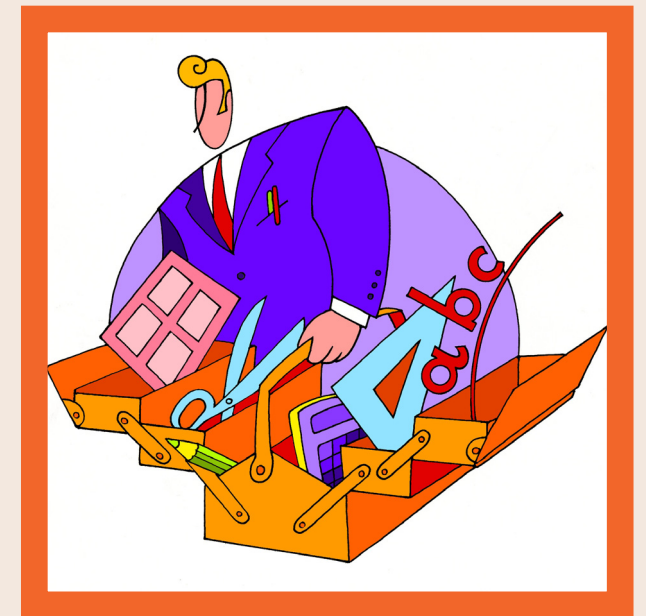


ArchiTools



PLUG-IN FOR ARCHICAD®

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Cigraph S.r.l.
Via Orsato, 38 - 30175 VE/Marghera
Tel. +039 041 93 23 88
Fax+039 041 92 00 31
Internet: <http://www.cigraph.com>
e-mail: archisuite@cigraph.com

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ArchiTools

User Manual

ArchiTools has been conceived as a sort of multipurpose Swiss penknife.

The palette is in fact designed to bring together a variety of different but valuable commands and functions.

Our customers often ask us to develop single-command procedures to simplify their work and improve productivity, but often we are unable to meet these requests as developing an entire add-on to approach a problem resolved with a single command would have little sense.

At the same time, thanks to Graphisoft and luckily for all users, ArchiCAD is becoming ever more powerful version after version and functions which previously neglected certain fields of application are gradually being integrated.

This means that as the years go by, certain add-ons become ever more obsolete.

One emblematic example is **ArchiRuler**, in the past one of the most successful add-ons as it fulfilled all 2D drawing needs, at the time somewhat neglected in ArchiCAD.

Today ArchiCAD's 2D functions are much more powerful and the majority of procedures provided by **ArchiRuler** are therefore obsolete (some such as Guide Lines are now actually provided by ArchiCAD as a native tool).

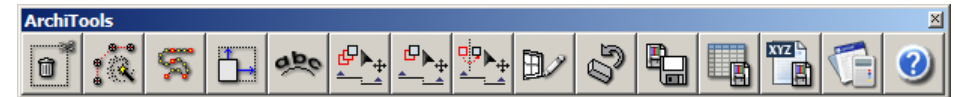
At the same time, some **ArchiRuler** procedures are still useful as they provide functions not yet fully covered by ArchiCAD.

Keeping an add-on "alive" for just two or three commands is obviously not worth the effort, so where can these "remaining" commands be inserted?

These problems are now a thing of the past as **ArchiTools** brings all these different commands together.

The ArchiTools tool palette

The **ArchiTools** tool palette provides access to all the commands provided by this add-on:



From left to right, the commands currently available are:

- Delete marquee area
- Distribute
- Simplify polyline
- 2D asymmetrical scaling
- Text on polyline
- Multiply (Section/Elevation)
- Move a copy (Section/Elevation)
- Mirror a copy (Section/Elevation)
- Custom window
- Rotate object
- Save rotatable object
- Tabbed text import (Table object)
- Import list of points
- List areas
- Help

Use of these commands is explained one by one below.

Delete marquee area

This tool groups together a number of very useful functions associated with use of ArchiCAD's Marquee Area tool.

Important: *if the marquee area defined is in multi-story mode, the procedure will be performed on all stories in the project.*

Only the 2D primitives are deleted. ArchiCAD 3D construction elements are not affected in any way.

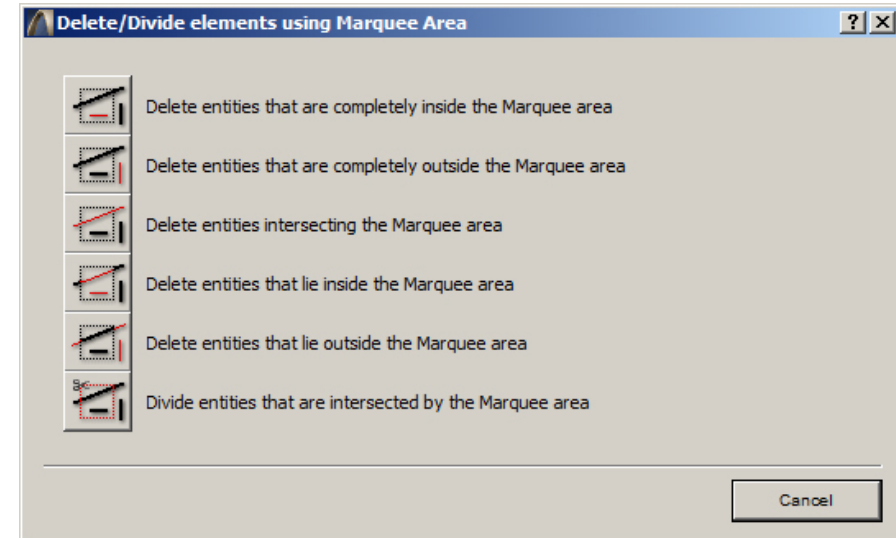
To use the command, a marquee area must already have been defined on the plan worksheet using any of the methods offered by ArchiCAD:

- polygonal marquee area
- rectangular marquee area
- rotated rectangular marquee area

As explained above, the procedure is available in both single and multi-story mode.

Once the area concerned has been defined using the Marquee Area tool, click on the **Delete Marquee Area** tool icon.

The following dialog box appears listing the various options provided by the programme:



The six buttons each run one of the six procedures available, while the Cancel button closes the dialog without continuing the procedure.

Delete elements completely inside marquee area

This command deletes only the elements completely inside the marquee area.

Delete elements completely outside marquee area

This command deletes only the elements completely outside the marquee area.

Delete elements intersecting marquee area

This command cancels only the elements intersecting the marquee area.

Delete elements and parts of elements inside marquee area

This command deletes all the elements completely inside the marquee area and parts of the elements partly inside the area. In practice, elements inter-

secting the marquee area will be divided at the intersection points and the part inside the area will be deleted.

Delete elements and parts of elements outside marquee area

This command deletes all the elements completely outside the marquee area and parts of the elements partly outside the area. In practice, elements intersecting the marquee area will be divided at the intersection points and the part outside the area will be deleted.

Divide elements intersected by marquee area

This command cuts/divides elements intersected by the marquee area.

Important: To function correctly, the edge of the marquee area defined using previous **ArchiTools** functions must not coincide with the outlines of any element on the current worksheet.

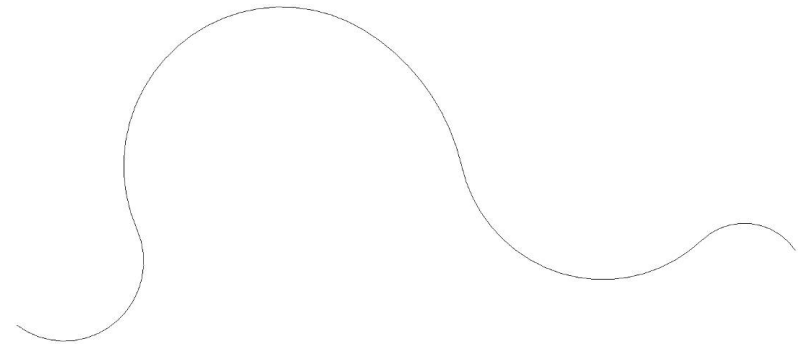
Distribute

This command is similar to the ArchiCAD "Multiply" command.

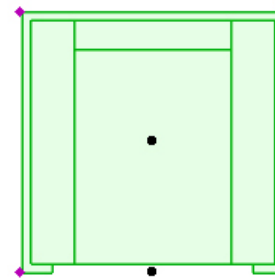
In common with this familiar command, it multiplies the selected element. In this case however, a path (straight and/or curved) along which the elements will be distributed must first be defined and assigned. The distribution method is configured in a special dialog box.

Let's take a look at how it works:

- First use an ArchiCAD line/arc/circle/polyline/spline to define the path along which the element will be distributed:

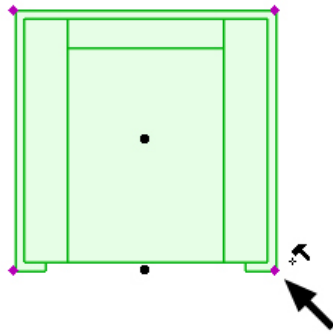


- Select the element (or elements, as you can also distribute a number of elements simultaneously) you want to distribute along the path



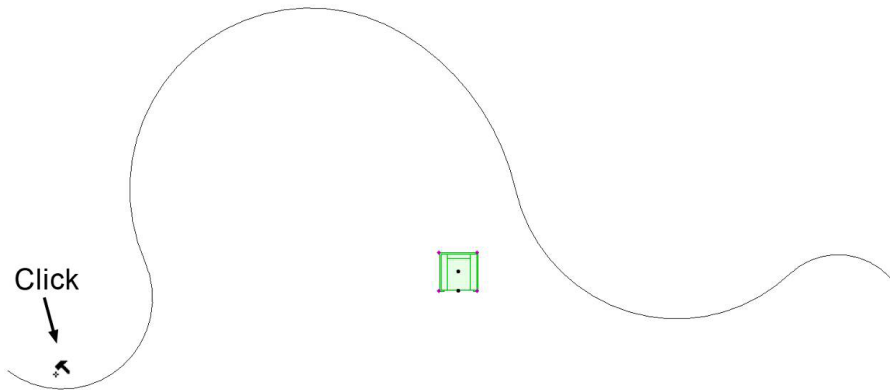
- Click on the **Distribute** tool icon in the ArchiTools palette

- the cursor changes shape to show that ArchiTools is waiting for data input from the user: click on the reference point of the selected element. This will be the insertion point of the element to be distributed, in other words, the point which moves along the path:

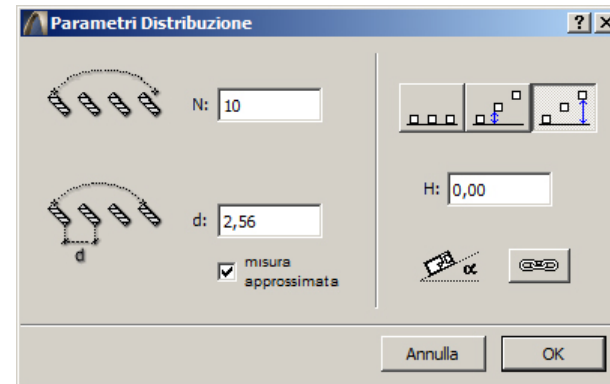


Click

- Finally, click on a vertex of the path, or near the vertex where you want distribution of the selection to begin:



A dialog box where you can configure the distribution parameters now appears:



First define the distribution of the selection:

- by the number of elements along the path, or
- by indicating a spacing which must be less than or equal to the maximum dimension proposed by default

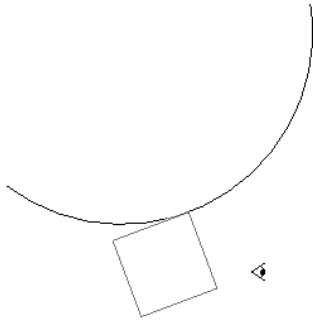
When the **approximate size** check-box is enabled, the distance **d** set by the user is "adjusted" to distribute the elements along the entire path.

If this check-box is disabled, all the elements will be spaced at exactly the distance set by the user.

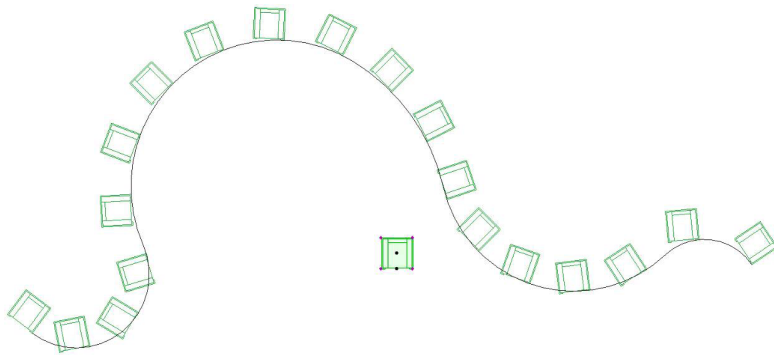
The three buttons at the top right can be used to offset the element along the Z axis during distribution. You can assign the spacing, or a total height over which the elements will be distributed.

Finally, when "constrain angle" is enabled, during processing, roto-translation (in other words, placement at a tangent to the path) will not be allowed and the distributed elements will have the same orientation as the original selection.

