



3

Tutorial

What's in this Chapter:

Welcome.	30
Creating a 3D Model	30
Filling in the Details	35
Creating a Building Model.	42
Aligning Objects Precisely.	46
Picking Up Speed	50



Welcome

Welcome to the Canoma Tutorial. These lessons are designed to introduce you to the major features and functions of Canoma. The main goal of the tutorial is to teach you all the basic techniques you'll need to use Canoma to create 3D models from 2D images.

Each lesson builds upon skills learned in the previous lessons. At the beginning of each section is a list of what you have learned up to that point.

Creating a 3D Model

The first thing you need to do is launch the Canoma application. Once it appears, Canoma displays the Workspace in its default configuration.

For these tutorials, you may want to leave the controls in their default positions. Refer to "Using the Canoma Workspace" on page 75 in the Canoma User Guide for more about configuring the Canoma Workspace.



The Canoma workspace.

Note

For the sake of clarity in this manual, we used higher contrast and larger pins in illustrations than you will see in the Canoma product.

Lesson1: Pinning Corners

To create your first 3D model:

- 1 Start Canoma.
- 2 Select **File menu > New**, then select **File menu > Add Image** and open **Canoma: Tutorials: tutorial1.jpg**.
- 3 Click the Creation tab.



The Creation Tab.

- 4 Click the Box object. A red wireframe of a Box is displayed. (Do not click any Selection Based Options.)



The Box object.



Selecting a Box adds a wireframe object of a box to your project.

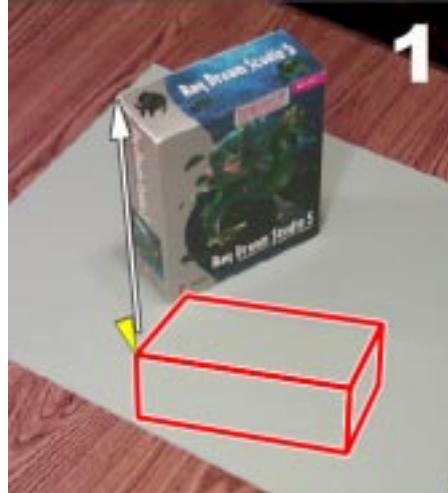
To start pinning:

- 1 Drag the box wireframe close to the Ray Dream Studio 5 box.
- 2 Click the Zoom button on the Toolbar and click the Ray Dream Studio 5 in the picture. Zooming in makes the next step easier. (Use the Pan tool—the hand button on the Toolbar, if you can't see both the wireframe and the Ray Dream Studio box.)



The Zoom button.

- 3 Click the Select button (the arrow) on the Toolbar, then click and drag a corner of the wireframe to a corner of the Ray Dream Studio 5 box. A triangle appears when the cursor is over a corner of the wireframe.



Click and drag a corner of the wireframe to a corner of the Ray Dream Studio 5 box.

This process feels like pinning the corners of a springy wireframe to a tackboard using push-pins. If you think you made a mistake, you can always Undo (Cmd/Ctrl + Z.)

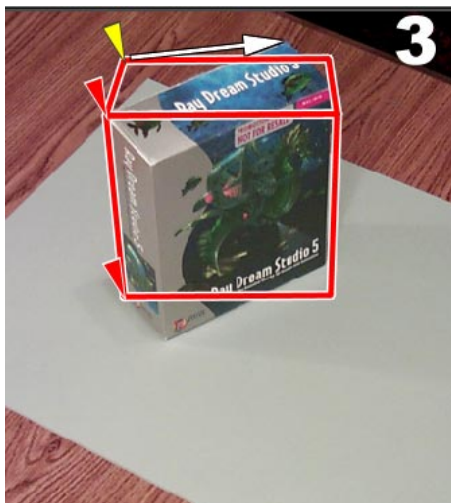
That's really the main goal—pin as many corners of the wireframe as you need to get a reasonable match between the wireframe and the underlying photograph.

- 4 Click and drag the remaining corners of the wireframe to corners of the Ray Dream Studio 5 box, as shown in the following

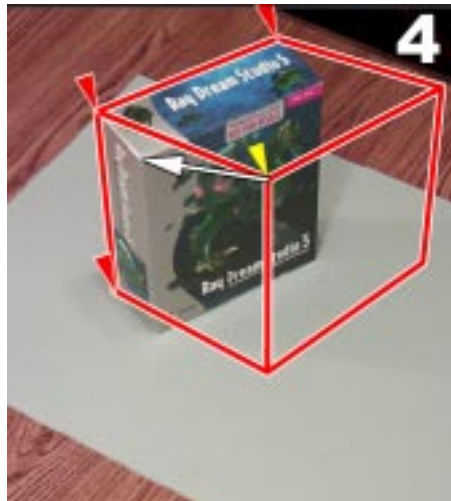
illustrations. Drag each corner in the same sequence as is shown below and try to be fairly precise.



