# TurboCAD® Pro Version 17

## Getting Started Guide

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# Getting Started Guide

Welcome to the TurboCAD Pro Getting Started Guide. The goal of this book is to get you quickly up and running, and to introduce you to the user interface and a variety of drawing and editing tools.

## System Requirements

**Minimum System Requirements:**

Pentium® IV Processor; Microsoft ® Windows® XP with 512 MB RAM; Windows Vista or Windows 7 with 1024 MB RAM; 300 MB of free hard disk space; 64+ MB of swap space; Super VGA (1024 x768) display; High Color (16 bit) graphics support; 4X DVD-ROM drive.

**Recommended:**

Your experience with TurboCAD will be greatly enhanced with a newer generation, higher speed CPU, 2-4 GB RAM, and larger display resolution. An optional GPU-accelerated wireframe render mode requires a supported graphic accelerator. The latest video drivers are typically required. The following are recommended: NVIDIA® Quadro FX 1000 & up , NVIDIA® GeForce FX & up, NVIDIA® GeFrce 6, 7, 8 & up, AMD-ATI Radeon 9500 & up, AMD-ATI Radeon X, HD 2000, 3000, 4000, AMD-ATI FireGL X, AMD-ATI FireGL V 3000 & up. INTEL® Integrated graphics series: GMA 3000 & GMA X3000.

## Installing TurboCAD

To install TurboCAD, insert the CD into your CD-ROM. If the installation process does not start automatically, select **Start / Run** from the Windows taskbar and type D:\setup.exe (where D is the drive letter of the CD-ROM).

After you have installed TurboCAD, the **Setup** program creates a program folder. If you choose the default settings, TurboCAD is installed in the C:\Program Files\IMSIDesign\TC17 folder. This folder contains several subfolders that contain TurboCAD program files and related files such as templates, sample drawings, and symbols.

The **Setup** program also creates a program group containing the TurboCAD application icon, as well as shortcuts to the Help and the Readme file.

# Registration

Registration and activation are automatic for electronic downloads.

For manual installation you can register online. If you do not have Internet access, please call 800-833-8082 to register. Becoming a TurboCAD registered user has many advantages, including technical support, access to extensive online support databases, and program updates.

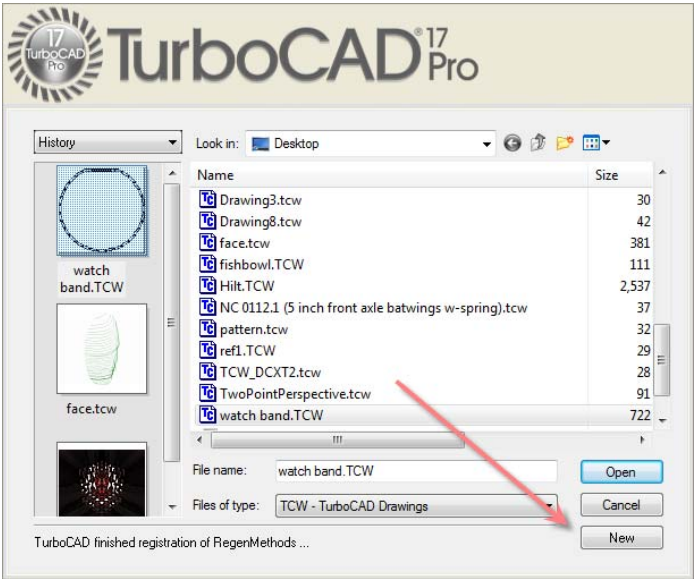
# Starting TurboCAD

If you accepted the default installation settings, TurboCAD can be accessed via the Windows Start / Programs menu.

1. Click the **Start** button on the Windows taskbar.
2. Select **Programs / IMSI**, and select the version you have installed.

NOTE: *You can also start TurboCAD by double-clicking the desktop icon.*

3. The introductory screen appears, in which you can open an existing file or create a new one. Click **New**.

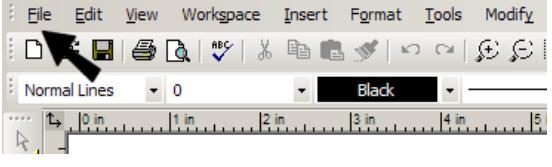


# The TurboCAD User Interface

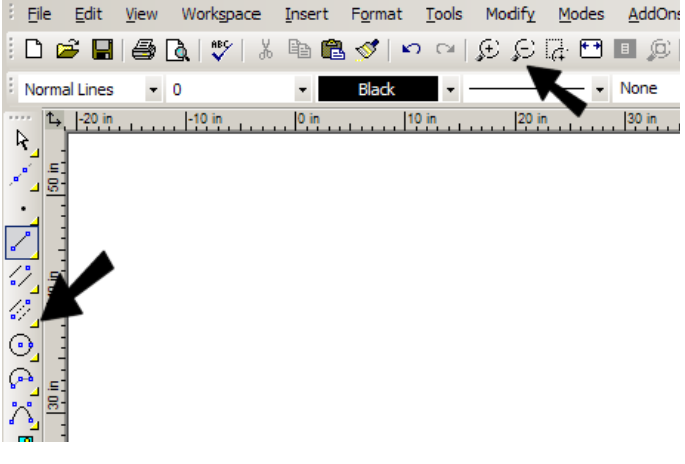
The main area of the TurboCAD window is the drawing area. By default, the background color is white, but you can change that by selecting **Options / Background Color** and choosing another color.

We will now look at some components of the User Interface (UI). What appears in the UI can be controlled in the **Workspace** menu.

All tools and options are available by selecting them from the **Menu Bar** at the top of the window - **File**, **Edit**, **View**, etc. (Most tools are available in toolbar icons as well).

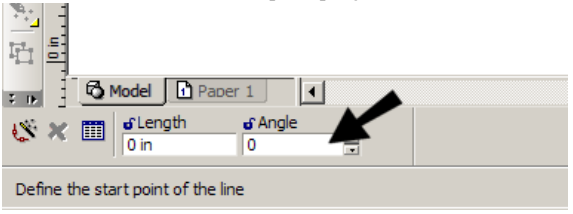



**Toolbars** are groups of related icons. They can be located along the top, bottom, and sides of the window.

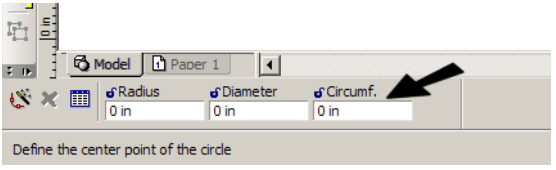


By default, the **Standard** toolbar appears at the top of the window, and the **Property** toolbar appears just below it. **Drawing Tools** appear along the left side. You can drag a toolbar to another location by picking it on its top or bottom edge.

Located at the lower left corner of the window, the **Status Bar** lets you know the current status of the model, and prompts you for the next action.

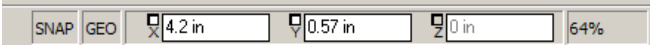



By default, the **Inspector Bar** is located immediately below the drawing window.

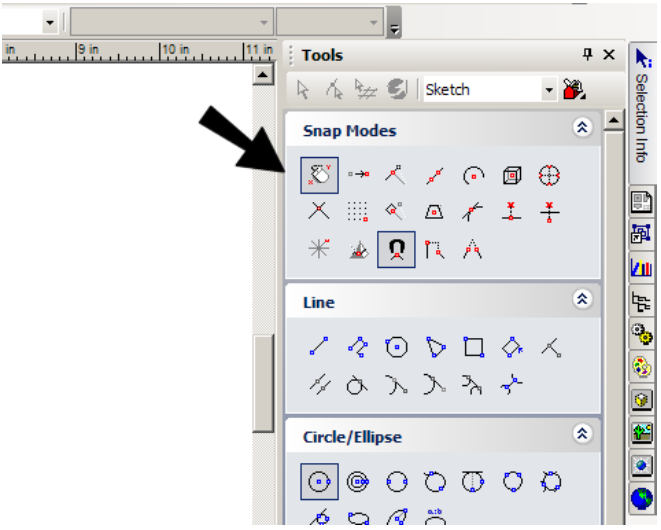



The Inspector Bar usually contains icons for cancelling an action and opening an object's properties, as well as numeric fields relevant to the current tool. The right side of the Inspector Bar contains options relevant to the current tool or mode. All options that appear here can also be accessed from the local menu, opened by right-clicking.

When creating or sizing objects, you can define points by entering them directly into the **Coordinate Fields**. By default, this toolbar is located at the lower right corner of the window.



Located by default on the right side of the window, the **Palette Area** provides convenient access to many features, such as **Blocks**, the **Internet**, **Selection Info**, etc.




Here is a description of some of the available palettes:

- **Library Palette**: Used to display, save, and insert symbols and parts found in the various symbol libraries - both those included with TurboCAD installation and those you create yourself.
- **Blocks:** A block is a collection of objects combined into a single object. This palette enables you to create and insert blocks.
- **Selection Info:** Displays information about the currently selected object or objects, such as entity type, measurements, location in the drawing, and physical and engineering properties. Properties can also be edited here.
- **Measurement Info:** Displays measurements calculated by the **Measure** tools.

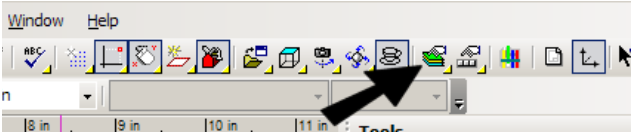
- **Internet Palette:** Provides access to the Internet from within the TurboCAD window.
- **Color Palette:** Displays all colors currently available.
- **Tools Palette:** Displays commonly-used groups of tools, and you can create your own.

The **Program Setup** pages contain general options that apply to TurboCAD all the time, not just for the current drawing. These pages can be accessed from the **Options** menu, or from the flyout icon on the **Standard** toolbar.

