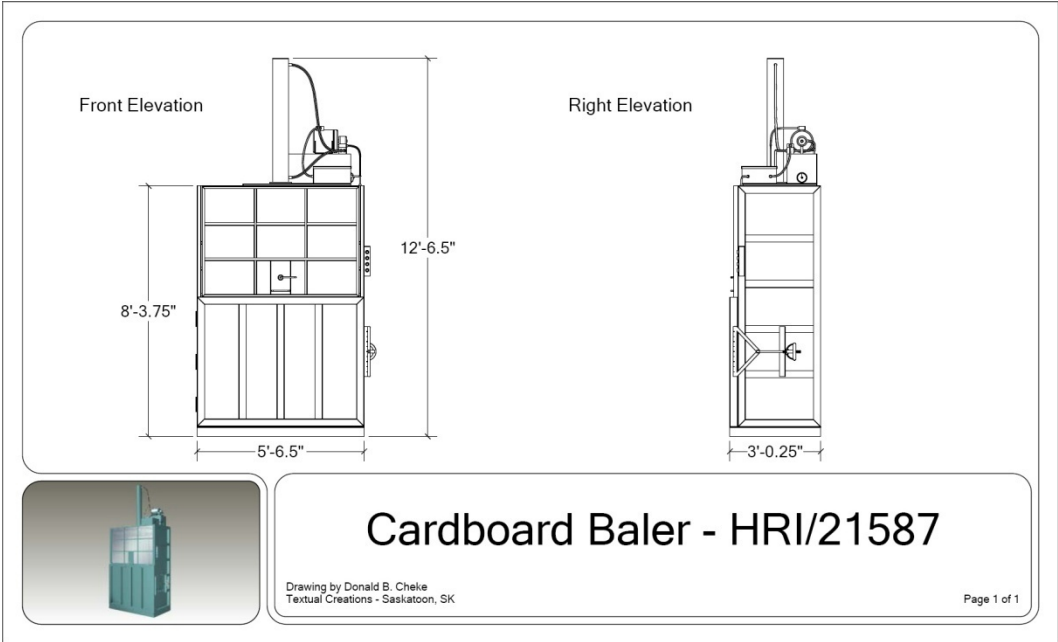
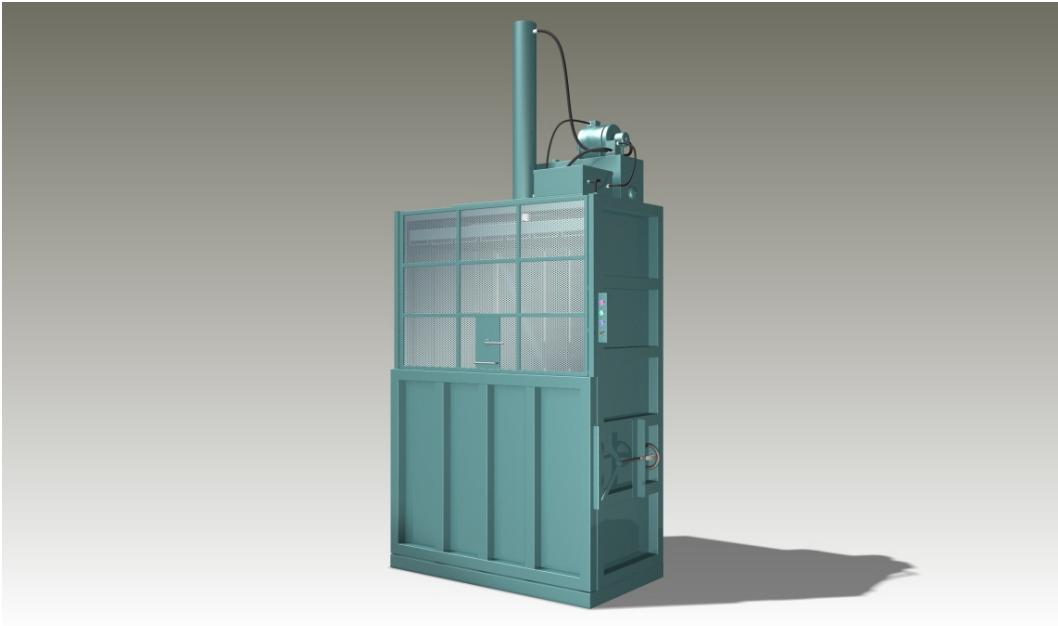


# TurboCAD Pro V15.2 – Cardboard Baler

Donald B. Cheke



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Saskatoon, SK Canada

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#### Special Note

All of the work presented within this tutorial is based on TurboCAD Pro V15.2. 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 V15.2 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.

## Table of Contents

Table of Contents .....	3
Introduction .....	4
Setup.....	7
Initial Lighting.....	14
2D Profiles .....	19
2D Profiles to 3D Objects .....	31
3D Construction of Main Structure .....	34
Compressor Structure & Upper Mechanics .....	97
Hydraulic Lines and Electrical Wires.....	151
Ground Plane.....	167
Materials Application .....	168
Named View - 1 .....	180
Render Scene Luminance .....	185
Render Scene Environment .....	188
Saving the Rendered Image.....	190
Named View - 2 .....	191
Paper Space .....	192
Printing.....	211
Appendix – An Important Note about TurboCAD Materials .....	212

## Introduction

Time once again for a mechanical TurboCAD tutorial and what better than a very interesting piece of machinery. The cardboard baler, a staple in the back rooms of many retail outlets such as Safeway, have been in use for more years than most people would imagine – leading the way in recycling long before it was a popular notion.

Within the tutorial the reader will be lead through every keystroke to produce every component of the cardboard baler that is illustrated on the cover of the tutorial. The reader will learn how to create all the elements using 2D profiles and modified 3D primitive shapes. The reader will learn how to insert standard lighting and how utilize render scene luminance and a render scene environment. Additionally, the reader will learn how to render their drawing and save it in a high resolution image format. Finally, the reader will learn how to utilize paper space where a drawing sheet will be created utilizing viewports and annotations.

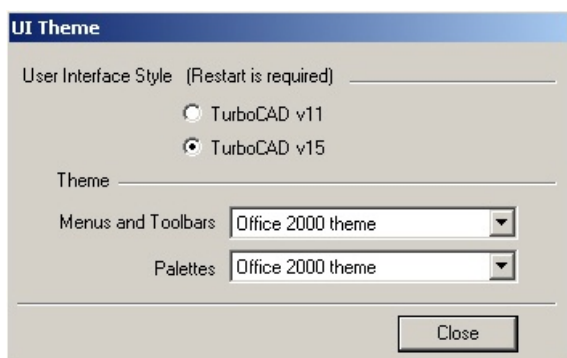
This tutorial is in no way intended to teach mechanical design or construction, but rather it is intended to teach the use of some of the tools that TurboCAD has to offer and to introduce the new user to a drawing methodology. The author feels confident that the techniques outlined within the tutorial can help lay the foundation for future successful TurboCAD drawing and illustration for even the newest user.

As with any technically advanced software, the user is generally faced with a steep learning curve. It is the hope of the author that the money and time spent working through a Textual Creation tutorial will help ease the learning and allow the reader to come away feeling confident that they made a wise decision.

