

Perspective Straightening

Entzerren von Fotografien

Raddrizzamento Prospettico

Redressement d'images photographiques

Corrección de imágenes fotográficas

ArchiFaçade™



PLUG-IN FOR ARCHICAD®

ArchiFaçade™

User Guide

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ArchiFaçade

Plug-In for correcting images

What is an ArchiCAD plug-in?

A Plug-in is a software component that allows ArchiCAD to provide new functions in addition to the standard characteristics.

ArchiCAD allows you to manage the plug-ins automatically, starting them up and closing them through the menu bar. Indeed, once the Plug-in has been installed, a new menu will appear in the menu bar. This menu will behave completely like any other ArchiCAD menu. It will allow you to access the ArchiFaçade palette and therefore to access all of its tools.

In fact, you will not even realise that you are using a Plug-in: it will still be similar to using your ArchiCAD, but with more functions.

System Requirements

ArchiFaçade's configuration is established by the configuration requested for ArchiCAD. However if you do not have enough storage space for the libraries, a warning message will be displayed.

In this case, more storage space in the Disk Operating System can be made available by closing other applications or decreasing the storage space assigned to ArchiCAD.

ArchiCAD Version

ArchiFaçade is compatible with ArchiCAD 6.5 (we suggest you use the 6.5 V3-R3 release) and does not work with older versions of ArchiCAD.

Where should the ArchiFaçade plug-in be placed?

The plug-ins cannot be opened directly through the Finder (Macintosh platform) or through Windows Explorer (Windows platform) and therefore, to be able to start them up, you must copy them into the ArchiCAD Add-Ons folder.

- **Mac OS:** the Add-Ons folder can be found in the same folder as the ArchiCAD application, or within the Graphisoft folder present in the System folder.
- **Windows:** the Add-Ons folder must be in the same folder as the ArchiCAD application. If positioned elsewhere, ArchiCAD will not be able to access it.

ArchiCAD verifies the presence of Plug-ins when booting up. If the Plug-ins are not found in the correct place, you must quit the program and place them in the correct location and then restart ArchiCAD.

For temporary use, you may run the Plug-in requested via the **Load Add-On...** command present in the *Tools menu*.

Installing the package

The ArchiFaçade folder contains the ArchiFaçade plug-in and the "ArchiFaçade.Lib" folder. To install ArchiFaçade, please carry out the following procedure:

- Copy the ArchiFaçade folder into the Add-On folder, found in the ArchiCAD folder.

If the installation has been performed correctly, a new menu will have been added to the Menu Bar.



Thanks to this added menu, you will be able to display/hide the ArchiFaçade Toolbox.

The library needed for running the "ArchiFaçade.Lib" is automatically added to the list of active libraries by ArchiFaçade.

If, for whatever reason, the additional library is not loaded, when you use one of the ArchiFaçade commands for the first time, the program will notify you and suggest that you start it up.

Select the **Load library...** command from the ArchiCAD *Archive menu*.

In this window, select the ArchiFaçade.Lib folder and add it to the list of active libraries.

Introduction

ArchiFaçade is a simple and powerful program that allows you to modify a foreshortened photograph to make it look like the result of an orthogonal projection.

This is based on the principles of projective geometry: through the appropriate mathematical transformations, the points that make up the image distorted by the perspective can be modified to the point that the corrected image can be created.

In the past this procedure was performed manually through a laborious procedure of graphic projections.

With ArchiFaçade you can correct the image by inserting the known measurements of the supporting points, or, by identifying lines that in reality belong to a horizontal or vertical surface on which it is possible to apply the trilateration technique.

The resulting image at the end of the process is equal to a projection that has been performed point by point.

Since the procedure is based on the interpolation of the transformation of coordinates of the so-called "supporting points" from their apparent position to their real position, it is important to remember that the greater the distance separating them, the greater the accuracy when the corrected image is created. For example, it could be worthwhile providing the coordinates for the ground length and eaves height of the façade.

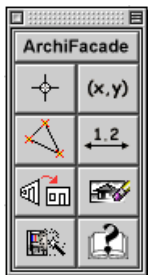
ArchiFaçade also allows you to transform a photographic image into an ArchiCAD library element and to insert it into a three-dimensional display. It will be possible to attribute to this the orientation and the perspective effects that you wish, by way of the same ArchiCAD tools.