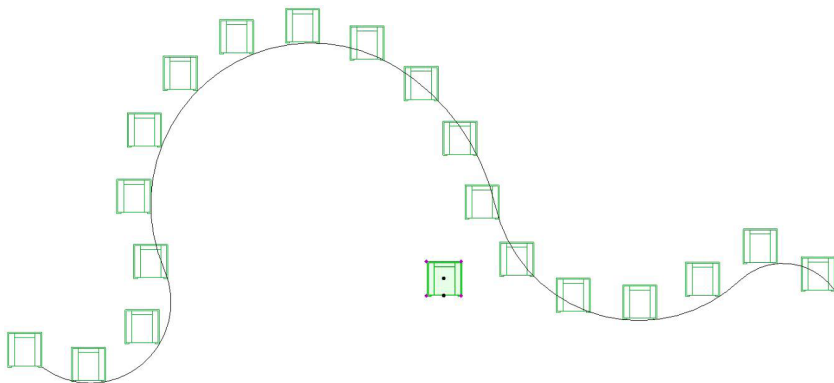
When the dialog is closed, a further click defines on which part of the path the element to be distributed should be placed:



And here is the result of the distribution:



If “constrain angle” had been enabled, the distributed selection would no longer be oriented along the path, but would always retain the same original angle:



Simplify polyline

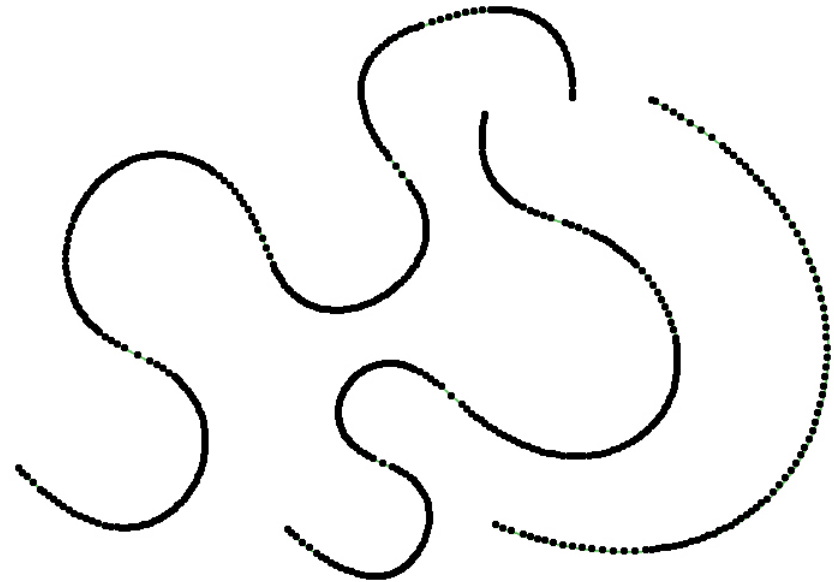
This command allows a selected polyline to be “simplified” by filtering the individual nodes and eliminating those within a certain minimum distance (filter) defined by the user.

This procedure is extremely useful when, for example, drawings are imported from other CAD programmes where the splines or curves are often converted into thousands of small successive segments.

Managing and viewing these groups of thousands of individual elements make the drawing slow and difficult to manipulate. Simplifying these elements greatly reduces processing times, lightens the drawing and often has no noticeable influence on the graphic quality of the result.

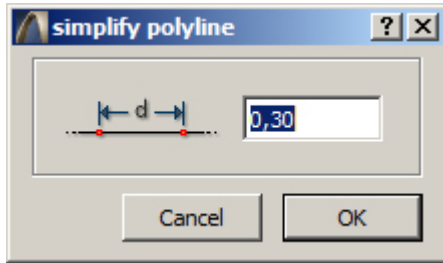
Proceed as follows:

Select the polyline (or polylines) to be simplified

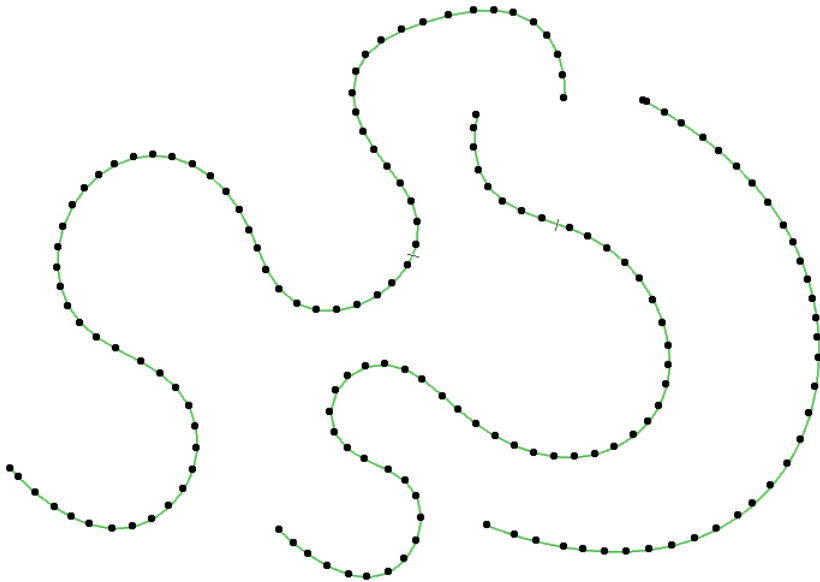


Click on the **Simplify Polyline** tool icon in the ArchiTools palette

A dialog box allowing the filter distance to be set will be displayed:



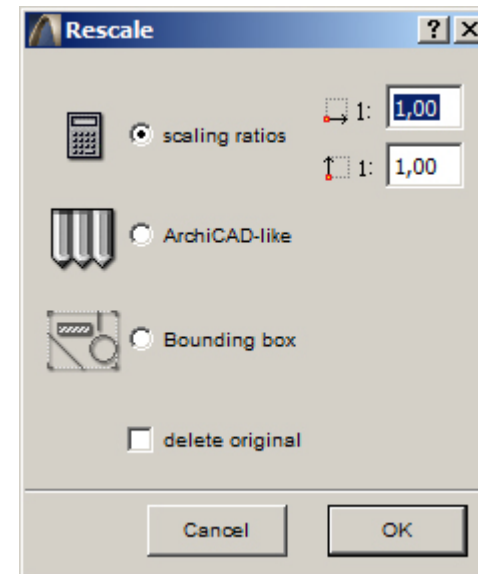
When the filter distance has been defined and the configuration confirmed with the OK button, processing of the selection begins and the simplified polylines are produced immediately:



2D asymmetrical scaling

This command is quite similar to the ArchiCAD Resize command, but in this case, the 2D element can be scaled asymmetrally, in other words, assigning different scale factors to the X and Y axes.

After choosing one or more 2D elements and clicking on the **2D Asymmetrical Scaling** tool icon in the ArchiTools palette, the following dialog box appears, allowing you to set the scaling method to be used:



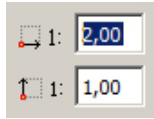
Three methods are available:

- numerical configuration of the scale factors
- ArchiCAD-like
- bounding box

In the last check-box, you can define whether the selected original should be deleted or retained after the scaling operation.

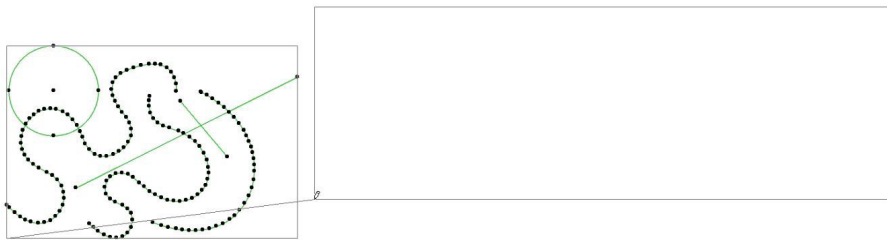
Numerical configuration of the scale factors

In this case, the asymmetrical resizing is defined numerically using the two values controlling the scaling proportion of the original along the X and Y axes:

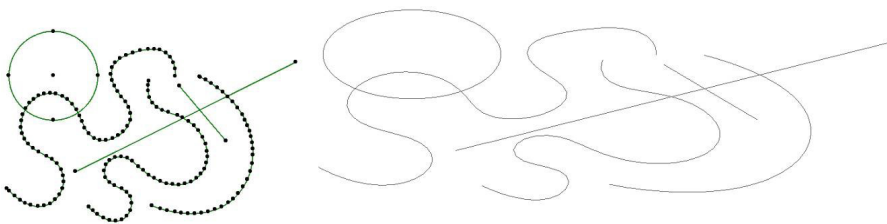


When the values have been confirmed with the OK button, the dialog closes and the programme waits for definition of the point where the resized selection should be inserted.

To do this, the original selection is represented "enclosed" in its bounding box and the cursor in the form of a pencil indicates the position of the new bounding box, scaled with respect to the original:



When you click on the desired point, the scaled result will appear:



ArchiCAD-like

The second scaling method known as **ArchiCAD-like** allows a start and end reference vector to be defined.

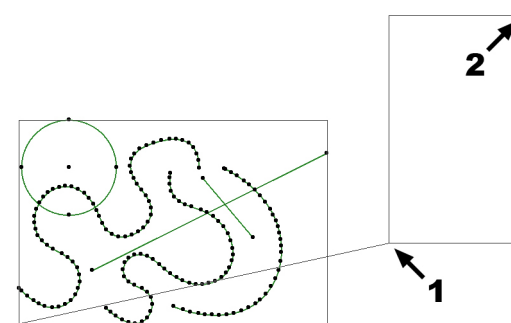
The two vectors determine the scaling proportions.

The first term of the second vector also defines the insertion point of the scaled result.

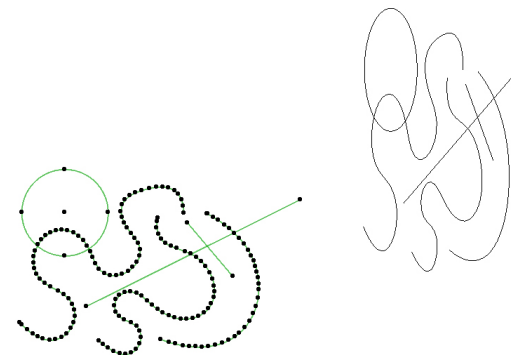
Bounding box

This is perhaps the simplest, or at least the most intuitive, graphic method.

When selection of this method has been confirmed with the OK button, the original selection is shown "enclosed" in its bounding box and the cursor in the form of a pencil waits for the first click to define the insertion point of the scaled result:



After the first click, a second click defines the proportion of the final bounding box and the result appears immediately:



Text on polyline

This command is used to simulate text along the path of a line, arc or polyline. The result will not, in fact, be a text element, but a parametric object representing the text.

This tool in the ArchiTools palette can be used either to create a new element or edit existing elements.

If you click on the tool icon with no active selection, the command will be interpreted as a create new element command and you must then click on the polyline the text must follow.

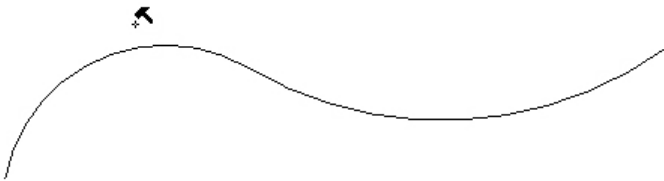
If on the other hand before clicking you have selected one or more **Polyline Text – ArchiTools** object/s, then the object configuration dialog will be displayed and you can edit the elements present in your project.

Create text on polyline

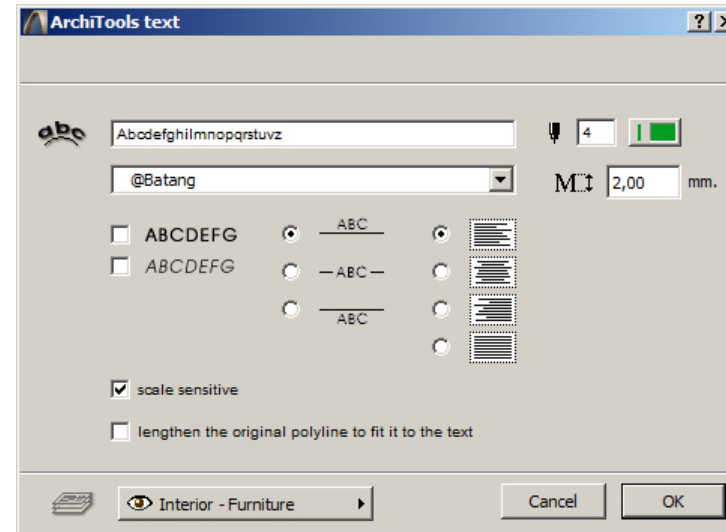
Without an active selection, click on the **Text on Polyline** tool icon in the ArchiTools palette

The cursor changes shape and waits for you to click on the polyline the text must follow.

Be careful where you click. The nearest end will be interpreted as the starting point of the text to be generated:



When the polyline to be used as a path has been defined, a dialog box is displayed where you can configure all the characteristics of the element being created:



In the first field, enter the string of text to be displayed.

Immediately beneath, a pop-up menu allows you to define the font to be used.

Immediately on the right you can define the pen used and the size (in millimetres) of the character.

The controls at the bottom define:

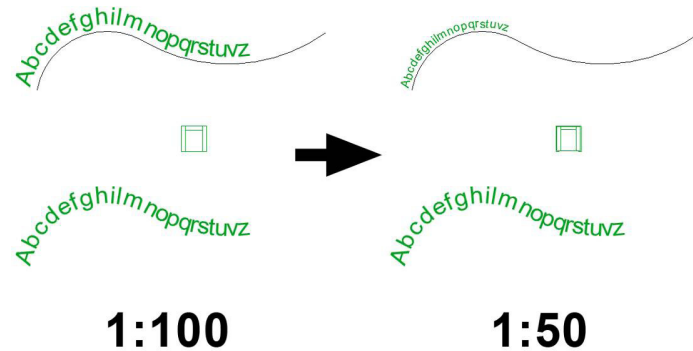
- the style of the text (bold, italic, bold+italic)
- the position of the text with respect to the path (above, in the middle, below)
- the alignment of the text with respect to the polyline

You can use the **scale sensitive** option (enabled by default) to control the appearance of the text:

- when the option is enabled, the size of the text will automatically be adapted/resized when the scale of the model changes.
- when the option is disabled, the size of the text will remain constant even if the scale of the model changes. In this case, the size of the text is given by the unit of the sheet.

The following example shows two text on polyline elements, the one on the top is scale sensitive, the one on the bottom is not.

Their appearance at the original scale (1:100) is shown on the left, while their appearance after changing to a scale of 1:50 is shown on the right.



The last option is only relevant when the length of the text string set exceeds the length of the polyline used as a path. In this case, the text is cut until it fills the entire space of the path.

When the **lengthen original polyline to fit to text** option is enabled, the entire string will be displayed as though the last segment of the polyline used as a path were prolonged as a result.

Here is an example illustrating the two different results obtained with the option enabled and disabled.

