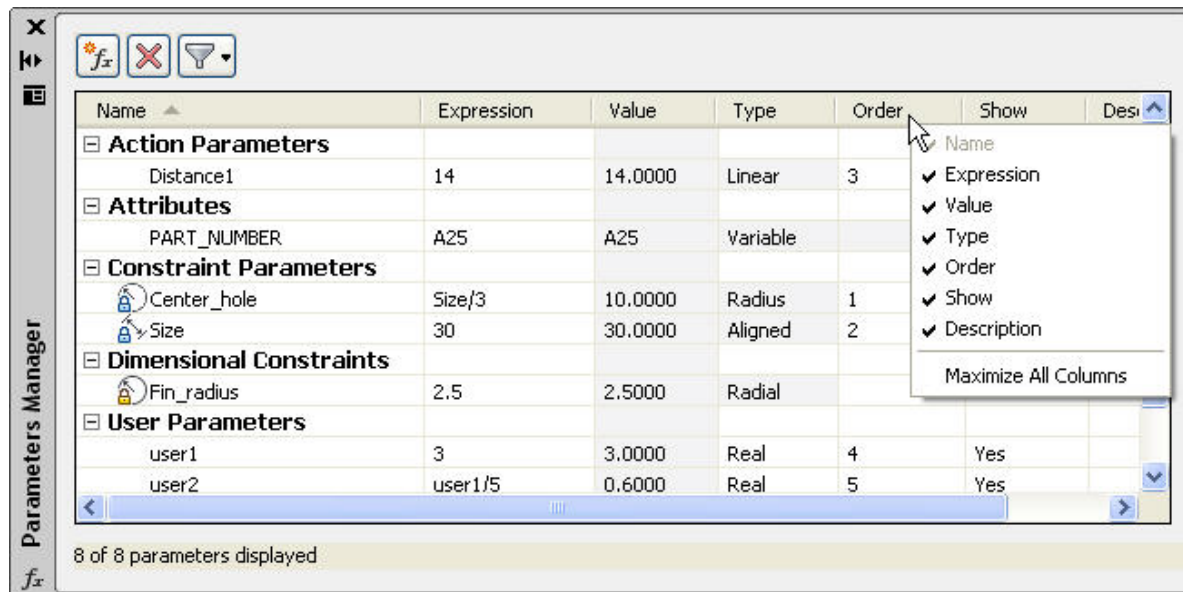


Figure 27. Block Editor Parameters Manager

### Test Blocks

A new Test Block tool (BTESTBLOCK command) enables you to test a block definition while authoring dynamic blocks. When you use this tool, AutoCAD opens a temporary window, similar to a drawing window, with the block reference already inserted. The Test Block Window is easily identifiable by the title bar, background color, and the contextual ribbon tab which includes a button to Close Test Block. When you close the test block, you're automatically returned to the Block Editor.

### Block Properties Table

A new Block Table tool has been added to the Block Editor. Accessible from the Dimensional panel of the ribbon, or the BTABLE command, it displays the Block Properties Table where you can define different variations of a property set for the block reference. You can enter properties manually or copy and paste from a Microsoft® Office Excel® spreadsheet.

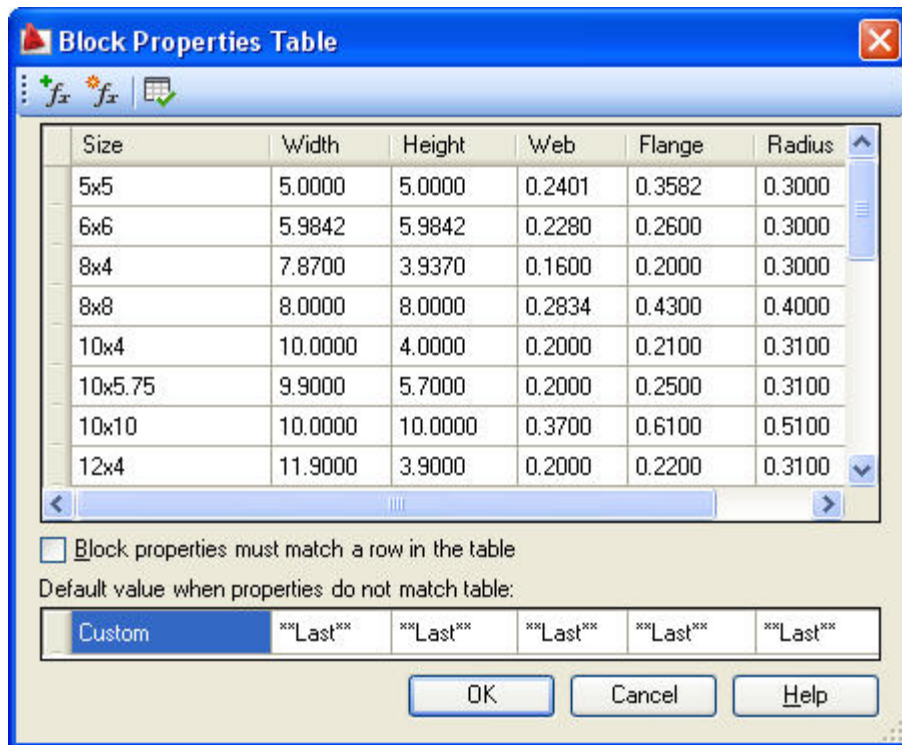


Figure 28. Block Properties Table

A menu grip on the inserted block reference enables you to switch between different sets of values or rows in the table.

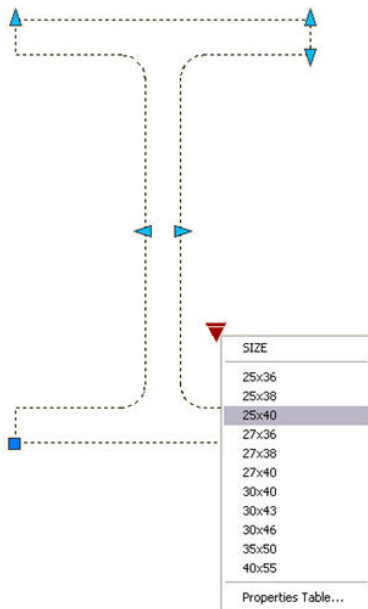


Figure 29. Block Properties Table grip

Selecting "Properties table.." from the grip menu displays the Block table, enabling you set the block to the values defined by any row in the table.

### Action Bars

The display and positioning of Action objects in the Block Editor is enhanced to be consistent with Constraint bars. Action objects are no longer placed individually in the Block Editor; rather they are automatically grouped



into Action bars based on the parameters with which they are associated. You can toggle between the new and old display styles by setting the BACTIONBARMODE system variable prior to entering the Block Editor.

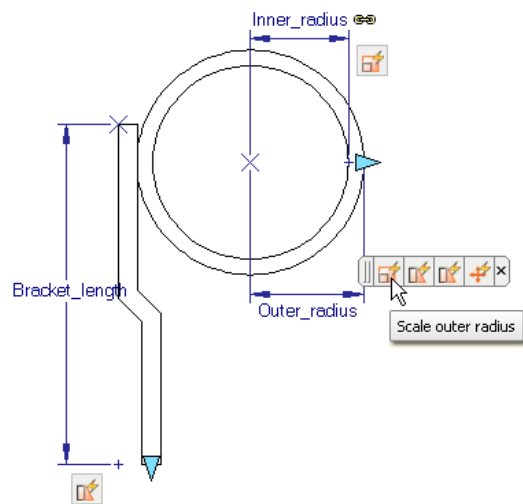


Figure 30. Action bars

When viewing the block definition with Action bars turned on, you can quickly tell which actions are associated with which parameters and how many actions each of the parameters affects. You can also see which parameter has its “Chain actions” property enabled. If you roll over an action in an Action bar, both the associated parameter and affected geometry are highlighted.

### Block Editor Settings

A new dialog box, launched with the command BESETTINGS, enables you to control all the settings for the Block Editor environment in one place. You can apply colors to objects based on their constraint status, making it easy to identify objects that are partially, fully, or over-constrained, or that have no constraints at all. The system variable BCONSTATUSMODE controls whether this shading is used.

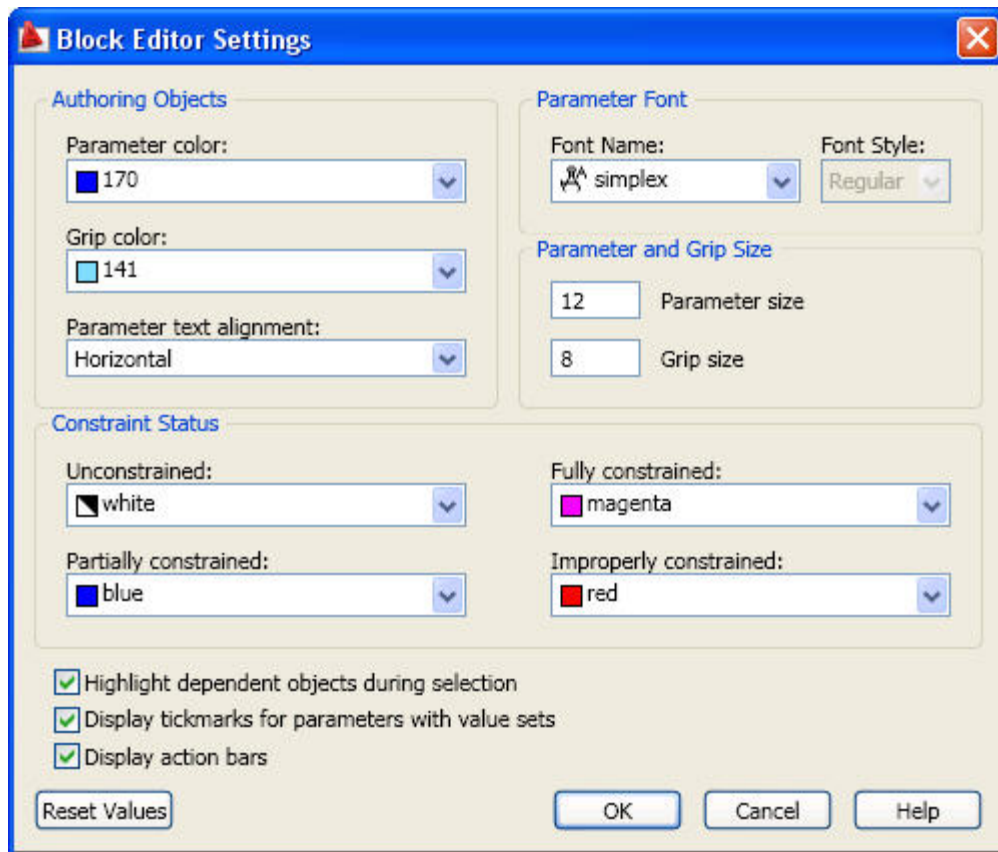


Figure 31. Block Editor Settings

### Authoring Blocks with Constraints versus Parameters and Actions

When creating dynamic blocks using geometric and dimensional constraints, it is generally recommended that you don't mix them with parameters and actions. For example, if you apply geometric constraints to the geometry in the block definition, you should use constraint parameters to define custom properties for the block instead of the action parameters. It is also recommended you add a Fix constraint to the definition and fully constrain the block. You can check whether the block is fully constrained by clicking on the Constraint Status in the ribbon.

## Annotation Tools

### Find and Replace

Find and Replace functionality has been enhanced for increased efficiency. You can use the new Zoom button to zoom to a highlighted text object, similar to double-clicking on the item within the results list. Additional buttons enable you to quickly create a selection set that includes all of the objects in the results list or only those that are highlighted.

### Multileaders

Edit the properties of individual Multileader segments by using the CTRL key to select the segment and then accessing the Properties window. New grips at each corner of the leader text enable you to resize the text box in the same way you resize a simple mtext object.

Mleader styles have been enhanced to provide you with more control over the leader connections. On the Leader Structure tab, you can specify Vertical attachment in addition to the traditional Horizontal attachment. On the Content tab, when a Block multileader type is selected, you can specify a scale. The block scale is also displayed as a Multileader property in the Properties window. A new button on the Content tab provides direct access to the Text Style dialog box enabling you to create and modify text styles without exiting the Multileader Style dialog box.

The MLEADEREDIT command has been streamlined by eliminating the need for you to select an option to add or remove leader lines. It adds leaders by default until you select the option to remove leaders.

## Mtext

Mtext improvements include a default column mode of Dynamic with manual height. In addition, the corner grips on mtext objects are now consistent with the corner grips on table objects.

## Spell Checker

The Check Spelling dialog box has been updated to include an Undo button, which enables you to undo actions you made for the previous spelling mistake. In addition, the Select Objects button has been enhanced so that you can begin selecting objects to check without first having to choose the Select Objects option from the drop-down list.

## Dimensions

Enhancements to dimension styles and properties provide more control over the display and placement of dimension text.

The Text tab of the Dimension Style dialog box has been updated with a new text placement option that enables you to position dimension text below the dimension line. You can control the direction of the text using the new View Direction option in which you can specify that the text be displayed from Left-to-Right or Right-to-Left. The Properties palette has been updated to include these new properties as well.

