panzercad
cameramatch

Version 2010 for Vectorworks 2010

User Guide

Table of Contents

Introduction

Camera Match sets the 3D view of a model to match the perspective view of a given photograph. The view is determined by:
- A background image (photograph)
- A Camera Match Reference object
- A Camera Match object

The Camera Match package consists of the following items:

1. Camera Match Reference: Object placed on a Design Layer, the Camera Match Reference gives Camera Match the 3D model's orientation in 3D space.

2. Place Camera Match Reference: Menu command: Used to insert a Camera Match Reference object.

3. Camera Match: Object placed in a viewport's Annotation Space, the Camera Match object calculates the 3D view by aligning control lines to the photograph.

4. Place Camera Match Object: Menu command: Used to insert a Camera Match object.

5. Camera Match Mask: Object used for masking parts of the rendered model that are obscured by objects in the photo.

Installation

Quit Vectorworks, if it is running.

Macintosh: On this install disk, you will see the folders as shown in the image (below). Drag the "PanzerCAD Camera Match 2010" folder icon to the "Vectorworks Plug-ins" folder icon. After doing this, the " PanzerCAD Camera Match 2010" folder will be copied to the path shown below. Alternatively, the "PanzerCAD Camera Match 2010" folder can be manually copied to directly to this path on your hard drive:

PanzerCAD Camera Match 2010 — INSTALLATION: Drag to Vectorworks Plug-ins Folder — Vectorworks "Plug-ins" Folder

> Macintosh HD
  > Users
    > [your log-in name]
      > Library
        > Application Support
          > Vectorworks
            > 2010
              > Plug-ins

Windows: Copy the "PanzerCAD Camera Match 2010" folder into the "Plug-ins" folder in the following location:

+ C Drive
  + Documents and Settings
    + Administrator
      + Application Data
        + Nemetschek
          + Vectorworks
            + 2010
              + Plug-ins

Add Camera Match to the workspace:
  Menu Commands:
- Place Camera Match Reference
- Place Camera Match Object

  Tools:
- Camera Match Mask

1. In Vectorworks, go to the "Tools / Workspaces / Workspace Editor" menu item.

2. Select the "Edit the current workspace" Option and click "OK".

3. In the Workspace Editor "Menus" Tab:
- In the list to the left, open the "PanzerCAD Camera Match" category by clicking on the small triangle (a "+" in Windows) to the left of it.
- In the list to the right, open the desired pull-down menu item (i.e.: the "Tools" menu) by clicking on the small triangle (a "+" in Windows) to the left of it.
- Add the Camera Match commands from the left list to the desired menu on the right.

4. In the Workspace Editor "Tools" Tab:
- In the list to the left, open the "PanzerCAD Camera Match" category by clicking on the small triangle (a "+" in Windows) to the left of it.
- In the list to the right, open the desired tool palette (i.e.: the "Visualization" palette) by clicking on the small triangle (a "+" in Windows) to the left of it.
- Add the "Camera Match Mask" tool from the left list to the desired palette on the right.

5. Click "OK" and you're finished. You should now see the Camera Match commands and Masking tool available in their corresponding locations.

For more information on using the Workspace Editor, refer to the Vectorworks manual.

1: The Photo Image

- Start with an image that is not cropped.
- Correct image from lens distortion.
- Open the Vectorworks file of the 3D model and import the image using the Resource Browser.

TIP: It's best to start with a photo image that is the same size and resolution as desired for the final composite image.

Do Not Crop:

The center of the photo tells Camera Match where the camera is looking. If the photo is cropped, the center may have changed and Camera Match cannot correctly calculate the view.

Correct the image from Lens Distortion:

Most lenses create some degree of barrel distortion in their images. This distortion causes straight lines (or edges) in the photo to look curved and will give less accurate results.