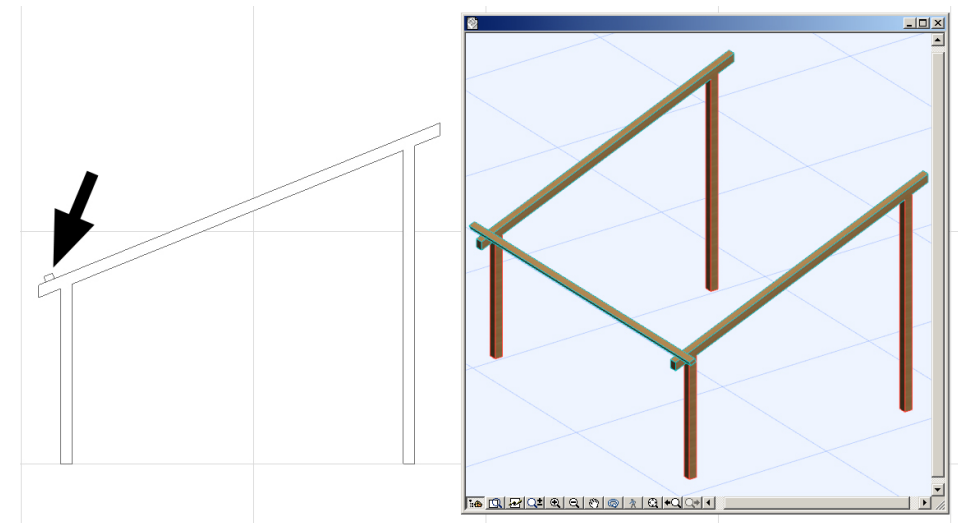


Multiply (Section/Elevation)

This command is exactly the same as the ArchiCAD command, but it can finally be used in Section/Elevation windows as well.

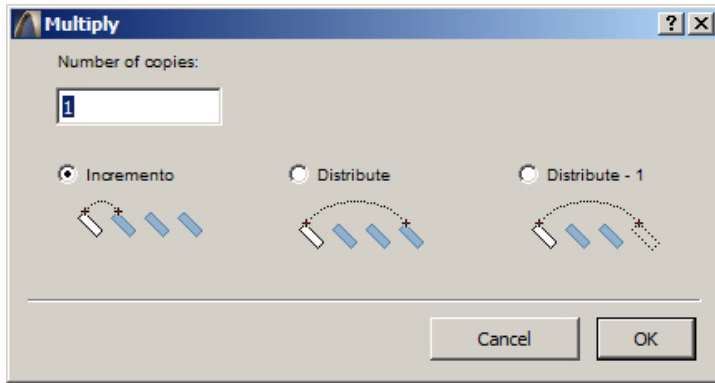
In the following example, we have inserted four posts with two beams and a cross beam which we want to multiply to complete our roof (indicated by the arrow in the image on the left).

The operation could obviously be performed directly in the 3D window using the ArchiCAD command, but we thought the designer might often find it more convenient to work in Section/Elevation windows.



We then activate the relative Section/Elevation window, select the element (or elements) to be multiplied and click on the Multiply tool icon in the ArchiTools palette.

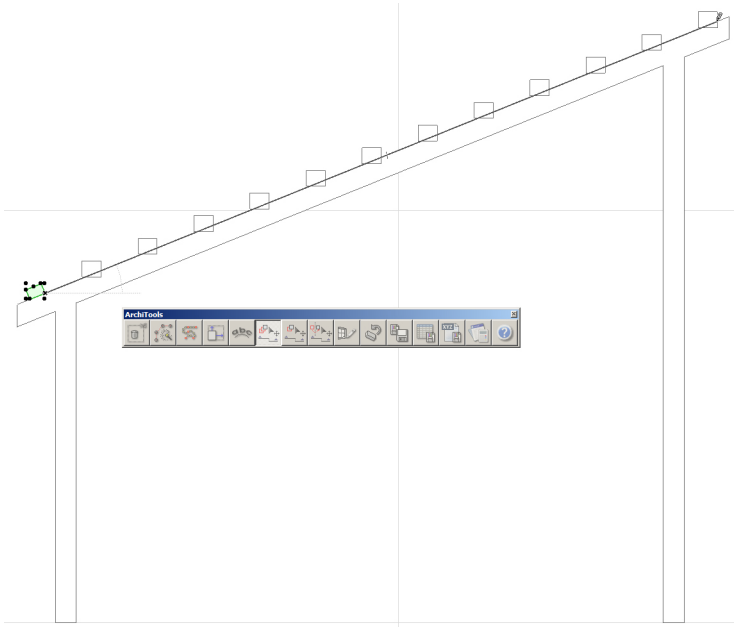
A window to select the Multiply method is displayed.



The options are the same as those in the ArchiCAD Multiply dialog.

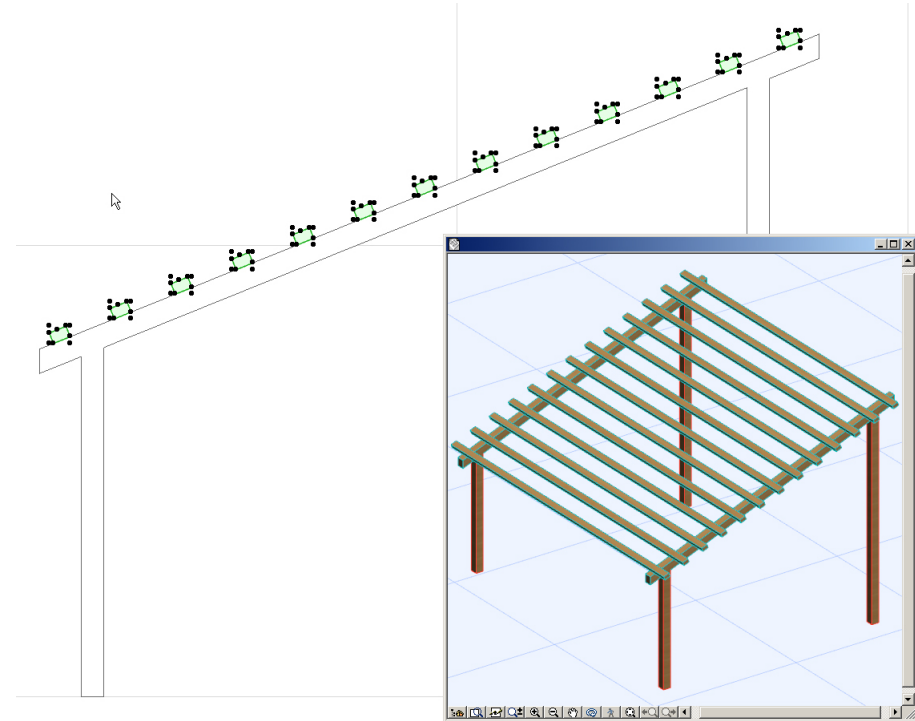
In our example, we enter 12 as the number of copies and enable the **Distribute** option as the copy creation method, then confirm the settings with the OK button.

Now, exactly as in ArchiCAD, the distribution vector is defined with two clicks:



After the first click, previews appear showing how the copies will be arranged according to the position of the cursor.

When the vector has been defined, the copies are immediately inserted and the final result is precisely what was requested:



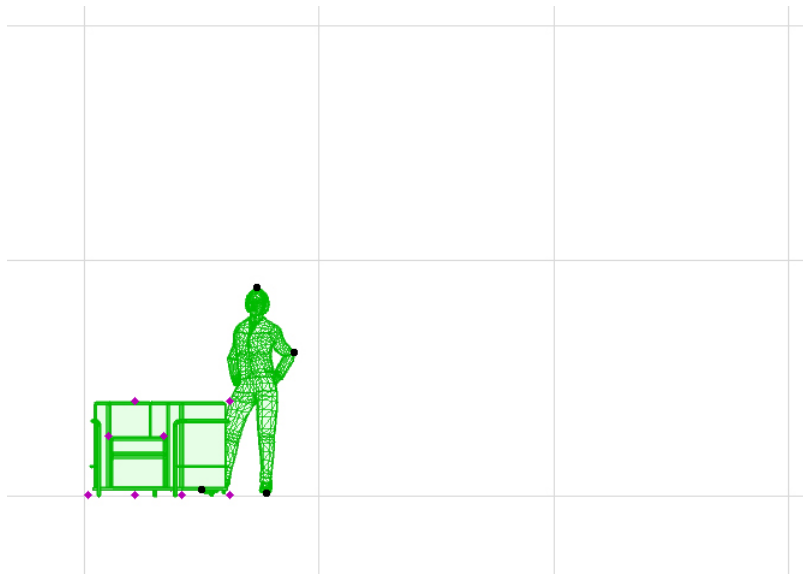
Move a copy (Section/Elevation)

This command is also exactly the same as the ArchiCAD command, but it can finally be used in Section/Elevation windows as well.

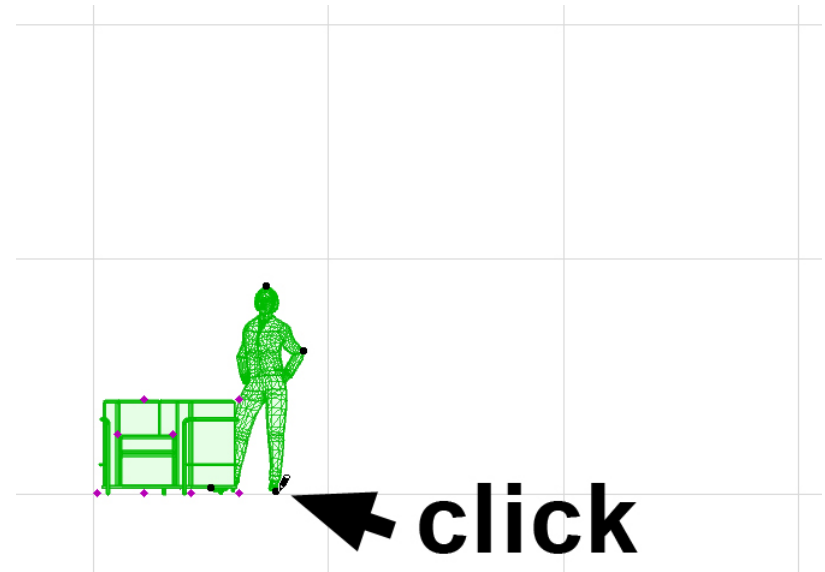
Once launched the procedure is looped, in other words, you can continue to move copies of the first original element until you interrupt the procedure (right mouse button then Cancel, or the ESC button).

It is extremely simple to use:

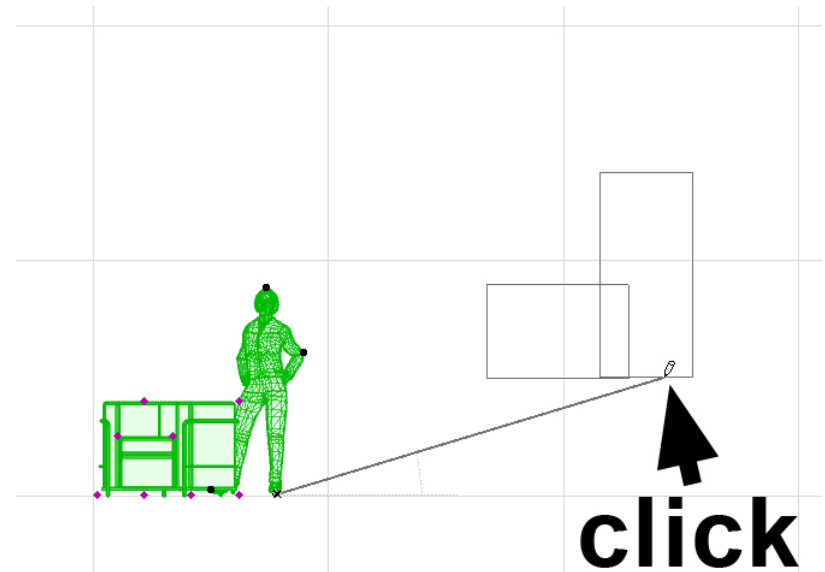
- Select the element (or elements) whose copy you wish to move:



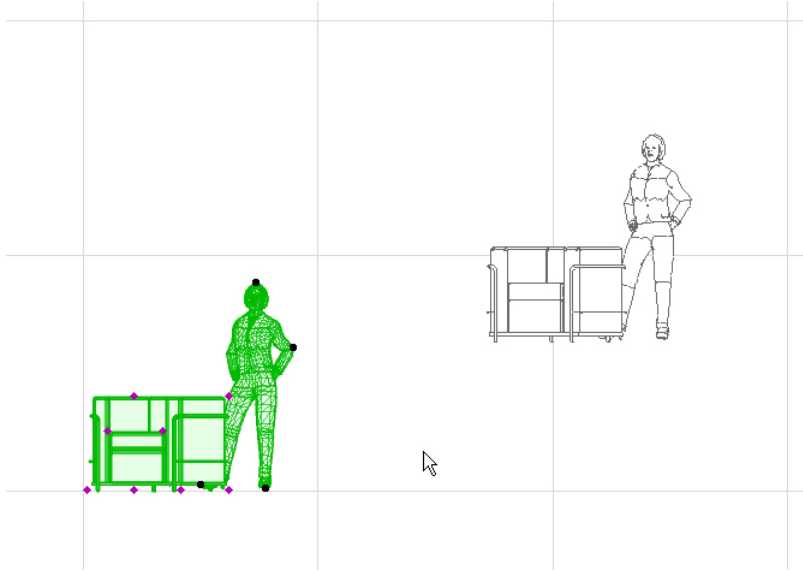
- Click on the Move a Copy tool icon in the ArchiTools palette
- The cursor changes and waits for you to click on the reference point of the selection



- -Define the shift vector with a second click



- The copy is inserted and ArchiTools is ready for the following shift vector to be defined:



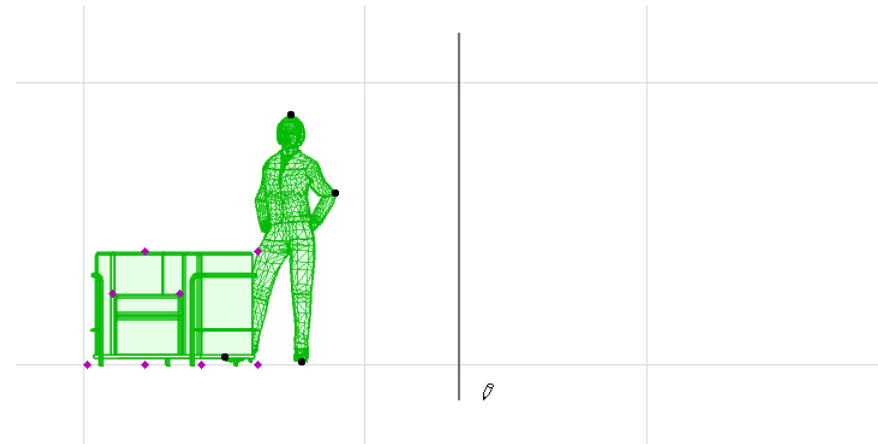
Mirror a copy (Section/Elevation)

This command is also exactly the same as the ArchiCAD command, but it can finally be used in Section/Elevation windows as well.