The Primary and Alternate Units tabs of the Dimension Style dialog box include new sub-unit controls for suppression of leading zeros. You can specify a sub-units factor and suffix. For example, if the unit is 1 meter, you could specify a sub-unit factor of 100 and sub-unit suffix of cm. In this case, when the dimension value is less than 1, such as .96, it displays as 96 cm instead of .96 m. The new sub-units properties are also included in the Properties palette.

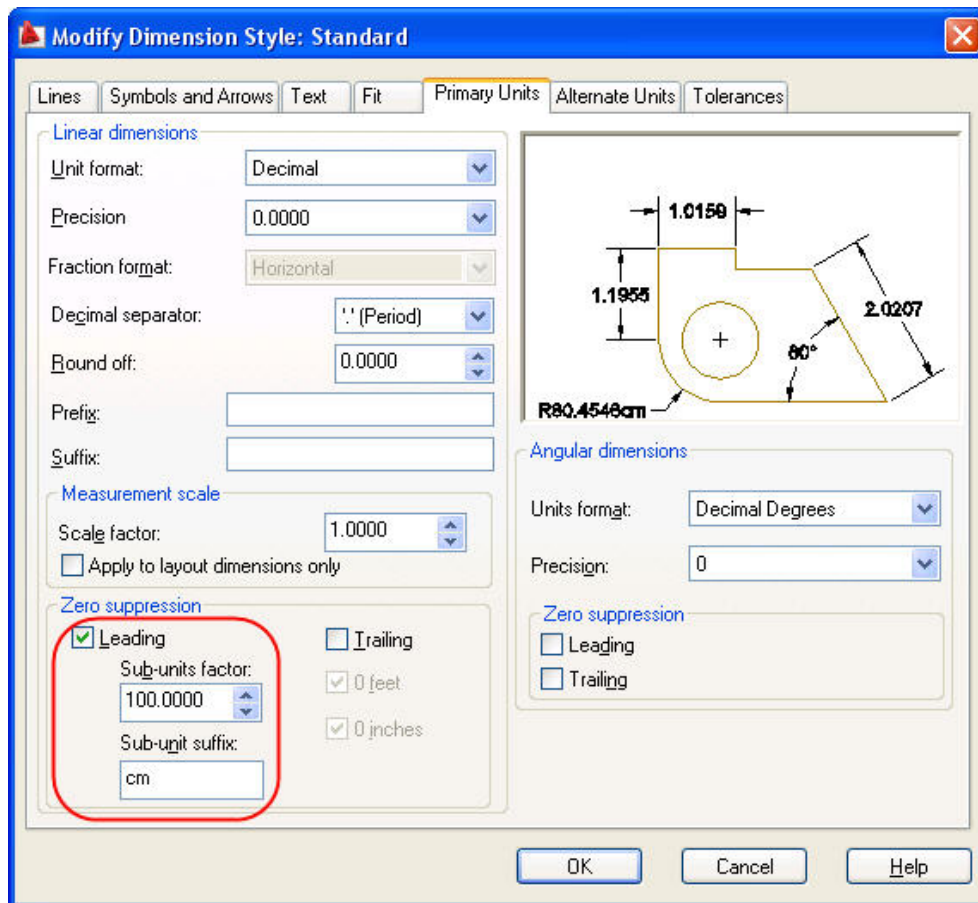


Figure 32. Sub-unit controls

## Hatch

When a hatch boundary area is not found, AutoCAD attempts to show you where the problem may have occurred. Red circles appear around endpoints near where any gap in geometry is estimated to be.

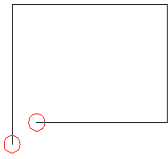


Figure 33. Hatch boundary gap

Additional enhancements provide more robust boundary detection and the ability to edit non-associative hatch objects. You can select on a non-associative hatch and then use intuitive grips to dynamically change its shape.

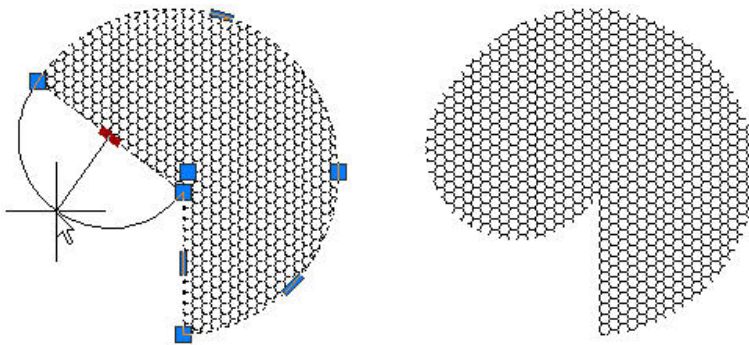


Figure 34. Non-associative hatch editing

## Color Selection

In AutoCAD 2010, you can set layer colors and pick from the AutoCAD Color Index with ease. Access the Select Color dialog box directly from the Layer drop-down list by selecting on the layer color swatch. If the layer has a viewport color override, the color swatch has a white border. The new color you select applies to the appropriate viewport color override or global color. Behavior within the Select Color dialog box has also been improved. As you hover the cursor over a color swatch, the arrow cursor and a black border are displayed in addition to the traditional white border making it easier to see which swatch you are about to select.

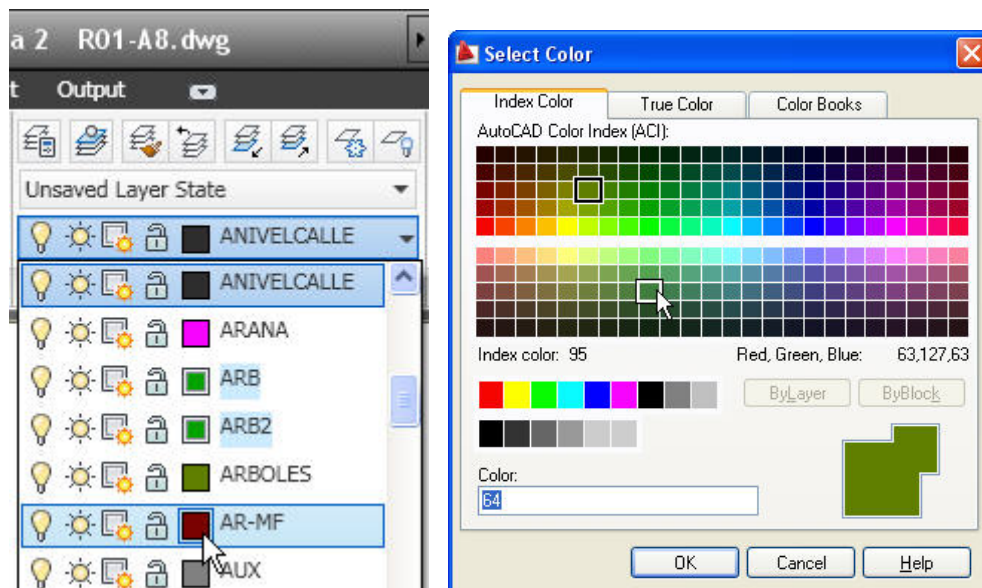


Figure 35. Color selection

## Measure Tools

The new MEASUREGEOM command enables you to measure the distance, radius, angle, area, or volume of a selected object or a sequence of points. You can access these tools from the Utilities panel of the Home ribbon tab. The default option is Distance. However, selecting a different measure tool will set it as the default for the remainder of the AutoCAD session or until a different tool is selected.

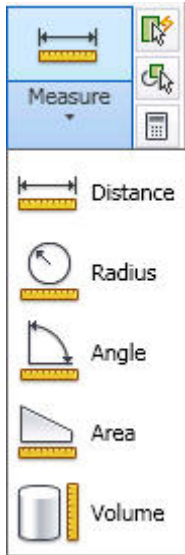


Figure 36. Measure tools

The Distance tool enables you to measure the distance between two points. AutoCAD visually displays the distance, delta x, delta y, and angle in the xy plane within the Drawing Editor. If you select the Multiple option, you can continue picking points and, with each pick, AutoCAD displays the cumulative distance. Other options within the Distance tool are similar to the Polyline command enabling you to switch between Line and Arc measuring modes.

You can use the Radius tool to display the radius of a selected arc or circle. The Angle tool measures the angle of a specified arc, circle, line, or vertex.

The Area tool enables you to specify points or select objects to display the included area. You can use the Add or Subtract options to determine cumulative areas. As you specify points or select objects, the included area dynamically highlights so that you can see what you've selected! Additional options within the Area tool enable you to switch between line and arc measuring tools so that you can easily measure curved spaces as well as polygonal.

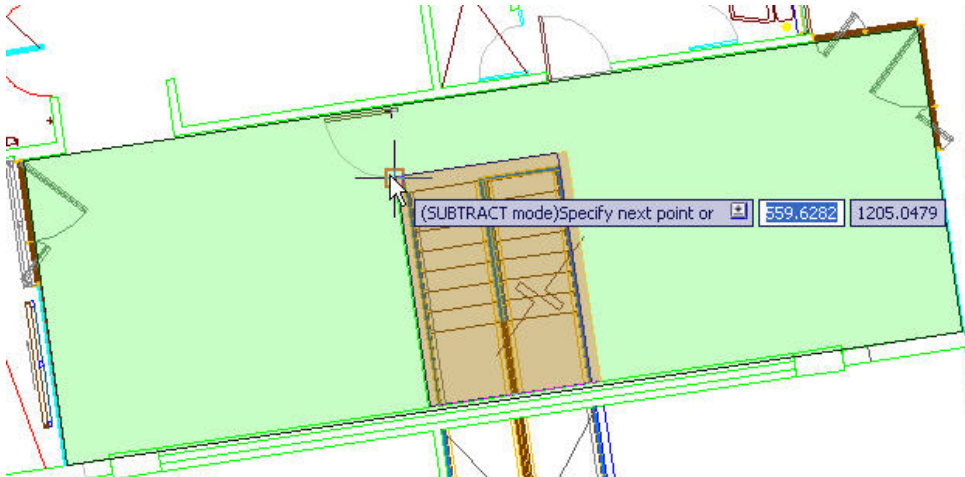


Figure 37. Area highlighting



You can use the Volume tool to specify boundary points with visual feedback similar to the Area option, and then specify a height to determine the volume. Additionally, you can display the volume of selected solids or regions.

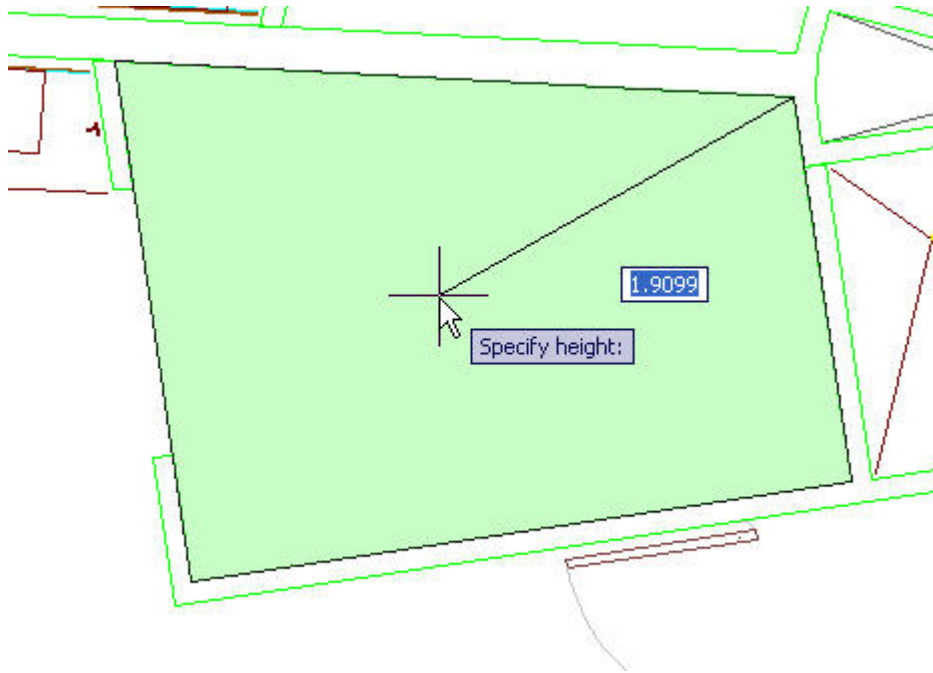


Figure 38. Volume highlighting

## Reverse Tools

The new REVERSE command enables you to reverse the direction of lines, polylines, splines, and helixes. Simply select the object(s) to reverse. The ability to change the direction of these objects provides you with more control, such as the display of special linetypes.