Applications for correcting lens distortion:

Some image editing applications (i.e.: Adobe PhotoShop) have tools for this, but some low cost applications are designed specifically for this purpose. We recommend the following applications because they support many cameras and do the correction automatically.
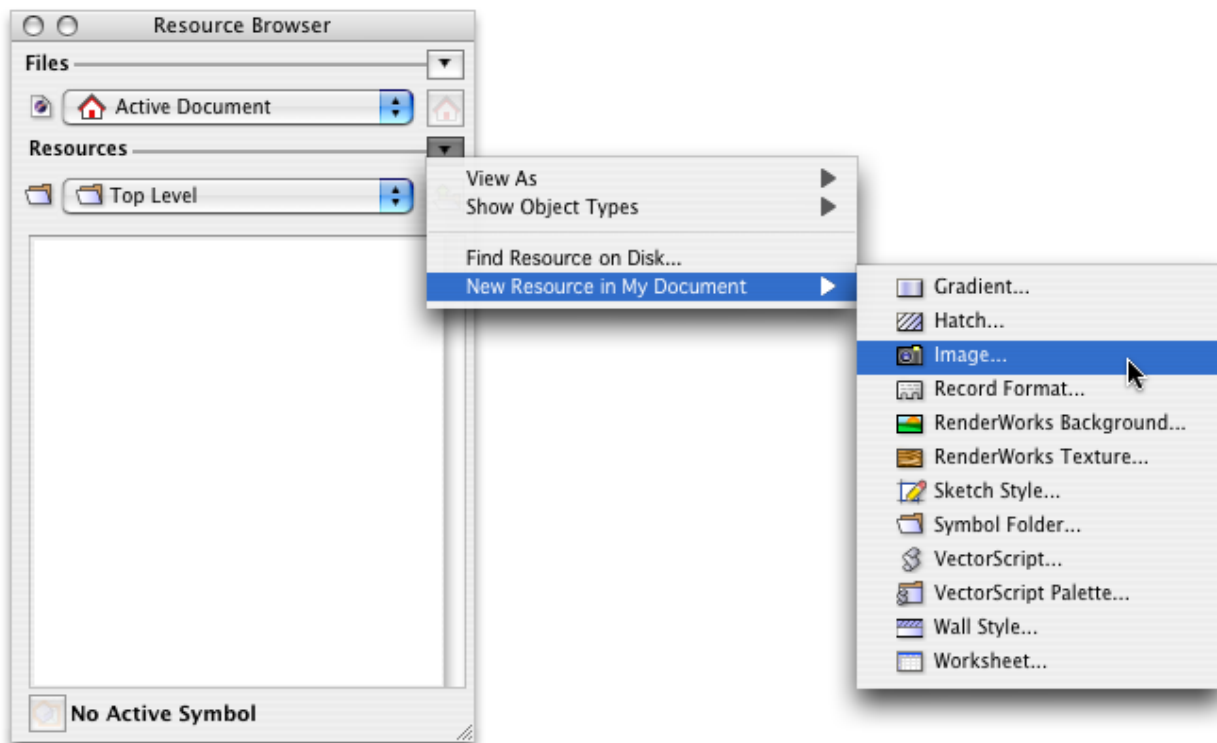
Recommended Macintosh Solution:	Recommended Windows Solution:
LensFix Cl: http://www.kekus.com	**PTLens:** http://www.epaperpress.com

Import the image into Vectorworks as an Image resource:

The photo image is used by the Camera Match object for aligning Control Lines to establish the view. The same image is also used to create a Renderworks Background for rendered views.

2: The Reference Object

- Go to the Design Layer containing the 3D model.
- Choose the "Place Camera Match Reference" command.
- You will be prompted to name the object.
- Give it a name and click "OK."
- Click on the desired point of reference in the model, rotate the Reference Object to relate to the model, and click again.
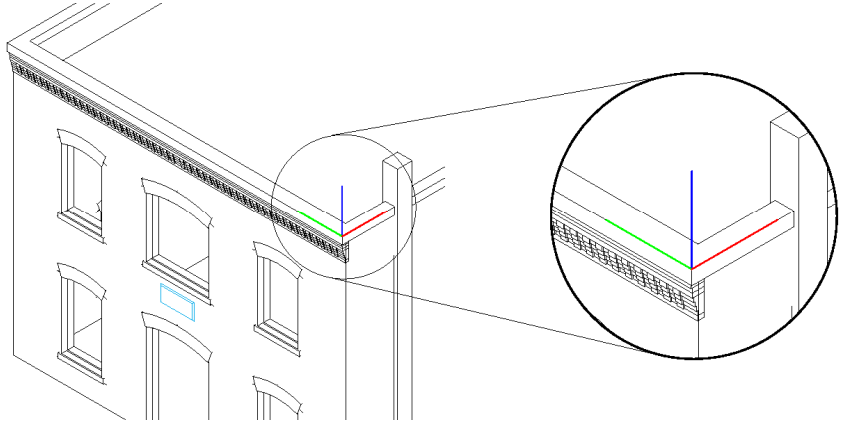- If necessary, set the appropriate Z height in the Object Info palette.