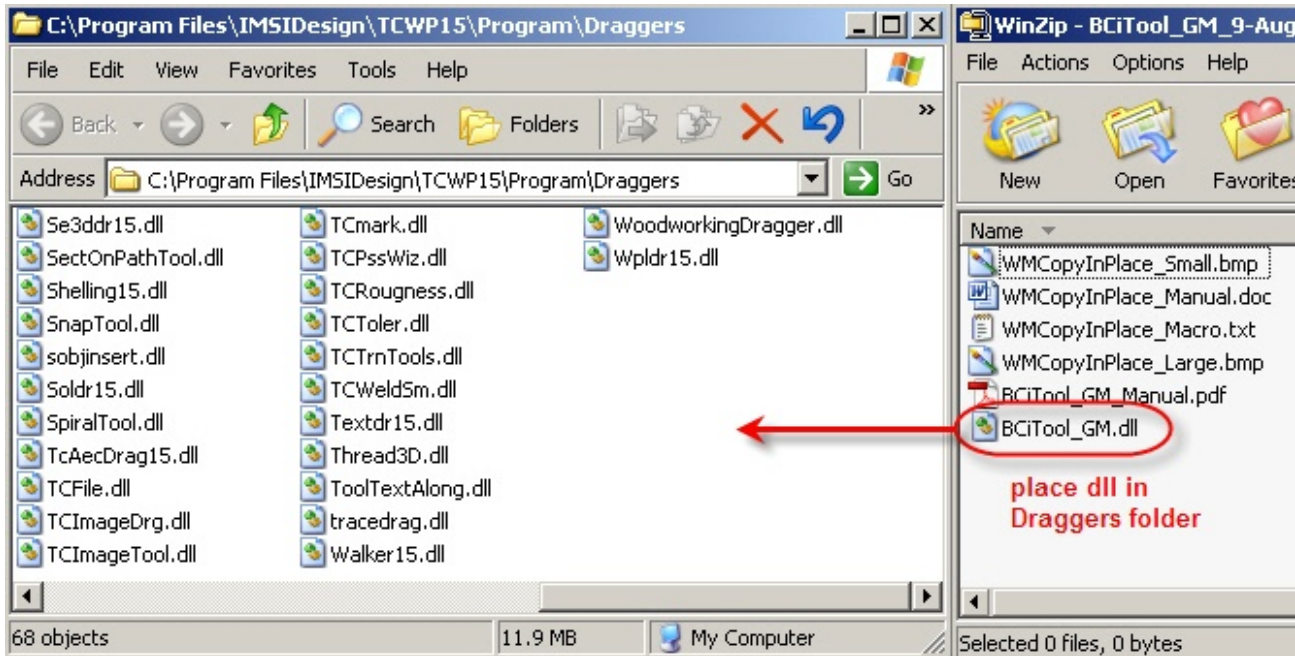
This tutorial will assume that the reader has the full edition of TurboCAD Pro V15.2 with the current Architectural and Mechanical add-ons, although no architectural or mechanical add-on tools will be used during the tutorial that the author is aware of.

There are many ways to approach a project and it is likely that each person using the program would proceed in very different ways, so be open to alternative methods as experience builds. What is important is that the user becomes familiar with the objects that they wish to model and begin to look at them in a different way than they might otherwise do. What primitive shapes make up the whole? What will be required of these primitive shapes early in the drawing and how will this affect needs further along? What component or components should be started with? Many questions can only be answered through experience, but hopefully some of them will be answered by the time the beginner has worked through this tutorial. There is a great deal covered in this tutorial and the author urges the beginner to be patient, to read very carefully and to take the time necessary to do a good job. Try to enjoy the process as much as you will enjoy the final results.

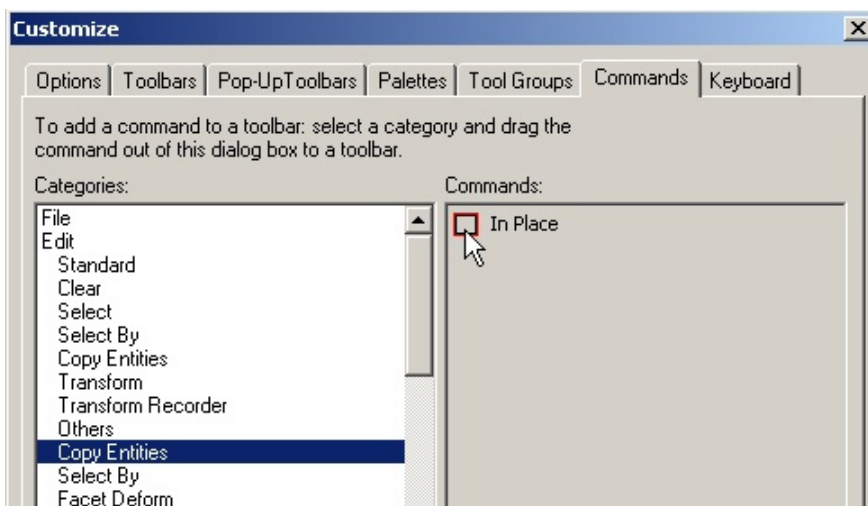
This tutorial assumes that the beginner has studied the desktop to some degree and can locate most of the tools. Since there are endless desktop configurations that can be set up in TurboCAD the author has opted to illustrate the required tools with the V15 user interface, and the default toolbars in their undocked format (Office 2000 theme).



This tutorial also utilizes a tool that does not come pre-packed with TurboCAD. It is the Copy in Place tool created by David Bell, based on an original macro by Winston Mitchell. It is available as a free download on the General Macros page at <http://www.bcitool.com/>. Please download it and install it as per the instruction that come with the download. It is truly an indispensable tool. Placement of the dll should be done with TurboCAD shutdown, so the dll will load when TurboCAD is started.



This toolbar does not seem to show up, as it once did when it was installed and TurboCAD was started. If this toolbar does not show up for the user, they will need to drag a copy onto an existing toolbar or create a new toolbar when TurboCAD is started. The tool is located under the *second* Copy Entities entry of the Customise dialogue. The category below the second Copy Entities, "Select By", also contains the two other tools that are part of the BCiTools\_GM toolbar, should a user wish to add them to a toolbar.



If the reader is using Microsoft Vista or XP 64 and cannot get the Copy in Place tool to appear or function at all an alternate means of copying in place will be needed. This will be presented further along in the tutorial when the first copy in place is required.

**Some images have been supplied with the tutorial. Place them in a permanent location on the computer hard drive.**

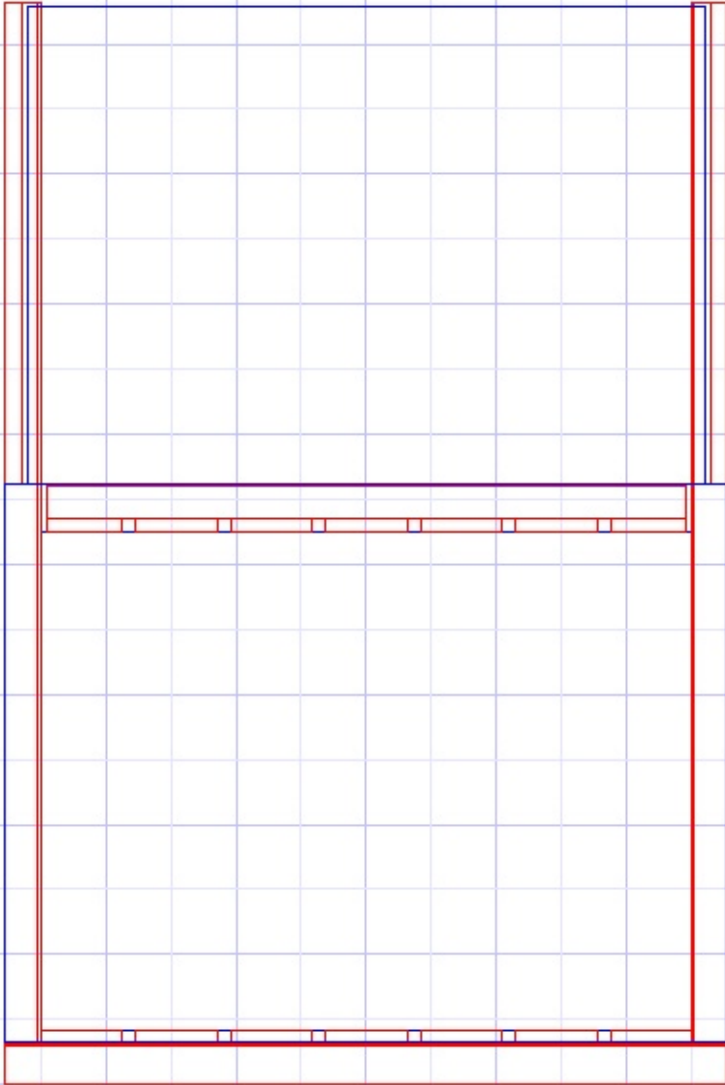
**Please remember that any supplied images and files are for use within the tutorial only and may not be shared or sold to others.**

