



VECTORWORKS®

interiorcad

Vectorworks interiorcad – Production Realism

Tutorial Worktable

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Example by:
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Vectorworks is a product of Vectorworks, Inc.
interiorcad is a product of extragroup GmbH.

extragroup 

1 Production realism basics

Production realism? An equivalent to photorealism, production realism stands for a new type of furniture design.

You can construct your furniture parts like a workpiece, which lies on the CNC machine. On the CNC, the workpiece is milled, drilled, mitered and more. We have transferred this principle to the CAD. Edit your workpiece directly on the screen, just as you would on the CNC. You will benefit from all the advantages, that CAD planning provides today: You can plan directly in 3D - the result can always be checked and changed on the screen immediately. Then you are able to create renderings, cutting lists, calculations and CNC programs.

In Vectorworks interiorcad we call these workpieces «Custom Parts 3D». They are editable with the following tools:

- «Drilling 3D»
- «Hole line 3D»
- «Center Punch 3D»
- «Dado/Rabbet 3D»
- «Contour 3D»
- «Miter 3D»

These tools work in harmony with the other tools in Vectorworks interiorcad. Thus, for example, locuses or circles can be easily converted into holes or polygons in contours. In later chapters you'll see how this simplifies the construction considerably with practical examples.

In addition, there are tools for placing the fittings:

- «Simple Connector 3D» is used for the placement of wooden pins, screws, Invis connecting fittings
- «Connector 3D» is used for the placement of multipart housing / pin combinations
- «Hinge 3D» is used for fixing doors

These fitting tools can be used to place single or multiple connectors in a grid. You can adapt both, the actual hardware and the raster to your own needs.

Thus free-standing furniture can be planned – the planning of carcass furniture such as cabinets and shelves would be quite complex without any tools. There is an easy to use cabinet maker to set cabinet dimensions, layouts, pedestal / visor and bevels parametrically.

These cabinets can then be equipped flexibly with fittings, changed with the tools mentioned above and connected with Custom Parts 3D. For example this allows cutouts for cable, kitchenettes with countertops, or also computer-stand workstations – an example that has kindly been provided by Dominic Jahn from the Neuland GmbH in Eichenzell.

2 Objectives of this manual

In the following pages, we'll construct these computer workstations.



Therefore, we'll first place a cabinet with the new cabinet maker. Then we'll edit the cabinet by using drillings and contours to construct recesses for cables and the ventilation of the computer. We'll also place wooden pins in a self-created grid. After that, this cabinet can still be edited by using the cabinet maker. Vectorworks interiorcad helps you to refine your design ideas during the construction.

Then we'll construct the workstations around the cabinet. We'll work entirely in 3D and will use the tools described above in addition to classical Vectorworks interiorcad drawing tools such as lines, rectangles, circles, arcs, or mirrors. It follows the placement of embedded monitors. A challenge that we'll face together.

Then we create a bespoke 3D fitting to fix the cabinet back wall. A look at the cutting list (BOM) and the output in WoodWOP will complete the book.

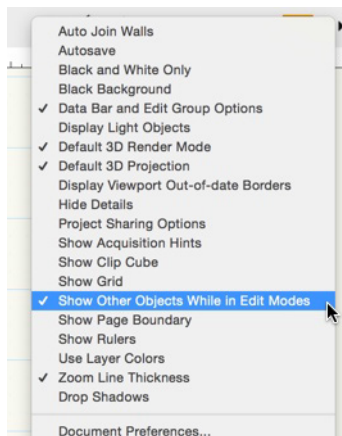
3 Set up the Vectorworks interiorcad environment

3.1 Vectorworks preferences

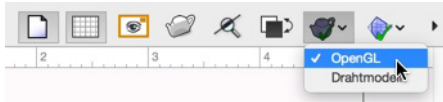
- When editing a group, the objects in the background are grayed out. To avoid accidentally snapping to these objects, disable the function «Show Other Objects While in Edit mode» to completely hide the room.



- If you cannot find the function on the top right of the drawing area, activate the Quick Preference by clicking on the small disclosure arrow to the right of the Quick Preferences bar.



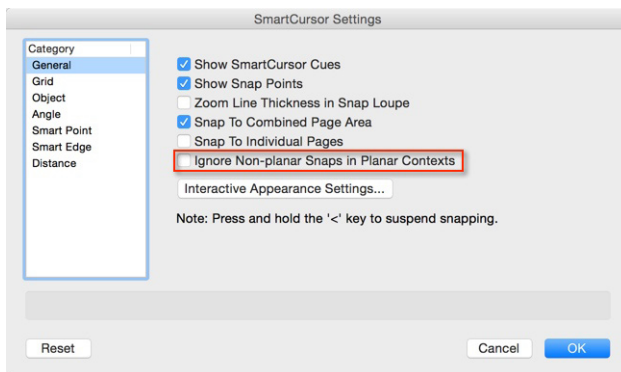
- Ensure that the Quick Preferences «Default 3D Render Mode» and «Show Grid» are also activated.
- The grid should be disabled and the default render mode should be switched to «Open GL».



- Double-click any button on the «Snapping» palette.



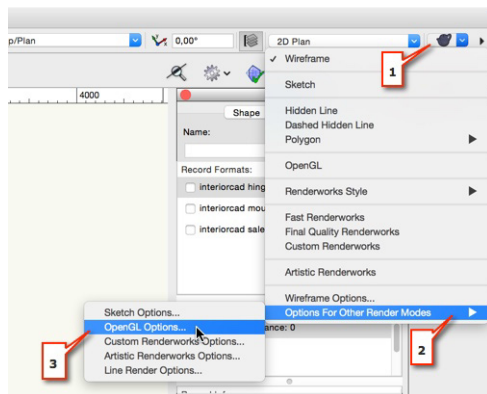
On the «General» tab, disable the «Ignore Non-planar Snaps in Planar Contexts» option and then click «OK» to close the dialogue box.



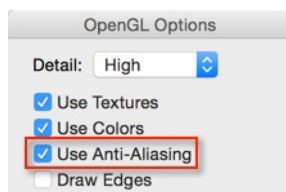
3.1.1 «OpenGL» Views

To ensure your «OpenGL» render looks the same as in our examples, enable the «Use anti-aliasing» option. Click the «View bar» on the «Render Modes» menu and open the

«OpenGL Options». If you haven't selected the «Open GL» view yet, you'll find these settings in the «Options For Other Render Modes» submenu.



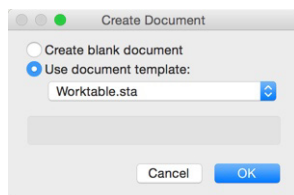
Check «Use Anti-Aliasing».



Now that all your settings are the same as ours, we'll start creating the cabinet.

3.2 Open document template

Please choose «File > New» and select the document template «Worktable.sta».

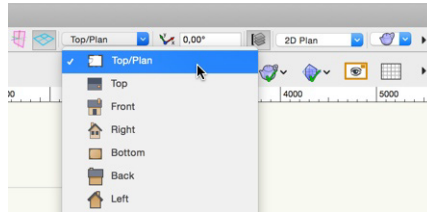


This template file contains a plan and a light set.

4 Design lower cabinet

First, we will design a lower cabinet for a computer.

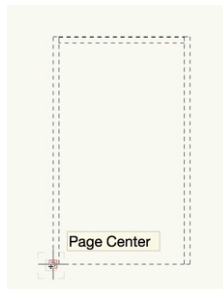
- In the «View bar», choose «Top/Plan» view.



- From the «interiorcad» tool set, choose the «Cabinet 3D» tool .

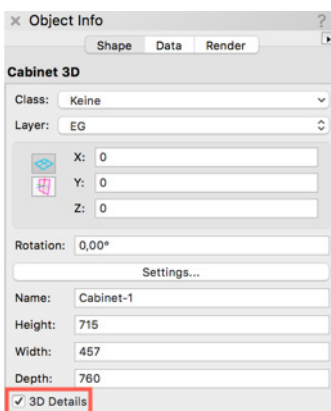


- Insert the cabinet - with two clicks - on the «Page Center». The first click determines the insertion point of the cabinet, the second click determines its rotation.

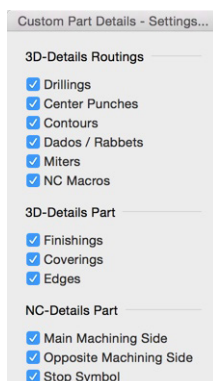


- Press «X» to activate the «Selection» tool.

- Enable the «3D Details» option in the Object Info palette.



- If the option «3D Details» is disabled, the view of the components is simplified so that edges, coverings, finishings and CNC machinings like drillings are not shown. This improves the mouse snapping and optimizes performance. Please enable the «3D Details» option. In «interiorcad > Custom Parts > Custom Part Details» you can define which 3D Details are shown. For the images in this book all options are enabled.

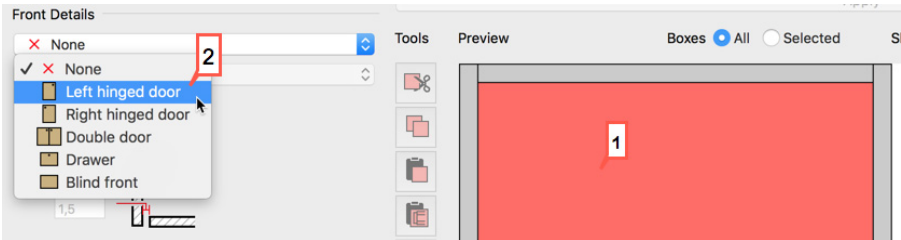


- Double-click the cabinet's edge to change its settings.
- Select the «Base» tab to change the general geometry of the cabinet. The height «715», the width «457» and the depth «760mm» should already be set by the template file.

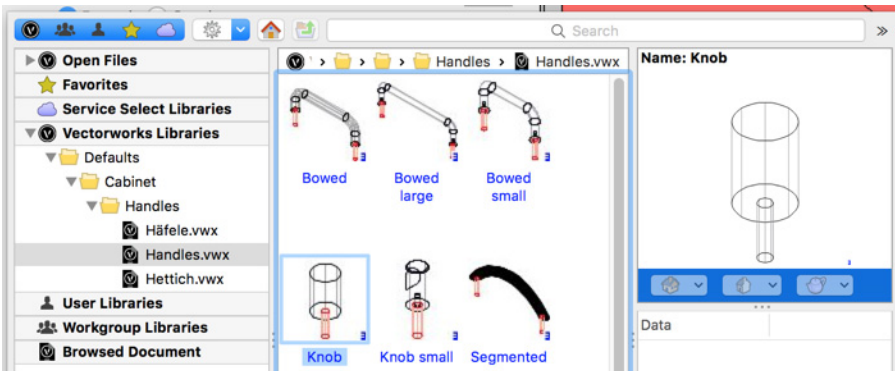
Height:	715
Width:	457
Depth:	760

- First click on the tab «Division»,

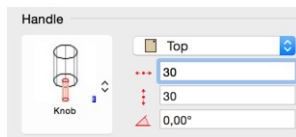
- second in the preview on the right.
- Select «Left hinged door» and «Overlay» from the «Front details» menu. The door will be shown in the preview.



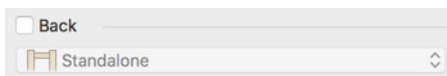
- Select the handle «Knob».



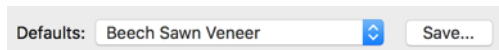
- Set the handle's position at the «Top» of the door and set the handle's horizontal and vertical offset to «30». In this case the offset is measured from the top right edge of the door.



- You can control your settings in the preview and make changes anytime.
- To make the computer's cooling working properly, we will remove the back of the cabinet. Click the «Back» tab.
- Uncheck the «Back» option - That's all on this tab.



- Click the «Construction» tab. Select the default template «Beech Sawn Veneer» to assign materials and edges to all construction groups. Feel free to use our templates for your own projects or choose a construction group to assign other materials individually.



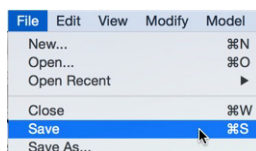
- Click «OK» to close the dialogue box.
- Change the view to «Right Isometric», either in the pulldown menu in the «View bar» or in the «Views» palette.



- Place the cabinet in the center of the screen: If you roll the mouse wheel, you zoom in and out. Vectorworks interiorcad zooms to your mouse cursor, or away from it. Move the view by moving the mouse while you are pressing the mouse wheel. Try to navigate through the scene.



- Save the document. Select «File > Save» or press «Ctrl + S» and save the file as «Worktable.vwx».




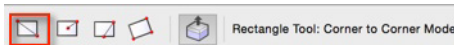
4.1 Insert cutouts and drillings

4.1.1 Cutout at the bottom

At the place where the cables come into the cabinet from the floor, we will now create a cutout into the cabinet. The easiest way is to draw a rectangle on the bottom of the cabinet, move it and then convert it into a Contour 3D. Change to «Right Rear iso» view.



- Select the «Rectangle»  tool in the «Basic» palette.
- In the «Tool bar» you can easily change the mode of a tool. For the «Rectangle» tool you can specify from which points it is drawn. We want to draw the rectangle from bottom left to the top right. So we'll choose the «Corner to Corner» mode.

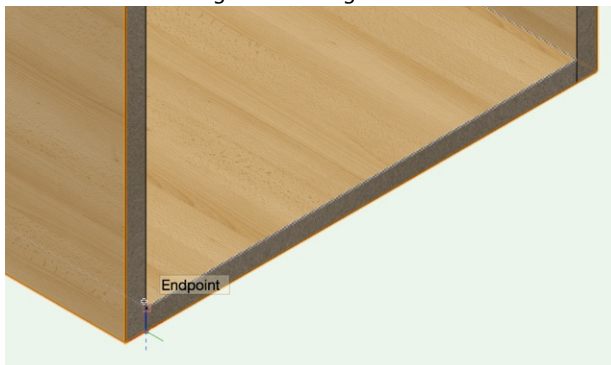


- In Vectorworks interiorcad we can work directly in 3D. For this, we can either create a working plane to the surface on which we want to draw or Vectorworks interiorcad can determine the working plane automatically. Activate the «Automatic» working plan in the «View bar».

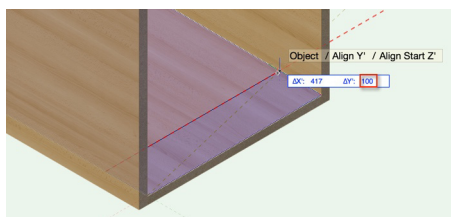


- Zoom with the mouse wheel into the left inner corner of the cabinet. Make sure that the cue «Endpoint» appears and the bottom is colored blue. This means, that Vectorworks interiorcad placed the «Automatic Work Plane» on this surface. It is set on the

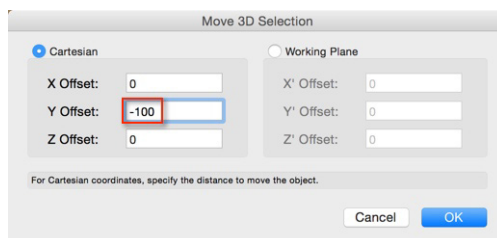
ground, if you move the mouse over the cabinet's bottom before you hover the edge. Then click once to start drawing the rectangle.



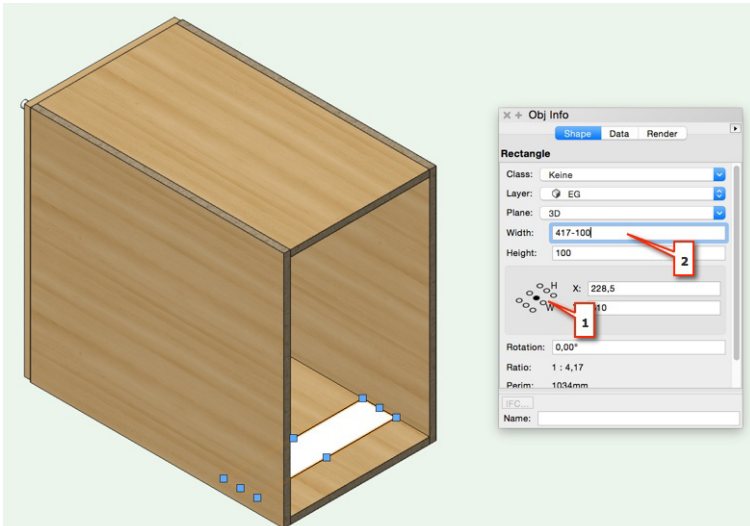
- Move the mouse to the right inner edge of the cabinet.
- Then press the «Tab» key until you reach the y field and enter «100». Again press «Tab». interiorcad automatically jumps to the desired measurement.



- Click to place your rectangle on the cabinet's bottom.
- The rectangle has been placed on the cabinet's bottom, already in the perfect height for creating the contour. We only need to move it «100» inside the cabinet and make it smaller:
- Press «Ctrl+Alt+M» for the «Move 3D Selection» dialog. The «x-offset» indicates the shift in the horizontal, the «y-offset» the shift in the vertical and the «z-offset» the shift in height. Enter -100 for «y», to move the rectangle «100» into the cabinet.



- In the «Object Info palette» choose the «Middle Insertion Point». This allows us, to uniformly decrease the rectangle's width from both sides. (1)
- Subtract «-100» from the width of the rectangle (2)



- In the «interiorcad» tool set, select the «Contour 3D» tool.

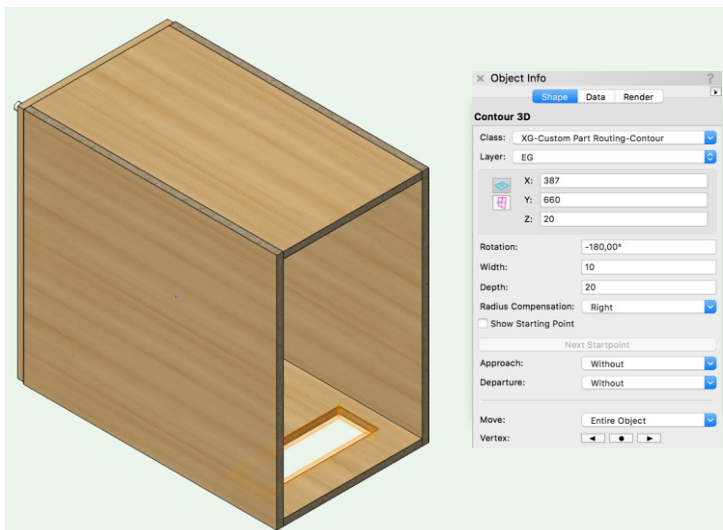


- In the «Tool bar», press the «Convert» button to create a contour from the rectangle:



- In the «Object Info palette», set the Depth to «20».