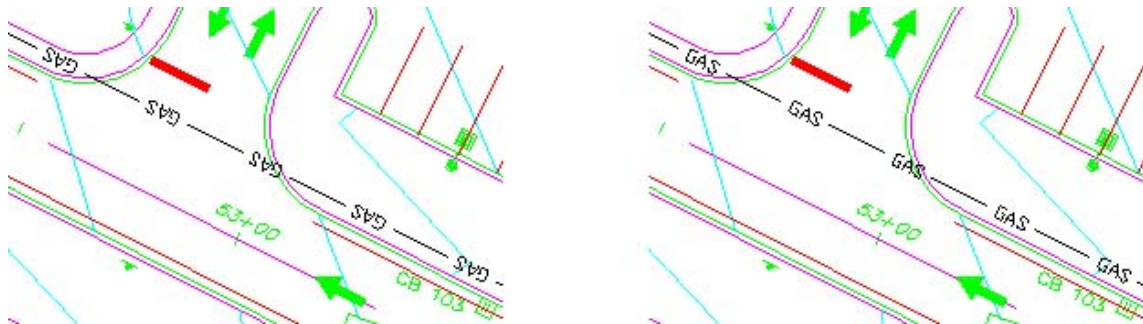


Figure 39. Reverse results

In addition to the new REVERSE command, the PEDIT command has been updated to include a new Reverse option. Simply select the polyline you want to edit and choose the Reverse option. The results are the same as using the REVERSE command.

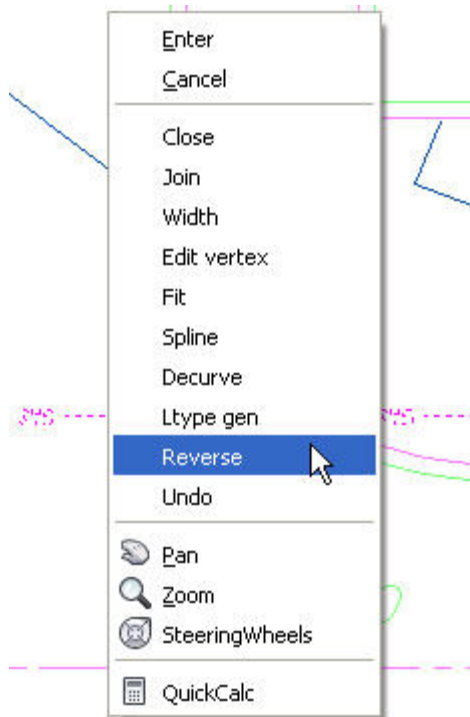


Figure 40. Reverse option

## Spline Editing Tools

The updated SPLINEDIT command includes a new option to convert a spline to a polyline. You can launch the SPLINEDIT command from the Modify ribbon panel. Select the spline you want to edit and choose the Convert to Polyline option. You'll then be prompted to specify a precision for the conversion. Enter any value between 0 and 99. The higher the value, the more accurate the polyline.

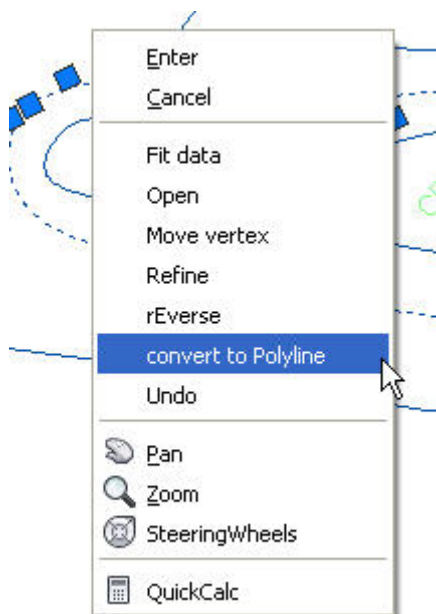


Figure 41. Convert to Polyline option

In addition to the new Convert to Polyline option in the SPLINEDIT command, you can use the updated PEDIT command to select a Spline object and automatically convert it to a polyline. After selecting the spline and confirming that "Yes" you really do want to convert it, you can specify the precision between 0 and 99.

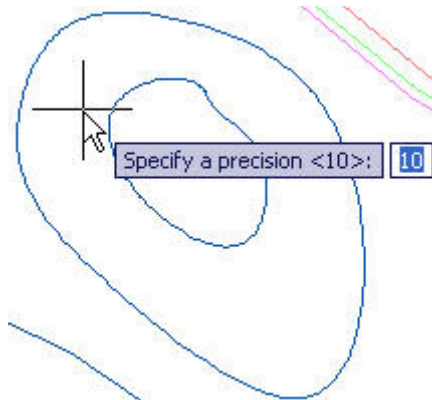


Figure 42. Spline to polyline precision

To further control the accuracy when converting splines to polylines, you can use the new PLINECONVERTMODE variable to specify the fit method. When PLINECONVERTMODE is set to 0, polylines are created with linear segments. When it's set to 1 (the default), polylines are created with arc segments.

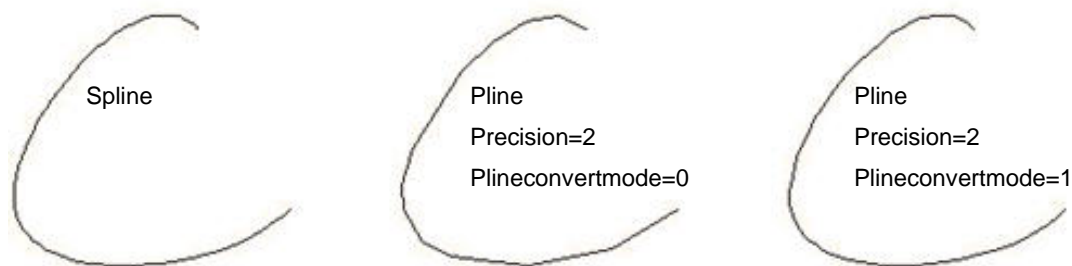


Figure 43. Pline conversion mode

The DELOBJ variable has been updated to support the PEDIT and SPLINEDIT commands. If you're not familiar with the DELOBJ variable, it was introduced as a way to control whether geometry used to create 3D objects (profiles, paths, etc) is retained or deleted. It is typically accessed via the 3D Modeling tab of the Options dialog box. When DELOBJ is set to 0, the option to Retain Defining Geometry, the original spline is retained in addition to the new pline, which is created. When DELOBJ is set to any other option/value, the original spline is deleted.

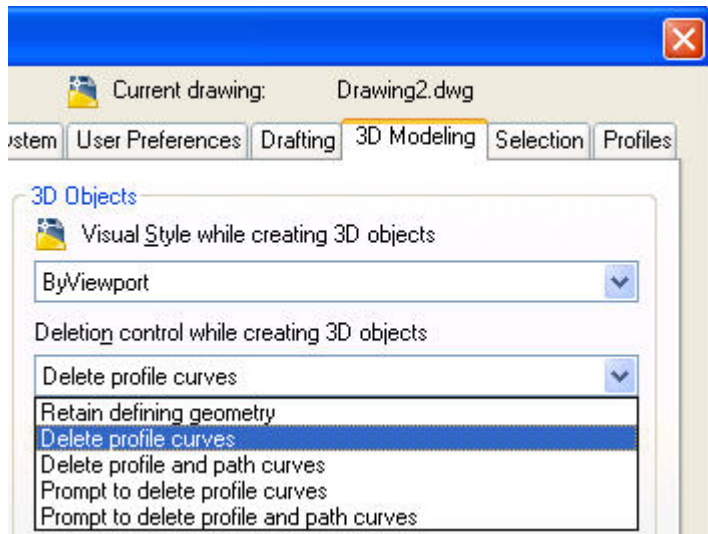


Figure 44. Options dialog box

## Purge Tools

The Purge dialog box has been updated to include an option for purging zero-length geometry and empty text objects.

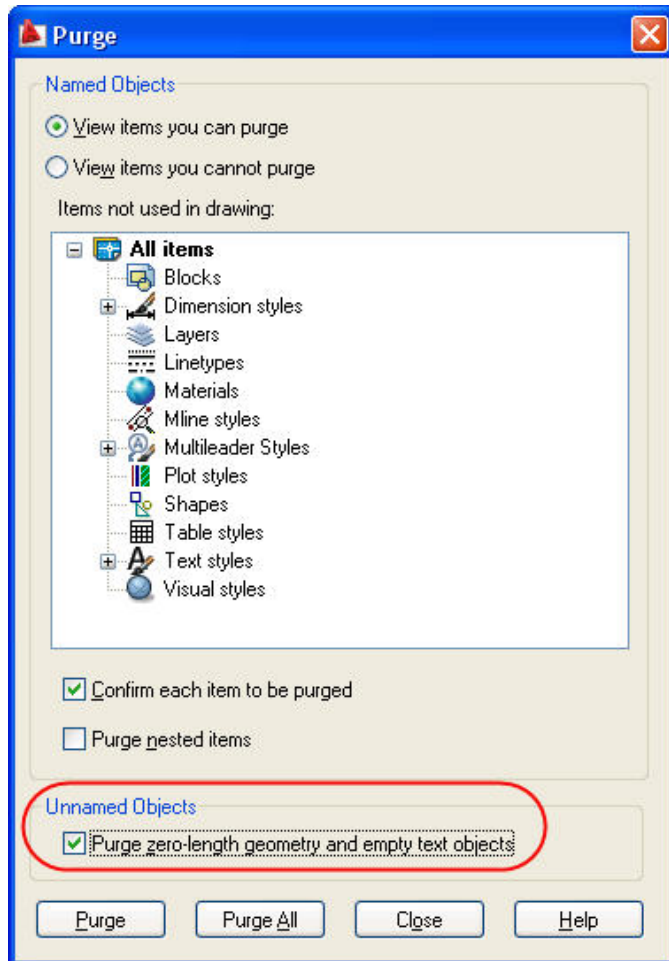
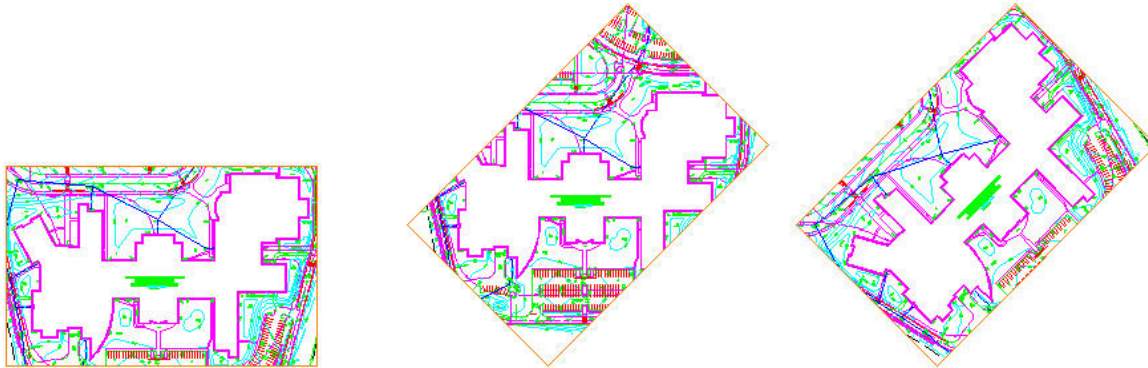


Figure 45. Purge dialog box

How do you create zero-length geometry or empty text objects? Usually by accident! For example, you might grip-edit a line and accidentally snap one endpoint onto the other endpoint. Or you might begin creating an mtext, enter a space, and then cancel out of it. The mtext object still exists but you can't see it because it is nothing more than a space. After performing the Purge operation, AutoCAD will report how many zero-length or empty text objects it purged. The same functionality is available at the Command line using the -PURGE command.

## Viewport Rotation Tools

The new VPROTATEASSOC variable enables you to control the rotation of a view within a layout viewport. When you rotate the viewport with VPROTATEASSOC set to 1 (the default), the view will also rotate to maintain its orientation relevant to the viewport. When it's set to 0, the view within the viewport will not rotate even though the viewport itself does.



Original Viewport

VPROTATEASSOC=0

VPROTATEASSOC=1

Figure 46. Viewport rotation

## External References

AutoCAD 2010 provides a consolidated interface and increased flexibility for working with externally referenced file formats, including DWG™, DWF™, DGN, PDF, and Image files.

### Geographic Data

Attach externally referenced drawing files using geographic data. If both the host drawing and the external reference drawing have a geographic location, a new option in the External References dialog box enables you to locate the attached xref relative to the host drawing using Geographic Data. A similar option is available in the Insert dialog box.

### Reference Tools

The Reference panel on the Insert tab of the ribbon provides tools for you to attach and modify externally referenced files. Use the Attach tool to select a DWG, DWF, DGN, PDF, or Image file and specify attachment options. Additional tools enable you to clip a selected reference, adjust its Fade, Contrast, and Brightness, control its layer visibility, display reference frames, snap to underlay geometry, and adjust xref fading.