Camera Match Reference Object:

The Camera Match Reference Object tells Camera Match the 3D model's orientation in 3D space. The Reference Object is positioned on the model to define the planes where the vanishing lines lay. The three color coded axes define the following vanishing points:

Green = Left vanishing point
Red = Right vanishing point
Blue = Up vanishing point

It also establishes a 3D point that can be located in the photo (an existing point at a known height).

Typically, the Reference Object should be located at a corner of an object and the two arrows should point along two nonparallel vertical planes (i.e.: two walls that meet at a corner). If the corner angle of the model is not 90º, the angle between left and right axes can be adjusted to match. In Top Plan view, drag the selection handle at the endpoint of each line to align with the corner of the model.
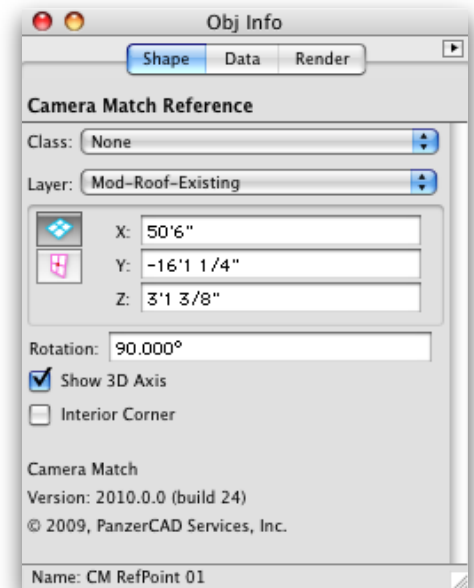
Object Info Palette Settings:

The following setting can be set through the "Obj Info" palette while the Reference Object is selected.

Z-height:
The Z-height of the Reference Object should be set to the known height of an element that can be located in the Photo.
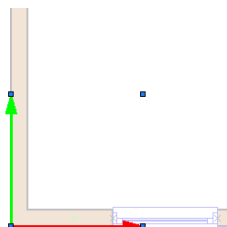
Show 3D Axis:
While in 3D views, this option better shows the Reference Object's orientation to the model. When off, only a 3D locus is shown.
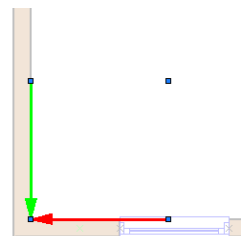
Interior Corner (Unchecked):
Unchecked, Camera Match assumes the Reference Object is placed on an exterior corner (i.e.: for an exterior view). The arrows point away from the corner and toward the vanishing points.

Interior Corner (Checked):
Checked, Camera Match assumes the Reference Object is placed on an interior corner (i.e.: for an interior view). The arrows point toward the corner and toward the vanishing points.

3: Creating a Viewport for Camera Match

- Create a viewport of the desired layers and classes.
- Place the new viewport on a new (or empty) sheet layer.

NOTE: The Camera Match object is designed to be used within a viewport's annotations space.

TIP: It's best to display minimal 3D geometry (in the viewport) to represent the existing model. Keep any detailed or new parts of the model turned off (by turning off any related layers & classes). This will help keep things less cluttered and speed the Camera Match process. Once the view is set, change the class settings to show what's needed for the final rendering.

4: The Camera Match Object

- Edit the Annotations of the new viewport.
- Run the "Place Camera Match Object" menu command.
- You will be presented with the "Camera Match Settings" dialog.
- Set as needed and click "OK"
- A Camera Match object will be placed in the document.