- The «Radius Compensation» determines the direction in which the cutter drives around the contour. Because the drawing direction of a rectangle is not clear, please try «Left» and «Right» and set the value so that the contour is as large as possible:




4.1.2 Cable drillings on top and on the side

Next we will add cable holes on the top and on the side. The top drillings have a diameter of «100mm» and the side drillings have a diameter of «60mm».

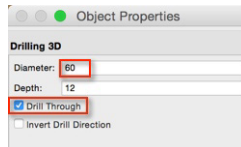
- Change to the «Left Iso» view.



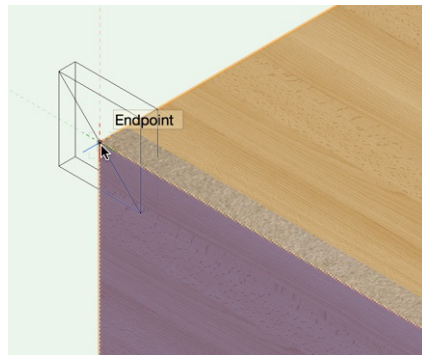
- Zoom to the upper rear corner of the cabinet.
- Now we include a drilling into the left side of the cabinet. In the «interiorcad» tool set, select the «Drilling 3D»  tool.
- Open its preferences with a click on the button in the «Tool bar».



- Set the «Diameter» of the drilling to «60». If we enable the «Drill Through» option, we don't need to know the depth of the board. Press «OK» to proceed.



- Move the drilling to the «Endpoint» (Don't click!). The automatic working plane is colored blue. It should be on the side of the cabinet as shown and not on its top.

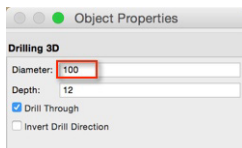


- Press the «Tab» key and set x to «60». Then press the «Tab» key again. Enter «110» for y and confirm with «Enter». Now the position of the drilling is shown by an intersection of dashed lines.

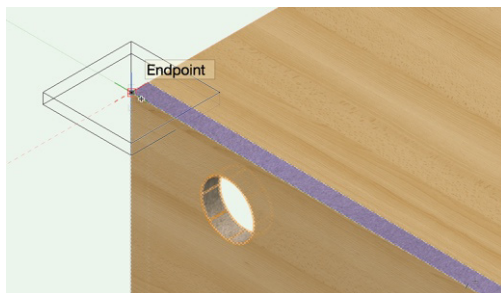


- Click on the intersection to place the drilling.

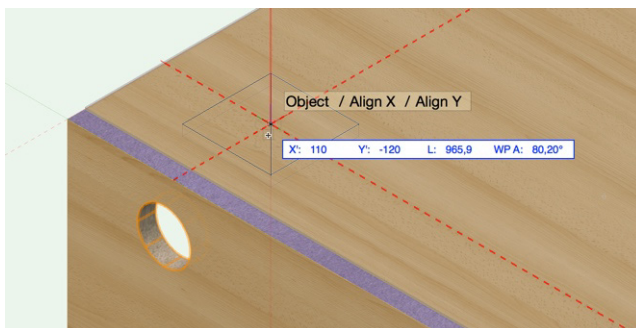
- The second cable drilling is in the cabinet's top panel. In the properties change the «Diameter» to 100 and click «OK».





- Move the mouse again on the left rear corner of cabinet and press «Tab» when the edge is highlighted blue.



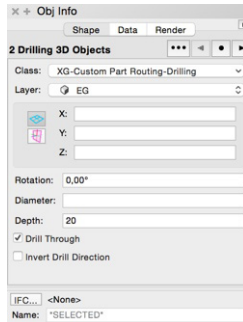
- Enter «110 / -120» in the X and Y fields respectively, and click on the intersection.




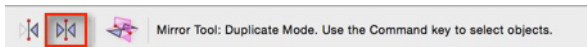
Both drillings are now transferred with the «Mirror»  Tool to the other side:

- First, we'll select both drillings: Press «X» to activate the «Selection»  tool, then hold down the «Shift» key and click the edge of the inactive drilling in the side. If both

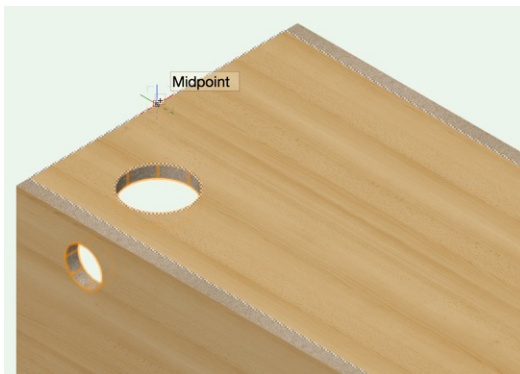
drillings are selected, the title of the «Object Info palette» changes to «2 Drilling 3D Objects».



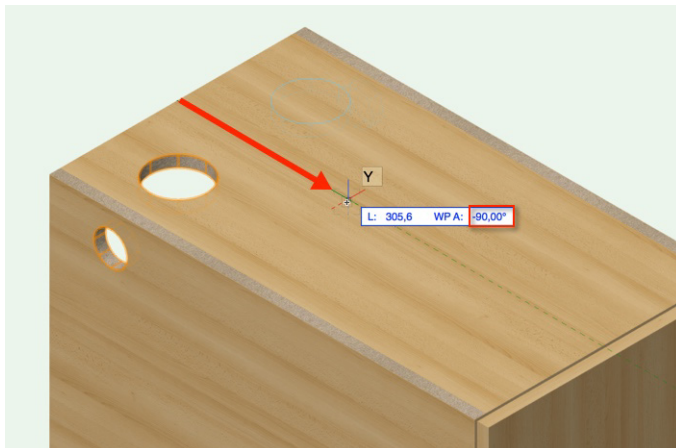
- Select the «Mirror»  tool.
- Please check in the Tool bar if the «Duplicate Mode» is enabled:



- Zoom in as shown below and select the «Midpoint» of the top.



- Click and drag a line parallel to the cabinet sides. Click again when you see a suitable preview (W: «-90»).



- In the «Right Isometric» view, you can see that the right drilling was mirrored correctly.



- Press «Ctrl+S», to save your results.


4.2 Changing cabinet

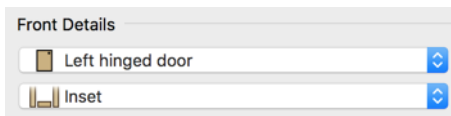
Even after adding the drillings and the contour, you can edit the cabinet with the cabinet maker. In principle, this is even possible if you have already inserted fittings. If the type of construction no longer matches a used fitting, the fitting is removed as desired.

We would like:

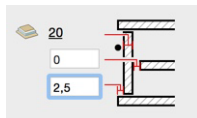
- To change the door construction to inset
- To adjust the Reveal
- To shorten the top and bottom shelf of the cabinet
- To divide the cabinet for the second computer and accessories

4.2.1 Change Front Division

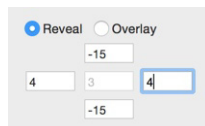
- Please press «X», to activate the «Selection»  tool.
- Double-click the edge of the cabinet and open the «Division» tab.
- Click in the cabinet to activate a box to change its deviation.
- Under «Front Details», change the door style to «Inset».



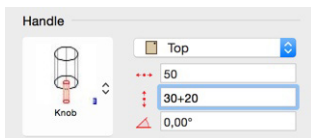
- Increase the distance of front to body to «2.5».



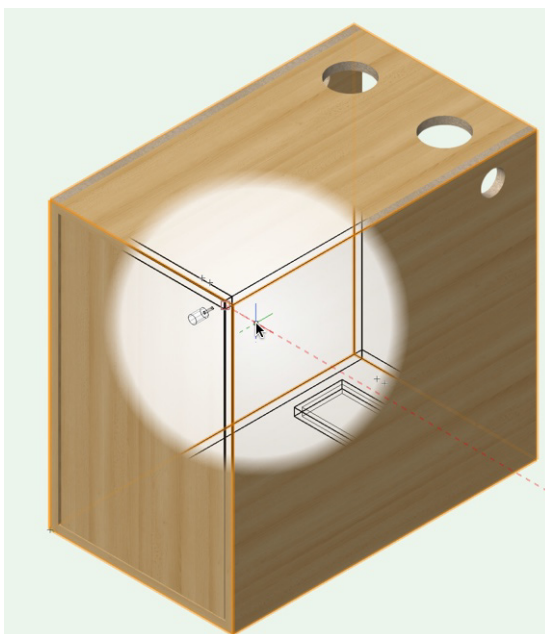
- Change the «Reveal» settings as shown below.



- Move the horizontal and vertical handle position «+20» inside. You do not need to calculate yourself, you can enter «+20» in the cabinet maker as shown in the figure.



- Exit the dialog with «OK». At first sight the cabinet looks correct.
- However, if you check the «wireframe» view with the «X-ray Select Mode» (key «B»), you will see that the door protrudes into the bottom and top panel of the cabinet.

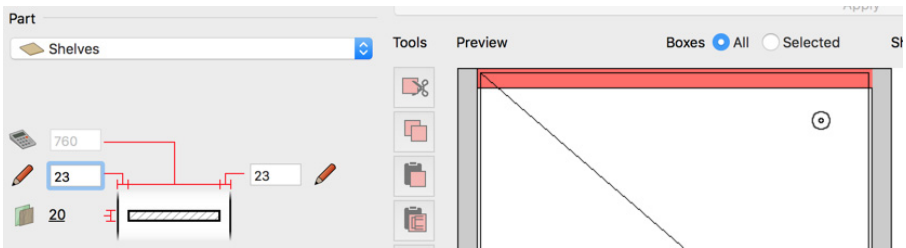


4.2.2 Adjusting the recess of top and bottom panel

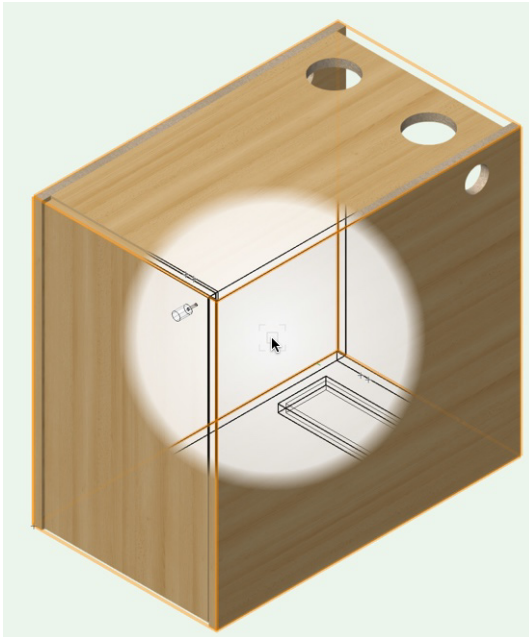
Now we'll adjust the bottom and top to spring back. This corrects the error in the type of construction and allows an improved air circulation in the cabinet.

- Double-click the edge of the cabinet and click the «Division» tab.
- Click on the top panel in the preview pane on the right of the dialogue box. In this way you can configure a single shelf precisely.

- Set the recess of shelf from front and back to «23».



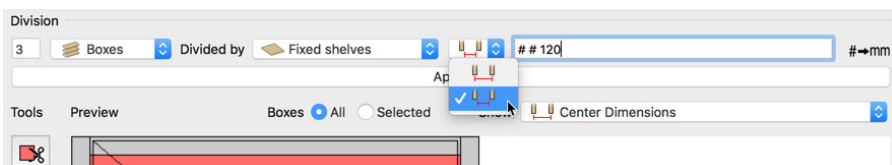
- Repeat the procedure for the bottom.
- Click «OK».
- Now check the «OpenGL» view. In the «X-ray Select Mode» («B» key) you will see again the «wireframe» shining through the 3D model. Now the interaction between the door and shelf is fine.



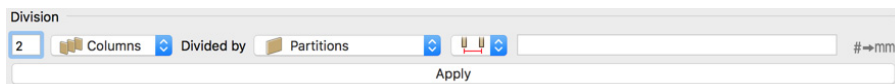
4.2.3 Improving the cabinet front division

We add now two more shelves and a column to use the space for multiple computers and accessories. All shelves and sides will spring back 2cm in order to have enough space for cables.

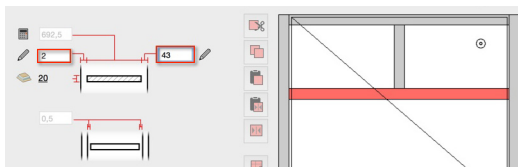
- Double-click the cabinet and change to «Division» tab.
- Click into the box.
- Below Division, type 3 and then change «Divided by» by to «Fixed Shelves». This will divide the cabinet into three boxes. Make the distribution by «Measurement include proportionate side / shelf thickness» for «Inside Distance» and enter the Division # # 120. Then click «Apply».



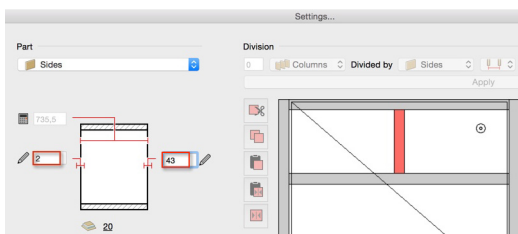
- Now select the upper box and divide it again by two equal columns. You only need to enter a «2» and click «Apply».



- Now all shelves and columns should jump back from behind 20mm further to create space for cables.
- Select the upper shelf and enter «2» into the «Recess of shelf from front» and «43» into the «Recess of shelf from back» field.



- Repeat the procedure for the second shelf and the vertical divider.




- Click «OK» and check the result in «OpenGL» render mode and «Left iso» view.



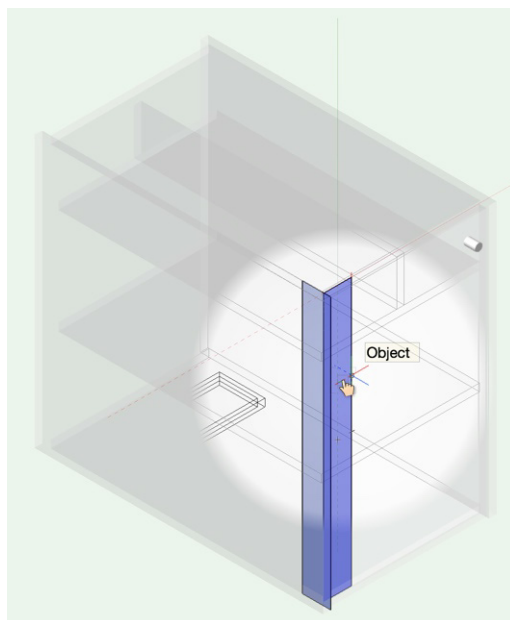
4.3 Insert fittings

4.3.1 Insert hinges

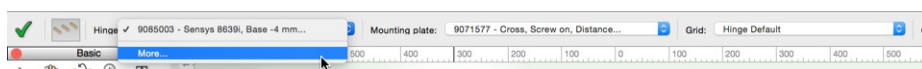
Now we will add fittings. At first we will create hinges for the doors:

- In the «interiorcad». tool set, choose the «Hinge 3D»  tool. «OpenGL» is immediately turned off - a «wireframe» view, in which the connection surfaces of the door are highlighted in blue, appears.

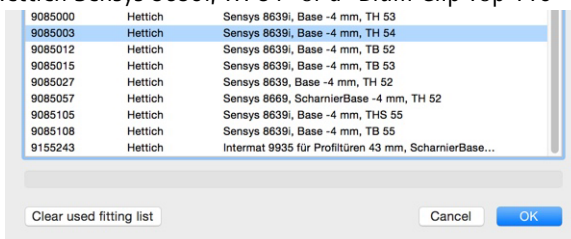
- Click on the door front to determine on which door the hinges will be positioned.



- The pulldown menu «Hinge» contains the hinges recently used. If your list is empty, a dialog with all hinges will be shown. You can reach this dialog anytime, if you click on «More».



- Select e.g. «Hettich Sensys 8639i, TH 54» or a «Blum Clip Top 110 °» and press «OK»



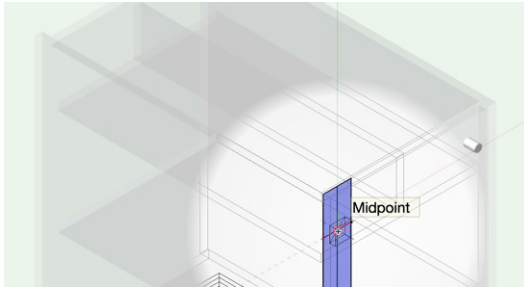
- On the «Tool Bar» select the «Hinge Default» grid. It is displayed on the door. You will see two intersections of the grid on which the hinges should be inserted.



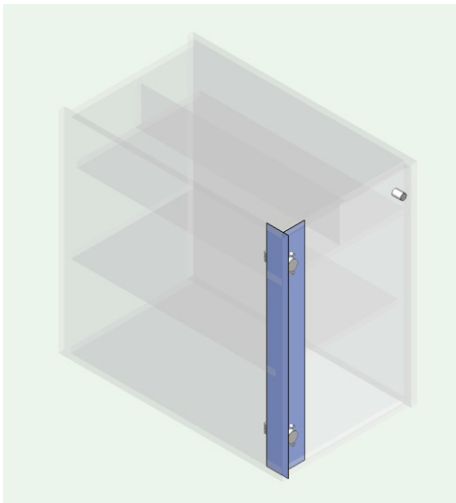
- If the second mode «insert on every grid point» is enabled, a fitting is used on each grid point - so both hinges will be placed at the same time. Additional, you can choose a mounting plate in dependency of the cup distance:



- Click on one of the two grid points (cue «Midpoint») ...



- ... And both hinges will be inserted. That's it.

