

CANOMATM

User Guide
for Windows[®] and Macintosh[®]

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Credits

Canoma was Engineered by Tilman Reinhardt, Robert Seidl, Luc Heinrich, and Gerald Guyomard, with support from Arnoud Berry, Brian Wagner, Seath Ahrens, and Alexei Lebedev. Installer by Carin Lew.

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Thanks to John Leddy and Pierre Berkaloff for their support.

Some images provided by Photodisc.

MetaCreations
The Creative Web Company



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Welcome to Canoma

What is Canoma?

Canoma lets you quickly create photorealistic 3D models from scanned or digital photographs, without extensive 3D modeling skills. No need for specialized equipment or calibrations. Canoma even works on historical photographs. Canoma models can be posted on Web sites or in electronic catalogs, or imported into traditional 3D modeling and animation software. Canoma is a perfect companion to other Web authoring tools.

Easier to learn than traditional 3D programs (with all their modes, tools, and windows), Canoma lets 2D graphic illustrators and designers create and manipulate realistic 3D models—applying all their retouching and filtering skills to 3D objects.

Here's how Canoma works:

- Take one or more photos of what you want to model in 3D. More photos mean greater detail.
- Select 3D shapes (called objects or primitives,) then pin them to the corners of objects in your photograph. (There are ways to also control edges and alignment.)
- Preview your 3D creation—move in for a close-up look or away, rotate around the model, or just walk through it! Canoma adds texture to your model right from your photographs.
- You can edit areas of texture, letting Canoma open your favorite 2D program, present you with a head on 2D view of the area to edit, then watch as Canoma reapplies the edited texture in proper perspective!
- Create animations or export your 3D model to other 3D programs or for use on the Web.



The Canoma workspace.

What Can You Do with Canoma?

With Canoma you can create very realistic three-dimensional (3D) computer models from one or more photographs, a process called image-assisted modeling. Canoma models have simple geometries and use photographs as texture source, allowing the pixels to do the work of making your models look good.

Select the face of a Canoma model, bring up a 2D pixel editing tool, such as Painter or Photoshop, and retouch the surface texture, add text, or apply a 2D filter. Watch Canoma reapply the altered pixels, while retaining 3D perspective.

3D models can be rotated and viewed from different directions, allowing customers to thoroughly inspect product or merchandise models. Once 3D models are completed, you can create a simple animation or “walk through”, even publish those on the internet.

Canoma lends itself well to regular, man-made objects. Amorphous or very complex shapes that may occur in nature such as trees, mountains, or curved objects can also be approximated, using simple stand-in geometry. Canoma also supports translation sweeps or extrusion, which allows a polyline contour to be swept along a straight axis.

On-line Catalogs

You can publish a Web catalog full of Canoma models. For example, you could use Canoma to create a catalog of “hard goods”, such as furniture or appliances, then output it in the Metastream format.



Examples of models created for catalogs.

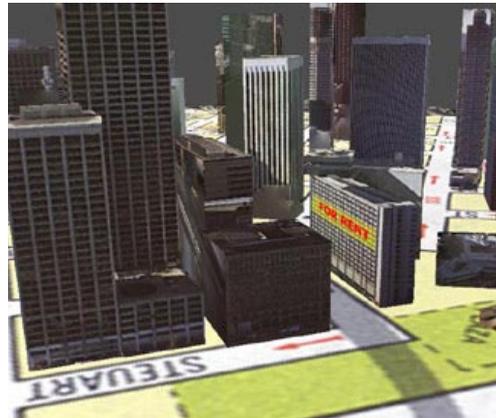
The Metastream format is widely distributed by Microsoft and Intel and can be downloaded for free from www.metastream.com. Metastream uses small, compact files and outputs a single file that is easy to maintain and post.

Streaming a 3D image allows customers to experience instant gratification, as they manipulate a 3D object. High quality, interactive vending, all from within a standard Web browser.

Canoma creates quick, low-polygon count, photorealistic models. This can be a fast, cost-effective way of disseminating information, without the security risk that distributing detailed blueprints from a CAD program could introduce.

Web Sites, Travel and Tourism, Commercial Real Estate

A 3D preview of property can be a strong sales incentive for online travel, real estate sales, or vacation rentals. Entertainment, restaurant, and hotel information sites all benefit from the photorealistic 3D models.



A Canoma model created from a photo of San Francisco. The “For Rent” sign was added using a 2D pixel editing program.

Interior/Exterior Design and Remodeling

If the project is to remodel a kitchen, bathroom or the outside of a house, a photograph session and a quick modeling session—without becoming a wizard—creates a model of how the project looks right now. Repeat site visits are replaced by a photorealistic 3D model, that’s always available for a design meeting.