**The beginner should not overlook the importance of the internet as a resource for material to help understand the dynamics of what they are trying to model. If only to help gain a better understanding of what a user is modeling a Google image search and regular web search is time well spent.**

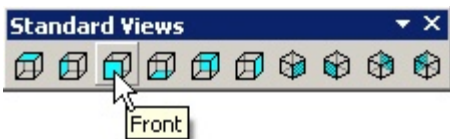
## 2D Profiles

Some initial layout will be done at this point to illustrate the design that is being worked toward. This may be something that a user finds quite practical when designing from scratch.

The image below illustrates what is being worked toward. This baler model creates a bale that is 60" wide, 30" deep and 46" high (max).



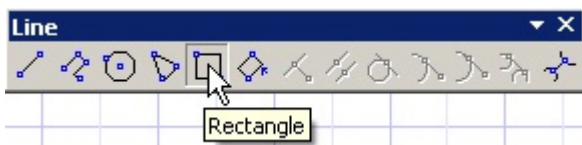
Switch to **Front** view.



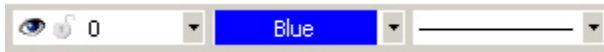
Select **Plane by Active View** from the **Workplane** toolbar. Note how the grid moves with the workplane.



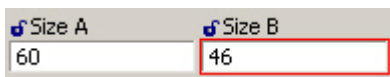
Select the Rectangle tool from the Line toolbar.



Select Blue from the color dropdown menu on the Property toolbar.



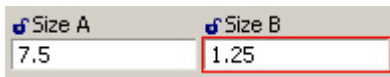
Place the cursor over one of the grid intersections and press the G key (G SEKE snap) on the keyboard to place the first point of the first rectangle. Move the cursor in a right upwardly direction for a short distance and then Tab into the Inspector Bar and enter 60 in the Size A field and 46 in the Size B field. Press Enter.



Select Red from the color dropdown menu on the Property toolbar.



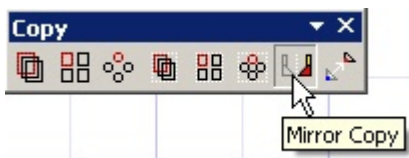
V SEKE snap the first point of the next rectangle to the lower left corner of the blue rectangle. Move the cursor in a right downwardly direction for a short distance and then Tab into the Inspector Bar and enter 7.5 in the Size A field and 1.25 in the Size B field. Press Enter.



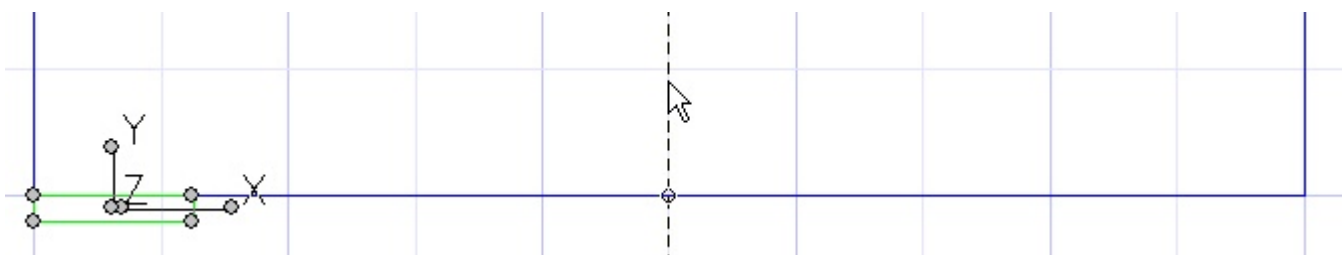
Press the Space Bar to exit the tool.

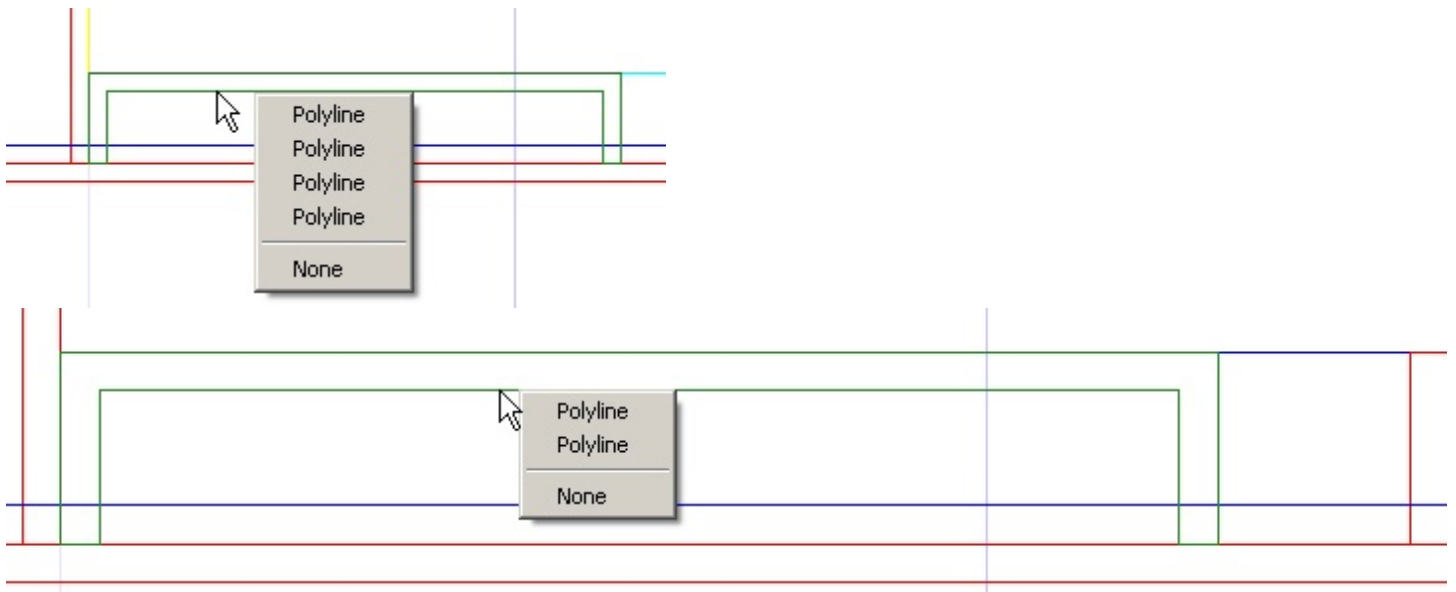
Select the red rectangle.

Select the Mirror Copy tool from the Copy toolbar.