The following are the available **Program Setup** pages:

- **General Setup:** Sets file opening and saving parameters, as well as user information.
- **Desktop:** Controls what appears on the window.
- **Preference:** General program options, such as cursor shape, axis color, zoom factor, and display of coordinate system icons.
- **Toolbars and Menu:** Usage and appearance of toolbars and menus, plus access to customization options for toolbars, menus, and keyboard shortcuts.
- **Auto-Naming:** Controls how groups, blocks, and symbols are named.
- **File Locations:** Enables you to specify the folders where TurboCAD places several types of program files.
- **Symbol Libraries:** Displays the folders containing symbols.
- **Colors:** Enables you to add, modify, or delete colors from the TurboCAD palette.
- **Warning Dialogs:** Controls the display of TurboCAD warning messages.

**Drawing Setup** pages are file-specific options, which are only valid for the current file. They can be accessed from the **Options** menu, or from the flyout icon on the **Standard** toolbar.




The following are the available **Drawing Setup** pages:

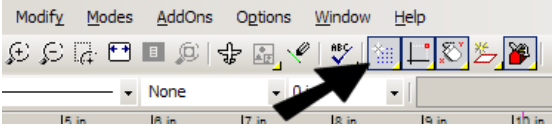
- **Display Options:** Options for adjusting the quality and redraw speed of the display, and options for displaying block attribute values.
- **Grid Options:** Controls the grid type, size, and display.
- **Advanced Grid Options:** Advanced controls for the frequency and locations of grid lines.
- **Space Units:** Controls for setting units in Model and Paper Space.
- **Angle Options:** Controls the measurement and display of angles, as well as control over the Ortho angle.
- **Layers:** Layers can be used for placing objects according to individual categories, and can be used to change which objects are visible.
- **Line Styles:** View predefined line styles, modify or delete them, and create new ones.
- **Background Color:** Changes the background color, which is white by default.
- **Print Style Table:** Select the print styles you want in your drawing.

# 2D Project

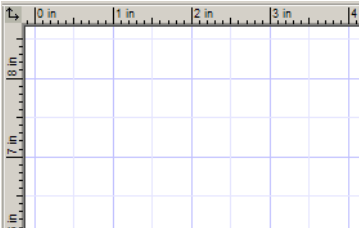
This exercise will get you familiar with many of the commonly-used 2D drawing tools.

## *Drawing Lines*

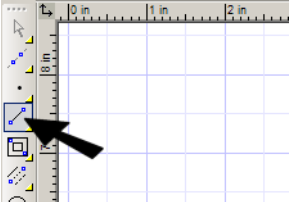
1. Start by displaying the grid. From the **Standard** toolbar along the top of the window, click **Show/Hide Grid**.




2. The grid appears, with lines 1/2” apart. You can change grid spacing and colors by selecting **Options / Grid**. If rulers are displayed (**Workspace / Rulers**), you can see the measurements.



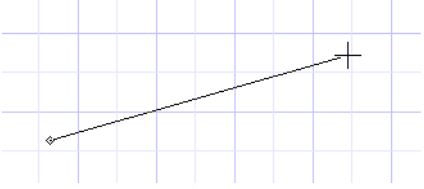

3. The first tool we will use is **Line**. From the **Drawing Tools** toolbar (along the left side), make sure **Line** is active. If it is not, click the icon to activate it.



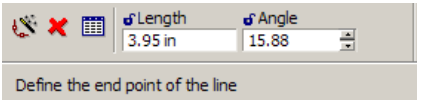
NOTE: *You can access any tool from the menu as well. For **Line**, select **Insert / Line / Single**.*

4. Before clicking the first point, look at the **Coordinates Field** in the lower right corner of the window. Move your mouse around, and you can see the coordinates of the cursor location update dynamically.

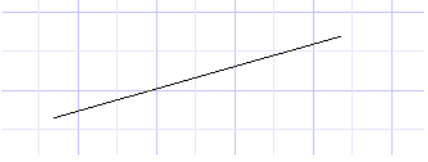
5. Click anywhere to place the first point, and move the cursor toward a second point, but do not click yet.



6. Look in the **Inspector Bar**, in the lower left corner of the window. As you move your cursor, the **Length** and **Angle** of the line update.

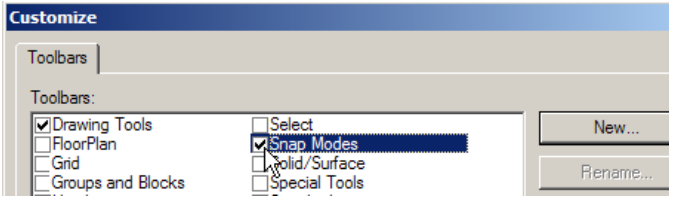



7. Click anywhere to place the second point of the line.

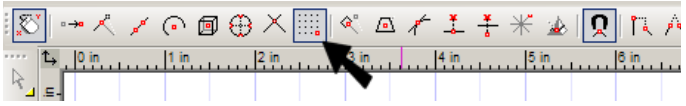


8. For the next object, we will use snaps. Snaps enable you to place the cursor on an exact point, preventing you from having to approximate a point's location.

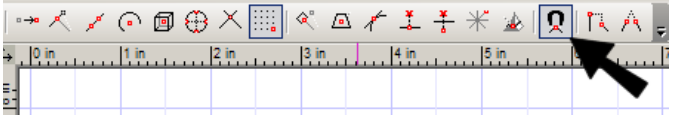
9. To display the **Snap Modes** toolbar, right-click in the blank, gray space on any toolbar. From the list, select **Snap Modes**. Then close the **Customize** window.



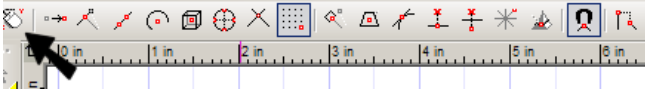

10. The **Snap Modes** toolbar should appear along the top of the window. Click **Grid**. (A snap is enabled when it appears pressed in, and you can click a snap again to disable it.)



11. Also make sure **Show Magnetic Point** is enabled. This means that the nearest snap point will be marked when the cursor is close to it.



12. Finally, turn off **No Snap**, located at the top of the toolbar. If this is on, the other snaps will not work.



13. If any other snaps are active, turn them off.

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NOTE: *Snaps can also be set by selecting **Modes / Snaps**.*

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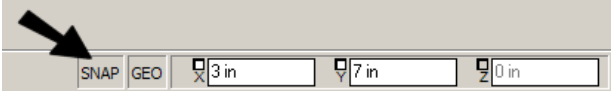
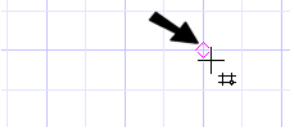
14. Now look to the left of the Coordinate Fields. The SNAP button should be on (if it is grayed out, click it to enable it). SNAP enables you to quickly turn on / off all permanent snaps, and when off, whatever snaps you set on the **Snap Modes** toolbar will not work.

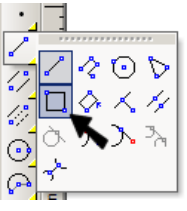



TIP: *If you right-click on the SNAP or GEO (geometric aids) button, you will see a window in which you can set permanent snaps. This is equivalent to using the* ***Snap Modes*** *toolbar.*

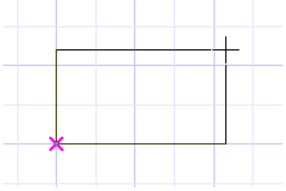
15. With the **Grid** snap on, you can move your cursor in the drawing area and see the magnetic point whenever you are on or near a grid point.



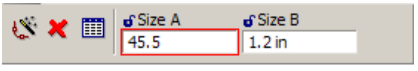
16. The next object to draw is a rectangle. Look at the **Line** icon, and notice the small yellow triangle in the corner. This indicates that is part of a flyout toolbar which contains other similar tools. Click and hold down the **Line** icon until the other options appear, and select **Rectangle**.



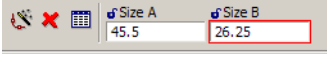
17. Place the first corner at any grid point. Move the cursor, but do not click the second point yet.



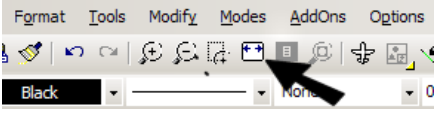
18. Press the Tab key to enter the Inspector Bar fields. The cursor jumps to the **Size A** field, in which you can specify the rectangle dimension in the X axis (horizontal). Enter 45.5. The units are assumed to be in inches, so there is no need for the (“) symbol.



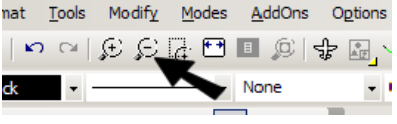

19. Press Tab again to jump to the **Size B** field, and enter 26.25 (a point you could not find using a **Grid** snap).




20. Press Enter, and the rectangle is created. Assuming you did not change your display size, you probably cannot see the entire rectangle on the screen. Click **Zoom Extents** (on the **Standard** toolbar) to resize the display so that all objects can be seen.



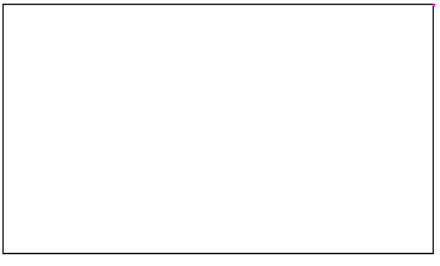

21. If the rectangle looks too large, click **Zoom Out** as needed to make it appear smaller.



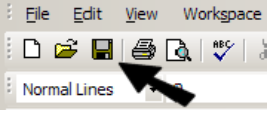
NOTE: *These commands are also available on the **View** menu.*

TIP: *If you have a wheel mouse, you can move the wheel up to zoom in, and down to zoom out. While zooming this way, the location of the cursor affects how the objects are centered on-screen.*

22. Depending on your zoom size, the grid might disappear. If it is still displayed, it will look pretty crowded, so click **Show/Hide Grid** to blank the grid. You should just have the rectangle on the screen, as well as that original line you drew (which is not included in this picture).

