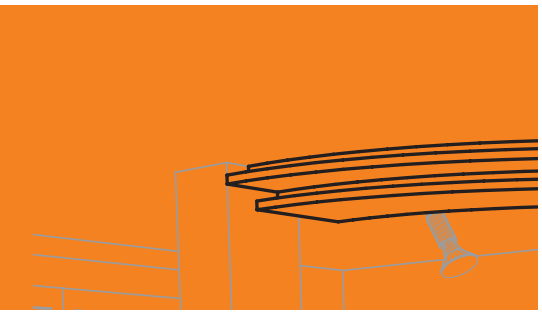
Vectorworks®
interiorcad®

Advanced Course
3D Design and Visualization



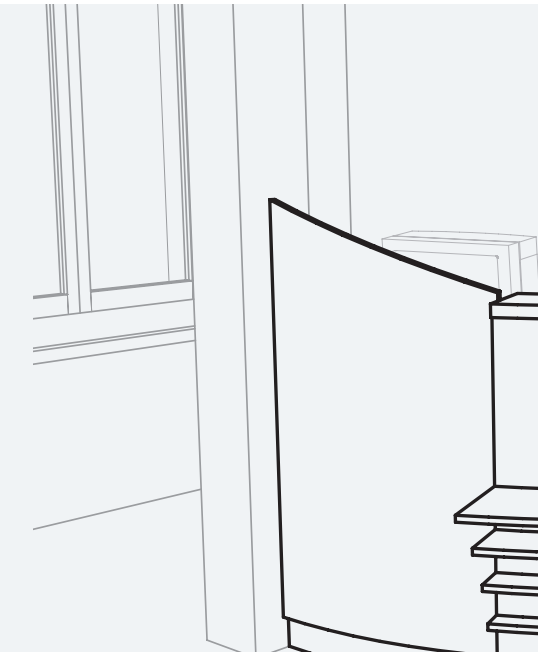


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Table of Contents

Preface

This course is designed to teach you the most important commands and tools for 3D drawing step by step, so as to introduce you to drawing with Vectorworks. To complete this class successfully, you should be familiar with Vectorworks' user interface and the basic tools and commands.

Goals

In this course, you will...

- ...draw a counter using 2D and 3D tools.
- ...become acquainted with different view and visualization methods.
- ...learn how to create sheet layers and viewports.
- ...create a rendering of your drawing.

Requirements

- This tutorial is based on Vectorworks interiorcad 2009 including Renderworks 2009.
- You should have a standard installation on your computer.
- We recommend a screen resolution of **1280 x 1024** pixels or more.
- If possible, use a wheel mouse.
- You should have basic knowledge of your operating system, know the names of the keys on the keyboard (e.g. Ctrl, Alt, etc.) and have **basic Vectorworks skills.**

1 Preparations

1.1 Downloading the Template

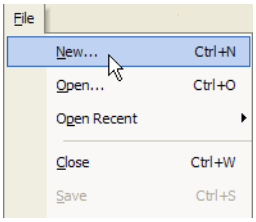
To start the exercise, download the template **Template Counter Design.sta** and a halftone image needed for the exercise from "www.extragroup.de/learning" and copy them to your computer.

- Download the installer for Windows or MacOS respectively and save it to the **desktop**.
- Double-click the installer file and follow the instructions in the dialogs. (MacOS: Unzip the archive and put the file Vorgabe Thekenplanung.sta into the folder Templates, which is located in the Vectorworks program folder.)

1.2 Opening the Template

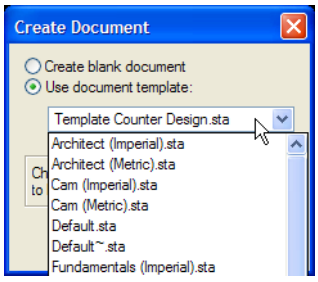
Now you can start Vectorworks and open the template.

1 Choose **File > New...**



2 In the pop-up dialog, select **Use Document Template**.

3 Select **Template Counter Design.sta** from the pull-down menu.



4 Click **OK** to confirm.

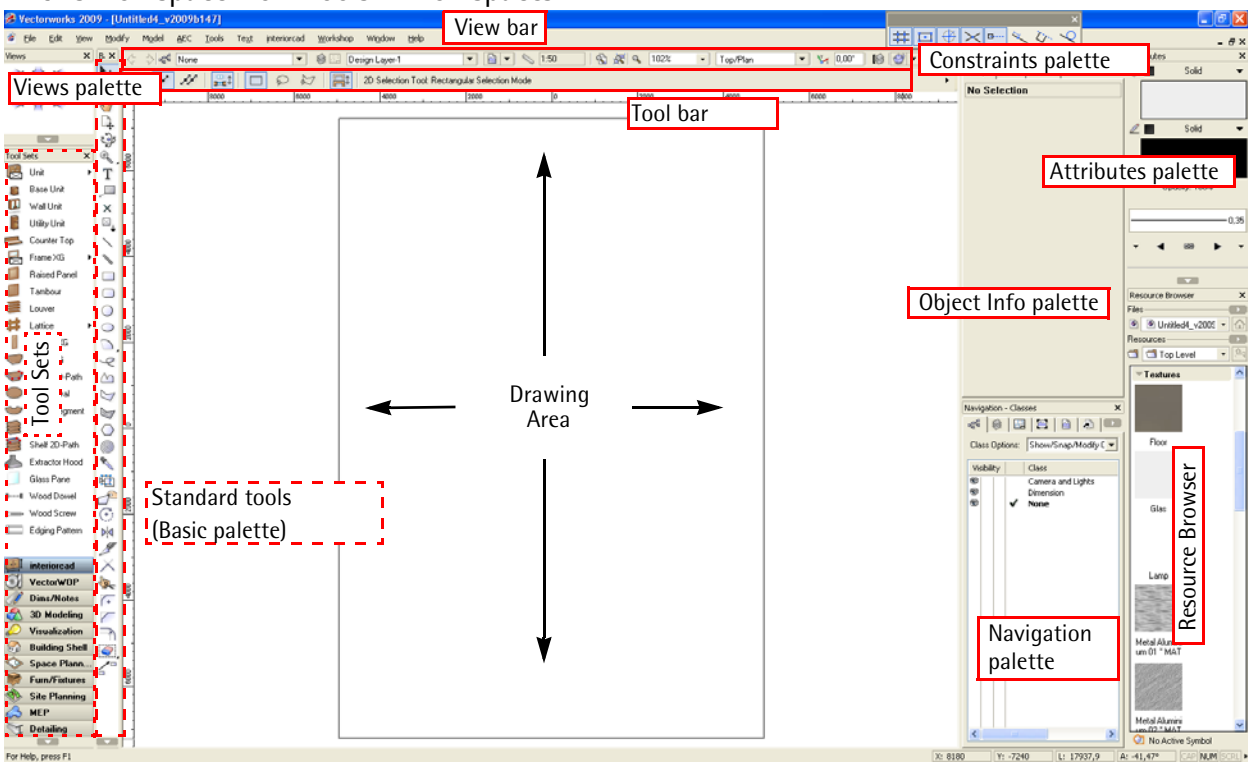
5 Choose **File > Save as...** and save the file as „Counter Design.vwx".

- Make sure to save your drawing every now and then using **Ctrl+S**. You can also choose **File > Save**.

1.3 Vectorworks Interface

If you have trouble finding a button or palette during the course, simply refer to this page.

The workspace used here is called **interiorcad**. If your screen looks different, you can select this workspace from Tools > Workspaces.



All frequently used 2D tools are in the Basic palette to the left of the drawing. All other tools can be selected from the Tool Sets palette on the very left. Use the buttons in the bottom left corner to toggle between tool sets.

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1.4 Vectorworks Preferences

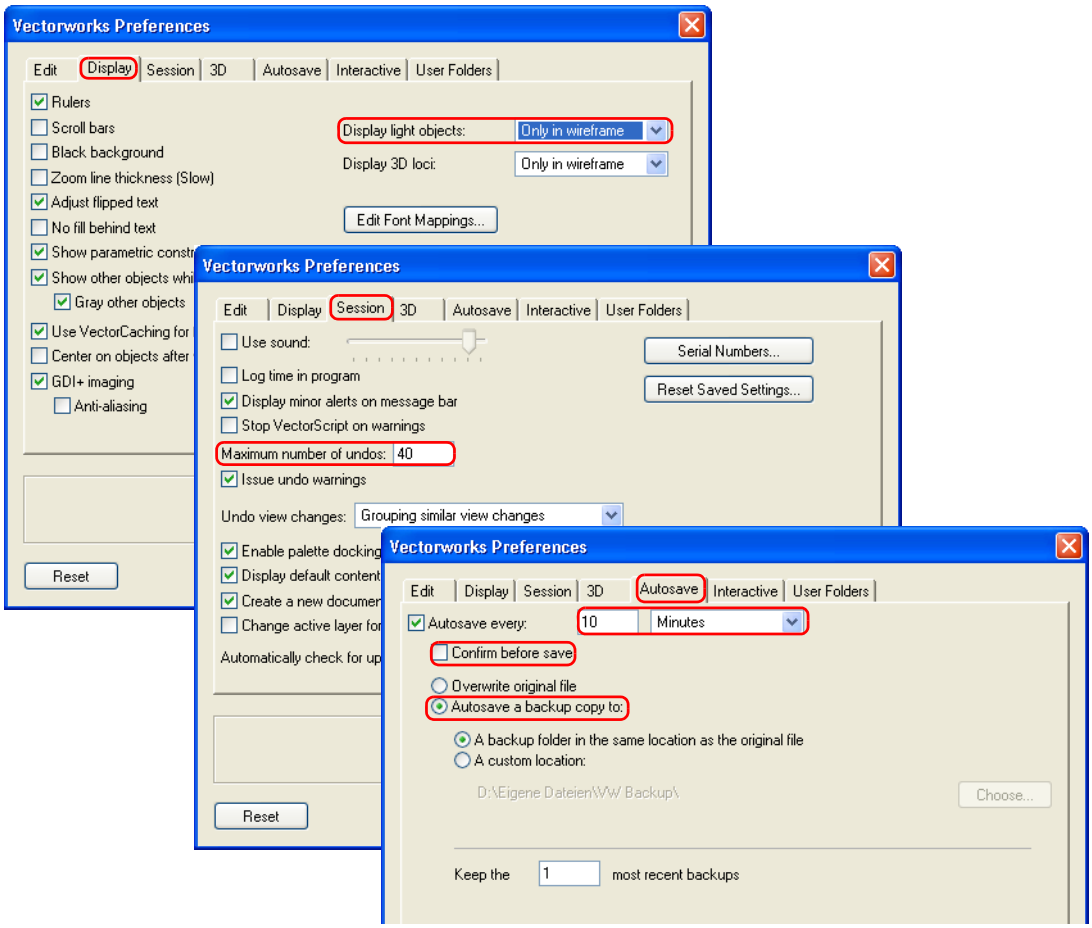
It is recommended to check some of the most important basic preferences in order to guarantee that they match those used in this tutorial.

1 Select **Tools** > **Options** > **Vectorworks Preferences**....

2 In the **Display** tab, select **Only in wireframe** from the **Display light objects** pull-down menu.

3 On the **Session** tab, set the **Maximum number of undos** to **40**.

4 We also recommend adjusting the settings on the **Autosave** tab as shown below.



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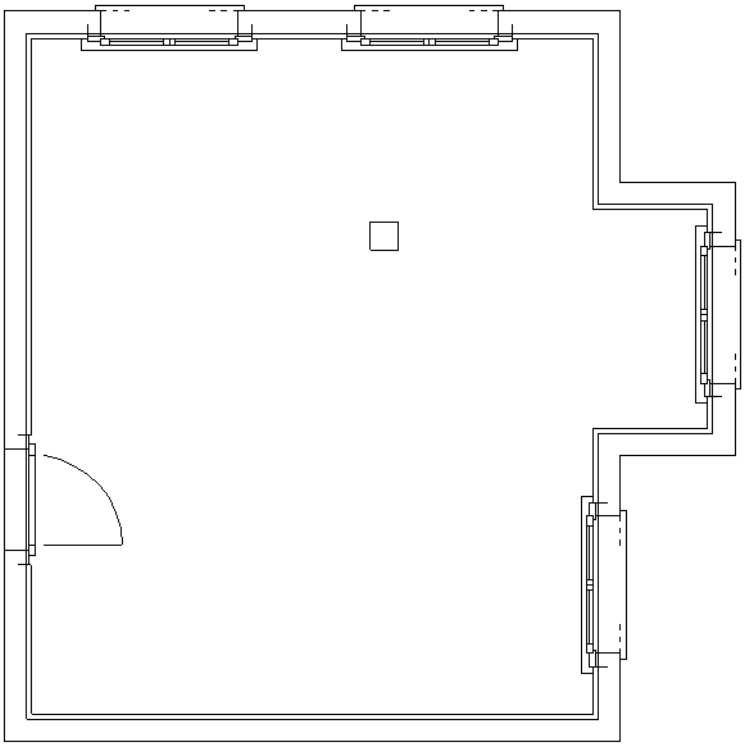
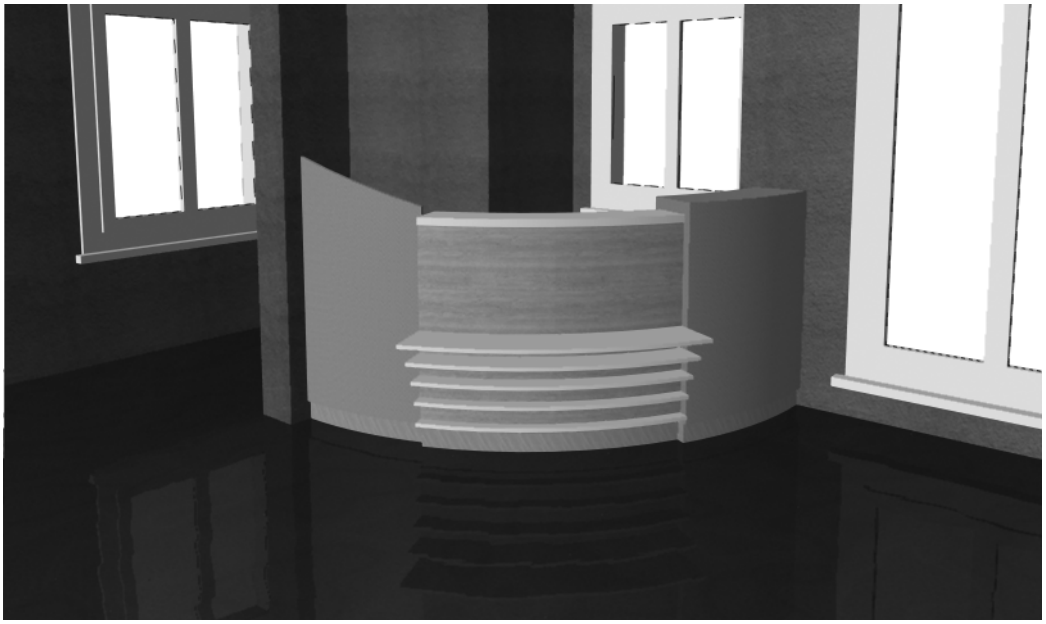
2 Drawing the Counter

Open the template. A floor plan appears in the drawing:



The end result is the counter shown below:

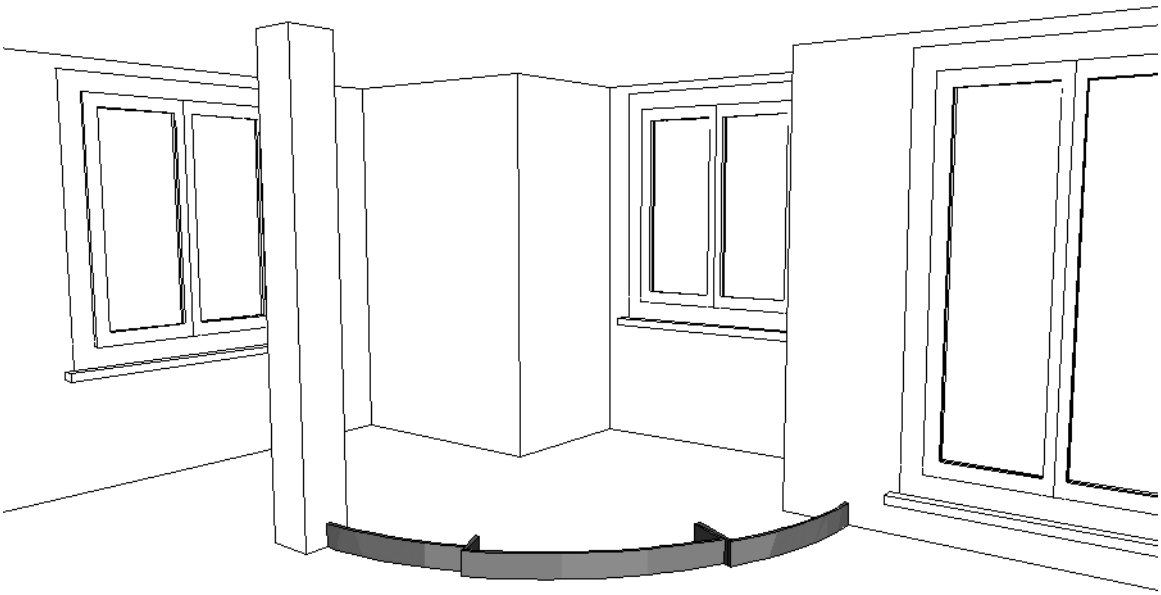


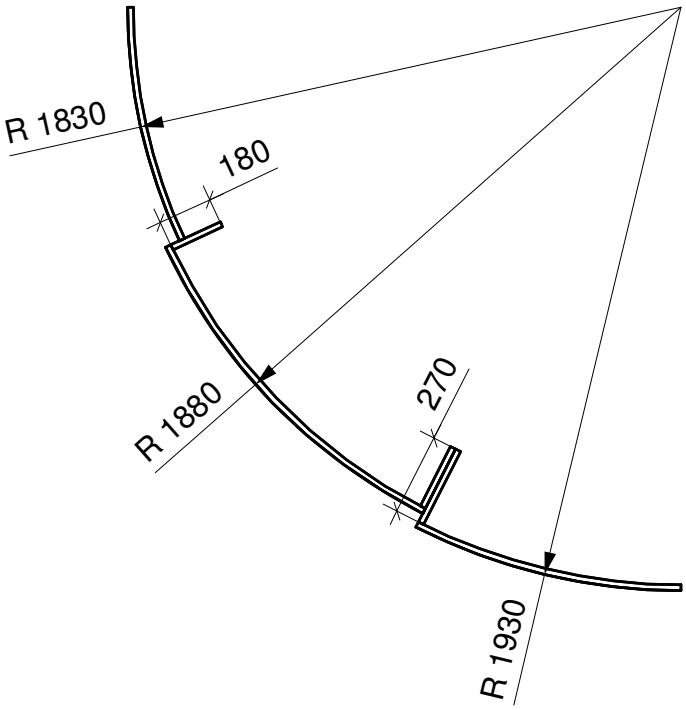
In this chapter, you will become acquainted with the following tools and commands:

- Set 2D locus 
- Draw Arc 
- Split 
- Create NURBS curve (Ctrl+Alt+N)
- Create Tapered Extrude (Ctrl+Alt+U)
- Flyover 
- Create Shell Solid 
- Assign textures
- Change Render mode
- Extract 
- Move 3D (Ctrl+Alt+M)
- Extrude Along Path
- Create Contours 
- Group and Ungroup objects
- Compose contours

2.1 Plinth

The first step is drawing the counter's plinth.





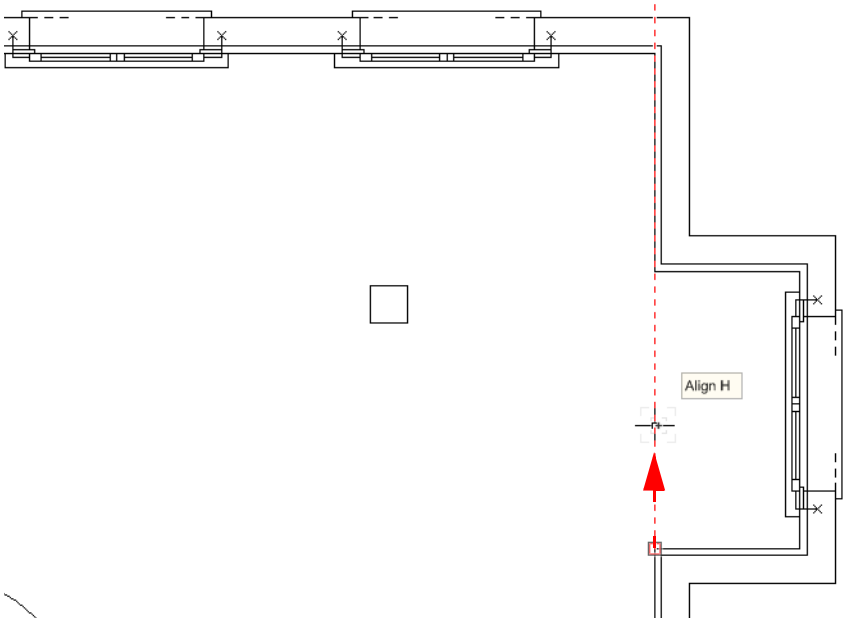
2.1.1 Set 2D Locus

We set a 2D locus to define the center of the arc.

1 Select the **2D Locus** tool from the Basic palette.

■ Please do not click the mouse again until we reach step 6. Simply move the cursor as described. ■

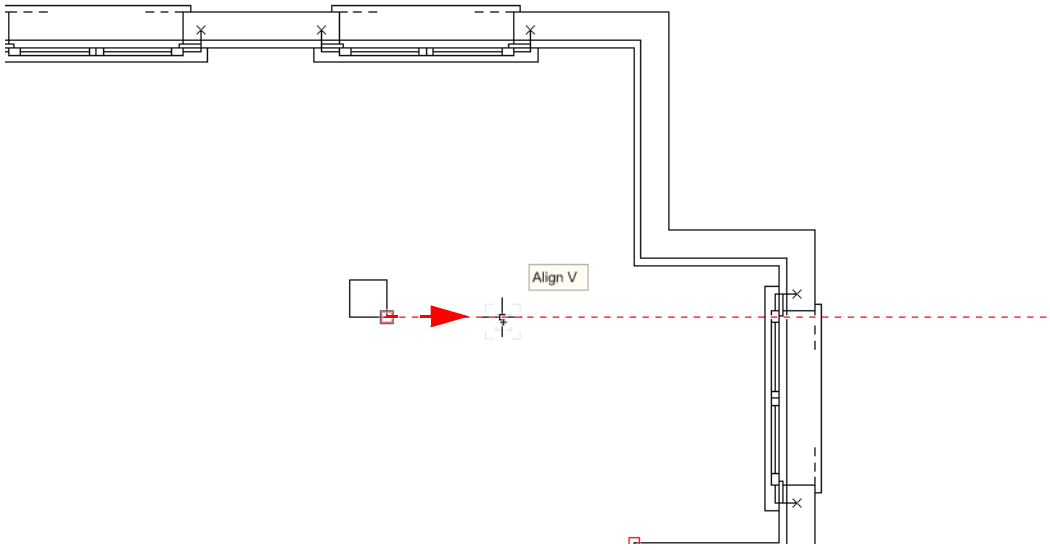
2 Without clicking, move the cursor to the corner indicated below and then upwards. An extension line and the cue Align H will appear.



The extension line disappears.

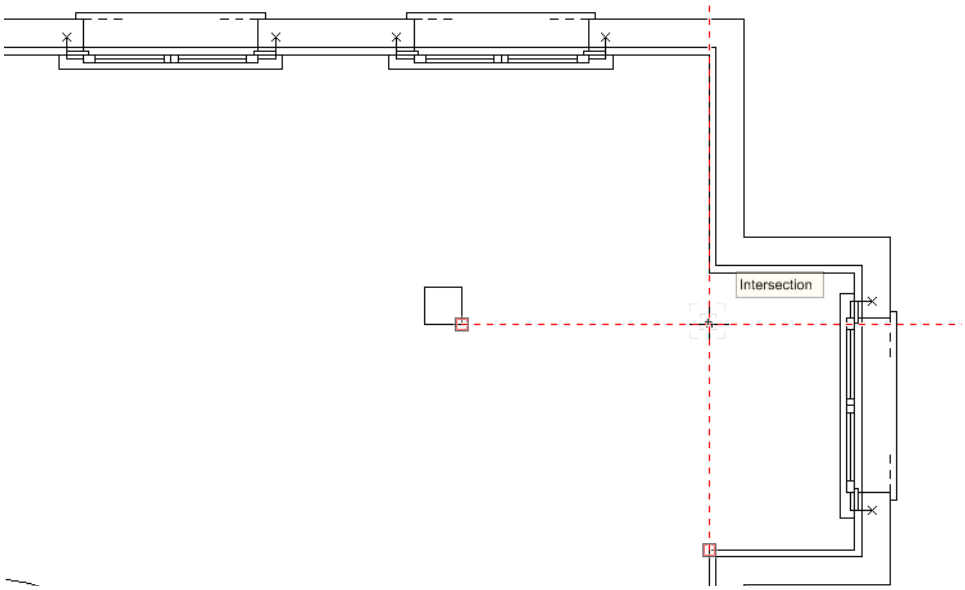
3 Slowly drag the cursor to the right.

A new extension line appears.



4 When you reach the first extension line, Vectorworks displays both lines, aligns the first and second points, and displays the cue Intersection.

5 **Left-click** once to set the 2D locus.



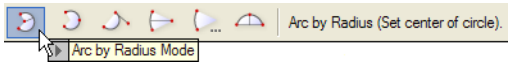
Notes:

2.1.2 Draw an Arc

In the next step, we draw an arc from the bottom edge of the column to the right wall.

1 Select the **Arc** tool from the **Basic** palette.

2 Select **Arc by Radius Mode** on the Tool bar.

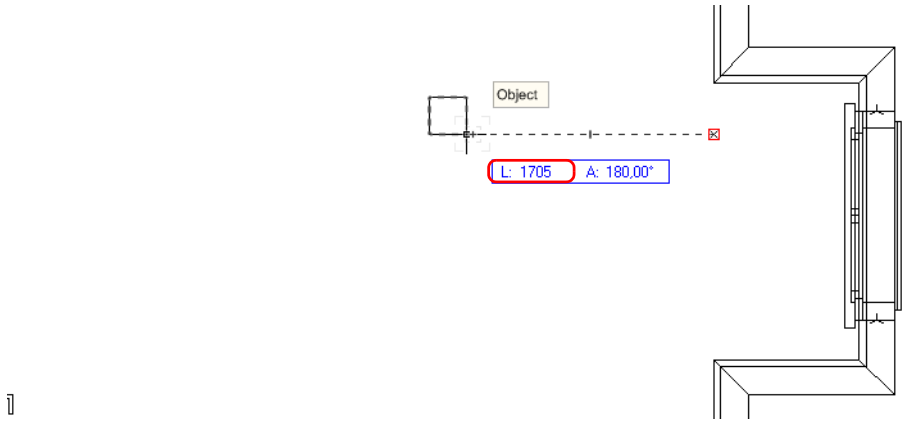


3 **Click** the 2D locus once to place the center of the arc.