Lastly, the program allows you to edit perfect the images, so that you can keep only the elements that interest you.

All this will be made clearer through three practical examples.

A first approach: the Toolbox

All the ArchiFaçade commands and functions are available in its Toolbox.



The only command that is added to the ArchiCAD standard menu is the command that allows you to display/hide this palette at any time.



The ArchiFaçade Toolbox is active, of course, in the ArchiCAD plan worksheet. It is automatically hidden in the 3D display and in the "Sections/Elevations" windows.

The following tools are present in the palette:



The **Insert Supporting Points** tool allows you to insert the points and their values.



The **Modify Supporting Points** tool allows you to modify the values of the points already inserted.



The **Define Trilateration** tool allows you to identify the alignment and the points to triangulate it to.



The **Modify Trilateration** tool allows you to modify the values and the elements of the triangulation that have already been inserted.



Once all the values have been inserted, the **Correct Image** tool allows you to carry out the correction operation.



The **Delete Area Selected** tool allows you to perfect the final image, cutting out all that is not needed.



The **Create Silhouette Object** tool allows you to use the digital images for creating wings in the three-dimensional drawings.



The **Help Tool** provides a rapid and clear overview of the tools' functioning.

Correcting a photographic image

We want to correct the façade of a very simple building, a photographic image of which we have in the examples folder.

To do this, we will have to place four hotspots in correspondence with four “strategic” points of our image; for example the façade’s four corners.

We will place our hotspots in correspondence with the points as THEY APPEAR in the image, i.e. distorted by the perspective.

We will then attribute the REAL coordinates to them, i.e. those that derive from the building measurements carried out in practise.

Our program will correct the quadrilateral constructed from our points, making them take on an orthogonal aspect. Doing this, it will also modify the projective coordinates of EVERY point of the figure contained on the same plane. We will thus see all the parts contained in the photo of the façade appear as if it were an elevation survey.

Of course, at the same time, all the points that do NOT belong to the plane will be distorted to an even greater extent; starting from the edge of the image that will be transformed from a rectangle into an irregular polygon.

Since we are only interested in the corrected façade, we will easily be able to cut out all that does not interest us from our figure.

Let’s take a look at the first guided exercise:

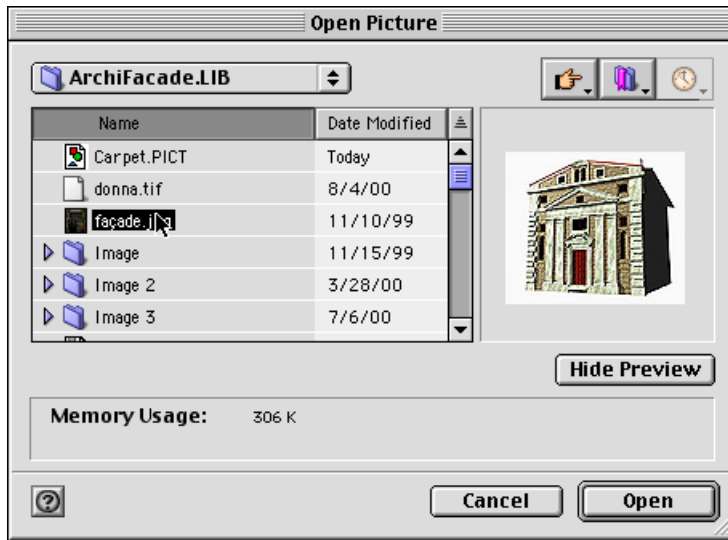
Firstly you must open the image that you want to correct in the ArchiCAD worksheet . To do this:



- Double-click the **Figure** tool icon in the ArchiCAD toolbar.

The ArchiCAD “Figure Settings” dialog box will appear and ask you the name and path of the image you want to open. The format of the image can be: BMP, PICT, GIF, TIFF or JPG.

- Click on **Open...** and select the file you want to open.



- Select the folder where the file on which you want to work is located. In this case it will be the "ArchiFaçade.LIB" folder and the "façade.jpg" file.
- Confirm with **Open**.

