

TurboCAD Pro V19.1 – Workplanes

Demystifying TurboCAD Workplanes

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Parking lot has been converted into grid to illustrate the current 'work'plane.

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Special Note

All of the work presented within this tutorial is based on TurboCAD Pro V19.1. Although users of previous versions are welcome to try the tutorial it cannot be stated what results will be achieved. Many changes, some subtle and others not so subtle, are made with each program revision. Although many steps and directions would be generic some may not be. The same can be said for tools between versions. Older versions may not have the same tools as Pro V19.1 and if the same tools are available the tools themselves may have been revised and hence, work in a different manner than they previously did.

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Introduction

One of the fundamental concepts in TurboCAD, when it comes to drawing in 3D, is the use and understanding of workplanes. Most new users are initially overwhelmed by this concept, but once the user puzzles out what workplanes are all about they quickly realize that they weren't that complex after all.

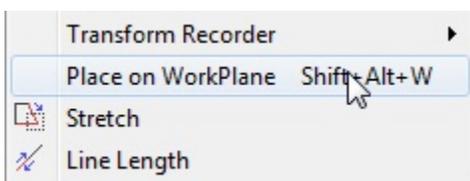
Each workplane tool, complete with a user-friendly explanation and example will be illustrated within this tutorial and this will be done by having the reader work through various examples keystroke by keystroke. By the time the reader reaches the end of this tutorial any confusion about workplanes should have lessened significantly.

Perhaps an analogy might help start the process of demystification. Think of a workplane as the table underneath a piece of paper. When you draw on the paper the table supports the paper, it keeps the paper flat and stable. This stability, this structure, ensures that the pencil doesn't poke through the paper and ensures that the graphite is laid down smoothly and clearly. Work proceeds just as planned. Let's say then, that the paper is moved off the table and held in the air. Now, when one attempts to draw on the paper one is plagued with problems. The paper is flimsy, one cannot lay down a straight line of graphite and if one pushes too hard the pencil can poke right through the paper. In this analogy, this is so because the table, and its stable structure, was left behind. In order, then, to be able to draw in different views or on different surfaces the table must be moved and placed under the paper *wherever* that paper may have been moved to, much like one may adjust their drafting table to a different angle.



One very important thing for the beginner to remember, right from the start, is that the table (workplane) is required to employ *all* the 2D tools, be it lines, circles or the myriad other tools. It is also required with *all* the 2D modification tools. As well, after some procedures, such as mirror copy, the objects will need to be selected and placed on the current workplane to utilize other 2D tool functions or processes such as line length, offset, parallel or tangent.

Objects are placed on the workplane by selecting them and invoking 'Place on WorkPlane' from Modify menu at the top of the TurboCAD desktop.

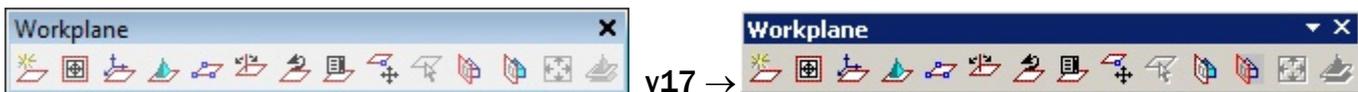


Since this is a frequent need, many users create a shortcut tool on their TurboCAD desktop or use the short-cut keys (Shift + Alt + W). Below is an image of the tool the author has on his desktop. A text toolbar is created first and then the text icon is changed to the down arrow icon via the 'change button image' customize dialogue.



Many users find the above part especially confusing and often ask why? In essence every item is created on its own workplane even though it looks like they are on the same workplane. Issues don't arise until the 2D objects are copied and then functions such as line length, offset, parallel, tangent and so forth are employed. It is just something a user has to get used to as it has been this way for all versions of TurboCAD. Eventually a user will come to know instinctually when to place their 2D objects on the workplane.

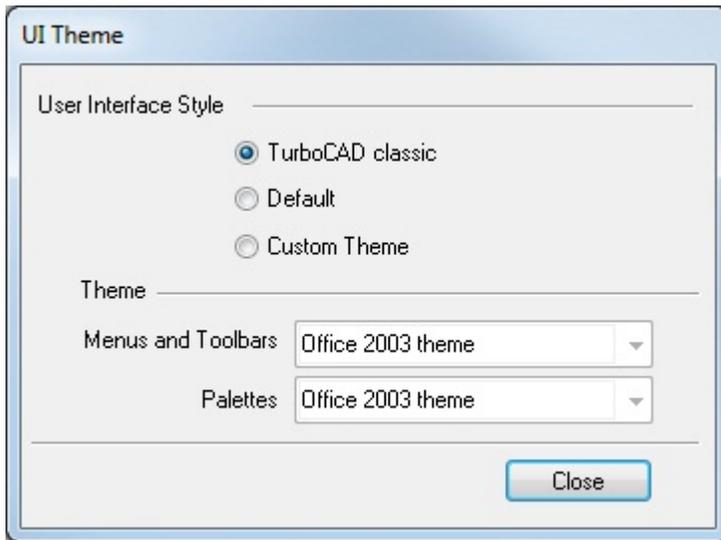
Because the "table" (workplane) is required continually while drawing the developers of TurboCAD have included several workplane tools to facilitate 'the move' quickly and efficiently.