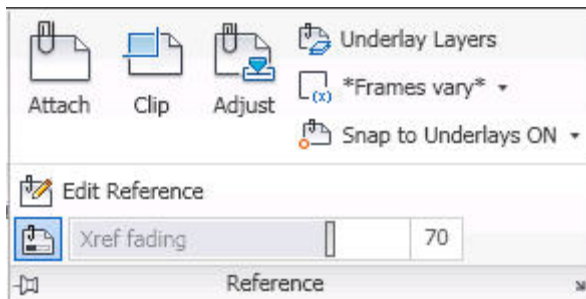


Figure 47. Reference ribbon panel



When you select a reference file in the drawing, a relevant contextual tab is automatically displayed in the ribbon. For example, if you select a PDF underlay, the PDF Underlay tab is displayed providing you easy access to PDF underlay tools.



Figure 48. PDF Underlay contextual tab

Easily edit the clip boundary of any reference using grips. You can even invert the clip with a simple click on the invert grip!



Figure 49. Inverted clip boundary

You can display the reference frame for each type of reference using its specific frame system variables such as DWFFRAME, DGNFRAME, and PDFFRAME. To quickly override these individual system variables, use the Frame tool (FRAME system variable) in the References panel of the Insert ribbon tab. You can hide frames, display and plot them, or display but not plot them.

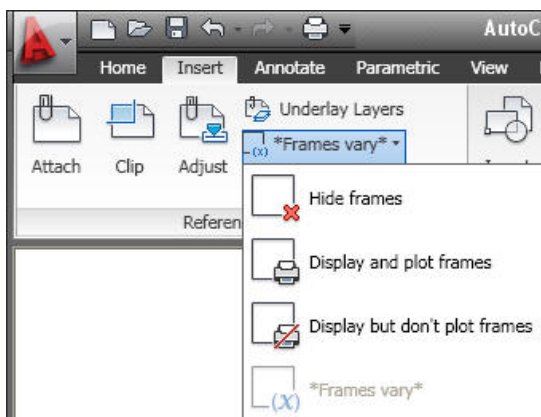


Figure 50. Frame controls

You can enable object snapping for geometry in underlay files. To control this behavior for specific reference types, use its individual system variables such as DWFOSNAP, DGNOSNAP, and PDFOSNAP. You can override these individual system variables using the Snap to Underlays tool (UOSNAP system variable) in the References panel of the Insert ribbon tab.

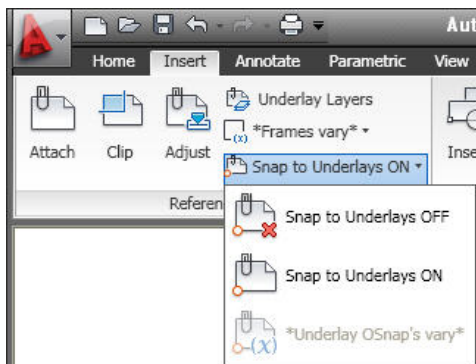


Figure 51. Underlay controls

When you open a drawing that has unresolved references, a new tool helps identify the missing files.

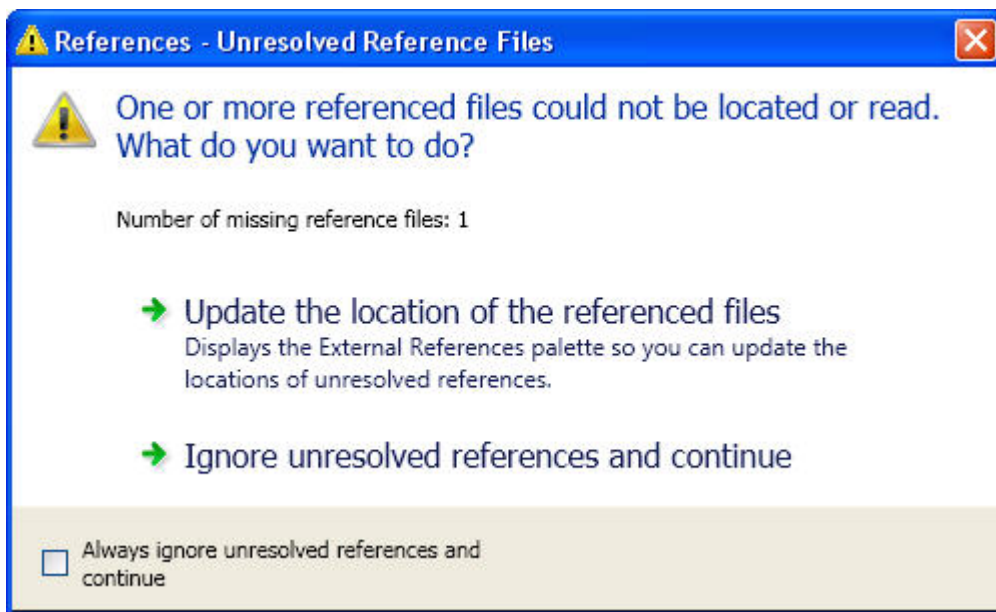


Figure 52. Unresolved Reference Files

If you choose Update, AutoCAD opens the External References palette so you can repath the missing files. If you choose Ignore, the warning closes and takes no action. If you always want to ignore unresolved references, use the checkbox at the bottom to stop the warning from displaying again.

This is a great improvement over previous versions, when you had to manually search for missing references by checking the command line when opening a file, scouring the drawing for the text strings identifying unresolved references, or looking in the External References palette.

## Sheet Sets

Sheet set functionality includes a variety of enhancements to increase productivity.

A new Sheet right-click menu option enables you to quickly specify whether a sheet should be included in the publish operation. To control the publish property of multiple sheets and even entire subsets, you can access the new Publish Sheets dialog box from the right-click menu by selecting the option to Edit Subset and Sheet Publish Settings.

The Subset Properties dialog box has a new look and feel, similar to the Sheet Set Properties and Sheet Properties dialog boxes. It includes a new control to specify if the subset should honor the sheets' individual "Include for Publish" settings or if it, the entire subset, should be excluded from the publish operation. The Subset right-click menu includes similar options. An icon in the sheet list provides a visual indication of those subsets that are excluded from the Publish operation.

Sheet List Table functionality is more flexible than ever before. In addition to creating a sheet list table for the entire sheet set, you can now insert a sheet list table for individual subsets and even individual sheets. You can access this functionality from the right-click menu in the Sheet List table and a new tab in the Sheet List Table dialog box enables you to control the behavior of subsets and sheets. You can specify which sheets to include and which subsets to track so that you are prompted when new sheets are added to that subset.

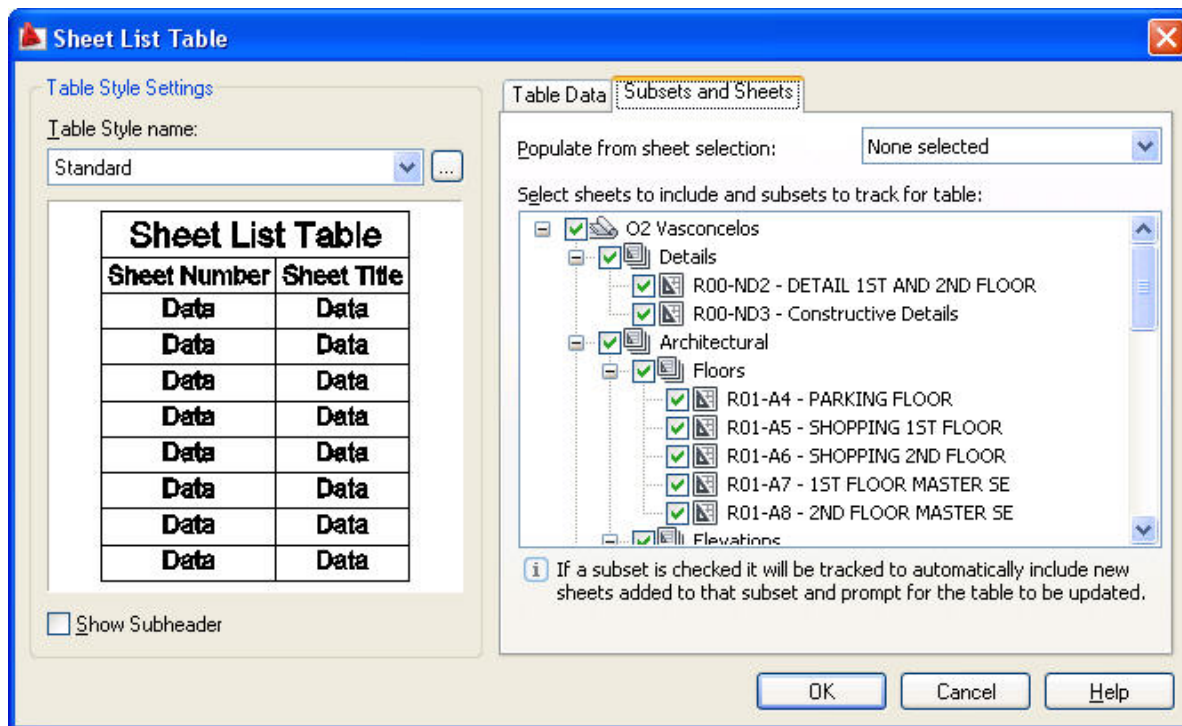


Figure 53. Sheet List Table

## Quick Views

The preview images for Quick View Layouts and Quick View Drawings have been enhanced to include a preview image of Model space in addition to the layout previews.

## Communicate

With AutoCAD 2010 software, communication is a seamless operation. Share critical design data securely, efficiently, and accurately. Experience the benefits of native DWG support, the world's most widely used design data format, allowing you to keep everyone in the loop at all times. Take your ideas to the next level with presentation-ready graphics, rendering tools, and the best plotting and 3D printing capabilities in the business. It's communication at its best.

## PDF Support

PDF support has been significantly enhanced in AutoCAD 2010. PDF publishing now provides better visual quality with smaller file sizes, and you can even attach PDF files to a drawing as an underlay.

### PDF Output

PDF output provides more flexibility and higher quality output than previously available. The default vector resolution has been increased from 400 to 600 dpi to produce precise lineweights at a reasonable file size. To further improve the visual quality of PDF output, TrueType fonts are exported as text rather than as graphics. This improves the visual quality of text and also enables highlighting, searching, and copying text within the PDF viewer. Additional improvements enable you to specify merge control, include layer information, and automatically preview the plotted PDF.

You can use the Plotter Configuration Editor to view and modify the PDF settings for plotted output. Select the DWG to PDF.pc3 plotter in the Plot dialog box and then choose Properties. The new Merge Control option is displayed under the Graphics node and the other options are accessible when you select Custom Properties.

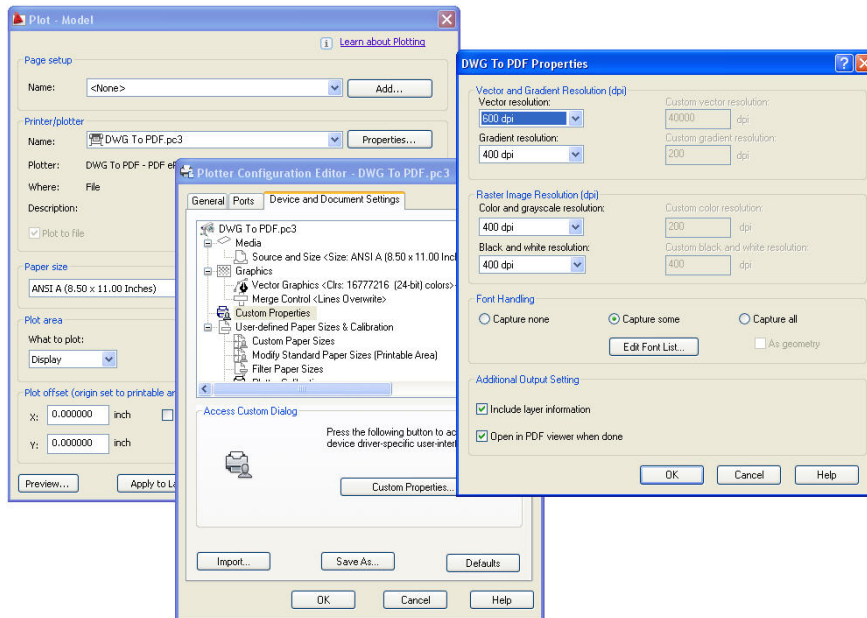


Figure 54. DWG to PDF Plotter Configuration Properties

You can control many of the PDF output settings separately for exported, published, or plotted PDF files. A new Export to DWF/PDF panel on the Output ribbon tab provides access to the Export to DWF/PDF Options dialog box where you can specify a single- or multi-sheet PDF file, include layer information, and apply merge control. After applying the appropriate options, you can select PDF from the flyout tools.