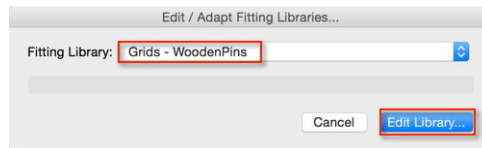


4.3.2 Insert WoodenPins

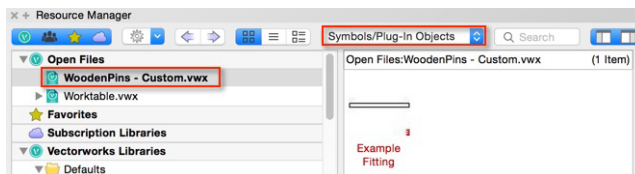
Next, we'll insert wooden pins. We would like to define our own grid, which is compatible with dowel machines.

Create grid

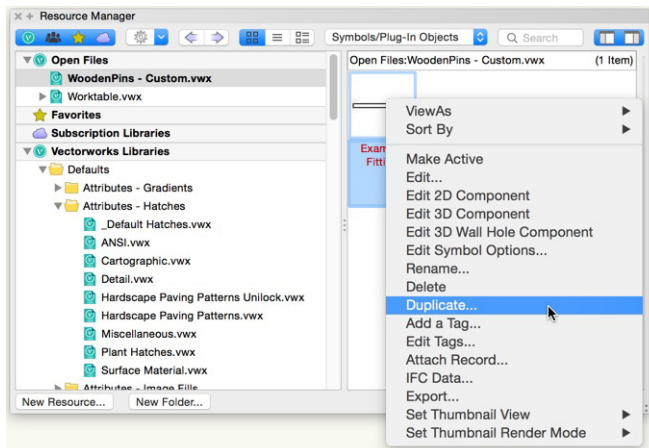
- From the menu, choose «interiorcad > Fittings > Edit / Adapt Fitting Libraries».
- Select «Grids - WoodenPins» from the pulldown menu and proceed.



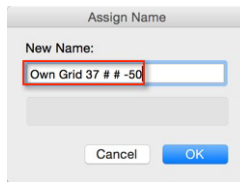
- This creates a new library document in your user folder where you can create your own grid usable for wooden pins. Each library document contains a reference to the description in the interiorcad manual and a sample library symbol in the «Resource Manager».
- Ensure that the library document and «Symbols/Plug-In Objects» are chosen in the «Resource Manager», to see the sample grid.



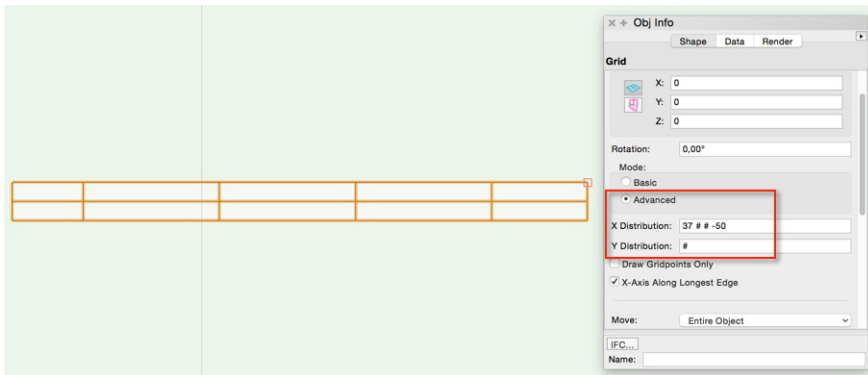
- The easiest way to create a new symbol is to copy an existing one and change it: Right-click a symbol in the «Resource Browser» and select «Duplicate»..



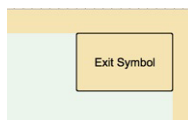
- Enter the name «Own Grid 37 # # -50» and click «OK».



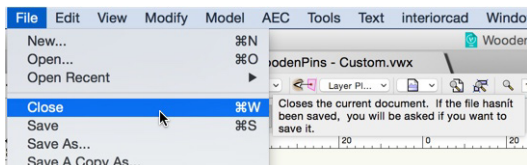
- Right-click the new symbol and choose «Edit 3D-Component» from the context menu.
- The grid is placed on the origin of the document. On the «Object Info» palette, click the «Advanced» mode. Enter the new X-Distribution «37 # # -50», the Y-Distribution «#» and press «Enter». The grid changes accordingly.



- Press the «Exit Symbol» button at the top right of the drawing area.




- Save with (Ctrl+S) and close this document (Ctrl + W).



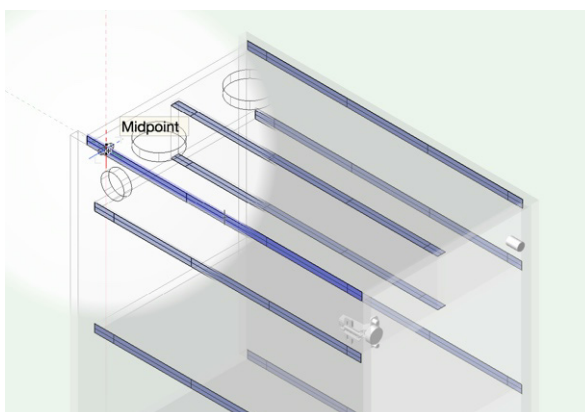
Insert wooden pins

Now we'll insert the wooden pins in the created grid

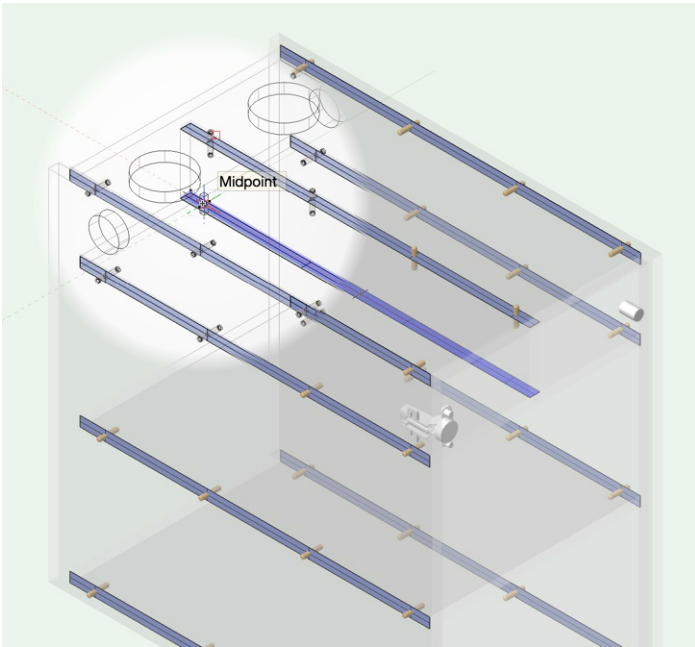
- In the «interiorcad» tool set, choose the «Simple Connector 3D»  tool.
- On the «Tool bar» enable the «Insert on every grid point» mode, select the Wooden pin «BU 8x40 - Wooden Pin Beech» and choose the «Grid 37 # # -50».



- All connecting surfaces are highlighted in blue. By clicking on one of the intersections, wooden pins are inserted on all grid points of a connecting surface. By holding down the «Shift» -key while you are clicking, all connecting surfaces are pegged automatically. So hold down the «Shift» key and click on one of the grid points. Make sure that the cue «Point» appears.



- Holding down the «Shift» key, click again on the lower connecting surface of the side to fixture the side with wooden pins as well. Insert wooden pins for the removable shelves as well.




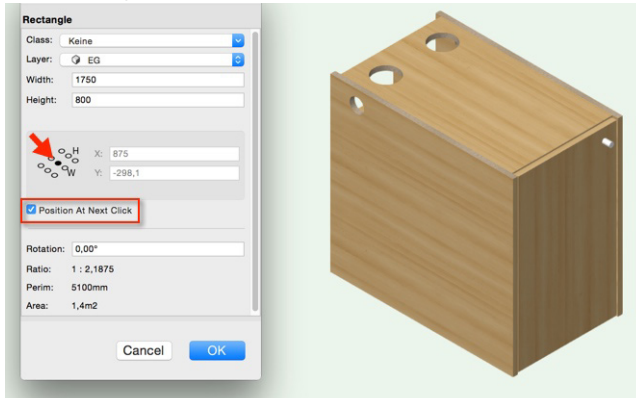
Later in this tutorial we will construct a backplane with slots for ventilation and fix it with self-created KEKU fittings. However, since this still requires some preliminary exercises, we'll first construct the computer workplaces around the cabinet from 3D Custom Parts.

5 Creating computer workplaces from 3D Custom Parts

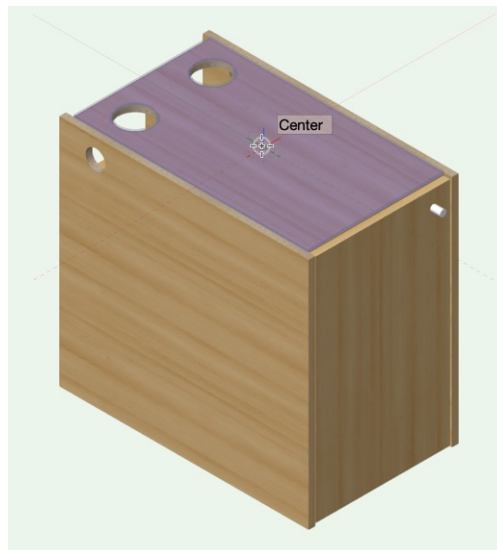
5.1 Worktop and side panels


First we'll construct the countertop on the cabinet. For this, we draw a rectangle directly in 3D and convert it into a 3D Custom Part.

- Double-click the «Rectangle»  tool. This will open the settings of the tool. Enter a panel length x of «1750» and a width y of «800». We want to insert the board centered on the cabinet, so we choose the «Middle Insertion Point». Check «Position At Next Click». Finally click «OK».

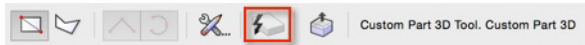


- Click on the «Center» of the top of the cabinet, to place the rectangle at worktop height centered on the cabinet.

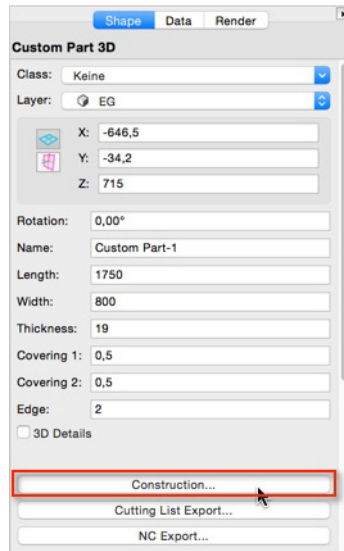


- To create a Custom Part, choose the «Custom Part 3D»  tool in the «interiorcad» tool set.

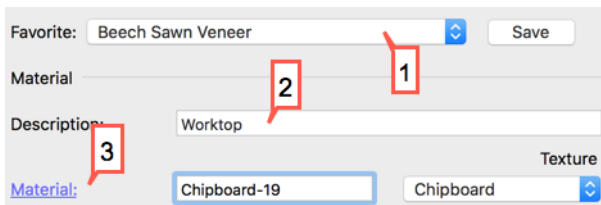
- With one click on the «Convert» button on the «Tool bar» a Custom Part will be created. In the following this frequently needed function will be used with the shortcut «Ctrl + Alt + 1».



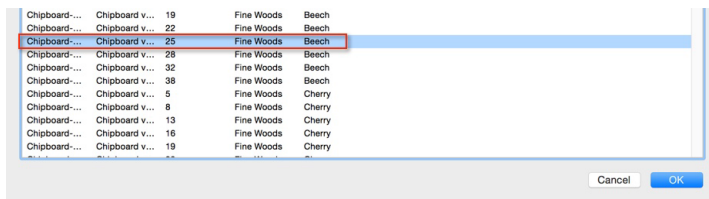
- In the «Object Info palette» you can see that the Custom Part has a lot of properties. So you can set, for example, the thicknesses of the coverings and edges or disable them completely. Click the «Construction» button to define the materials.



- At first choose the template «Beech Sawn Veneer». If you enter a «Description», it appears in the Cutting List to distinguish the parts. Click the magnifying glass to choose a board.




- Select «25mm Chipboard Beech» and click «OK» to confirm both dialogues.



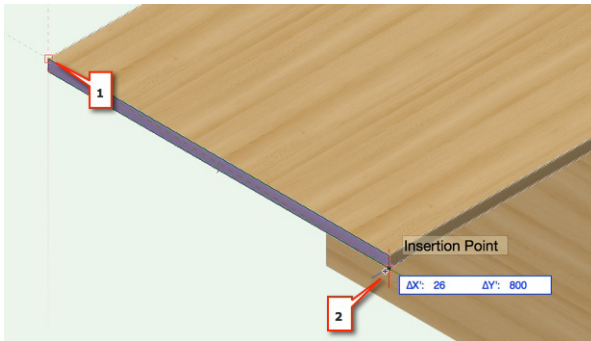
- The board thickness and the materials have been changed:




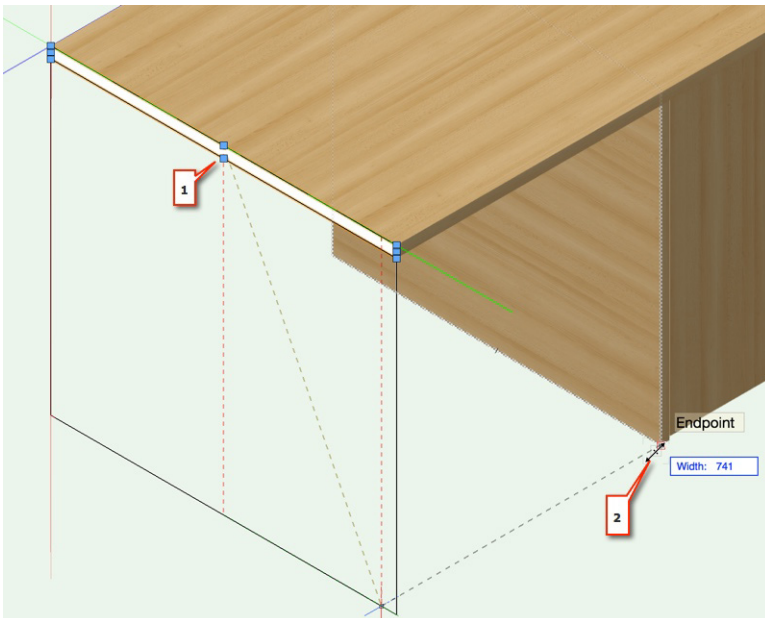
Now we'll construct the left side and mirror the side and fittings to the right.

- Zoom to the left edge of the panel using the mouse wheel.
- In the «Basic» palette, select the «Rectangle»  tool and on the «Tool bar», ensure «Corner to Corner» mode is selected.

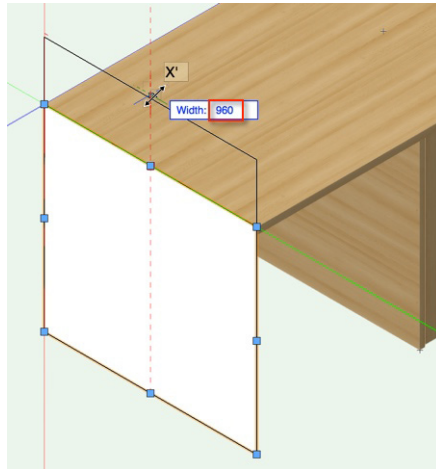
- Draw the panel's edge, with two clicks from top left to bottom right. Make sure that the edge is highlighted in blue before you click. After the second click, the rectangle is shown in white and lying on the edge.




- Please press «X» to activate the «Selection»  tool.
- Click on the blue «Selection Handle» at the bottom center. Drag the mouse to the bottom right and click one more time on the cabinet's corner. The rectangle is thereby extended downwards to the cabinet's bottom edge.

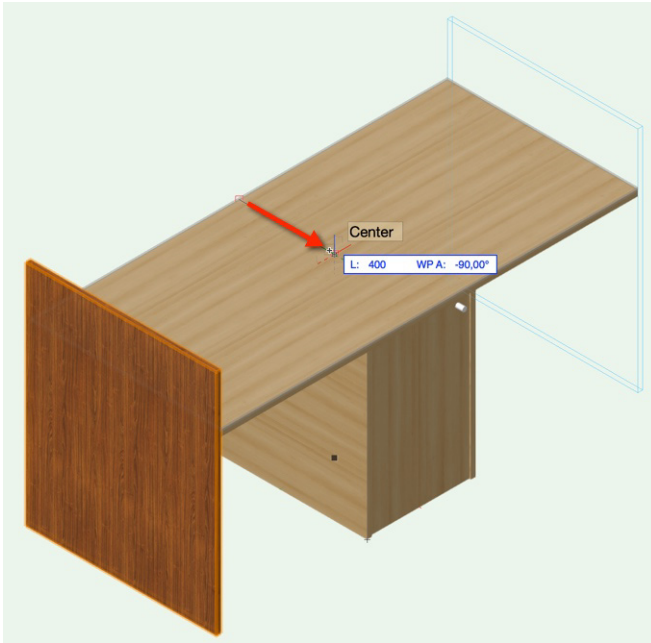


- Then click on the «Selection Handle» in the top center, and enter the value 960. Then press «Enter» twice, to confirm the value and complete the transformation.



- Press «Ctrl+Alt+1», to convert the rectangle to a Custom Part 3D.
- Select the «Mirror»  tool and click on the «Center» of the worktop's left side.

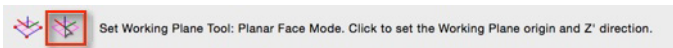
- Then drag the mouse a little towards the opposite side ensuring that the axis line is snapped to -90 degrees, and then click to complete the mirror operation.