Camera Match Settings (Dialog)

The " Camera Match Settings" dialog is invoked when placing a new Camera Match object, or by clicking the "Settings…" button in the "Obj Info" palette.
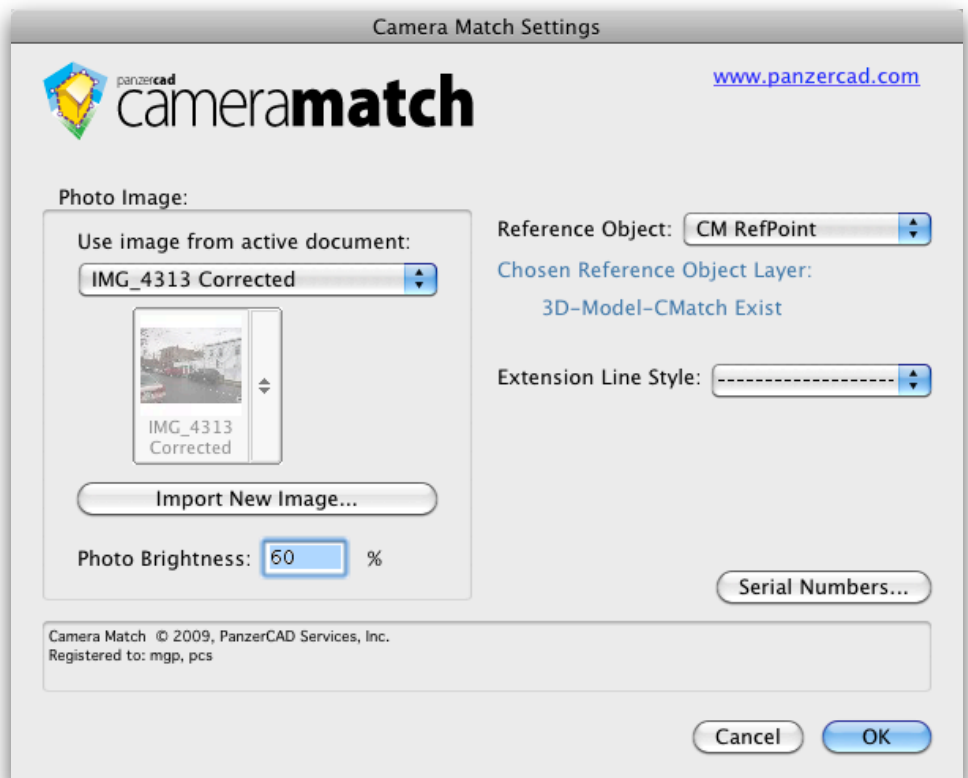
"Photo Image" section: Select an existing image resource from the pop-up, or click the "Import Image" button to import one from a file.

Photo Brightness: The Photo Brightness can be set to adjust the brightness of the photo image. A value of "0" keeps the original image brightness. Adjusting the brightness can make it easier to see the Camera Match control lines against the photo.

Reference Object: Use the Reference Object pop-up to select the desired Reference object.
TIP: The residing layer of of the chosen Reference Object is shown in blue. This information can be helpful in locating Reference Objects.

Extension Line Style: This sets the line style of the extension lines.

Camera Match Settings (Obj Info Palette)

The "Obj Info" palette displays these settings for the selected Camera Match object:

Settings Button: Opens the "Camera Match Settings" dialog (see the "Camera Match Settings" section for details).

Photo Printed Width & Height: Sets the printed size of the Photo Image for the Camera Match object. When you set one value, the other will adjust to maintain the proportions of the photo.

Show Photo: Displays the photo image within the Camera Match object. The photo image displayed is used by the Camera Match object to align control lines and is also used for render modes that do not use a Render Background.

NOTE: When setting the view (via the "Set View to Match" or "Fine Tune View" button), the Show Photo will turn off for any render mode that uses a Render Background. Conversely, Show Photo will turn on for any render mode that does not use a Render Background.

Show Control Lines: Displays the control lines.

NOTE: Uncheck this for final rendering.

Show Reference Object 3D Axis: Displays the 3D axis of the Reference object.

NOTE: Uncheck this for final rendering.

Control Lines Pop-up Menu: Sets the number of horizontal & vertical control lines that determine the vanishing points.

Field of View: Displays the Field of View according to the calculated view.