-  ← Show / Hide Workplane
-  ← Workplane by Active View
-  ← Workplane by World
-  ← Workplane by Entity
-  ← Workplane by 3 Points
-  ← Workplane by Z Axis
-  ← Previous Workplane
-  ← Set Named Workplane
-  ← Workplane Origin
-  ← Edit Current Workplane
-  ← Workplane by Facet
-  ← Auto Workplane by Face
-  ← Fit Workplane to Window
-  ← Show/Hide Intersections between WorkPlane and 3D Objects

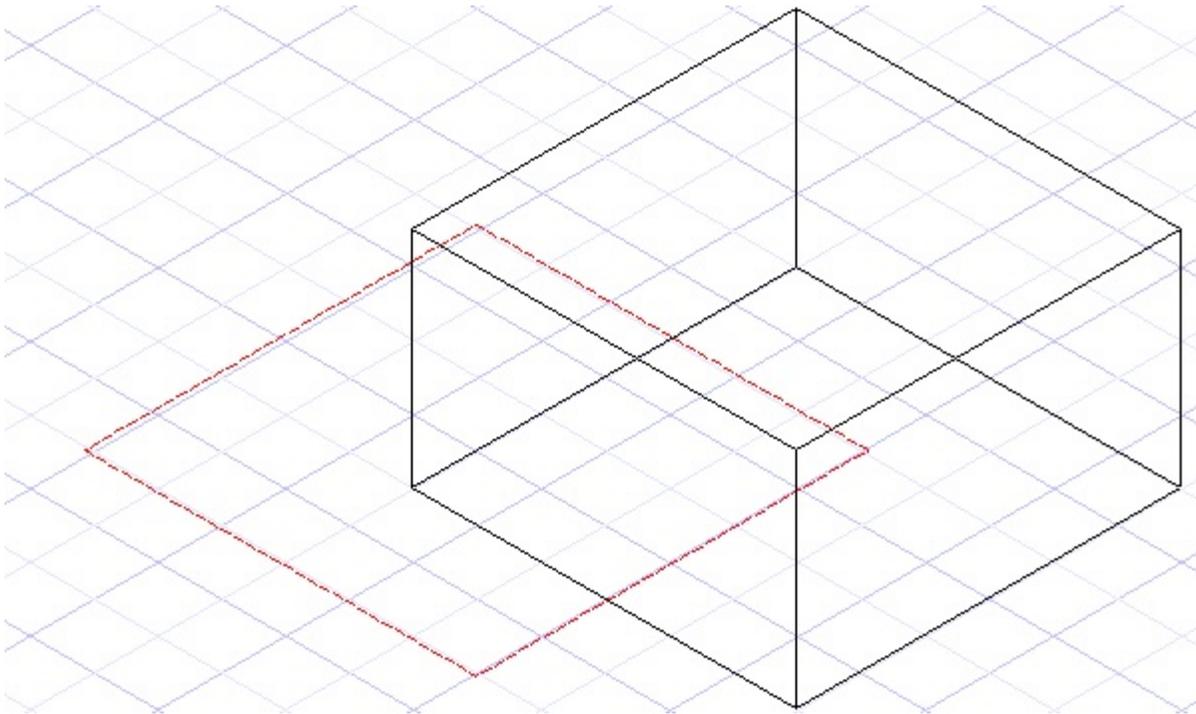
This tutorial will assume that the reader has the Platinum edition of TurboCAD Pro V19.1 (64-Bit), although no Platinum specific tools are used, that the author is aware of. The author does not have the 32-Bit version of TurboCAD V19,1 but foresees no issues with doing this tutorial in the Basic Pro edition.

This tutorial assumes that the beginner has studied the desktop to some degree and can locate most of the tools. Since there are endless desktop configurations that can be set up in TurboCAD the author has opted to illustrate the required tools with the TurboCAD Classic user interface with its Office 2003 theme and the default toolbars in their undocked format.



Please remember that any supplied images and files are for use within the tutorial only and may not be shared or sold to others.