Drag each corner of the wireframe to a corner of the Ray Dream Studio 5 box.



Continue to drag corners of the wireframe to corners of the Ray Dream Studio 5 box.



Drag each corner.



Try to be reasonably precise.

Lesson 2: Viewing Progress

To look at the 3D model:

- 1 Click and drag across the trackball controller. You'll see a shaded 3-D box with the correct dimensions. As you drag the trackball, the camera rotates around the box.



Drag another corner.



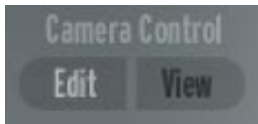
Drag the trackball to rotate the model.

- 2 Reset your viewpoint to the one shown in the 2D photograph by clicking on the photograph's thumbnail.



Click to return to the viewpoint in the 2D photo.

- 3 Click Edit to switch back to Edit mode.



The *Edit/View* buttons switch between *Edit* and *View* modes.

Lesson 3: Adding Textures and a Ground Plane

To add texture to the model:

- 1 Click the Quick Texture button (the rabbit) on the Toolbar. This applies textures from the photograph and automatically switches to View mode.



The *Quick Texture* button maps pixels directly from the photograph and switches to *View* mode.

Texture enhances the model, but the box still looks like it's "flying in space."

To add a ground plane:

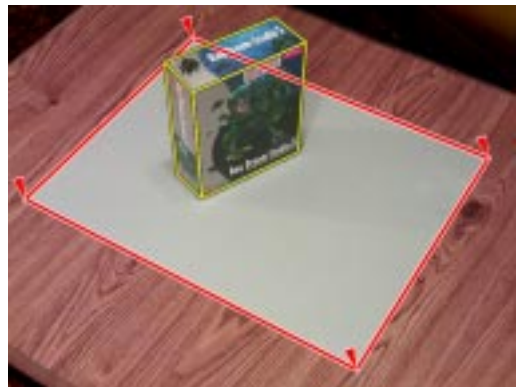
- 1 Click Edit to return to Edit mode.
- 2 Click the Creation tab.

- 3 Click the Horizontal Rectangle object.



Use a rectangle for the gray poster board. (Notice that, because it's not selected, the *Box* object wireframe is now yellow.)

- 4 Pin the corners of the rectangle to the corners of the gray poster board underneath the Ray Dream box.



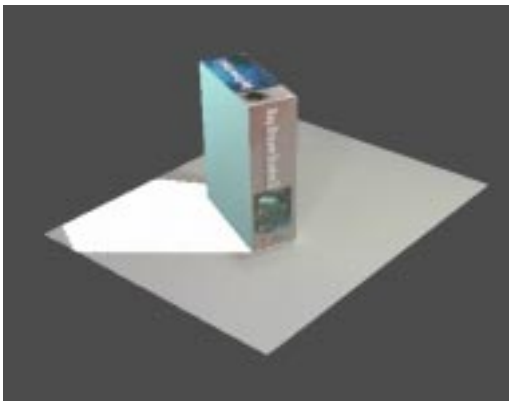
Pin corners.

- 5 Click the Quick Textures button to add texture to the ground plane. The result is a pretty realistically textured 3D model on gray poster board.



Create textures and the box is no longer floating.

- 6 Use the trackball to preview & rotate your model in 3D.



Rotate your 3D model.

Filling in the Details

The Story So Far

You learned the basic principle of the Canoma program—pin wireframes to photograph elements. You also learned how to view, rotate, and apply texture to your model.

In the following section, you'll learn how to fill in areas that are not textured, by adding information from additional photographs.

Lesson 1: Adding a Second Image

Using just a single photograph, Canoma could not create textures for the back sides of the box or for the obscured area of the ground plane. Now that you know how to go from wireframe mode to View mode and back, it's time to add more textures.

You can add images from different viewpoints to fill in the "bald spots" on any model. Later, we'll discuss other tricks for filling in areas where you have no additional photographic information. For this tutorial, a single additional photograph, taken from behind the box is used to complete texturing the model.

This lesson starts where the previous ended. If you still have that project file open, skip ahead to "To Load another photo" on page 36.

To open an existing project:

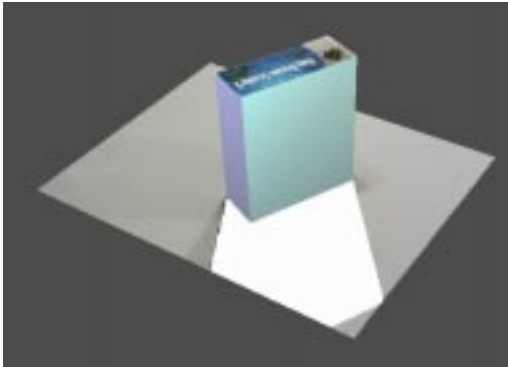
- 1 Select **File menu > Open**.
- 2 Open the file **Canoma: Tutorials: finished1.3dv**.