Measured Line Pop-up Menu: Determines the control line to be used for the Measured Line. The measured line is shown with solid arrows and displays it's given dimension.

NOTE: The Camera Match Reference object placement is related to the measured line. See the "Reference Target Point" description and the "The Control Lines" section of this manual.
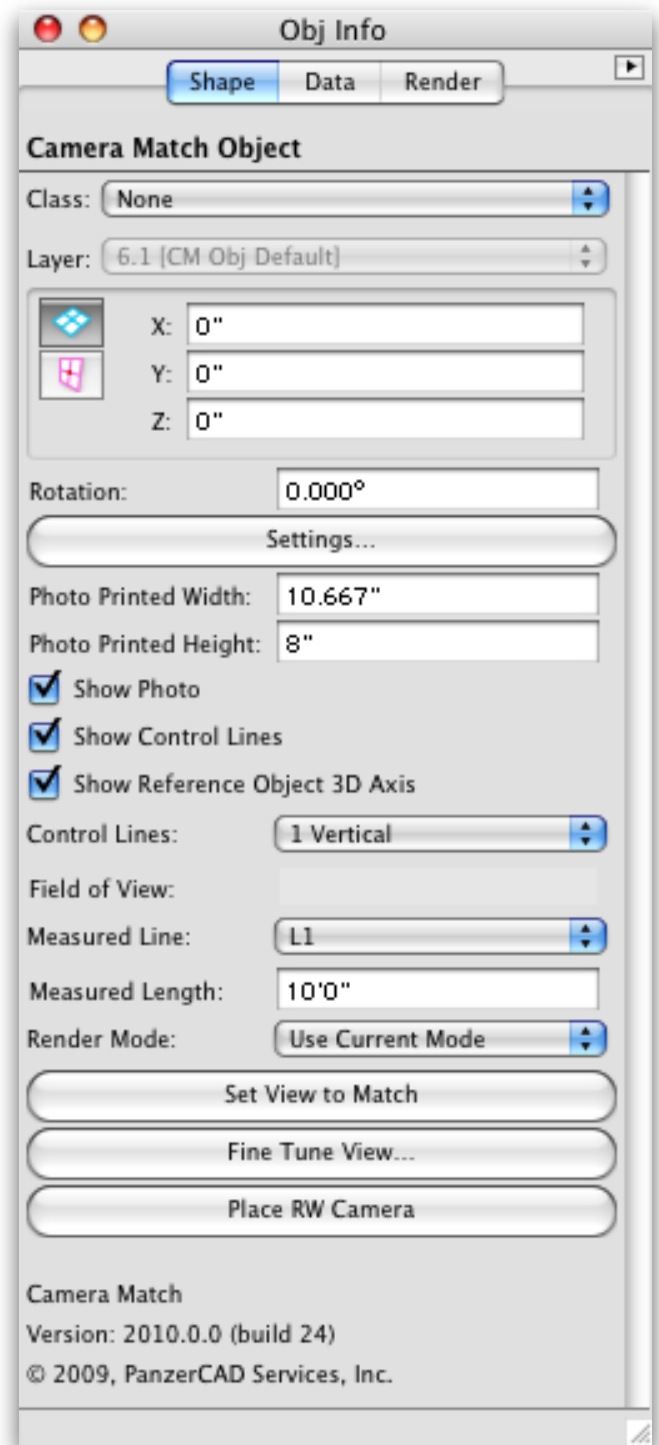
Measured Length: The known length of the Measured Line.

Render Mode: Sets the Render Mode for the viewport containing the Camera Match object. This setting will take effect when the "Set View to Match…" or the "Fine Tune View…" buttons are pushed.

"Set View to Match…" Button: Sets the view and render mode of the viewport to the calculated view.

"Fine Tune View…" Button: This button opens the "Fine Tune View" dialog (see "Fine Tune View" section for details).

"Place RW Camera" Button (available in Renderworks only): This button will place a Renderworks Camera on a design layer set according to the current Camera Match view. All Renderworks Camera settings (location, target, field of view, tilt, etc.) will be set so that it's view is equal to that of the Camera Match view.