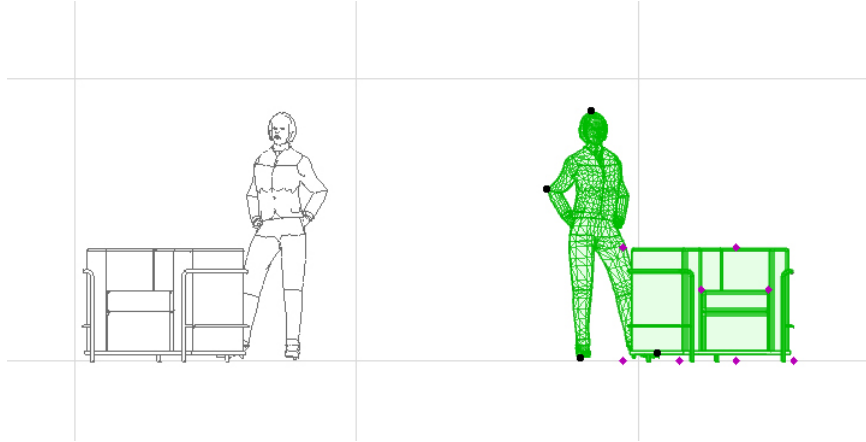
Obviously ArchiCAD construction elements cannot be freely rotated in 3D space (only some, such as the Shell element), so the mirror axis is always constrained to the vertical.

It is extremely simple to use:

- Select the element (or elements) whose copy you wish to move:
- Click on the **Mirror a Copy** tool icon in the ArchiTools palette
- The cursor changes and waits for you to click to define the first point of the mirror axis
- After the first click, the axis definition vector will be constrained to the vertical:



- Finish defining the mirror axis with a second click and the mirrored copy appears immediately:



Custom window

This function creates openings of any shape for use as normal ArchiCAD Window objects.

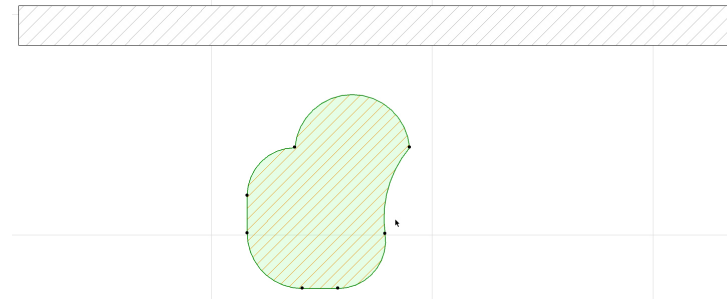
The tool can be used with slightly different procedures in both Plan view and Section/Elevation windows.

The shape of the window is defined using an ArchiCAD fill. Curved sides can also be used, but any holes in the selected fill will not be considered.

The window used will always be the same, a parametric window (**Custom Opening – ArchiTools**) which can assume any shape and be used to represent empty openings, complete windows and niches.

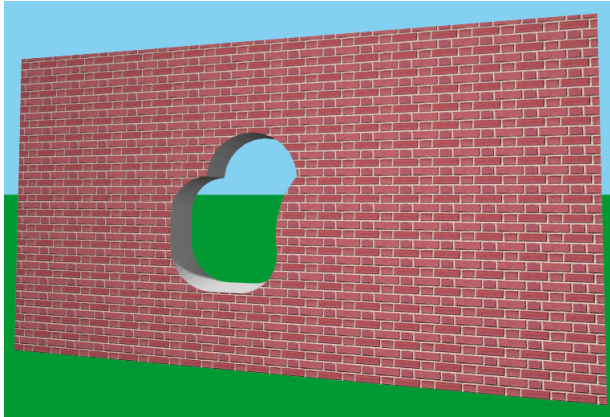
Creation of custom windows in the Plan view

- Use an ArchiCAD fill to define the shape of the window to be inserted:



- Select the fill and click on the **Custom Window** tool icon in the ArchiTools tool palette
- ArchiTools acquires the necessary data from the shape of the fill and opens the ArchiCAD Window Settings dialog box with the **Custom Opening – ArchiTools** window selected and already configured to correspond to the shape of the selected fill
- Configure the various options for this window element as for any other window in the ArchiCAD library, then confirm with the OK button

- Insert the window in any of the walls present in the Plan view:



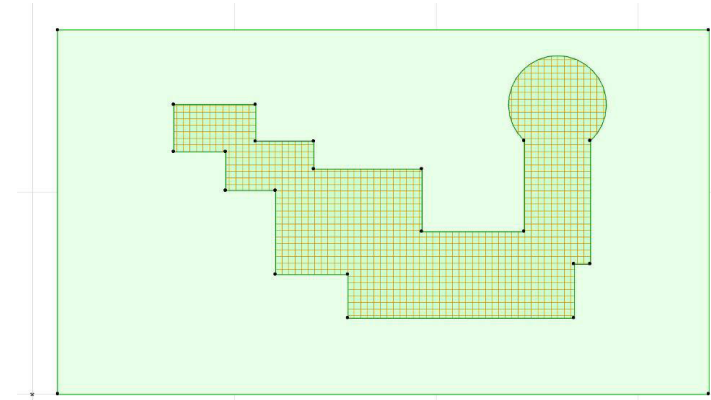
Creation of custom windows in Section/Elevation windows

With some differences, the same procedure can also be used in ArchiCAD Section/Elevation windows.

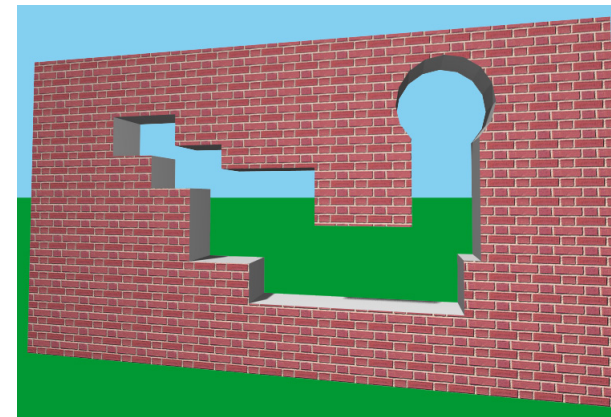
In this case however, the fill not only defines the shape of the window, but also its position in the wall where it will be inserted.

To use this procedure, the Section/Elevation must be parallel to the wall where the window will be inserted and the host wall must not be curved or trapezoidal (in these two cases, the concept of parallelism to the section line would not, in fact, make sense).

- Use an ArchiCAD fill to define the shape of the window and its position in the wall where it will be inserted:



- Then select both the fill and the wall and click on the **Custom Window** tool icon in the ArchiTools tool palette
- ArchiTools acquires the necessary data from the shape of the fill and opens the ArchiCAD Window Settings dialog box with the **Custom Opening – ArchiTools** window selected and already configured to correspond to the shape of the selected fill
- Configure the various options for this window element as for any other window in the ArchiCAD library, then confirm with the OK button
- ArchiTools immediately inserts the window in the selected wall:

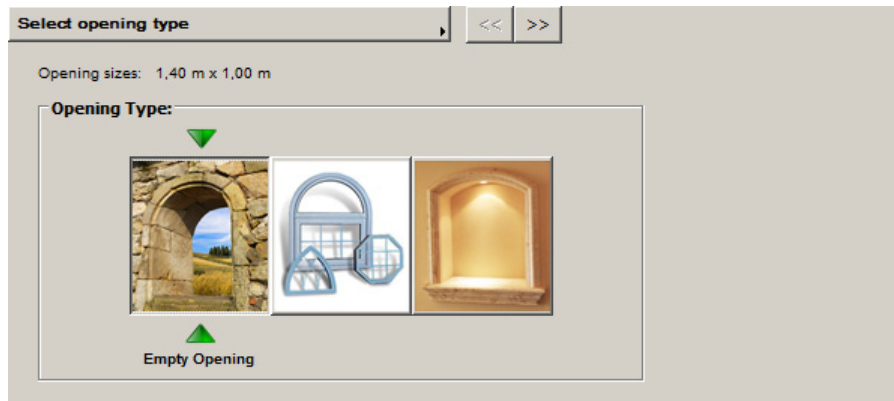


Custom Opening – ArchiTools window configuration dialog

As described above, the **Custom Opening - ArchiTools** window used by this tool is a window type library part, like all other windows used in the ArchiCAD Library.

It can be configured in the **ArchiTools Parametric Window Configuration Custom Panel**.

The first page selects the type of element:



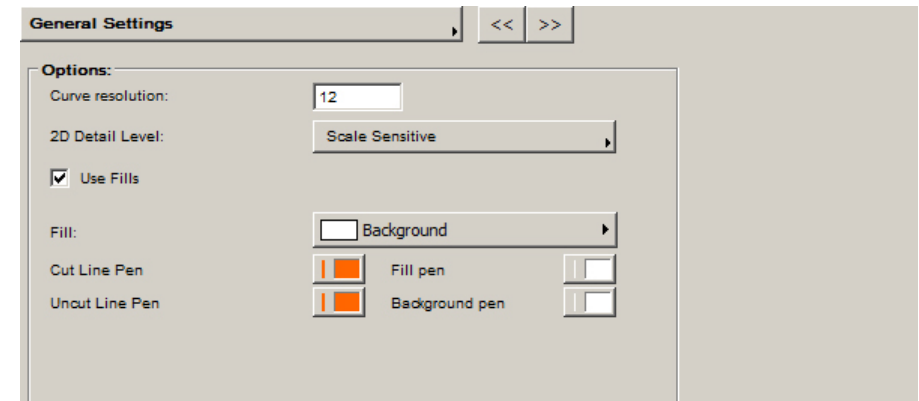
The three buttons select one of the three options provided:

- Empty opening
- Parametric window
- Niche

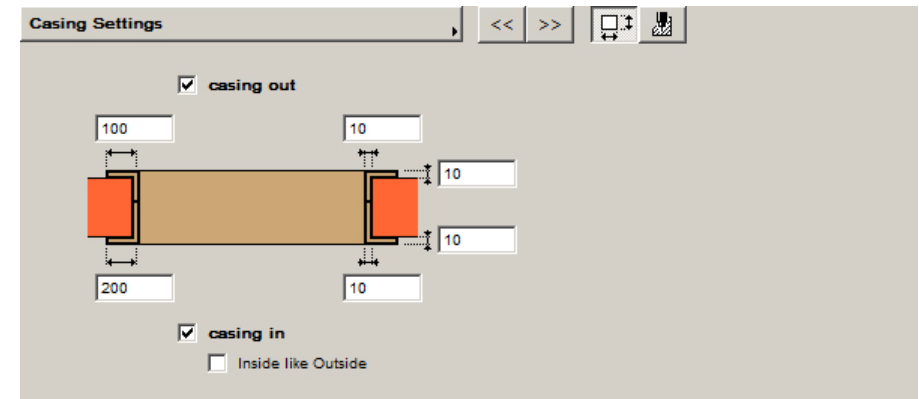
At the top of the panel, a pop-up menu and two navigation buttons provide access to the other configuration pages.

The number and type of configuration pages depend on the type selected. The various options relevant to the type selected are then displayed.

General settings (common to all three types)



Casing settings (common to all three types)

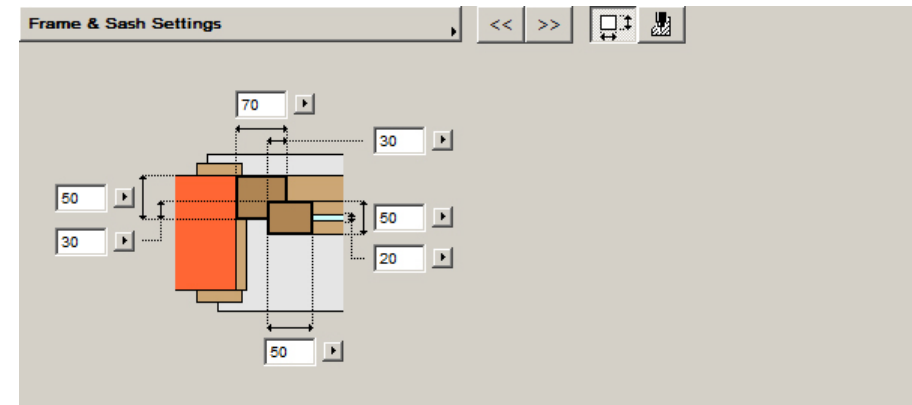


Shelf settings (empty openings and niches only)

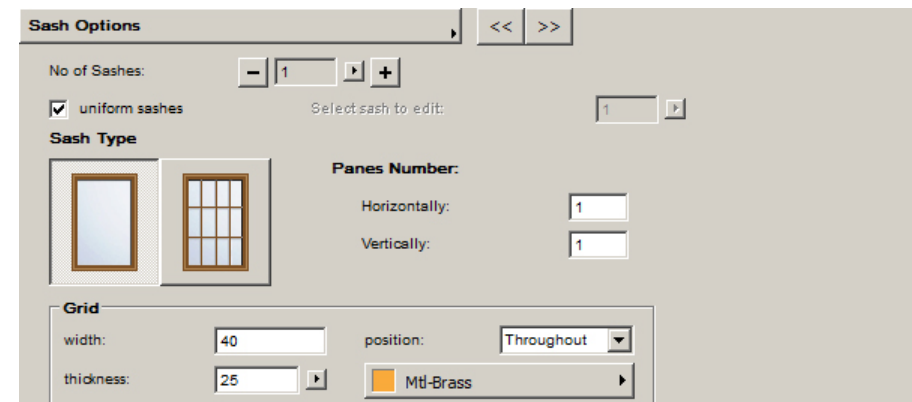
This panel displays and configures the shelves to be inserted in the window element:



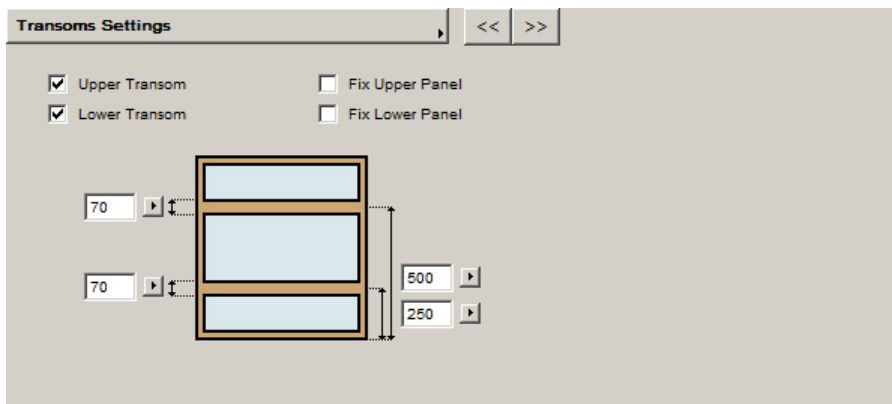
Frame and sash settings (parametric windows only)



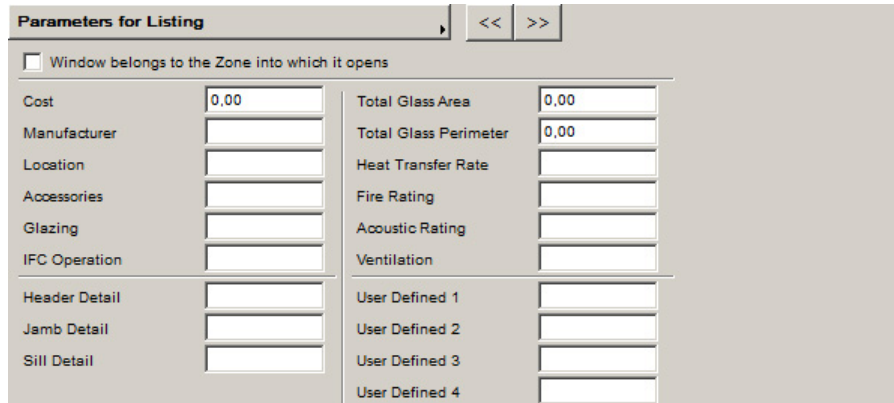
Sash settings (parametric windows only)



Transom settings (parametric windows only)



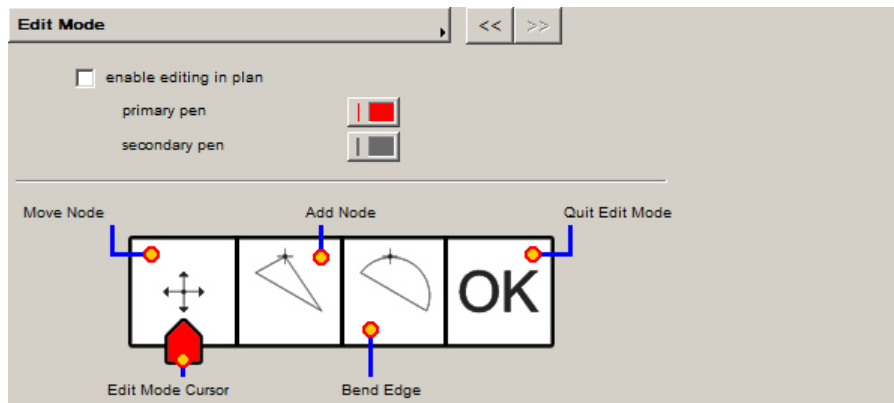
Parameters for listing (common to all three types)



The 'Parameters for Listing' dialog box contains a table of parameters for a window. At the top, there is a title bar 'Parameters for Listing' and navigation buttons '<<' and '>>'. Below the title bar is a checkbox 'Window belongs to the Zone into which it opens'. The main area is a table with two columns of parameters, each with a text input field.

Parameters for Listing	
<input type="checkbox"/> Window belongs to the Zone into which it opens	
Cost	0,00
Manufacturer	
Location	
Accessories	
Glazing	
IFC Operation	
Header Detail	
Jamb Detail	
Sill Detail	
Total Glass Area	0,00
Total Glass Perimeter	0,00
Heat Transfer Rate	
Fire Rating	
Acoustic Rating	
Ventilation	
User Defined 1	
User Defined 2	
User Defined 3	
User Defined 4	

Edit mode (common to all three types)



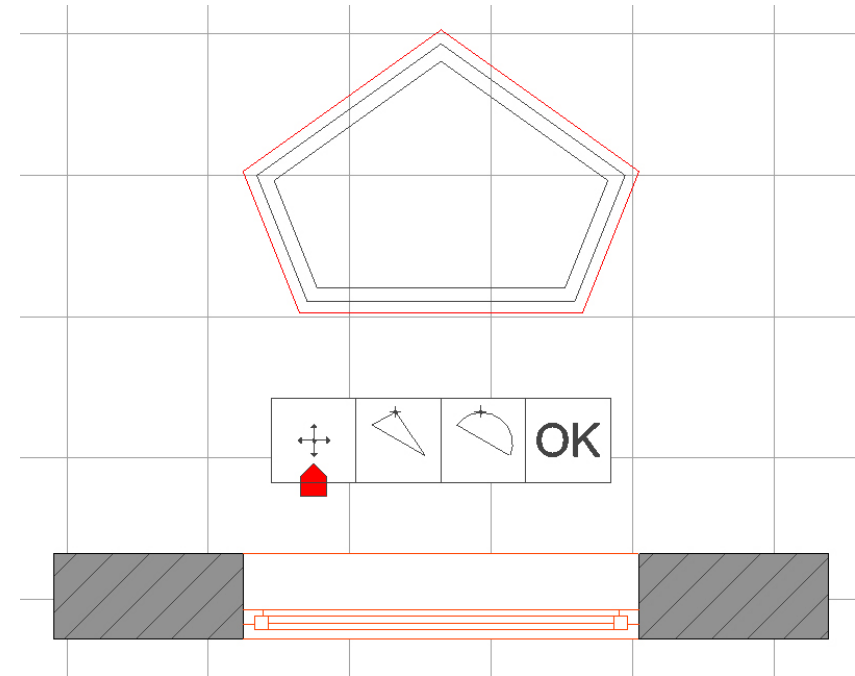
The 'Edit Mode' dialog box contains a title bar 'Edit Mode' and navigation buttons '<<' and '>>'. Below the title bar is a checkbox 'enable editing in plan'. Below this are two color swatches for 'primary pen' (red) and 'secondary pen' (grey). The main area is a horizontal toolbar with four buttons: 'Move Node' (with a crosshair icon), 'Add Node' (with a triangle icon), 'Bend Edge' (with a curved arrow icon), and 'Quit Edit Mode' (with an 'OK' button). Below the toolbar are two labels: 'Edit Mode Cursor' and 'Bend Edge'.

In this last panel, you can edit the geometry of a previously defined window.

If you need to edit the geometry of a previously inserted window, deleting the window and repeating the element definition procedure from the beginning would be inconvenient.

This panel comes to your aid. Select the window to be edited, then access the **Edit mode** panel and **enable editing in plan** using the first check-box at the top, then close the dialog by confirming with the OK button.

Display of the window in the Plan view will be modified as below:

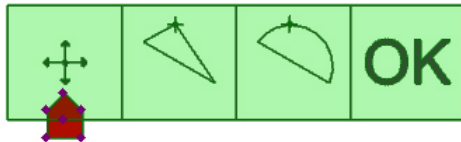
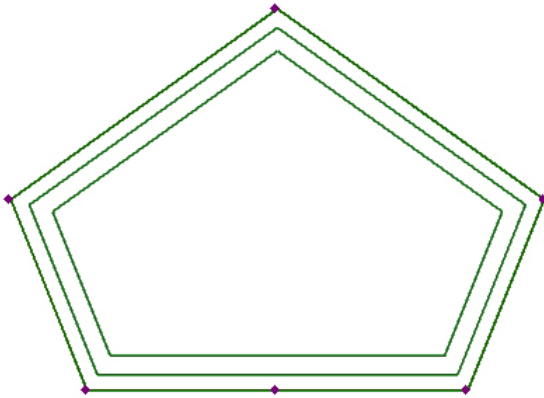


As well as the normal symbols, you also see the front view of the window and immediately below, a button panel with four options and a red cursor indicating the active function.

The editing functions provided are:

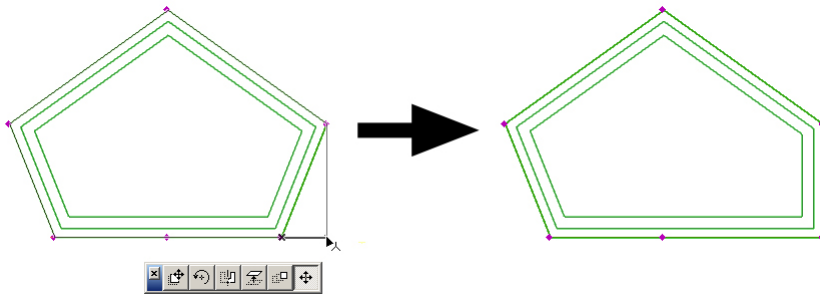
- Move node
- Add node
- Bend edge
- Quit edit mode (OK)

When the window is selected, graphically editable hotspots appear allowing you to edit the window and move the cursor to the position required:



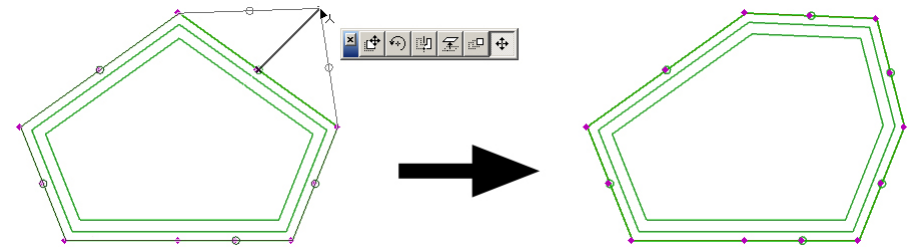
Move node

In **move node** mode, you can move the nodes to the required position by dragging the relative graphic hotspots:



Add node

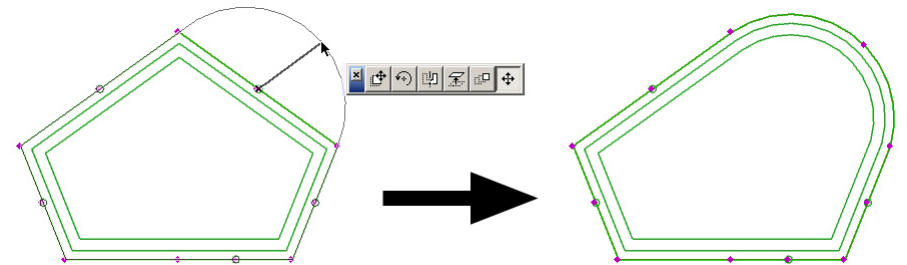
In **add node** mode, you can add nodes by dragging the graphic hotspots by the median points (shown by small circles) to the required position:



You can also move the nodes to the required position by dragging the relative graphic hotspots (as if you were in **move node** mode):

Bend edge

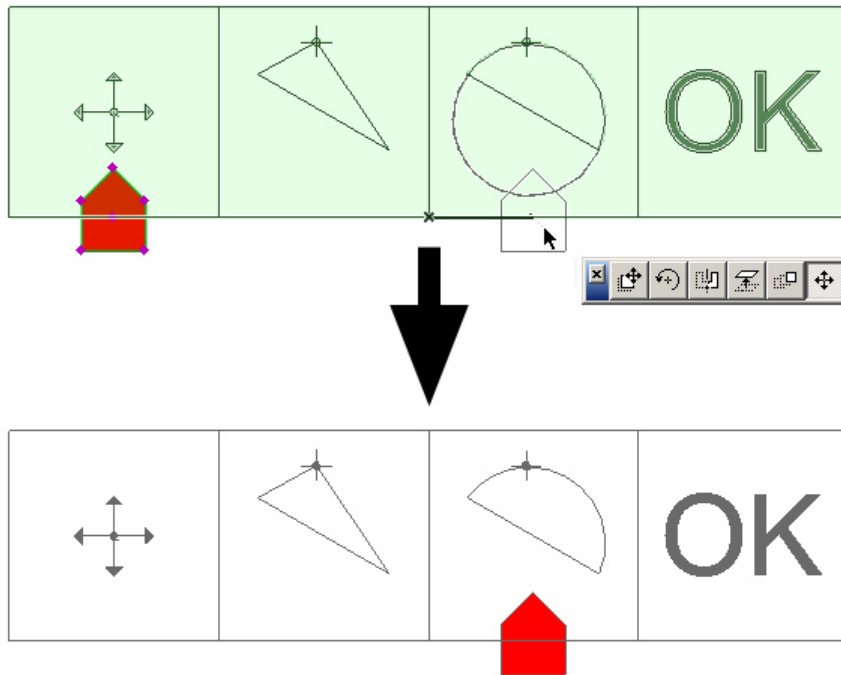
In **bend edge** mode, you can bend the sides by dragging the graphic hotspots by the median points (shown by small circles) to the required position:



You can also move the nodes to the required position by dragging the relative graphic hotspots (as if you were in **move node** mode):

Mode change cursor

You can move the cursor easily by its hotspots to go from one editing mode to another:



Quit window editing

When you have finished editing, you can go back to the normal view in two ways:

- by moving the cursor to the OK position
- by using the window settings dialog and deselecting the **enable editing in plan** option used previously.

Rotate object and Save rotatable object

These two procedures will be examined together as the first (rotate object) can only be used on objects saved using the second procedure (save rotatable object).

Save rotatable object

- In the ArchiCAD Plan view, choose the object to be rotated.
- Click on the **Save Rotatable Object** tool icon in the ArchiTools palette.
- In the standard dialog which appears, enter the name of the object, define the position where it is to be saved, then click on Save.

The object thus obtained can be rotated in 3D space, using the **ArchiTools Rotate Object** command.