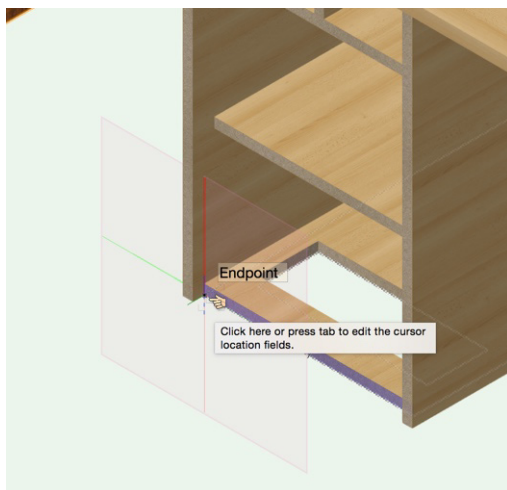
5.2 Creating back walls

Now we'll create the back walls of the worktable. So far, we could always use the automatic working plane, as we have drawn directly on a surface. Now we want to transfer the position of a plane. Change to the «Left Rear Isometric» view.

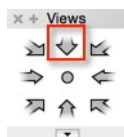
- Open the «Set Working Plane»  tool and enable the «Planar Face Mode».




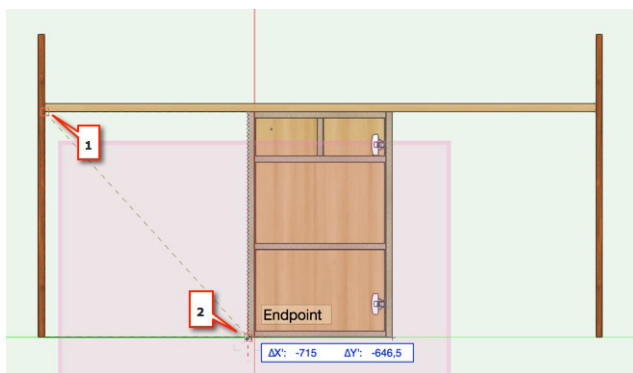
- Insert the working plane by clicking on the lower left corner of the cabinet's bottom .



- Change to «Back» view.

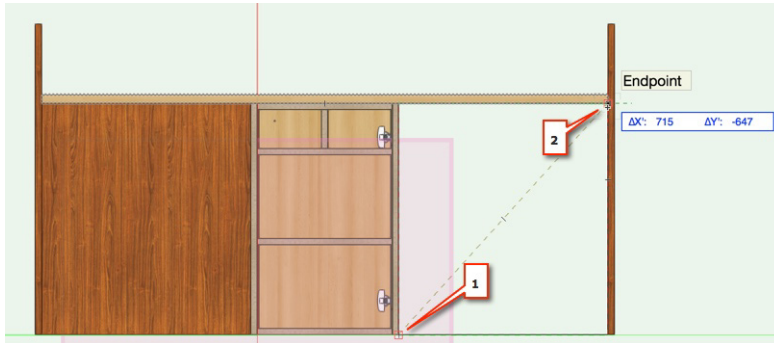


- Select the «Rectangle»  tool and place two clicks at the upper left corner and the bottom right corner to create a rectangle that represents the back of one part of the cabinet.

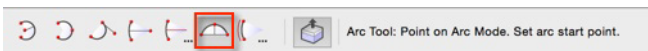


- Press «Ctrl+Alt+1» to create a Custom Part 3D.

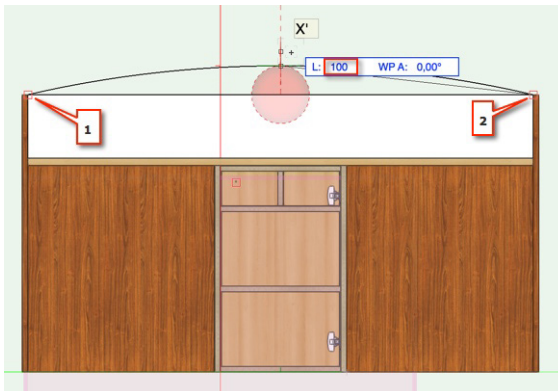
- Now draw another rectangle from bottom left to top right, to represent the back of the other half, and finally press «Ctrl + Alt + 1».



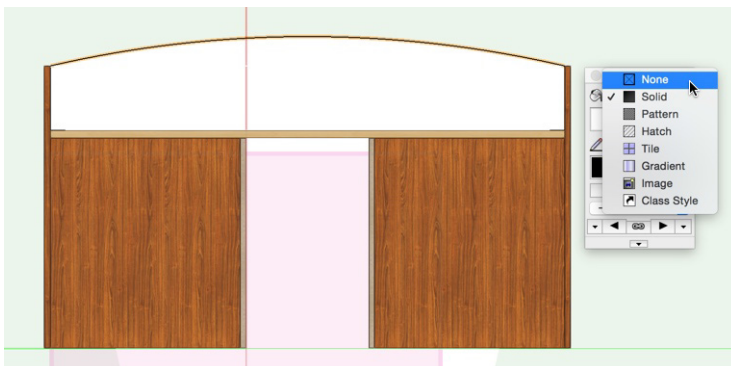
- Draw a third rectangle above between the two sides, but don't convert it to a 3D Custom Part.
- Click the «Arc» tool and enable the «Point on Arc Mode».



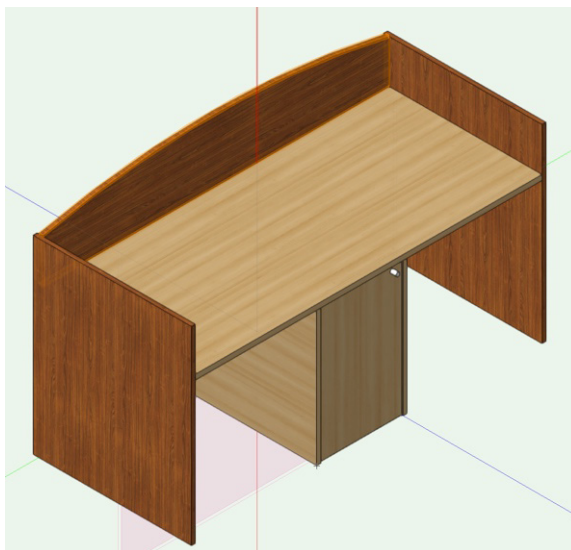
- Click through the upper corners of the rectangle, then drag the mouse slightly upwards and enter the length of «100». Press «Enter».



- At the moment the area of the arc looks like a piece of cake. In the «Attributes» palette change the fillstyle to «None» to reduce the area on the arc itself.

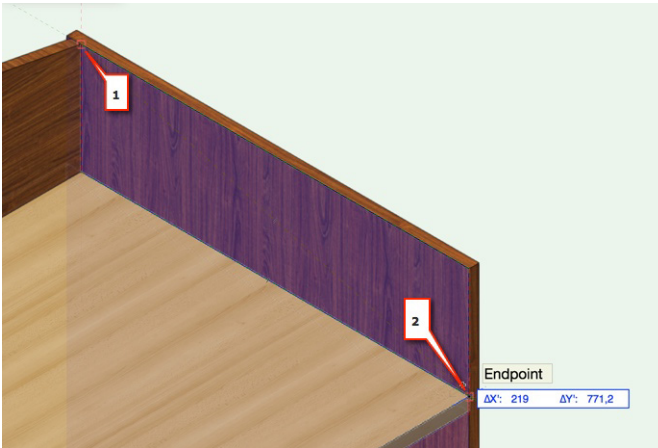


- Please press «X» to activate the «Selection» tool and click while holding down the «Shift» key on the rectangle to add it to the selection.
- Press «Ctrl+Alt+Shift+A» to invoke the «Add Surface» command and add the two selected shapes together for form a single polyline.
- Press «Ctrl+Alt+1» to create a Custom Part 3D.
- In the «Left Iso» view the worktable looks like this.



- The middle wall is still missing: Zoom to the right side of the worktable and select the «Rectangle» tool.

- Press «#» (in some Vectorworks versions «\»), to enable «Automatic» working plane.
- Draw over the visible protrusion of the right side and press «Ctrl + Alt + 1». Pay attention again, that the side is highlighted blue before drawing the rectangle.

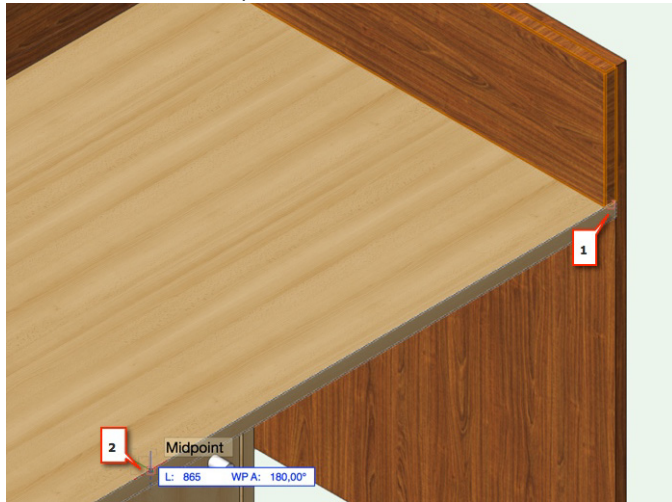


- Open the «Move by Points»  tool and enable the first mode.

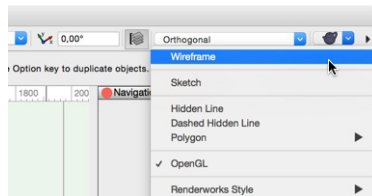


- Use the mouse wheel to focus on a view, in which you can see both the center of the lower Custom Part's edge and the center of the worktable.
- Click the midpoint of the lower Custom Part's edge.

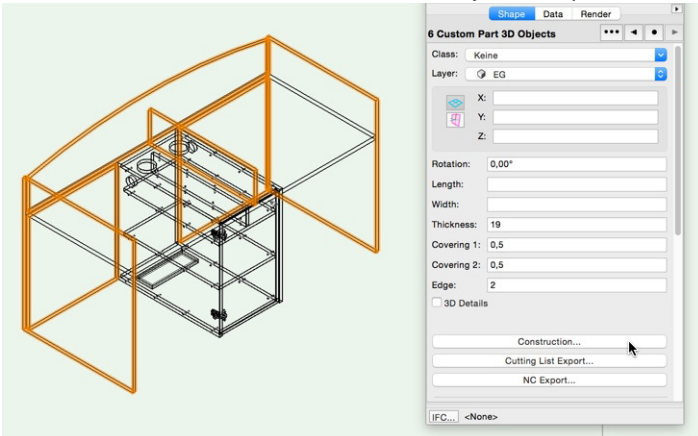
- Then click the «Midpoint» of the worktop's edge. Please be sure to snap to the center of the worktop surface, otherwise the center side will protrude into the worktop and can not be fixed with wooden pins.



- In the «View bar», change to «Wireframe» mode, then press «X» to activate the «Selection» tool.



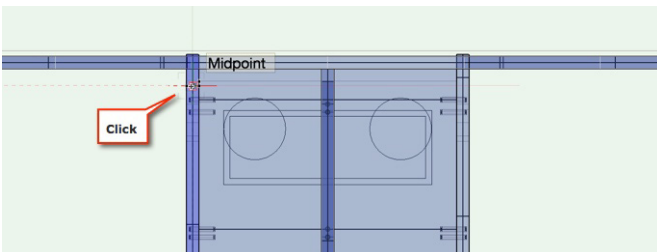
- Hold down the «Shift» key and use the «Selection» tool to select the six Custom Parts 3D - then click the «Construction» button in the Object Info palette.



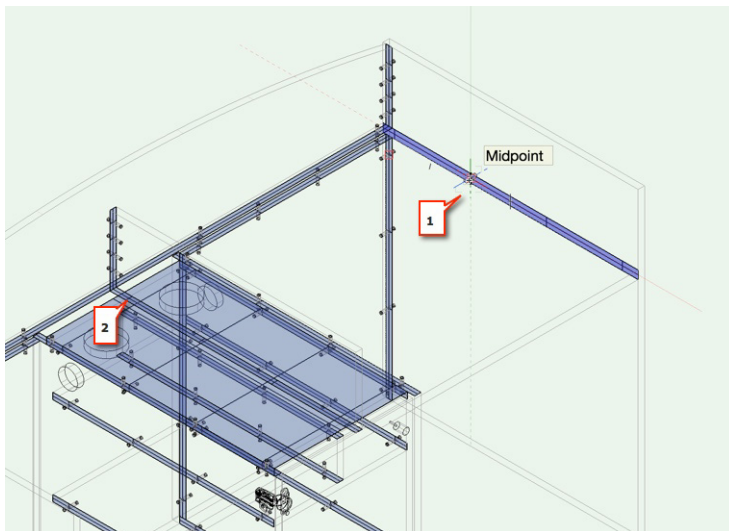
- Choose the Favorite «Beech Sawn Veneer» and click «OK».




- Now we'll insert wooden pins. In the «interiorcad» tool set, choose the «Simple Connector 3D» tool.
- In the «Top» view, click this point while holding down the «Shift» key. Look for the cue «Midpoint»



- After that, change to «Left Iso» view and insert the wooden pins. First click these two points while holding down the «Shift» key. Then insert the wooden pins for the back walls if necessary.




- Press «X» to activate the «Selection»  tool.

- The basic construction is now finished. The result should look like this in «OpenGL» render mode.

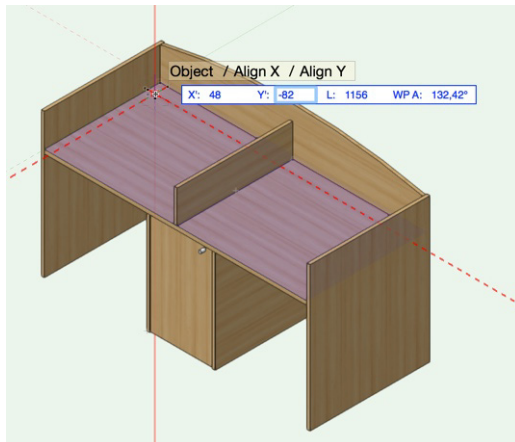


5.3 Inset Monitors

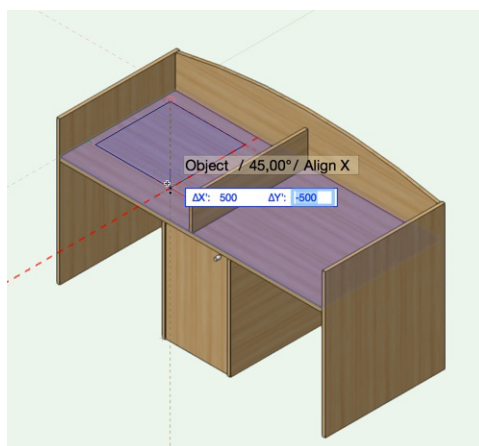
First, we create cutouts for the monitors. For this, we will construct two contours with different depths: Because of the different radius corrections the section milled through the panel is smaller, although its measure is the same.


- Change to «Right Iso» view.
- In the «Basic» palette, select the «Rectangle»  tool.

- Zoom in on the rear inner corner of the worktable. Then press the «Tab» key and enter for «x» 48 and «y» -82.



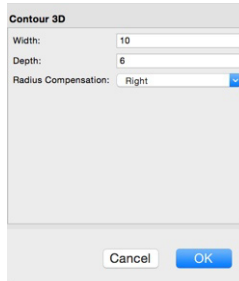
- Draw a rectangle that measures «500 x 500» with two clicks. You can move the mouse a little, enter «500 Tab -500» and press «Enter» to confirm the values and complete the rectangle.



- In the «interiorcad» tool set, click the «Contour 3D»  tool.
- In the Tool bar open the «Preferences».



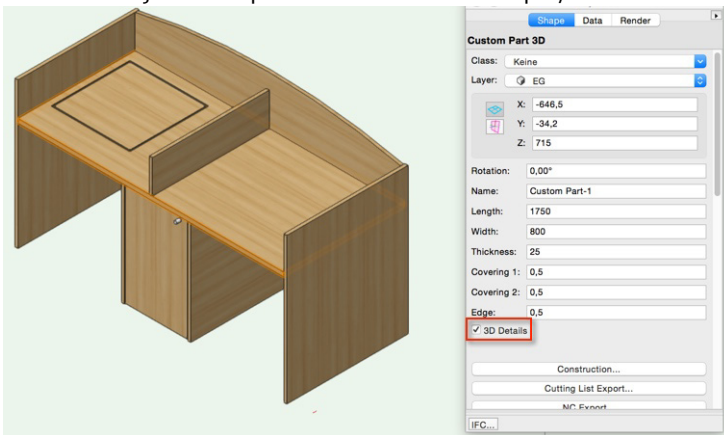
- Set the width to «10», the depth to «6» the Radius compensation to «Right» and click «OK». With this radius compensation the cutter will travel clockwise around the rectangle.



- Click the «Convert» button in the «Tool bar», to create the contour.



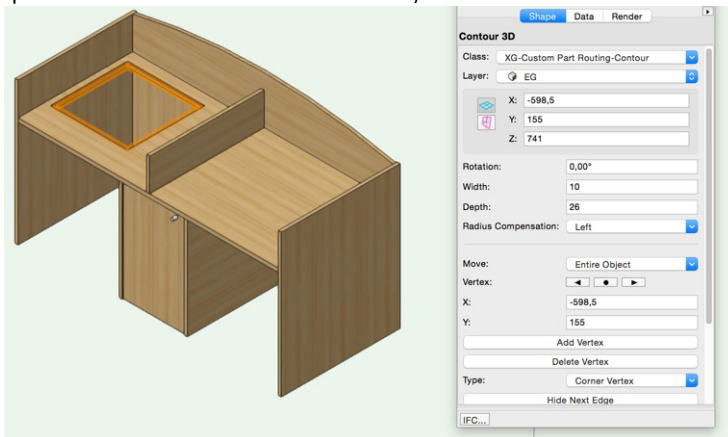
- Now the contour is activated, but you cannot see it. Press «X» to activate the «Selection» tool and click on the edge of the countertop to select it. Then check «3D Details» on the «Object Info» palette. The contour is displayed.




The contour will now be duplicated and adjusted.