5: The Photo Size

- Select the Camera Match Object.
- In the Obj. Info. palette, set the "Photo Printed Width" or "Photo Printed Height" to match the size of the Render Background.

IMPORTANT: The size must exactly match the Render Background size for correct results.
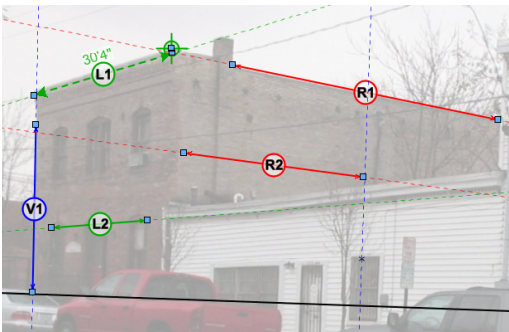
6: The Control Lines and Reference Target

- With only the CameraMatch object selected, zoom "Fit to Objects" so that the entire photo is within the document window.
- Position the control lines to tell Camera Match the orientation of the Camera Match Reference object:
  - The **green** lines point toward the left vanishing point (defined by the **green** axis of the Reference object).
  - The **red** lines point toward the right vanishing point (defined by the **red** axis of the Reference object).
  - The **blue** lines point toward the vertical vanishing point. Place on any vertical element in the photo.
- Select the Measured Line in the "Measured Line" popup menu (in the Obj Info palette).
- Enter the length of the Measured Line in the "Measured Length" field (in the Obj Info palette).
- Since the reference Target point establishes where the "Camera Match Reference" object is on the photo, locate the Reference Target to the same location on the photo.
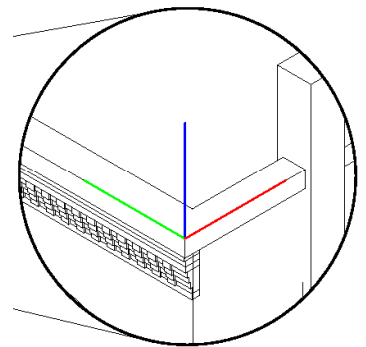
The Control Lines:

A total of five control lines are needed to define the three vanishing points of a photo. The default is "1 Vertical." This provides a pair of control lines for both the left and right vanishing points, and one for the vertical vanishing point.
TIP: In photos that have too few horizontal elements, the "1 Left" or "1 Right" setting (in the "Control Lines" pop-up) might be a better choice.

The **green, red** and **blue** Control Lines point toward their respective **left, right** and **vertical** vanishing points.

These colors also correspond to the three colored axes of the reference object.

Green and Red Control lines: The green and red lines establish the left and right vanishing points respectively.
TIP: When using only one right (or left) control line, keep it placed as far (vertically) from the horizon line as possible. The vanishing point of a single horizontal control line is determined by the intersection of this line and the horizon line. The further these lines are from each other, the more accurate the vanishing point will be.

Blue Control lines: The blue lines establish the vertical vanishing point.
TIP: When using only one vertical control line, keep it placed as far right (or left) from the photo center as possible. The vertical vanishing point is determined by the intersection of this line and a line (perpendicular to the ground plane) passing through the photo center. The further these lines are from each other, the more accurate the vanishing point will be.
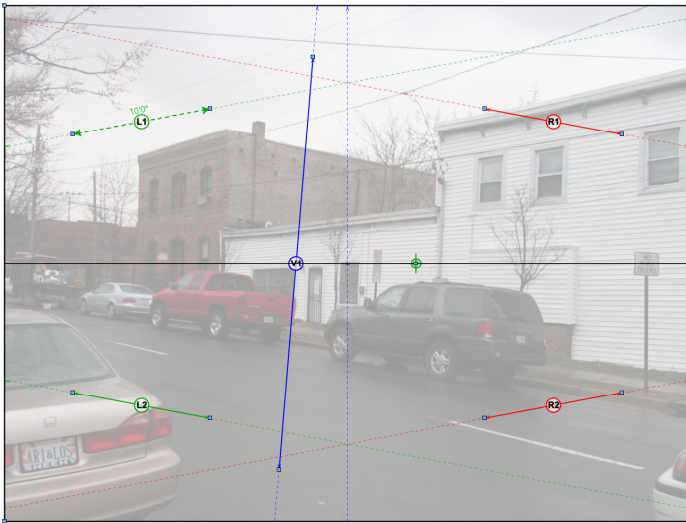
The Measured Line: The Measured Line is a control line that tells Camera Match a known length in the photo. This line must be drawn along a feature (on the photo) of a known length. This line must lay on the vertical plane defined by the green or red axis of the Camera Match Reference. Any horizontal control line can be set as the Measured Line through the "Obj Info" palette. The control line that is chosen as the measured line will be shown with bold arrows and will display its given dimension.