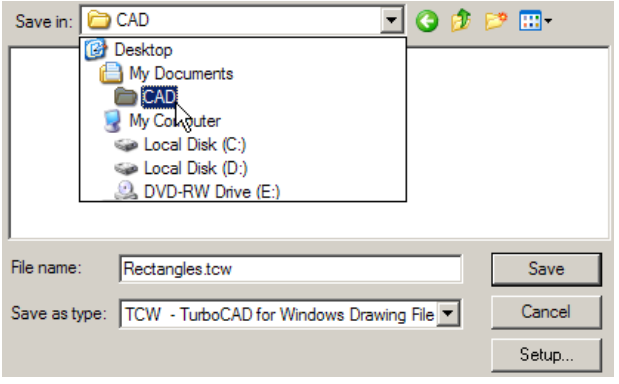


23. You should save your work often, to avoid losing data if a system crash should occur. Click the **Save** icon (or select **File / Save**, or press Ctrl+S).

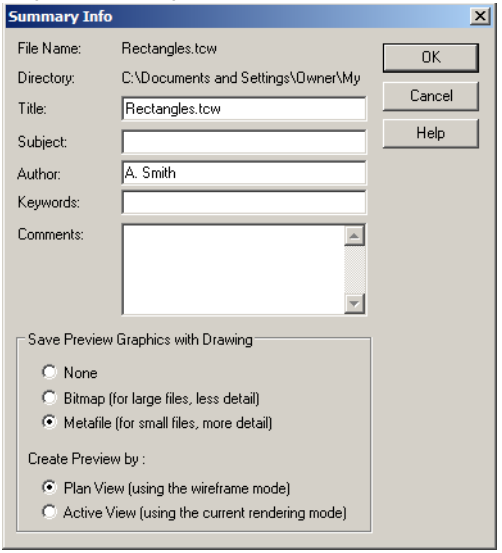



TIP: *You can select **Options / General** to open a window in which you can set time intervals for file backup and saving. intervals.*

24. Name the file something like “rectangles”; the default file extension for TurboCAD files is *.tcw. Save the file to a folder you can easily find later, such as My Documents\CAD.



25. Click **Save**, and the **Summary Info** window appears. You can use this window to save extra information about the file, such as author, subject, and how you want preview graphics to be created and appear. Fill in any information you want, and click OK.

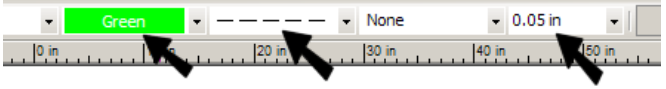



26. Now that the file is saved, you can close it and reopen it, using **File / Open** or Ctrl+O. In the **Open** window, browse to the folder you selected and highlight the “rectangles.tcw” file. A preview is shown on the right side - this preview features makes it easy to quickly identify the file you want.

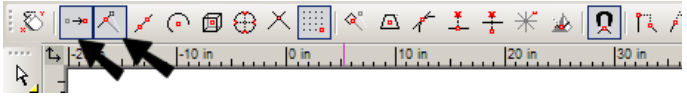
## *Properties and Snaps*

1. Go back to the **Line** tool.

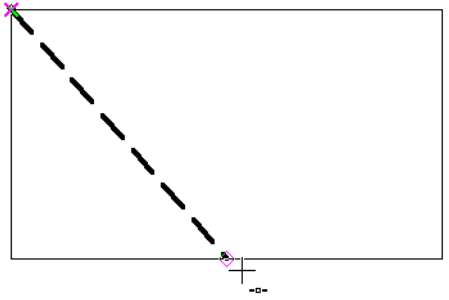
2. For the next objects, we will set new object properties. The **Property** toolbar is located along the top of the window, below the **Standard** toolbar. Set a new color, new line type (dashed, dotted, etc., and a new line width. All objects created from now on will have these properties.




3. In the **Snap Modes** toolbar, turn on the **Vertex** (end point) and **Middle Point** snaps.



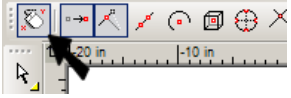

4. Draw a line from the top left corner (vertex) to the midpoint of the bottom edge.



When the second point has been selected, the line has the color, type, and thickness you set.

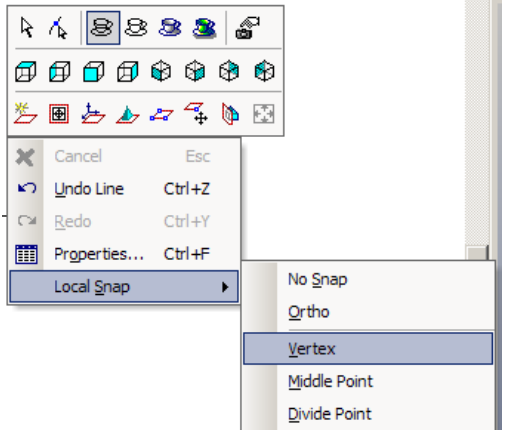
5. We will now recreate this line, using a different type of snap mode. First undo the line. You can click the **Undo** icon, or press Ctrl+Z.

6. In the **Snap Modes** toolbar, click **No Snap** so that all permanent snaps will be disabled. (You could also click the SNAP button at the bottom of the window to disable it.) When you move the cursor, magnetic points should no longer appear.




You have seen how to set running (permanent) snaps, but now we will use local (one-time) snaps. These are snaps that are activated just once.

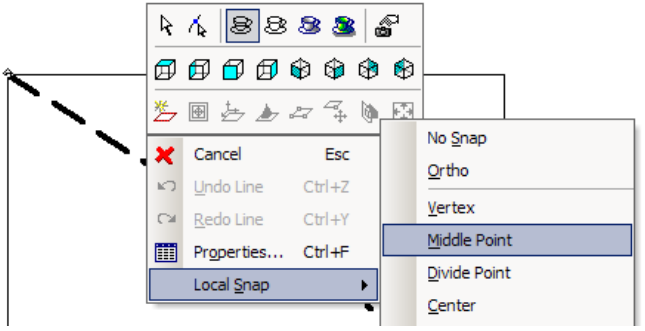
7. **Line** should still be active. Before placing the first point, right-click and select **Local Snap / Vertex**.



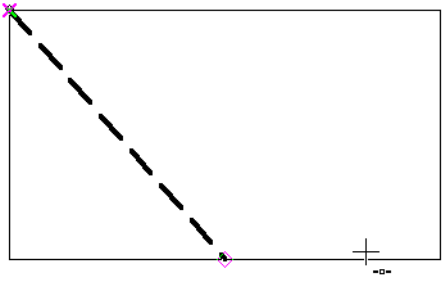

NOTE: *You can use local snaps while permanent snaps are on as well.*

8. Click either the top or left edge, close to the top-left corner. The corner is selected as the snap point.

9. Before clicking the second point, right-click again and select **Local Snap / Middle Point**.

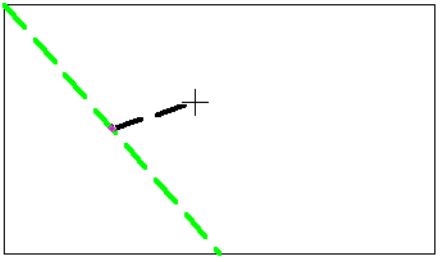



10. Click anywhere on the lower edge, and the midpoint is selected to complete the line.

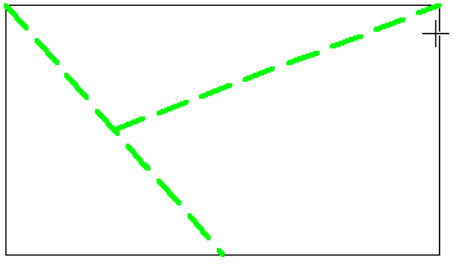


Another way to use a one-time snap point is to use a SEKE - Single Equivalent Keyboard Entry.

11. For the next line, move the cursor anywhere along the diagonal line you just drew and press the M key. This snaps to the midpoint of this line.



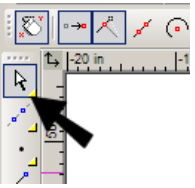
12. Now move to either the top or right edge, near the corner, and press V. This snaps to the endpoint of the line.



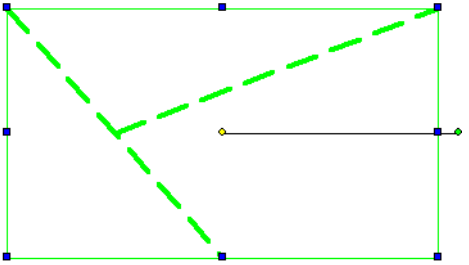
## *Editing 2D Geometry*

The next step is to trim lines to get one closed chain. At this point, the rectangle cannot be used to trim other objects, because it is one object comprised of four sub-objects. The rectangle must be broken down into its individual parts first.

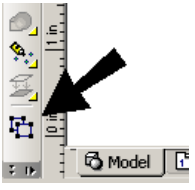
1. Activate the **Select** tool, located at the top of the **Drawing Tools** toolbar. (Or from the menu, select **Edit / Select**.)



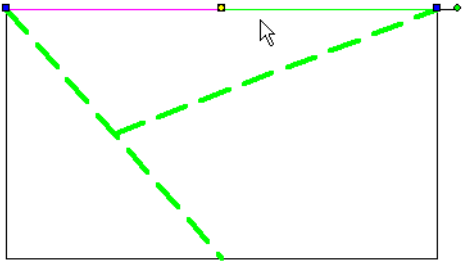

2. Click the rectangle to select it. All four lines are contained in the selection box.



3. While the rectangle is selected, click **Explode** (or select **Format / Explode**). This icon is near the bottom of the **Drawing Tools** toolbar. If you cannot see it, click the small arrow at the bottom of the toolbar to see the remaining icons.



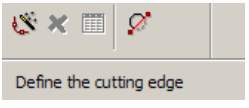
4. Click outside the rectangle to deselect it, and select the rectangle again. Now only the segment you clicked is selected.