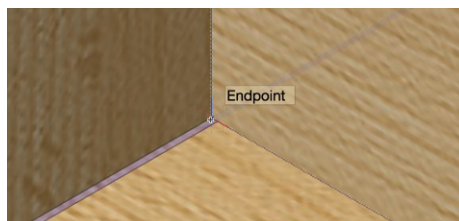
- Select the contour and press «Ctrl + C» to copy it.
- Press «Ctrl + Alt + V» to paste in place. This will insert a copy of the contour in the same position as the original.
- In the «Object Info» palette change the Radius compensation of the inserted contour to «Left».
- One contour should now be large, the other one should be small. Set the depth of the smaller contour on «26» to cut through the panel. If the smaller contour is not

selected, you may need to change to «Activate» tool to select it, before you change the depth. Finished the cutout looks this way.

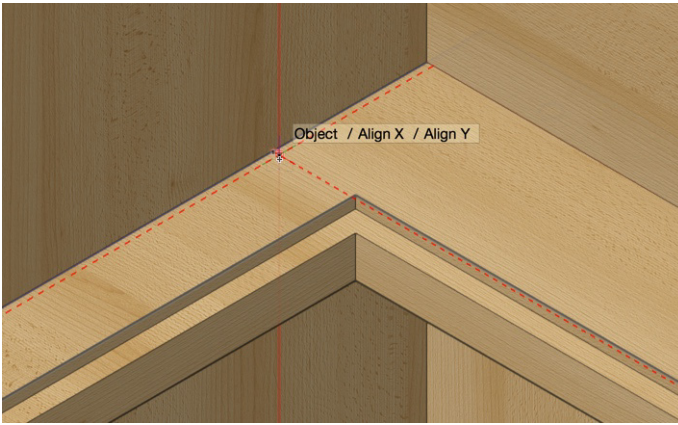


Now we'll construct the brackets for the monitors.

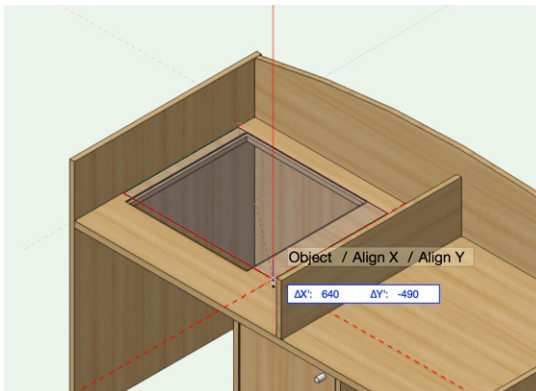
- Select the «Rectangle»  tool and move the mouse again as accurately as possible to the rear inner corner of the worktable.
- Ensure that only the edge of the worktop is highlighted blue and the «Endpoint» cue appears so that you don't align to the inside of the edge by mistake. Then press «Tab».



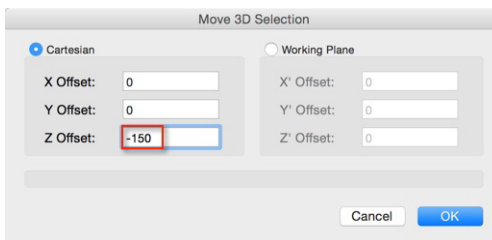
- Press the «Tab» key and enter the values «x'» 3,3 and «y'» -74.




- Then create a rectangle which measures «640 x 490». To get the rectangle drawn in the correct direction, type in «x' » 640 and «y' »-490.



- Use the shortcut «Ctrl+Alt+1» to create a Custom Part 3D.
- Press «Ctrl+Alt+M» to move the custom part down «150».

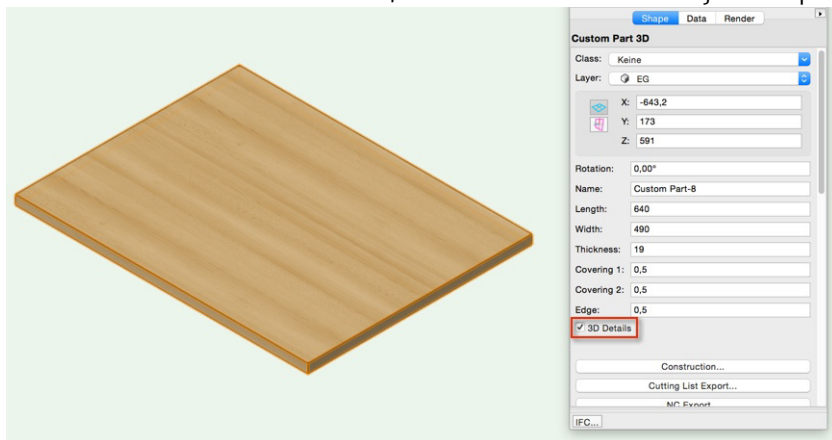



- Press «Ctrl + G» to create a group for the bracket. Then press «X» to activate the «Selection»  tool.
- Double-click the Custom Part to enter the group. All the surrounding elements are hidden and will not cause snapping problems as you edit the bracket.

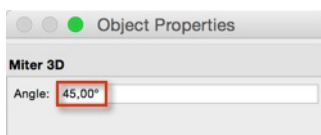
On the lower side of the board we'll mitre the edge at the desired angle:

Select as usual the material favorite «Beech Sawn Veneer» (press the «Construction» button in the «Object Info palette»).

- To see the mitres on the Custom Parts, check «3D Details» in the «Object Info palette».

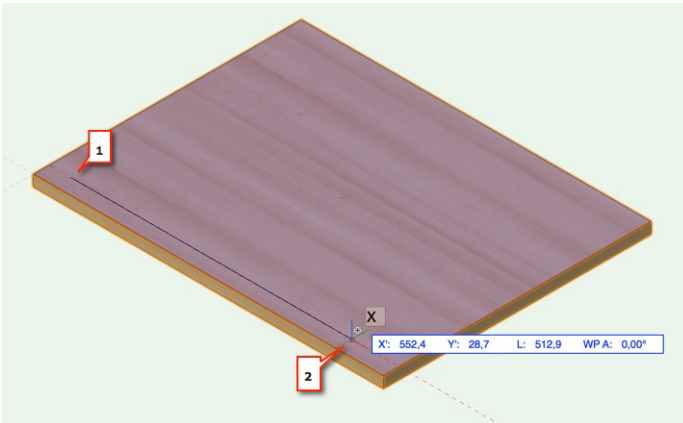


- In the «interiorcad» tool set, click on the «Miter 3D»  tool.
- In the «Tool bar» open the preferences. Set the mitre «Angle» field to «45 degrees».



- Now move the mouse near the edge over the panel. The surface is highlighted blue.

- Click and draw with two clicks a line parallel to the edge. The miter should be drawn close enough, but not directly on the edge.

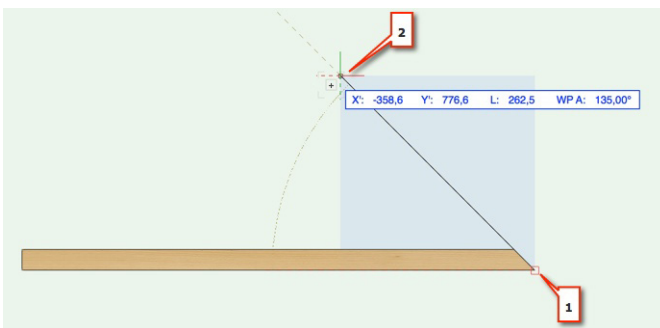


We'll now create the lower edge of the bracket by mirroring the Custom Part to the level.

- Change to the «Left» view.



- Select the Custom Part. Select the «Mirror» tool and draw a mirror axis as shown.

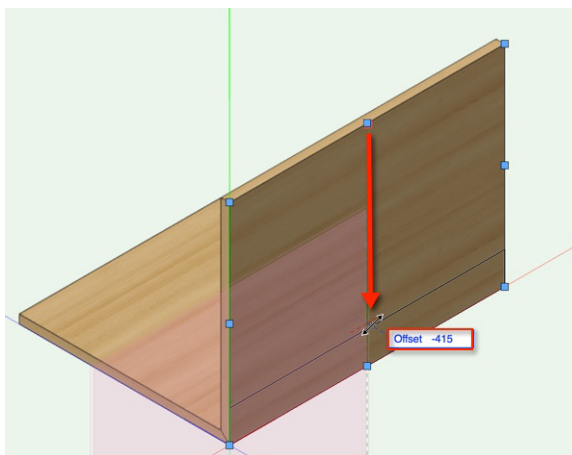


- Change to «Left Iso» view.
- Open the «Reshape» tool and enable the «Move Edges Parallel Mode».




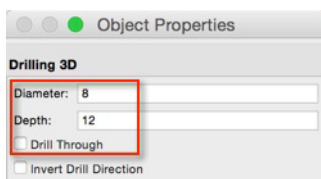
- Click on the «Midpoint» of the outer edge and drag the mouse down.

- Enter the offset «-415» and press «Enter».

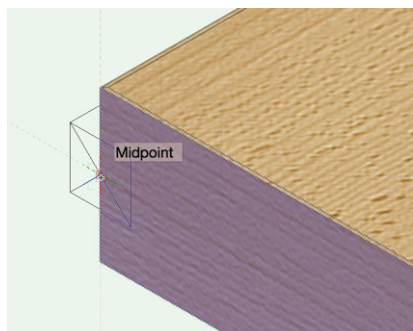


Next, we'll add the drillings for mounting the bracket.

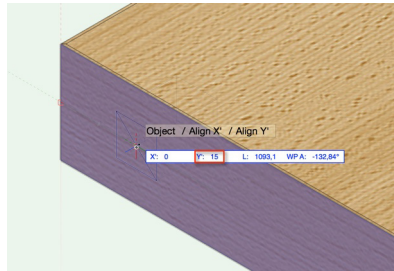
- Zoom to the left edge.
- In the «interiorcad» tool set, select the «Drilling 3D»  tool.
- In the «Tool bar» open the preferences and change the diameter to «8», the depth to «12» and uncheck the «Drill through» option.



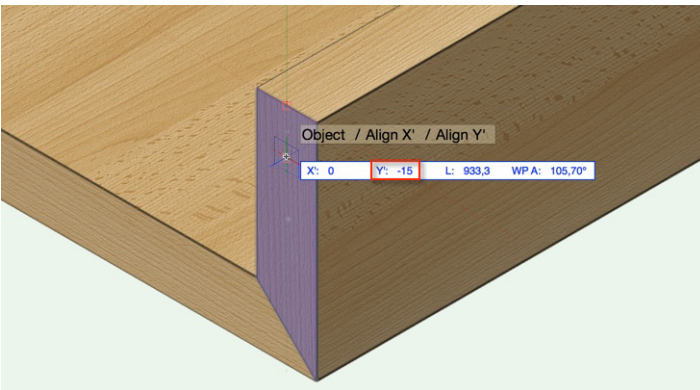
- Move the mouse to the «Midpoint» of the edge.





- Press «Tab» to enter X «0» and Y «15». Then insert the drilling with one click.

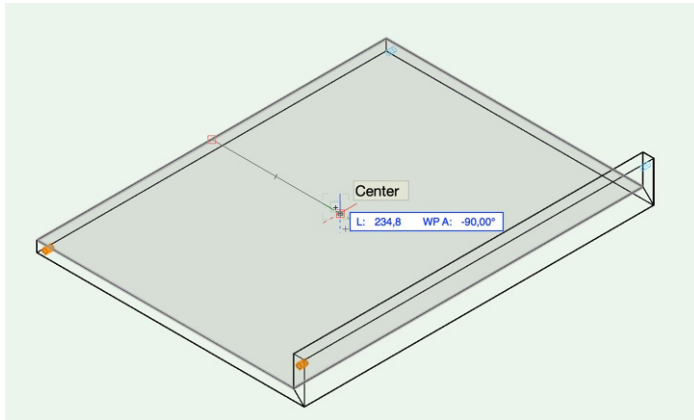


- Now we'll insert two more drillings: Zoom to the center of the top edge.
- Enter «-15» for Y and click the intersection point to enter the drilling.




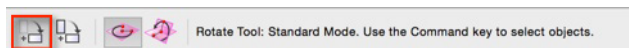
- Press «X» to activate the «Selection»  tool and select the second drilling while holding down the «Shift»-key.
- Change to «Wireframe» mode.

- Choose the «Mirror»  tool and draw a mirror axis with two clicks, through the center of the bracket.

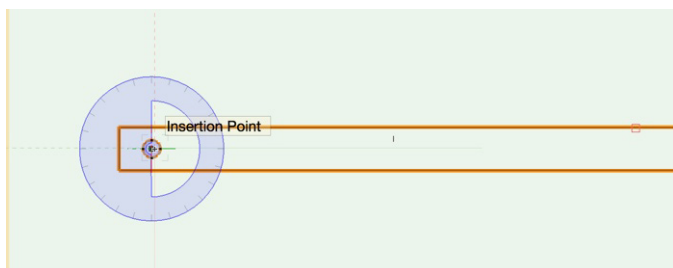


Now we'll rotate the bracket:

- Change to the «Left» view.
- Press «Ctrl+A», to activate all objects.
- Open the «Rotate»  tool in the Basic tool set.
- Enable the «Standard Mode».

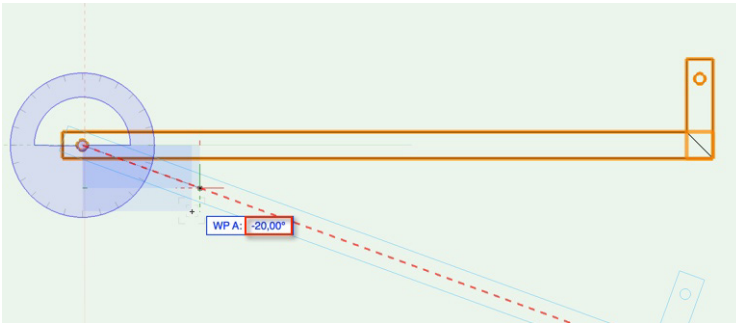


- Click in the middle of the drilling (Look for the cue «Insertion Point»).




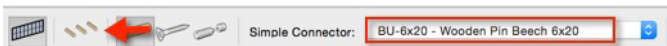
- Drag the mouse horizontally to the right and click.

- Enter the angle «-20 degrees» and click again.




The bracket is now rotated. For safety the bar will be fixed with two wooden pins.

- Change to «Right Iso» view.
- Choose the «Simple Connector 3D»  tool as used.
- In the «Tool bar» disable the «Insert On Every Grid Point Mode». Because of the miter we'll choose the smaller wooden pin «BU-6x20».



- Click through the two outer grid points to add two wooden pins.



- Please press «X» to activate the «Selection»  tool.
- Press the «Exit Group» button top right of your drawing area.



Now we still need drillings for the fasteners of the bracket on the cabinet and on the left side panel. With a working plane on the inner surface of the left side, we can transfer the coordinates and dimensions of the drillings to the left side.

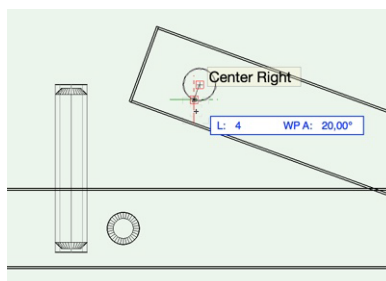
- Click the «Set Working Plane» tool and set a «Working Plane » on the inner surface of the left side.



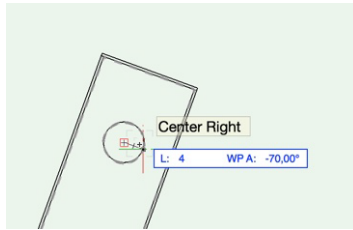
- Change to «Left» view and «Wireframe» render mode.
- Open the «Circle» tool and enable the «Radius Mode».



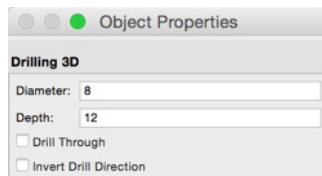
- Zoom to the upper drilling of the bracket, and draw over this by clicking on the circle center and then entering the half drilling diameter as radius «4». The circle is created directly on the working plane, so that we can convert it into a drilling.



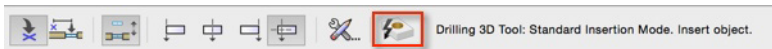
- Draw another circle to convert to the drilling for the bar.




- Select both circles and open the «Drilling 3D» tool in the «interiorcad» tool set.
- In the tool's preferences set the «Depth» to 12 and disable «Drill through».

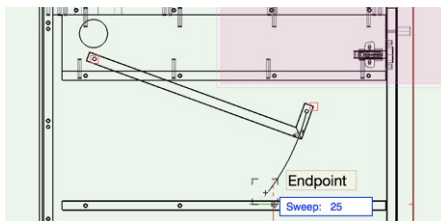


- Click the conversion button in the «Tool bar» and the circles will be converted to drillings.



At the bottom, we want to create more drillings on an arc in order to select different screen positions. We'll draw an arc, on which we'll position the drillings.

- Open the «Arc»  tool.
- In the «Tool bar», enable the «Radius Mode».
- Click in the center of the upper drilling. This defines the center of the arc. And then in the center of the drilling in the bar. Drag the arc to down. Press Tab, enter an internal angle of a «25 degrees» and confirm. Then click to draw the arc.

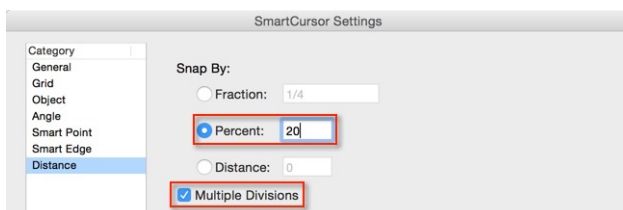


- Change to «Right Iso» view. As you see, both drillings have been inserted in the side correctly. Zoom to the arc using the mouse wheel.

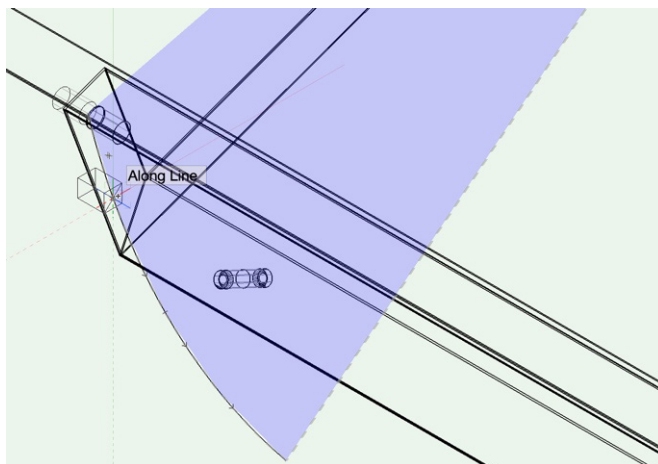
- In the «Snapping» palette double-click the «Snap to Distance» button.