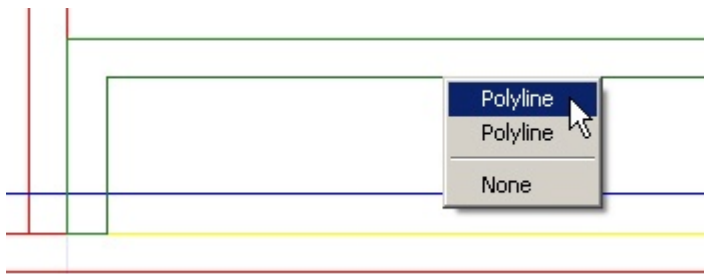


M SEKE snap the lower line of the blue rectangle to define the first point of the mirroring line. Press and hold the Shift key down. Move the cursor upward a short distance and then left mouse click to define the second point of the mirroring line. Release the Shift key. In progress below.





Select the Polyline that highlights the inner red rectangle. The bottom line should show yellow and the rectangle will be selected after the item is left mouse clicked.



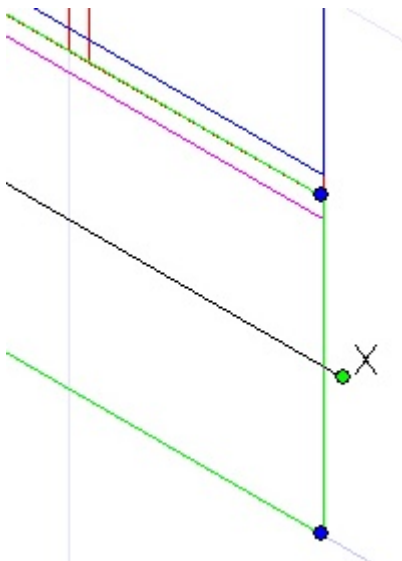
Once selected, press Delete to remove it.

From the Options menu at the top of the desktop, select Preference. Uncheck the Use Choice option. Click OK.

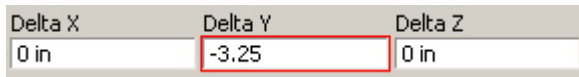
## 2D Profiles to 3D Objects

Switch to Isometric SE view.

Select the two base profiles. They will be moved forward 3.25 inches to create a lip below the lower gate.



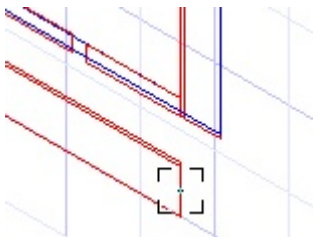
With the two profiles now selected, Tab into the Inspector Bar and enter -3.25 in the Delta Y field. Press Enter.



Select the Simple Extrude tool from the 3D Object toolbar.



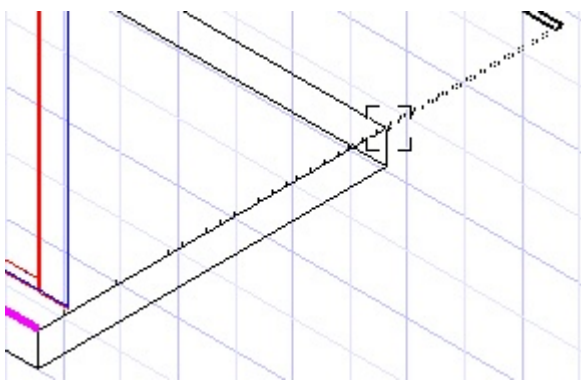
Select the lower base rectangle as the object to extrude.



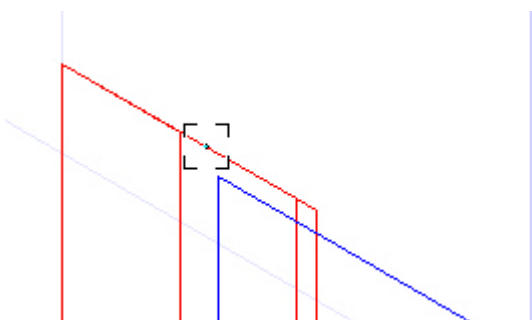
It may extrude oddly until the height is defined. Tab into the Inspector Bar and enter -36.25 in the Height field. Press Enter.



Select the upper base profile as the object to extrude. Move the cursor to the upper back corner of the first extrusion and V SEKE snap to define the extent of the extrusion. In progress below.



Carefully select the left 3 x 96" rectangle as the next object to extrude.



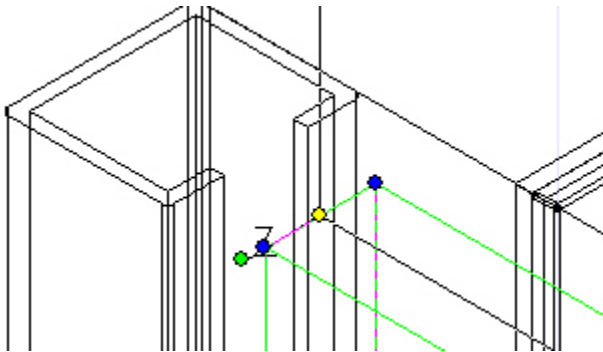
Pos X	Pos Y	Pos Z
0 in	-0.875	77.5 in

Switch to Isometric SE view.

Rollers and the square rods that attach the gate to them will now be created.

With the gate still selected, select Explode 1X from the Format menu at the top of the TurboCAD desktop so it can be resized.

With the gate still selected, Press D SEKE and relocate (M SEKE) the reference point to the top left corner line, as indicated in the picture below.



Select the Make Copy tool to turn it on.

Tab into the Inspector Bar and enter 3 in the Size X field, 1 in the Size Y field and .5 in the Size Z field. Press Enter.

Size X	Size Y	Size Z
3	1	.5

Select the Make Copy tool to turn it off.

Assign the now selected small box to layer 0.

Turn off the Upper Gate layer.

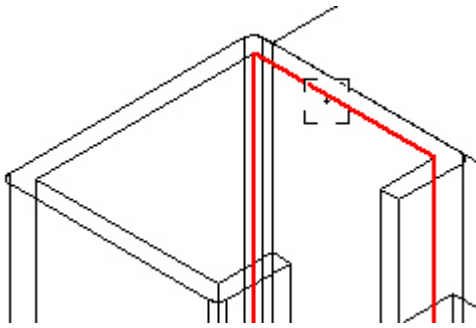
Select the Cylinder tool from the 3D Object toolbar.



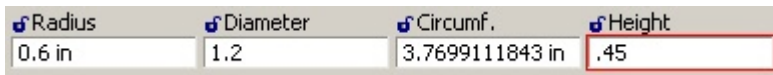
Select the Auto Workplane by Face tool from the Workplane toolbar.



Place the cursor by the inner edge of the slide rail, as indicated in the picture below, and then M SEKE snap to place the first point of the cylinder. In progress below.



Tab into the Inspector Bar and enter 1.2 in the Diameter field and .45 in the Height field. Press Enter.

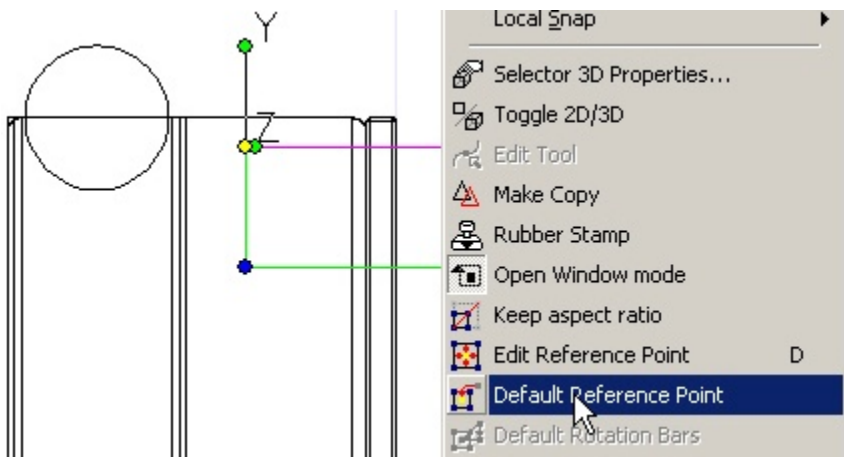


Select the Auto Workplane by Face tool from the Workplane toolbar to turn it off.