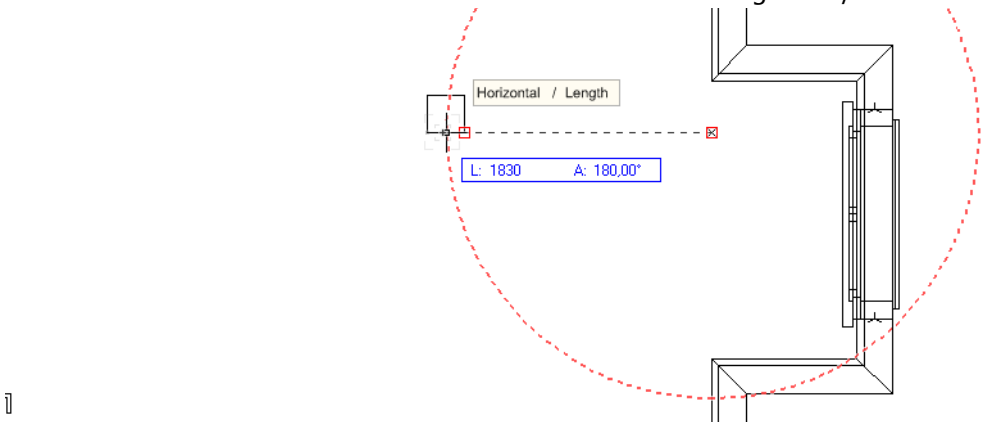
4 Move the cursor to the bottom left corner of the column.

The column's edges are 250 mm long. Since we want the arc to start in the center of the column's edge, we have to add **125** mm to the radius.

5 Press TAB to access the Data bar, enter **1705+125** into the **L field** and press **Enter**.



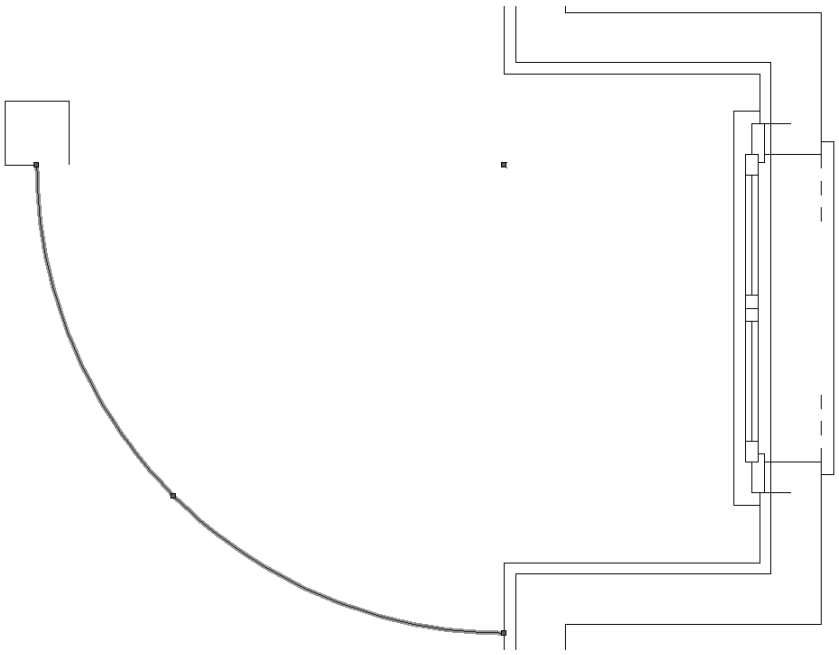
Vectorworks adds the values. Now the radius cannot be changed anymore.



6 **Click** the edge of the column.

7 **Click** the right wall of the room (cue: Vertical) to place the end point of the arc.

The arc is created as shown below:



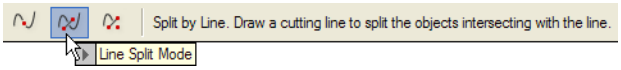
Notes:

2.1.3 Split Arc

The three parts of the counter are offset from each other by 50 mm. To create this effect, we split the arc into three parts and change the radii of the parts.

1 Make sure that the arc is selected.

2 Select the **Split** tool from the **Basic** palette and select **Line Split Mode** on the Tool bar.

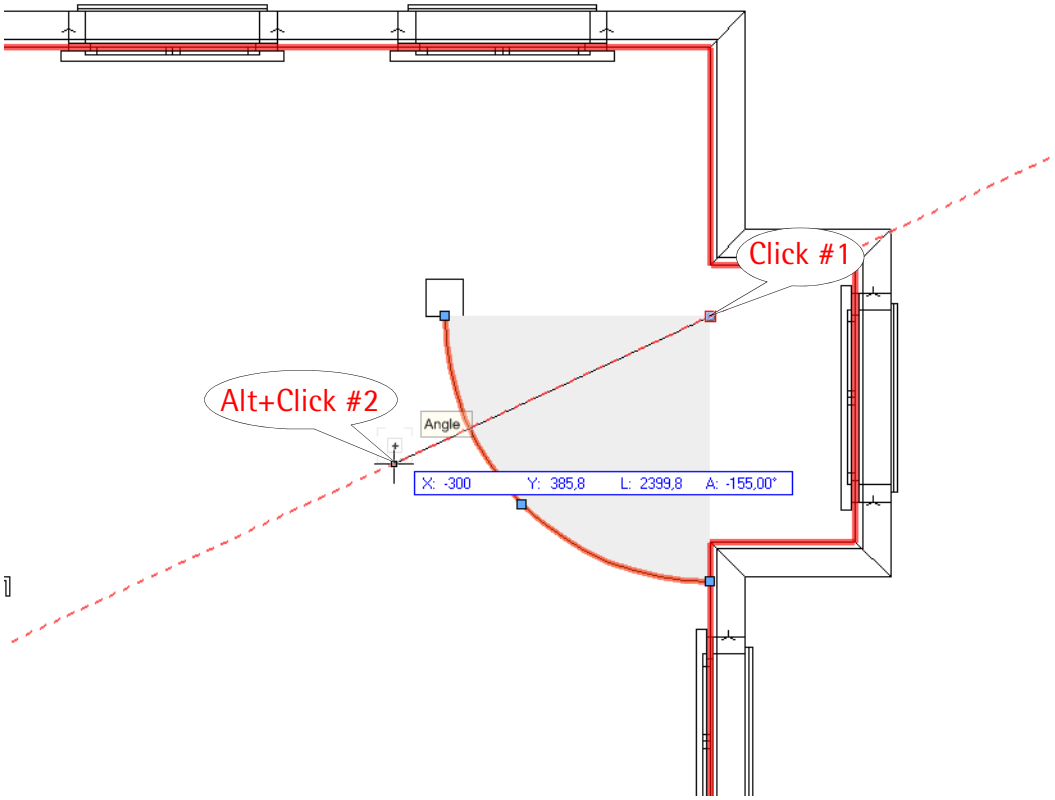


3 **Click** the 2D locus created in chapter 2.1.1 (center of the arc) (**Click #1**) and drag the cursor to the left beyond the arc.

4 Press TAB repeatedly until the **Angle** input box is marked. Enter **-155** degrees and press **Enter** to confirm.

5 Press **Alt** (!) while **clicking** again outside the arc (**Click #2**).

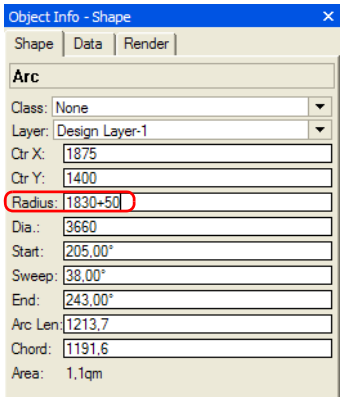
■ It is vital that you press Alt during the second click to make sure that only selected objects are split. Otherwise all objects along and beyond the split line are split as well. ■



6 Repeat the last step to create the third arc. Enter **-117** degrees.

Now we extend the radii of the arcs in the center and on the right.

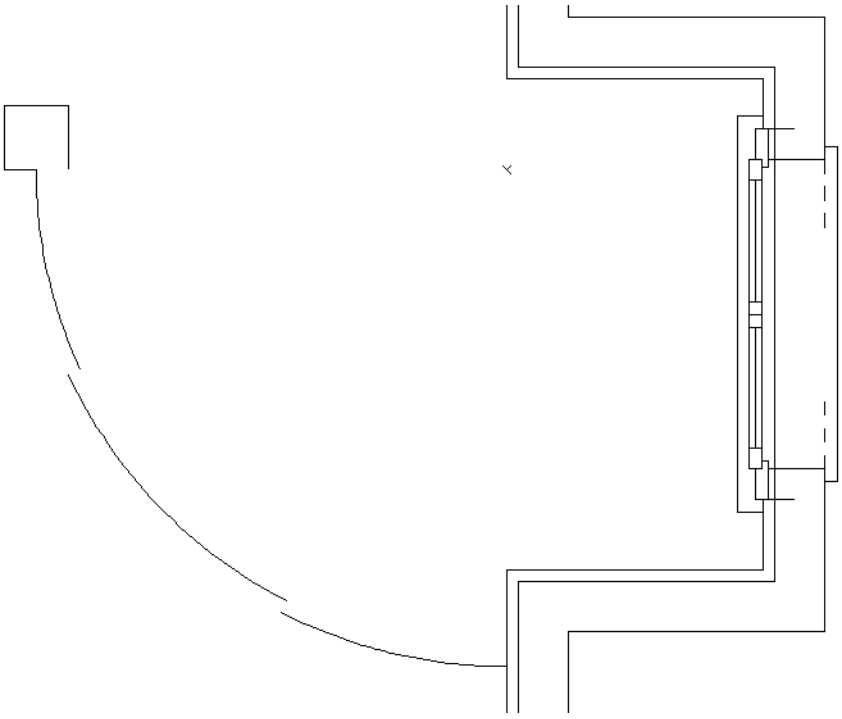
7 Select only the arc in the **center** and use the Object Info palette to add **50** mm to the **radius**.



8 Press **Enter** to confirm.

9 Repeat the previous two steps to add **100** mm to the radius of the arc on the right.

Now the arcs should look like this:



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2.1.4 Create NURBS Curves

In the next step, we will draw connections between the arcs and add depth and height to the plinth. As you can see in the drawing, the arcs have a surface. Giving those a height would result in objects shaped like slices of cake. Since we only need the rounded edge of the arc to create the plinth, we first convert the arcs to NURBS curves (3D curves).

1 Select one of the arcs and press **Ctrl+Alt+N**.

The Object Info palette shows that the selected object is a NURBS Curve.

2 Repeat for the other two arcs.

2.1.5 Flyover

We can now look at the intermediate result in 3D.

1 Press **Shift+C** to select the **Flyover** tool. (You can also select the tool from the **Basic** palette.)

2 **Click** an end vertex of one of the NURBS curves.

The cursor turns into a dashed cross.

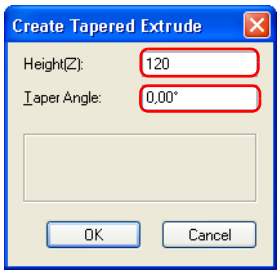
3 Hold down the left mouse key to rotate the drawing around this vertex.

2.1.6 Create Tapered Extrude

Now we can convert the arcs to 3D objects.

1 Select one of the arcs and press **Ctrl+Alt+U**. (You can also choose **Model** > **Tapered Extrude...**)

2 Enter **120** mm into the **Height (Z)** input box. Make sure that the **Taper Angle** is set to **0**. Click **OK** to confirm..



3 Create tapered extrudes with a height of **120 mm** from the remaining NURBS curves as well.

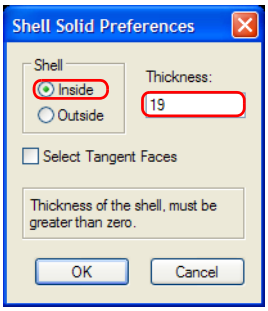
2.1.7 Create Shell Solid

We now use the **Shell Solid** tool to add depth to the surface elements.

1 Select the **Shell Solid** tool from the **3D Modeling** tool set and **click** Shell Solid Preferences in the Tool bar.

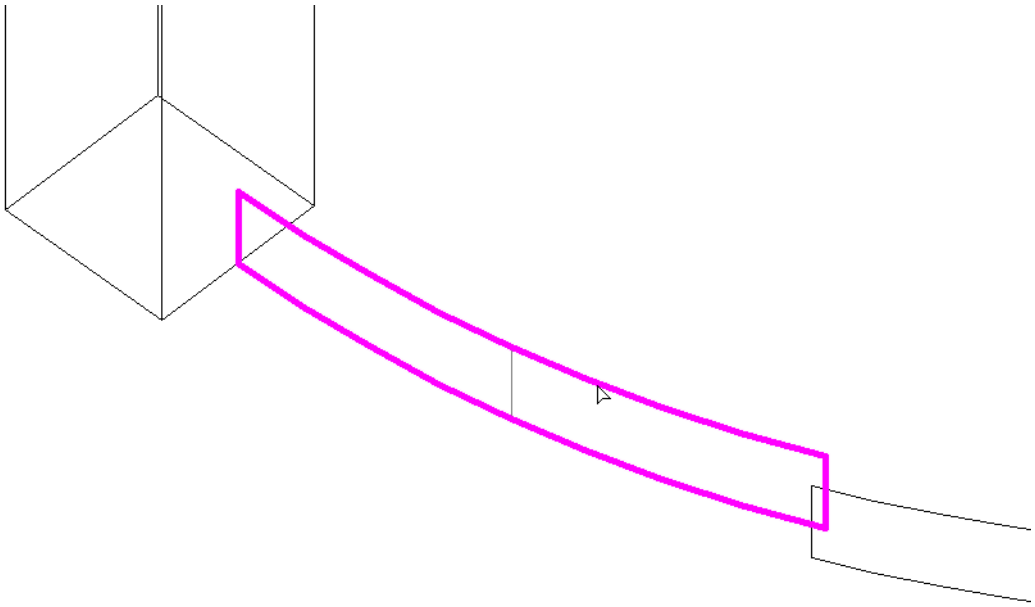
2 Enter **19** mm in the **Thickness** box.

3 Select **Inside** in the **Shell** area.

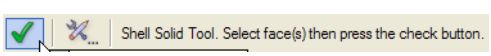


4 Click OK to confirm and **click** one of the tapered extrudes.

The extrude is marked in red.



5 Click the green checkmark in the Tool bar or press **Enter** to confirm..



6 Repeat for the other extrudes.

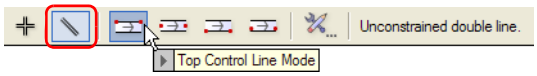
2.1.8 Draw Connections

In the next step, we will draw connections between the plinth elements.

1 Press **Ctrl+5** to change to **Top/Plan** view .

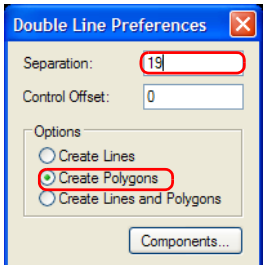
2 Select the **Double Line** tool from the **Basic** palette.

3 Make sure that **Top Control Line Mode** and **Unconstrained Double Line Mode** are selected on the Tool bar.



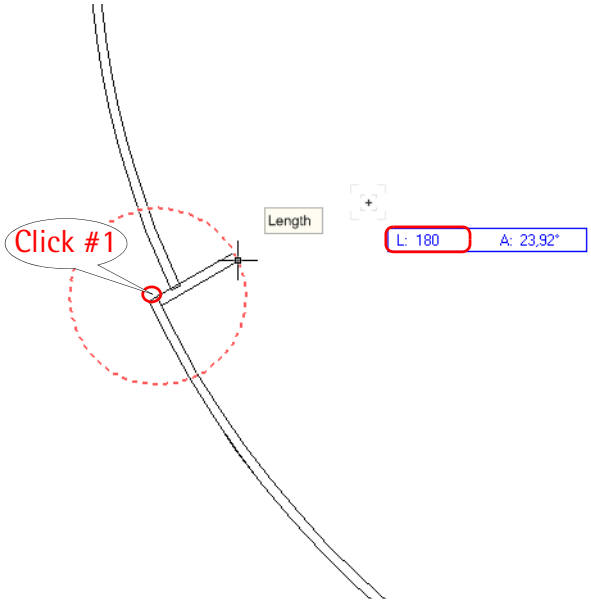
4 Click **Double Line Preferences** .

5 Enter **19** mm in the **Separation** box and select **Create Polygons**.



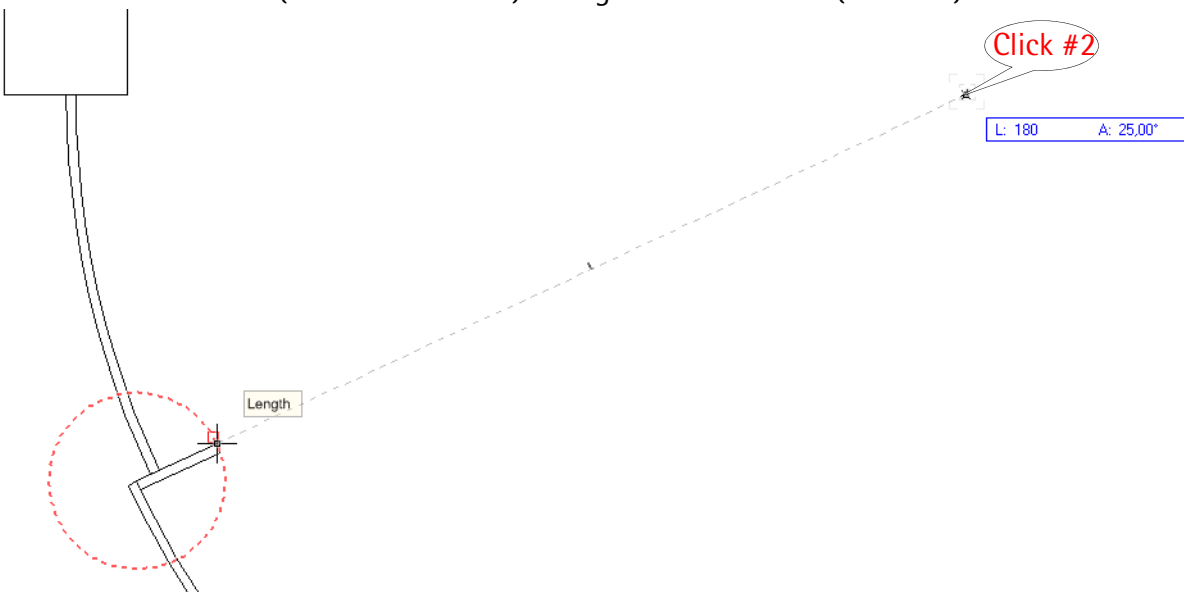
6 Click OK to confirm.

7 Click the corner of the **central** arc as indicated below (**Click #1**).

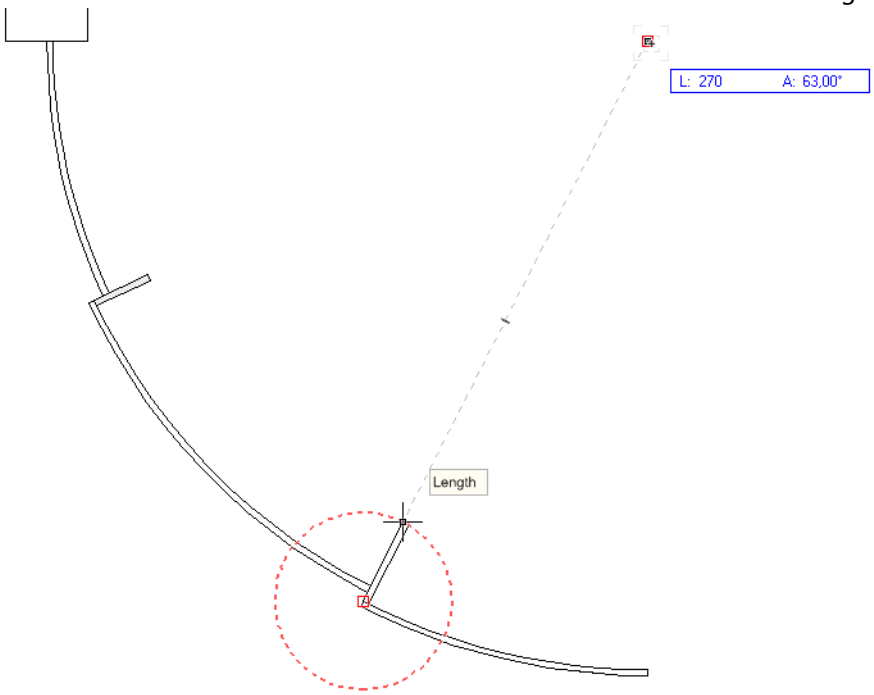


8 Press **TAB** to access the Data bar, enter **180** mm for **L** and press **Enter** to confirm.

9 Click the 2D locus (center of the arcs) to align the double line (**Click #2**).

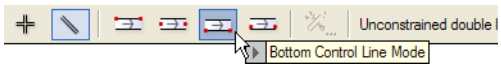


10 Repeat for the second connection. The double lines have to be **270** mm long this time.



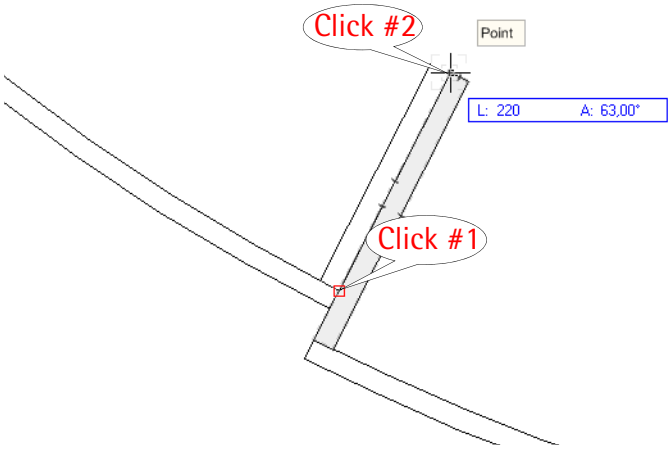
We redouble this connection with another element.

11 For this second element, we change to **Bottom Control Line Mode**.



12 Start the double line at the **inner right** corner of the **central** arc (**Click #1**).

13 The double line should be level with the existing element (**Click #2**).



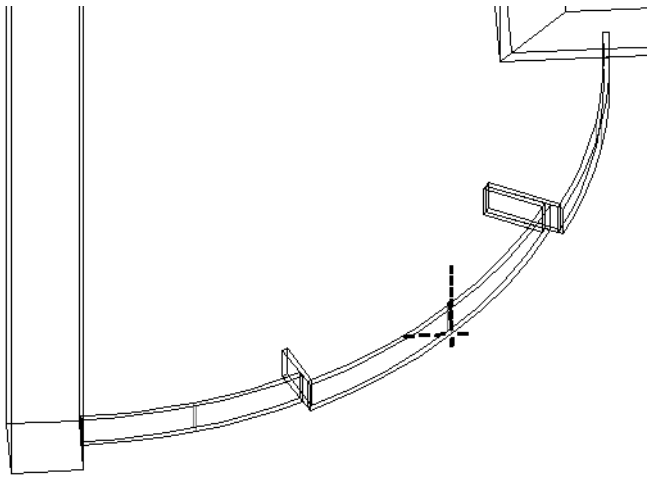
Now we also give those connections a height.

1 Select one of the double lines created in the last step (Object Info palette: Polygon).

2 Press **Ctrl+E** and enter **120** mm in the **Height (Z)** box.

3 Repeat for the remaining two connections.

The finished plinth should now look like this



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2.1.9 Group Plinth

Next, we group all parts of the plinth for more clarity.

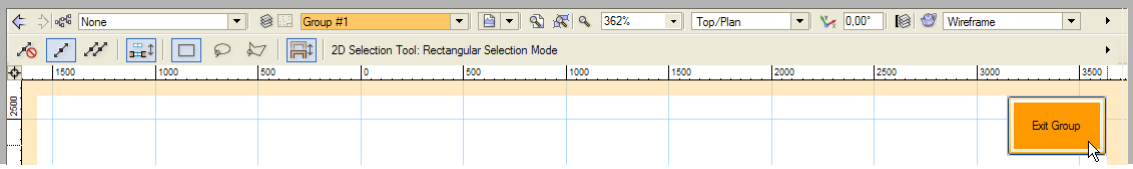
1 Press X to change to the 2D Selection tool. Press **Shift** and select all parts of the plinth.

The Object Info palette shows that 6 Objects are selected.

2 Press **Ctrl+G**.

The message in the Object Info palette changes to Group.

■ Now, you can only select the plinth as a group. Any changes to the plinth have to be made inside the group. To access it, double-click the group. Depending on your Vectorworks settings, only the plinth will be displayed in the drawing or all other parts of your drawing are displayed grayed. The separate elements can be selected individually. Click the orange **Exit Group** button in the top right corner to return to the drawing. ■

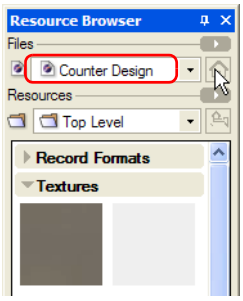


2.1.10 Assign Texture

Finally, we assign the plinth a texture for photo-realistic rendering.

1 Select the plinth.

2 Click the Home **button** in the Resource Browser to make sure that the Resource Browser displays the resources of the file "Counter Design"



■ If the Resource Browser is too narrow in your workspace, move the mouse over the **left edge** of the Resource Browser. When the cursor changes to this shape , you can click and drag the edge to the left while holding the mouse. You can drag it back as desired in the same way. ■

3 Scroll down until the **category "Textures"** is visible.

4 **Double-click** the texture **Metal Aluminium 02 MAT**.

2.1.11 Change Render Mode

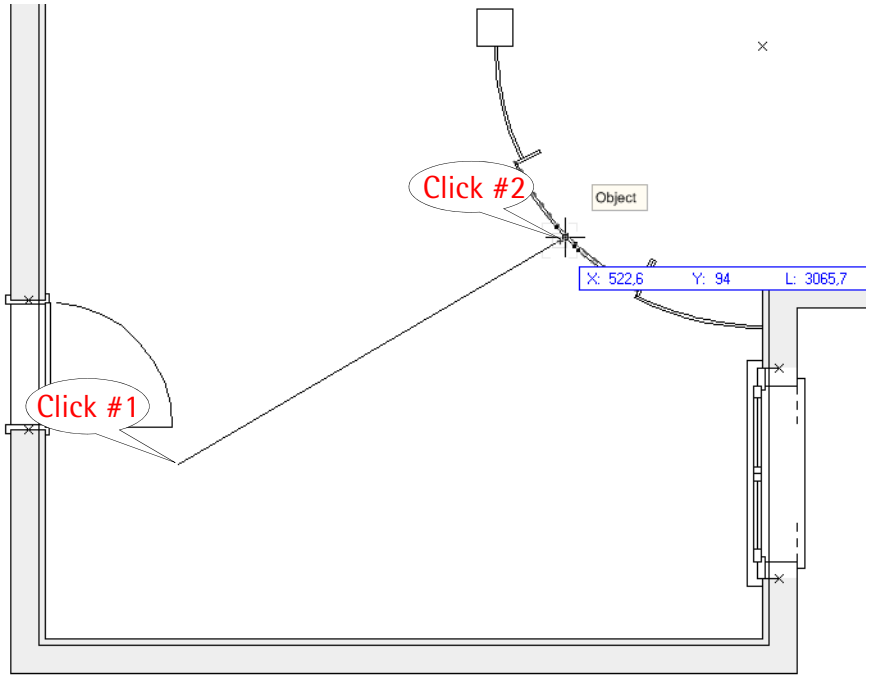
Now you can define a 3D view to look at a rendering of the plinth.