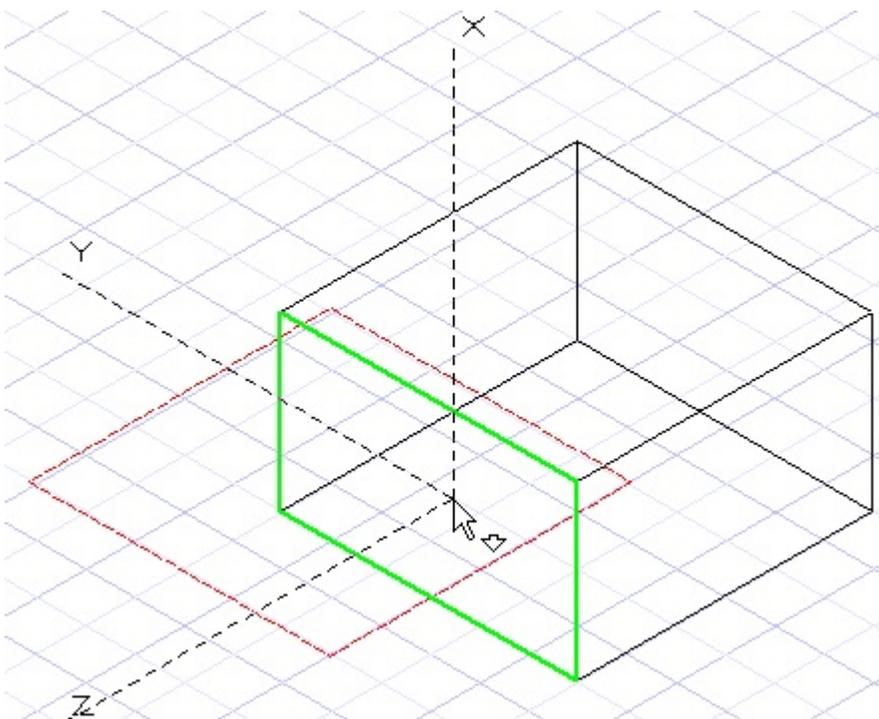
For those working through the tutorial in pre-V18 versions please note that most of the functions described in the tutorial, as being on the Modify menu, were on the Format menu in previous versions of the program.



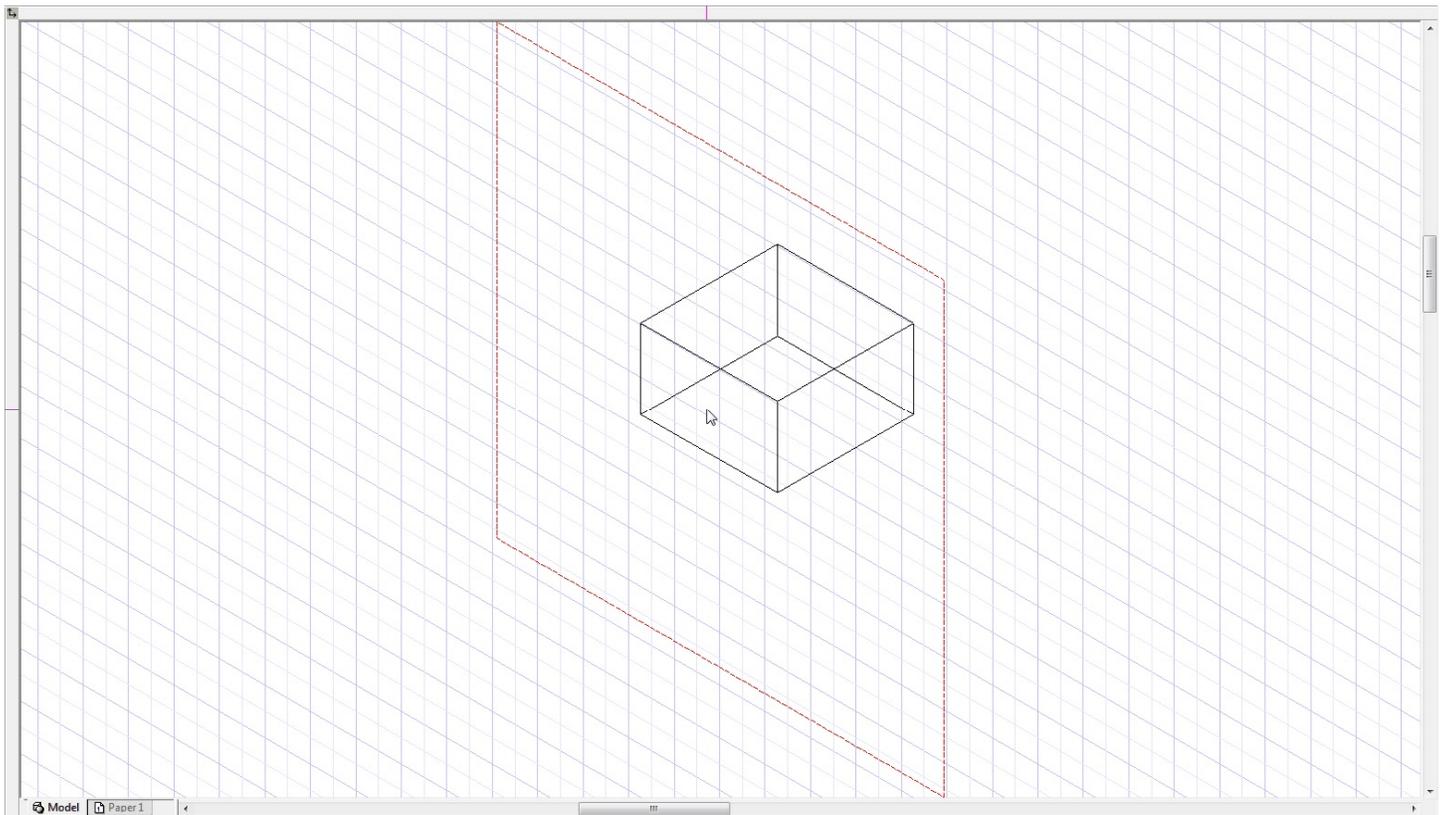
To demonstrate how the grid reflects the position of the workplane, select the Workplane by Facet tool from the Workplane toolbar. An explanation of this tool will come further along in the tutorial.