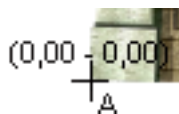
The cursor will change into a small cross and wait for you to indicate the figure's insertion point.



- Click on the **Insert Supporting Points** tool icon. The cursor will take on the shape of a pencil.
- Define the four supporting points for the projection one at a time. For example, the façade's four external corners.

In correspondence with every point selected, ArchiFaçade will make a hotspot symbol appear, accompanied by a progressive letter (A, B, C, D).

It will also show a value in brackets; in this phase this value is set at (0,00-0,00).



Note:

Of course the smaller the distance between the points, the greater the margin of inaccuracy of the correction operation. It is therefore best to take into consideration the largest measurements possible, together with the building's more difficult projectability. For example, if they are accurate enough, the ground length and the eaves height of the building.

At the end of the introduction of the fourth point, ArchiFaçade will open a dialog box, asking you to enter the values of the coordinates of the supporting points.

Real Co-ordinates

A x:

A y:

B x:

B y:

C x:

C y:

D x:

D y:

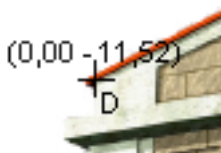
The Fit in Window function will also be automatically activated to display all four points at the same time.

- Insert the “real” values of **X** and **Y** of each individual point, as they are in your projection.

In this case:

- Then click on **OK**.

The values in brackets next to the hotspot symbol will take on the value attributed by you.



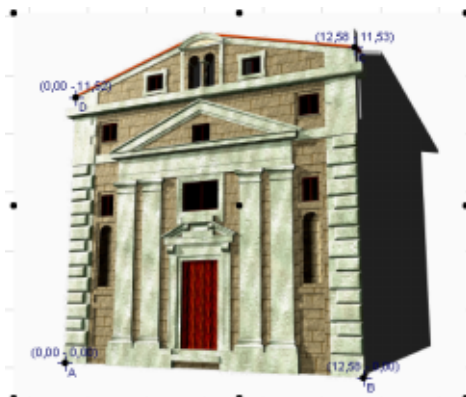
If you have to modify the settings already inserted, the procedure is extremely simple:

- Select the four supporting points.
- Click the **Modify Supporting Points** tool icon.

The previous dialog box will reappear, and you will be able to insert the correct coordinate values.

- With the ArchiCAD **Selection Arrow** tool, select an area that includes all four of our points and the image to correct.





- Then press the **Correct Image** tool icon.

The cursor will take on the shape of a pencil and ArchiFaçade will wait for you to select the insertion point of the corrected image.

- Click on the point where you want the corrected image to appear on the worksheet.

A dialog box will then appear that will ask you if you want to save this image onto the disk; and, if yes, where and with what name.

- Select the folder and the name to give to the image file created.

Once the previous operation is completed, your corrected image will appear in the pre-selected point.



At this point, your façade will be shown as an elevation.

The **Cancel Area Selected** tool has been created so that you can cut out any undesired parts of the image.

It is used as follows:

First and foremost you must select the part of the image that you want to keep.

To do this:

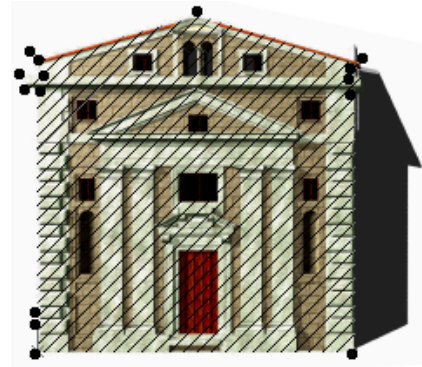
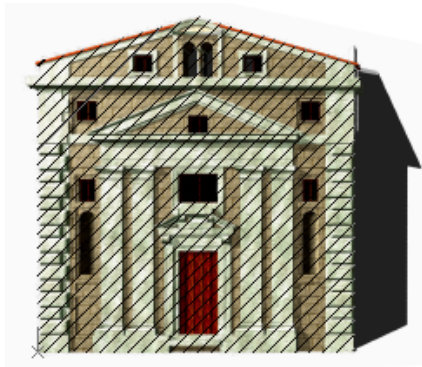


Note:

- Click the ArchiCAD **Fill** tool icon, and cover the area that you want to keep with the fill.