1 Press **Ctrl+5** to change to **Top/Plan** view.

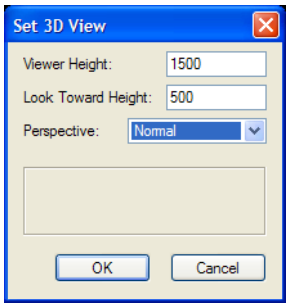
2 Choose **View > Set 3D View**.

3 Use the mouse wheel to zoom out until the whole room is displayed.

4 As shown below, first click to define the viewpoint (**Click #1**) and then to define the direction (**Click #2**).



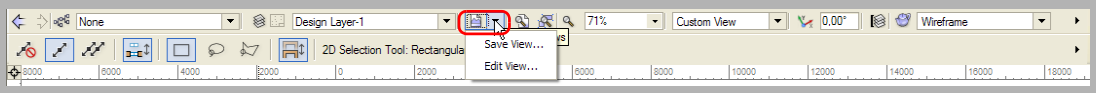
5 Set **Viewer Height** to **1500** mm, **Look Toward Height** to **500** mm and **Perspective** to **Normal**.



6 Click OK to confirm.

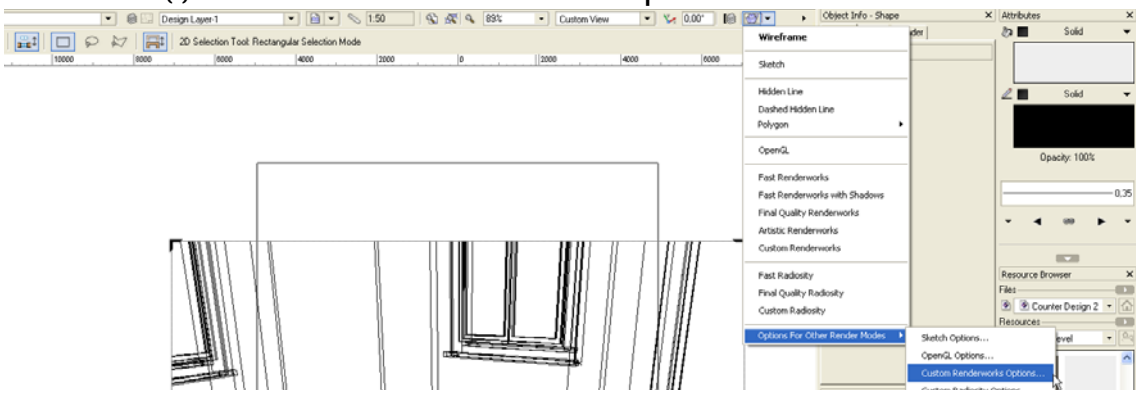
A perspective view is displayed in the drawing.

■ All 3D views can be saved and accessed at a later point: Click Saved Views in the View bar. Refer to the manuals for further details. ■



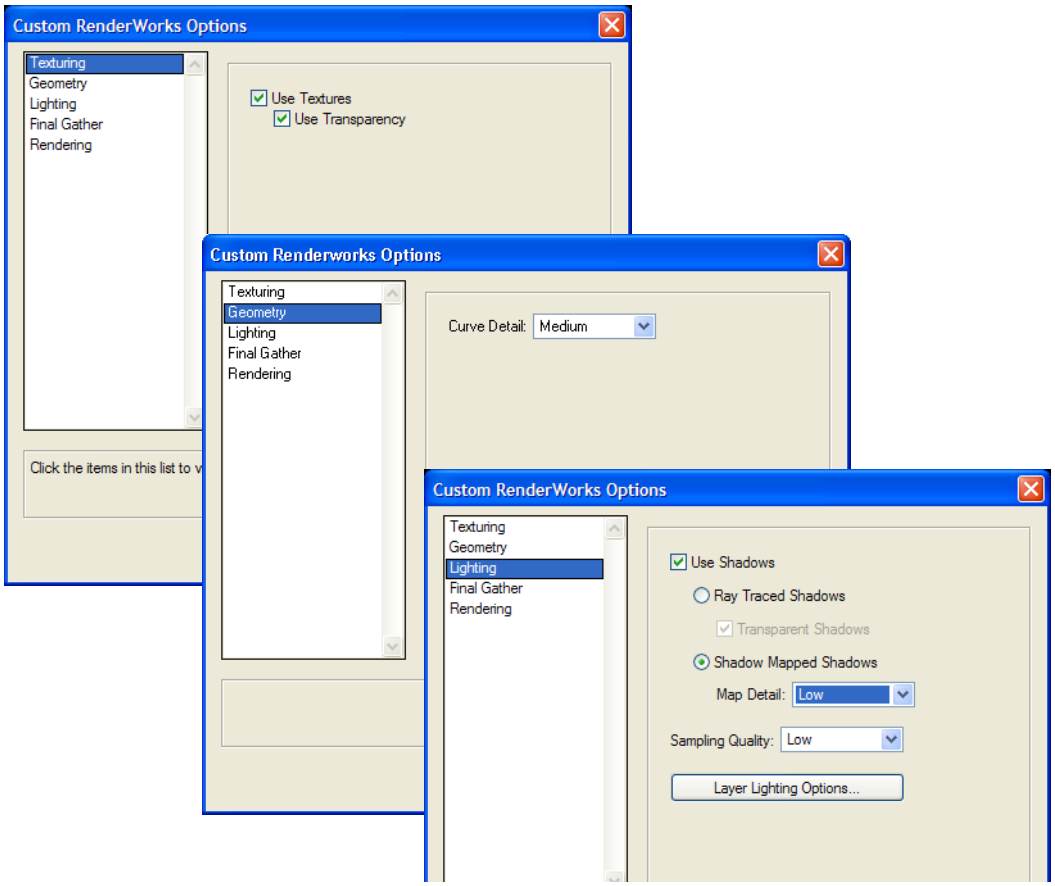
We will now edit the Render mode **preferences**.

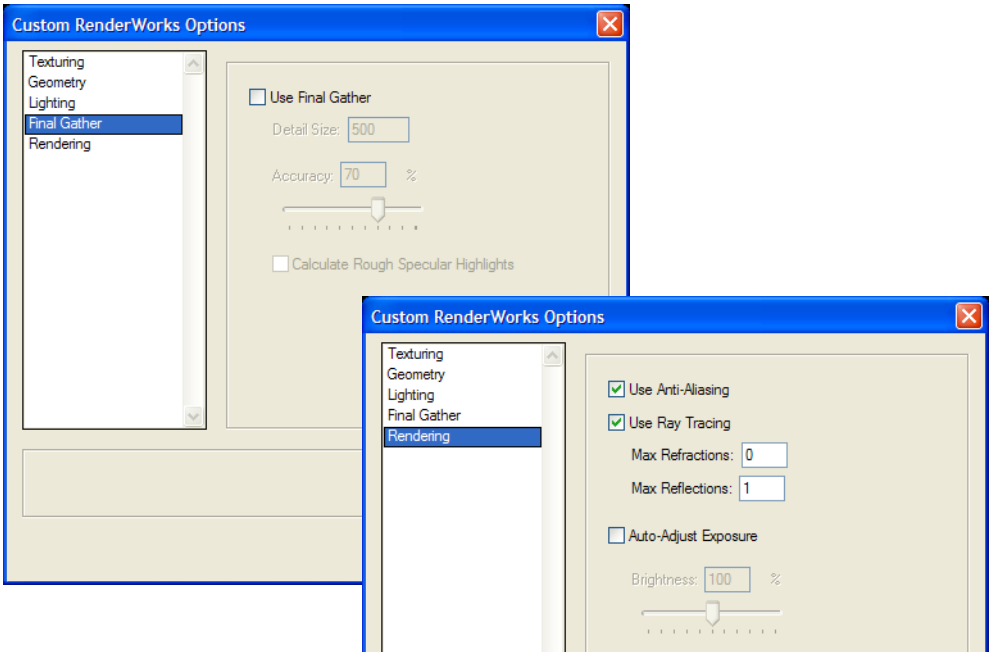
1 Select Current Render Mode in the View bar. Then click **Options For Other Render Modes...>** (!) and select **Custom Renderworks Options...**



■ If the Current Render Mode box is not displayed in the View bar, make the Resource Browser or other palettes (cursor ⇹) a bit narrower. ■

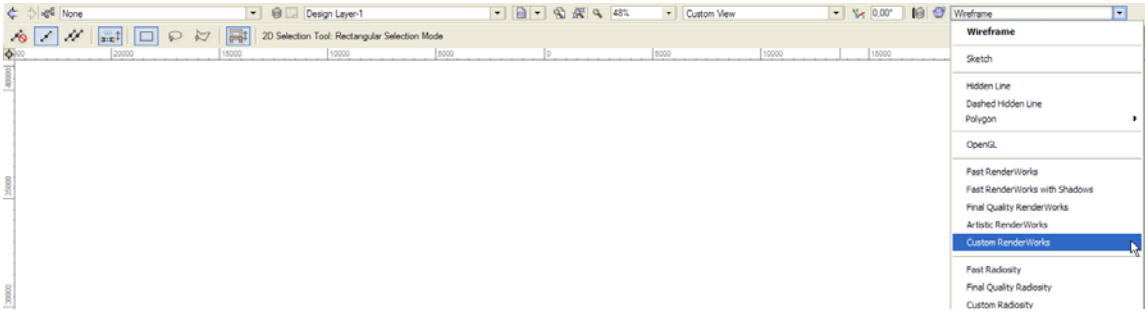
2 Make sure that the settings are adjusted as displayed below and click **OK** to confirm.:





■ Use the dialog **Custom Renderworks Preferences** to adjust the quality of the renderings. **Final Quality Renderworks** offers the best visualization results, but it also uses more computing time and resources than any of the other visualizations. ■

3 Select Current Render Modes again and click **Custom Renderworks**.



■ Depending on the size of the project and the speed of your computer, it may take the program some time to render the drawing. A progress bar will appear in the Tool bar during rendering. You can press Esc at any time to abort rendering. ■

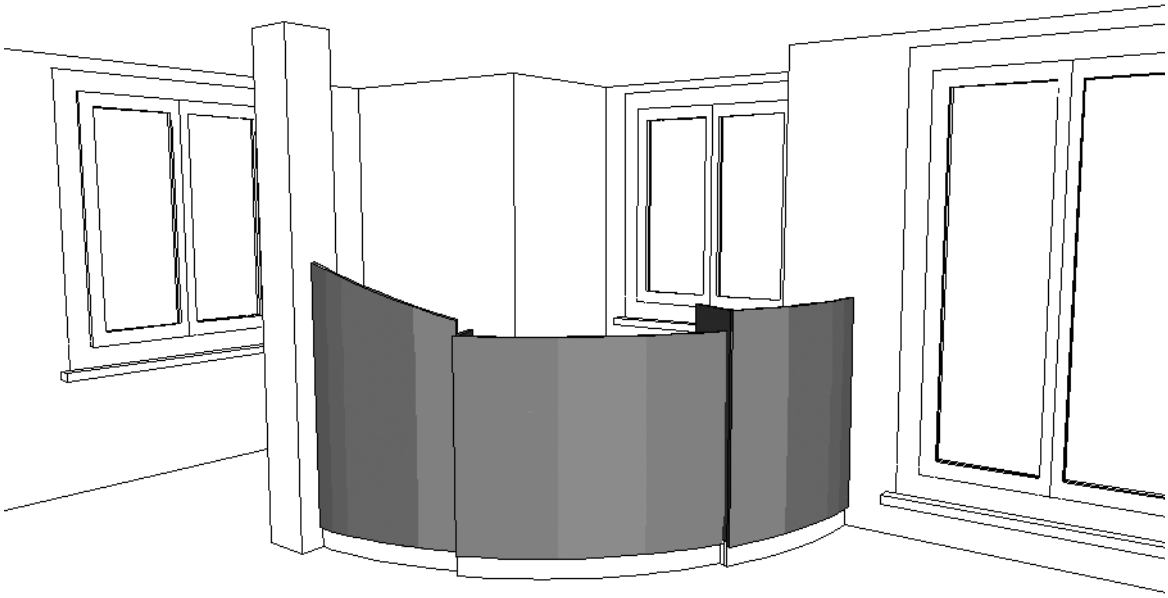
4 Change back to **Wireframe** to continue the exercise.

■ It is important that you always draw using the Wireframe Render Mode. Otherwise, Vectorworks renders the complete drawing after every change you make. ■

Notes:

2.2 Front Scribes

In this step, we will draw front scribes for the counter.



2.2.1 Extract Front Scribe Edges

The front scribes all have a radius that is 19 mm longer than that of the plinth. We extract the outer edge of the plinth parts and add **19** mm to the radius.

1 Select **View** > **Projection** > **Orthogonal**.

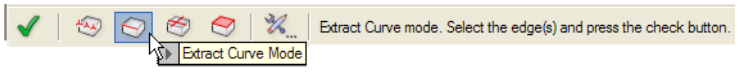
2 Zoom in on the peft part of the plinth.

In chapter 2.1.9, we grouped the plinth parts. Now we want to work inside this group.

3 **Double-click** one of the plinth parts to get inside the group.

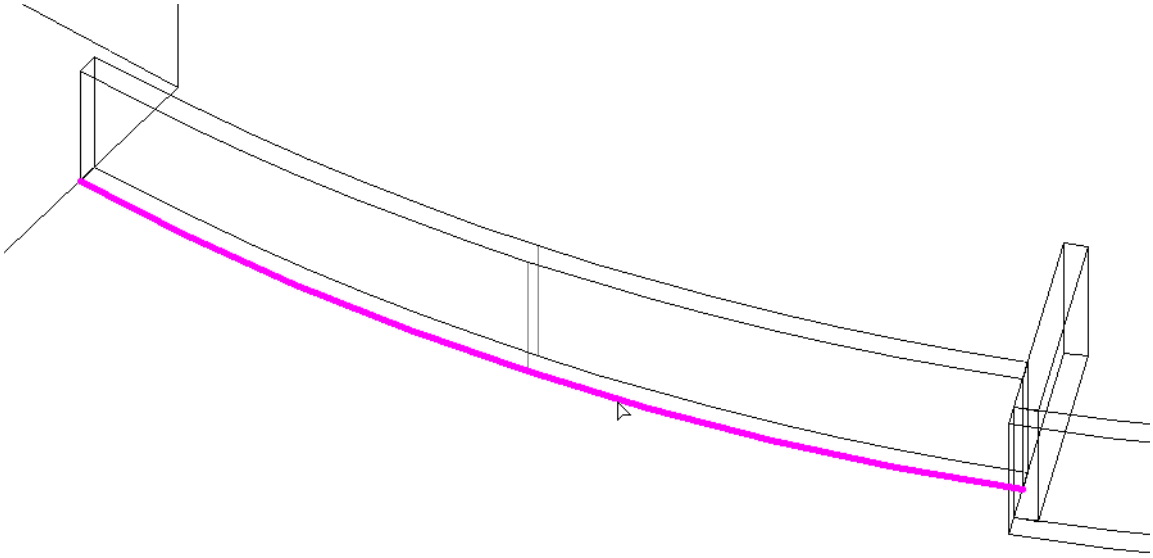
4 Select the **Extract** tool from the 3D **Modeling** tool set.

5 Select **Extract Curve Mode** in the Tool bar.



6 Click the **bottom front edge** of the plinth part.

The edge is marked in red.



7 Press **Enter** or click the **green checkbox** in the Tool bar.

The edge is displayed as a thin NURBS curve and marked in red.

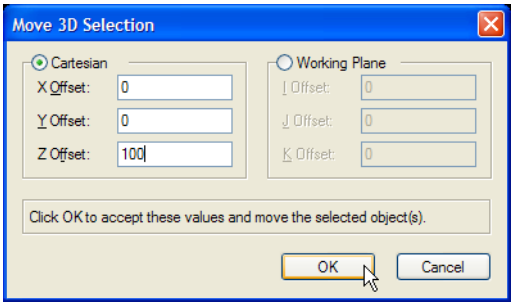
2.2.2 3D Move Curve

The bottom edge of the front scribe is to start 100 mm above the ground, so we move the NURBS curve to the appropriate height.

1 Make sure that the NURBS curve just created is selected.

2 Press **Ctrl+Alt+M** to call 3D Move... (You can also choose **Modify > Move > Move 3D...** or select it from the contextual menu.)

3 In the following dialog, enter **100** mm in the **Z Offset** box. Make sure that **X Offset** and **Y Offset** are set to **0**. Click **OK** to confirm..



2.2.3 Height and Wall Thickness of Scribes

We use **Tapered Extrude** to create the height of the scribes.

1 Press **Ctrl+Alt+U**. (You can also choose **Model > Tapered Extrude**.)

2 Enter **1300** in the **Height (Z)** box and make sure that the **Taper Angle** is set to **0** degree.

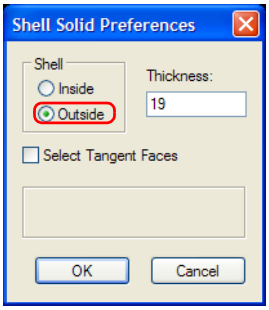
3 Click OK to confirm.

Now we make the scribe 19 mm thick.

1 Select the **Shell Solid** tool from the **3D Modeling** tool set and **click Shell Solid Preferences** in the Tool bar.

2 Set **Thickness** to **19** mm.

3 Select **Outside** (!) in the **Shell** area.

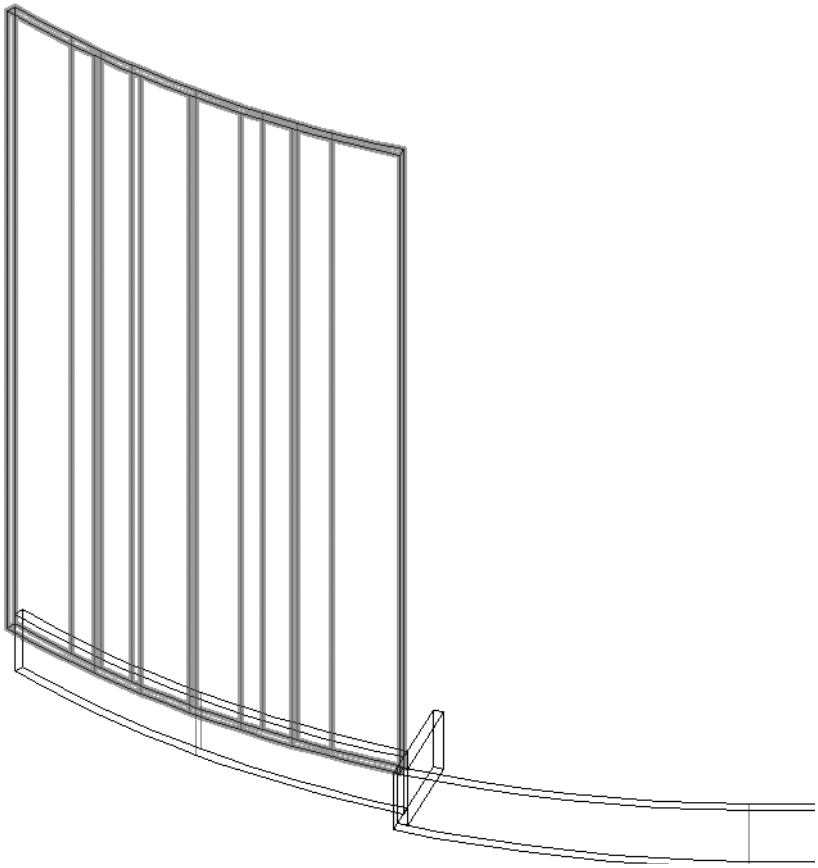


4 Click OK to confirm. Then **click** the edge of the tapered extrude so it is marked in red.

5 Press **Enter** or click the **green checkmark** in the Tool bar.

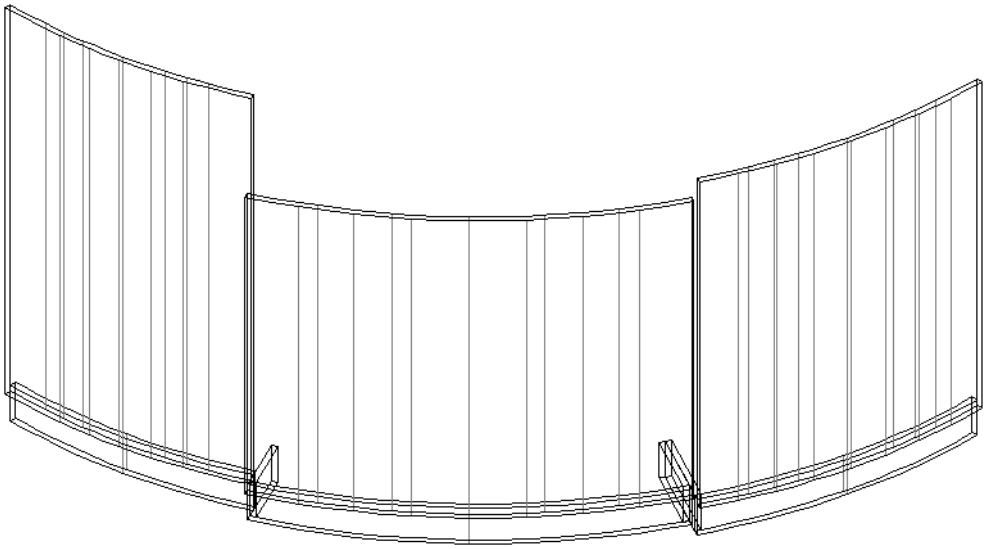
Notes:

The first scribe should now look like this:



6 Repeat the steps described in chapters 2.2.1 to 2.2.3 for the other scribes, but give the **central** scribe a **height** of **1000** mm and the **right** one a **height** of **1100** mm.

The result should look like this:

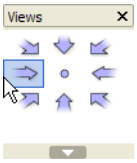


2.2.4 Bevel Top Edge

In the next step, the **top right** corner of the **left** scribe is to be beveled.

1 Select the **3D Selection** tool from the 3D Modeling tool set and **select** the **left scribe**.

2 Change to **Left View** via the **Views** palette or in the Current View menu in the View bar.



3 Select the **Split** tool from the Basic palette.

4 Select **Line Trim Mode** in the Tool Bar.

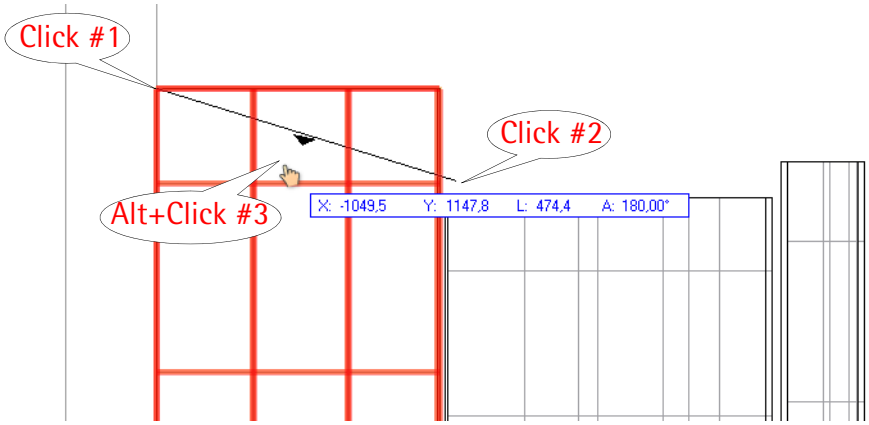
5 The cut is to begin at the **top left** corner (**Click #1**).

6 Press TAB repeatedly until the **A** box is marked. Enter **-17** degrees and press **Enter** to confirm.

7 Move the cursor beyond the right edge of the scribe and click (**Click #2**).

An arrow appears at the edge of the split, indicating which side is to remain after the cut.

8 Press **Alt** (!) and click below the split line (**Click #3**).



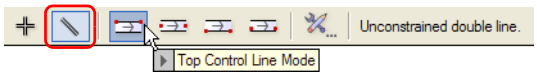
2.2.5 Panels Between the Scribes

In the next step, we create the side panels between the scribes.

1 Press **Ctrl+5** to return to Top/Plan view and zoom in on the **left** connection of the plinth.

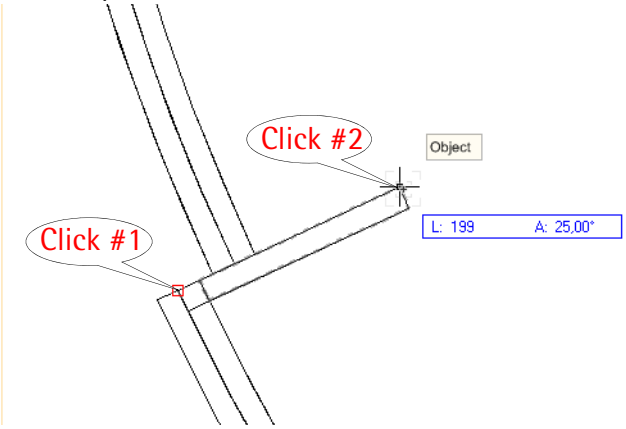
2 Select the **Double Line** tool from the Basic palette.

3 Select **Top Control Line Mode** and **Unconstrained Double Line Mode** in the Tool bar.



4 Click **Double Line Preferences** . Check that **Separation** is set at **19** mm and that **Create Polygons** is selected.

5 Now draw a double line from the **inner left corner** of the **central** scribe (**Click #1**) to the **back edge** of the side panel (**Click #2**).



■ Make sure to select the inner edge of the fron scribe, NOT the inner edge of the plinth!■

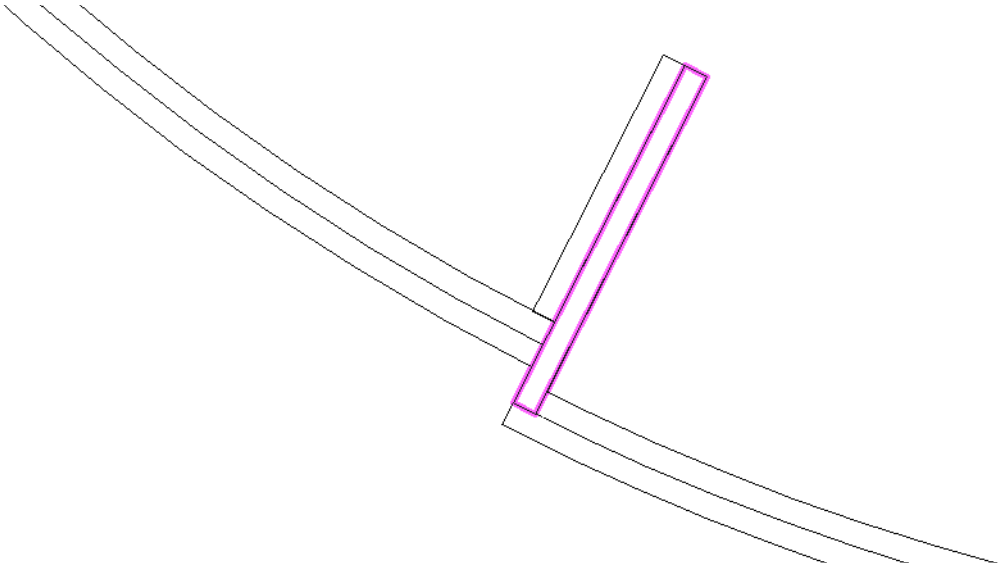
The central part of the counter is to be 1100 mm high. Since the side panel is to be perched on the plinth, it is 980 mm high.