- 3 Click the Quick Textures button.



The Quick Textures button.

- 4 Use the trackball to rotate the box, so you can see the back of the box. The back of the box is untextured. To add texture information for the back, you need to add a photograph of the back of the box.



The back of the box and the ground plane behind the box are untextured. This is because Canoma has no texture information for these areas.

To load another photo:

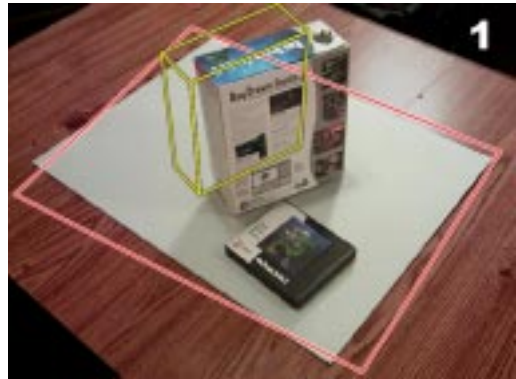
- 1 Click the + on the 2D Image Palette and load **Canoma: Tutorials:tutorial2.jpg**.
- 2 Click the Creation Tab.
- 3 Click the box object.

Wait! Do not start pinning!

A new wireframe is now superimposed on the second photo, but the alignment is all wrong.

Your task is to make the wireframe match this second photograph. Always look at how the wireframe and the photo line up, then use the trackball to roughly adjust the alignment. Only then can you start using pins.

Aligning the wireframe first saves a lot of effort (far fewer pins are needed) and also makes Canoma's mathematics more stable.

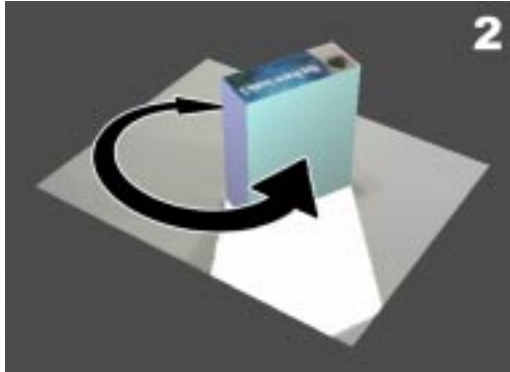


Roughly align the new wireframe to the second photograph, BEFORE you start pinning.

To align the wireframe:

- Use the trackball to rotate the whole model about 180 degrees, so you are looking from roughly the same viewpoint as the second photograph. Notice how the program snaps back from Preview Mode to Edit

Mode as soon as you let go of the trackball. It only does this during rough alignment (before any pins have been placed.)



First, rotate the whole model about 180 degrees



Now that the wireframe is more closely aligned, you can start pinning.

Don't worry about getting the model perfectly aligned. Roughly the same viewpoint is fine. If you can see the correct face of the box, you're OK.

After you release the trackball, the superimposed wireframe already matches the second image much better.

To pin and texture the second image:

- 1 Place pins on the corners of the rectangle and the box. Place pins first on those corners where the fit is worst.

As you add pins, the rest of the wireframe soon fits the photograph.



Add pins and the wireframe soon fits the photo.

- 2 Switch to View mode, either by clicking the View button or by clicking the trackball. The 3D camera position matches the photograph quite well.
- 3 Click the Quick Textures button (the rabbit) on the Toolbar to generate textures based on both photographs.

The back side of the Ray Dream Studio 5 box, as well as the previously obscured (white) pieces of the ground plane are now filled with texture. Your model might have some white boundaries or visible seams. More precise pinning helps reduce that, but there's a special texturing trick that can also improve the texture quality. More about that later!

- 4 Use the trackball to verify that you have texture all around the 3D model.

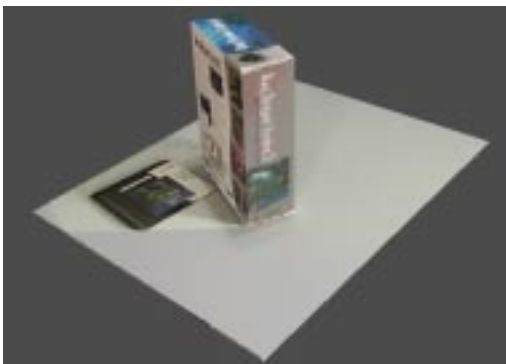


Fully textured.

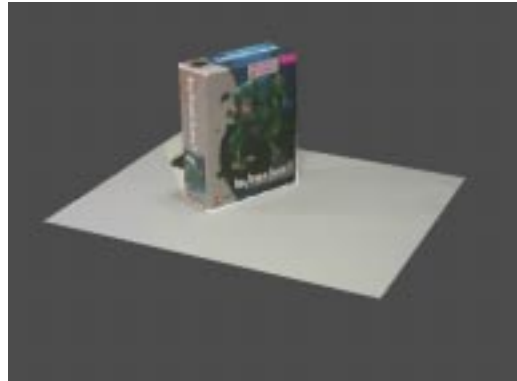
Lesson 2: Modeling Nearby Objects

Notice that there is a CD case behind the Ray Dream Studio 5 box. This is very typical of real world examples. As you add photographs, you may discover objects that were partially or fully obscured. When that happens, you can choose to model the objects. If you don't model them, their image is flattened onto other objects.