Move the cursor over the front face of the box as indicated in the picture below. The alignment of the axis' may change depending on the route taken to the front of the box (from right to left below). When the front face of the box is highlighted as in the image below....



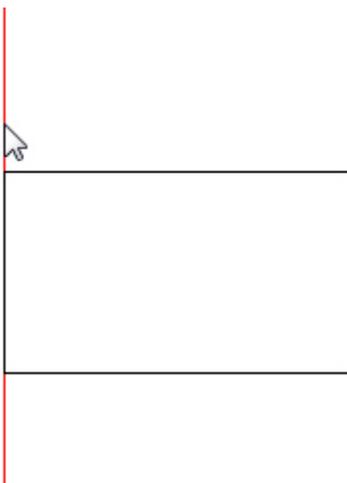
....left mouse click to define the new workplane. Immediately the grid moves into position and so does the workplane indicator. The grid will move whether the workplane indicator is on or not. Sometime the workplane indicator is only somewhat helpful. One can see that the workplane indicator is oriented in the right direction but it is difficult to tell whether it lines up properly to the face of the box.



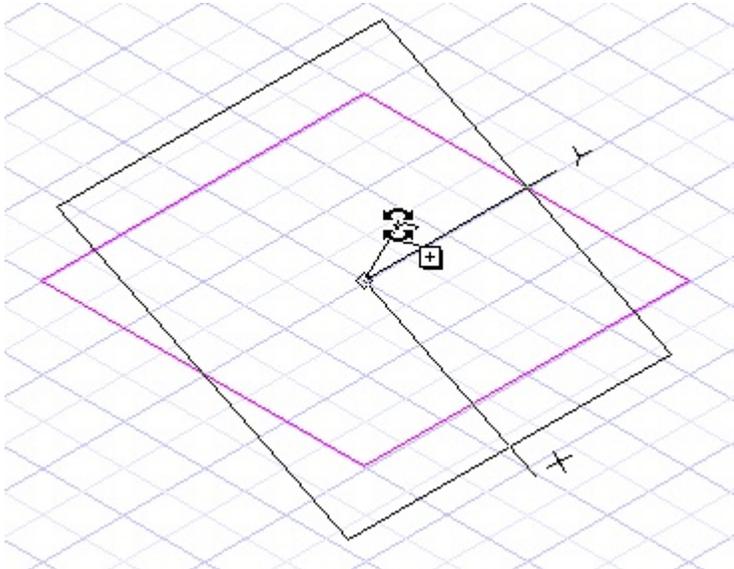
Switch to Right view.



Scroll in and out as necessary to see that the indicator (the workplane) is indeed lined up with the face that was previously selected.



Left mouse click on the green Z rotation handle to pick it up (click and release). Note which rotation field on the Inspector bar changes as the cursor is moved.