6 Press **Ctrl+E** to create an extrude with a height of **980** mm.

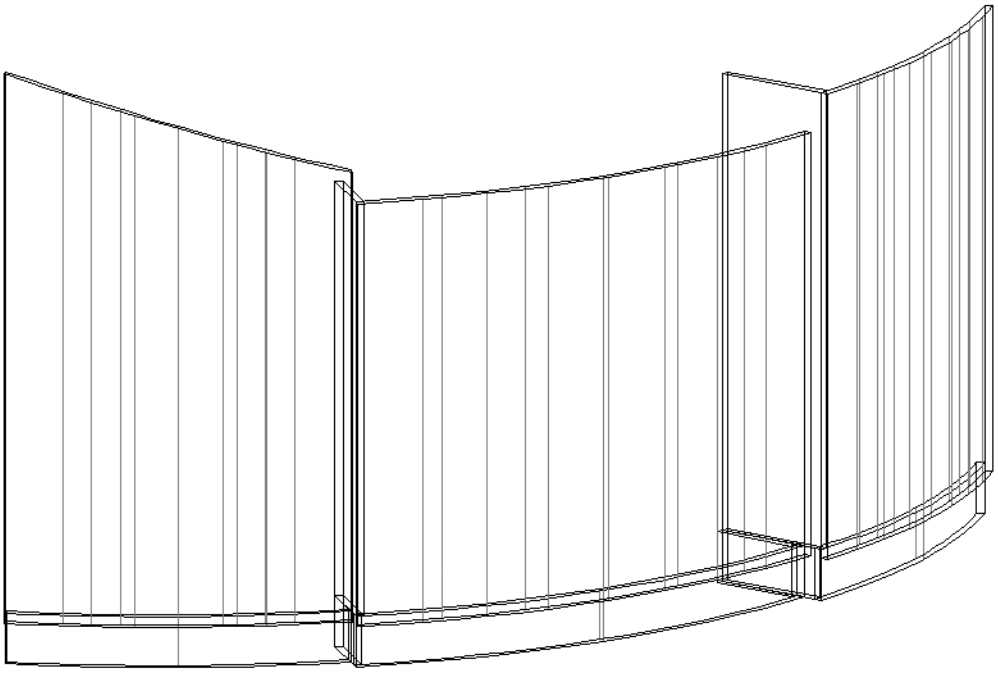
7 Make sure that the connection part is selected and press **Ctrl+Alt+M** to call 3D Move.... (You can also choose Modify > Move or select it from the contextual menu.)

8 Enter **120** mm in the **Z Offset** box.

9 Add a side panel to the right front scribe as well and make it **1080** mm high. It does not have to be redoubled.



The counter should now look like this:



Notes:

2.2.6 Assign and Edit Texture

Finally, we assign textures to the scribes and side panels.

1 Select the **outer scribes** and the two **side panels**.

2 Select the texture **Metal Aluminium 03 MAT** from the Resource Browser and double-click it.

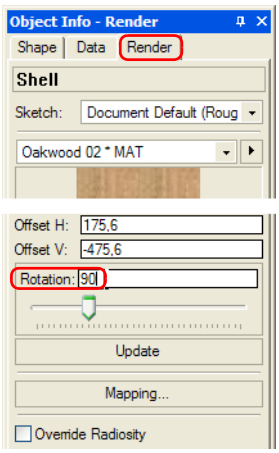
3 Select the central scribe and assign the texture **Oakwood 02 MAT** to it in the same way.

4 Check the result using the render mode **Custom Renderworks**.

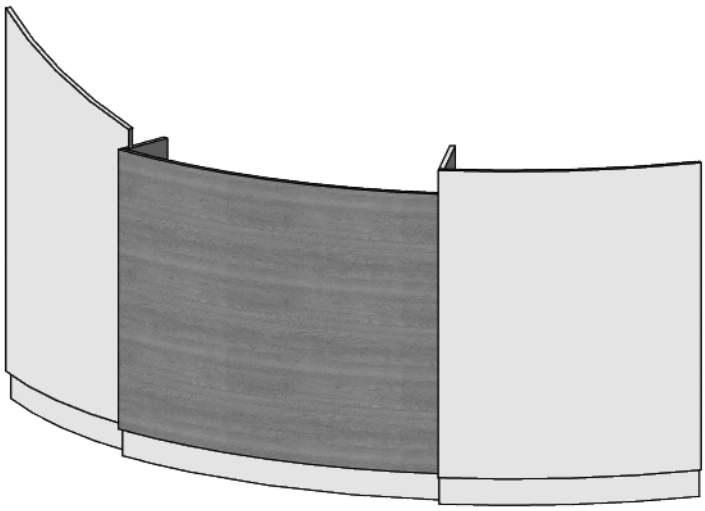
If required, the grain of the central scribe can be rotated.

1 Select the scribe and change to the Render tab in the Object Info palette.

2 Set **Rotation** to **90** degrees and press **Enter** to confirm.



The result should look like this:



3 Change back to **Wireframe**.

2.2.7 Storage Trays

Now, we add storage trays onto the right and central sides of the counter. We first extract the top inner edge from the right scribe and then create the desired board from it.

1 Select the **Extract** tool and make sure that **Extract Curve Mode** is selected.

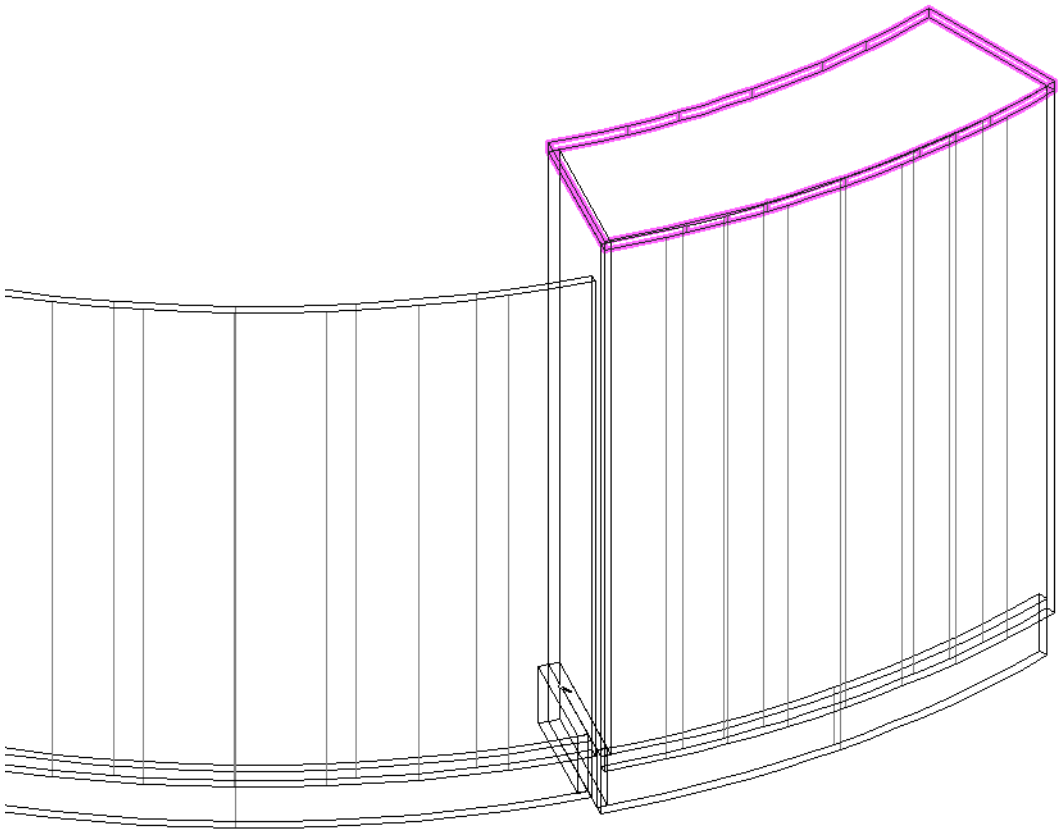
2 Click the top **outer edge** of the right front scribe and press **Enter** to confirm.

3 Press **Ctrl+Alt+U** to create a tapered extrude of **19** mm height from the NURBS curve.

4 Select the **Shell Solid** tool.

5 Select **Shell Solid Preferences**. Set **Thickness** to **308** mm and Shell to **Inside** (!).

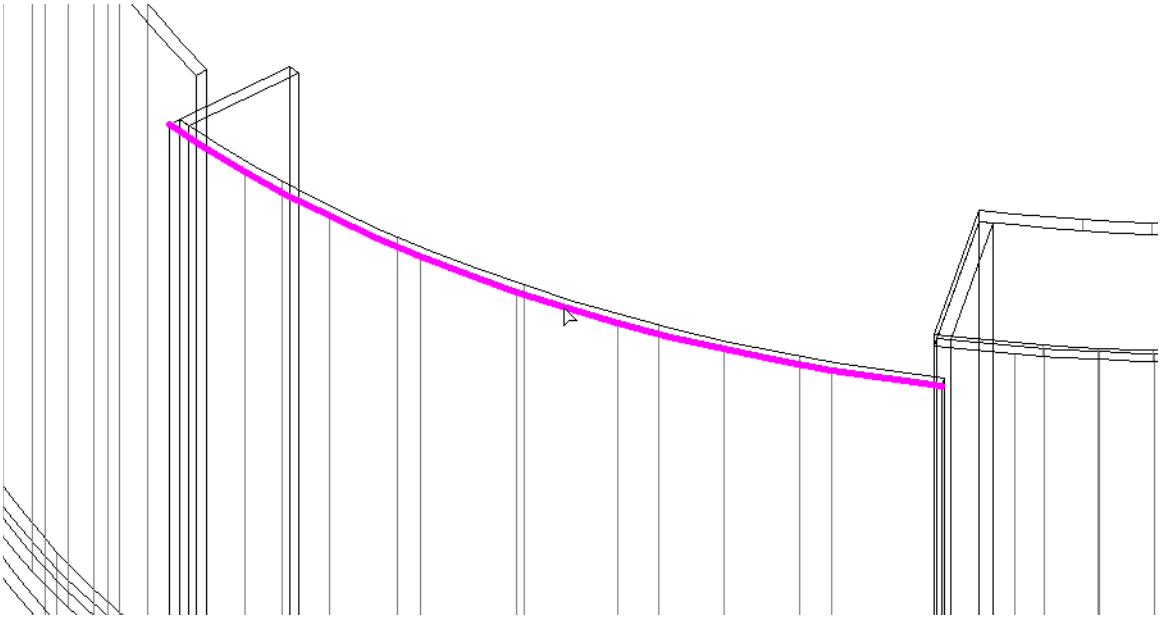
6 **Click** the tapered extrude you just created and press **Enter** to confirm.



7 Assign the texture **Metal Aluminium 03 MAT** to this storage tray.

We proceed in a similar fashion for the central storage tray. The difference is that this storage tray is to protrude over the front scribe by 10 mm.

1 First use the **Extract** tool to extract the **top outer edge** of the central scribe as a NURBS curve.

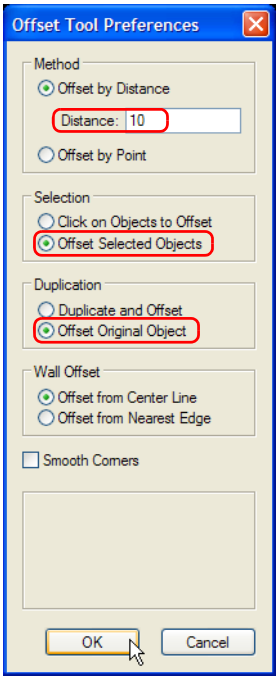


2 Then **double-click** the **Offset** tool in the Basic palette.

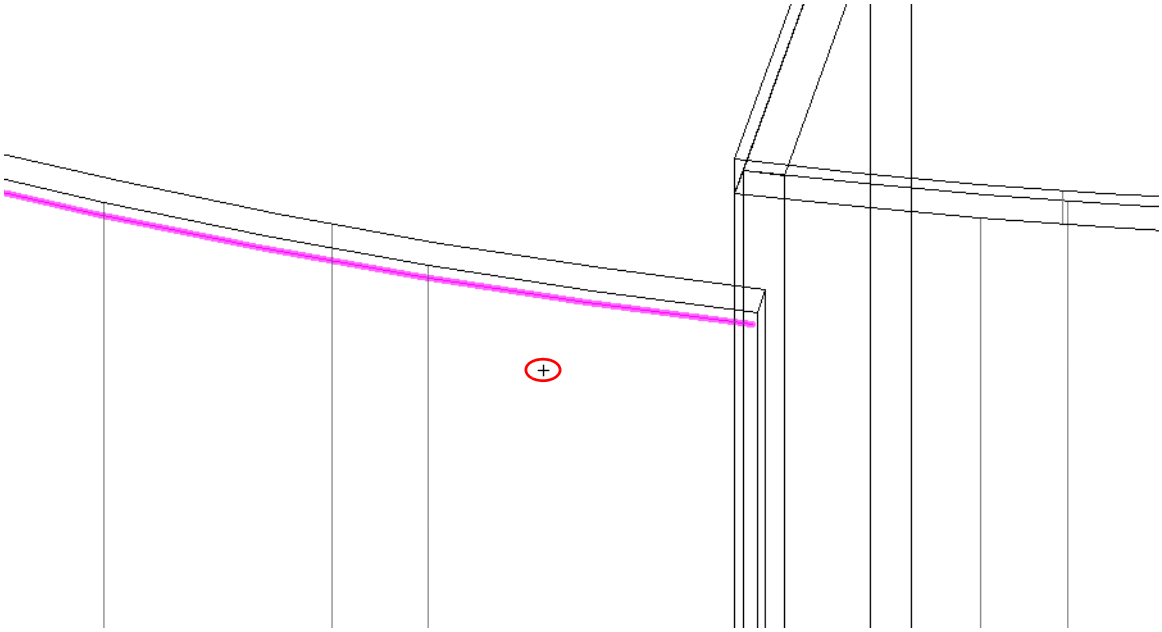
3 Set the **Distance** to **10** mm.

4 Make sure that Offset **Selected Objects** is selected.

5 The original NURBS curve is not needed anymore, so you should select **Offset Original Objects**. Click OK to confirm..



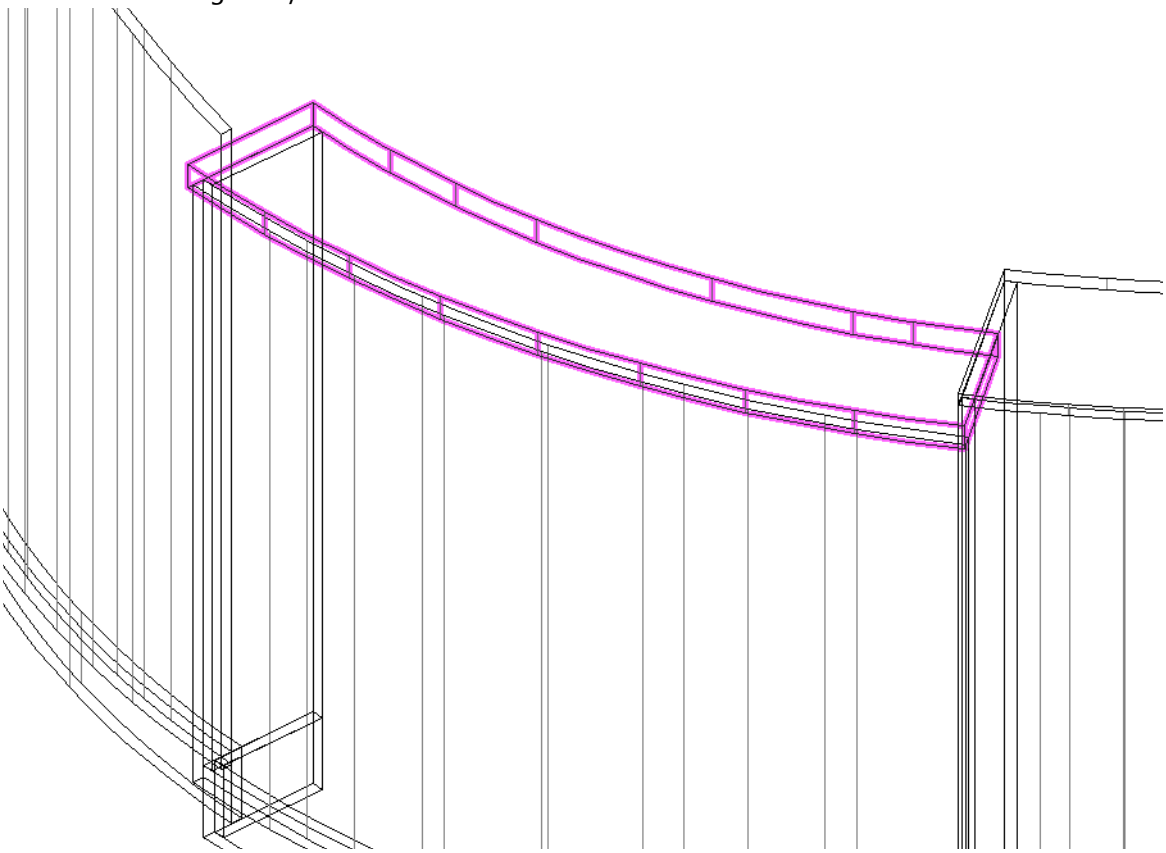
6 We want to offset the curve to the outside. Click outside of the counter front panel as shown below. (Referring to the screen, you have to click underneath the curve.)



7 Press **Ctrl+Alt+U** to create a tapered extrude with a height of **38** mm from the offset curve.

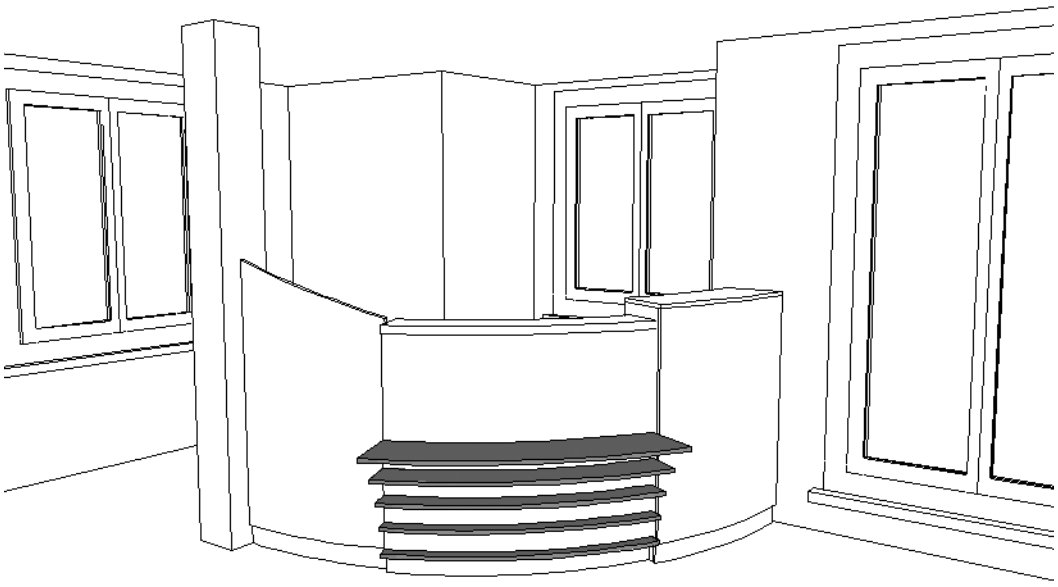
8 The **228** mm width of the storage tray is created using the **Shell Solid** tool. (Repeat the previously described steps.)

The central storage tray should now look like this:



2.3 Front Ledge

In the next step, we will create a ledge at the front of the central part. We first create an extrude along path and then cut the individual boards from that extrude.

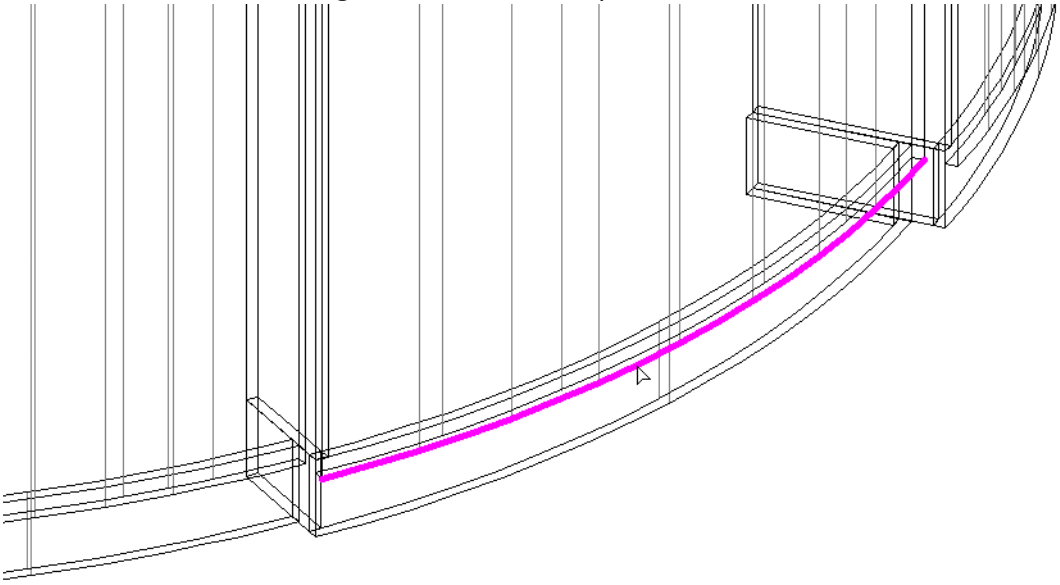


2.3.1 Create Path

For the path, we will extract the outer edge of the central scribe.

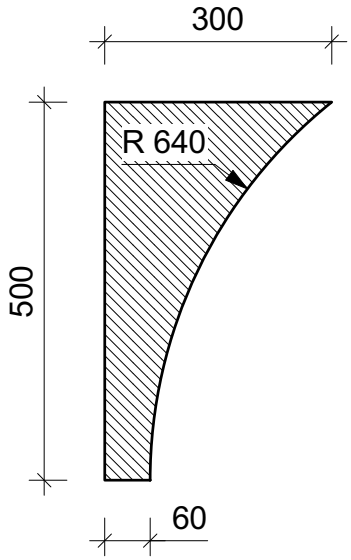
1 Select the **Extract** tool and make sure to select **Extract Curve Mode**.

2 Click the bottom outer edge of the scribe and press **Enter** to confirm.



2.3.2 Create Profile

In the next step, we will draw the profile for the extrude along path. The extrude is to have the following dimensions:



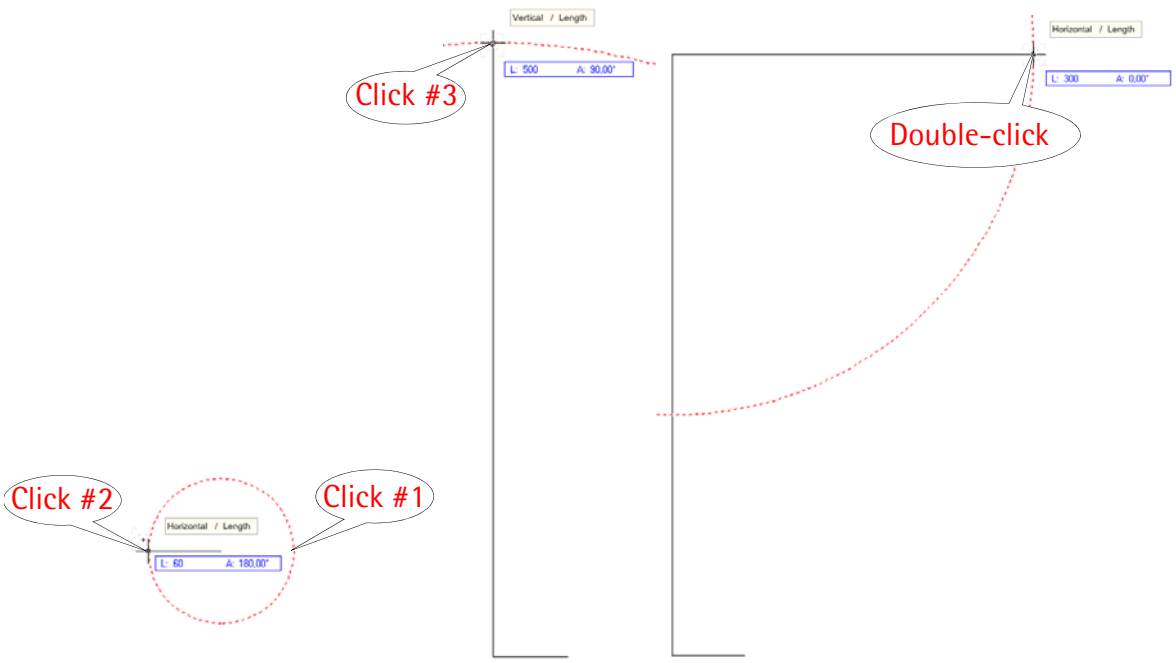
Press **Ctrl+5** to return to Top/Plan view.

Now we use the **2D Polygon** tool to draw the three straight lines on an empty space in the drawing as shown above.

1 Start at the bottom right **(Click #1)** and then draw a **horizontal** (Angle 0° or 180°) line which is **60** mm **long** (**Click #2**).

2 From there, draw a **vertical** line (Angle 90°), **500 mm long** (**Click #3**).

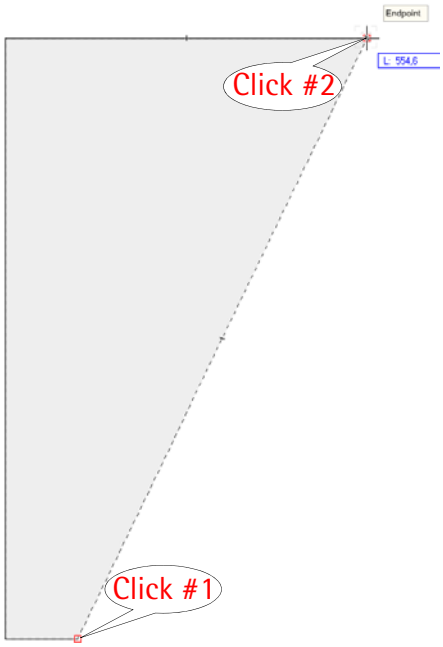
3 The third part is to run **horizontally** to the right (Angle 180°) and to be **300** mm long. **Double-click** (!) here (**Click #4**).