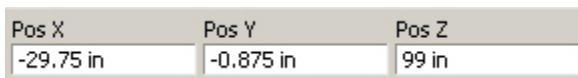
Press the Space Bar to exit the tool.

Switch to Front view and zoom in on the slide wheel.

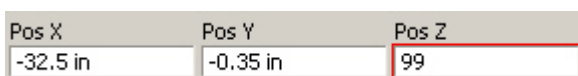
Select the small box (resized gate) and then right mouse click and select Default Reference Point from the local menu.



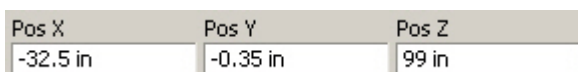
Note the Z Position of the selection.



Select the wheel (cylinder). Tab into the Inspector Bar and enter 99 in the Z Position field. Press Enter to line it up with the small box.



Note the X Position of the selected cylinder.

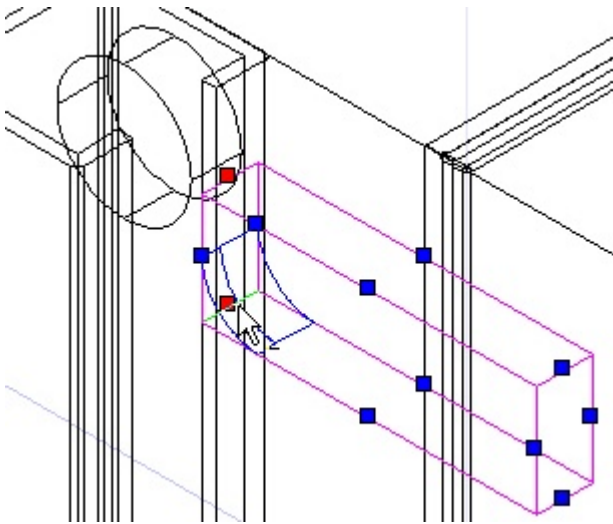


Switch to Isometric SE view.

Select the Fillet Edges tool from the 3D Modify toolbar. Tab into the Inspector Bar and enter .5 in the Start Radius field. Press Enter.

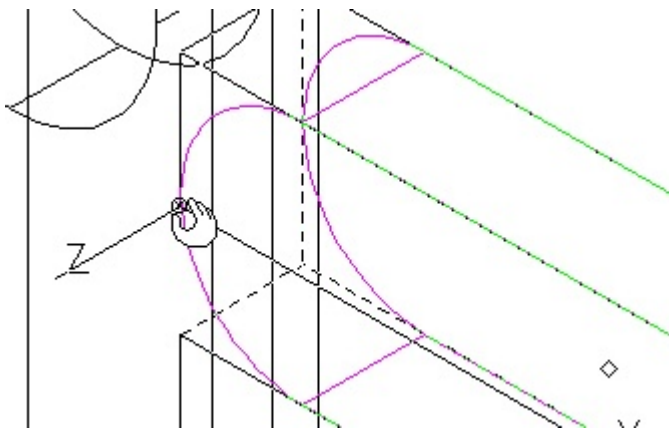


Select the small box as the object to fillet. Left mouse click the two short left lines as the edges to fillet. Select Finish. In progress below.

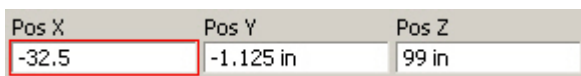


Press the Space Bar to exit the tool.

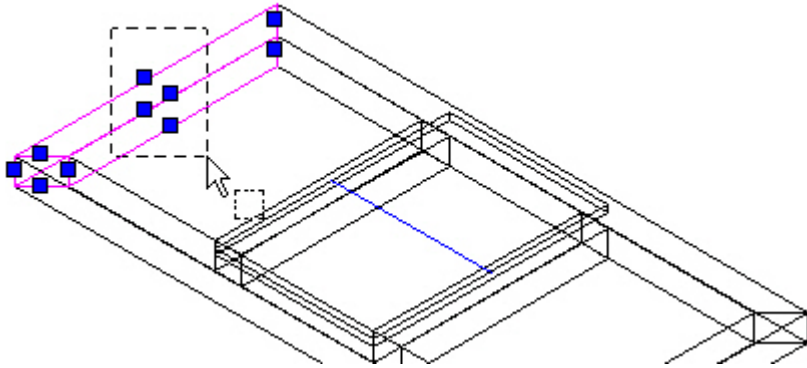
Select the small box. Press D SEKE and relocate (C SEKE) the reference point to the center of the forward arc of the fillet. In progress below.



With the box still select, Tab into the Inspector Bar and enter -32.5 in the X Position field. Press Enter to move it in place.



Select the Fillet Edges tool from the 3D Modify toolbar. Tab into the Inspector Bar and enter 1/16 in the Start Radius field. Press Enter.



Select Finish.

In the same manner fillet the four outer edges of the other five compressor structure beams.

Select the Cylinder tool from the 3D Object toolbar.

**M SEKE** snap the blue polyline on the plate to place the first point of the cylinder. Tab into the Inspector Bar and enter 3.5 in the Diameter field and 52.5 in the Height field. Press Enter.

Radius	Diameter	Circumf.	Height
1.75 in	3.5	0.9955742876 in	52.5

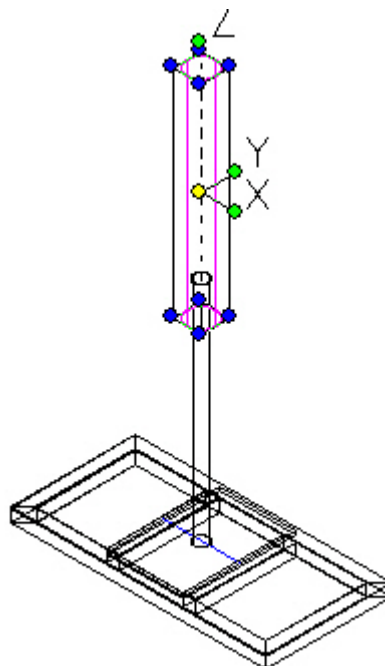
**C SEKE** snap the top edge of the last cylinder to place the first point of the next cylinder. Tab into the Inspector Bar and enter 6.5 in the Diameter field and 50 in the Height field. Press Enter.

Radius	Diameter	Circumf.	Height
3.25 in	6.5	0.4203522483 in	50

Press the Space Bar to exit the tool.

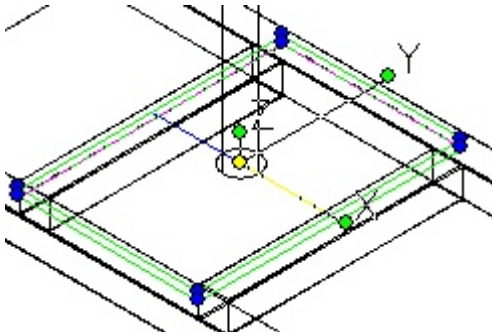
Select the upper cylinder. Tab into the Inspector Bar and enter -8 in the Delta Z field. Press Enter.