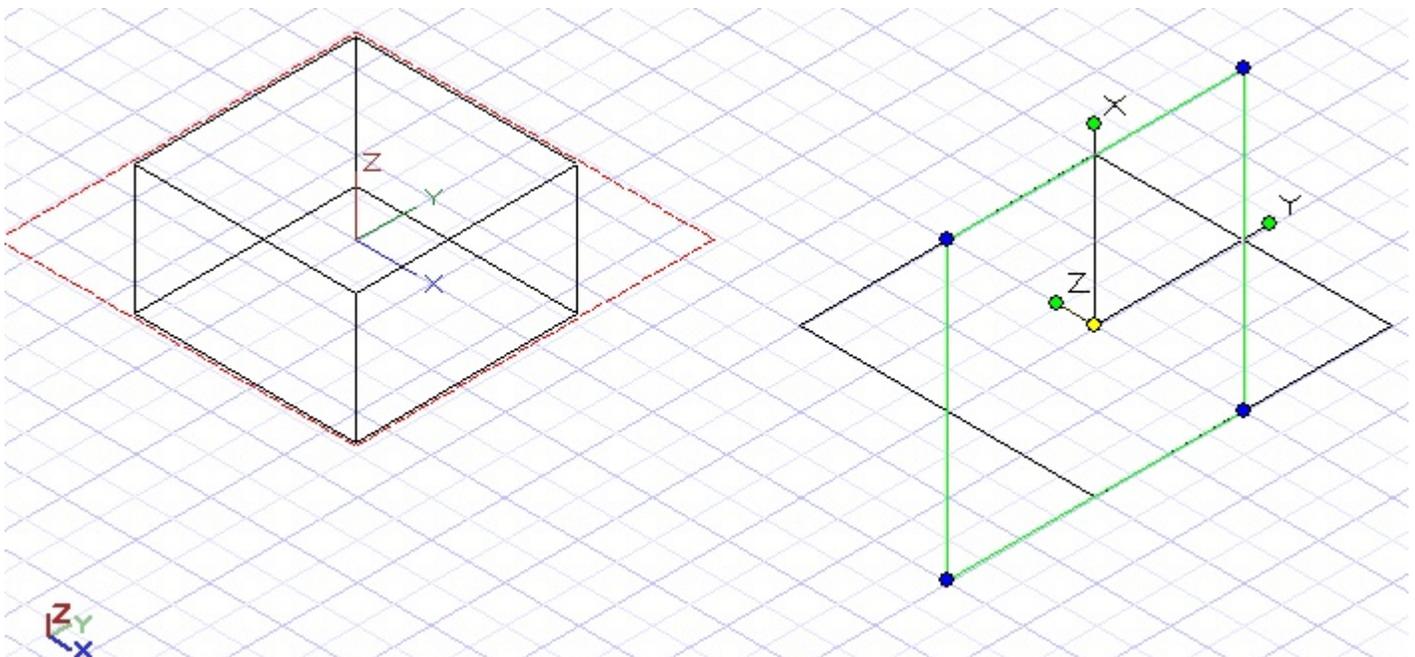


Rot X	Rot Y	Rot Z
0	27.3858042275	0

Tab into the Inspector Bar and enter 270 in the Y Rotation field (rotating on the Y axis). Press Enter.

Rot X	Rot Y	Rot Z
0	270	0

Note the relationship to the world CS icon. This rotated square now represents the world Z-Y plane.

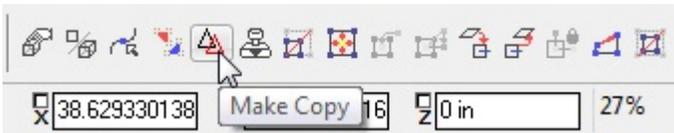


Left mouse click on the green Y rotation handle to pick it up (click and release). Begin to rotate the rectangle counterclockwise and when the X and the Y Rotation fields change to 90 Tab into the Inspector Bar and enter 0 in the Y Rotation field. Press Enter.