- Set «Snap By» to «20» Percent and enable the «Multiple Divisions» option. Then click «OK». Thus, the arc is divided into five parts of five degrees on which we can place a drilling.

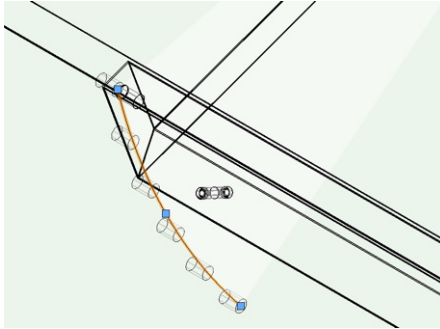


- Use the «Drilling 3D» tool as you have in the exercises above to place the further drillings on all sections of the arc. Make sure that the inner surface of the side or of the arc is highlighted in blue.

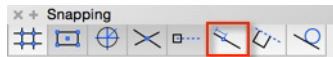


- Press «X» to activate the «Selection»  tool.

- Select the arc and press the «Delete» key to delete it.

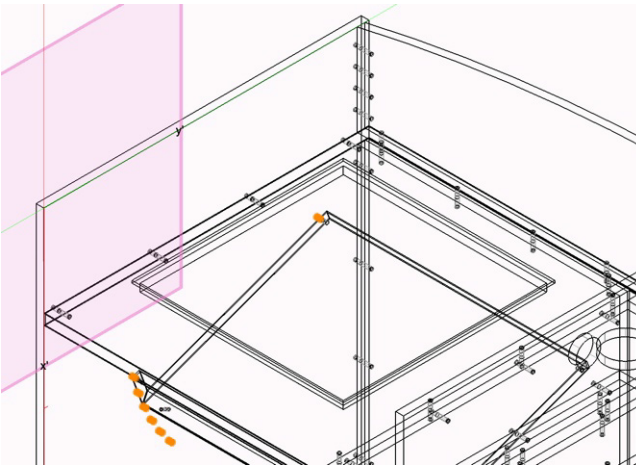


- In the «Snapping» palette disable the «Snap to Distance» option to prevent snapping by mistake.




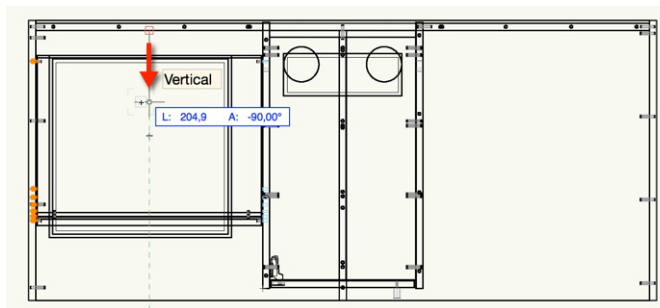
The different arresting pins for the monitor bracket are now finished on one side. Now, we'll mirror them to the other side.

- Select the 7 drillings while holding down the «Shift» key.

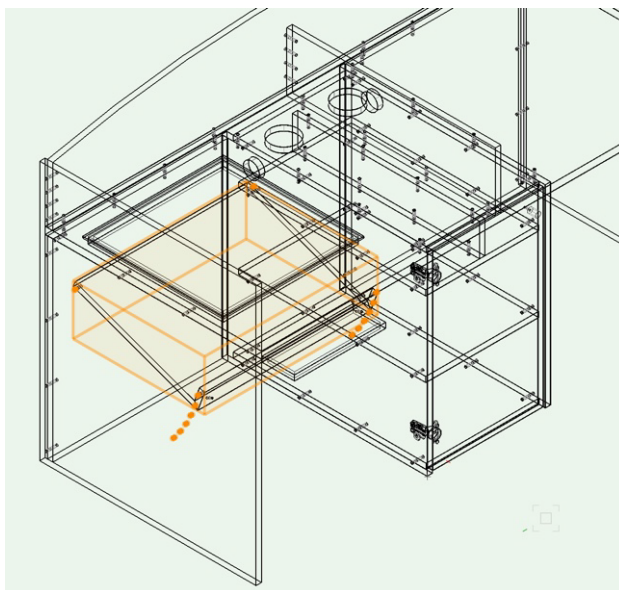


- Press «Ctrl+5» for «Top/Plan» view.

- Open the «Mirror»  tool and draw a mirror axis through the center of the back.

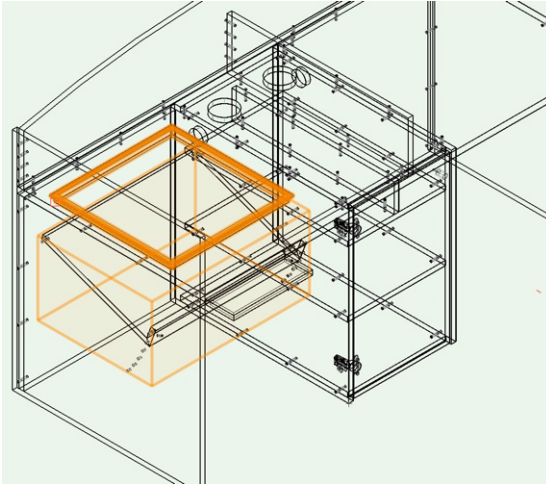



- In the «Left Iso» view in «Wireframe» mode you can see, that all drillings have been inserted correctly.
- Press «X» to activate the «Selection» tool. Select all of the drillings and the bracket. On the «Object Info» palette, you should have 15 objects selected.

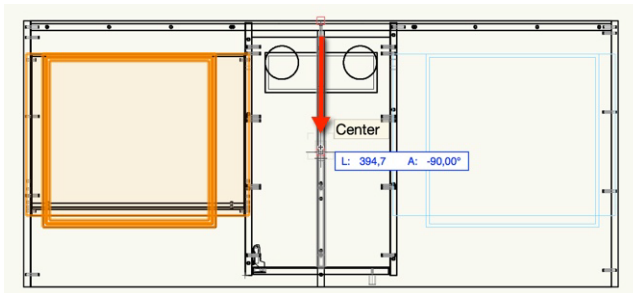


- Create a group by pressing «Ctrl+G». The highlighting extends and the group will protect from accidentally moving any of the individual objects within the group.

- With the group still selected, press the «Shift» key and click on the two contours to add them to the selection. On the «Object Info palette», you will see that you have 3 objects selected.

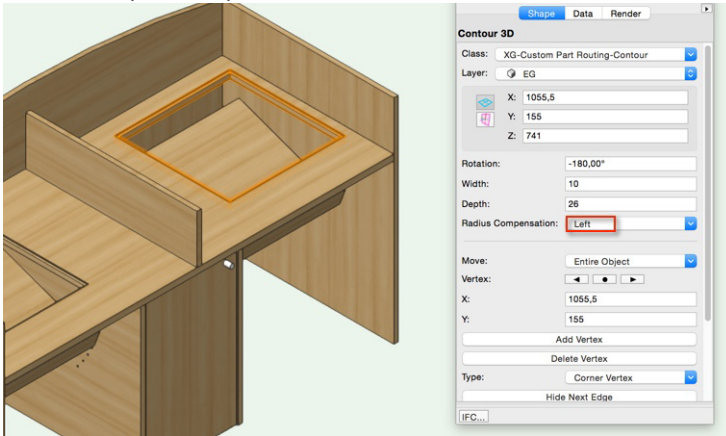


- Press «Ctrl+5» to activate «Top/Plan» view.
- Open the «Mirror»  tool and draw an axis through the center of the entire cabinet.

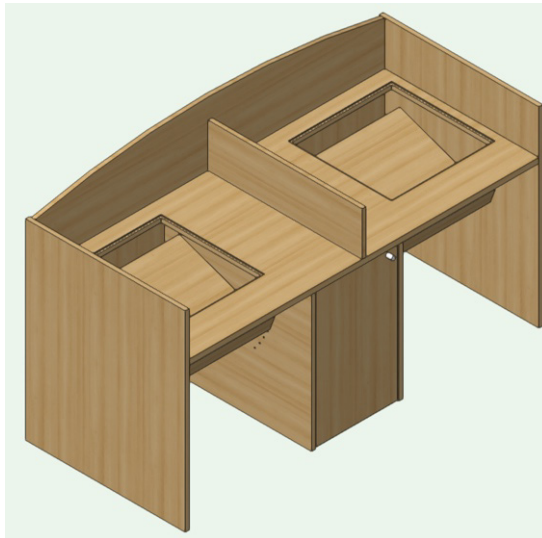


- Check the result in the «Left Iso» view. The drillings of the bracket should be placed properly, however, you will need to switch both radius compensation options of the

contours. So, choose the «Selection» tool, select the first contour, and swap the radius compensation. Repeat the process with the second contour.




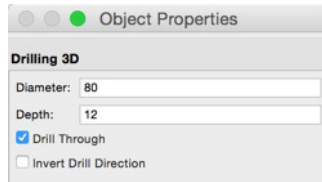
- When finished, the brackets should look like this:



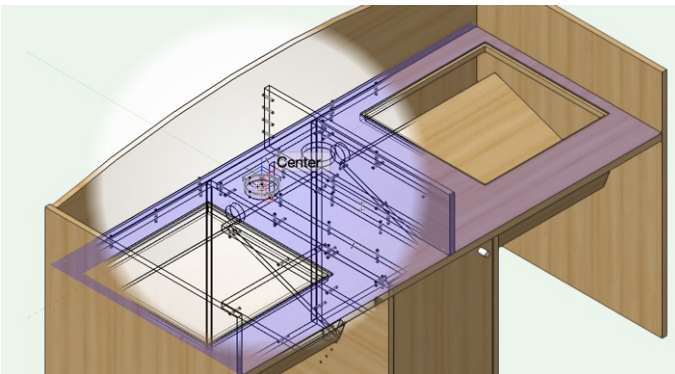
5.4 Cable drillings in the worktop

In the cabinet cover, we have already inserted two drillings for wiring. Now we want to insert matching drillings in the countertop. These should therefore have the same center, but a diameter of only 80.

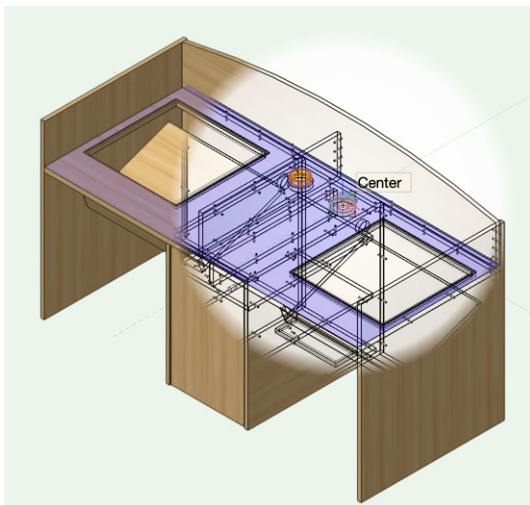
- In the «interiorcad» tool set, open the «Drilling 3D»  tool and set the preferences as shown:.



- Hold down the «B» to enable the X-Ray Select Mode and click the «Center» of the left drilling.



- Change to «Right Iso» view to place the right drilling in the same way.



- The result should look like this:



6 Constructing the cabinet's back

We now construct a bespoke back panel with ventilation slots and fasten it with a self-created fitting.

Beginners can skip this chapter and proceed directly to the BOM output.


6.1 Create a Custom Part

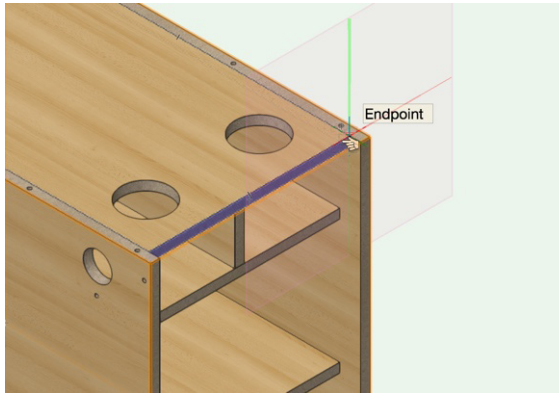
For clarity, we will use the following steps to create a group, which we can use to hide other elements around the group, when editing.

- Select the cabinet.
- Press «Ctrl + G», to create a group.
- Double-click the group to enter it. In «Right Rear Iso» view it looks like this:

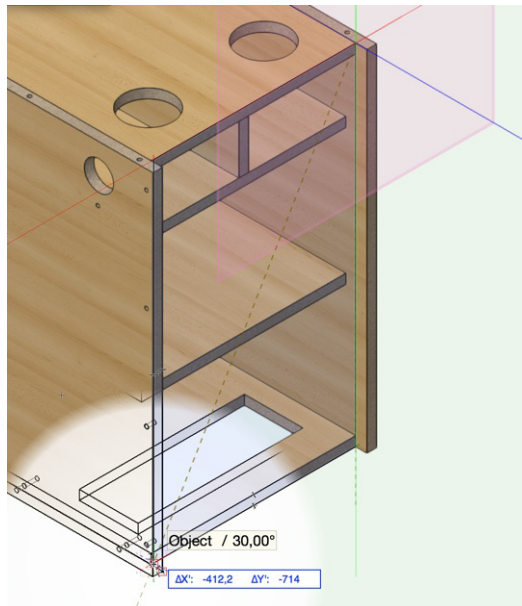


- The back panel with the associated fittings will be created directly within the group. Then the back panel will be constructed from a Custom Part 3D on the working plane of the recessed bottom panel.

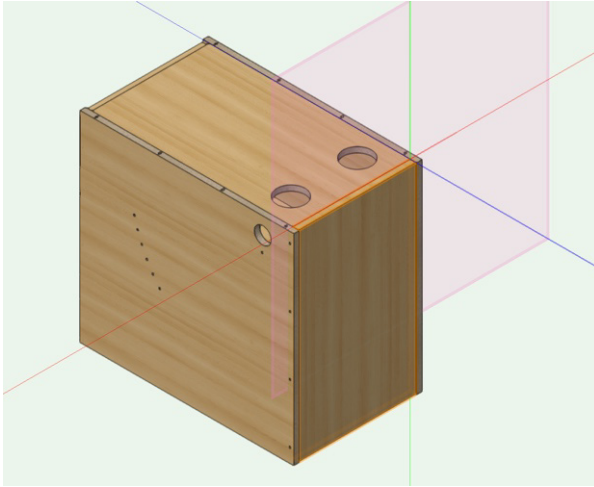
- Open the «Set Working Plane».  tool and set a Working plane on the upper edge of the cabinet as shown below.



- Then draw a rectangle from top right to bottom left. The «X-Ray-Select Mode» (Key «B») will help you to find the point at the bottom left.



- Convert the rectangle to a «Custom Part 3D». Then click the «Construction» button on the «Object Info» palette and assign the material favourite «Beech Sawn Veneer». The result should look like this.



- Click «Exit Group» to see the whole worktop again.

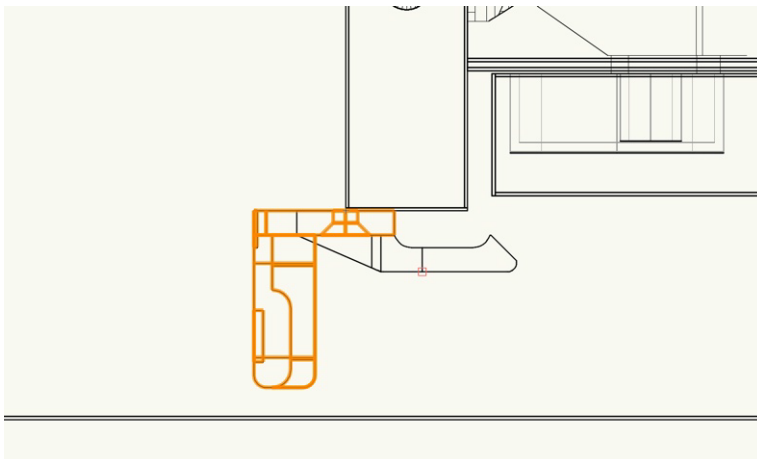
6.2 Create fitting

Note: During the interiorcad 2019 version, there will be some KEKU fittings that can be positioned via the «Special Connector» method of the «Simple Connector 3D» tool like wooden pins. So it's worth installing updates and new libraries. Nevertheless, it does not hurt to learn how to create simple fittings yourself:

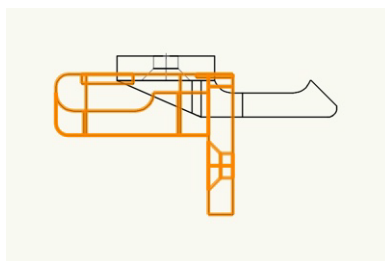
An interiorcad fitting consists of its 3D geometry and CNC machining. The 3D geometries are now available to download from most fitting manufacturers. You can simply load the appropriate DXF / DWG files from their websites, import them into interiorcad and add the CNC machinings.

- The Step-files for the KEKU fitting can be downloaded on the Häfele website. We also added them as «Board.stp» and «Side.stp».
- Press «Ctrl+5» to get into Top/Plan view.

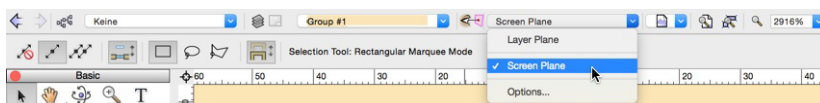
- Locate the two STEP files in your Windows Explorer or Mac Finder and drag them to your Vectorworks interiorcad drawing area. The geometries are automatically imported. If you don't see the geometries, use the shortcut «Ctrl + 3».