The area covered by the fill must not have any holes.

- Click on the ArchiCAD **Arrow Selection** tool and select the fill and the image at the same time.



- Now click on the **Delete Area Selected** tool icon in the ArchiFaçade bar.

The “Delete” dialog box will appear, asking you if you want to cut out the surface that is inside or outside the fill.



Since you have covered the area that you want to keep with the fill:

- Select the **Delete outside** pushbutton.
- With a click, activate the **Replace original image** option; the cut image will be superimposed on the one selected in the previous point, thus replacing it.

To keep both the images, deactivate the **Replace original image** option.

The cursor will take on the shape of a pencil and the cut image will be inserted on in the point where you click.

Your façade will finally appear as the projection of an elevation.



Note:

Instead of covering the area that interests you with the fill and cutting out what you do not want, you could do the opposite: cover the part you want to remove with the fill. You must, however, remember to select the Delete Inside pushbutton.

Summary of the commands

To proceed:

- Click on the **Insert Supporting Points** tool icon.
- Insert the points with a click of the mouse, making the hotspots appear.
- Insert the REAL values of the **X** and **Y** coordinates and click **OK**.
- Select and click, if necessary, on the **Modify Supporting Points** tool icon and repeat their/its insertion.
- Select the whole area you want to correct.
- Click on the **Correct Image** icon.
- Click on the chosen point to insert it.

- Click on the ArchiCAD **Fill** tool icon.
- Cover the area that you want to keep or remove with a fill.
- Select the whole image.
- Click on the **Delete Area Selected** tool icon.
- Select the requested options and click **OK**.

Correcting an image through trilateration

We can also correct our image by using the trilateration technique.

We can identify a segment that appears oblique in the photographic image, and which we know belongs to a perfectly horizontal or vertical plane in reality.

To be able to calculate its position exactly, we will select two points on the façade and carry out its trilateration, with reference to the ends of the alignment.

By inserting the real values - i.e. measured in practise - of the two triangles that derive from it, we will give our program the necessary information for modifying all the points of the plane considered, in such a way that it looks to us like a elevation survey.

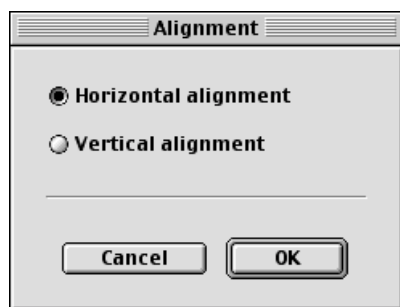
Once the reference data have been entered, the correction procedures are the same as presented in the previous case.

Firstly, open the image that you want to correct by following the indications already explained in the *"Correcting a photographic image"* paragraph (see p. 5).



- Click on the **Define Trilateration** tool icon.

A dialog box will appear that will ask you whether the reference segment must be horizontal or vertical.



- Select, for this example, the **Horizontal alignment** option, and click on **OK**.

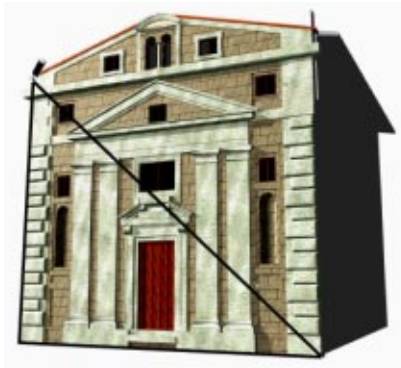
The cursor will take on the shape of a pencil.

- Select the two points that represent the two ends of the segment to correct.



The cursor will transform into the vertex of an “elastic” triangle.