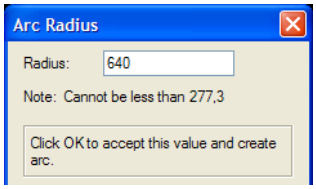
4 For the next step of the drawing, select the **Arc** tool from the Basic palette.

5 Select Arc by 2 Points and a Specified Radius on the Tool bar.

6 Place the first vertex of the arc **at the bottom** (**Click #1**), the second one **at the top** of the polygon (**Click #2**).



7 Set the radius to **640** mm in the following dialog.



8 Select the polygon and the arc. Then choose **Modify > Compose**.

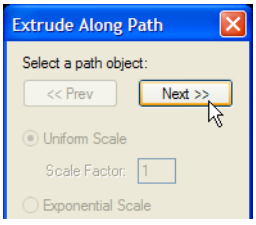
The individual objects are joined into one polyline.

2.3.3 Create Extrude along Path

1 Select the polyline and the NURBS curve extracted in chapter 2.3.1.

2 Press **Ctrl+Alt+X**. (You can also choose **Model > Extrude Along Path**.)

3 The **NURBS-Curve (!)** should be **marked** in red. Otherwise, click the Next or Prev buttons to toggle between selections.



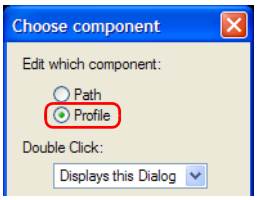
4 Click OK to confirm.

5 Change to **Left Isometric** view.

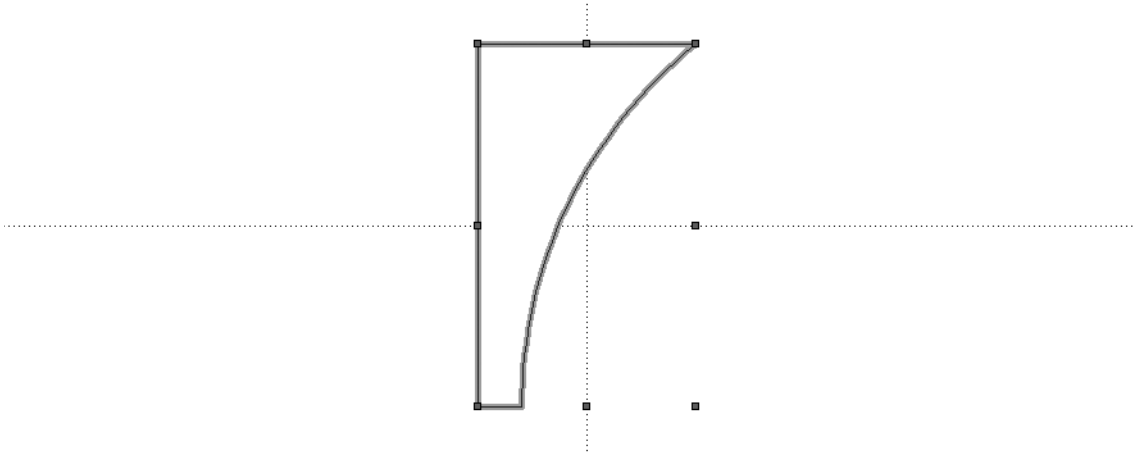
The extrude along path is not yet at the right position: it is not at the right height, and it is still inside the counter. To correct this, we edit the extrude and then move the profile to the appropriate position relative to the path.

6 **Double-click** the extrude along path.

7 In the following dialog, select **Edit Profile** and click OK to confirm.

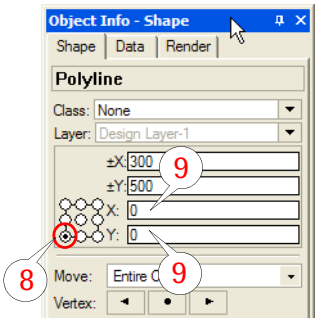


The display changes. The profile and a dashed crosshairs are displayed.

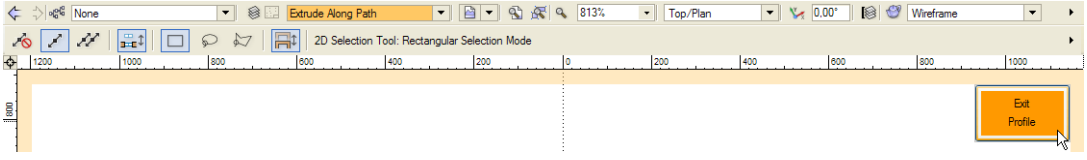


8 Select the profile and set the insertion point to **bottom left** in the Object Info palette.

9 Now change the values for **±x** and **±y** to **0** in the Object Info palette.



10 Click the orange Exit **Profile** button to exit the profile.l



2.3.4 3D Contours

In the next step, we will cut the extrude into regular horizontal sections and create 19 mm boards from these.

For more clarity, we will first group the extrude.

1 Select the extrude and press **Ctrl+G**.

2 **Double-click** the group to work inside it.

3 Change to Front view.

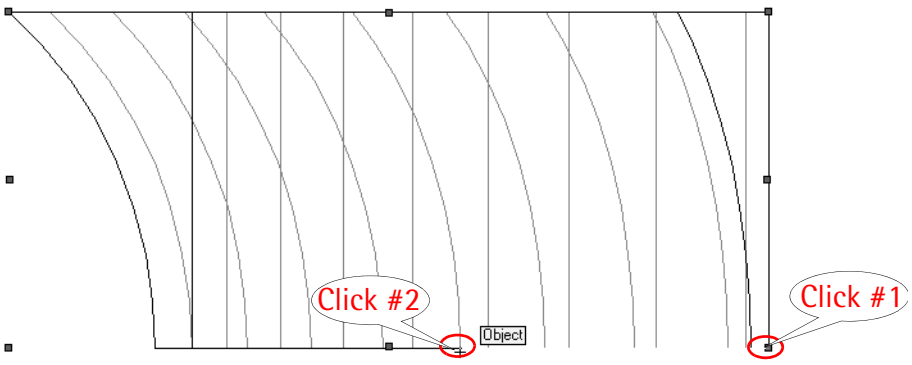
4 Select the **Create Contours** tool from the **3D Modeling** tool set.

The extrude is to be split into four sections.

5 Select **Create Contours Preferences** in the Tool bar. Set the **Contour Increment** to **500/4** mm.

6 Move the mouse over the **bottom right corner** of the extrude and click when the cue Point is displayed (**Click #1**).

7 Drag the cursor to the **left** and click on the **bottom edge** of the extrude (**Click #2**).



8 Change to **Right Isometric** view.

Notes:

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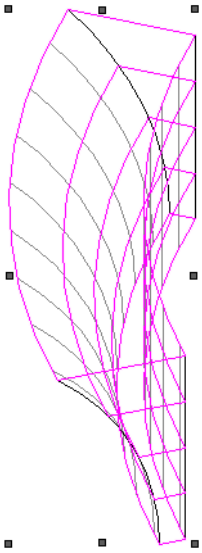
_____

_____

The extrude is now criss-crossed by red curves running along its shape. The curves are grouped by default.



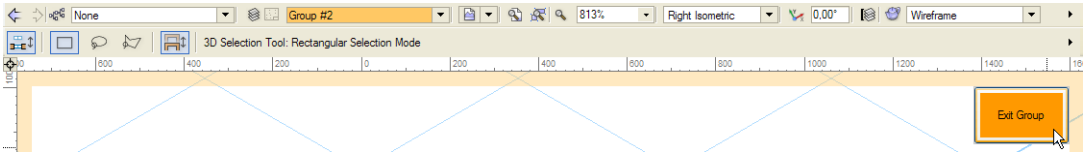
Now we can assign a thickness to the surfaces.

9 Press **Ctrl+U** to ungroup the curves and call **Tapered Extrude (Ctrl+Alt+U)**.

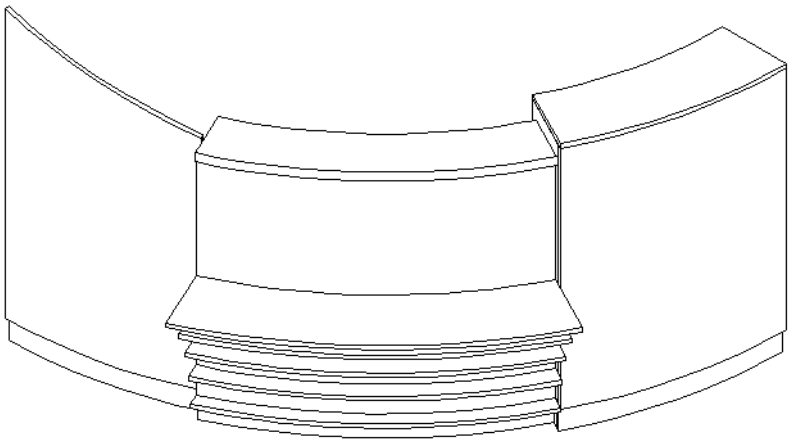
10 Assign the surfaces a **thickness** of **19** mm. Make sure to set the **Taper Angle** to **0°**.

11 The original extrude is no longer needed. Select it and press **DEL** to delete it.

12 Click the orange **Exit Group** button to exit the group.

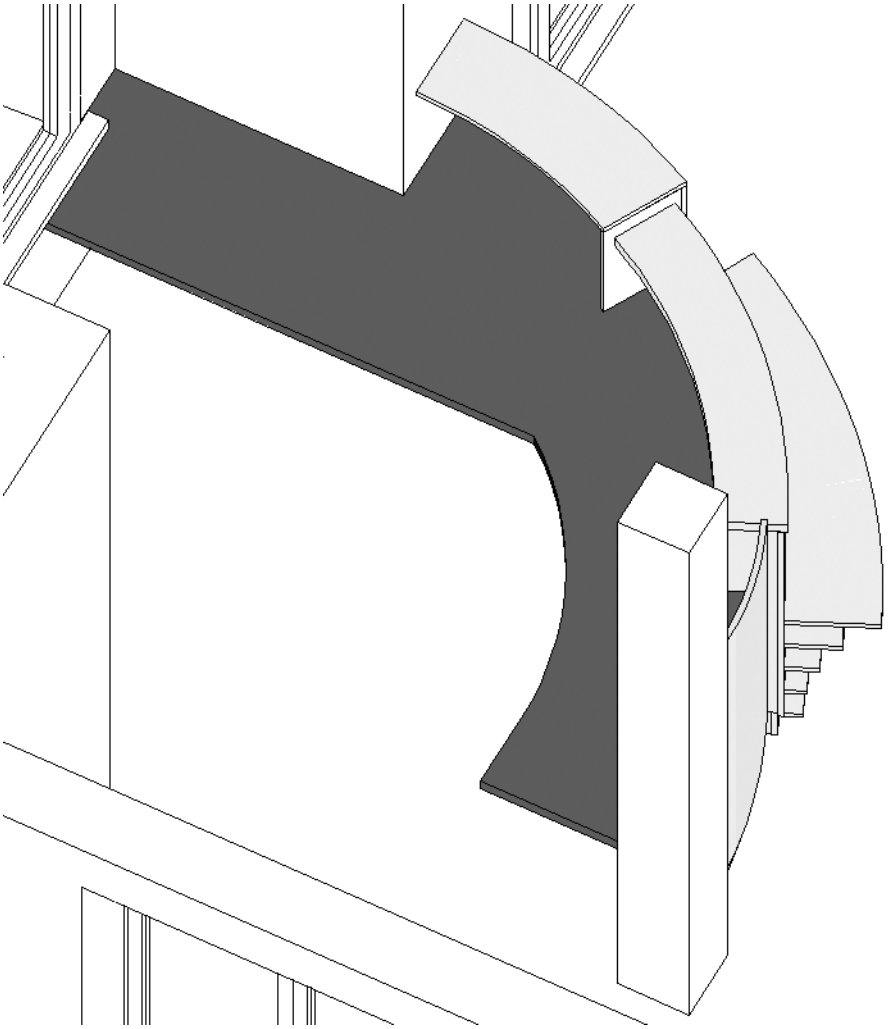


The counter should now look like this:



2.4 Work Surface

In this chapter, we will design the work surface of the counter.



2.4.1 Create Class

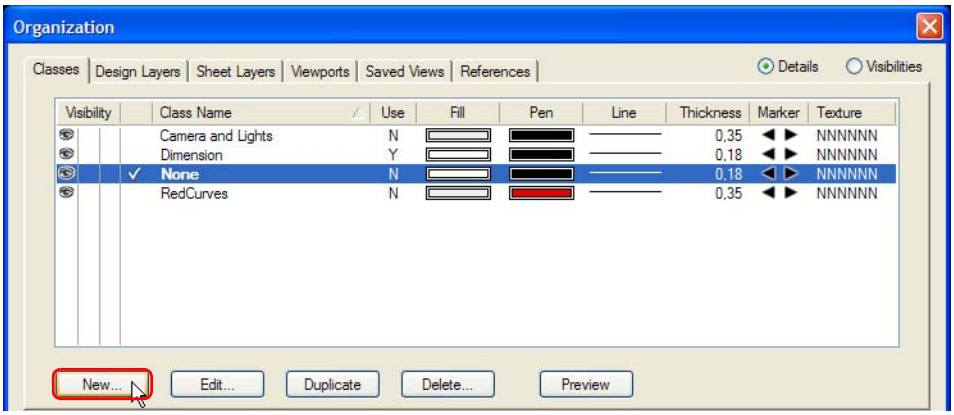
Before designing the basic geometry of the work surface, we create a class. Via this class, we can later access all objects of the basic geometry.

1 Click **Exit Group** to return to the main drawing.

2 Press **Ctrl+5** to return to **Top/Plan** view.

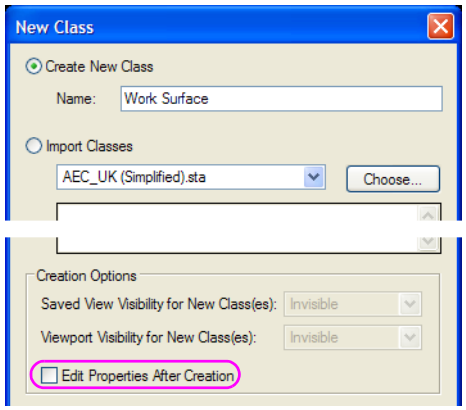
3 Right-click an empty space in the drawing and select **Classes...** from the contextual menu click the Classes shortcut in the View bar.

4 Click **New** in the following dialog.



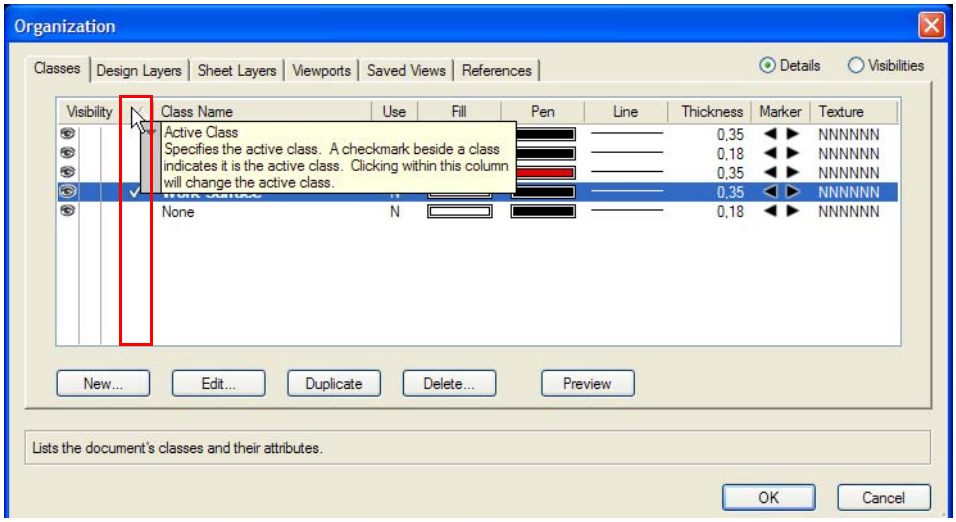
5 Name the new class **Work Surface**.

6 Uncheck Edit Properties After Creation in case it is checked. All other options of this dialog are unimportant.



We want to store the objects of the work surface's basic geometry in the Work Surface class, so we have to set it as the **active class**.

7 To do this, place the check in front of the class Work Surface in the list.



8 Click OK to confirm.

2.4.2 Draw Contour Section

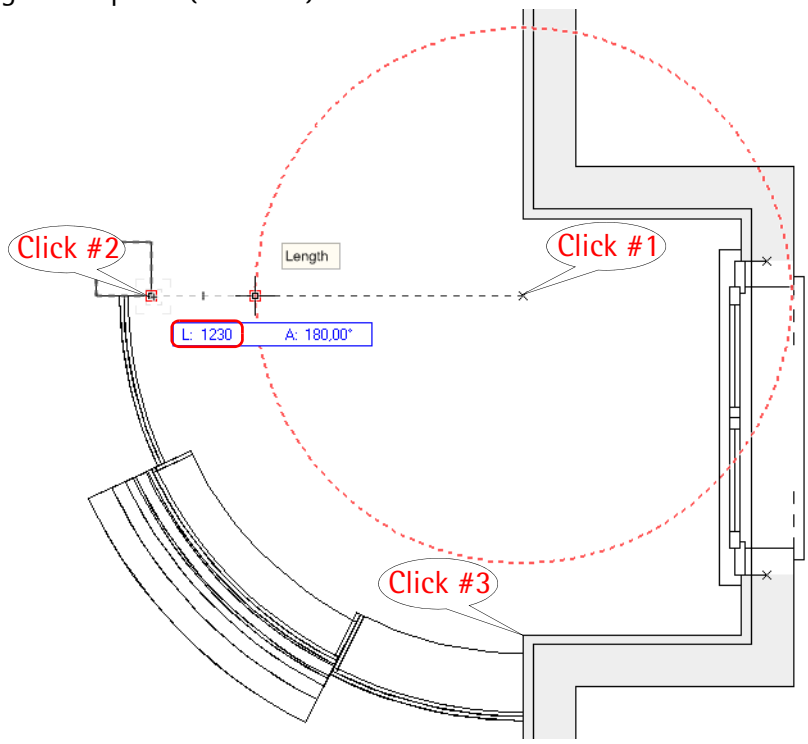
In this chapter, we will create the separate parts of the work surface contour in several short steps. Afterwards, we combine it into a continuous surface.

1 Select the **Arc** tool and select **Arc by Radius Mode** .

2 Start the arc at the 2D locus (**Click #1**).

3 Set the radius to **1230** mm in the **L** box.

4 Stretch the arc between the bottom edge of the column (**Click #2**) and the bottom part of the right side panel (**Click #3**).



Notes:

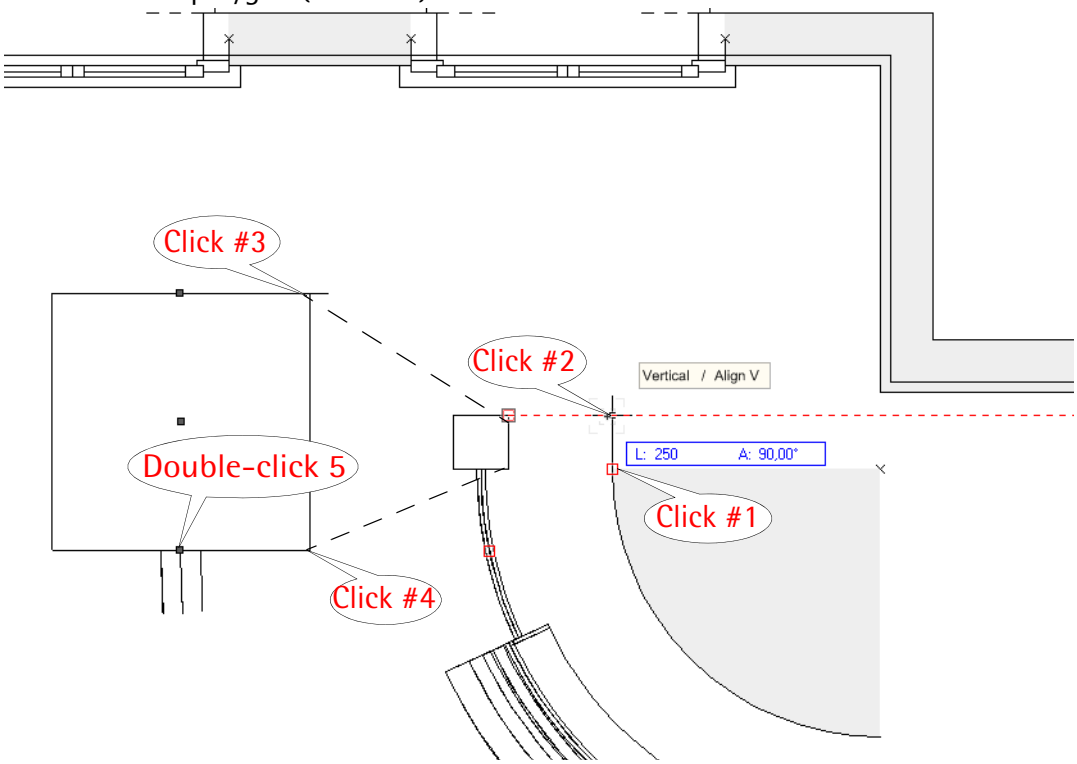
The next section of the contours starts at the arc.

1 Select the **2D Polygon** tool and start a polygon at the top left vertex of the arc (**Click #1**).

2 Move the cursor onto the **top right corner of the column** and then back to the right. Click when the message 90° / Align 0° is displayed (**Click #2**).

3 Draw the next line from there to the **top right** corner of the column (**Click #3**) and another line along the right edge of the column (**Click #4**).

4 The last line of the polygon ends at the **inner edge** of the **front scribe**. **Double-click** (!) there to finish the polygon (**Click #5**).



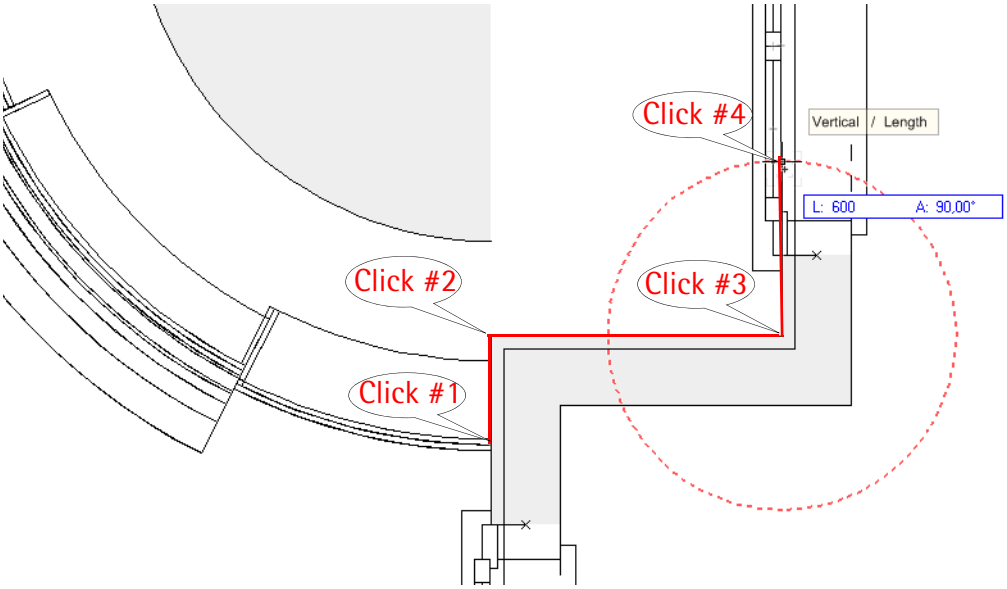
Notes:

The basic form of the work surface adjoining the window is also first drawn as a polygon.

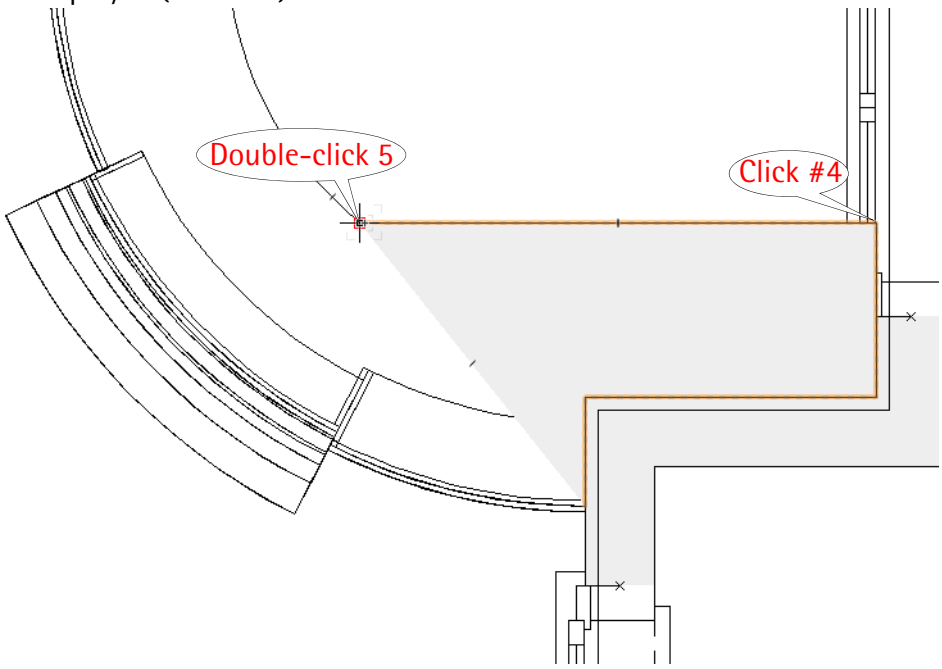
1 Start the polygon at the **inner edge** of the **right front scribe** (**Click #1**).

2 Draw the first two lines along the wall (**Click #2, 3**).

3 The third line starts at the inner corner of the wall and runs **600 mm** upwards at an angle of **90°** (**Enter value and Click #4**).



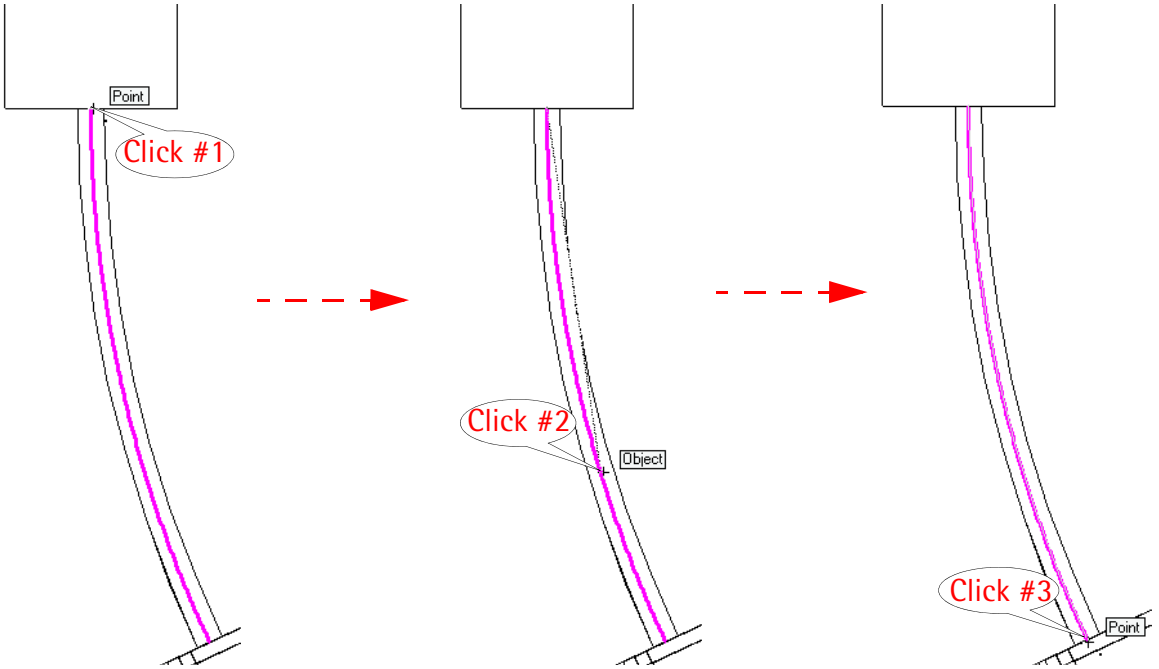
4 Move the cursor in the direction of the arc and **double-click** when the cue **Object / Horizontal** is displayed (**Click #5**).