Look carefully at the CD case's texture in the 3D preview. It looks like a truck drove over it.



The CD case is flat.



The flat CD is visible from the front, too.

Your next task is to model the CD case. To do that, you'll want to take a look at things up close.

To model the CD case:

- 1 Click Edit to switch back to Edit mode.
- 2 Click the Zoom button on the Toolbar, then click and drag the cursor over the area where the CD is located. This defines a rectangular area to zoom in on.



Drag the Zoom tool to define a zoom area.



The CD case close up.

- 3 Create a box.
- 4 Pin the new wireframe to the CD case, three or four pins should be enough.



Pin the wireframe to the CD case.

- 5 Click the View button and verify the existence and size of the new 3D object.



Check the new CD case model in View mode.

Up until now, you've used Quick Texture. Canoma can also create high-quality textures. Quality Textures compensates for brightness differences between photographs that can show up as seams. It also fills in white gaps for which there is no available information. Quality texturing takes longer, but it looks better.

To use Quality Texturing:

- 1 Select **Texture menu > Quality Resolution** and choose a 1:1 resolution setting from the popup list.
- 2 Click the Quality Texture button (the turtle) on the Toolbar.



Click to turn on Quality Textures.

After textures are generated, they look better (although it does take longer to generate them.)

Lesson 3: Adding a Close-up Image

You could stop there, but what if you need better textures for the front of the Ray Dream Studio 5 box? You might want to animate walk-through, and for that you'd want more detail. To add that detail, you'll add yet another image. The image you'll add does not show any new information, but it does show the front of the box in more detail.

You can imagine doing something similar with architectural photographs:

- first create a model using an aerial photograph
- then add detail with close-ups shots taken at ground level.

To add and pin the third image:

- 1 Click the + on the 2D Image Palette and load **Canoma:Tutorials:tutorial2b.jpg**.
- 2 Roughly align using the Trackball.
- 3 Click the Ray Dream Studio box to select it and pin the visible corners.
- 4 Click the gray ground plane to select it, but don't start pinning.

Close-up views often have the same problem. You just can't see the entire photo element you previously modeled. In this third photograph, none of the gray ground plane's corners are visible.

You can use a second (of three) Canoma tools to position the wireframe for the ground plane. These tools are called beads.

To position a wireframe using beads:

- 1 Move the cursor over any edge (rather than a corner) of the wireframe. A little disk appears.
- 2 Click on the edge of the wireframe to create a bead and drag it to the edge of the gray ground plane.



Use beads to position the wireframe for the third image.

- 3 Now switch to View mode.
- 4 Click the Quality Textures button, and select a 1:1 resolution.

This time Canoma is going to work for a while. Once textures are complete, you can zoom in on the result. The texture on the front of the box is noticeably improved.



Use beads to position the wireframe for the third image.

Lesson 4: Editing Textures

Why stop now? You can edit the texture on the Ray Dream Studio box, using a 2D pixel editing tool, such as Painter or Photoshop. You can edit the image in 2D ("head on" view), then Canoma automatically displays the results of your edits, in proper perspective.

Note

When you edit texture, Canoma saves a file of the resulting edit in a subfolder, inside your main project folder. If you create a layered file during editing, you may want to save a version of that file in another location, just in case you need to do any additional editing.

To edit textures:

- 1 If necessary, click the View button to switch to 3D Preview mode.

- 2 Click the Texture Brush in the Toolbar.



The Texture Brush

- 3 Click the face of the Ray Dream box. Canoma opens a 2D editing program.

Note

Since this is the first time you've used the Texture Brush, Canoma asks you to choose a 2D pixel editing program, such as Painter or Photoshop. You can also select the application and 2D file format using **File menu > Application Preferences**.

- 4 Make a change to the image—change the color, add some text, or retouch something. You can change the resolution, but don't change the aspect ratio.
- 5 Save your work. Save a flattened image file, to the same filename as the original. If the original was a JPG file and you added text or other layers, be sure to flatten the image before saving.
- 6 Click back inside the Canoma's program window.

The edited texture is displayed in proper 3D perspective.



You can edit the texture with your favorite image editing tool

Creating a Building Model

The Story So Far

You learned how to add photographs to an existing project, to fill in the gaps. You also learned how to roughly align the wireframe to a new photograph using the trackball (before any pinning!) You learned that fewer pins are needed in the additional photographs. You now understand the differences between Quick and Quality Texturing and between low and high-resolution settings. You learned how to edit textures with a 2D pixel editing program.