Delta X	Delta Y	Delta Z
0 in	0 in	-8

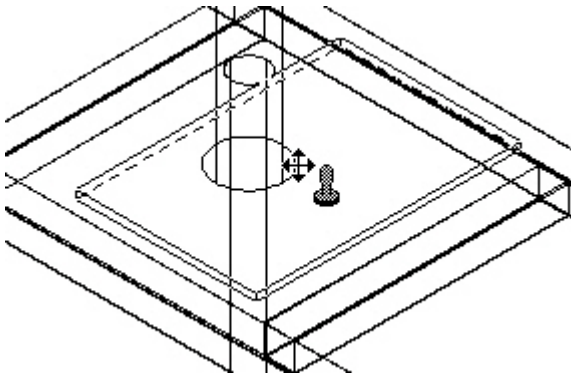


Turn on the Upper Members layer.

Select the plate on top of the compressor structure. Press **D SEKE** and relocate (**M SEKE**) the reference point to the middle of the blue line.



Right mouse click and select **Rubber Stamp** from the local menu. Move the cursor to the edge of the bottom of the upper cylinder and **C SEKE** snap to place a copy. In progress below.

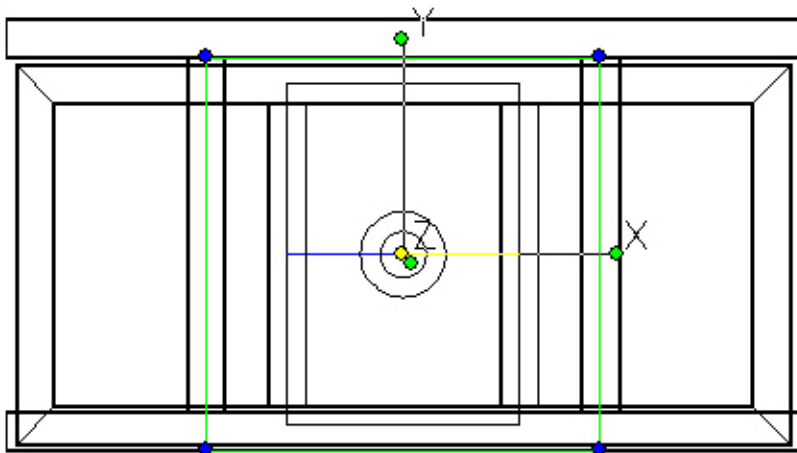


Press **Esc** to exit the Rubber Stamp tool.

Select the upper plate. Tab into the Inspector Bar and enter **30** in the **Size X** field and **30** in the **Size Y** field. Press **Enter**.

Size X	Size Y	Size Z
30	30	0.75 in

Switch to **World Plan** view.

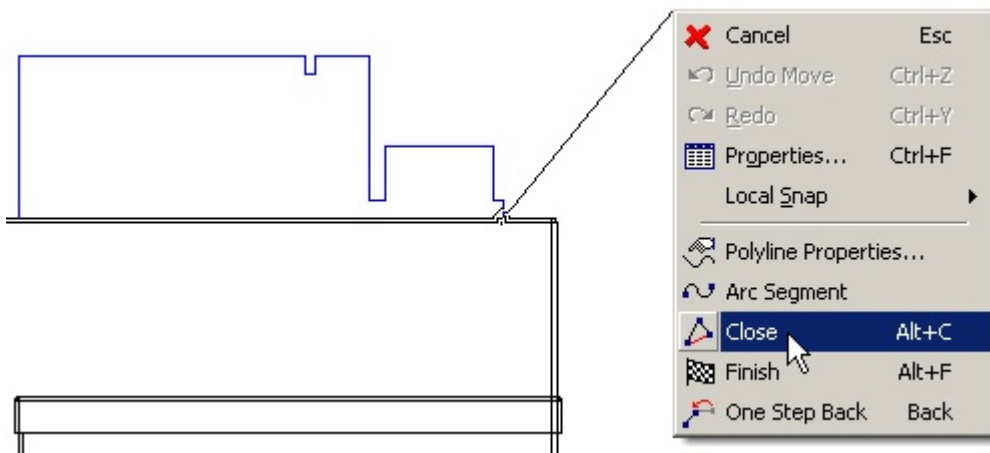


With the upper plate still selected, Tab into the Inspector Bar and enter **1.5** in the **Delta Y** field. Press **Enter**.

Delta X	Delta Y	Delta Z
0 in	1.5	0 in

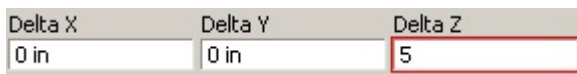
Tab into the Inspector Bar and enter .5 in the Length field and 270 in the Angle field. Press Enter.

Right mouse click and select Close from the local menu.



Press the Space Bar to exit the tool.

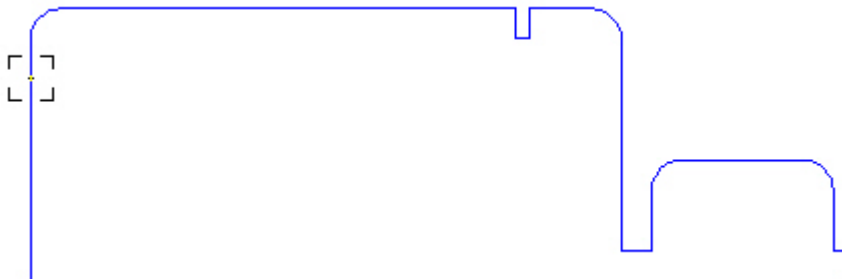
Select the new profile. Tab into the Inspector Bar and enter 5 in the Delta Z field. Press Enter.



Select the Fillet tool from the Modify toolbar.

The Radius field should still read .5 inches.

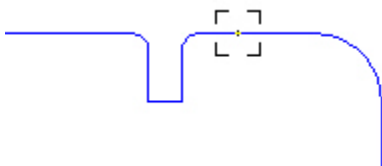
Using left mouse clicks on the lines that comprise the corners, fillet the four corners as indicated in the picture below.



Tab into the Inspector Bar and enter 1/8 in the Radius field. Press Enter.



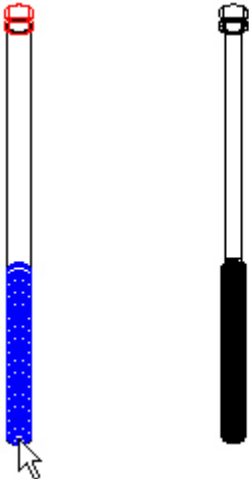
Using left mouse clicks on the lines that comprise the corners, fillet the two corners as indicated in the picture below.



Left mouse click in a clear area of the drawing to start the bolt.

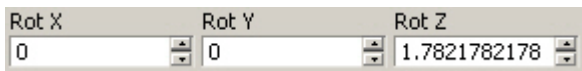
Be patient. A red, blue and black bolt outline will appear on screen and will remain like that until the program performs the calculations required to create the bolt. When the calculations are complete the finished bolt will appear.

In progress.      Like so.



Press the Space Bar to exit the tool.

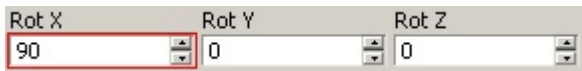
Select the bolt and note the rotation in the Z Rotation field. It reads 1.7821... This is normal, just the nature of the tool.



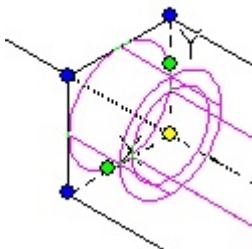
With the bolt still selected, Tab into the Inspector Bar and enter 0 in the Z Rotation field. Press Enter.



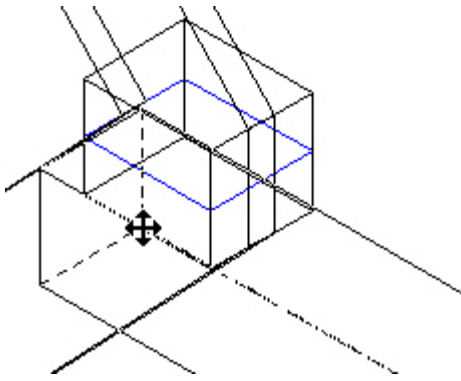
With the bolt still selected, Tab into the Inspector Bar and enter 90 in the X Rotation field. Press Enter.