For the front edge of the work surface, we trace the **inner edges** of the front scribes.

1 Select the **Arc** tool and **Three Points Mode**.

2 Trace the arc by clicking the beginning (**Click #1**), any place along the line (**Click #2**) and the end (**Click #3**).



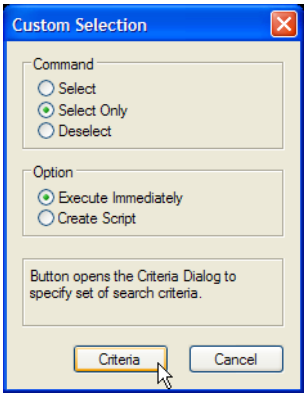
3 Repeat for the remaining two front scribes. Make sure to trace the **inner edges** of the front scribes.

Notes:

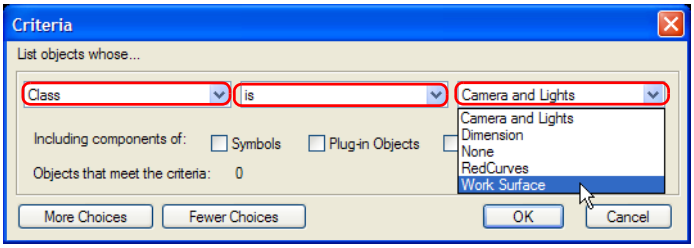
2.4.3 Work Surface - Basic Shape

For further use, we group the contours created in the previous chapter and work inside this group.

1 Choose **Tool > Custom Selection... Make sure that Select Only and Execute Immediately** are selected. Then click **Criteria** to proceed.



2 Make all changes as shown below to select all objects that are in the class Work Surface and click OK.



The Object Info palette shows that **6 Objects** are selected.

3 Press **Ctrl+G** to group the objects.

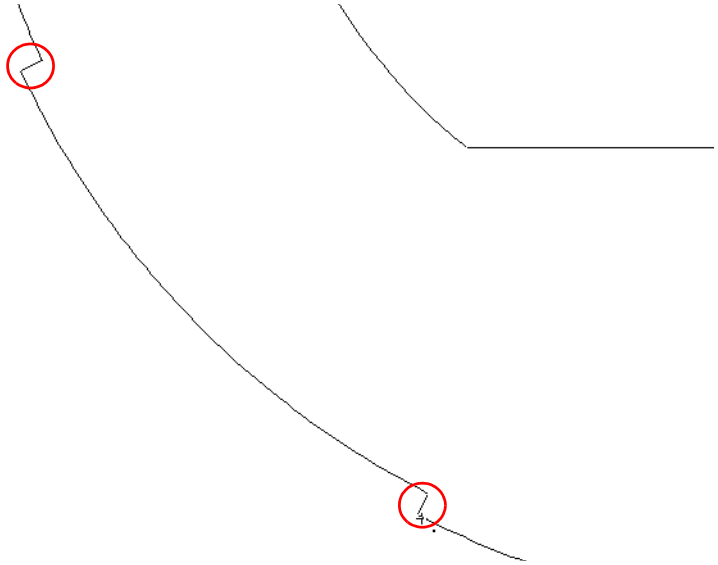
4 Press X to change back to **2D Selection** and **double-click the group to work inside it.**

Notes:

Now we complete the contour with the missing line elements.

1 Select the three arcs at the front and press **Ctrl+B** to send them to the back.

2 Select the **Line** tool and connect the end vertices of the arcs.

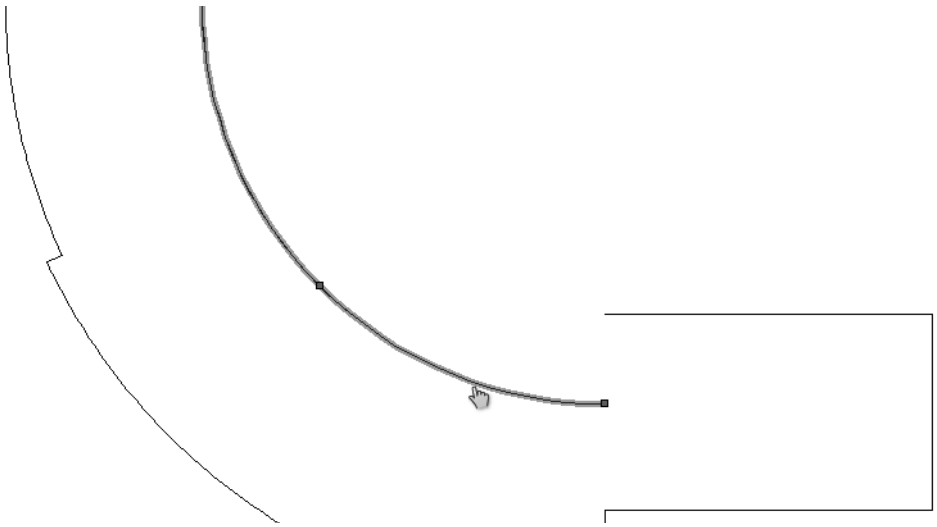


The smallest arc, which was drawn first, protrudes to the right, so it has to be shortened.

3 Select the inner arc and press **Ctrl+F** to send it to the front.

4 Select the **Trim** tool from the Basic palette.

5 Now click the end of the arc to be trimmed. Make sure to click the object edge, not the arc's surface.



2.4.4 Connect Individual Objects and Create Work Surface

Now we will combine all objects into one surface.

1 Press **Ctrl+A** to select all objects.

2 Choose **Modify > Compose**.

The individual objects are composed into a polyline.

3 Press **Ctrl+E** to give the polyline an extrusion of **38** mm.

4 Press **Ctrl+Alt+M** and set the **Z Offset** to **730** mm.

5 Click Exit Group.

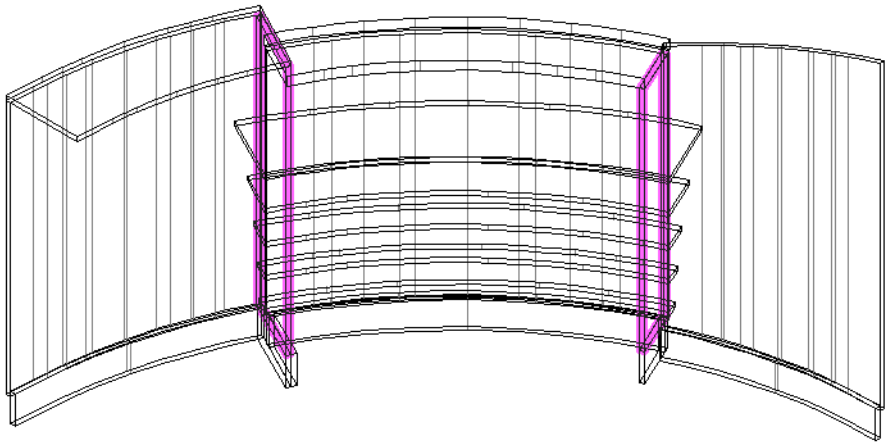
2.4.5 Cut the Work Surface

In the last step, two gaps for the connections have to be cut into the work surface. We copy the side panels into the work surface group.

1 Double-click the front ledge to access the group containing the front scribes.

2 Change to **Right Rear Isometric** view.

3 Select the right and left side panels.



4 Press **Ctrl+C** to copy them to the clipboard.

5 Exit the group and double-click the edge of the work surface to access the other group.

6 Press **Ctrl+Alt+V** to paste the elements from the clipboard into the group.

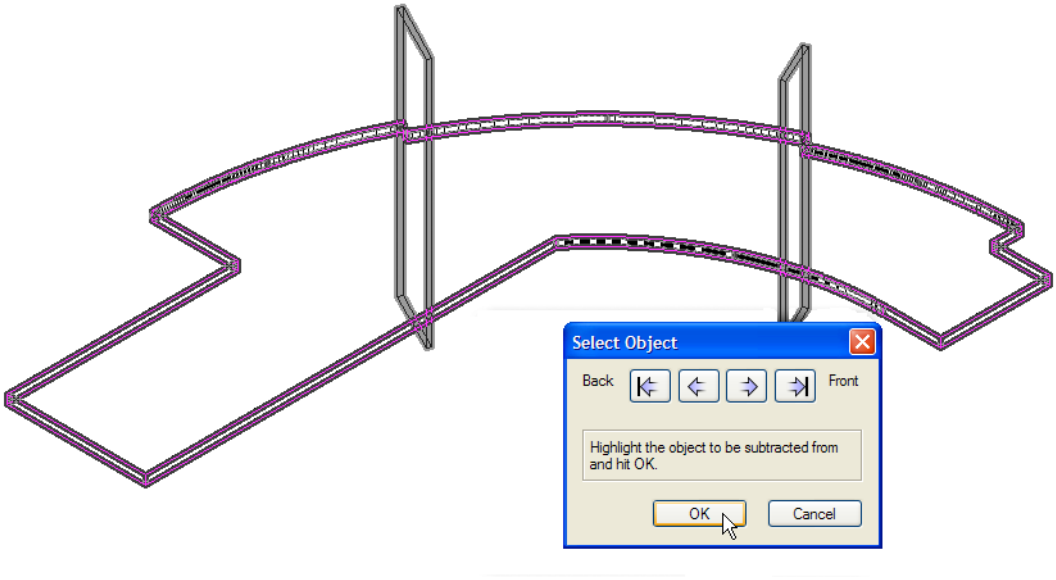
■ The command Paste in Place (Ctrl+Alt+V) pastes the elements from the clipboard to the same coordinates as the original elements. ■

7 Press **Ctrl+A** to select the three objects.

8 Choose **Model** > **Subtract Solids**.

9 Make sure that the work surface is marked in red.

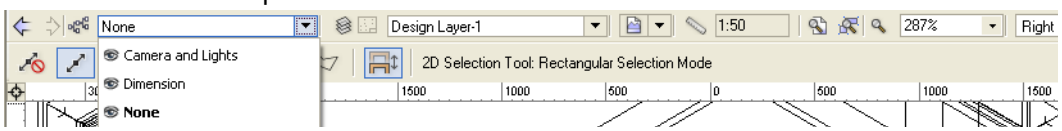
10 Click OK to confirm.



11 Click Exit Group to return to the main drawing.

After finishing the work surface, we can now reset the active class to **None**. You can do this either as described as in chapter 2.4.1 or via the pull-down menu on the View bar.

12 Select **None** from the pull-down menu as active class.



13 If you have not already done so, you should press **Ctrl+S** now to save your drawing.

Notes:

3 Visualization

The counter design is now completed. The following part of the course deals with visualizing the counter and creating effective presentations.

The end result of this chapter should look like this:

In this chapter, you will become acquainted with the following tools and features:

- Pasting objects via the Resource Browser
- Creating Sheet Layers
- Creating Viewports
- Inserting Renderworks Camera
- Using the Light Tool
- Converting objects to Line and Area Lights

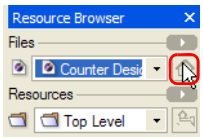
3.1 Add Props

Before visualizing our counter, we will add some props to the drawing: a chair, a screen, and lamps.

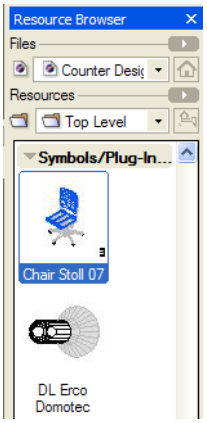
3.1.1 Insert Chair

1 Press **Ctrl+5** to change to **Top/Plan** view.

2 Make sure that the resources of the file Counter Design are displayed.

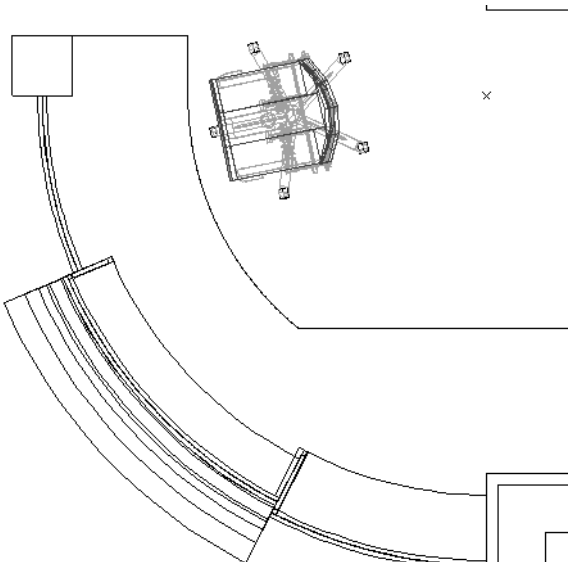


3 **Double-click** the symbol **Chair Stoll 07** in the category Symbols/Plug-in Objects.



The contours of the chair are now displayed in extension lines around the cursor.

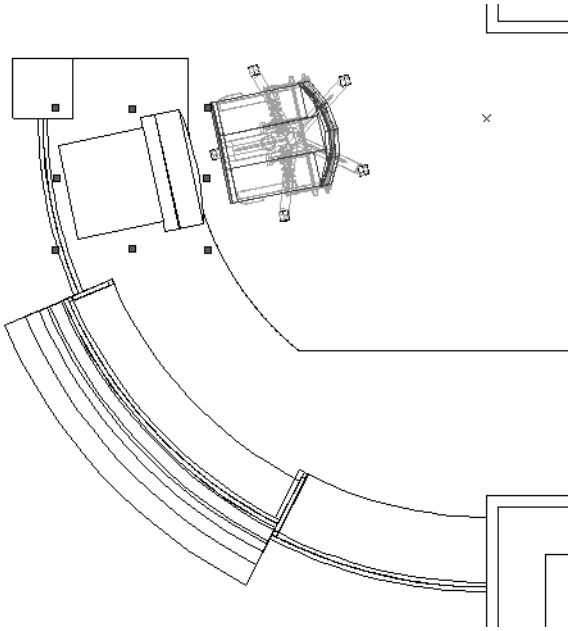
4 Insert the chair behind the counter as shown below. The first click defines the position, the second one the orientation of the chair.



3.1.2 Insert Screen

1 Double-click the object **Screen 04 19"** in the Resource Browser.

2 Insert the screen as shown below.



3 Change to **Left Isometric** view.

4 Make sure the screen is selected.

5 Press **Ctrl+Alt+M**, enter **730+38** mm in the **Z Offset** box and click OK to confirm.

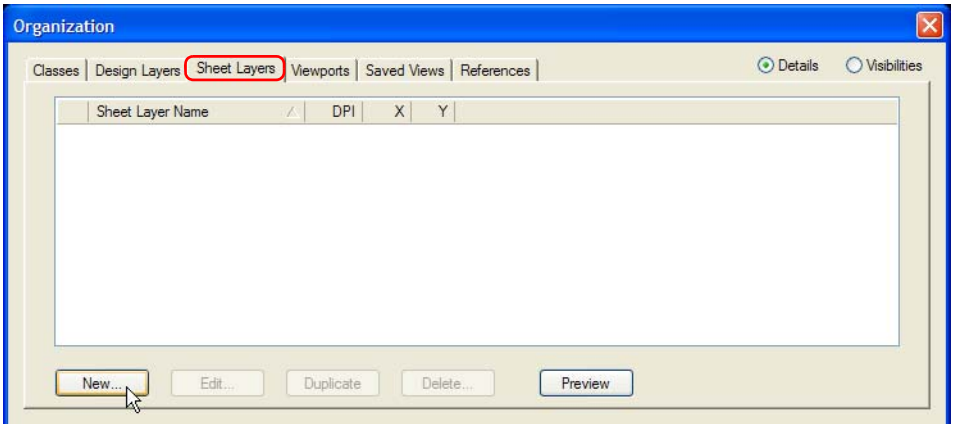
Notes:

3.2 Create Sheet Layer

In this chapter, we will arrange different views of our drawing on a sheet layer for printing.

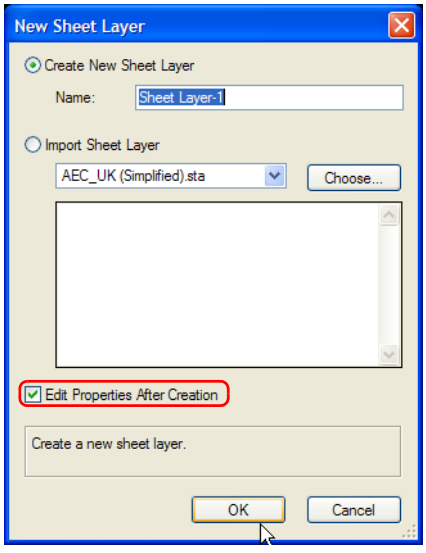
1 Right-click an empty space in the drawing and select **Layers...** from the contextual menu or click the Layers shortcut in the View bar.

2 Change to the **Sheet Layers** tab and click **New**.



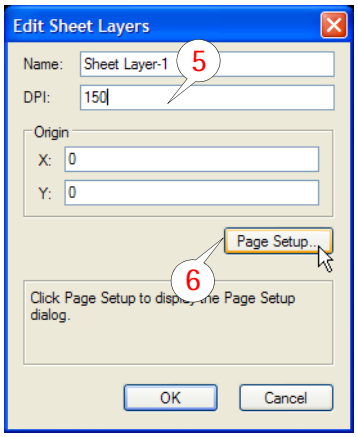
3 You can take over the default name, **Sheet Layer-1**.

4 Check **Edit Properties After Creation** and click OK to confirm.

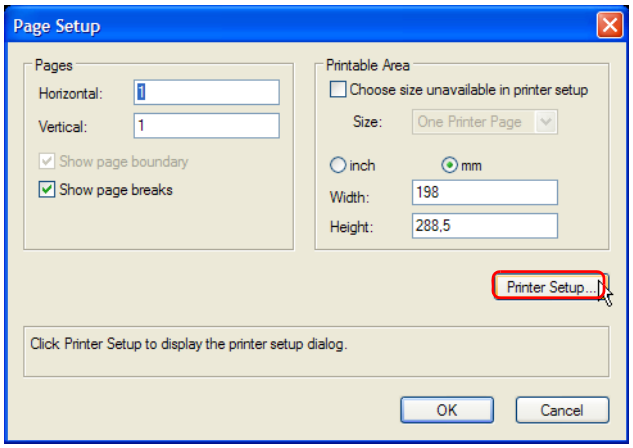


5 Enter **150** dots per inch in the **DPI** box.

6 Click **Page Setup...**.



7 In the **Page Setup** dialog, adjust all settings as shown below and then click **Printer Setup**.



8 In the Printer Setup dialog, choose the desired printer and set paper size and orientation to **A4** and **Portrait**.

9 Click OK to confirm in all open dialogs to return to the main drawing.

The drawing now shows a blank page.

Notes:

_____

_____

_____

_____

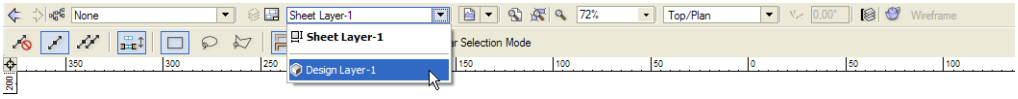
_____

3.3 Create Viewports

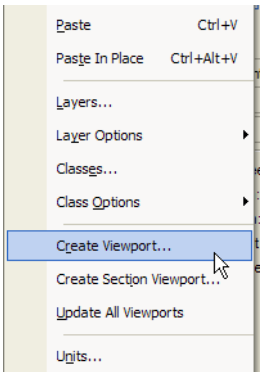
3.3.1 Floor Plan View

The currently displayed ("active") layer can be selected from a menu in the View bar.

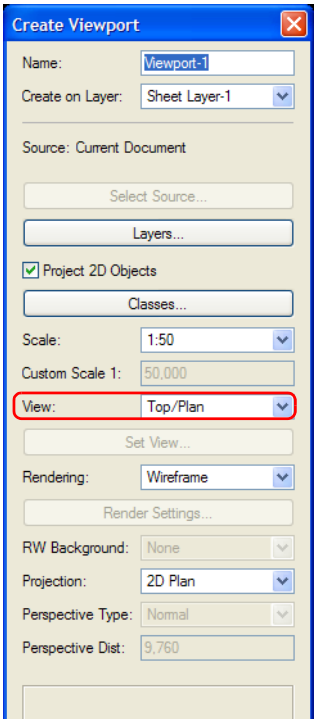
1 Use the box to change back to Design Layer-1.



2 Right-click an empty space in the drawing and select **Create Viewport...** from the contextual menu.

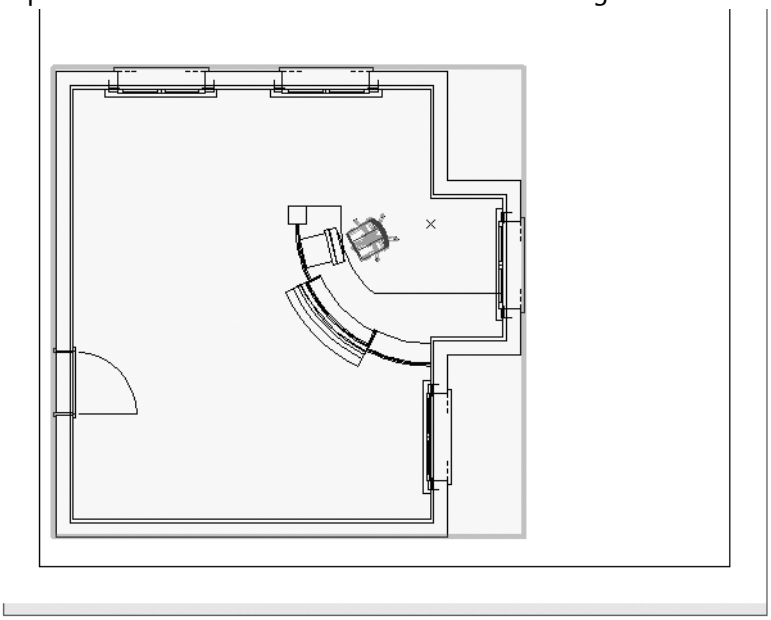


3 Set View to **Top/Plan**. Check the other settings as well.

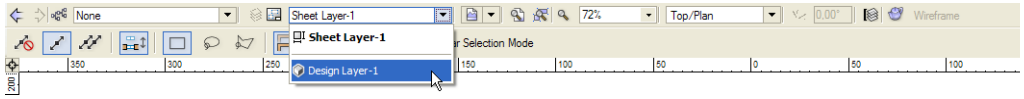


Click **OK** to confirm. Vectorworks inserts the viewport on the sheet layer.

4 Move the viewport to the bottom left corner of the drawing.



5 Open the Layer menu on the View bar to return to Design Layer-1.



Notes:

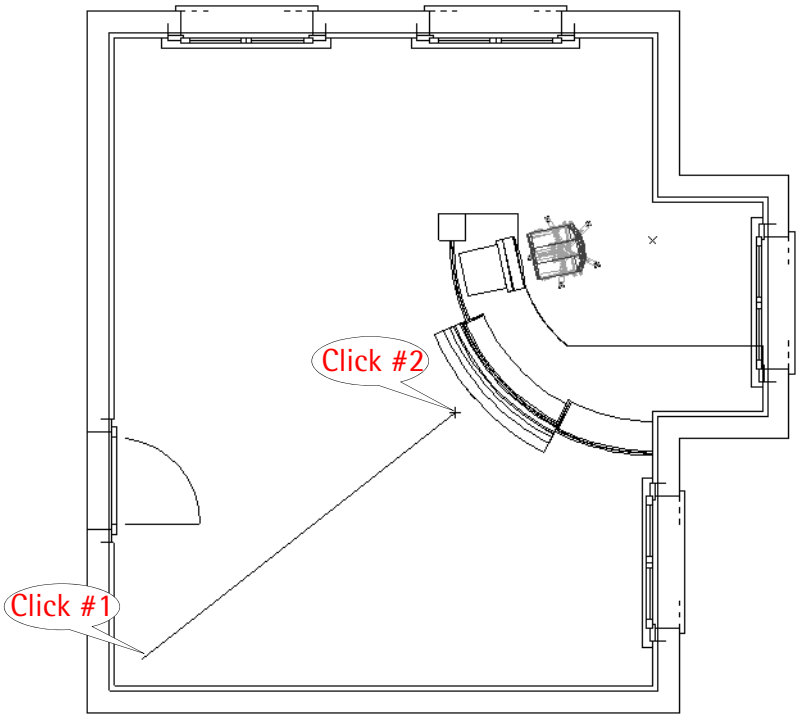
3.3.2 Perspective View

Next, we want to insert a perspective view of the room into the sheet layer. In addition to the command **Set 3D View**, you can also use the **Renderworks Camera** tool to create perspective view.

1 Press **Ctrl+5** to change to Top/Plan.

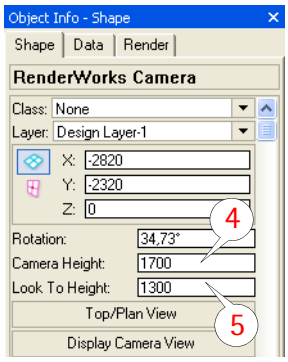
2 Select the **Renderworks Camera** from the **Visualization** tool set.

3 As shown below, click once to define the camera's position (**Click #1**) and a second time to define its orientation (**Click #2**).



4 In the pop-up dialog, change **Camera Height** to **1700** mm.

5 **Look To Height** should be **1300** mm.

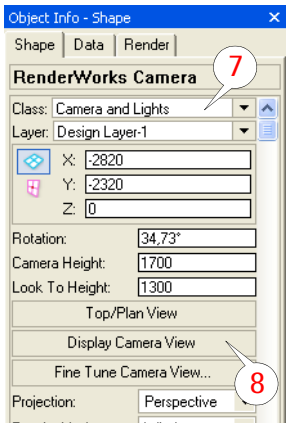


6 Click OK to confirm.

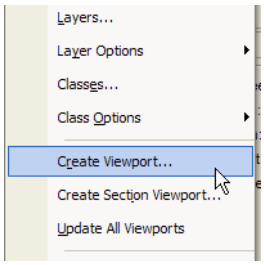
We assign the camera to one of the classes so we will later be able to hide it in the floor plan view.