You may have noticed that a red wireframe is the "active" or selected one currently being pinned, all others are yellow. You know how to add close-up pictures to get crisper textures and how to add beads rather than pins when you cannot see the corners.

In the following section, you'll try a bigger model. This section of the tutorials takes a little longer, so reserve some time. The instructions describe tricks for modeling some of the buildings. You can go further and model other buildings for additional practice. A finished example file—**Canoma: Tutorials: finished3.3dv**—is available for you to study.

Lesson 1: Starting with One Object

To model the first photograph:

- 1 Start Canoma.
- 2 Select **File menu > New**, and open **Canoma: Tutorials: tutorial3.jpg**.



Open tutorial3.jpg.

Start by modeling the main white building.

To add the first object:

- 1 Use the Zoom tool to get a close-up view of the white building for better precision.



Add and pin the first object.

- 2 Click the Creation Tab.
- 3 Select the Box object.
- 4 Pin the box wireframe to the main part of the white building.

Notice that the building has a notch out of the left front corner. It is not a full box.

Do not model the notch! Keep it simple. This is a typical trade-off in Canoma between "getting fast results" and "making it correct". Quite often, the fast results are good enough.

Since you can't actually see the corners of this building, you must estimate in order to put pins where you think the corners are located.

In the last tutorial we suggested that you only place pins where you can see real corners. Here, by looking at the top edges of the building, which are very visible, you can safely estimate the location for the pins.

Notice that there are structures on top of the white building. Now that the base structure is pinned, it's time to model some of the structures on top.

It is important to understand that by default, all objects you create sit on the ground, at height 0. Sometimes, such as in this case, you may need to put objects on top of other objects.

To model objects that are on top of other objects:

- 1 Make sure the white building wireframe is selected, i.e. that the wireframe is red. If it is yellow, click to select it.
- 2 Click the Creation Tab.
- 3 Click Stack in the Selection Based Options, then select the Box object.



Using the Stack option places a new object on top of the active object.

- 4 Pin this box to the relatively flat superstructure that sits on top of the building.



Pin the "on-top" box to the flat structure on top of the building.

- 5 In View mode, click Quick Texture.



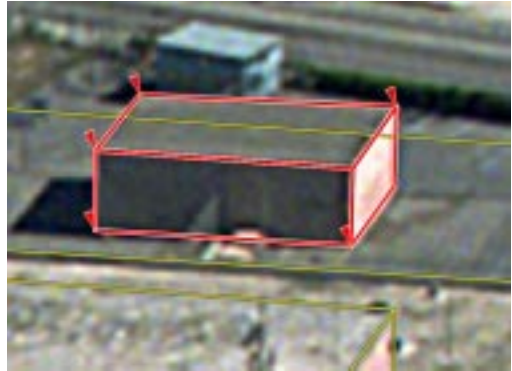
Add Quick Texture.

To create the ground plane:

- 1 Click the Creation Tab.
- 2 Click the Floor Rectangle object to create a flat rectangle that's large enough to be the ground plane for your entire scene.
- 3 In View mode, click the Quick Textures button.

Lesson 2: Completing the Job

Now that you've modeled part of the building, you can go on to model the rest of the photograph.



Continue to model structures in the photograph.

A Few Things to Remember

- In general, the first few objects really help Canoma determine the camera viewpoint and perspective. Larger objects, with well defined perspectives allow better operation than smaller objects or objects viewed head-on.
- Remember to always model objects from the ground up. First model the base of a building, then create a pyramid or roof on top of that.
- You can also establish perspective early on by using a temporary object, such as a large ground plane, to show Canoma the vanishing directions (how parallel lines such as the roads converge.) You can delete the temporary object after the rest of your modeling is complete. Like removing a scaffold after real-world construction.

Reducing Confusion

As you add more objects, some with objects on top of them, the wireframe display can get cluttered. Here is a trick to reduce the confusion.

To use Solo Mode:

- Click the Solo Mode button to dim all wireframes except the one you are currently working with (the selected one, in red.)



The Solo Mode button.

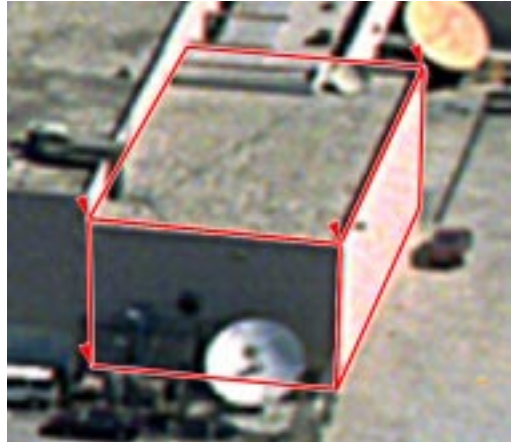
The Solo Mode button is only available when there is more than one object in your scene.

To switch from Solo Mode to normal editing:

- Click the Solo Mode button again.