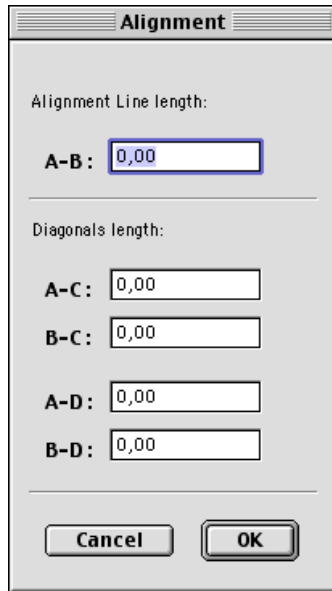
- Select a third point for the first triangulation.



- Select a fourth point for the second triangulation.

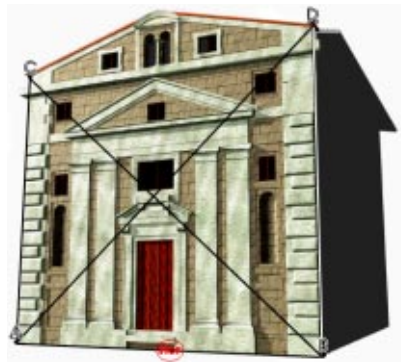


When the fourth point has been inserted, ArchiFaçade will open a dialog box, which asks you to enter the measurements of the sides of the triangles obtained.



The dialog box is titled "Alignment". It contains two sections. The first section is labeled "Alignment Line length:" and has a text input field labeled "A-B:" with the value "0,00". The second section is labeled "Diagonals length:" and has four text input fields labeled "A-C:", "B-C:", "A-D:", and "B-D:", each with the value "0,00". At the bottom, there are two buttons: "Cancel" and "OK".

The **Fit in Window** function will automatically be activated to display all four points at the same time. A letter (A,B,C,D) will appear next to each of them that will allow you to identify them.

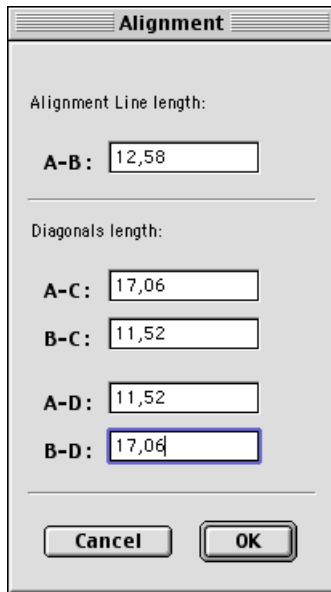


Our segment will be identified by a red line and the wording "Hor".



- Insert the real values.

In this case:



The 'Alignment' dialog box contains the following fields and buttons:

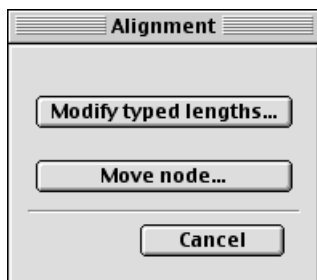
- Alignment Line length:**
 - A-B: 12,58
- Diagonals length:**
 - A-C: 17,06
 - B-C: 11,52
 - A-D: 11,52
 - B-D: 17,06
- Buttons:** Cancel, OK

- Then click on **OK**.

If you want to modify the settings already inserted, the procedure is extremely simple:

- Select the object's four reference points.
- Click the **Modify Trilateration** tool icon.

A dialog box will appear that asks you if you want to modify the lengths keyed in or move a node.

The 'Alignment' dialog box contains the following buttons:

- Modify typed lengths...
- Move node...
- Cancel

- Select, for example, **Modify typed lengths....**

The previous dialog box will appear, and you will be able to insert the correct measurements.

- Otherwise, select **Move node...**

The cursor will again take on the shape of a pencil.

- Click on the node that you intend to move.
- Click on the point where you want the node to be moved to.



The configuration of the triangulation will be modified according to the new indications.



*This is a **CYCLICAL** command: once a modification has been introduced into the configuration, ArchiFaçade always waits for you to request another one.*

To interrupt this procedure simply:

- *Click the **Cancel** pushbutton on the ArchiCAD Control Box;*
or:
- *Click any tool in the ArchiCAD Toolbox; or:*
- *Access the ArchiCAD Hierarchical Menu (in Windows: right mouse button, in Macintosh: mouse button + Ctrl), and select the **Cancel** command.*
- Through the ArchiCAD **Selection Arrow** tool, select an area that includes all four of our points and the image to correct.
- At this point follow the procedure that has been described in the "Correcting a photographic image" paragraph (see p. 5).