7 Change the camera's classes to **Camera and Lights** in the **Object Info palette** (!).

8 Click **Display Camera View** in the Object Info palette.

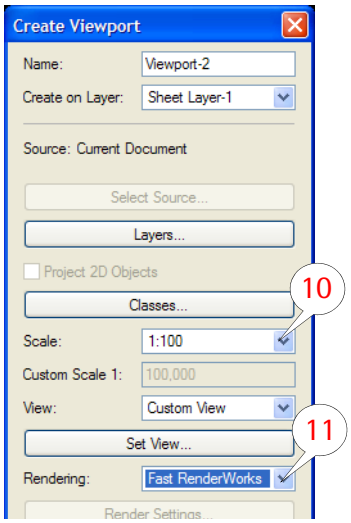


9 To place this view on the sheet layer, **right-click** an empty space in the drawing and select **Create Viewport...** from the contextual menu.



10 Change the Scale to **1:100** in the pop-up dialog.

11 Set **Rendering** to **Fast Renderworks**.

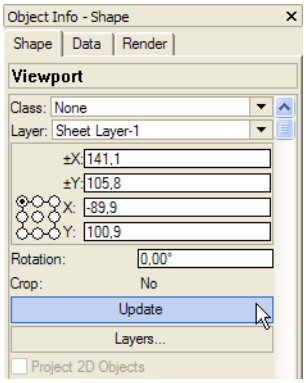


12 Click OK to confirm.

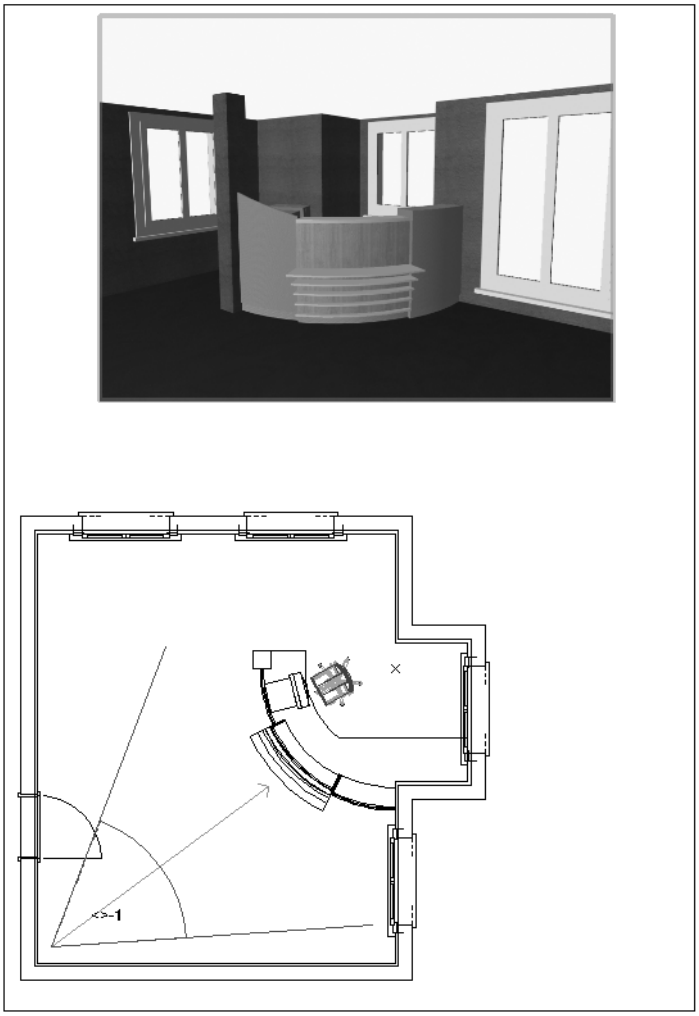
13 Move the viewport to the top half of the page.

The viewport is not rendered immediately. It has to be updated first.

14 Select the viewport and click **Update** in the Object Info palette.



Now the rendering is displayed on the sheet layer.

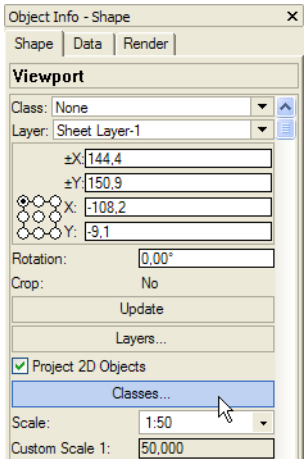


3.3.3 Change Class Visibilities

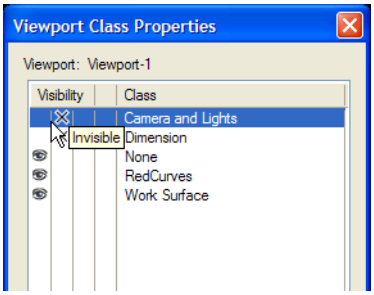
All changes you make in the design layer als o show up in the viewports. Since the camera is displayed in the floor plan view, we will now change the class visibilities to hide the camera in this view.

1 Select the floor plan view.

2 Click **Classes...** in the Object Info palette.

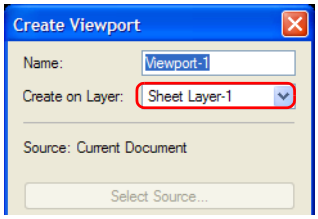


3 Set **Camera and Lights** to **Invisible** and click OK to confirm.



You can now create more sheet layers and place viewports on them as described.

When you create viewports, make sure that the correct sheet layer is selected in the dialog.



3.4 Lights

In the next step, we add lights to our drawing to make the rendering more realistic. Also, our room is still without a ceiling.

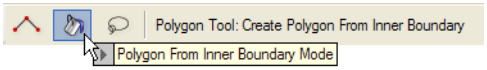
3.4.1 Draw Ceiling

1 Open the Layer menu in the View bar and return to **Design Layer-1**.

2 Make sure that the drawing is displayed in Top/Plan (**Ctrl+5**) view.

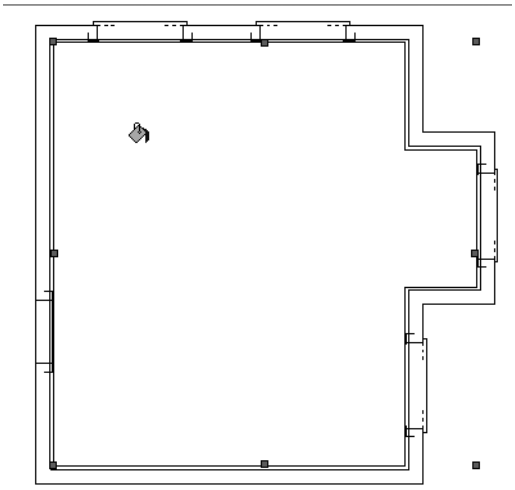
3 Select the **2D Polygon** tool.

4 Select **Polygon From Inner Boundary Mode** in the Tool bar.



5 Click any **empty** space inside the room.

The room's floor plan is created as a polygon.

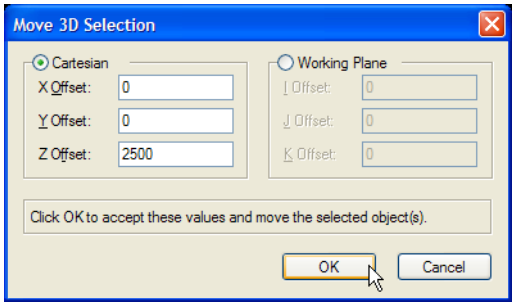


6 Press **X** to exit the polygon tool.

7 Press **Ctrl+E** to convert the polygon to an extrude. Set the extrusion to **50** mm.

8 Press **Ctrl+Alt+M** (**3D Move**).

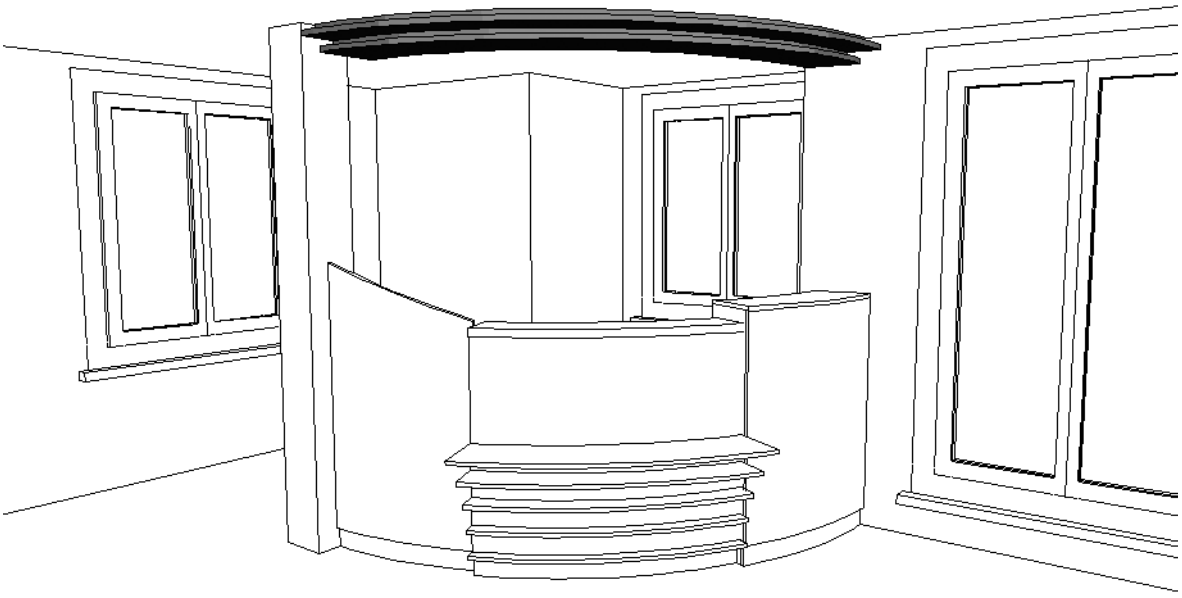
9 Set **Z Offset** to **2500** mm. Make sure that **X Offset** and **Y Offset** are set to **0** and click OK to confirm..



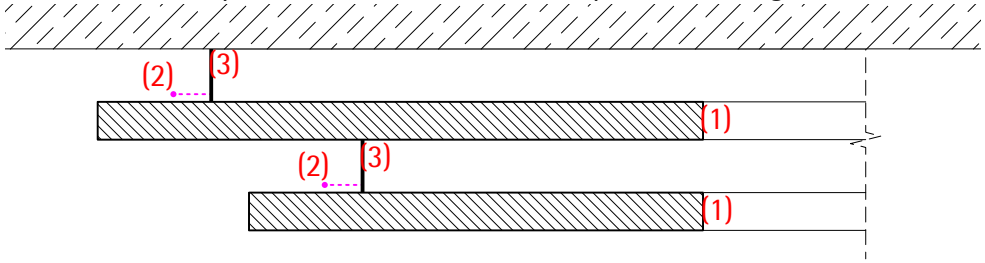
10 Finally assign the texture **Plaster 01 Mat** to the ceiling via the Resource Browser.

3.4.2 Create Ceiling Element

In the next step, we create a ceiling element with lights above the counter.



The element consists of two slats (1) which are lit from behind by line light objects (2). Two scribes (3) close off the space between the slats and up to the ceiling.

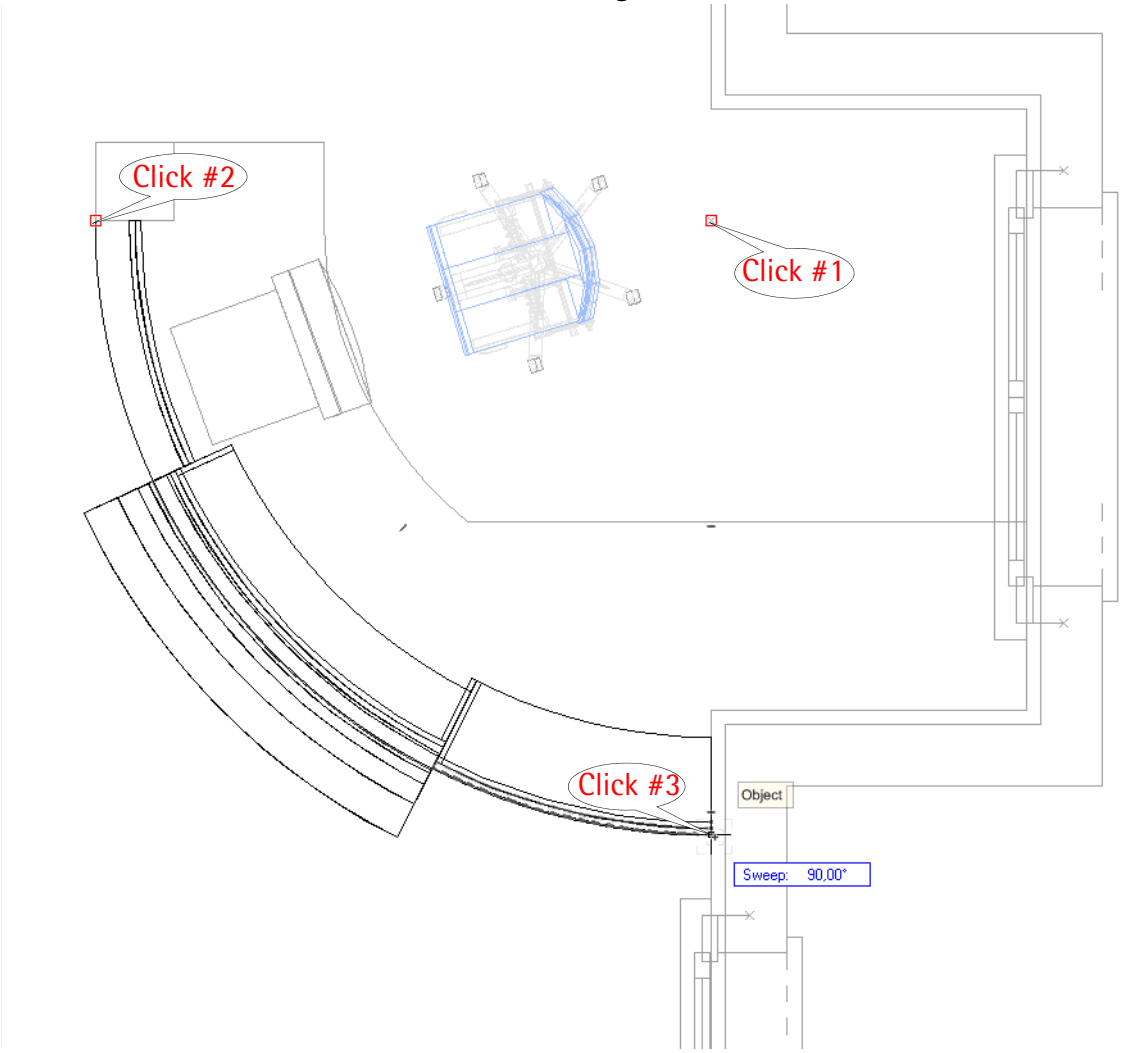


The base of the ceiling element is the quarter of a circle between the column and the right wall of the room.

1 Select the **Arc** tool.

2 Make sure that **Arc by Radius Mode** is selected.

3 Click the 2D locus created in chapter 2.1.1 (**Click #1**) and draw an arc from the **bottom left corner** of the column (**Click #2**) to the **right** wall (**Click #3**).



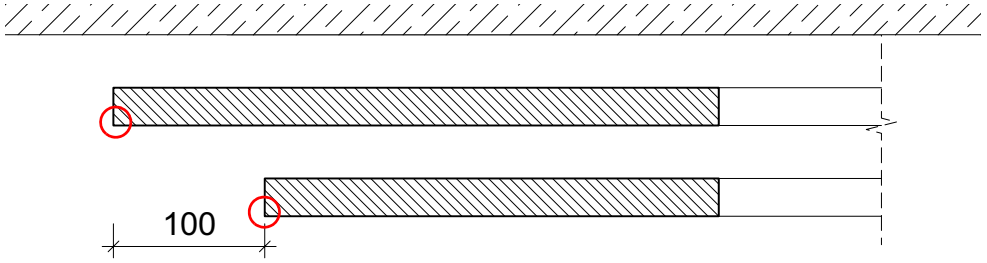
As in the chapters before, we use a group for more clarity.

1 Select the arc and press **Ctrl+G.**

2 **Double-click** the group to work inside it.

3 Press **Ctrl+Alt+N** to convert the arc to a NURBS curve.

The arc we just drew will become the front edge of the top slat. We need another arc for the bottom slat.

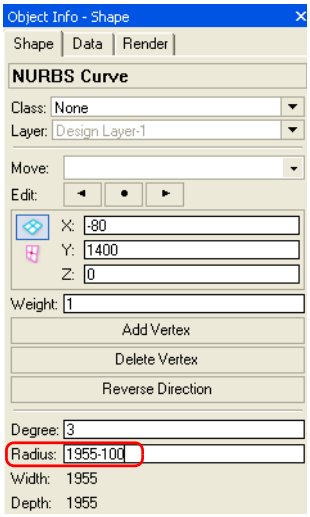


1 Press **Ctrl+C** to copy the arc to the clipboard.

■ We will need the arc in the clipboard later for the scribes between the slats and for the line lights. Make sure to copy nothing else to the clipboard until the end of this chapter. ■

2 Press **Ctrl+Alt+V** to paste in the NURBS curve as congruent duplicate.

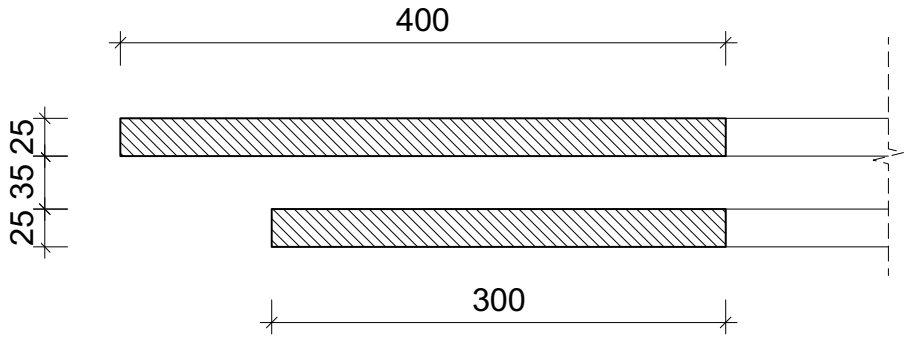
3 **Subtract 100** mm from the **Radius** in the Object Info palette.



Now two arcs should be visible.

Notes:

In the next step, we create the two slats as shells and move them into the right position relative to each other.



1 Change to **Right Isometric** view.

2 Press **Ctrl+Alt+U** to create a tapered extrude from the outer arc. Set the extrusion to **25** mm. Make sure that the **Taper Angle** is set to **0°**.

3 Select the **Shell Solid** tool from the **3D Modeling** tool set.

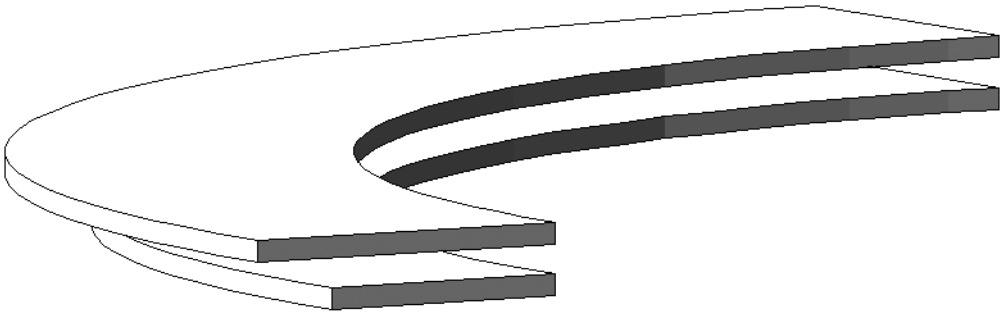
4 Select **Shell Solid Preferences** on the Tool bar. Set **Shell** to **Inside** and **Thickness** to **400** mm.

5 Select the **tapered extrude** just created and press **Enter** to confirm.

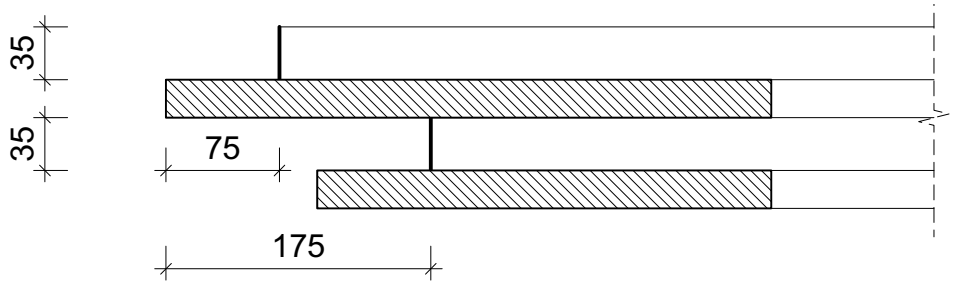
6 Press **Ctrl+Alt+M** to move the wider slat upwards by **25+35** mm.

7 Repeat steps 2 through 5 for the other arc to create the smaller slat. Enter a **Thickness** of **300** mm in **Shell Solid Preferences**.

The result should look like this:



Now we will create the two scribes in between as tapered extrudes and move them to the right positions relative to each other.



1 Press **Ctrl+Alt+V** to paste another copy of the original arc in place.

2 Use the **Object Info palette** to **subtract 75** mm from the **radius** of this curve.

3 Press **Ctrl+Alt+U** to create an extrude of **35** mm height.

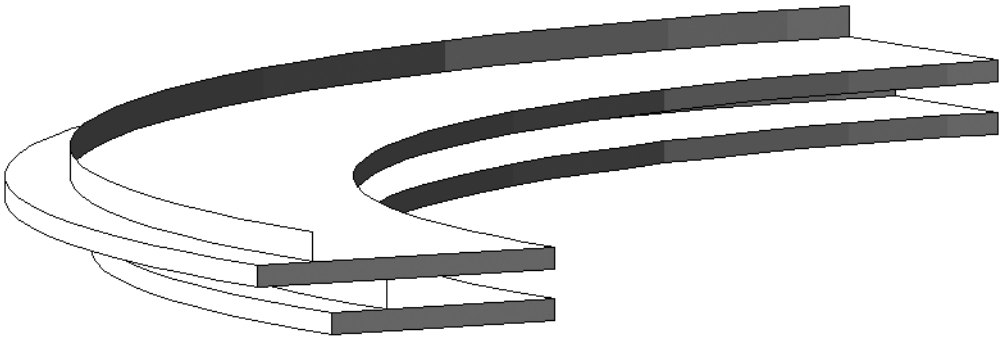
4 Press **Ctrl+Alt+M** to move the scribe upwards by **25+35+25** mm.

5 Press **Ctrl+Alt+V** to paste in another copy of the arc and **subtract 175** mm from the **radius**.

6 Press **Ctrl+Alt+U** to create an extrude of **35** mm height.

7 Press **Ctrl+Alt+M** to move the scribe upwards by **25** mm.

The result should look like this:



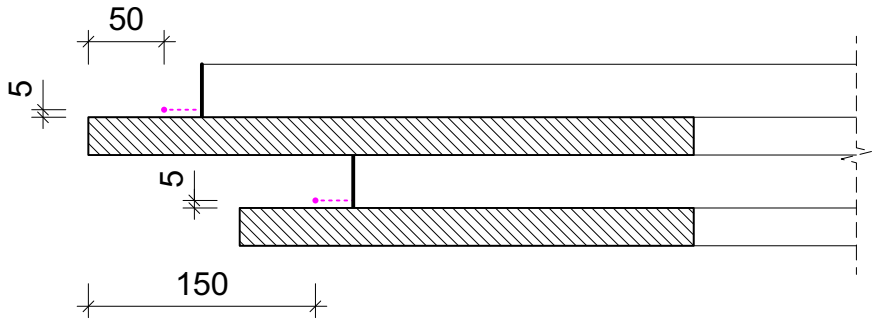
In the last step, we assign textures to the objects.

1 Press **Ctrl+A** to select all objects within the group.

2 Select the texture **Plaster 14 Mat** from the **Resource Browser** and **double-click** the objects to assign it to them.

3.4.3 Create Line Lights

Line lights are created from two more copies of the arc.



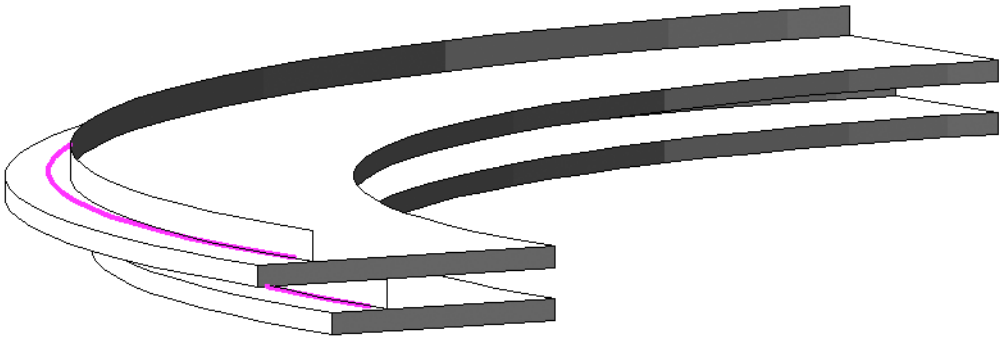
1 Press **Ctrl+Alt+V** to paste another copy of the arc in place and **subtract 50** mm from the **radius**.

2 Press **Ctrl+Alt+M** to move this NURBS curve upwards by **25+35+25+5** mm.

3 Paste in the final copy of the arc and **subtract 150** mm from the **radius**.

4 Move this NURBS curve upwards by **25+5** mm.

The result should look like this:

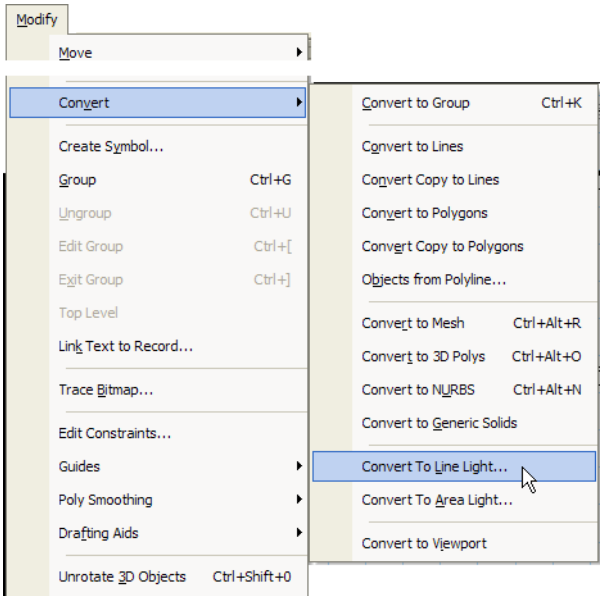


Notes:

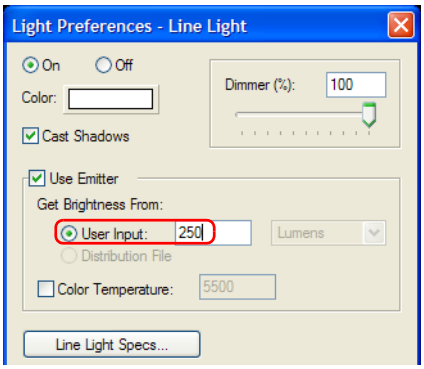
In the next step we convert the arcs pasted and edited in the previous chapter to line lights.