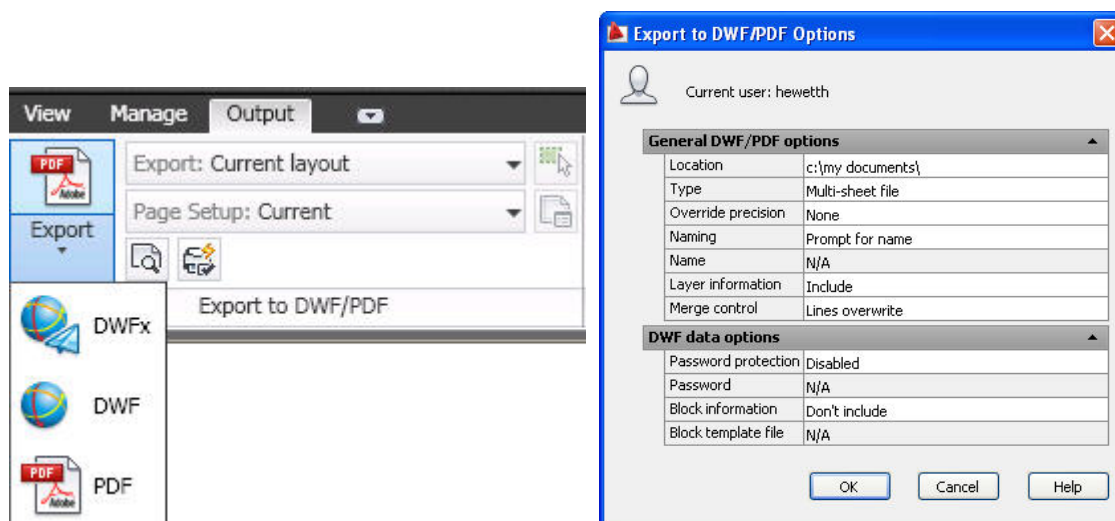


Figure 55. Export to DWF/PDF

In addition to the Plot and Export functionality, PDF support has been integrated into Sheet Sets and Publish. You can specify PDF output, including single- or multi-sheet, layer information, and merge control, in the Sheet Set Publish Options and the Publish Options dialog boxes.

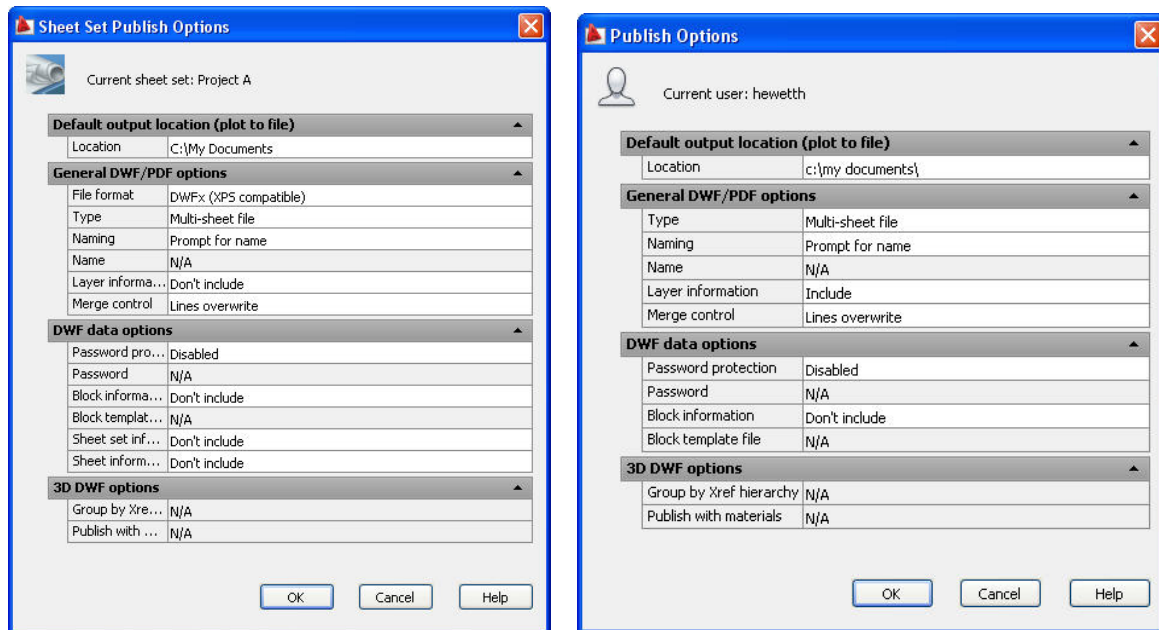


Figure 56. Sheet Set and Publish Options

## PDF Underlays

AutoCAD 2010 addresses one of the top AUGI® (Autodesk User Group International) wish list requests by enabling you to attach a PDF file to an AutoCAD drawing as an underlay. You can work with PDF underlays in the same way you work with other external references including DWG, DWF, DGN, and Image files. You can even snap to key points on PDF geometry using familiar object snaps. For more information, see the [External References](#) section.

## Drawing File Format

AutoCAD 2010 introduces a new file format that offers improved save times, especially when saving files with lots of annotative objects, along with several new features.

## Improved File Navigation

File Navigation dialogs such as Open and Save now support auto-complete when typing file names.



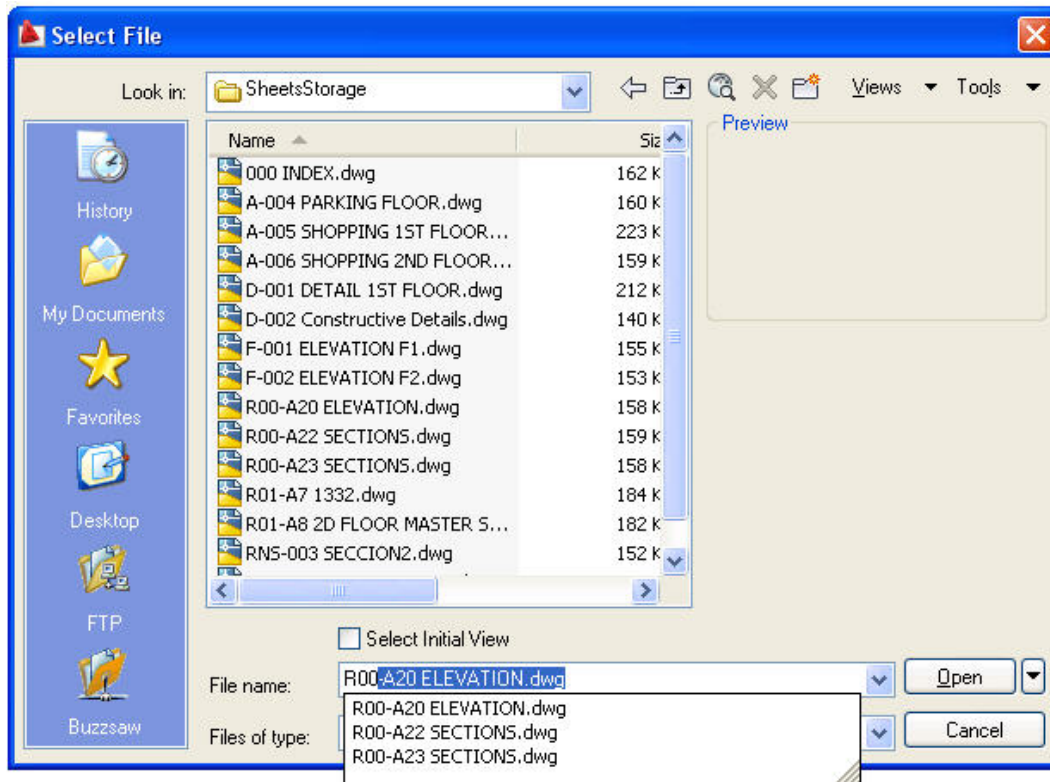


Figure 57. Auto-complete

## Object Size Limits

In previous versions of AutoCAD, no single object in an AutoCAD drawing could be larger than 256 MB. In AutoCAD 2010, the object size limit has been increased to at least 4 GB (depending on your system configuration), providing more flexibility. These large objects, however, are not backwards-compatible, so a new compatibility option has been added to the Open and Save tab of the Options dialog box.

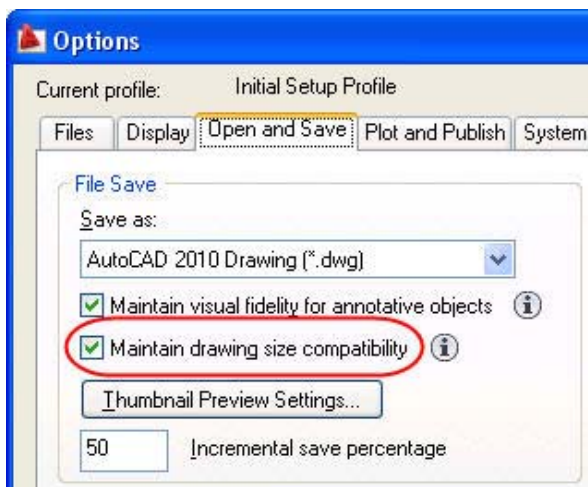


Figure 58. Maintain drawing size compatibility

When the box is checked, object size limits from previous versions will be used instead of the new, expanded limits.

## 3D Printing

The new 3D printing functionality in AutoCAD 2010 enables you to output your 3D AutoCAD drawings directly to STL-supported 3D printing vendors through an internet connection. This simple utility will walk you through



preparing your model, adjusting the scale, creating an STL file from your model, then downloading your STL file to a user-specified vendor for printing. The final 3D model will be printed then shipped to you within days.

You can prepare your model for 3D printing using the 3DPRINT command or selecting Send to 3D Print Service from the output tab. Select all solid objects you want to print. Once all objects are selected, select Return, which will display the Send to 3D Print Service dialog. Specify the scale of your model, then save the model to an STL format.

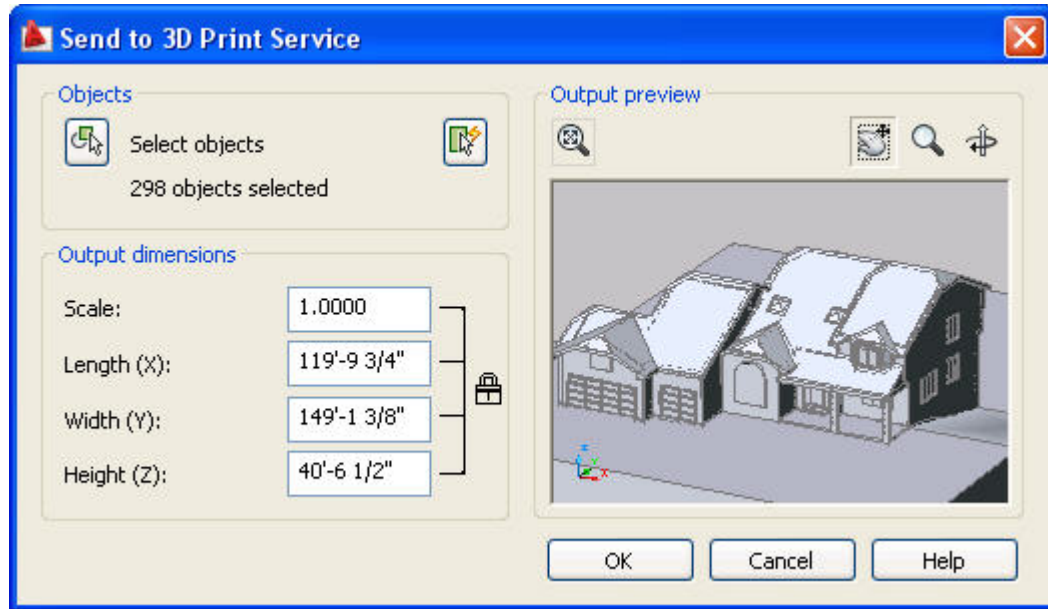


Figure 59. Prepare Send to 3D Print Service dialog box

Once saved, you are automatically directed to a location on Autodesk.com where you can select the 3D print vendor.

## eTransmit

The eTransmit functionality has been enhanced to include a new option to “include unloaded file references.” When this option is enabled, all unloaded reference files are included in the transmittal set but will remain unloaded in the eTransmit package. The Archive functionality includes the same option to include unloaded file references and is enabled by default.

## Autodesk Seek

Autodesk Seek enables you to easily search for building product information and design files from inside your Autodesk design application for download directly into your AutoCAD drawings.