Even while you are in Solo Mode, when you move the cursor over other areas of the photograph, existing, but currently hidden wireframes, temporarily show up outlined in yellow.

This color-coding lets you see where objects are located and also lets you quickly select one for further work, without having to switch between Solo and regular editing Mode.



Use Solo Mode to reduce confusion.



The final project.

Lesson 3: Navigating Through a Model

You know how to use the trackball to rotate a 3D model. There are other ways to navigate through a model.

Using the Cross Control

Camera Cross controls let you move the view of your model along specific axes. When you're using these controls, the view does not tilt or rotate from its original position. It only moves up, down, back, or forward.



The Cross Controls.

Just play around with the Cross Controls - you can always reset to the viewpoint of a particular photograph by clicking on its thumbnail.

The Banking control sphere tilts your Camera (really rotating the camera on the Y axis,) creating the effect of a tilted horizon. This control is great for creating tilted airplane cockpit views. Banking simulates a Roll action.



The Banking Control.

The Field of View control sphere acts like a wide-angle lens control. The higher the setting, the wider the field of view for your lens.

Canoma's Field of View control automatically adjusts the distance, so that objects in the center stay about the same size.



The Field of View Control.

Tip

You can also navigate right in the Project Window. Refer to "Using the In-View Navigation Controls" on page 104 in the Canoma User Guide for another way to navigate around your model.

Aligning Objects Precisely

The Story So Far

In the previous lessons, you learned how to create objects on top of other objects. You learned how to use Solo Mode to help you remain focused on desired objects. You learned how to add a ground plane even when there are no good corners visible and how to use beads instead of pins when you need to model a partial object. Finally, you learned how to navigate through your models using the Cross Controls, the Banking Control, and the Field of View Control.

In the following lessons, you will learn how to use glue to align objects precisely.

Lesson 1: Using Glue

You are about to make a model of a building in Washington, DC. You will use glue to align objects precisely.

To start with the 2D image:

- 1 If you haven't already, select **File menu > Close** to close the previous tutorial.
- 2 Select **File menu > New**.
- 3 Load **Canoma: Tutorials: tutorial4.jpg**.

To start modeling:

- 1 Model the base of the red building, using a **Box**.

You cannot really see the front bottom or the back top corner, so you can use beads for the edges there.



Model the base with a box.

- 2 With the first wireframe still selected, click **Stack** and **Aligned** in the **Selection Based** options on the **Creation Tab**, then create a

Box and pin it. Use a bead to raise the top of this second wireframe to the proper height.



Use a bead to estimate the edges.

Tip

Since you know that each section of the Red building is aligned with the rest, using **Stack/Align** for the second wireframe tells the program that the elements are aligned, which creates a better model.

The next step is to model the small structure on top.

- 3 With the second wireframe still selected, click **Stack** and **Aligned** in the **Selection Based** options on the **Creation Tab**, then create a **Box** and pin it.

Since the bottom corners of the third box coincide with the top of the second box, you can use glue rather than pins to give them approximately the same location.

To glue the third box to the second:

- 1 Click the **Glue** button (the glue bottle) in the **Toolbar**.

- 2 Click and drag a bottom right corner of the topmost box.
- 3 Move that corner over the edge of the second box. A little yellow bead is visual feedback that you are gluing to the edge of the box.
- 4 Let go of the mouse button.
- 4 Now do the same thing for the right-back corner of the roof and the left-front corner.

Note

In real life the roof extends beyond the edge of the building. Model the roof to be the same length and width as the building. Don't force the roof out past the edge of the box with a pin. Refer to "Avoiding Model Stress" on page 96 in the Canoma User Guide for more about how to avoid introducing unnecessary stress into your Canoma model.



Circles tell you that the object is glued to the one below.

The next step is to create a roof on top of the topmost box.

To glue on the first roof:

- 1 With the topmost wireframe box selected, click Stack and Aligned in the Selection Based options on the Creation Tab, then create a Roof.
- 2 Click the Glue button (the glue bottle) in the Toolbar.
- 3 Click on the right-front corner of the roof wireframe and drag it to the top-right-front corner of the topmost box.

You'll see a yellow pin that indicates you are gluing, rather than pinning, the roof to the box. When you release the mouse button, a circle shows that the corner is glued.



With three corners glued to the box, the roof's orientation is fixed.

- 5 Now fix the height of the roof. You could use a pin in the front top corner or a bead on the top edge, but a bead is better in this case.
- 6 Switch to View mode to see the results. A perfect fit. If things went awry during this step, use Undo (Cmd/Ctrl+Z) and try again. Now it's time to put a roof on the second level of the building.