1 Select one of the NURBS curves.

2 Choose Modify >Convert >Convert to Line Light....



3 In the Light Preferences dialog, change **Brightness** to **250** Lumens and click **OK** to confirm.



4 Repeat with the same settings for the other NURBS curve.

All parts of the ceiling element were created on the ground layer by default. Now we move them upwards to the ceiling.

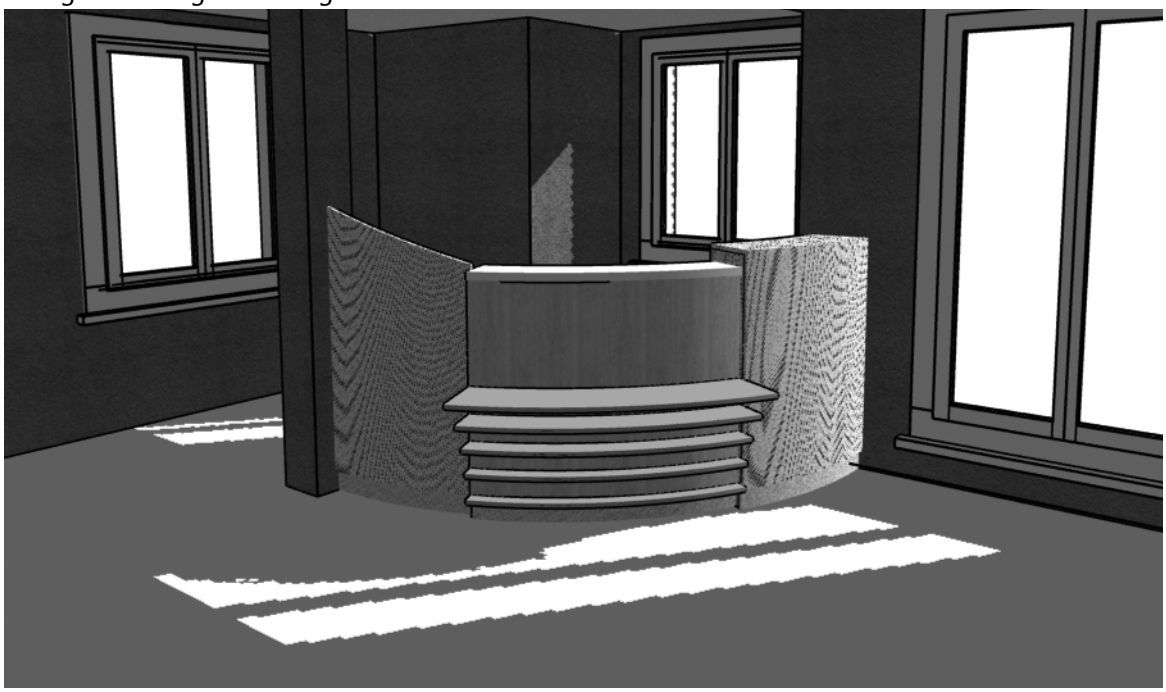
1 Press **Ctrl+A** to select all objects inside the group.

2 Press **Ctrl+Alt+M** to call **3D Move...**. Move the objects by **2500-35-25-35-25** mm on the Z axis to their final position beneath the ceiling.

3 Click **Exit Group** to return to the main drawing.

3.4.4 Insert Directional Light

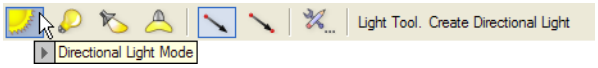
In the next step, we insert a directional light. This light is placed outside the room to simulate the light coming in through the windows.



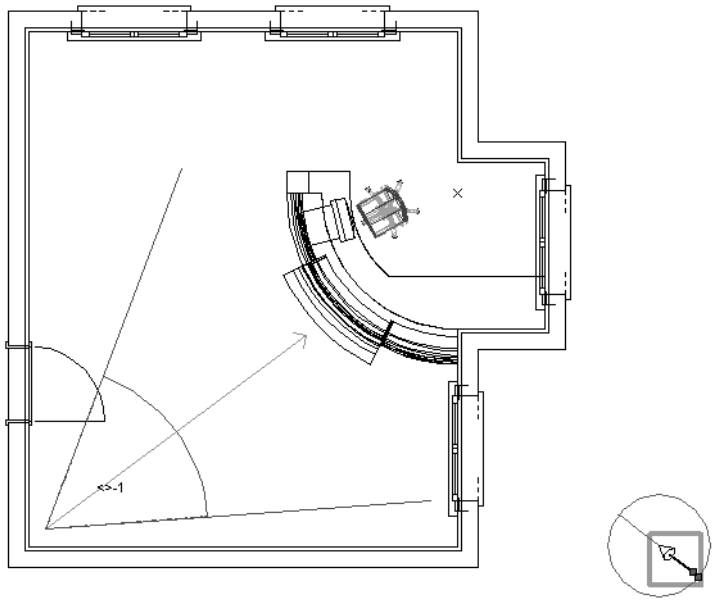
1 Press **Ctrl+5** to change to **Top/Plan** view.

2 Select the **Light Tool** from the **Visualization** tool set.

3 Select **Directional Light** on the Tool bar.

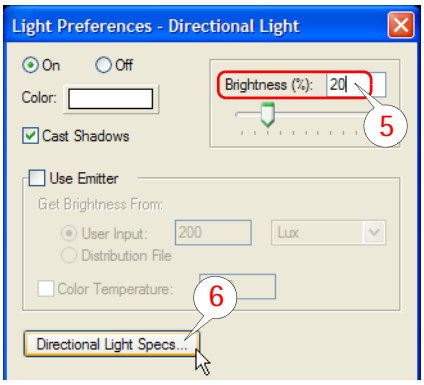


4 Place the directional light as shown below.

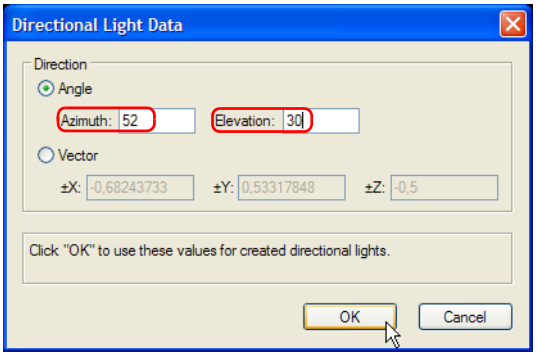


5 In the pop-up dialog, set **Brightness** to **20** %.

6 Click **Directional Light Specs....**

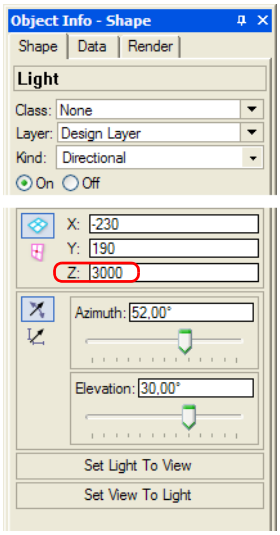


7 Set **Azimuth** to **52** degrees and **Elevation** to **30** degrees.



8 Click OK to confirm in both dialogs.

9 Change the **Z** position of the light to **3000** mm in the Object Info palette.

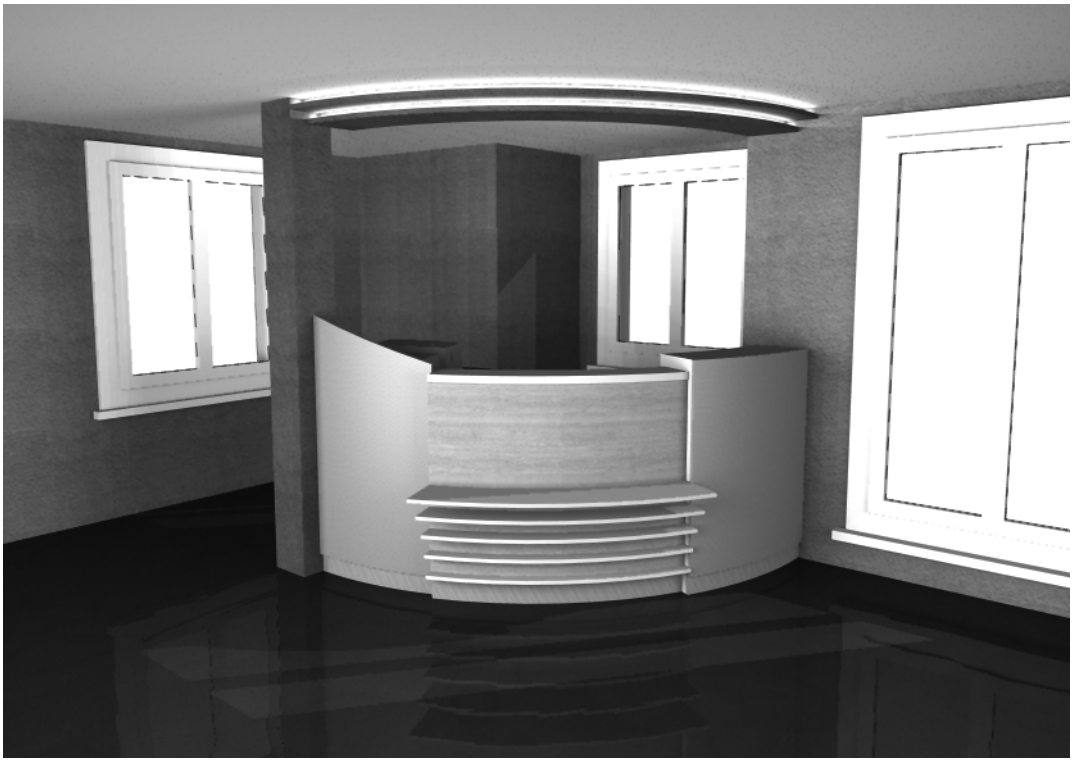


10 Press **Ctrl+5** to return to Top/Plan view.

■ You can now look at the intermediate result. Select the Camera tool and click Display Camera View in the Object Info palette. Then select Fast Renderworks with Shadows from the View > Rendering and change back to Top/Plan view. ■

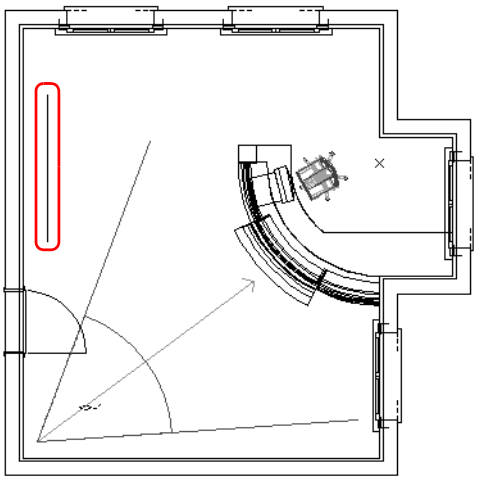
3.4.5 Add Area Light

Even though there is directional light coming through the windows, the room still seems too dark. In this part of the course, we will add two area lights to the left and the right area of the room.



1 Select the **Line** tool.

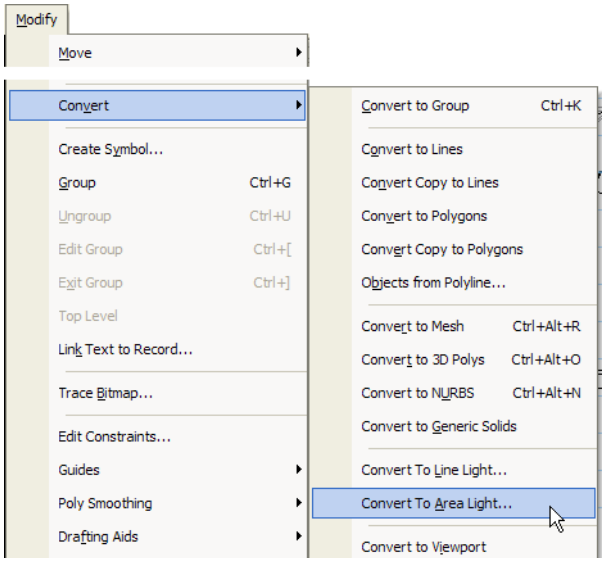
2 As shown below, draw a **2000** mm long line running **parallel** to the **left** wall.



3 Press **Ctrl+E** to create an extrude with a height of **1000** mm from the line.

4 Press **Ctrl+Alt+M** to move the extrude upwards by **900** mm.

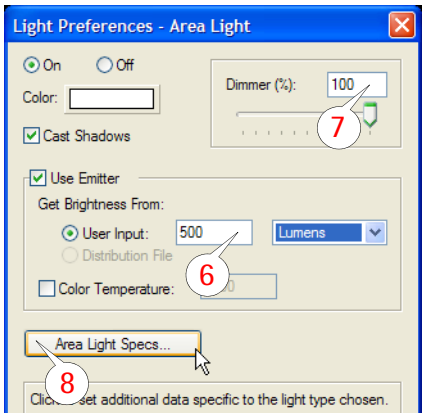
5 Choose **Modify > Convert > Convert to Area Light...**



6 In the pop-up dialog, set **Brightness** to **500** Lumens.

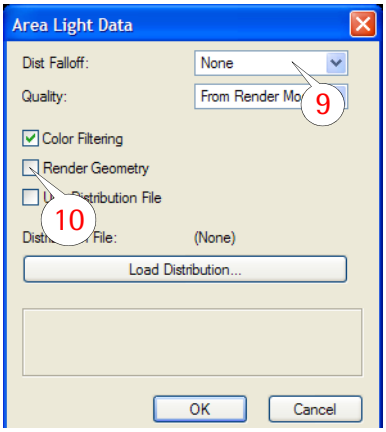
7 Make sure that **Dimmer** is set to **100**%.

8 Click **Area Light Specs...**.



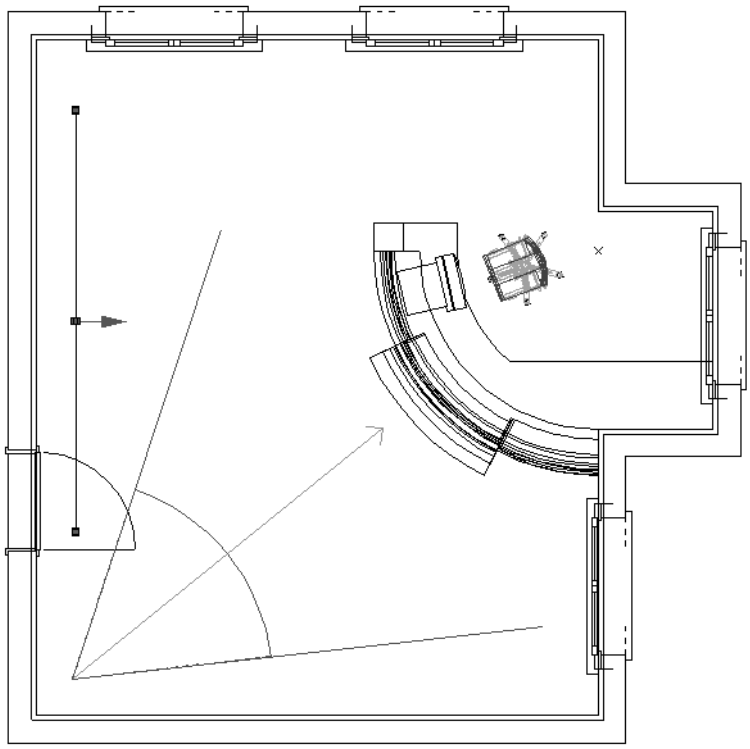
9 Set **Dist Falloff** to **None**.

10 Uncheck **Render Geometry**.



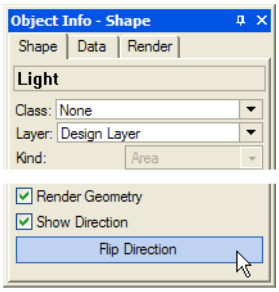
11 Click OK to confirm both dialogs.

The area is converted to an area light. A red arrow indicates in which direction the light falls.



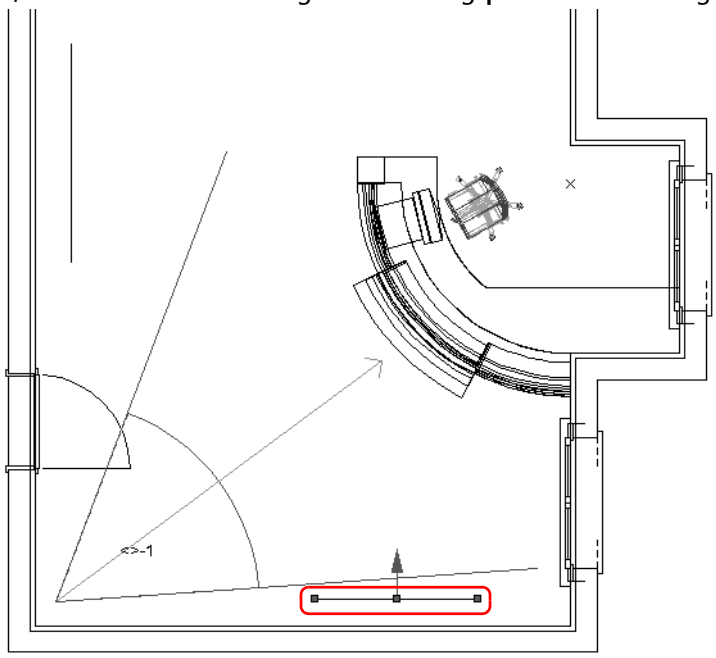
■ The red arrow and the modification points are only displayed if the 2D Selection tool (shortcut **X**) is set to Single Object Interactive Scaling Mode . ■

12 Make sure that the arrow points to the right. If this is not the case, click the button **Flip Direction** in the Object Info palette. (You may have to scroll down in the palette to find it.)



The second area light is created in the same way.

1 As shown below, draw a **1500** mm long line running **parallel** to the right wall.



2 Press **Ctrl+E** to create an extrude of **1000** mm height from the line. Press **Ctrl+Alt+M** to move the extrude upwards by **900** mm.

3 Choose **Modify** > **Convert** > **Convert to Area Light...** to convert the extrude to an area light.

4 In the Light Preferences - Area Light dialog, set **Brightness** to **200** Lumens and **Dist Falloff** to **None**.

5 Click OK to confirm.

6 Click **Flip Direction** in the Object Info palette to make sure that the red arrow points towards the counter.

Notes:

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3.4.6 Add Lamps

Next, we will add two lamps above the counter.

First we will create an arc to help us place the lamps.

1 Select the **Arc** tool.

2 Make sure that **Arc by Radius Mode** is active.

3 Click the 2D locus drawn in chapter 2.1.1.

4 Press TAB to change to the **L** input box and enter **1400** mm.

5 Press TAB again, enter **180** degrees in the **A** box and press Enter to confirm.

6 Click into the drawing.

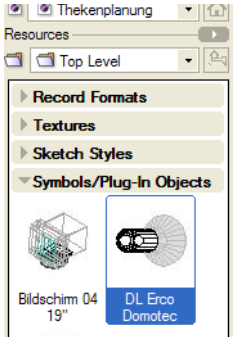
7 Drag the cursor down and to the right without clicking.

8 Press TAB again, set the **Angle** to **80** degrees and press Enter to confirm.

9 Click into the drawing again.

Now the lamps can be placed.

1 Select the symbol **DL Erco Domotec** from the resource type Symbols/Plug-in Objects in the Resource Browser and **double-click** it.

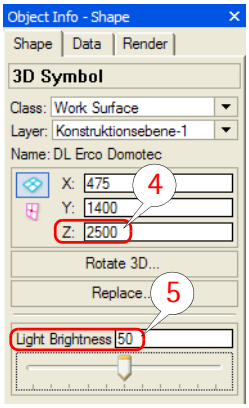


2 Move the mouse over the top vertex of the arc and **double-click** when the cue **Endpoint** is displayed.

3 Change to **Left** view.

4 Make sure that the lamp symbol you just inserted is selected. In the Object Info palette, set the **Z** value to **2500** mm.

5 Change the **Light Brightness** setting to **50**% and press Enter to confirm.

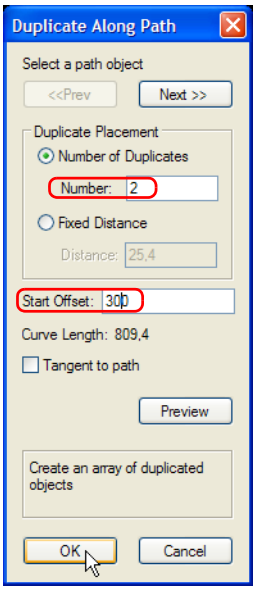


6 Press **Ctrl+5** to change to **Top/Plan** view.

7 Select the arc and the lamp.

8 Choose **Edit** > **Duplicate Along Path.**

9 Adjust the settings in the pop-up dialog as shown below:



10 Click **OK** to confirm.

11 **Double-click** the arc (path).

12 The **arc** and the first **lamp** can now be deleted.

13 Select the lamp above the screen and change the **Angle** to **-80** degrees in the Object Info palette.

14 Select the other lamp and set the angle to **150** degrees.

Notes:

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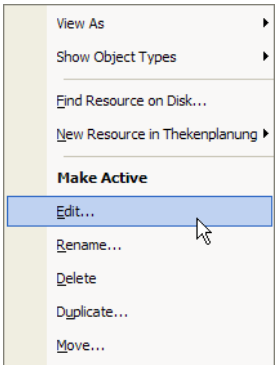
3.4.7 Visible Light Beam

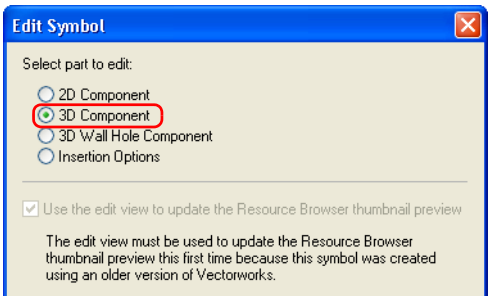
In the next step, we want to adjust the settings of both lamps so that their light beams become visible.

1 **Right-click** the symbol **DL Erco Domotec** in the **Resource Browser**.

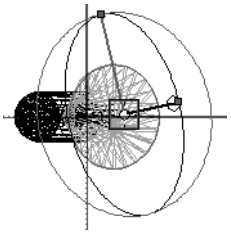
2 Select **Edit...** from the contextual menu.



3 In the following dialog, select **3D Component** and click **Edit** to confirm..

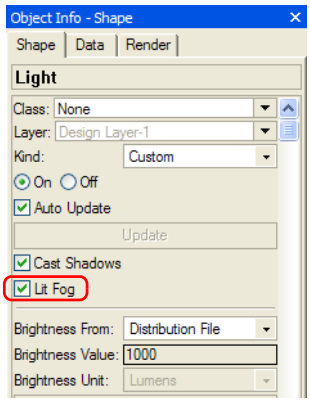


The symbol content is now displayed in the drawing.



4 Click one of the symbolic arrows to select the light.

5 Check Lit Fog in the Object Info palette.



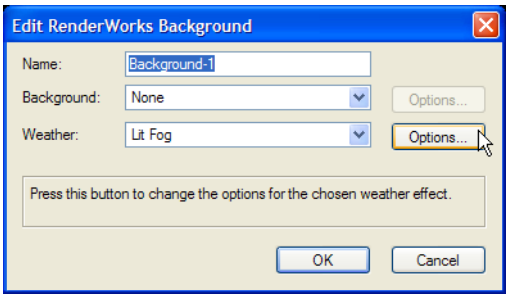
6 Click the **Exit Symbol** button to exit the symbol.

Additionally, we have to assign a Renderworks Background so that the effect will be visible.

1 Change to the category **Render Backgrounds** in the **Resource Browser**.

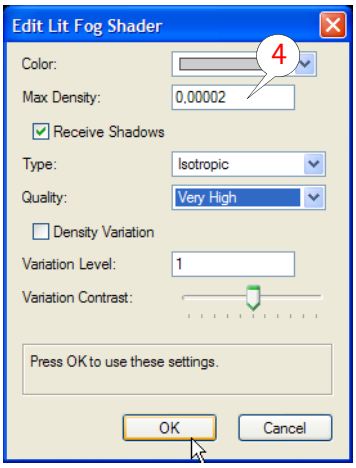
2 **Right-click** the background named **Background-1** and select **Edit...** from the contextual menu.

3 Set **Weather** to **Lit Fog** and click **Options...**.



4 Set **Max Density** to **0.00002**.

5 Adjust all other settings as shown below and click OK to confirm:



6 Double-click **Background-1** in the Resource Browser to assign it to the drawing.

If desired, you can now look at the result using the camera. We recommend using the setting **Custom Renderworks**.

■ The rendering takes longer than before because of the lights etc. How long a rendering will take depends on CPU performance, quantity of main memory available, contents of the selected drawing, and selected render mode. A newer computer should only take a few minutes; an older computer can take much longer than that. ■

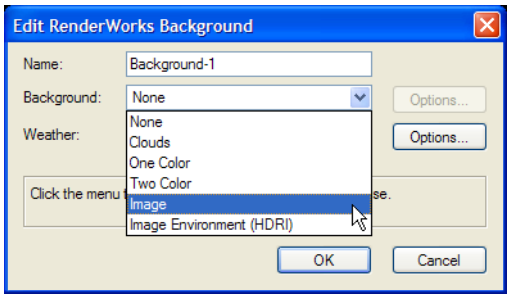
Notes:

3.5 Select Background Image

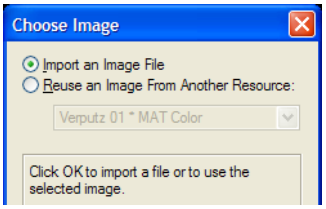
In the last step, we will add a background image to the drawing.

1 **Right-click Background-1** in the **Resource Browser** and select **Edit...** from the contextual menu.

2 Set **Background** to **Image**.

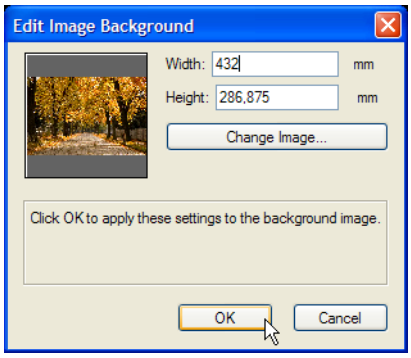


3 Select **Import an Image File** and click OK to confirm.



4 Change to the desktop and select **Counter Design Background.jpg**. (This file was unzipped along with the template.)

5 In the following dialogs, always click **OK** to confirm.



Vectorworks now puts this picture in the background during rendering and renders the drawing over it.

You can now change to the **sheet layer** and update the rendering.

1 Set the **viewport's** render mode to **Custom Renderworks** or the highest-quality (but also most performance-intensive) **Final Quality Renderworks**.

2 Backgrounds are assigned to viewports individually. Set RW Background for this viewport to **Background-1**.

3 Click **Update**.