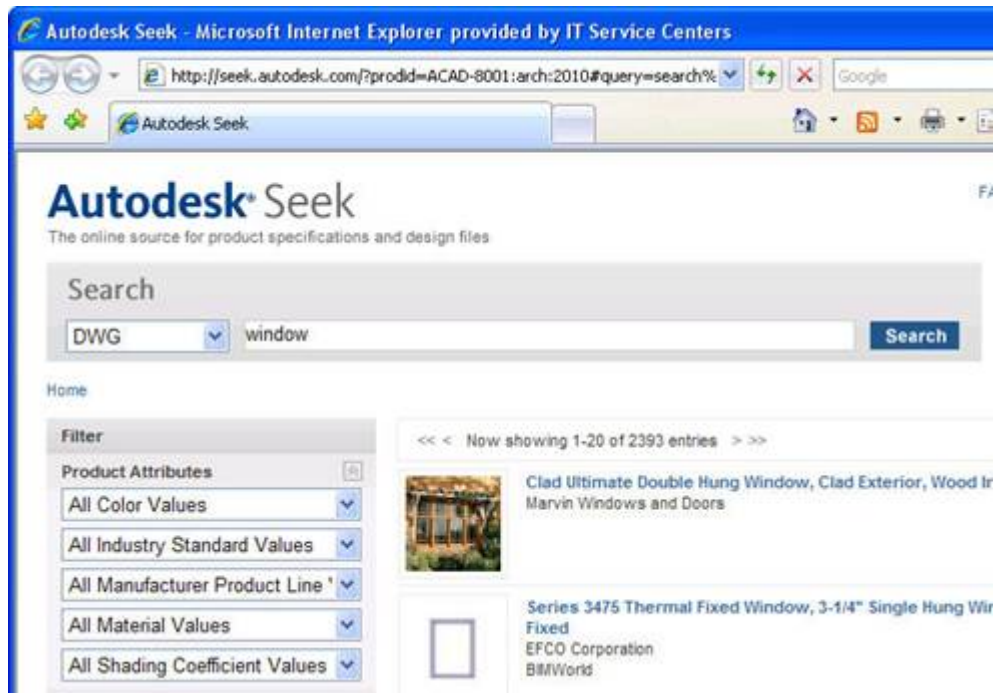


Figure 60. Seek search results

In addition, you can share designs with peers by uploading them directly from AutoCAD to the Autodesk Seek web service. Easily access Share using Autodesk Seek from the Output panel of the ribbon tab.



Figure 61. Share with Autodesk Seek

You can choose to share the current drawing or select a block definition within the drawing.

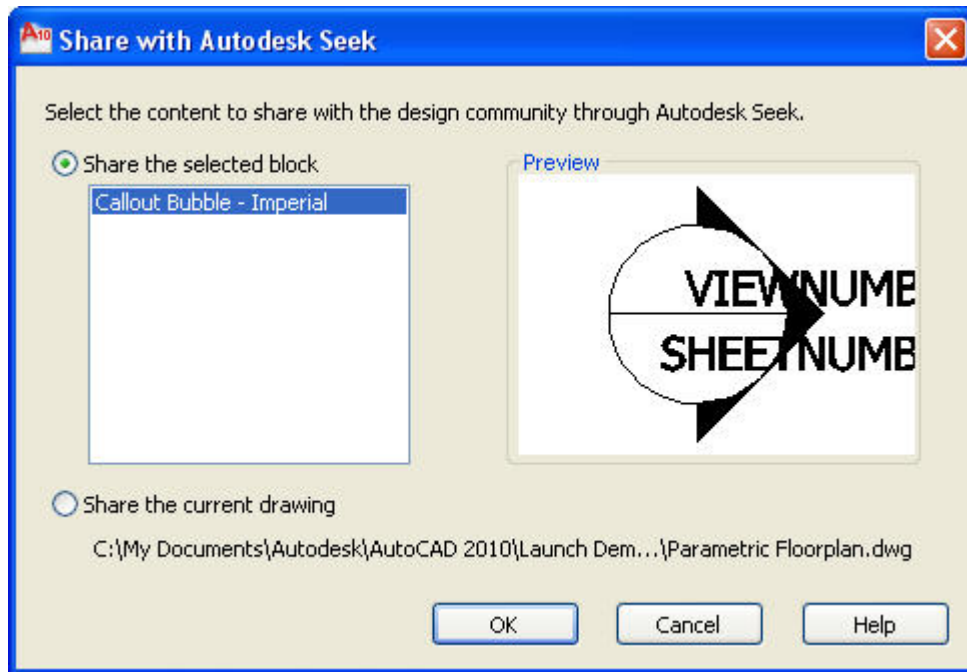


Figure 62. Share with Autodesk Seek dialog box

## Explore

AutoCAD 2010 gives you 3D power to explore your ideas in almost any shape imaginable. AutoCAD and a blank canvas have a lot in common. Both give you the ability to create the previously unimaginable. But AutoCAD provides the flexibility to explore design ideas in both 2D and 3D, with intuitive tools that help your concepts become real. The world is your canvas—what will you create next?

Take your designs from concept to completion, all within your familiar AutoCAD environment. The many new and improved 3D design tools are easily accessible from the AutoCAD ribbon when the 3D Modeling workspace is active.

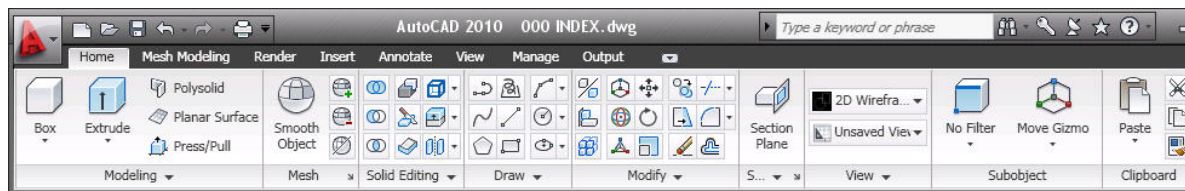


Figure 60. Ribbon in 3D Modeling workspace

## Conceptual Design

Apply your existing 2D AutoCAD knowledge to create basic shapes in the early stages of your conceptual design. As your design progresses, you can easily modify and mold your model using intuitive tools such as 3D gizmos.

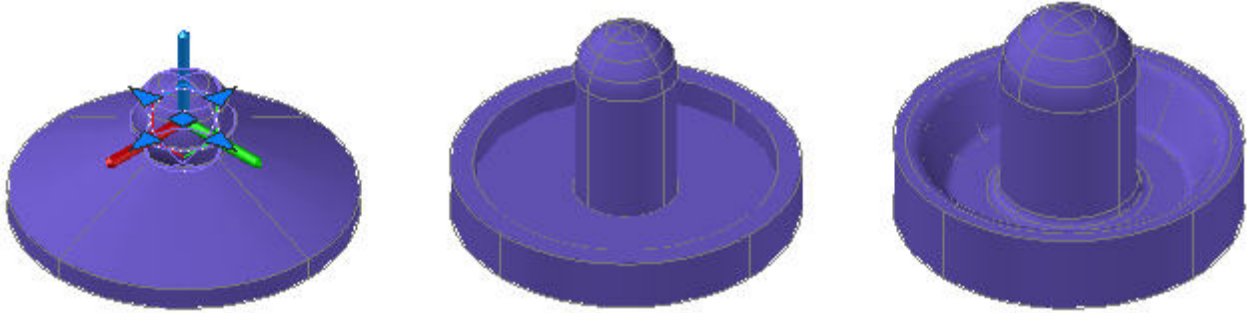


Figure 61. Variations of a conceptual design

AutoCAD 2010 includes a new 3D Scale gizmo in addition to the 3D Move and 3D Rotate gizmos. Using these gizmos, you can move, rotate, or scale selected objects within the constraints of a specified axis or plane.

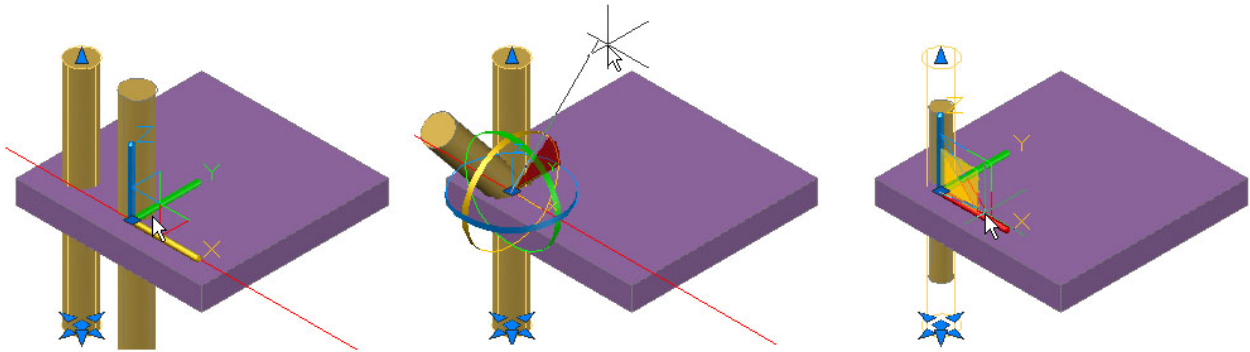


Figure 62. Move, rotate, and scale gizmos

You can access the gizmos by launching the 3DMOVE, 3DROTATE, or 3DSCALE command and then selecting the objects or, if you have a 3D visual style set current, you can simply select the objects. The gizmo is automatically displayed at the center of the selection set, saving you the extra step of specifying a position. When you select objects without first launching a command, the 3D Move gizmo is displayed by default.

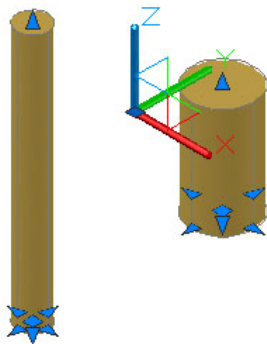


Figure 63. Move gizmo at center of selection set

The 3D Move gizmo has been enhanced with longer axes, XYZ labels, and planar highlighting to make it easier for you to view and select the appropriate axis or plane. Save another step using the 3D Move gizmo by picking the constraint axis or plane and the base point in one operation. As you specify the second point, the 3D Move gizmo dynamically moves with the selected objects.

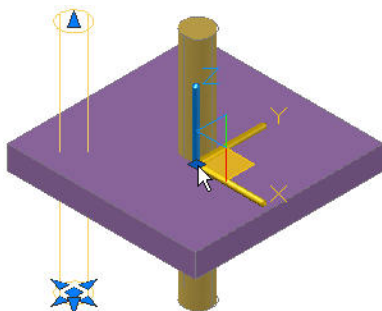


Figure 64. Move gizmo with planar constraint

A new context menu, available when you right-click on a gizmo axis or plane, enables you to change the gizmo's behavior. You can set the constraint to a different axis or plane, switch between the 3D Move, 3D Rotate, and 3D Scale gizmos, relocate the gizmo, and align it to the world UCS, current UCS, or an object face. You can further customize the location and orientation of the gizmo by manually specifying its origin, direction of the X-axis, and position of the XY plane.

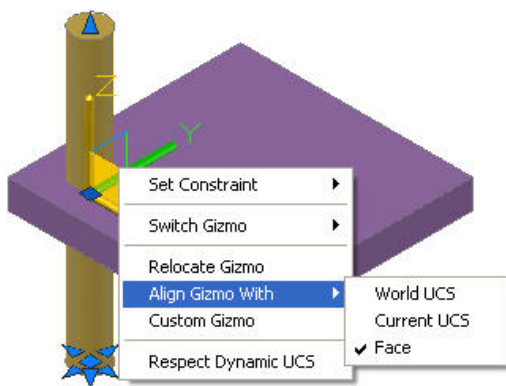


Figure 65. Gizmo right-click menu

In addition to using the right-click menu option to switch gizmos, you can press the space bar to cycle between them. If you want to change the gizmo that displays by default when you select an object, use the gizmo flyout on the ribbon.

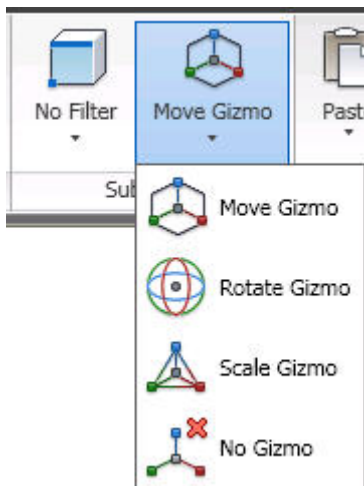


Figure 66. Gizmo flyout

The powerful and intuitive 3D gizmos are not limited to whole objects; you can use them with subobjects as well! For example, you can move, rotate, or scale the plane, edge, or vertex within an object. New subobject selection filters help ensure that you get the type of object you expected when picking on a subobject. You can access these filters from the Subobject panel on the Home tab of the ribbon or from the right-click menu when no objects are selected.