To add a final roof:

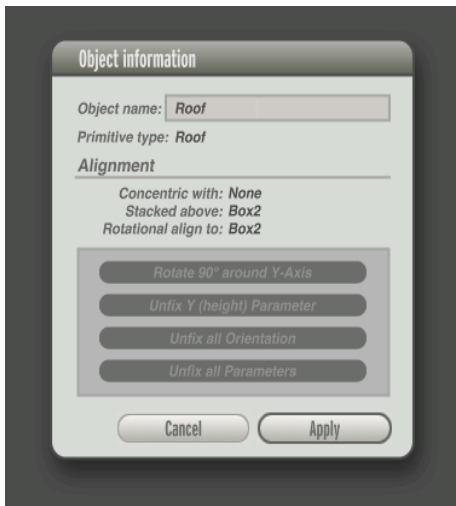
- 1 Select the second Box that you created (the middle level of the building.)
- 2 Click Stack and Aligned in the Selection Based options on the Creation Tab, then create a Roof.

Wait! the orientation of the Roof wireframe is all wrong. That's probably going to happen a lot, but it's easy to correct the orientation.
- 3 With the roof wireframe still selected, click the object information button or select **Edit menu > Get Information**.



The object information button.

The Object Information dialog is displayed.



The Object Information dialog.

- 4 Click the Rotate by 90° around Y-Axis button.
- 5 Now that the orientation of the wireframe is correct, glue the roof as you glued the previous roof. Glue only the three visible corners of this part of the building. Model the roof to be the same length and width as the building, ignoring any "real life" overhang.
- 6 Use a bead to "pull up" the roof to the correct height.
- 7 Switch to View mode, select Quality Textures, with a 1:1 resolution and create the textures for your model.
- 8 Congratulations!



The final results.

(If you get good at this, you can do this whole part of the tutorial, with texturing, in under two minutes. Refer to "Setting Selection Based Options" on page 88 in the Canoma User Guide and review the Concentric option for information about another feature that can save you time when you're creating models.)

Picking Up Speed

The Story So Far

You learned how to use glue for precise alignment (both corner-to-corner and corner-to-edge). You learned how to notice and avoid inconsistent input.

In the following lessons, you'll learn how to speed up modeling by duplicating similar elements in a photograph. You'll learn to use glue to precisely connect shapes.

You'll learn the importance of modeling large scale features first, even if your early models are only used as stand-ins, for more detailed models later. After establishing good perspective, you can delete temporary objects and replace them with successively more detailed models.

Lesson 1: Duplicating Similar Elements

To start with the 2D image:

- 1 Select **File > New** to create a new project.
- 2 Load **Canoma: Tutorials: tutorial5.jpg**.

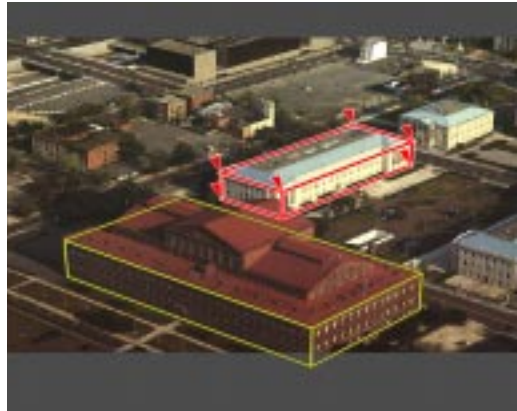
You'll recognize the red building from the previous tutorial, but now you'll model the whole area surrounding the red building. The trick is to model large structures first, as that establishes good perspective for Canoma. Only then should you proceed with more detailed models.

To model around the red building:

- 1 Create and pin a Box on both the larger building at the top of the photograph and the red building in front. This sets the

perspective for your scene - as you add more boxes, they should "fall into place" with only a few pins. Instead of completing this building, proceed with one of the two identical H-shaped buildings right behind the red one.

- 2 Use a single box for the first H-shaped building and pin it into place.



Use a single box for the first H-shaped building.

Tip

If you zoom in on a building before you create an object, the object gets created close to where you need to place it.

- 3 Assume that the two H-shaped buildings are symmetrical and aligned. Instead of just using create box, keep the H-shaped building's box selected and press Shift + Cmd/Ctrl+D to create an aligned duplicate of the selected box.

- 4 All you need to do is pin this duplicate to the other H-shaped building. Two pins are probably sufficient, because all other dimensions are known to Canoma from the first H-shaped Box.



Use *Aligned Duplicate* (*Shift + Cmd/Ctrl + D*) to create the second H-shaped building.

Use **Edit menu > Duplicate** when you are sure two objects have the same dimensions.

Use *Aligned Duplicate* (*Shift + Cmd/Ctrl + D*) when the dimensions and alignment are both identical. This reduces the number of pins needed to place wireframes and at the same time makes your 3D model more precise.

- 5 Create a box for the first small square-shaped building.

- 6 Use *aligned duplicate* (*Shift + Cmd/Ctrl + D*) again for the second square-shaped building.