The Reference Target Point:
The reference Target point establishes where the "Camera Match Reference" object is on the photo. The color of the target corresponds to the color of the Measured Line. The target Point (and the Camera Match Reference object) need to lay on the vertical plane defined by the measured line.

The Horizon Line:
The black line is the calculated horizon line.

The Camera Match object: Initially, the Camera Match object should look like the image above. The control lines are the 5 colored lines.

The Reference Target is the circle w/cross-hairs located over the black (horizon) line.

Before adjusting the control lines and target, turn off all constraints in the Constraint Palette (as shown right). This will make it easier to place the points without them inadvertently snapping to objects in the model.

Adjust the control lines: Move the control lines so that the green lines point toward the left vanishing point, the red toward the right, and the blue toward the vertical. Once they are in place, zoom in on each control line to fine tune them.

TIP: Try to keep each colored pair of lines far from one another. The closer any pair of lines are, the more parallel they become. Near parallel lines make it harder to establish an accurate vanishing point.

In the image (above), the two red lines are not ideal, but they are still acceptable.

7: Set View to Match

- Select the Camera Match object
- Select "Wireframe" or "Hidden Line" Render Mode (in the "Obj Info" palette).
- Click the "Set View to Match" button.

The Render Mode pop-up will set the render mode for the viewport when setting views with the Camera Match object. "Wireframe" or "Hidden Line" mode is recommended for initially setting and tuning the view.

The "Set View to Match" button will do the following: If needed, a Render Background will be created from the photo image and set to be used by the viewport. The view will be set according to the control lines. The Reference Object (placed in the model) should also now be anchored to the Reference Target location in the photo.

(7)

8: Tune the View

- Click the Fine Tune button (in the Obj Info palette)
- In the "Fine Tune View" dialog
  - Start tuning with the "Vanishing Point" controls.
  - If needed, continue tuning with the "Rotate / Distance" controls.
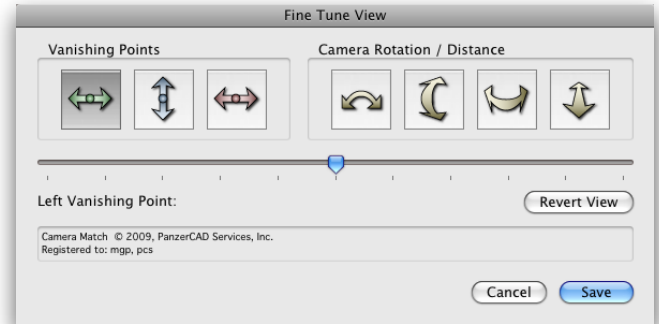
If the control lines are accurately placed, the calculated view may be close enough for you needs. However, it's still likely that the view will need some tuning. To do this, select the Camera Match object and click on the "Fine Tune View…" button (in the "Obj Info" palette). The "Fine Tune View" dialog will appear.

Fine Tune dialog

This dialog allows the view to be adjusted about the 3D Reference Target. All Fine Tune controls adjust the view while keeping the Camera Match Reference Object anchored to the Reference Target in the photo.

Mode Buttons & Live Slider

The dialog contains a series of mode buttons across the top. These buttons set the mode of the slider control below. Change the mode by clicking on the desired mode button. Once the desired mode button is selected, dragging the slider will adjust the view according to the chosen mode. While the slider is being dragged (with the mouse button held down), the view will update live on screen. Once mouse button is released, the slider control will re-center itself allowing for further adjustments.

Vanishing Point Modes

These modes allow the slider to adjust the distance of the vanishing points from the photo center. Each button adjusts the corresponding vanishing point designated by it's color.