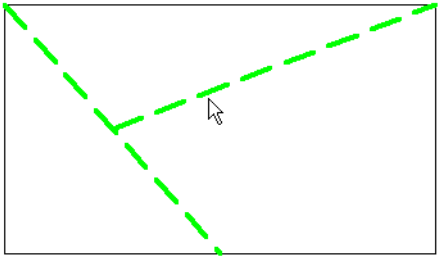
5. Open the **Modify** flyout toolbar and select **Trim**.

NOTE: *All tools on this toolbar can be found in the **Modify** menu.*

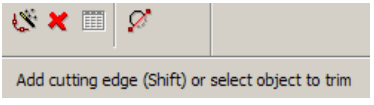
6. When in doubt about what steps to perform, you can always look in the **Status Bar** - located below the Inspector Bar at the lower left corner. The first step in the **Trim** tools is to define the cutting edge.



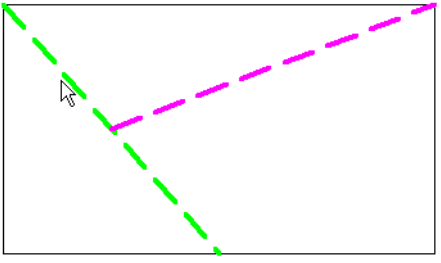
7. Select the second diagonal line you drew to be the cutting edge.



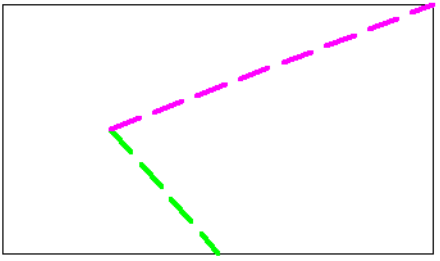
8. According to the prompt, you can select another cutting edge (not what we need), or select the object to trim.



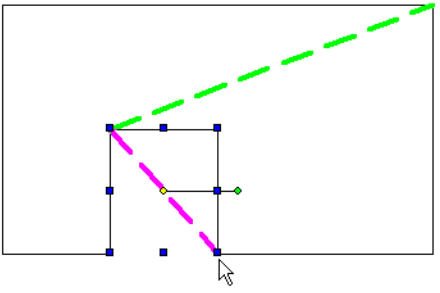

9. Select the first diagonal line, clicking it on the part you want deleted.



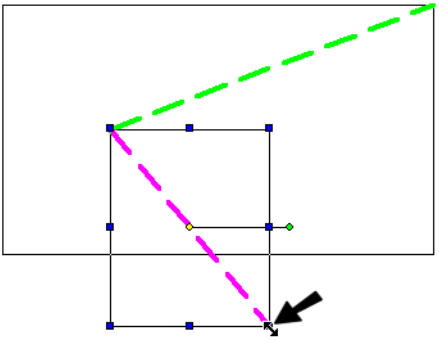
This is the result - the first diagonal line is trimmed by the second one.



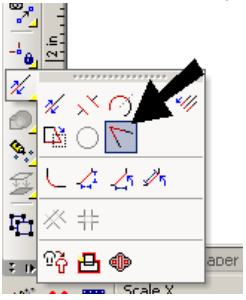
10. The next trimming tool is better demonstrated when two lines intersect. We can change a line for this purpose. Press the Spacebar - this activates **Select** - and click the trimmed line.



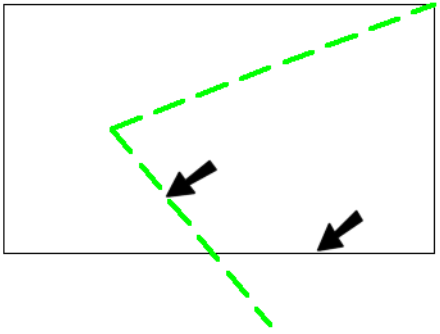
11. Note the blue squares at the corners and sides of the selection box. These are drag handles; you can use them to resize the selected objects. Click and drag the lower-right handle to make the line a bit longer. (You can also click a handle, release the mouse, and click again for its new location.)



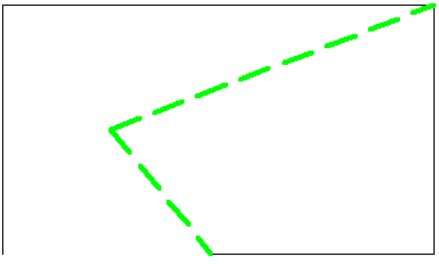
12. Now select **Meet 2 Lines** from the **Modify** toolbar.



13. Click the two lines shown, this time clicking them on the parts you want to remain.

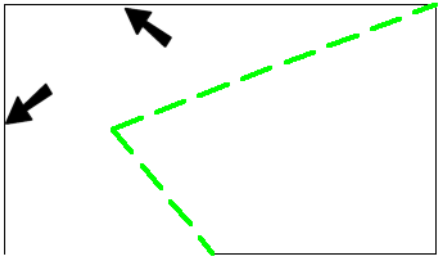


Here is the result - both lines were trimmed to one another.

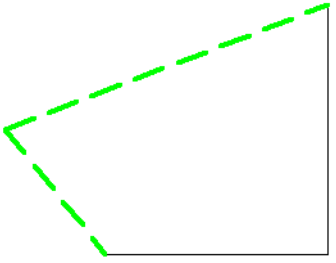


TIP: *We have just used several tools from the **Modify** toolbar. If you often use a particular toolbar, you can keep it permanently displayed in its entirety. Right-click in any toolbar area and select the toolbar you want to see, in this case the **Modify** toolbar.*

14. Activate **Select** once again and press Shift so that you can select multiple objects. Click both lines shown, and they are both selected. (When using Shift, you can also click a selected object to deselect it.)



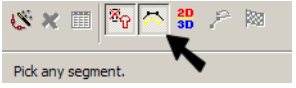
15. Press the Delete key to erase these lines.



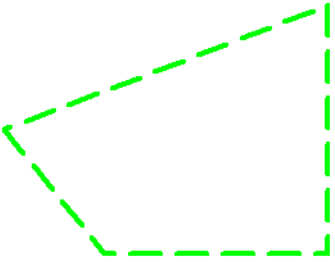
The remaining four lines are each separate objects, which you can verify by selecting each line one by one.

16. Make sure no lines are selected (click away from an object to deselect it). To join the lines into one object, select the menu option **Modify / Join Polyline**.
17. A polyline is a chain of connected line and arc segments, that is considered to be a single object (like the rectangle you created). A polyline can be open or closed.

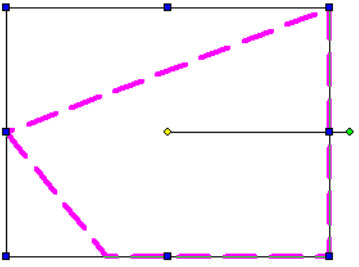
18. You could select each line one by one, but it is easier if you select **Auto Joining**. This option can be activated by the icon on the Inspector Bar or in the local (right-click) menu.



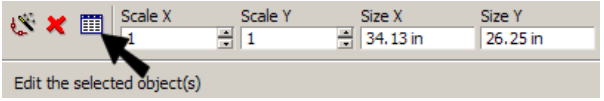

19. Click any line, and the chain is automatically identified. We now have a single object, which has uniform properties - line type, line weight, and color.



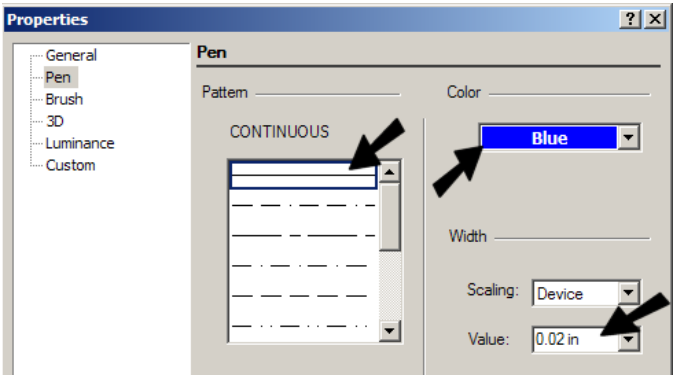
20. Use **Select** to select the polyline - it is one object.



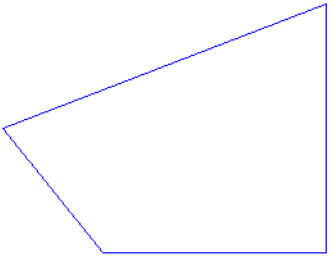
To change its properties, click the **Properties** icon in the Inspector Bar. (You could also select **Format / Properties** or press Ctrl+F.)




In the **Properties** window, open the **Pen** page. Set the line type to Continuous, and change the color and weight. This does not affect the settings in the **Property** toolbar, it only changes the properties of whatever is selected.

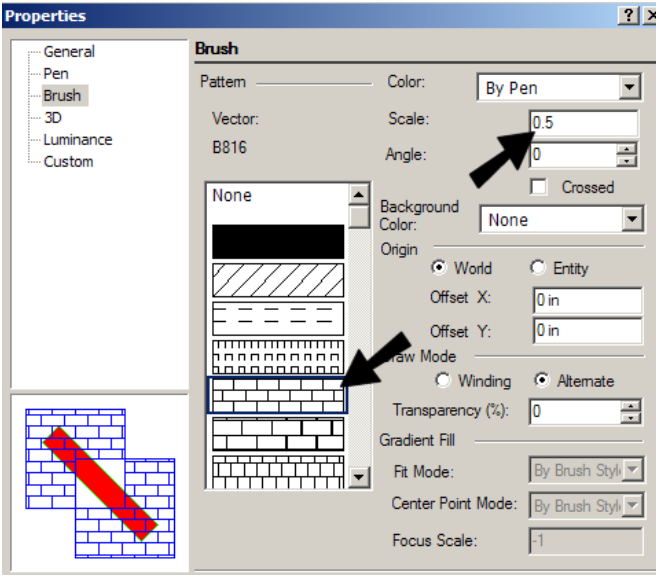



Click OK to close the **Properties** window, and here is the modified polyline (click outside the polyline to deselect it).