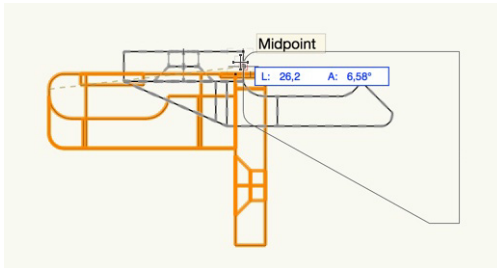
- Select both parts of the fitting and press «Ctrl+G» to add them to a group. Enter the group with a double-click.
- Then, select the board part (bottom left). To fit to the side part, it must be rotated 90 degrees clockwise and then be moved to the appropriate location.
- Press «Ctrl + Shift + R» for clockwise rotation.



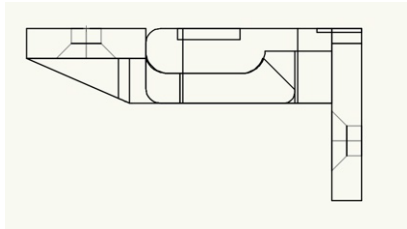
- In the View bar change to «Screen Plane» alignment. This causes that you can move the board only in the visible 2D directions.



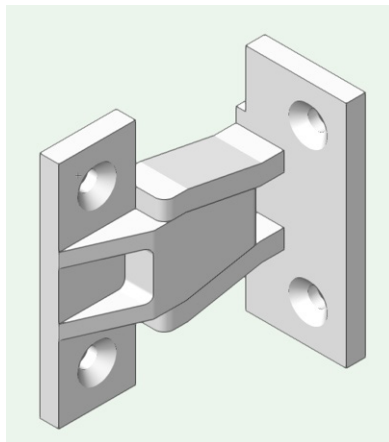
- Click the «Endpoint», and move the mouse to the «Midpoint» while holding down the mouse key.



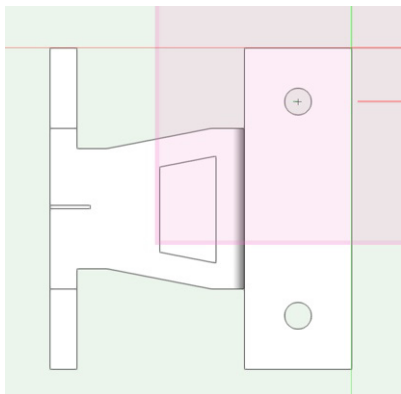
- In «Top/Plan» view the fitting should look like this...



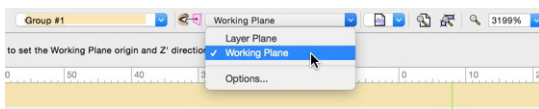
- ...and in the view «Left Iso» it looks like this. Perfect, but the drillings are still missing:



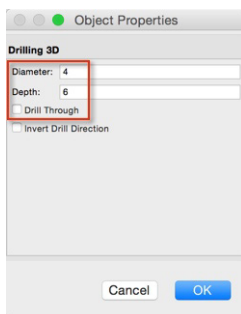
- Change to the «Back» view and set a working plane on the surface.



- In the «View» bar, switch the active plane to «Working Plane».

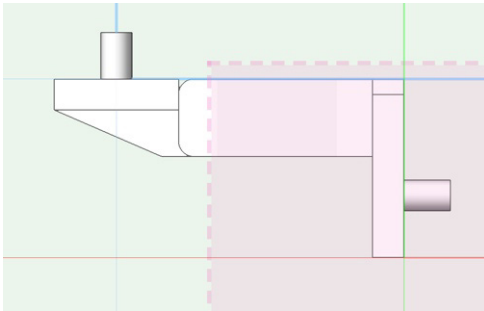


- Open the «Drilling 3D» tool. In the preferences, enter a «Diameter» of 4 and a «Depth» of 6.

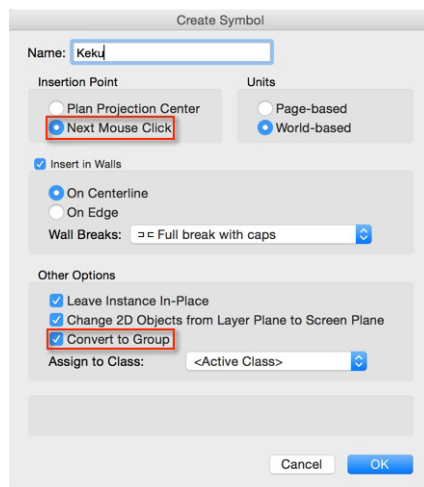


- Click into the center of the holes, while holding down the «Shift» key. The «Shift» key inverts the drilling direction to go from the fitting into the panel.
- Repeat the procedure in «Right» view for the other holes. Don't forget to set a new Working Plane.

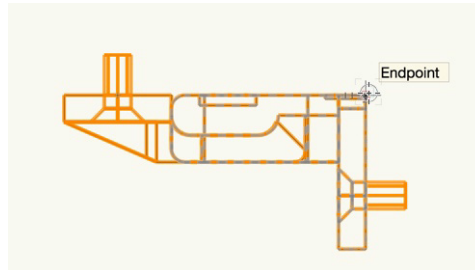
- When finished, it looks like this in «Top» view.



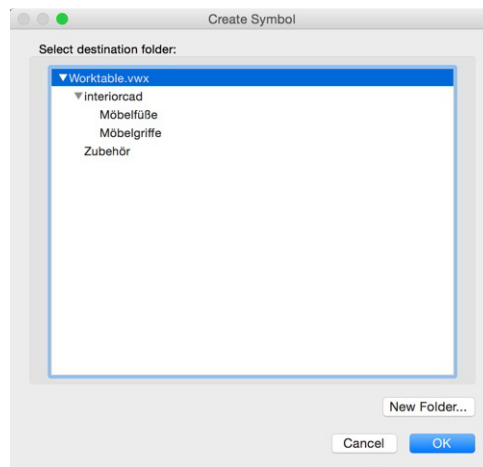
- Press «Ctrl+5» for «Top/Plan» view.
- Select all objects and choose «Modify > Create Symbol». The Insertion Point should be set to «Next Mouse Click». Furthermore, the symbol should be «Converted to Group» when placed in a drawing. All other settings should be as shown below.



- Now select the corner at top right, which will later be between the side wall and the back wall of the cabinet as the insertion point.



- Click «OK». This will save the symbol in the current document.



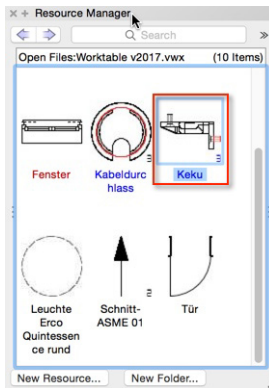
- The symbol has now been created. If you have experienced difficulty with this part of the tutorial, there is an example symbol named Keku in the template file.

6.3 Insert Keku fitting

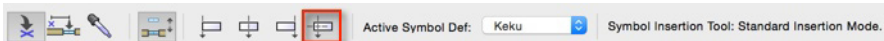
The fitting can now be inserted:

- Double-click the cabinet to enter the group.
- Zoom to the left of the cabinet's back.

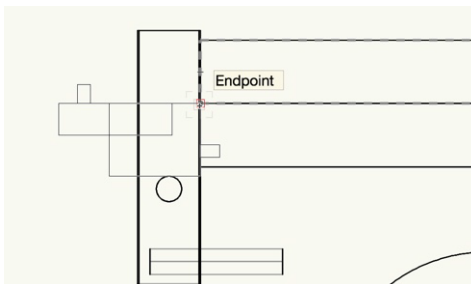
- In the «Resource Manager», double-click the «KEKU» fitting.



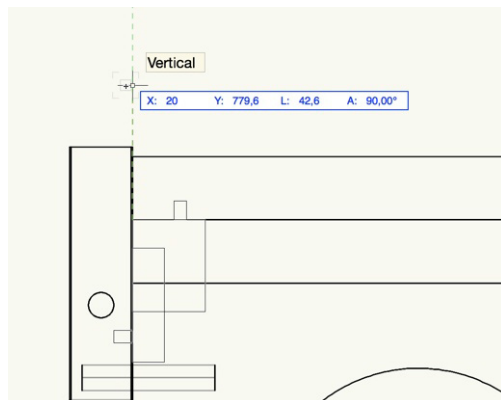
- In the «Tool bar», enable the «Standard Insertion Mode».



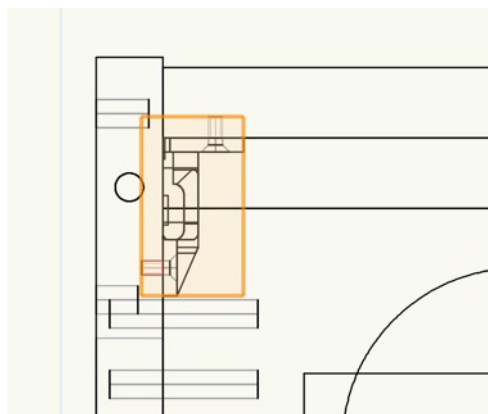
- In the «Top/Plan» view click the edge between left side and back panel - The Insertion Point of the symbol will be placed in this edge.



- Move the mouse to the top, to rotate the symbol into position. Click as soon as the cue «Vertical» appears.

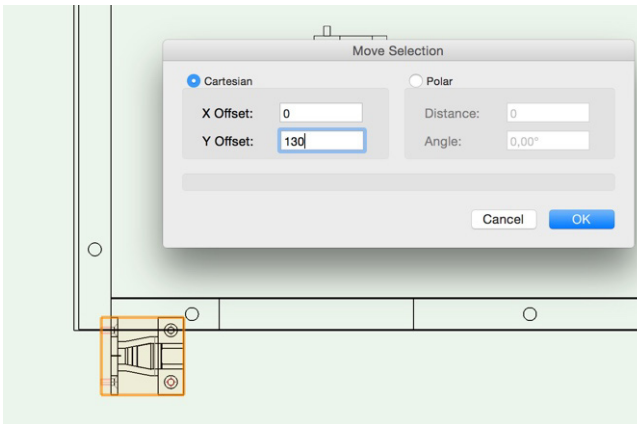


Seen from above, the fitting appears to be inserted correctly. However, the z-dimension is not defined yet. One indication of this are the red drillings which shows that the drillings are not connected to a cabinet or Custom Part.

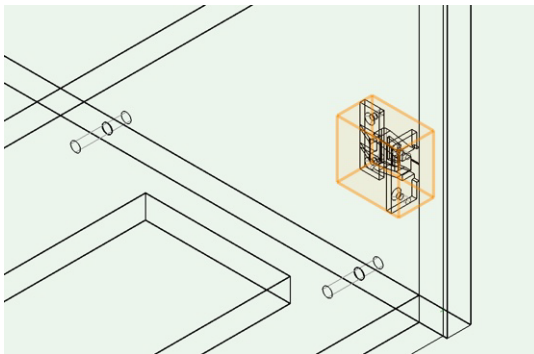


- Change to «Left» view.

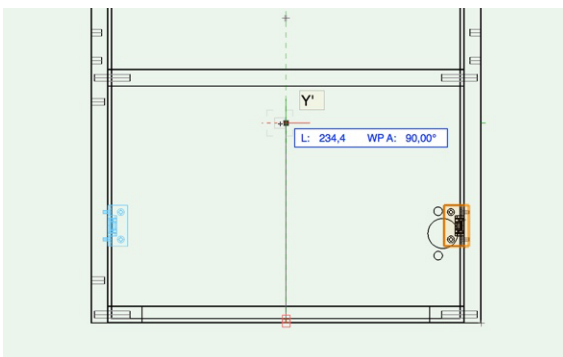
- Press «Ctrl + M» and enter «130» for Y Offset.



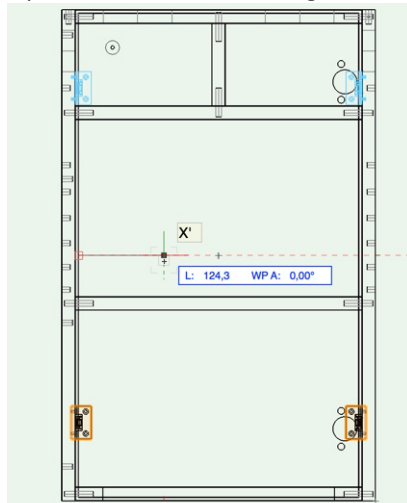
- In «Right Rear Iso» view you can check, that the height is perfect now.



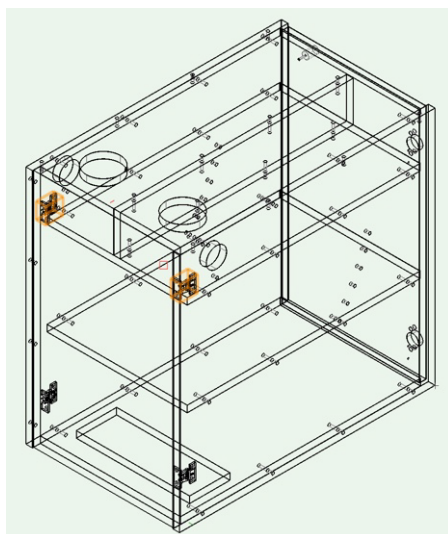
- In the «Back» view, mirror the fitting. Draw a mirror axis from the center of the back panel's lower edge upwards.



- Then activate both KEKU fittings and mirror them to the top. Make sure to snap at the center of the back panel. Otherwise the fittings won't be inserted correctly.




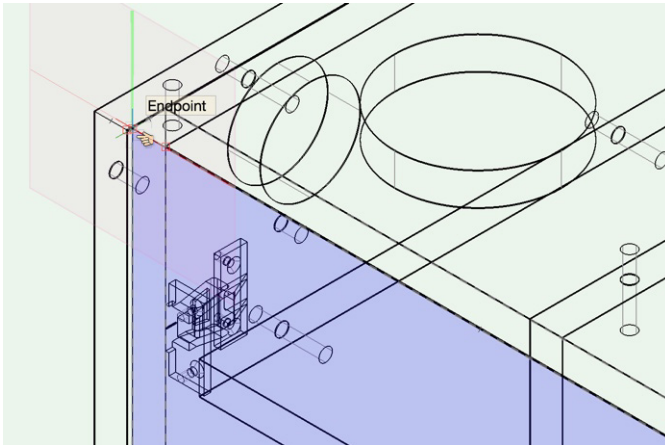
- In «Left Rear Iso» view it looks like this. You have done everything correctly, if none of the drillings is highlighted red.



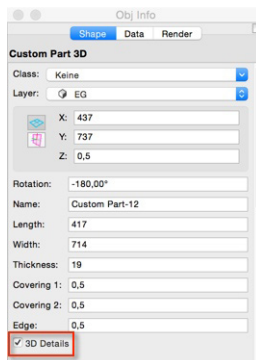
6.4 Ventilation holes


At the end of the construction part of the tutorial, we'll place five vents for every computer. For this we'll convert lines to Dado / Rabbet 3D objects.

- In «Left Rear Iso» view set a «Working Plane»  on the back panel. It's important to set the working plane on the back (and not on the side) to connect the dados with the Custom Part.

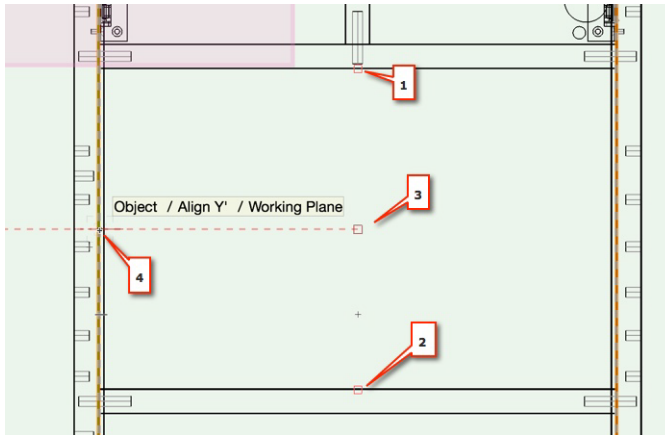


- To make the dados visible in the Custom Part, select the back panel and check «3D Details» in the «Object Info palette».

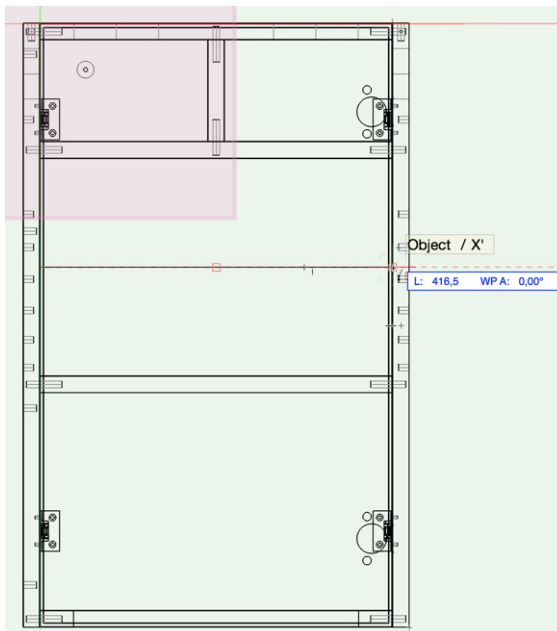


- Open the «Line»  tool.
- Change to «Back» view.
- First we create the dados on the top tray: Align on the «Midpoint» of the underside of the upper tray, then on the «Midpoint» of the upper side of the lower bottom. A snapping line between the two points is displayed. Locate the «Midpoint». Hover

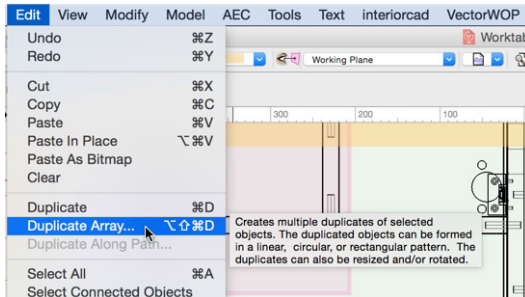
subsequently left and click on the edge. So you have transferred the middle between the two compartments on the edge. Which point is snapped on the cabinet walls, is not as important.