Left Vanishing Point Mode:
Extends / shortens the distance of the left vanishing point.

Vertical Vanishing Point Mode:
Extends / shortens the distance of the vertical vanishing point.

Right Vanishing Point Mode:
Extends / shortens the distance of the Right vanishing point.

Camera Rotation / Distance Modes

These modes allow the slider to adjust the camera rotation / distance.

Camera Tilt Mode:
Tilts the camera view about the Reference Target.

Camera Vertical Rotation Mode:
Rotates the camera vertically around the Reference Target.

Camera Horizontal Rotation Mode:
Rotates the camera horizontally around the Reference Target.

Camera Distance Mode:
Moves the camera toward / away from Reference Target.

Revert View:

Reverts the view to the last view set by Camera Match.

Cancel:

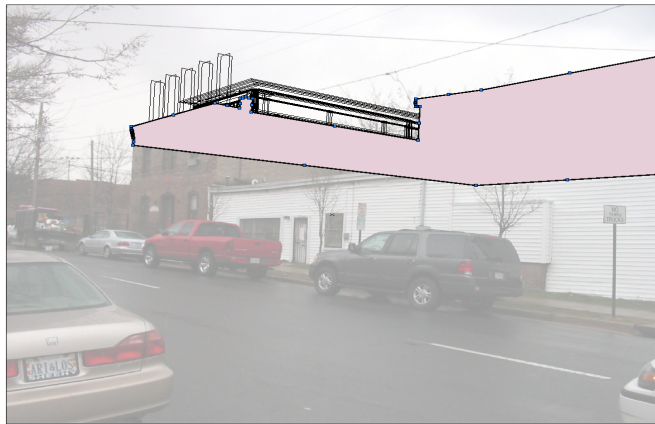Cancels the Fine Tune View dialog and reverts to the last view set by Camera Match.

Save:

Sets the Camera Match view to the Fine Tune settings.

9: Placing a Camera Match Mask

Masking can be done to hide parts of a rendered model that are behind objects in the photo image. More complex masking (i.e.: many tree branches in front of the model) is best left to a good image editing application. However, for simple masking tasks, a Camera Match Mask can do it directly in Vectorworks:

1. Obtain the desired Camera Match view.

2. While in the viewport's annotations, select the Camera Match Mask tool and draw a polygon over the areas of the model to mask (for clarity, the mask shape is shown in pink).

3. After drawing the polygon, a Camera Match Mask object will be created. (the Camera Match photo has been lightened for clarity).

Anti-aliasing Option:

With the Camera Match Mask selected, you may choose the Anti-aliasing option by using the checkbox in the "Obj Info" palette. This option helps blend the edges of the mask with the rendered model.

Anti-aliasing Option Off (image above): Notice the hard edge between the existing building photo in the mask and the rendered model behind.

Anti-aliasing Option On (image above): Notice the softer blended edge between the existing building photo in the mask and the rendered model behind.

5. For the final render, turn off the Camera Match photo and render the viewport.

Credits

Nemetschek North America (NNA):
There are so many of you at NNA that have helped with Camera Match in some way or another. Whether it was fixing some obscure bug, adding new a vectorscript function, or helping to promote Camera Match. I thank you all for your help. These are just a few names that come to mind:

Sean Flaherty	Biplab Sarkar
Steve Johnson	David Donley
Vladislav Stanev	Josh Loy
Theresa Eckels	Jessie Newburn
Eric Gilbey	

Orso B. Schmid: Development of the XML framework to ease translation of Camera Match into other languages.

Carlotta Birelli: German and Italian translation / localization of the Camera Match plug-ins and user guide. She is also responsible for creating much improved formating of the user guide.

Alexander Schmid: Guidance and assistance on perfecting the German translation of Camera Match.

Other victims of the Camera Match development process:
(in no particular order)

Carlotta Birelli	Julian Carr
Dan Jansenson	Gerard Jonker
Raymond Mullin	Orso B. Schmid
Joel Sciamma	

Dear victims,

Thank you all for putting up with the flood of emails and test version after test version without even one complaint (to me anyway). Your comments, suggestions, and ideas have been indispensable in forming Camera Match into a very useful product!

The project files used in this guide were provided by:

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