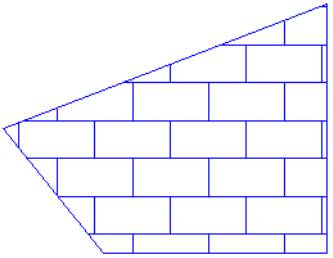
TIP: *You can set properties in advance for a group of tools - i.e. all tools located on the same toolbar. For example, you can right-click on the current icon in the **Line** toolbar. This opens the **Properties** window. Once you modify the properties, all objects created via the **Line** toolbar (rectangles, polylines, polygons, etc.) will now share these properties.*

21. For another way to open the **Properties** window, activate **Select** and double-click the polyline. Now open the **Brush** page. Here you can set the pattern, or solid-colored fill, that fills a closed shape. Select a brick pattern and reduce the scale.




NOTE: *Brush patterns can also be set on the **Property** toolbar.*

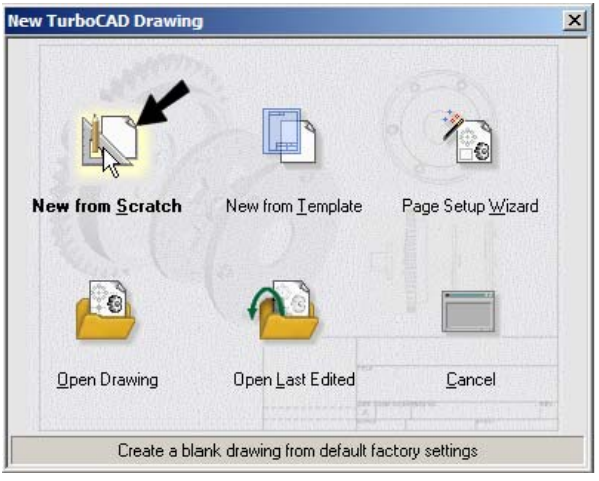
Here is the result:



## *Creating a Polyline*

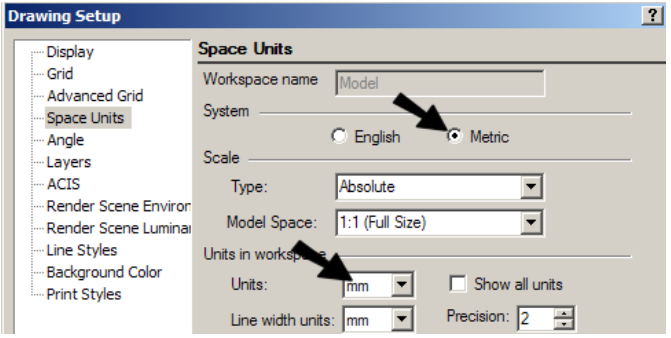
1. Start a new file by clicking the **New** icon (or select **File / New**, or press Ctrl+N).

2. Select **New from Scratch**.

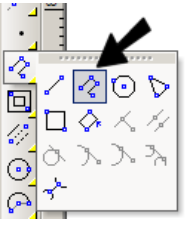



TIP: *Another useful option in the above window is **Page Setup Wizard**. This is a step-by-step guide for setting up your file. You can set units, precision, paper size / orientation, printing scale, and viewports (used in paper space).*

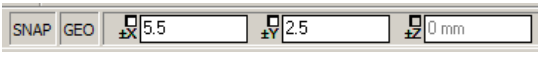
3. Start by changing the units. Select **Options / Space Units** and set the units to **Metric**, with mm as the base unit.



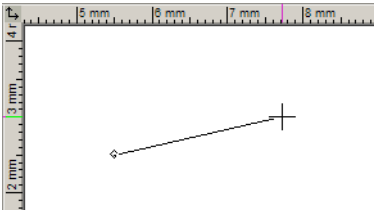

4. Click OK, and the rulers should now show mm measurements.
5. Open the **Line** toolbar and select **Polyline**.



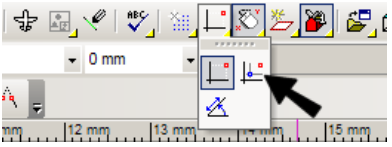
6. For the first point, press Shift + Tab to enter the Coordinate fields. This way you can start the object at a specific point in space. Enter 5.5 for X, and press Tab and enter 2.5 for Y. Press Enter.



7. The polyline's first point is now set at point (5.5mm, 2.5mm). Do not select more points yet.

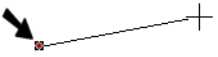



8. Until now we have been using **Absolute** coordinates, but if you know an object's measurements already, it is easier to enter distances from the last point, rather than entering exact coordinates each time. Therefore, use the icon on the **Standard** toolbar to switch to **Relative** coordinates




NOTE: *Coordinate systems can also be changed via the **Modes** menu.*

Now a red circle marks the last specified point.



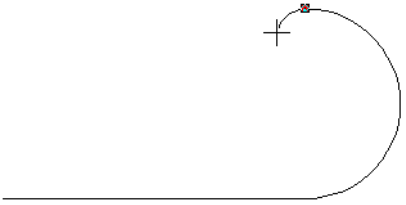
9. For the next point, return to the Coordinate fields. Now the X and Y fields have a +/- sign, indicating that distances you enter here are measured relative to the last point you set. Enter 4 for X and 0 for Y to create a line 4 mm long to the right (in the positive X direction).

The first segment, 4 mm long, has been created, and a red point marks the last point set.

10. Polylines can contain line or arc segments. Use the Inspector Bar (or local menu) to switch to **Arc Segment**.

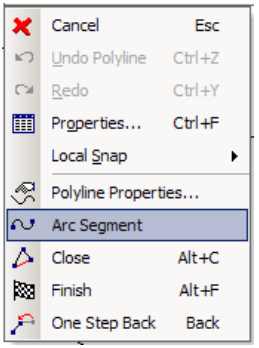
11. The arc starts at the end of the line, and is tangent to it. Enter 0, 2.5 to place the arc endpoint 2.5 mm above the last point.

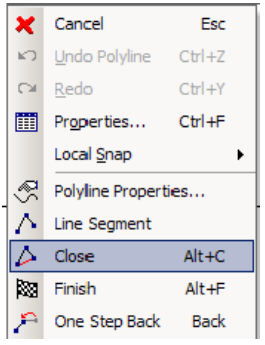
12. Here is the arc segment. Move the cursor to see that **Arc Segment** is still the current setting.



13. Switch back to **Line Segment**, and make the line 4 mm long, to the left (-4, 0).

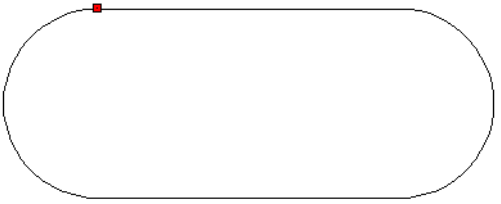
14. We want to close the polyline with another arc. First select **Arc Segment** again (shown below on the local menu), then select **Close**.




NOTE: *A polyline does not have to be closed. You can create an open polyline by selecting **Finish**, or you can double-click the last point*

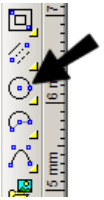
This is the resulting polyline.



15. Switch back to **Absolute** coordinates by pressing Shift+A. This gets rid of the red square that always follows you around.

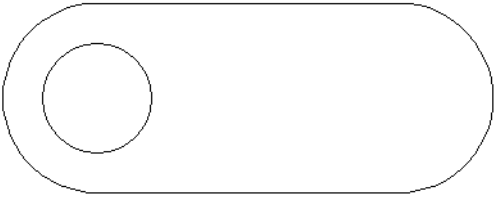
## *Creating Circles and Arcs*

1. For the next object, select **Circle Center and Point**.

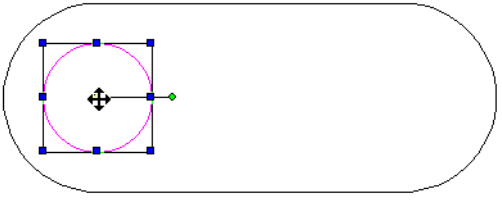


2. Move the cursor anywhere along the arc segment on the left side of the polyline and press C. This snaps the center of the new circle to the center of the arc.

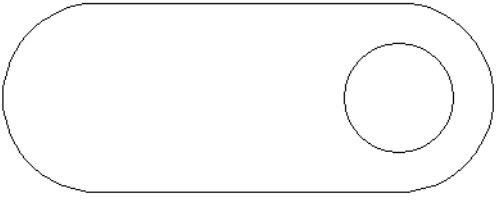
3. Move the cursor outward and click to place a point on the circle's circumference.



4. Select the circle, and move the cursor over the small yellow dot at the center. This dot is the reference point, which can be used to move the selected objects. Click this point.

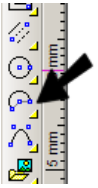


5. Move the reference point so that it is concentric with the arc on the right side. You can use the C key as before, or use a local snap, or even set the **Center** snap on the **Snap Modes** toolbar.

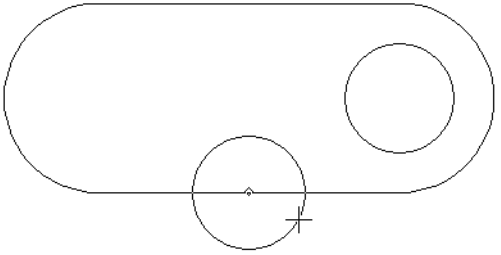


TIP: *When using the **Snap Modes** toolbar, keep in mind that these snaps stay active even when you might not want them. If you are having trouble selecting a certain point, check the **Snap Modes** toolbar to make sure the right snaps are set.*

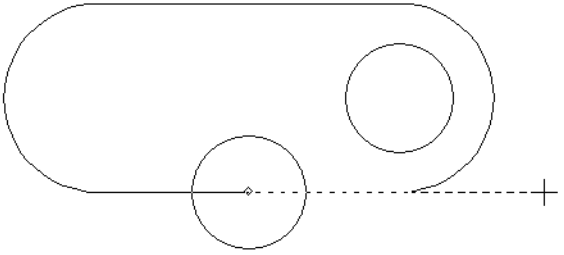
6. Now for an arc - select **Arc Center and Radius**.