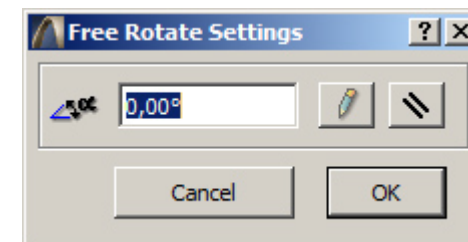
Rotate object

The **Rotate Object** tool lets you rotate in space any element generated by ArchiTools.

The **Rotate Object** tool can be used in any ArchiCAD work window.

You can also rotate a number of objects simultaneously, but you must have selected at least one rotatable object before clicking on the **Rotate Object** tool icon.

After clicking on the tool icon, the following dialog box appears:



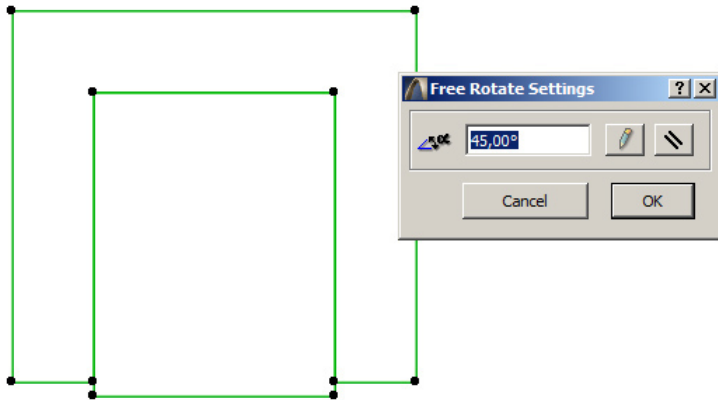
Enter a value for the angle of rotation in the only editable field present.

Note: If you are not in Plan view, you can enable graphic definition of the angle by clicking on the button with the pencil (the editable field will be disabled). You can now define the angle by graphic input.

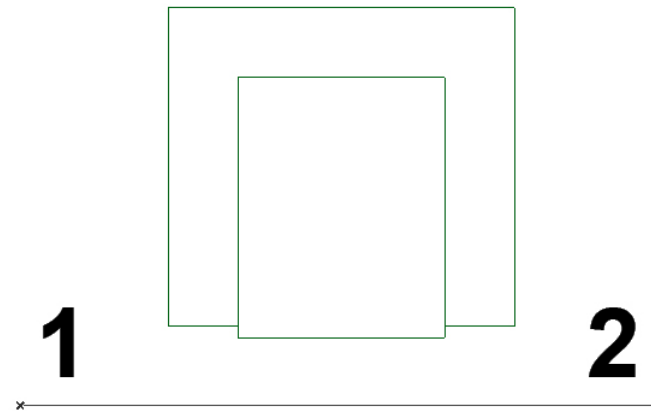
If you want to make the selected element (or elements in the case of multiple selections) parallel to an element rotated previously, click directly on the button with the parallel symbol. When exiting the dialog with the OK button, click on the element with which you want the selection to be parallel.

How to rotate an element in the Plan view

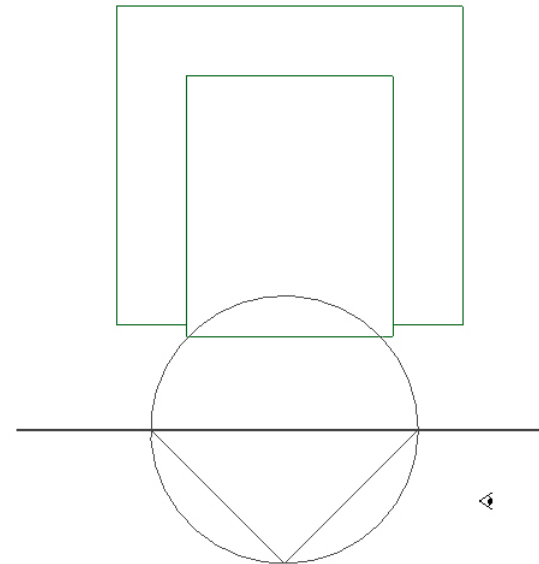
- Choose an object (or objects) to be rotated
- Click on the **Rotate Object** tool icon in the ArchiTools palette and the rotation configuration dialog box is displayed immediately:



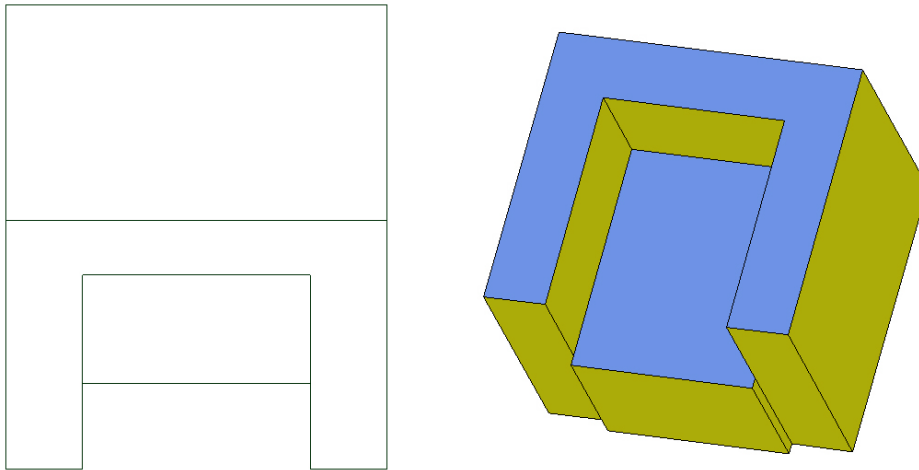
- Enter the required angle and confirm with the OK button
- The cursor changes shape to let you define both ends of the axis of rotation:



- After the axis has been defined, the cursor changes shape again to let you define the direction of rotation by moving from one part of the axis to the other.



- When you have chosen the direction of rotation, the element is immediately rotated as required. The following image shows the result in Plan and 3D views:



How to rotate an element in Section view

- Choose an object (or objects) to be rotated
- Click on the **Rotate Object** tool icon in the ArchiTools palette.
- When rotating in Section view, the options are always defined graphically and no dialog is therefore displayed. The cursor changes shape waiting for you to make three clicks, where:
 - the first click identifies the centre of rotation
 - the second click, identifies the start of the arc of rotation
 - the third click identifies the end of the arc of rotation (in practice the actual value of rotation which the selection will undergo).

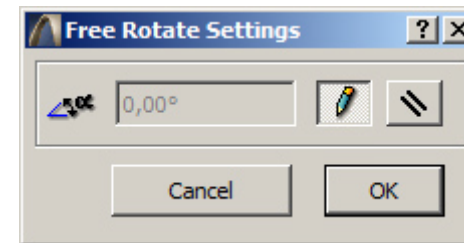
The procedure for using the rotate object tool in Section/Elevation windows is therefore identical to the “normal” Rotate command in ArchiCAD.

How to rotate an element in 3D view

Two methods can be used for 3D rotation, depending on whether you want to rotate the selection using a precise numeric value or to define the value graphically.

3D rotation with numeric input

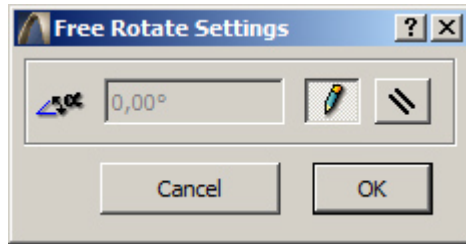
- Choose an object (or objects) to be rotated
- Click on the **Rotate Object** tool icon in the ArchiTools palette and the rotation configuration dialog box is displayed immediately:



- Enter the required angle and confirm with the OK button
- The cursor changes shape to let you define both ends of the axis of rotation. Note that the first point clicked also defines the height of the axis of rotation (which is always in the X-Y plane)

3D rotation with graphic input

- Choose an object (or objects) to be rotated
- Click on the **Rotate Object** tool in the ArchiTools palette and the rotation configuration dialog box is displayed immediately. In this case, click on the icon with the pencil as you want to define the angle of rotation graphically:



- Confirm with the OK button
- The cursor changes shape to let you define both ends of the axis of rotation. Note that the first point clicked also defines the height of the axis of rotation (which is always in the X-Y plane)
- After defining the axis of rotation, click to define the start of the arc of rotation.
- The last click defines the end of the arc of rotation (in practice the actual value of rotation which the selection will undergo).

Tabbed text import (Table object)

The tabbed text import procedure allows you to import files of tabbed text and display them as customisable tables in the ArchiCAD work environment.

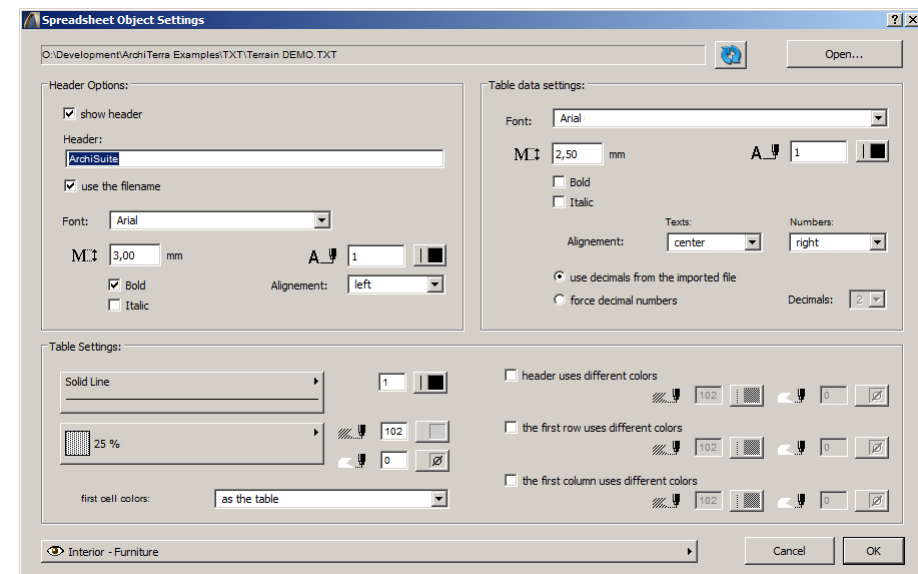
The link to the original file is maintained. If the imported file is changed, you can therefore display the updated table by simply updating the link.

This tool can again be used to either create or edit tables:

- if you click on this tool icon with no table object (**Data Table - ArchiTools**) selected, you will import a tabbed text file and therefore insert a new table object
- if on the other hand you select one or more table objects before clicking on the tool icon, you can edit the selection options

The procedure is extremely simple. Click on the **Import Tabbed Text** tool icon in the ArchiTools palette and select the file to be imported in the standard **Open** dialog box displayed.

After briefly reading and interpreting the file, the following dialog box is displayed to configure the table object to be inserted:



The path of the imported file (the file to which the table object to be inserted refers) is displayed in the first row at the top.

The data update button is immediately on the right. If you have modified the original tabbed text file (important: without changing the position, in other words, overwriting the previously imported file) and want to update the data in the table inserted in the ArchiCAD work environment, click on this button and the data will be read from the reference file again, updating the inserted table.

On the far right, the **Open...** button lets you change the reference file linked to the table by selecting a new one.

Header options

In the **header options** section, you can decide whether to display or hide a heading (and then whether to use the filename or a user-defined string as the heading) and configure the characteristics of the text used.

Table data options

In the table data options section, you can configure the characteristics of the text used for the cells containing the data, define the alignment for numerical and text data and set the number of decimal places used for numerical data.

Table options

In this section you can manage the graphic appearance of the table object: types of line, pen and fill used for the cells.

In the right hand section, you can assign independent colours to the heading, first row, and first column.

After configuring the table object, confirm the settings with the OK button.

The cursor changes shape and waits for you to make two clicks:

- the first click defines the point (left hand corner) at which the table object will be inserted
- the second click defines the orientation of the table (in other words, the angle at which the object will be inserted)

ArchiTools					
-21.0	22.0	10.0	1	1	
-14.7	27.3	10.0	2	1	
-8.4	30.4	10.0	3	1	
-3.8	28.3	10.0	4	1	
5.6	29.0	10.0	5	1	
13.3	29.7	10.0	6	1	
21.0	30.8	10.0	7	1	
26.9	29.4	10.0	8	1	
32.5	26.6	10.0	9	1	
35.3	25.9	10.0	10	1	

Import list of points

The **import list of points** procedure lets you import survey files (point clouds) into an ArchiCAD worksheet.

The procedure is identical to the **ArchiTerra** procedure, but in ArchiTerra the user imports a list of coordinates describing a terrain and the aim is therefore to obtain a terrain as the final result.

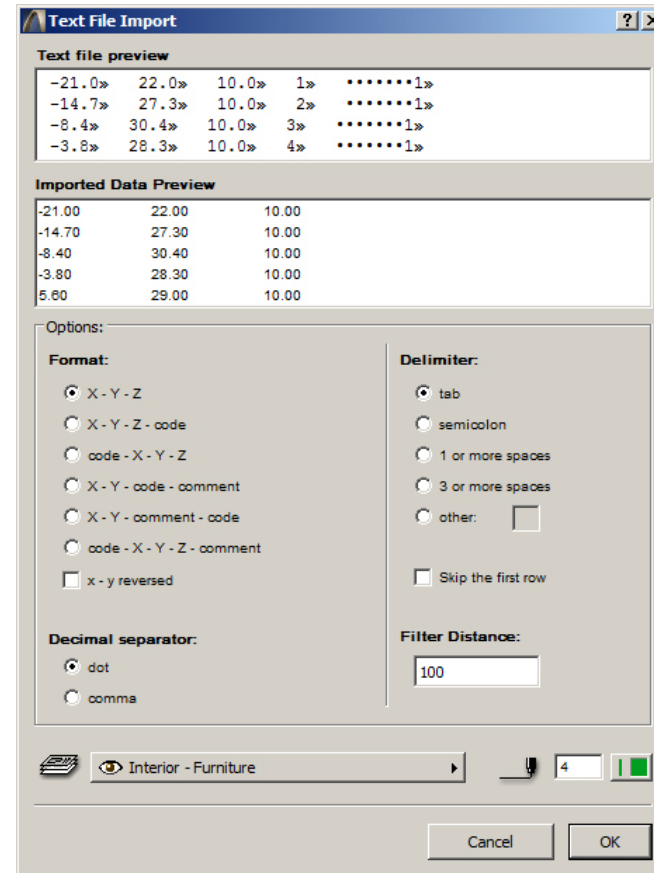
In this case, the point cloud could describe, for example, the façade of a building or a 3D element which has been surveyed using specific instruments.