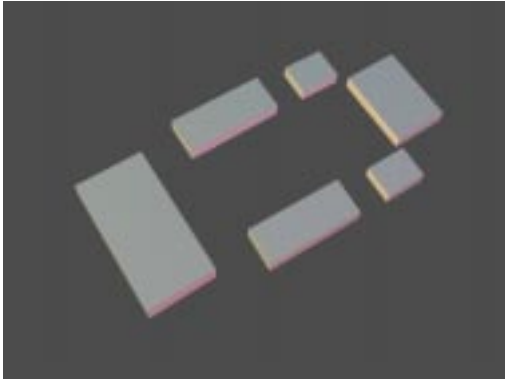
Use *aligned duplicate* (*Shift + Cmd/Ctrl + D*) whenever possible.

Now you have 5 Boxes across the whole picture.

Tip

It's a good idea to model large objects around the entire photograph first, to establish perspective. Don't start modeling in great detail in one corner of a photograph, because it's easy to imprecisely place a pin, causing Canoma to estimate a wrong perspective.

- 7 Rotate the model in View mode to check whether the dimensions match your expectations. This helps to verify whether a reasonable perspective was established.



Verify perspective.

If the perspective seems squashed or stretched, it's probably off. If that happens, it is probably best to start over. Which is not so bad, since you've only had to place a few Boxes.

Lesson 2: Adding Detail

What if you want to model in more detail? Once you are satisfied that Canoma has a good perspective, you can delete the "stand-in" or rough models you have just created, then replace them with more detailed models.

To add more detail:

- 1 Select one of the H-shaped Boxes and press the Delete key or select **Edit menu > Clear**.
- 2 Zoom into that area of the photograph.
- 3 Create a Box and pin it to the far end of the building.

- 4 Use **Align Duplicate** to create a Box for the near end.
- 5 Create a Box for the center.



Duplicate and Aligned Duplicate are your friends!

- 6 Since you know the building parts border each other, click the **Glue** button on the Toolbar to glue (not pin) top corners of the center box to the nearest top edge of the end boxes.
- 7 Now use a bead for the center Box's bottom edge, to slide it into the right place.

You could have modeled each of the 3 Boxes separately, but it would have been more work and they might not have aligned as nicely as they do now.

You can now model the second H-shaped building in more detail, using the same techniques.

Tip

As a finger exercise, complete the red building model in the front.

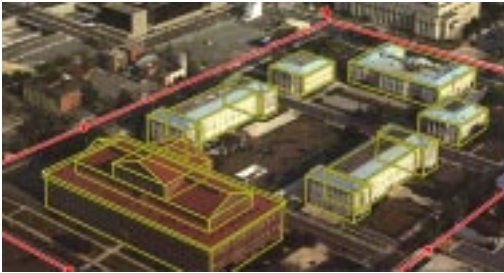
Lesson 3: Adding a Ground Plane

Finally, add a ground plane the same way you did in the 3rd tutorial.

To create the ground plane:

- 1 Create a Horizontal Rectangle.
- 2 Pin the far corner to the street corner at the far end (near the two red cars.)
- 3 Use beads to stretch the rectangle around all your buildings.

Parts of the rectangle now extend outside the photograph - that's fine.

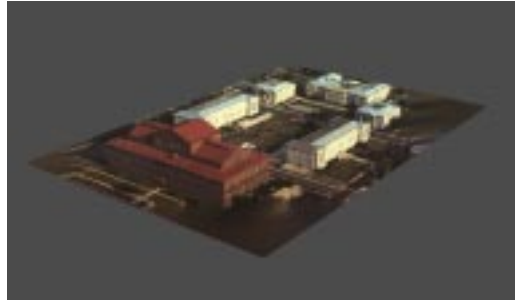


It's OK if parts of the rectangle extend outside the photograph.

- 4 Switch to View mode.
- 5 Select **Texture menu > Mirror Textures**.

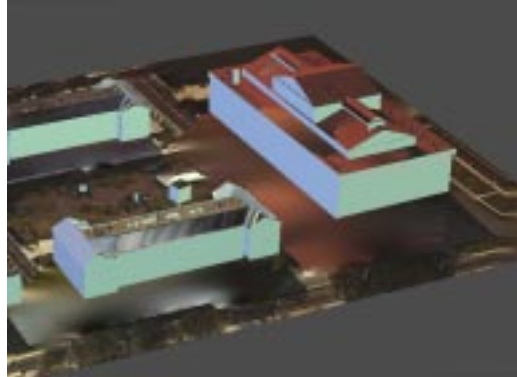
This tells Canoma to “steal” the texture from another place on the object, since pixel information is not available.

- 6 Click Quality Textures buttons, with a resolution of 1:1 to create the textures.



Looking good!

- 7 Rotate the model. You may be surprised. The back sides of the building, which were not visible in the photograph, are now textured. Canoma actually “mirrored” textures from elsewhere and did a pretty good job.



Before Texture menu > Mirror Textures is used



After using Texture menu > Mirror Textures. Canoma “steals” textures from a portion of the model where textures are available, then applies them to non-textured sides.