Summary of the commands

To proceed:

- Click on the **Define Trilateration** tool icon.
- Select the **Horizontal alignment** or **Vertical alignment** option, and click on **OK**.
- Select the two points that represent the two ends of the segment to correct.
- Select a third point for the first trilateration.
- Select a fourth point for the second trilateration.
- Insert the values obtained from the measurements. Then click on **OK**.
- Select, if necessary, the four reference points.
- Click the **Modify Trilateration** tool icon.
- Select **Modify lengths....**
- Insert the correct data.
- Otherwise, select **Move node....**
- Select the node that you intend to move.
- Click on the point where you want the node to be moved to.
- Click the **Cancel** command at the end of the modifications.
- Select the whole area to be corrected.
- Click on the **Correct Image** icon.
- Click on the chosen point to insert it.
- Click on the ArchiCAD **Fill** tool icon.
- Cover the area that you want to keep or remove with a fill.
- Select the whole image.
- Click on the **Delete Area Selected** tool icon.
- Select the options requested and click **OK**.

Create a wing / Silhouette Object

Now suppose that you have a three-dimensional model drawing of your building in ArchiCAD and that you want to insert some digital images of persons - or objects - into, or around it. This is useful for creating "wings"/Silhouette similar to those used in a theatrical set.

By definition, all the digital images belong to a horizontal plane. To insert them into your 3D environment, you may need to rotate them to the plane you want. For instance, a human figure will belong to a vertical plane, a carpet to the horizontal one.

The **Create Wing/Silhouette Object** tool has been created for this purpose.

By way of this tool, we will transform the image of a human figure that we have in archive in to an ArchiCAD library element so that we can insert it into any three-dimensional view of the drawing.

To do this, after opening our image and sizing it to the scale of the drawing, we will cut out the part of the image that we do not need. We will then give the rotation indications to make it belong to a vertical plane, and we will save it by transforming it into an object.

Firstly, in the ArchiCAD worksheet, you must open the image that you want to transform into a wing. It is important to remember that this image must already have been saved in the ArchiCAD library.

To do this:



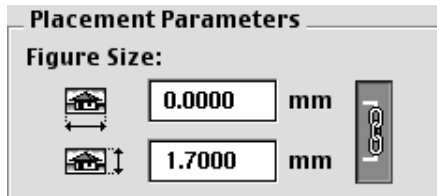
- Double-click on the **Figure** tool icon in the ArchiCAD toolbar.

The "Figure Settings" dialog box will appear and prompt you to key in the name and path of the image you want to open. The format of the image can be: BMP, PICT, GIF, TIFF or JPG.

- Click **Open...** and select the file you want to open in the related window.
- Select the ArchiCAD *Library* folder and the "*model.pct*" file.

If the image is not already in the scale desired, you will need to modify its dimensions. Since this is a person, insert the measurements that it would have in real life; taking into account the fact that the figure will be cut, and that the measurements that you enter refer to the complete image.

- Insert in the **Figure Dimensions** field the measurements that you want to set; for example, 1.70 m.



- Then click **OK**.

The cursor will change into a small arrow and wait for you to indicate the figure's insertion point.

- Click the point where you want the image to appear.

At this point you must select which parts of it you want to keep and which you want to remove.



- Then click the ArchiCAD **Fill** tool icon and cover the area that you want to keep with the fill.



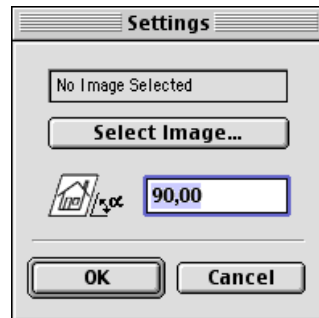
Note:

In this case the surface covered by the fill can contain holes.