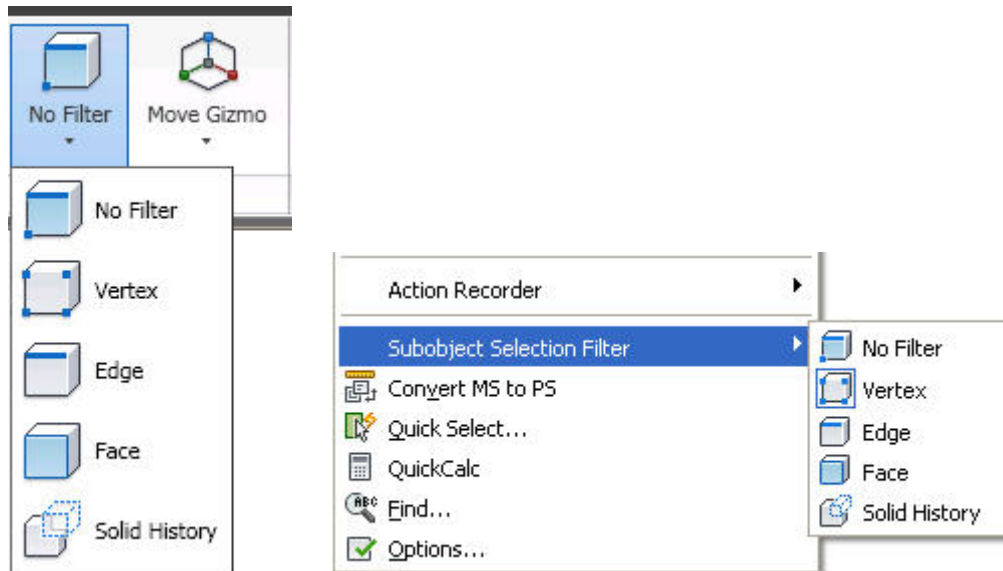


Figure 67. Subobject selection filters

With the subobject selection filter set to vertex, for example, you can ensure that when you press CTRL and pick on the corner of an object, AutoCAD will select the vertex rather than the edge.

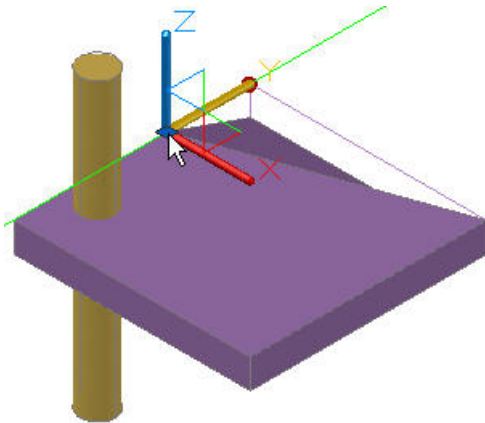


Figure 68. Subobject editing

The Solid Editing panel of the Home tab includes tools to perform unions, subtractions, interferences, intersections, and imprinting. These tools, which were previously available only for solid objects, now work on surfaces as well.

## Free-Form Design

The 3D design capabilities in AutoCAD have been significantly improved with the introduction of free-form design. New tools in AutoCAD 2010 enable you to create and modify meshes that are free-form and flowing.



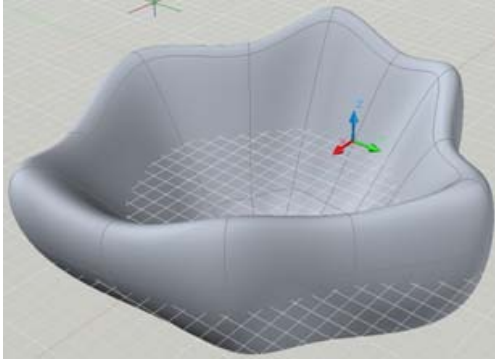


Figure 69. Example of free-form shapes

The new Mesh Modeling ribbon tab provides easy access to the mesh creation and editing tools. The Primitives panel includes a tool to create primitive mesh shapes (Box, Cone, Cylinder, Pyramid, Sphere, Wedge, and Torus) as well as revolved, ruled, tabbed, and edge mesh surfaces.

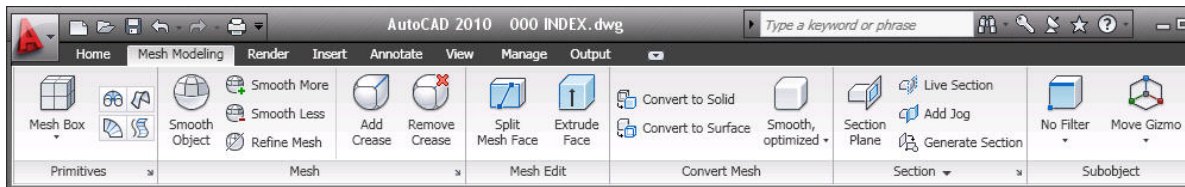


Figure 70. Mesh Modeling ribbon tab

A mesh object can be incrementally smoothed to create curved shapes, even when starting with a traditional primitive shape. The process of creating smooth mesh primitives is similar to creating their solid equivalents. For example, creating a smooth mesh cylinder provides the same prompts and options as creating a solid cylinder. By default, mesh primitives are created with no smoothness. You can adjust the smoothness level as you create the mesh by specifying the Settings option. Entering a smoothness equal to 0 produces a shape with straight edges. Higher smoothness values produce increasingly more rounded edges. You can convert existing 3D solids, 3D surfaces, 3D faces, polygon meshes, polyface meshes, regions, and closed polylines to Mesh objects using the Smooth Objects tool. Even after you've created a Mesh object at a specified smoothness, you can easily increase or decrease its smoothness using the Properties palette or the mesh editing tools available in the Mesh ribbon panel. The maximum Smoothness value of an object is Level 4. You can use the Mesh Refine tool to set the object's current smoothness level as the new baseline thus increasing the smoothness capability of the remaining levels. However, increasing smoothness and refinement adds complexity to the object and can affect performance. For the best of both worlds, you can develop your model at low levels of smoothness and increase the level of smoothness when the basic modeling is complete. In addition, you can refine individual faces without resetting the baseline level of smoothness. This allows you to confine the complexity to the areas where detail work is required.

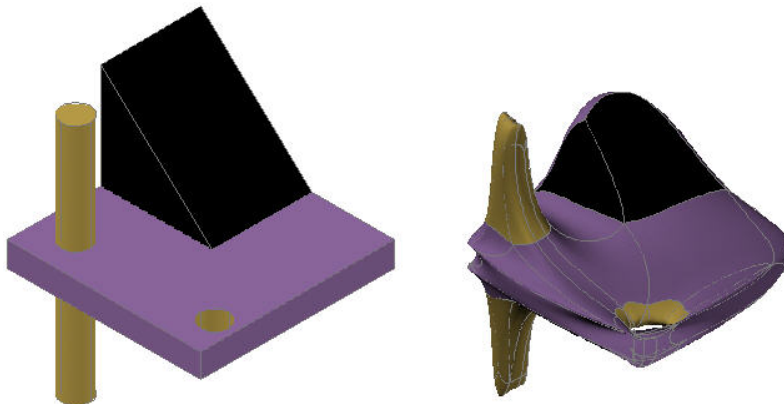


Figure 71. Incrementally smoothed objects

You can control the behavior of subobjects within a mesh using the Crease tools. For example, imagine the task of designing a modern new building to fit between two existing buildings on a crowded urban street. You

can crease subobjects near existing buildings and at the base to ensure they remain unaffected by the mesh smoothness. Combining the crease, smoothness, and refine functionality enables you to create smooth shapes within a hard-edged scenario.

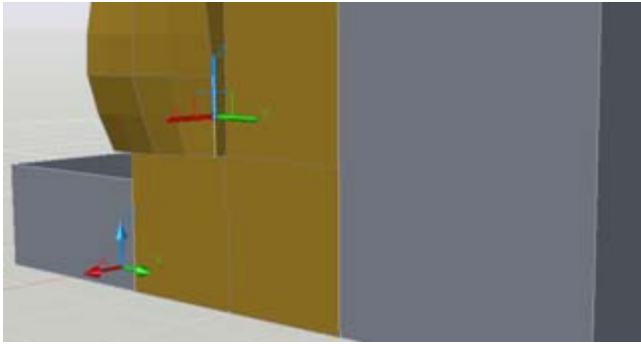


Figure 72. Mesh Crease

Unlike their solid equivalents, the faces of mesh objects are divided into smaller faces based on mesh tessellation values. You can control the default tessellation divisions for each type of primitive using the Mesh Primitive options, which are accessible with the MESHPRIMITIVEOPTIONS command or from the 3D Modeling tab of the Options dialog box. Easily preview the results using the Pan, Zoom, and Orbit tools within the Mesh Primitive Options dialog box.

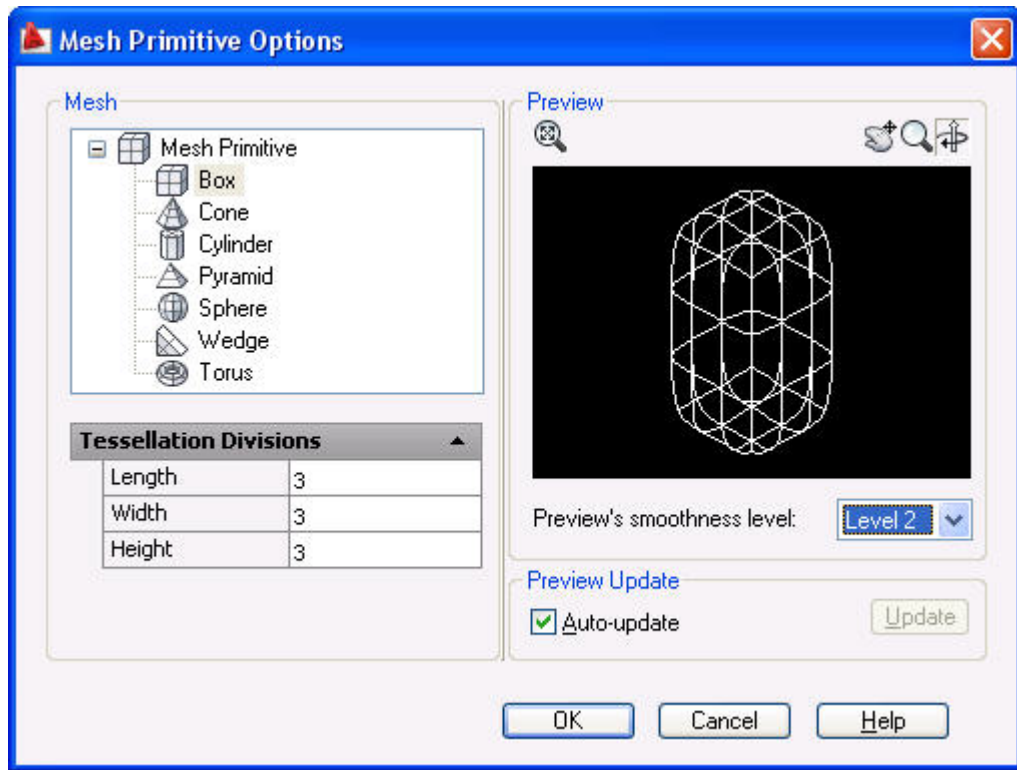


Figure 73. Mesh Primitive Options dialog box

You can further control the behavior for converting objects such as solids and surfaces to mesh objects using the Mesh Tessellation Options dialog box, accessible with the MESHOPTIONS command or from the 3D Modeling tab of the Options dialog box.

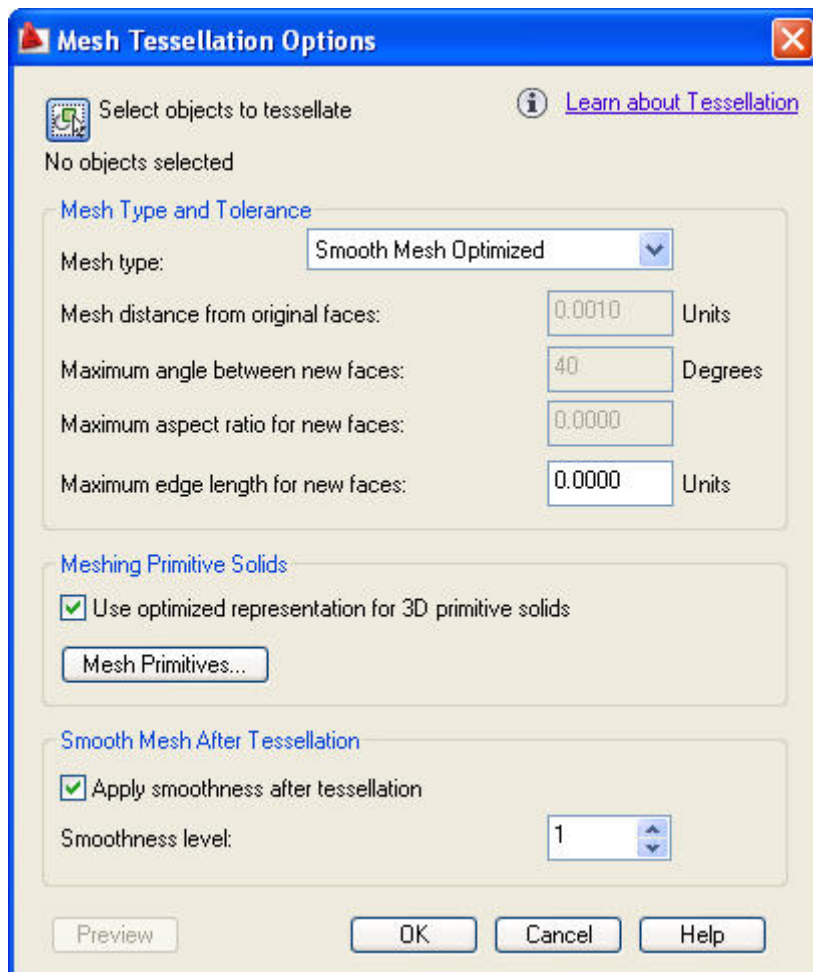


Figure 74. Mesh Tesselation Options

Mesh editing tools, available in the Mesh Edit panel of the ribbon, enable you to edit mesh faces as well as convert between surfaces and solids.