Once again, this tool can be used to both create or edit a point cloud:

- if you click on the tool icon with no point cloud object (**Point Cloud - ArchiTools**) selected, you will import a file of points and therefore insert a new point cloud object
- if on the other hand you select one or more **Point Cloud - ArchiTools** objects before clicking on the tool icon, you can edit the selection options

The procedure is extremely simple. Click on the **Import List of Points** tool icon in the ArchiTools palette, then select the file to be imported in the standard **Open** dialog box displayed.

After briefly reading and interpreting the file, the following dialog box is displayed to configure the table object to be inserted:



As in **ArchiTerra**, a preview of the first rows of the text file being imported is displayed at the top.

To make the syntax of the text to be imported easier to comprehend, meta characters are used to represent certain special characters:

- the » symbol indicates a tab
- the • symbol indicates a space

Immediately beneath is a preview of how the data will be imported according to the configuration set in the area below which provides a series of import options.

Options

In this section, you can choose the file format (in other words, the order in which the data to be imported will appear), the character separating the fields to be imported (using the first preview area as a reference), the decimal separator used in the file and the filter distance.

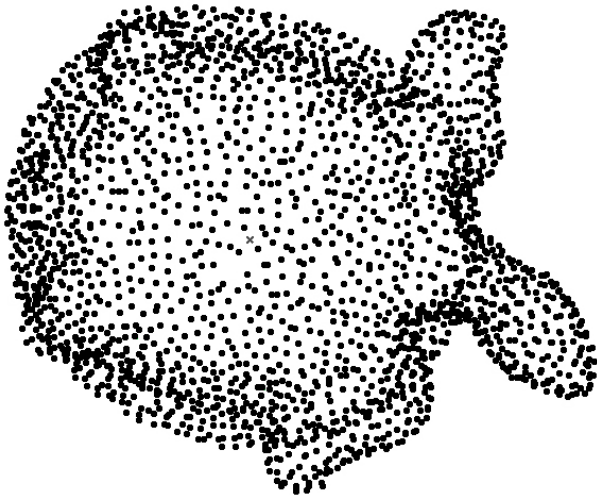
Remember that point clouds including tens of thousands of coordinates could slow ArchiCAD down (surveys performed using the so-called total stations could even include millions of points!).

We cannot obviously lay down any general rule. The performance depends on your software/hardware configuration and the configuration of the final object (for example, 3D markers or text displayed in Plan view greatly slow down ArchiCAD).

Always bear in mind that appropriate use of the filter can often give excellent results, even when the points “discarded” may seem excessive.

At the bottom of the dialog, you can choose the layer on which to insert the object and the pen.

After confirming the import options with the OK button and brief processing (again, the performance will depend on your configuration and the number of coordinates imported), ArchiTools will insert the **Point Cloud – ArchiTools** object representing your point cloud:



Select the **Point Cloud – ArchiTools** object and click on the Import **List of Points** tool icon to edit the parameters.

The following dialog box will be displayed immediately:

2D marker options

In this section, you can define the 2D marker used to represent each individual point in the survey.

Coordinates content

Here you can decide the composition of the string to be displayed alongside each point.

Coordinates text options

In this section you can enable/disable display of text alongside each point (the text configured in the coordinates content section) and define the graphic characteristics of the text used.

Coordinates offset

In this section you can decide whether or not to apply an offset to the coordinates.

Application of an offset does not in fact have any effect on the position of the point cloud object, but simply on the data displayed in the coordinates text.

The offset values set here will be applied to the data.

Point code text options

In this section, you can enable/disable display of the point code (obviously if the imported file includes this information) and define the graphic characteristics of the text used.

Point comment text options

In this section, you can enable/disable display of the point comment (obviously if the imported file includes this information) and define the graphic characteristics of the text used.

3D marker options

In this section, you can define the 3D marker used to represent each individual point in the survey in 3D projections.

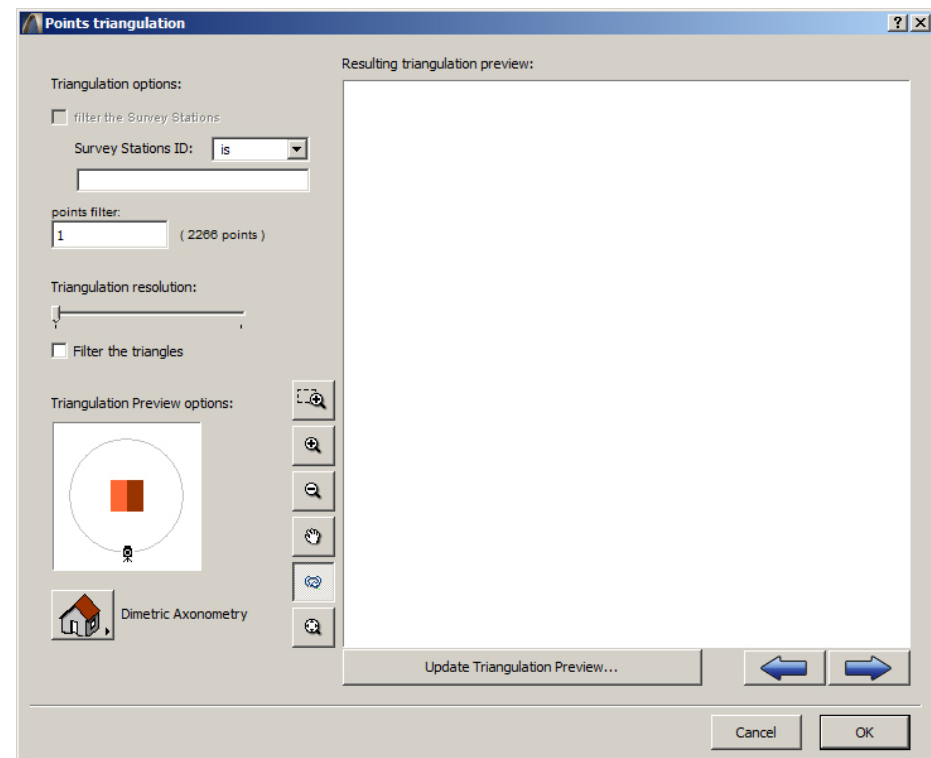
3D model

This section of the dialog allows you to manage an approximate triangulation of the point cloud in order to display in 3D images not just a simple point cloud, but a 3D object based on triangulation of the imported points.

Here you can enable/disable display of the triangulation, choose the pen and material used in the 3D view and define the approximate triangulation parameters using the **Triangulate...** button.

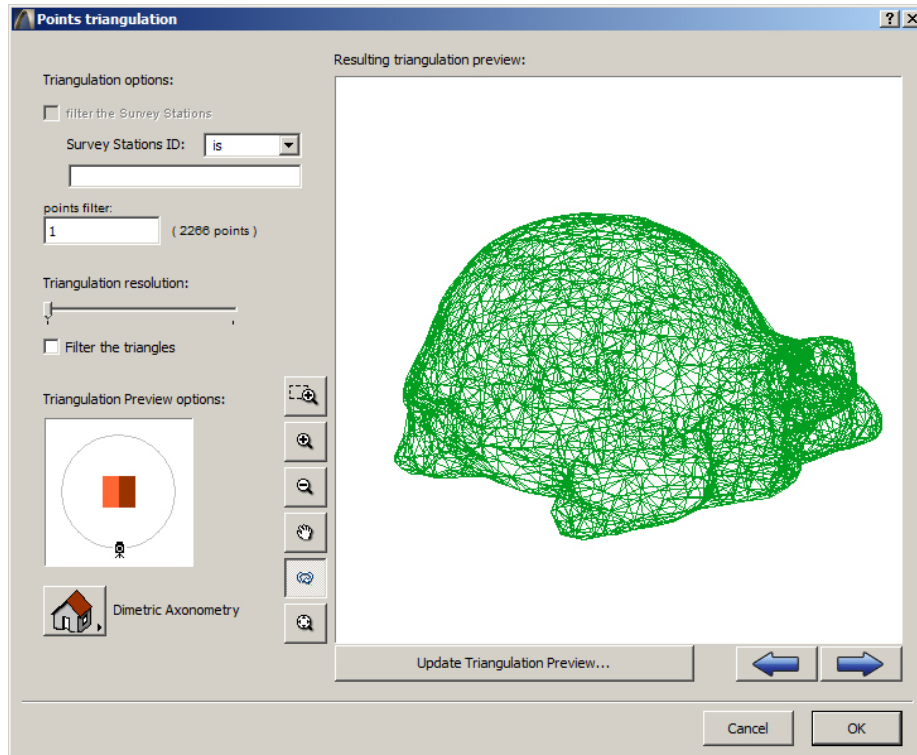
Triangulation options

Clicking on the **Triangulate...** button accesses the following dialog box:



The preview area on the right shows the 3D model resulting from triangulation of the point cloud.

When you first access the dialog box, the preview is blank (as the user has not yet entered any configurations in the left-hand section). To display the model with the current parameters, click the **update triangulation preview** button and after processing (the time taken depends on your configuration and the complexity of the point cloud), a preview of the model will appear:



Triangulation options

The top section allows the survey stations to be filtered.

The point clouds may in fact also contain the coordinates of the survey stations which obviously must not be included in triangulation of the model.

The coordinates of the survey stations are usually marked (or can be marked) with a code/ID contained in the information imported.

Enter the search string in the field and use the pop-up menu at the top for the search criterion.

Obviously the **filter survey stations** check-box will not be enabled until you have defined a valid search criterion (in other words until you have defined the search string in the field).

For example, suppose that all survey stations in your file have a code containing the string "station" followed by the number of the station:

- station 001
- station 002
- station 003
- tree – station 005

To filter these coordinates, you simply need to write the string "station" in the field and choose the string **contains** from the pop-up menu.

The following field defines a further filter, while the number of points to be processed is displayed alongside.

The operation of this filter is appreciably different from that described during the initial point import phase.

During importation, the filtered points are discarded, in other words, they are not read and saved in the **Point Cloud – ArchiTools** object.

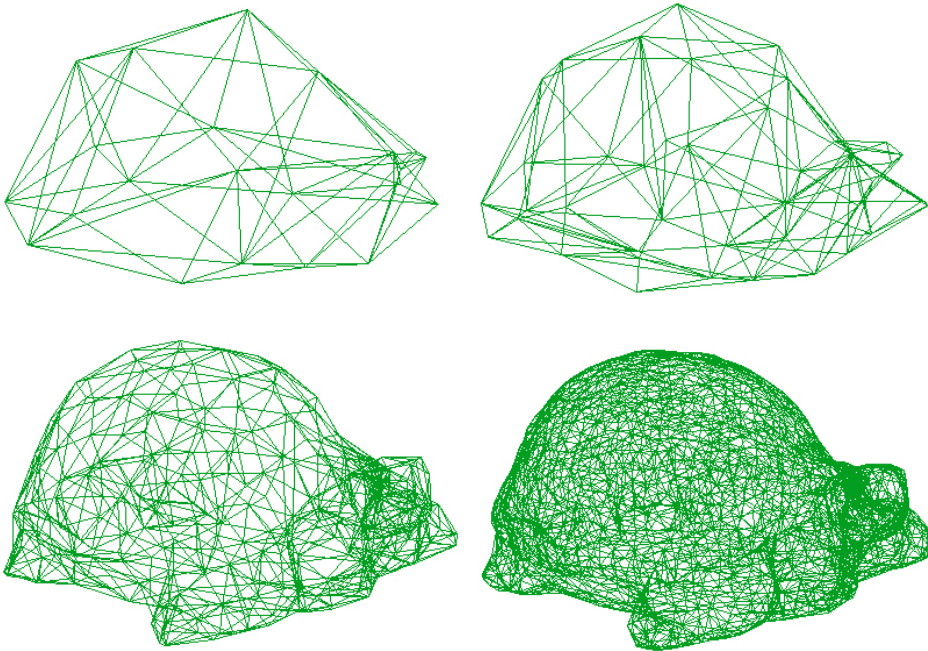
In this case, however, the points are filtered during triangulation only but continue to exist and be represented as coordinates in both the Plan and 3D views.

The information will therefore not be definitively lost, the model generated will merely be simplified.

Immediately below, a slide lets you manage the resolution of the resulting model:

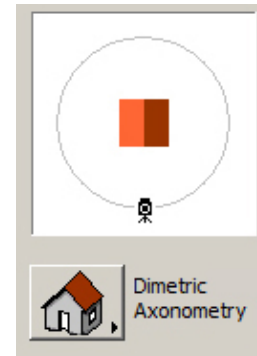
- move the slide to the extreme left for a very coarse model
- move the slide to the extreme right for the greatest possible level of detail
- in intermediate positions the resolution will obviously be somewhere in between

The same model triangulated with different resolutions but using the same point cloud is shown below:



The **filter triangles** check-box allows “isolated” triangles to be “cleaned up”. The aim of the procedure is to obtain a solid (obviously where possible) at the end of triangulation. If this option is enabled, all the triangles calculated will be reviewed and “isolated” triangles (in other words those not contributing to creating the solid) will be eliminated.

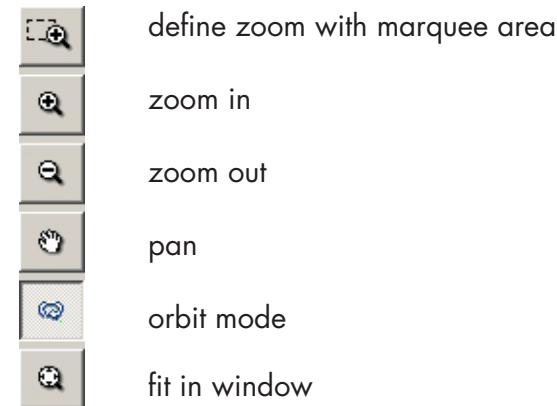
All the other commands present in the dialog should be familiar as they are more or less the same as those used in ArchiCAD.