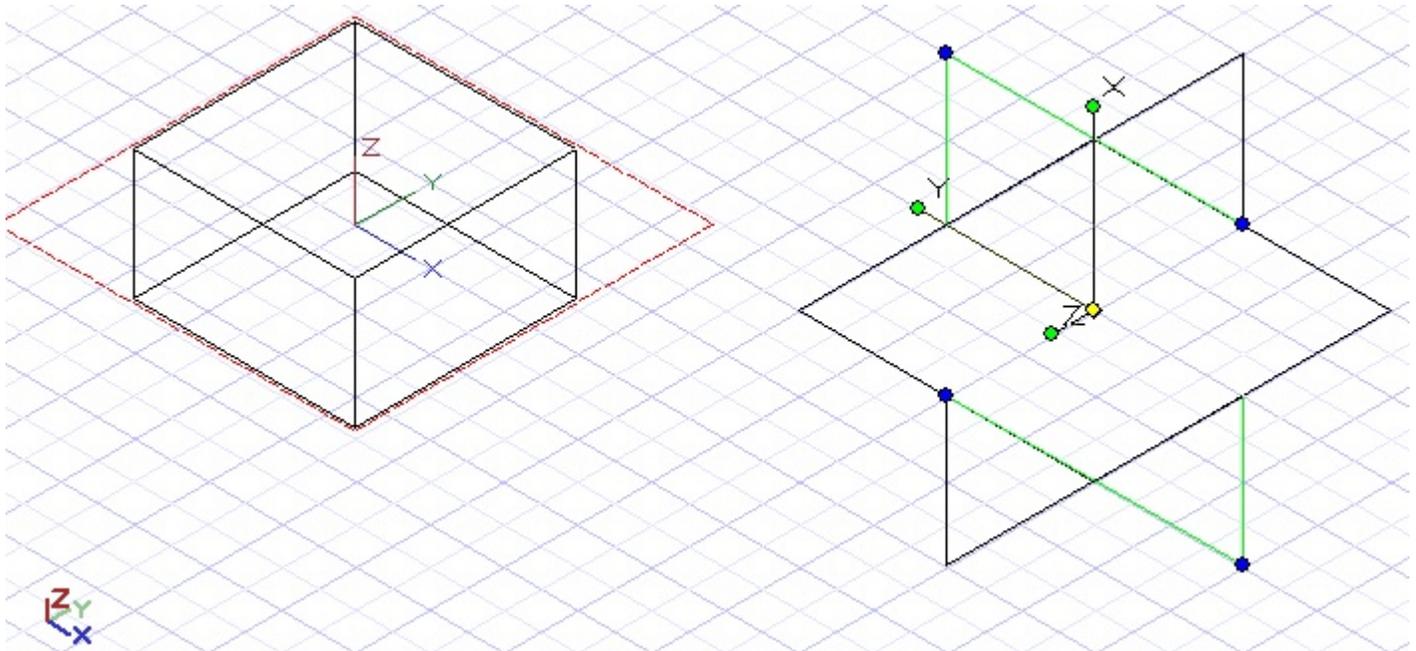
Rot X	Rot Y	Rot Z
0	270	0

Rot X	Rot Y	Rot Z
90	0	90

Select the Make Copy tool again to turn it off.

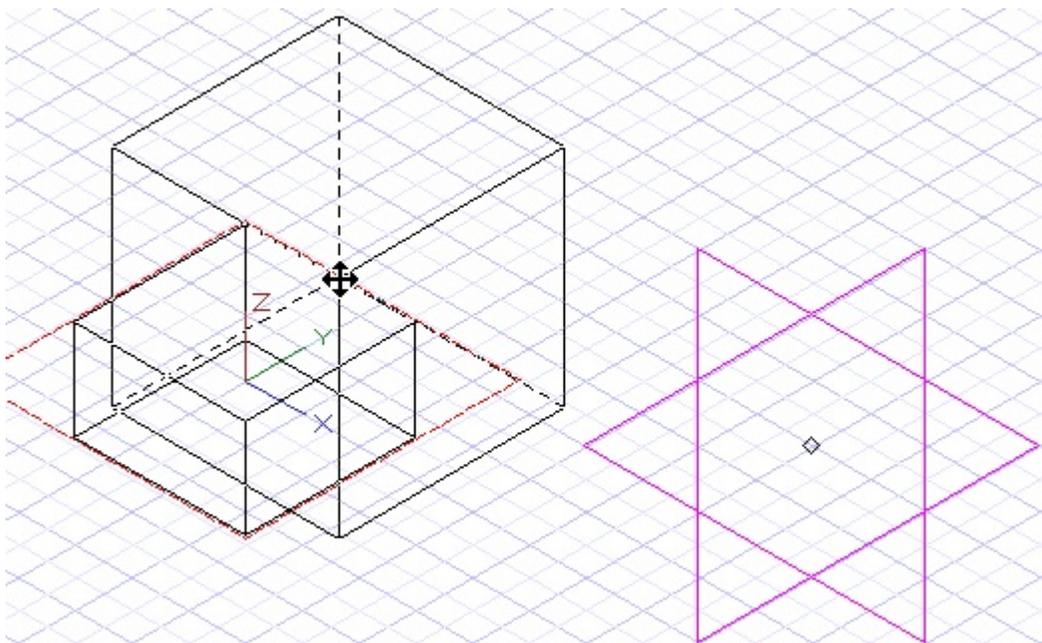


Note the relationship to the world CS icon. This rotated square now represents the world Z-X plane.