You can split a mesh face by specifying two split points. You can then select and edit each new face, as well as the edges and vertices that they produce, using the CTRL key for subobject selection. Selecting individual subobjects enables you to further modify the shape of the mesh. In addition, you can apply different materials to individual faces.

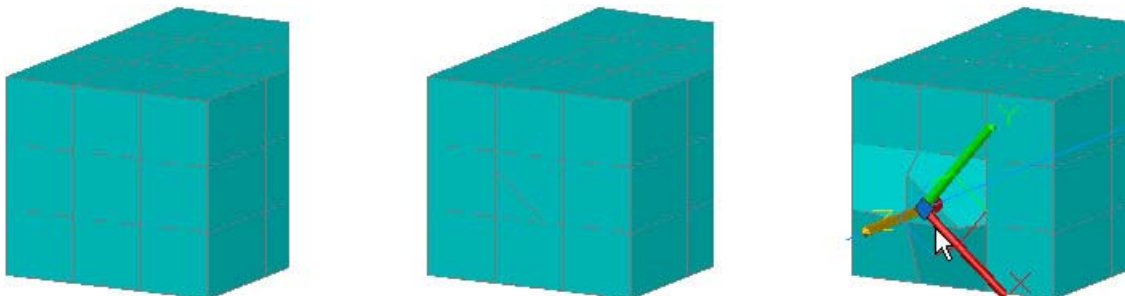


Figure 75. Split mesh face

Easily extrude a face in a mesh object using the Extrude Face tool on the Mesh Edit panel. Unlike extrusions performed on solid objects (which create a new solid object), mesh face extrusions extend and deform the mesh object without creating a new one.

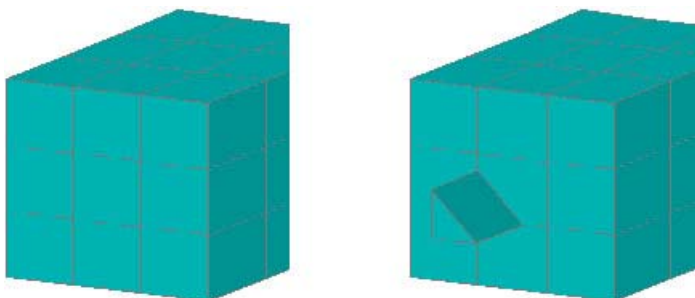


Figure 76. Extruded face

After using the mesh creating and editing tools to create organic meshes, you can convert those that are watertight (no gaps) and not self-intersecting, to smooth or faceted solids. Additional tools enable you to convert meshes to smooth or faceted surfaces and you can control the smoothness of objects during the conversion process. These conversion tools are available in the Convert Mesh panel of the ribbon tab.

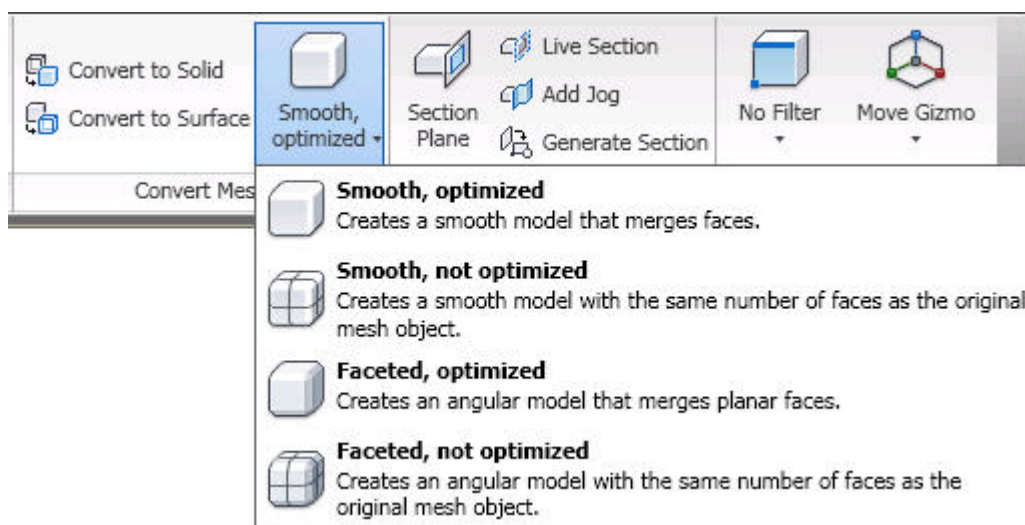


Figure 77. Convert Mesh tools

## Customize

Customize and configure AutoCAD 2010 in ways you never thought possible. Your job is unique. Your software should be as well. Customizing AutoCAD to meet your unique needs is easier than you ever thought possible. Configure your settings, extend the software, build custom workflows, develop your own application, or leverage one already built. Some think you have to choose between flexibility and power. With AutoCAD, you can have both.

### CUIx File

In AutoCAD 2010, the CUI file is replaced with the new CUIx file format. A CUIx file is a package file format that helps to improve performance when working with the CUI Editor. In addition to typical CUI information, a CUIx file contains the custom images used by the commands defined in the file.

### Action Macros

User interface for Action Macros have been simplified for increased usability and efficiency.

The option to "Request User Input" has been renamed to "Pause for User Input" and the corresponding icon has been updated for consistency with the user icons in the Action Tree. The Action tree tooltips and playback behavior are more predictable and consistent when accepting default values by pressing the Enter key and

when using dynamic input. In addition, the playback user messages have been streamlined for increased clarity.

A new command enables you to establish base points at specified locations in your action macro. You can access the new ACTBASEPOINT command as a button in the Action Recorder panel or as a right-click menu option in the Action Tree.

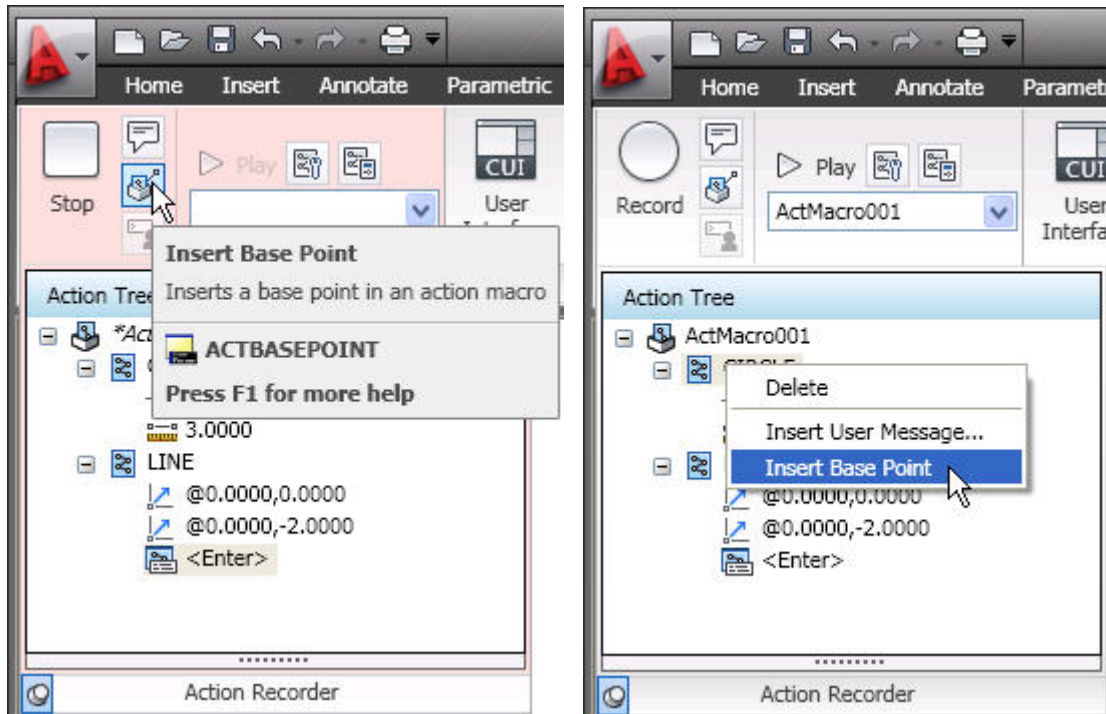


Figure 78. Action Recorder, Insert Base Point

A new Action Macro Manager enables you to copy, rename, modify, and delete action macro files from a central location. An Options button in the lower left corner provides quick access to the Action Recorder settings on the Files tab of the Options dialog box. You can launch the Action Macro Manager from the Action Recorder panel in the ribbon as well as from the right-click menu (Action Recorder>Play>Manage Action Macros) when no objects are selected.



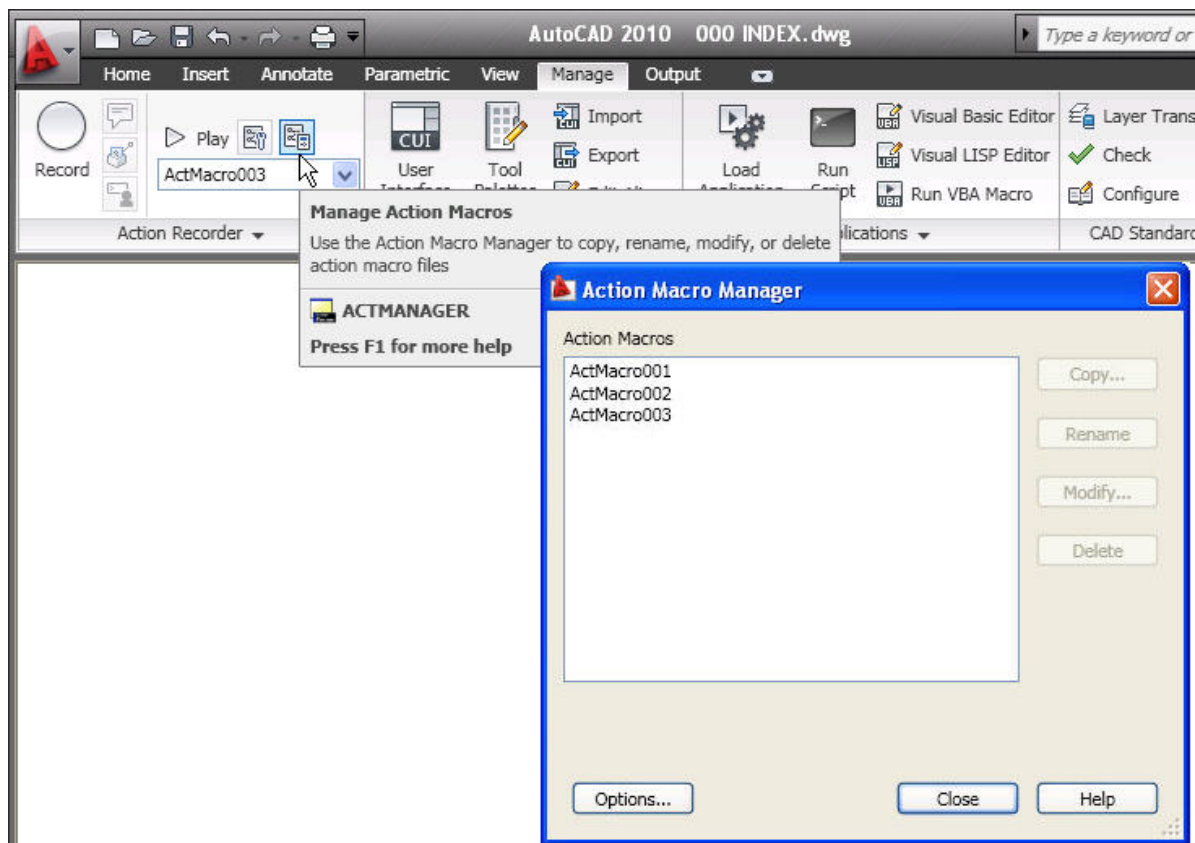


Figure 79. Action Macro Manager

## Online License Transfer

AutoCAD 2010 includes a new Online License Transfer (OLT) Utility that enables you to move stand-alone licenses between computers. It replaces the Portable License Utility (PLU) used in previous Autodesk product releases. You can access OLT functionality from the AutoCAD 2010>License Transfer Utility option in the Start menu.



Figure 80. License Transfer Utility

From the License Transfer Utility, you can choose to export or import a license. Both options require you to log in to Autodesk. You can export a license as either private or public. A private license can be imported only by the person who exported it. A public license can be imported by any user running the same product and serial number.



# Summary

With AutoCAD 2010, you can tackle your most challenging problems with ease. Create almost any shape imaginable with free-form design tools, cut revision time and keep everything connected with parametric drawing, share your ideas as PDFs, or bring them to life with 3D printing. AutoCAD 2010 takes you from idea to reality faster.

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