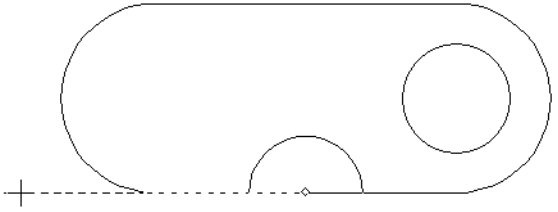
7. Place the arc center at the midpoint of the lower line, and click again to set the radius.



8. The next two clicks set the start and end angles. Arcs are created in the counter-clockwise direction. Keep Shift pressed, which puts you in Ortho mode. This means you can only move the cursor horizontally or vertically. Start the arc by clicking to the right (zero degrees).



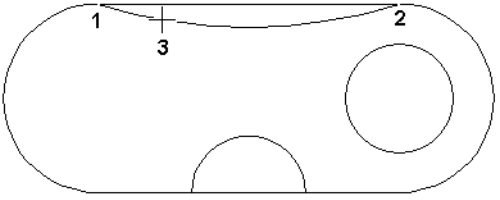
9. End the arc by clicking to the left (180 degrees).



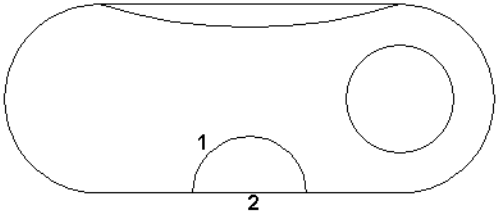
TIP: *Ortho mode can also be set on the **Snap Modes** toolbar.*

10. The next tool is **Arc Start / End / Included**, located on the **Arc** flyout toolbar.

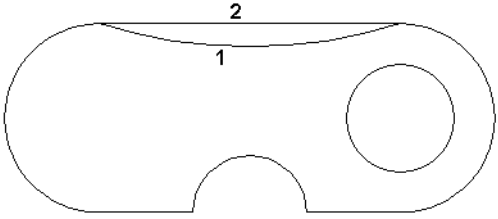
11. Use **Vertex** snaps to place the start and end points at the ends of the upper line. Click again to set the arc bulge.



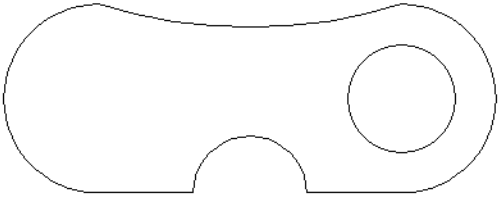
12. Activate **Trim** as before, selecting the half-circle arc first as the cutting edge, and then the lower line of the polyline.




13. While still in **Trim**, do the same for the upper arc.

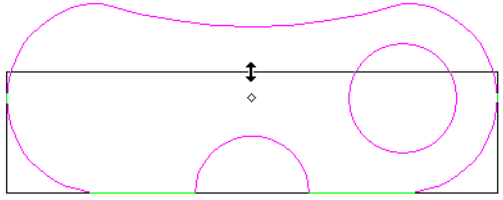



14. **Cancel** or press Esc to end the trimming tool.

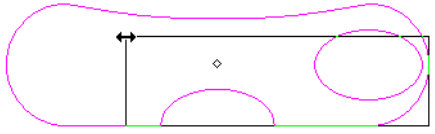


## *Scaling, Copying, and Rotating*

1. Select all objects by press Ctrl+A. To make the entire drawing shorter, drag down the blue handle on the upper line and click to resize.

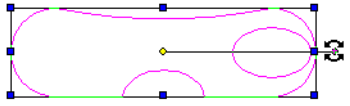


2. The side handles only scale in one direction. To scale in two directions, drag the top left corner handle.

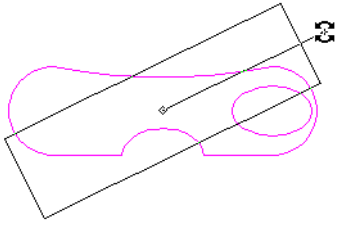


TIP: *While in **Select** mode, the values in the Inspector Bar can be used to scale by exact values. These fields also update dynamically as you drag the handles.*

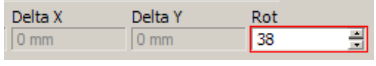
3. Move the cursor over the small green dot - this is the rotation handle.

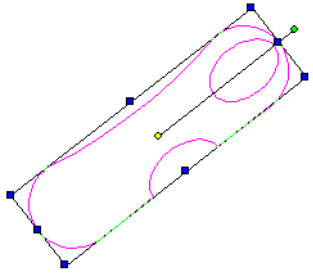


4. Click this point and move the cursor to rotate the objects. The reference point is now used as the center of rotation. Do not click to set the rotation yet.



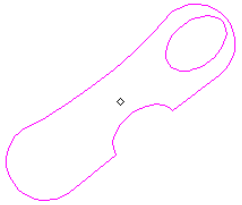
5. Press Tab once to access the Inspector Bar, and once again to jump to the **Rotation** field. Type a rotation angle and press Enter.

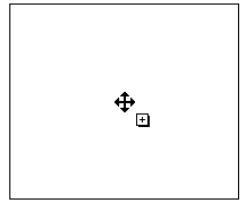


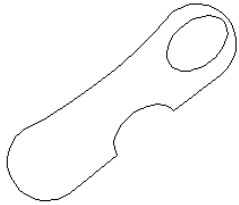
6. Now to copy these objects. In the Inspector Bar, click **Make Copy**.

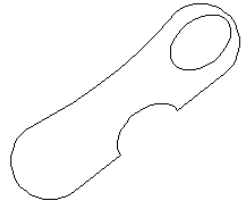
7. Use the reference point to move the objects to the right. Note that the move cursor now has a “+” symbol, indicating that you are in copy mode.



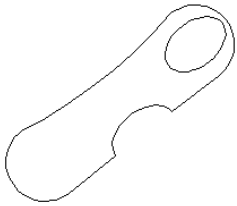


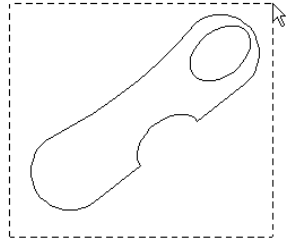
8. Click to place the copy. Turn off **Make Copy**, otherwise you will continue making copies.



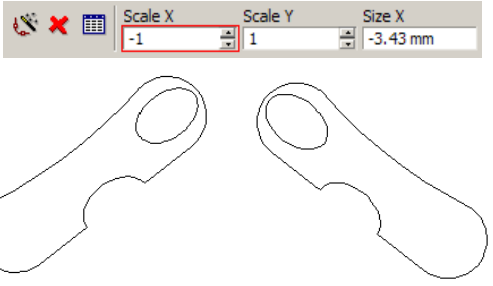


9. Make sure everything is deselected. For another way to select multiple objects, activate **Select** once again, and click and drag a box around the right set of copied objects.





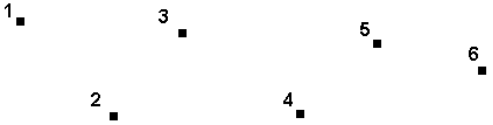
10. To make a mirrored copy of this set, enter -1 for **Scale X** in the Inspector Bar, and press Enter.



## *Points and Curves*

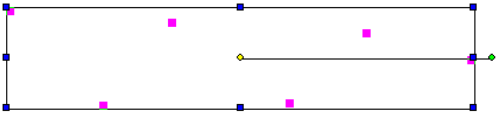
1. Start another file, or pan to some blank space in the current file. (You can pan by dragging the scroll bars up or down, or side to side.)
2. Open the **Point** fly-out toolbar, and select a square point.

3. Create a few points randomly like this:

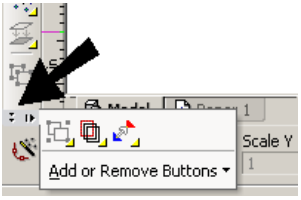



TIP: *In the **Properties** of these points, you can change the point size.*

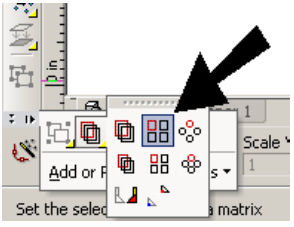
4. **Select** these points.



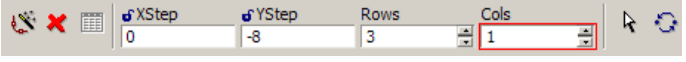
5. The next tool is in one of the **Copy** tools, whose flyout toolbar is near the bottom of the **Drawing Tools** toolbar. If you need to expand this toolbar, click the arrow at the bottom of it.




6. From the **Copy** toolbar, select **Array Copy**. This enables you to copy the selected objects multiple times in the X and Y directions.

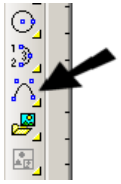


7. Press Tab to enter the Inspector Bar, and enter values like this. Adjust your **Y Step** value as needed to get a reasonable spacing - the preview line will update as you change the value. Enter three rows and one column.



8. Press Enter. You should have three rows (and one column) of the selected points.

9. Now find the **Curves** toolbar and select the first tool: **Spline by Control Points**. This draws a spline using points as a guide, but the curve does not actually pass through the points.



10. Click the points in the top set, one by one. If you want to snap to them, use the V key, or turn the **Vertex** snap on.

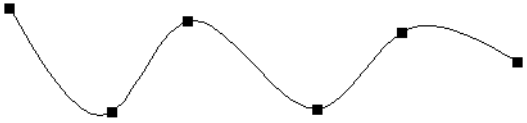
11. From the Inspector Bar or local menu, select Finish. (You can also press Alt+F.)

The spline looks like this - it passes through the first and last points only, and the other points guide its curvature.