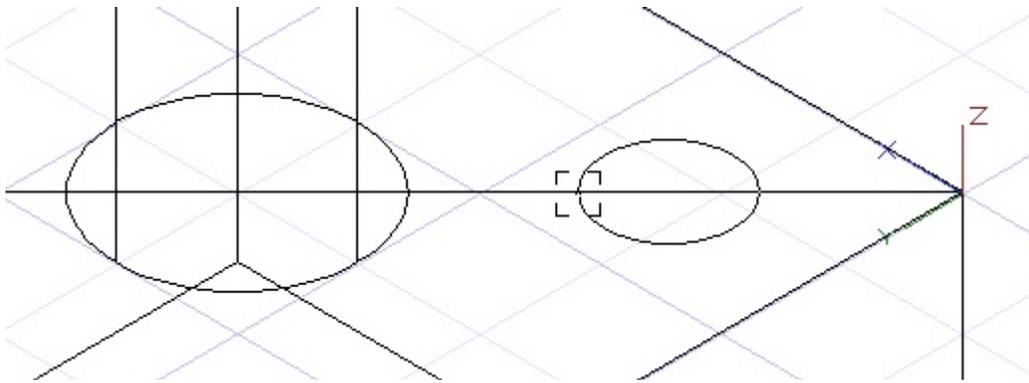


Select the three rectangles. This can be done by dragging the selection cursor fully around all three, or a user can press and hold the Shift key down and left click them one at a time to add them to the current selection. (With this method, a user can also deselect objects with a left mouse click if the object is already selected. Release the Shift key when all three are selected.)

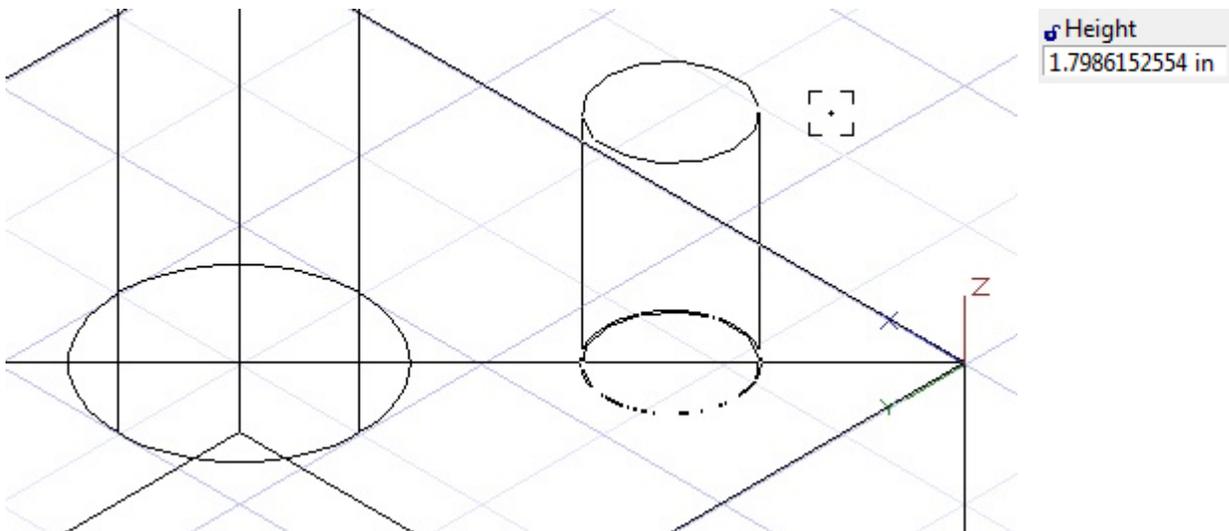
Left mouse click on the yellow reference point of the selection to pick it up. Move the cursor over to the edge of the box that was created earlier and E SEKE snap the squares to the box. In progress below.



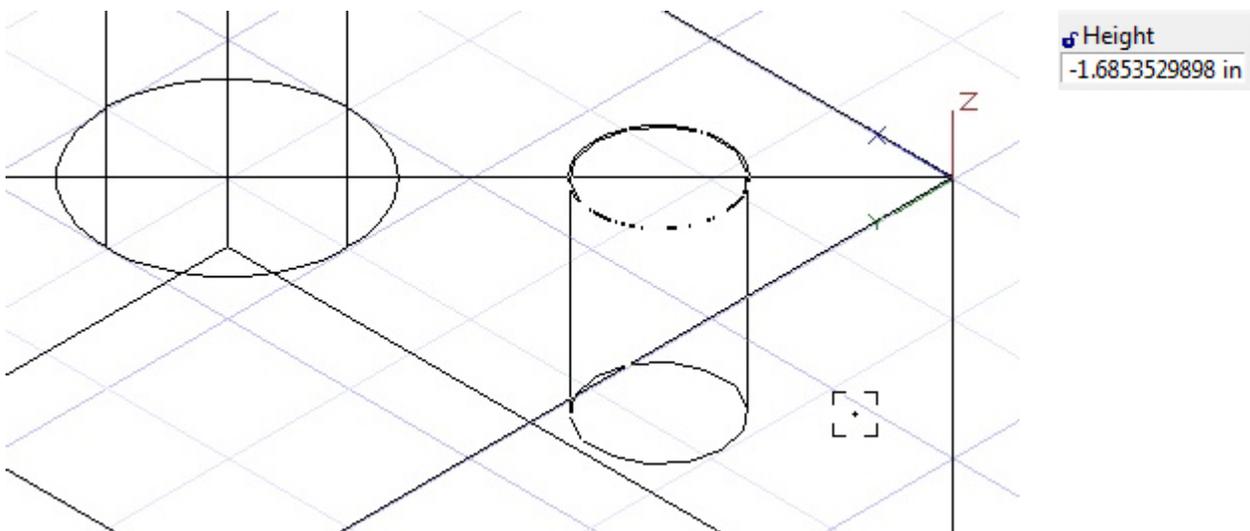
N SEKE snap the first point of the circle to diagonal line on the top of the box. Move cursor to the left a short distance and then left mouse click to place the second point. In progress below.