With the bolt still selected, Press D SEKE and relocate (C SEKE) the reference point to the inside circle of the head.



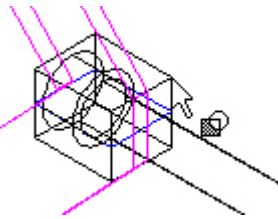
Left mouse click on the reference point of the selection to pick it up. Move the cursor to the edge of the block, as indicated in the picture below, and E SEKE snap to place the threaded rod.



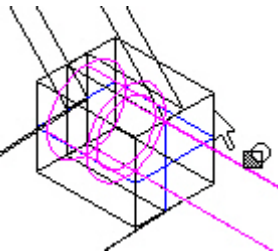
Select the 3D Subtract tool from the Boolean & Facet toolbar.

Select the Don't remove the subtrahend option.

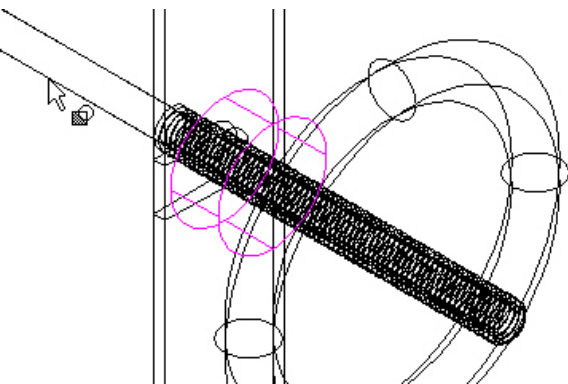
Select the v shaped hinge plate as the object to subtract from and then select the block as the object to subtract. In progress below.



Select the threaded rod as the object to subtract from and then select the block as the object to subtract. In progress below.



Select the cylinder at the L-bracket at the object to subtract from and then select the threaded rod as the object to subtract. In progress below. Be patient.



Select the 3D Add tool from the Boolean & Facet toolbar.

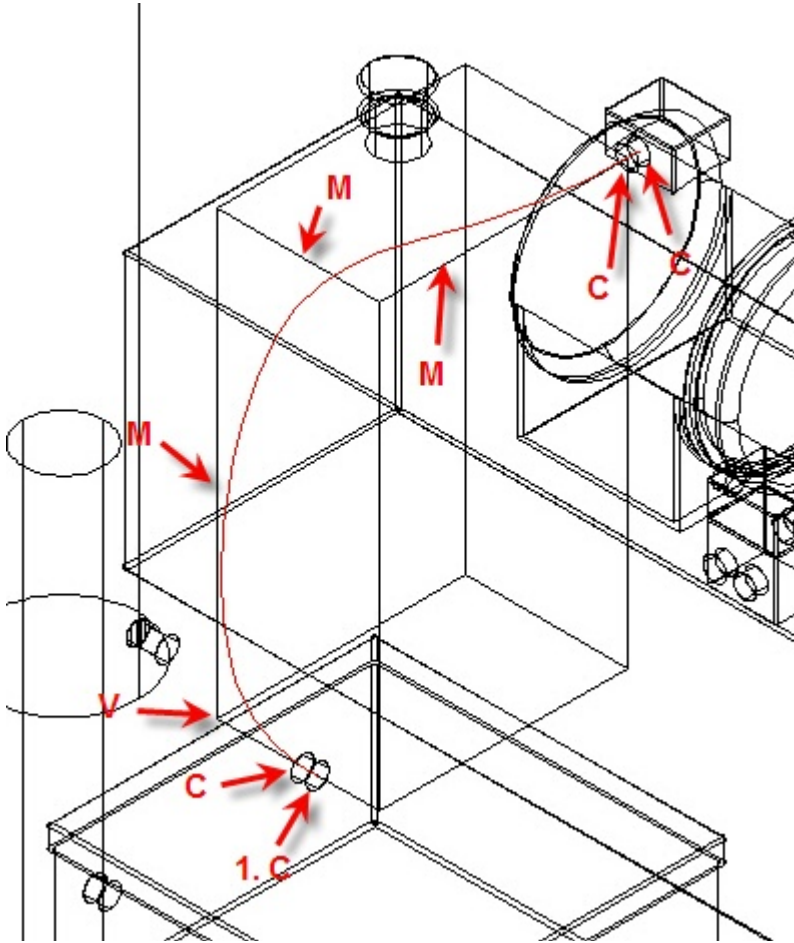
Select the two pieces of the L-bracket to add them together. In progress below.

With the box still selected, Tab into the Inspector Bar and enter 7 in the Size X field. Press Enter.

Size X	Size Y	Size Z
7	11.25 in	19.1614520582 in

Select the 3D Spline by Control Points tool from the 3D Objects toolbar.

Snap at the locations indicated in the picture below. Select Finish after last snap. Any C SEKE snaps are always at the edge of the circle.

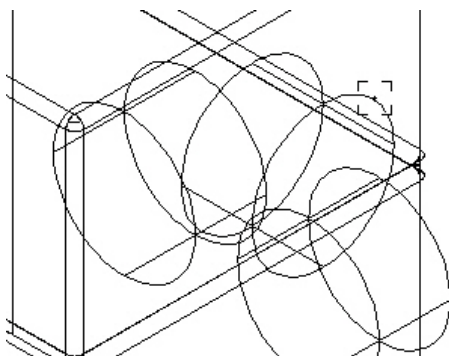


Press the Space Bar to exit the tool.

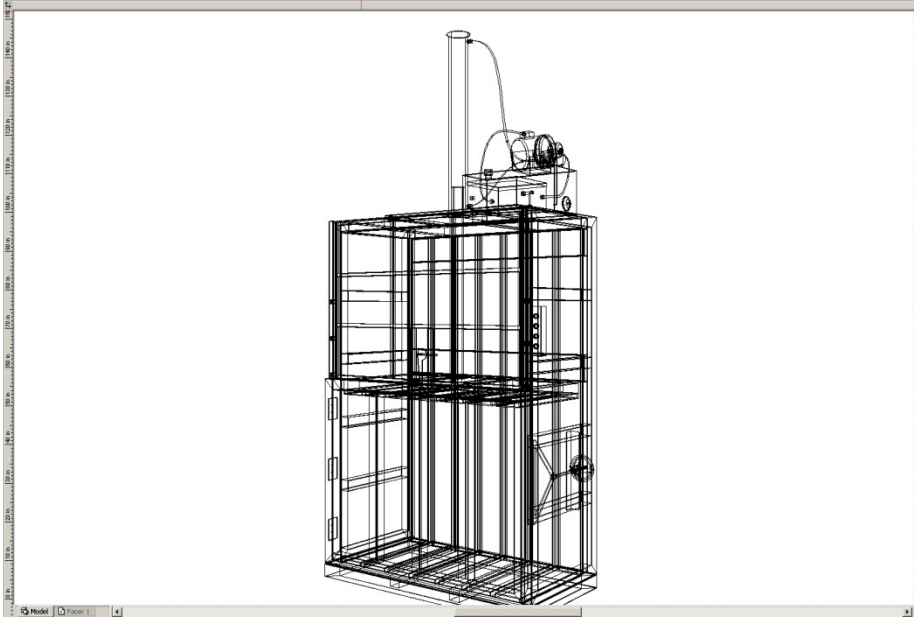
Select and delete the placement box.

Select the Box tool from the 3D Object toolbar.

C SEKE snap the first point of the box to the outside circle of the side fitting of the top relay, as indicated in the picture below. In progress below.