NOTE: *If you had selected **Close** instead of **Finish**, the spline would make a loop, and would not pass through any points. Also, if you want to finish an open spline, you can double-click its last point.*

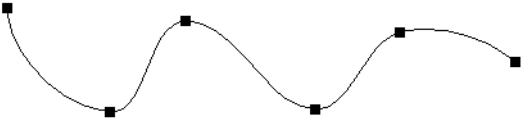
12. For the second set of points, activate the second curve tool - **Spline by Fit Points**.

13. Select the points in order like before. This time the spline does pass through the selected points.



14. For the third and last set, use **Bezier**.

15. This creates a curve similar to **Spline by Fit Points**, but with different tangency and curvature properties.

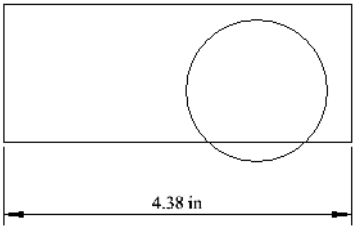


# Selection Info Palette

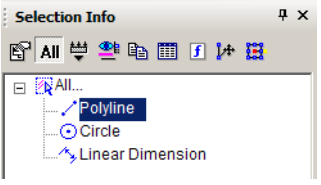
**Menu:** View / Selection Info

Displays information about the currently selected object or objects. You can also change properties of objects here.

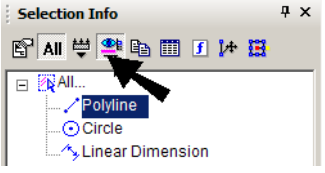
1. Create few objects, then select them all.



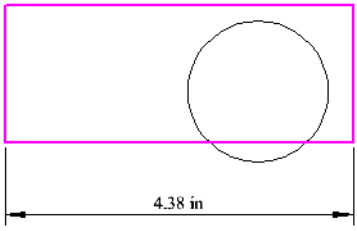

All types of objects are listed in the upper window of the Selection Info Palette.



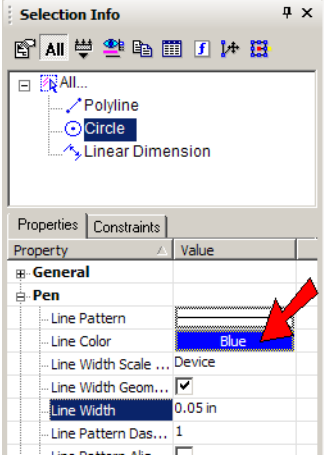

2. Highlight any item, such as the polyline. If the **Highlighting** icon is activated. . .



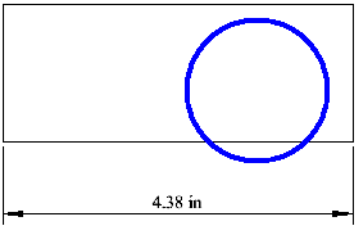
. . . the object will also be highlighted onscreen.




3. For the highlighted object, its properties are listed in the lower section of the palette. You can change colors, line widths, etc., as well as geometric properties such as radius or point coordinates. (If a field cannot be edited, it will be grayed out.) In this example, the **Line color** of circle was changed.



The change is made automatically.




NOTE: *For 3D ACIS objects, physical properties are not automatically listed. Click the* ***Physical Metrics*** *icon in the palette toolbar if you want to see engineering properties (volume, moments of inertia, etc.).*

# Working in 3D

The rest of the guide will give a basic overview of some things you can do in 3D.

## *3D Views*

While working in 3D, there are many ways to change how you view your drawing. Views are seen by the “camera” - equivalent to your eye. The camera is located in a specific place and faces a specific direction.

There are several standard orthographic and isometric views, and if you need additional perspective you can change how the camera is oriented. You can move the camera using the **Move Camera** commands, and dynamically examine the model using the **Walk Through** tools. To save and display additional views, you can create camera objects.

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TIP: *If you use a wheel mouse, keep the middle mouse button pressed, and drag the cursor around the screen to dynamically rotate the model.*

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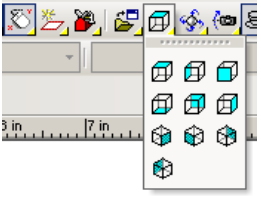
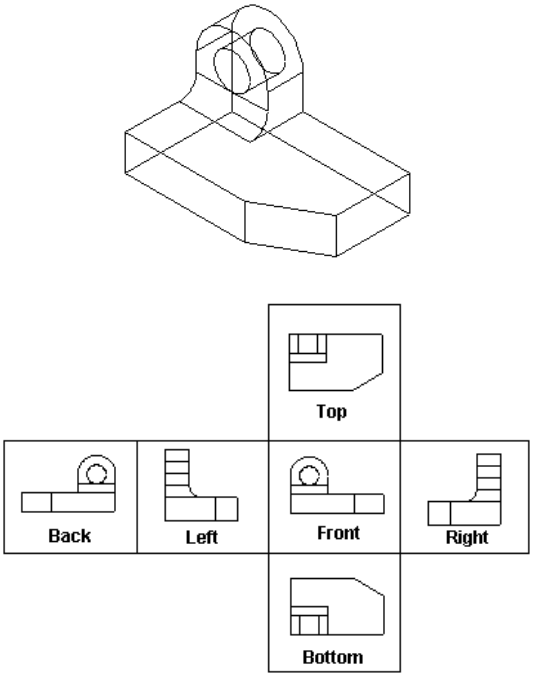
The ten standard views can be accessed from the **Standard** toolbar, or from the **View / Camera** menu. You can also display this toolbar separately by right-clicking in the toolbar area and selecting **Standard Views**.



## Orthographic Views

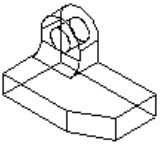
The first six views on the toolbar are orthographic views - Top (World Plan), Left, Front, Bottom, Back Right.

If your model was enclosed in a box, these views reflect how the model would appear by looking directly at each of the box faces.

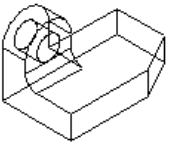


## Isometric Views

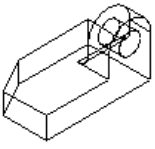
The last four views on the toolbar are isometric - angled views. The views are named for compass directions (Isometric_SE is the view looking from the southeast).



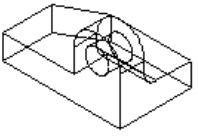
Isometric_SE



Isometric_SW



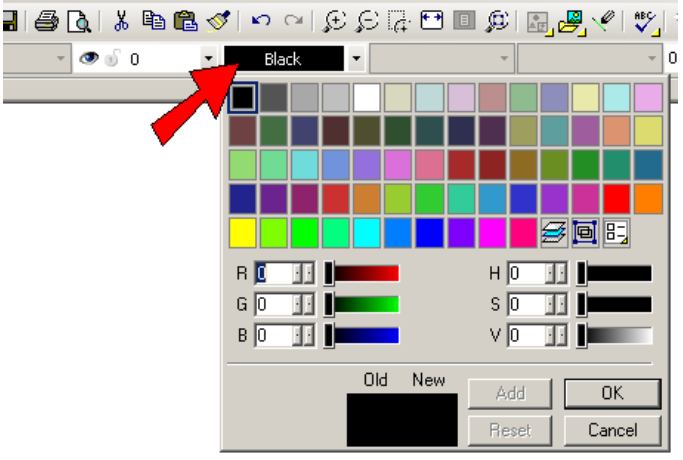
Isometric_NE



Isometric_NW

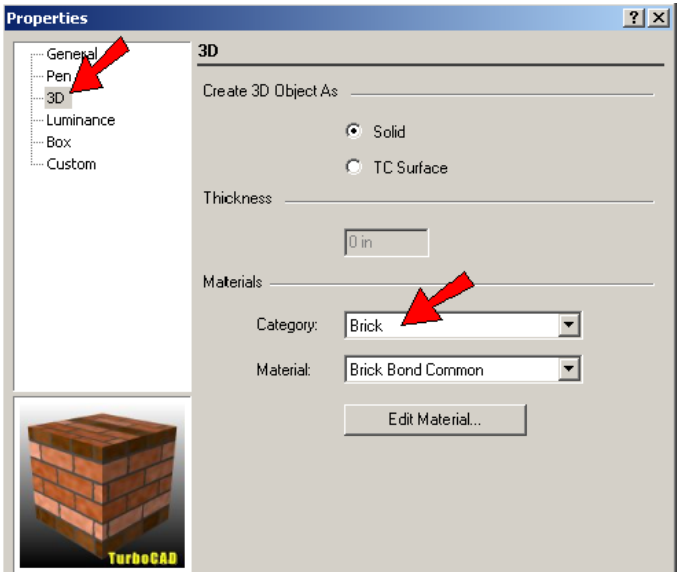
## *Rendering*

To add colors to your model, first select the objects and then select one of the colors in the **Property** toolbar.




Colors can also be assigned in an object's **Properties**, or in the Selection Info palette.

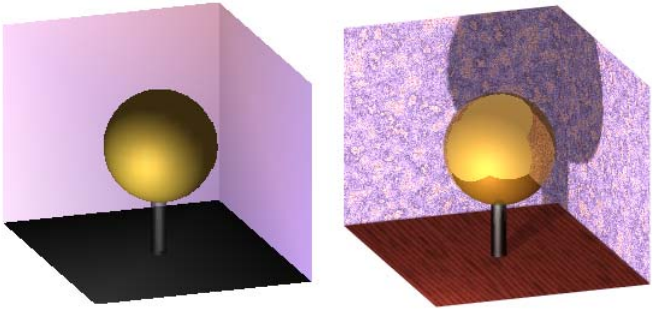
Materials can be assigned in an object's **Properties**, or in the Selection Info palette. **Category** and **Material** are found in the **3D** page of the **Properties**.




There are two ways you can show your 3D model using colors and textures. Render tools, including **Hidden Line** and **Wireframe**, are included as popups on the local menu, which appears when you right-click in the drawing area.