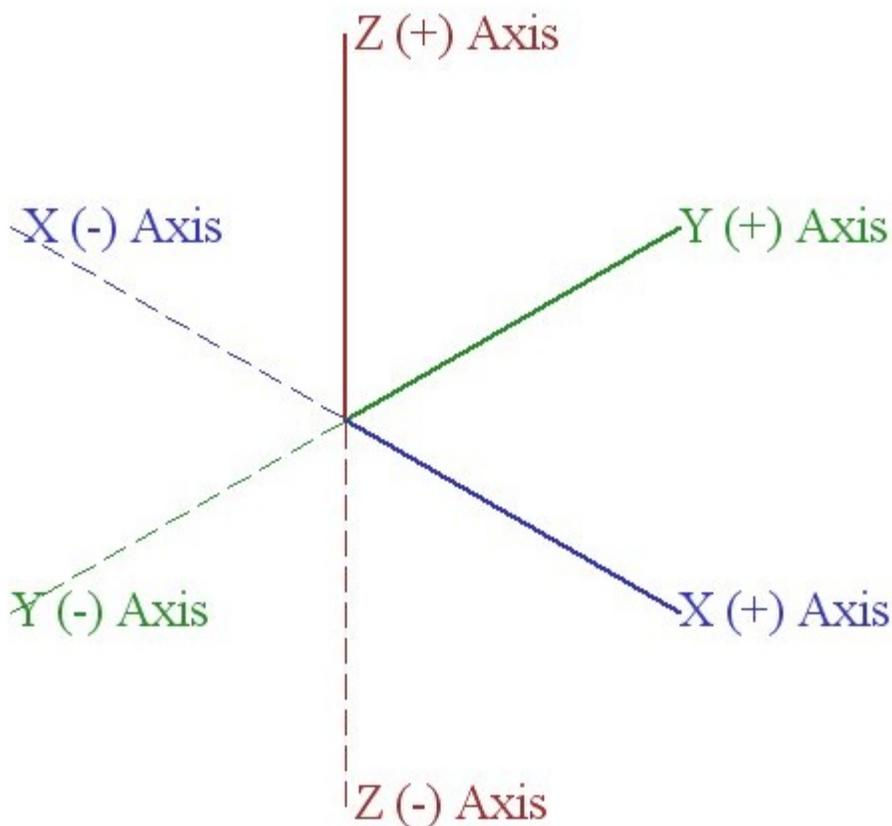
Move the cursor upward and at the same time note the direction of Z on the UCS icon and the numbers in the Height field of the Inspector Bar. Z is pointing upward in which case the numbers in the Height field should be positive numbers, and they are.



Move the cursor downward and at the same time note the direction of Z on the UCS icon and the numbers in the Height field of the Inspector Bar. Z is pointing upward in which case the numbers in the Height field should be negative numbers, and they are.

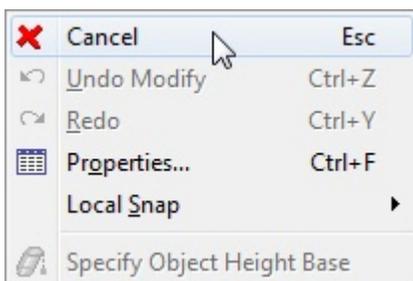


The illustration below shows the positive / negative relationship of the coordinate system as it pertains to workplanes.



Positive/Negative Relationship Figure
Isometric SE view

Right mouse click and select Cancel from the local menu to discontinue creating the cylinder.



Press Space Bar to exit the tool.

Select the Workplane by 3 Points tool.

The next three steps will turn the workplane over so that the Z of the UCS icon points downward.

Using three V SEKE snaps, as indicated in the picture below, define the new workplane. In progress below – just before the third snap.