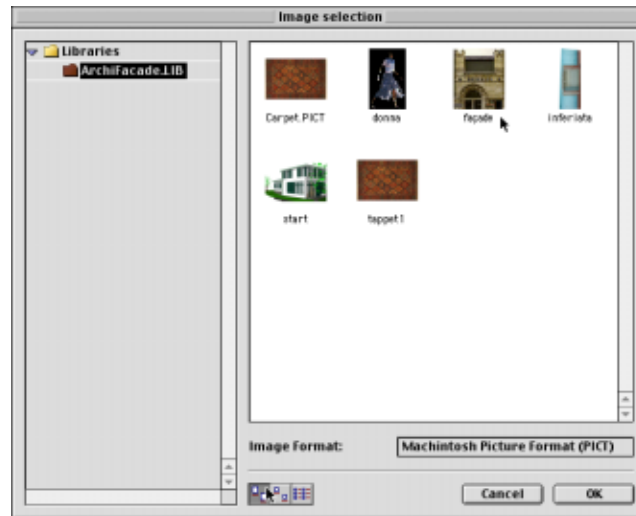
- Then select the whole image and the fill.
- At this point click on the ArchiFaçade **Create Wing/Silhouette Object** tool icon.



A dialog box will appear and ask you to select the image.



- Click **Select Image**.
- In the ArchiCAD Library folder select the image file that you had opened and confirm with **OK**.

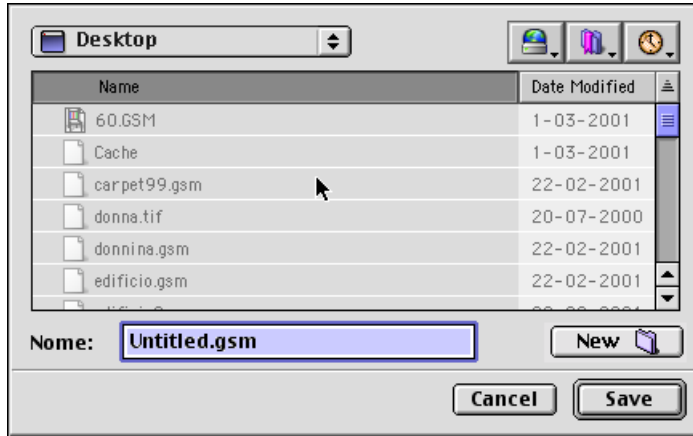


- Insert the value of the angle of inclination that you want to give to the figure. Since the image is always horizontal in origin, and we want to position it vertically, insert the value of 90 degrees into the field related to the angle of inclination.



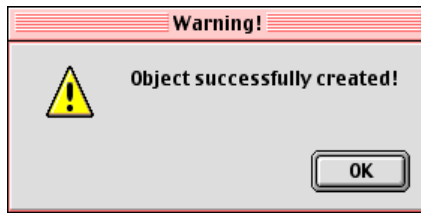
- Click on **OK**.

A window will appear and prompt you to insert the path and name to save the object as. For this object to be usable, you should save it in one of ArchiCAD's active libraries.



- Select, therefore, one of the active libraries and key in the name.
- Lastly, click on the **Save** pushbutton.

A window will confirm that the saving has been successful.



- Click on **OK**.

Your wing is now part of the library of objects. To display it:

- Double-click on the ArchiCAD **Object** tool and, when the dialog box appears, follow in full the normal procedures for any object of the ArchiCAD libraries.

You will be able to see your image from any angle through the ArchiCAD 3D display window.



Summary of the commands

To proceed:

- Double-click the **Figure** tool icon in the ArchiCAD *toolbar*.
- Click **Open....**
- Select the folder and the necessary files.
- Insert the measurements that you want to be set in the *Figure Dimensions* field.
- Then click **OK**.
- Click the point where you want the image to appear.
- Double-click on the ArchiCAD **Fill** tool icon, and cover the area that you want to keep with the fill.
- Select the whole image.
- Click on the ArchiFaçade **Create Wing/Silhouette Object** tool icon.
- In the first field insert the name of the file that contains the image, selecting it in the ArchiCAD *Library* folder.
- In the next field, insert the value of the angle of inclination that you want to give to the figure.
- Click on **OK**.
- Select the folder of an active library and key in the file name.
- Click on the **Save** pushbutton.
- Click on **OK**.

- Double-click on the ArchiCAD **Object** tool.
- The values already calculated for the pre-selected image will be given.