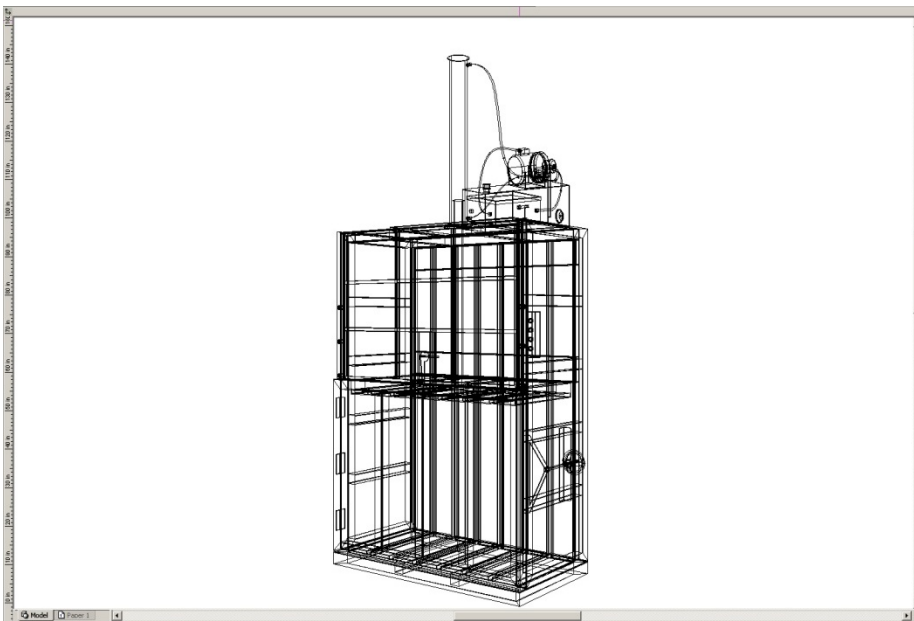
Left mouse click in the drawing and hold the mouse button down. Move the cursor to the left to turn the model to a position similar to the image below.



Select the Walk tool from the Walkthrough toolbar.



Left mouse click in the drawing and hold the mouse button down. Move the cursor down to move the model to a position similar to the image below.

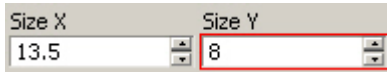


Select the Slide tool from the Walkthrough toolbar.



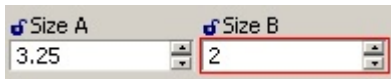
Press the Space Bar to exit the tool.

Select the rectangle that was just created. Tab into the Inspector Bar and enter 13.5 in the Size X field and 8 in the Size Y field. Press Enter.

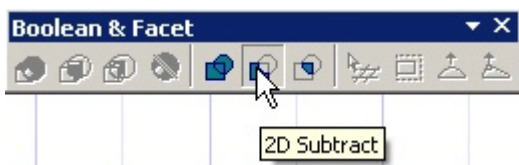


Select the Rectangle tool from the Line toolbar.

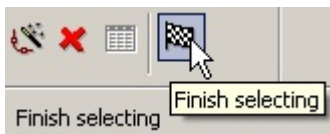
V SEKE snap the first point of the next rectangle to the lower left corner of the large rectangle. Move the cursor in a right upwardly direction for a short distance and then Tab into the Inspector Bar and enter 3.25 in the Size A field and 2 in the Size B field. Press Enter.



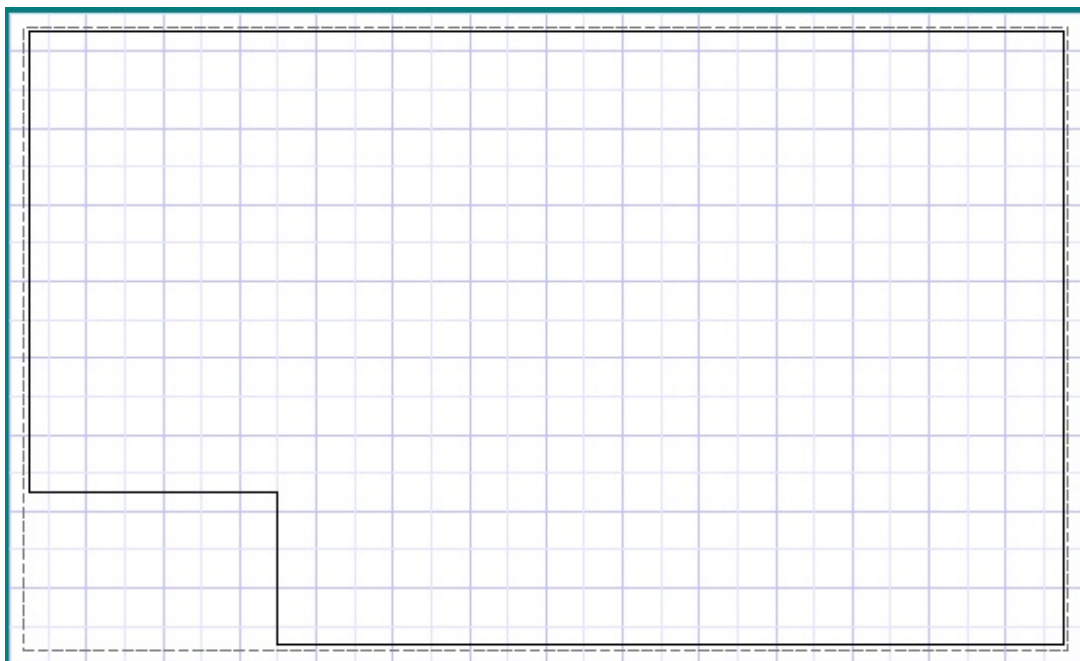
Select the 2D Subtract tool from the Boolean & Facet toolbar.



Select the large rectangle as the object to subtract from. Select Finish to complete selecting.



Select the smaller rectangle as the object to subtract. Select Finish.



Select the Rectangle tool from the Line toolbar.

Create one more rectangle using two V SEKE snaps.



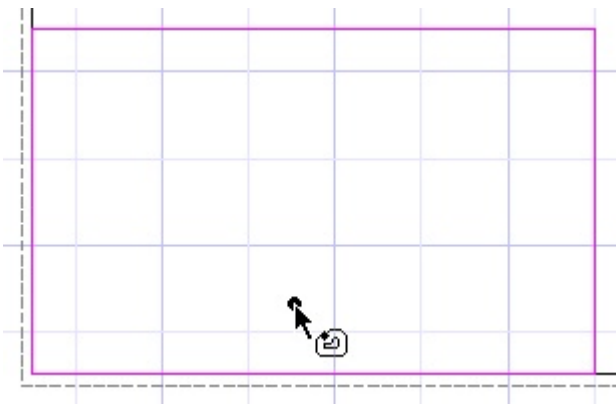
Press the Space Bar to exit the tool.

Select the Offset Copy tool from the Offset toolbar.

Tab into the Inspector Bar and enter .1 in the Offset field. Press Enter.



Select the small rectangle that was just created. Left mouse click to the inside of the small rectangle to create the offset. In progress below.

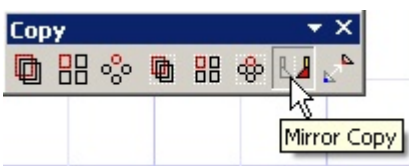


Press the Space Bar to exit the tool.

Select and delete the outer small rectangle that was offset from.

Select the smaller rectangle.

Select the Mirror Copy tool from the Copy toolbar.



V SEKE snap the inside corner of the larger border to define the first point of the mirroring line. Press and hold the Shift key down. Move the cursor upward a short distance and then left mouse click to define the second point of the mirroring line. Release the Shift key. In progress below.