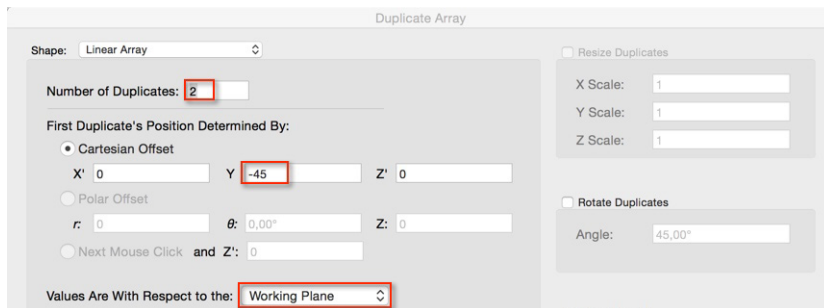
- Draw a line to the right side and click again.



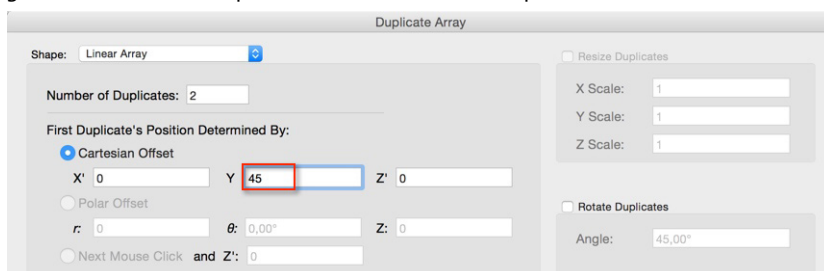
- In the menu click «Edit > Duplicate Array». With this command you can create one or more duplicates of an object in a defined distance.




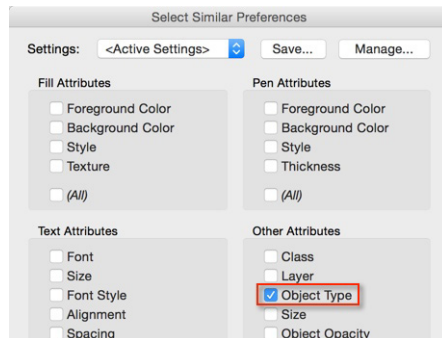
- Create two duplicates, which are moved «-45mm» down. The values are relative to the «Working Plane».




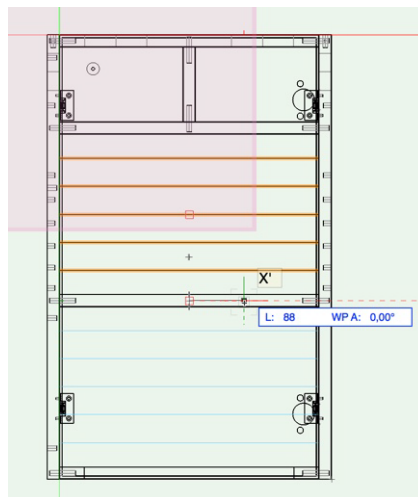
- Select the line in the middle of the tray and run the «Duplicate Array» command again. This time the duplicates should be moved up.




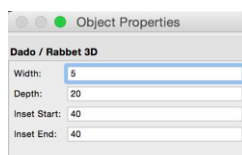
- Select the 5 lines. A tip: Instead of selecting the lines while holding down the «Shift» key, you can also use the «Select Similar»  tool with the preference «Object Type» to select them with a single click..



- «Mirror»  the lines on a mirror axis drawn through the panel below.



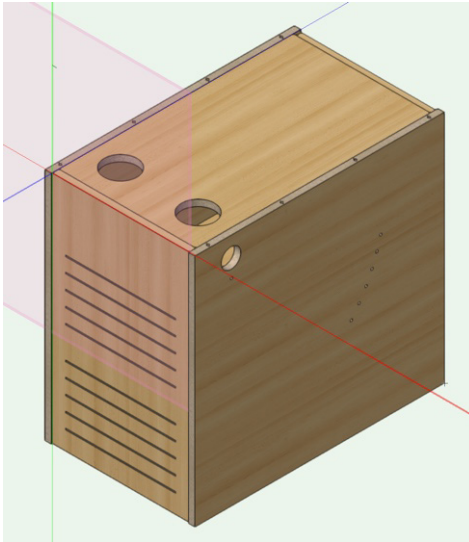
- Select all 10 lines and open the «Dado/Rabbet 3D»  tool in the «interiorcad» tool set.
- In the tool's preferences set the width to «5», the depth to «20» and the start and the end of the inset to «40».



- Click in the «Tool bar» to convert the lines to dados.



- The ventilation holes are finished. Exit the group.

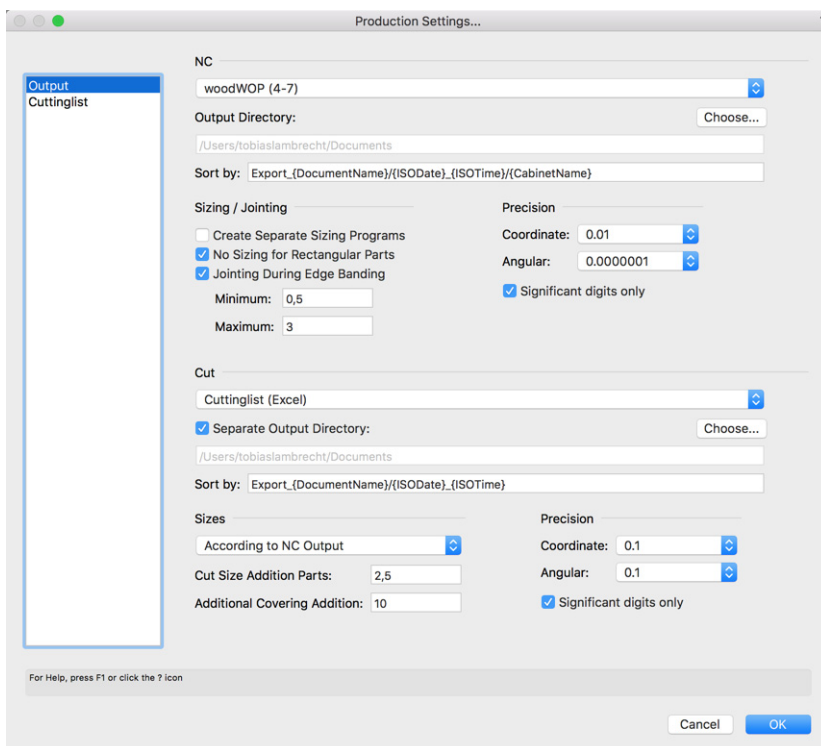


7 Cutting list

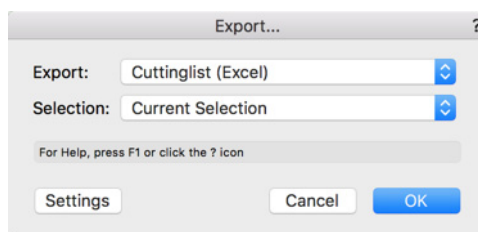
The construction includes all the information required to create a cutting list. We just need to export it.

- Press «Ctrl + A» to activate all objects.
- Choose «interiorcad > Exports > Cutting List Export».

- The export settings can be adjusted:



- Select «Cuttinglist (Excel)» and «Current Selection».



- A folder containing the file opens. You can open it into your spreadsheet program.

- At the moment the board names «Custom Part-1...n» are not expressive yet.

Cuttinglist.csv - OpenOffice Calc

Finden

Project ID

D	E	F	G	H	I	J	K	L	M
Cabinet Name	Board	Description	Length	Width	Thickness	Count	Unique Name	Edge ID 1	Edge Thickness
	Chipboard-19	Custom Part 3D	979	819	19	1	Custom Part-2	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	979	819	19	1	Custom Part-3	Beech-24*0.5	
Cabinet-1	Chipboard-19	Side Left	735	779	5	19		1 Side Left-1	Beech-24*0.5
Cabinet-1	Chipboard-19	Side Right	735	779	5	19		1 Side Right-1	Beech-24*0.5
	Chipboard-19	Custom Part 3D	734	666	19	1	Custom Part-5	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	734	665	5	19		1 Custom Part-4	Beech-24*0.5
Cabinet-1	Chipboard-19	Door	724	428	19	1	Door-1	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	659	509	19	1	Custom Part-8	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	659	509	19	1	Custom Part-10	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	659	94	19	1	Custom Part-9	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	659	94	19	1	Custom Part-11	Beech-24*0.5	
Cabinet-1	Chipboard-19	Shelf Top	437	733	5	19		1 Shelf Top-1	Beech-24*0.5
Cabinet-1	Chipboard-19	Shelf Bottom	437	733	5	19		1 Shelf Bottom-1	Beech-24*0.5
Cabinet-1	Chipboard-19	Shelf	437	712	19	1	Shelf-1	Beech-24*0.5	
Cabinet-1	Chipboard-19	Shelf	437	712	19	1	Shelf-0	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	436	733	19	1	Custom Part-12	Beech-24*0.5	
	Chipboard-19	Custom Part 3D	338	1769	19	1	Custom Part-6		
	Chipboard-19	Custom Part 3D	238	790	2	19		1 Custom Part-7	Beech-24*0.5
Cabinet-1	Chipboard-19	Partition	140	712	19	1	Partition-1	Beech-24*0.5	
	Chipboard-Beech-25	Custom Part 3D	1769	819	25	1	Custom Part-1	Beech-24*0.5	

- The name can be changed in the «Object Info palette».

Shape Data Render

Custom Part 3D

Class: Keine

Layer: EG

X: 437

Y: 737

Z: 0.5

Rotation: -180,00°

Rotate X 90°

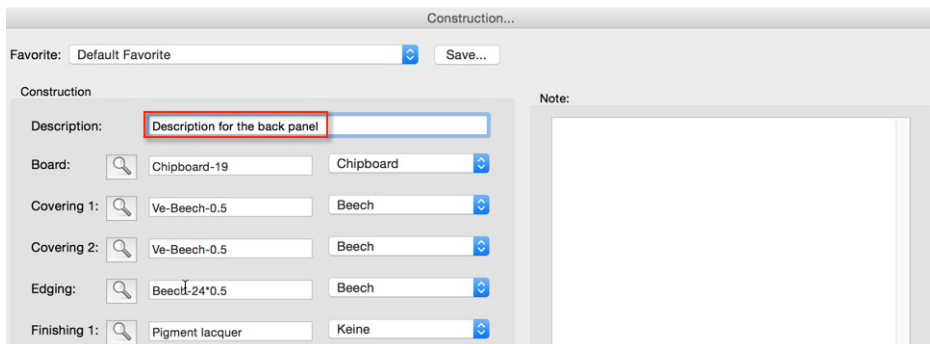
Rotate Y 90°

Rotate Z 90°

Name: Custom Part-12

Length: 417

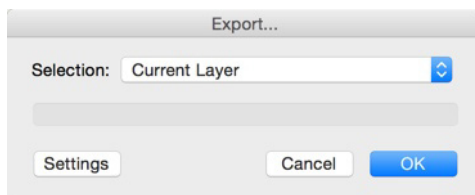
- The description is changeable in the «Construction» dialog – click the «Construction» button in the «Object Info palette».



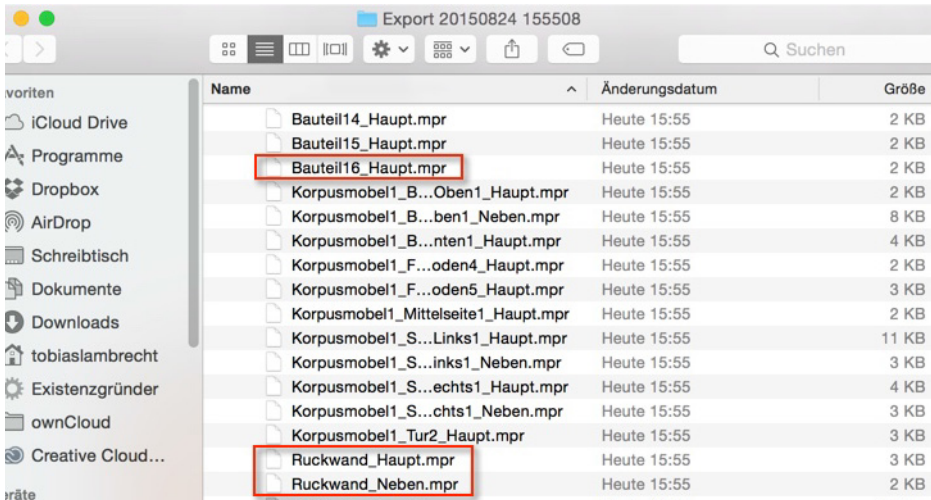
8 CNC-Export

The CNC export is as easy as the cutting list export. However, this can actually be used by VectorWOP customers only. In addition, a one-time adjustment to your machine configuration is required. Then it will work like this:

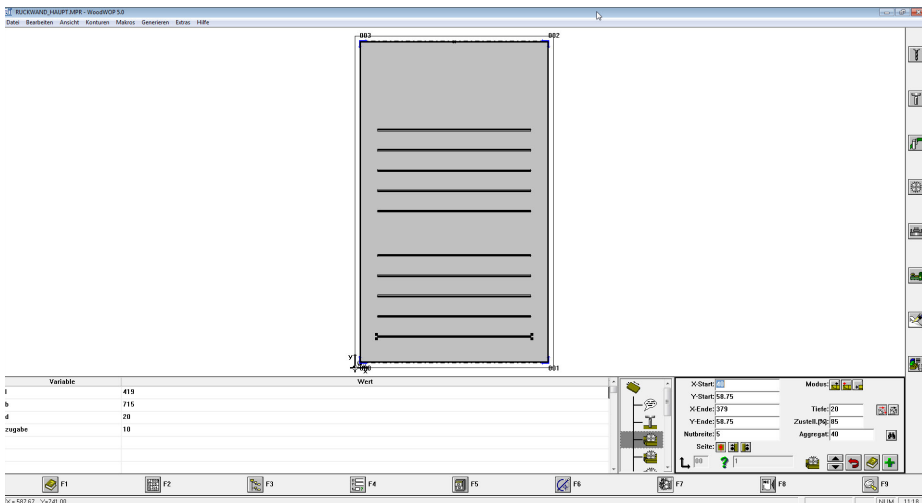
- Choose «interiorcad > Exports > NC Export».
- You should test your machine configuration at the beginning very thoroughly.
- To export all parts of the worktable select «Actual Layer». Choosing this option, you don't have to activate all parts before.



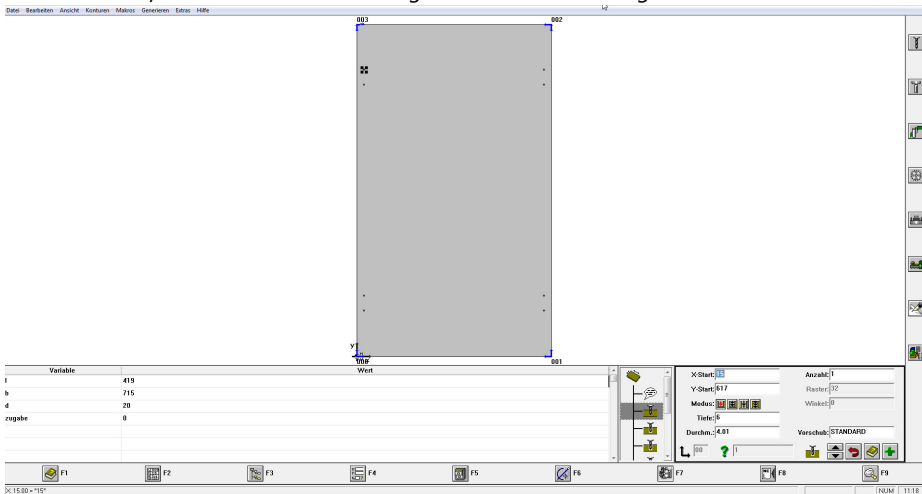
- You immediately get a folder with your CNC programs (in this example for «WoodWOP»). The name in the «Object Info palette» is used as the file name. If you don't use names, it is difficult to distinguish programs as you see in the list.



- Double-click to open a program in «WoodWop». This is the back panel with the ventilation holes.

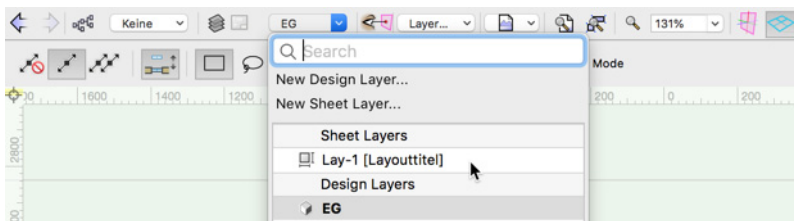


■ And here you can check the drillings for the KEKU fittings.

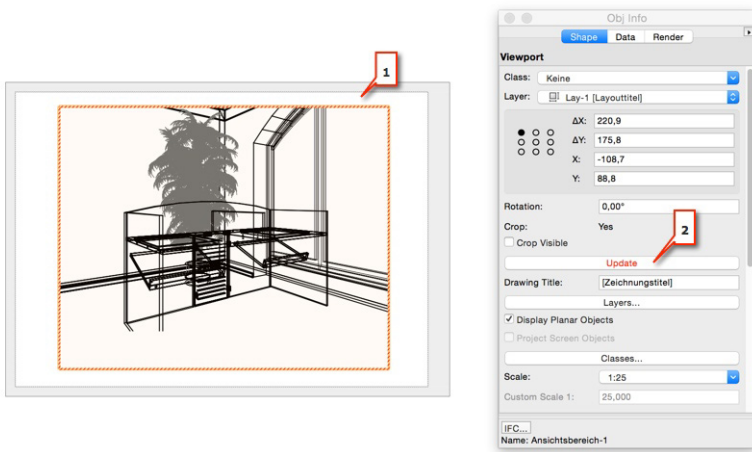


9 Rendering

Congratulations! You've done it. The worktable is now completed. Switch to the Sheet layer «Lay-1».



Select the viewport. Then click the «Update» button in the «Object Info palette» to render the scene. The high-resolution rendering can take some time.



To see the room in the background on the Design Layer the class «Grundriss» has to be enabled.