These tools also appear on the **View / Camera** menu.

**Draft** rendering shows materials without too much detail that might slow down your model. **Quality** rendering includes detailed material and shadow effects, but can slow down complex models.



Most drawing and editing functions can be used in this rendered view.

## *Creating 3D Objects*

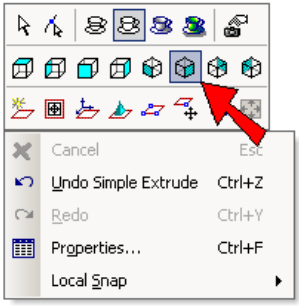
There are basically three ways to create 3D objects:

- 3D objects called “primitives” which are objects created from scratch, such as boxes, cylinders, prisms, and cones
- 3D objects created using profiles, such as extrusions and sweeps
- 3D objects created by assigning a thickness to a 2D object.

The 3D tools are found on the **3D Object** toolbar, or on this flyout toolbar.

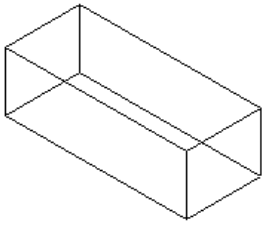
## 3D Primitives

1. Before creating a 3D object, switch to an isometric view. You can do this by right-clicking and choosing a view from the local menu.




2. Activate **Box**.

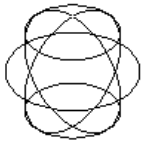
3. Click two opposite corners for the rectangular base.The third click sets the height of the box.



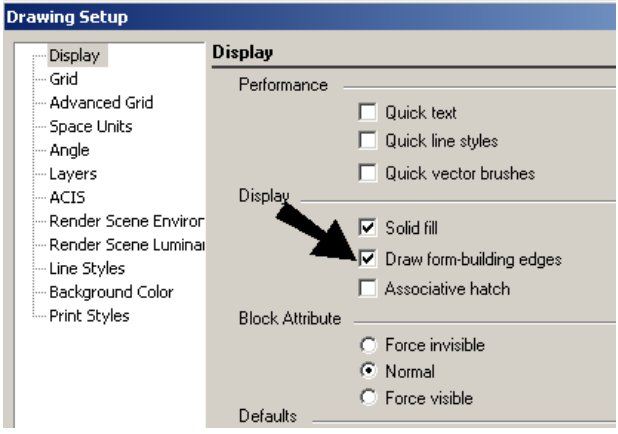
You can also enter the length, width, and height in the Inspector Bar. (You can press Tab to jump to the Inspector Bar.)

4. Next, activate **Sphere**.

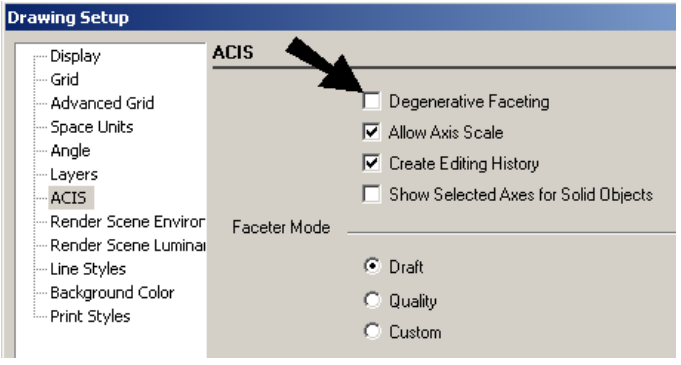
5. Click the center point, then a point on the outside.



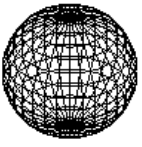
6. To change the way the sphere is displayed, select **Options / Display**, and check **Draw form-building edges**.



7. In the same **Drawing Setup** window, open the **ACIS** page, and make sure **Degenerative Faceting** is not checked.

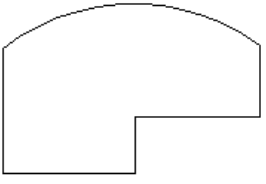



8. This is how the sphere should look:

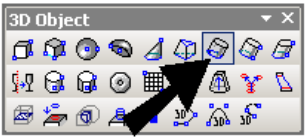


## 3D Profile Objects

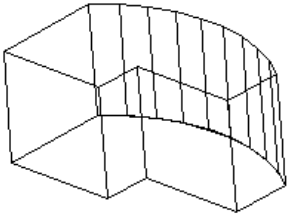
1. Start with a profile like this, which you can create using the **Polyline** tool.



2. Activate **Simple Extrude**.

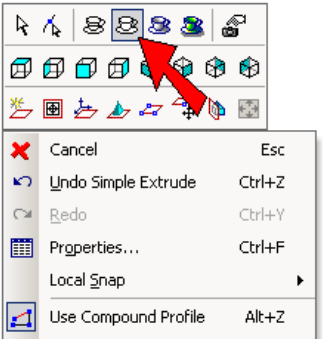



3. Click the profile, then move the mouse to create the 3D object.

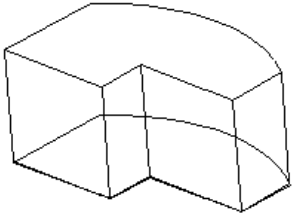


NOTE: *You can also extrude an open profile, which would result in a 3D surface.*

4. Switch to **Hidden Line** mode.

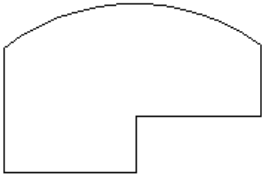


Now the hidden edges are not visible.

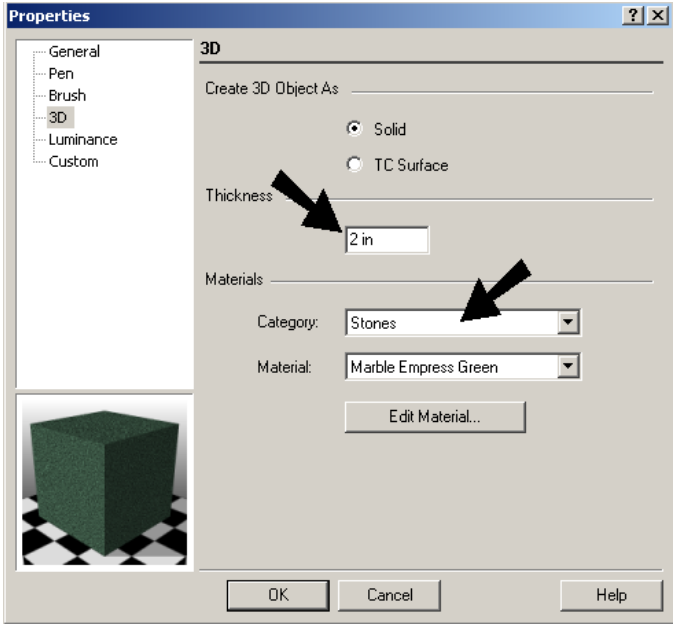


## 2D Object with Thickness

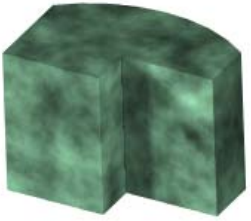
1. To make this object, start with the same 2D polyline used for **Simple Extrude**.



2. Using the **Select** tool, double-click on the polyline to open its **Properties**. On the **3D** page, enter a value for **Thickness**. And while you're here on this page, also select a **Category** and **Material**.




Here is the resulting object, shown in **Quality** render mode.



## *Combining 3D Objects*

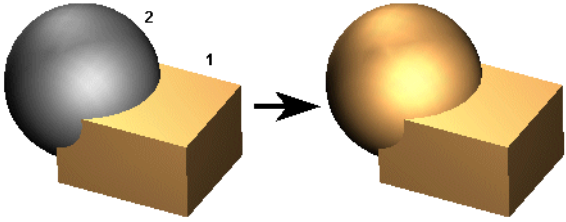
Boolean operations can be used to add, subtract, or intersect 3D objects.

### 3D Add

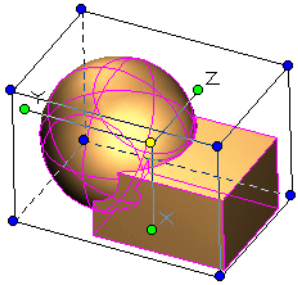
**Menu:** Modify / 3D Boolean Operations / 3D Add

Combines two 3D objects into one object. Any overlapping volume is removed.

Select two objects to combine, and the second object is joined to the first object. Selection order is important, because the new object will have all the properties of the **first** object selected, such as layer and material.




The resulting object is one object.



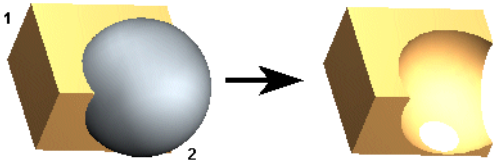

The selected objects do not have to overlap. If you combine non-overlapping objects, they will still be combined into one object.

### 3D Subtract

**Menu:** Modify / 3D Boolean Operations / 3D Subtract

Subtracts one 3D object from another.

First select the object to subtract from, then select the object to subtract. By default, the second object is deleted.




# Getting Help

These exercises demonstrate only the tip of iceberg for what you can do in TurboCAD. You can find information on all of TurboCAD's functionality in several places:

**Online Help:** The **Help** menu provides access to the online help. The help is also context-sensitive, which can be accessed by pressing F1 while using a tool or window. You can also click the **Help** button (question mark icon), then click on the tool button, menu item, tab, or palette in question.

**Web Tutorials:** There are several online demo tutorials that can be accessed from the page that appears in the Internet Palette.

**Help on the Internet:** Select **Help / TurboCAD on the Web**. Each item in the submenu opens the Internet Palette to the selected web site.

**User Forums:** Go to www.turbocad.com and click User Forums. Choose the forum for the version of TurboCAD you have. This is the place where users and IMSI staff post answers to individual user questions.

**Technical Support:** Go to the support section of http://www.turbocad.com for detailed support options. Paid technical support is available by calling 877-827-8776.