The top section shows the position of the camera.

From the pop-up menu, you can choose the type of projection to be used in the preview area.

The button panel on the left of the preview provides access to a number of navigation commands:



The two buttons with arrows immediately below the preview area on the right allow you to rotate the model.

In **orbit mode**, you can in any case click and drag the cursor to rotate the model interactively.

When the dialog is closed with the OK button, you go back to the **survey settings** dialog with the **show triangulation** check-box enabled.

Survey stations

As described above, the imported point clouds may also contain the coordinates of the survey stations.

The coordinates of the survey stations are usually marked (or can be marked) with a code/ID contained in the information imported.

Enter the search string in the field and use the pop-up menu at the top for the search criterion.

For example, suppose that all survey stations in your file have a code containing the string "station" followed by the number of the station:

- station 001
- station 002
- station 003
- tree – station 005

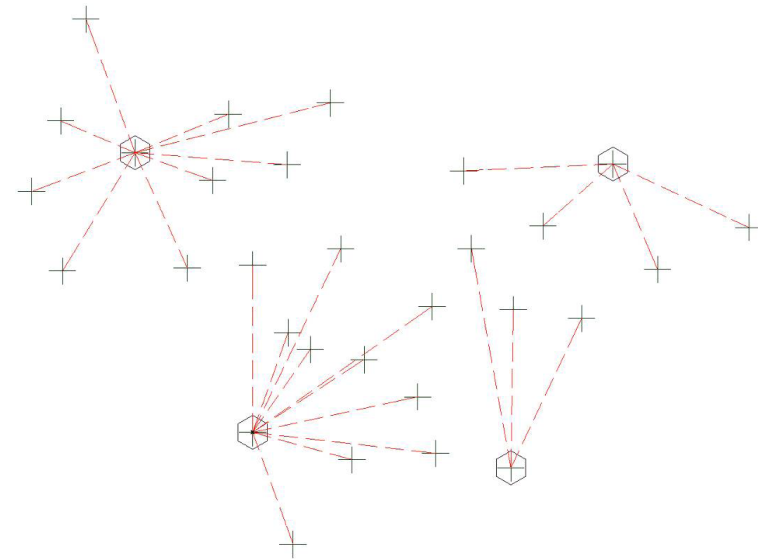
To filter these coordinates, you simply need to write the string "station" in the field and choose the string "contains" from the pop-up menu.

Once the filter identifying the survey stations has been identified, you can use special markers and colours to identify the survey stations in both the Plan and 3D views.

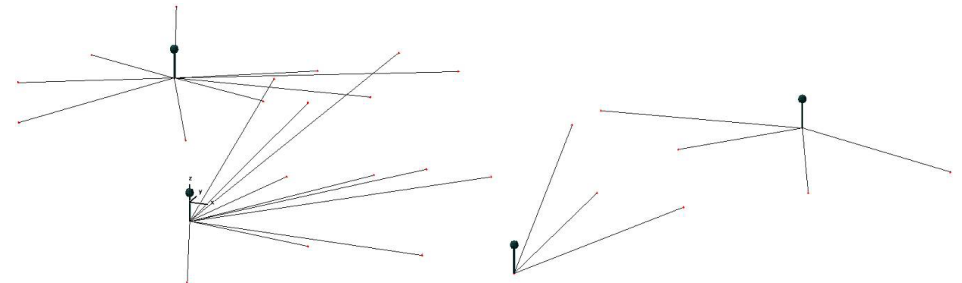
You can also display projections from these stations to the corresponding surveyed points (again in both 2D and 3D views).

The logic used by the data in the imported file must follow a very common standard: the first point listed is the point at which the survey station is located and all the following points (until the next survey station) belong to this first station (thus each of the points is connected to that station).

Below is an example of the result obtained from the above configuration in the Plan view:



And in the 3D window:



List areas

This command operates in exactly the same way as the ArchiCAD command with the same name. It basically calculates the surface area of a polygon with graphic demonstration of the calculation performed based on break down of the polygon into triangles and circular segments (if curved sides are present).

Heron's formula is used to calculate the surface area of the triangles.

In geometry, Heron's formula states that the area of a triangle whose sides have the lengths a , b and c is given by:

$$S = \sqrt{p \cdot (p - a) \cdot (p - b) \cdot (p - c)}$$

Where p is the semiperimeter:

$$p = \frac{a + b + c}{2}$$

For circular segments, the surface area is given by the following formula:

$$S = \frac{r^2}{2} \cdot \left(\frac{\pi \cdot \alpha}{180^\circ} - \sin(\alpha) \right)$$

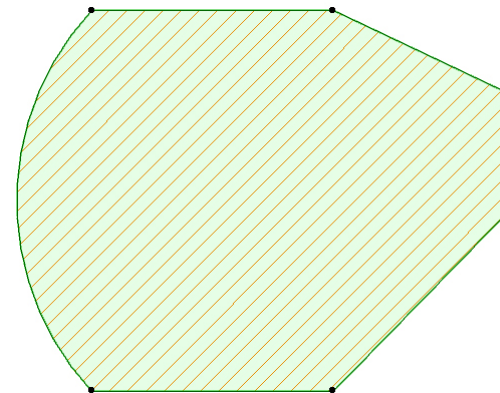
The substantial difference between this and the ArchiCAD procedure with the same name is that demonstration of calculation of the surface areas is not linked to the zones defined in the project, but to a fill drawn by the user (in any ArchiCAD work window).

Once again, the tool can be used to both create and edit.

- if you selected a fill (note that the procedure can be used to process just one fill at a time) before clicking on the **List Areas** tool icon, then you are in creation mode
- if you selected one or more **List Area – ArchiTools** object(s) (the library part used to represent the graphic demonstration of the calculation) before clicking on the **List Areas** tool icon, then you will edit the configuration of the selection.

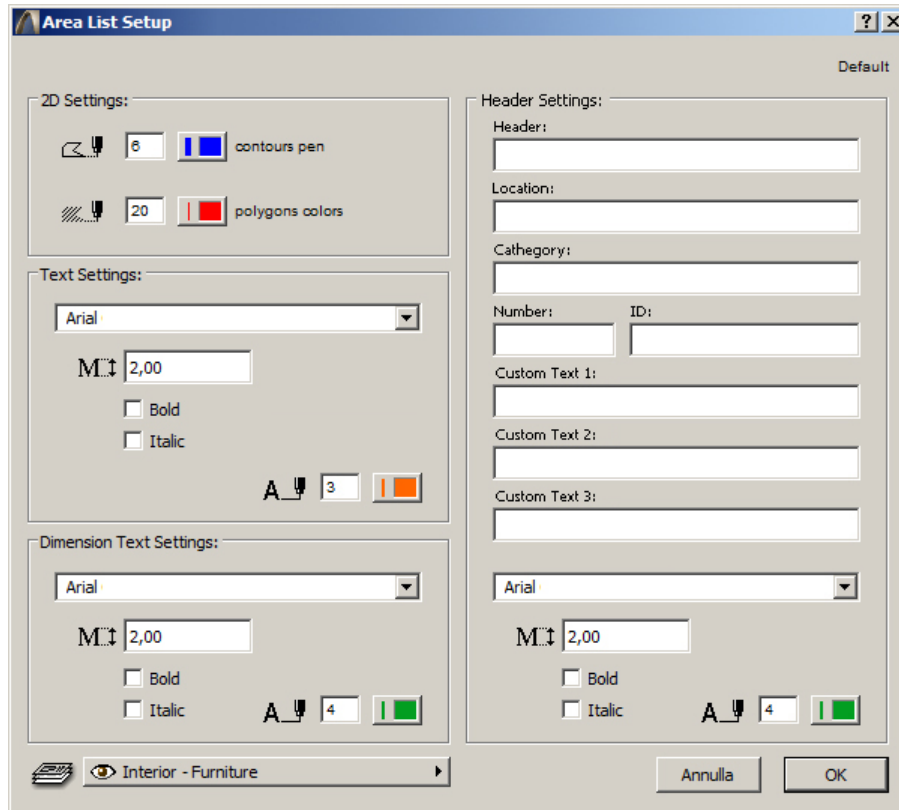
The procedure is very simple to use:

- draw a fill representing the surface area to be calculated (the fill may have curved sides and include holes, there is therefore no limitation):



- click on the **List Areas** tool icon in the ArchiTools palette

- ArchiTools immediately displays a dialog box where you can configure the result:



2D options

In this section you can configure the pens and background colour for the polygons used to graphically represent the calculation.

Calculation text options

In this section you can customise the characteristics of the text used to graphically represent calculation of the surface.

Dimension text options

In this section you can customise the characteristics of the text used for the values indicating the dimensions of the triangles and circular segments into which the original polygon has been broken down.

Header options:

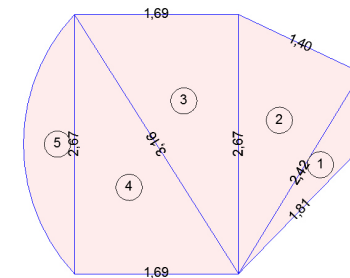
In this section you can define the strings used for the list heading and the characteristics of the text used for the strings.

If the strings are left empty, the row corresponding to the empty value will obviously not be processed by ArchiTools.

Finally, the usual pop-up menu at the bottom allows you to choose the layer on which to insert the object.

When you have finished configuration, close the dialog with the OK button. After a short period of processing, the cursor changes shape and waits for you to define the point at which the object representing the calculation of the surface area of the polygon is to be inserted.

When you click, the object is inserted immediately:



- ① $P = (1,81 + 0,77 + 2,42) / 2 = 2,50$
 $A = \text{SQR}[P * (P - 1,81) * (P - 0,77) * (P - 2,42)] = 0,49$
- ② $P = (2,42 + 1,40 + 2,67) / 2 = 3,25$
 $A = \text{SQR}[P * (P - 2,42) * (P - 1,40) * (P - 2,67)] = 1,69$
- ③ $P = (2,67 + 1,69 + 3,16) / 2 = 3,76$
 $A = \text{SQR}[P * (P - 2,67) * (P - 1,69) * (P - 3,16)] = 2,26$
- ④ $P = (3,16 + 2,67 + 1,69) / 2 = 3,76$
 $A = \text{SQR}[P * (P - 3,16) * (P - 2,67) * (P - 1,69)] = 2,26$
- ⑤ $R = 1,96 \quad \alpha = 85,94$
 $A = 1/2 * R^2 * ((PI * \alpha) / 180^\circ - \text{SIN}(\alpha)) = 0,96$

Polygon Area = 7,65

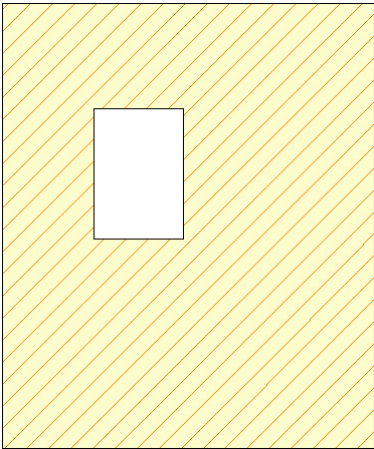
As you can see, the original polygon has been broken down into triangles and circular segments.

The relative dimension appears on each side and at the centre of each component there is an ID number in a circle.

On the right, there is a list of the individual components (recognisable by the ID number) with the formula used to calculate the surface area and the surface area calculated for each element.

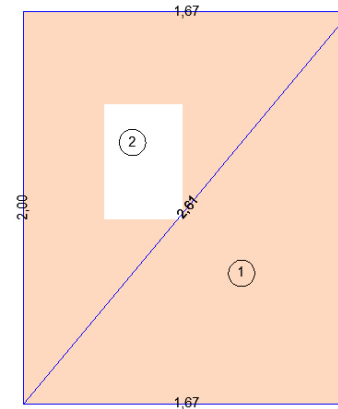
The algebraic sum of the surface areas of the individual components (representing the total surface area of the polygon) is shown at the bottom.

Below is an example using a fill with a hole:

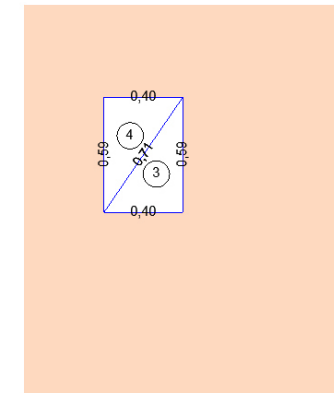


In this case, the calculation is rather more complex to represent. First, the surface area of the principal polygon will be calculated (as if there were no holes), followed by the surface area of the individual holes.

The surface areas of the holes will be subtracted from the principal surface area:



$$\begin{aligned} \textcircled{1} \quad P &= (1,67 + 2,00 + 2,61) / 2 = 3,14 \\ A &= \text{SQR}[P * (P - 1,67) * (P - 2,00) * (P - 2,61)] = 1,67 \\ \textcircled{2} \quad P &= (2,61 + 1,67 + 2,00) / 2 = 3,14 \\ A &= \text{SQR}[P * (P - 2,61) * (P - 1,67) * (P - 2,00)] = 1,67 \end{aligned}$$



$$\begin{aligned} \textcircled{3} \quad P &= (0,40 + 0,59 + 0,71) / 2 = 0,85 \\ A &= \text{SQR}[P * (P - 0,40) * (P - 0,59) * (P - 0,71)] = -0,12 \\ \textcircled{4} \quad P &= (0,71 + 0,40 + 0,59) / 2 = 0,85 \\ A &= \text{SQR}[P * (P - 0,71) * (P - 0,40) * (P - 0,59)] = -0,12 \end{aligned}$$

Polygon Area = 3,10

As can be seen, the individual holes are broken down and calculated one by one. The result will be a negative surface area which will be added algebraically to the surface area of the principal polygon.

Note: When you select an **Area List – ArchiTools** object, graphic hotspots will appear allowing you to drag the various parts of the image to move them to the desired position.

Help

In common with all other Cigraph add-ons, ArchiTools is accompanied by a help file.

Click on the last button on the right of the palette to display the user manual in **PDF** format.

Note: *Although our add-ons are multilingual, the manual provided (the manual included in the package you can download from our site or find on the DVD) is in English only. Download the manual in your preferred language from our site (or copy it from the DVD) and use the file to replace the one present to access the user manual in your language.*