- Using the texture editing feature, you and your 2D pixel editing tool, such as Painter or Photoshop, can make changes to surfaces or simulate different lighting.
- With Canoma’s animation feature, you can “walk” perspective clients through the suggested changes.



Walking through a kitchen model.

- With a 3D program you can go further, changing tiles, sliding in a new dishwasher, or actually trying out planned spotlights to illuminate that kitchen counter.



Before



After

Spotlights added to a Canoma model in a 3D program.

Graphic Design and Advertising

Industrial design and graphic artists can take existing products and packaging, extract the graphics, and edit the designs. They can create animations or place a package in a different environment.

It's easy to add billboards, place advertising on buses, and change details—all in photorealistic perspective, using only Canoma and your favorite 2D image editing program. You can output the results as 3D models, rendered 2D images, or even animations.

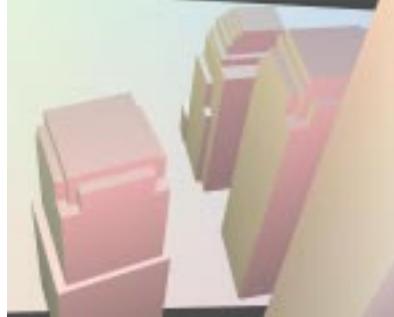


You can edit Canoma models with an image-editor.

Architecture, Urban Planning, Property Development

Architects can produce rough models of areas where new buildings are planned, then integrate the photorealistic model produced in Canoma with the detailed engineering model of

the planned building, giving everyone a good preview of how a building might fit into the neighborhood.



A Canoma model generated from a photo of the New York skyline can let you see how a new building might look in the cityscape.

Computer Game Developers and 3D Artists

With Canoma, you can quickly model a house or office, change some textures, add in a few monsters, and really try out ideas. 3D artists can use Canoma to create quick photorealistic clip objects that can be used to enhance existing 3D models and animations.

Canoma models of complete houses or interiors can serve as starting points for more detailed 3D modeling, since they provide scene measurements and object dimensions.

When You Have Questions

You can find answers to most of your questions in the following ways:

- **Canoma User Guide** - Providing all the information you need to get the most out of Canoma. The User Guide is also provided as a PDF file on the Canoma CD.
- **Online Help** - Providing direct access to specific chapters in the User Guide. Online Help contains the same information as the User Guide. Adobe Acrobat Reader software is required to read online Help or the PDF version of the User Guide. Adobe Acrobat Reader software is on the Canoma CD or downloadable for free from www.adobe.com.
- **Status line tips** - Check the bottom of your screen for UI related information.
- **Active Guide** - Text can pace you through the creation and application of your first few primitives. The Active Guide goes away after you've gained some experience or you can turn it off in the program preferences.

About your User Guide

The Canoma User Guide is for both Macintosh and Windows. By convention, Macintosh commands precede Windows commands in the text. For example, Command/Ctrl+I, is equivalent to the Macintosh Command-I and the Windows Ctrl+I. For simplicity, the term "folder" refers to directories as well as folders. The Canoma interface for Macintosh and Windows platforms is identical, unless otherwise specified.

When a modifier key differs between the Macintosh and Windows platform, the Macintosh modifier is listed first followed by a slash and the Windows modifier key. Option/Alt means Macintosh users press the Option key and Windows users press Alt.

There are several conventions used to identify paths to certain tools and controls. The convention to a menu follows the rule of the **menu name > menu item**. The convention to a palette follows the rule of the **palette name: subpalette name**. The convention to a palette menu follows the rule of **palette name: palette menu > menu item**.

Technical Support

MetaSupport is a portfolio of free and fee-based support options designed to provide quality support to you.

The options are as follows:

FREE On-line Support

On-line support is available on our Web site at www.metacreations.com 24 hours a day, 7 days a week. Access a list of Frequently Asked Questions (FAQs) for each product and find solutions immediately. If, after searching our on-line options, you still need assistance, you can contact MetaCreations Technical Support through one of the Telephone Support Services listed here.

Telephone Support

- **Standard Support**
Talk person to person with technical support representatives and get answers to installation, configuration and general usage questions. Each product has its own

support duration. The length of the complimentary support period depends on whether your MetaCreations product is a Level I (receive 90 days of complimentary support for a first-time purchase, or 30 days for an upgrade) or Level II (receive complimentary support for one incident for a first-time or upgrade purchase) product. The support period begins with your first call into MetaCreations Technical Support, provided you have registered the product.

Toll call: **831-430-4200**

- **Premium Pay as You Go**

When your standard support period ends, you can now receive priority access personal service regarding installation, configuration and general usage questions from our qualified support specialists. You pay a flat fee that covers all of the necessary support for the particular incident.

Toll-free call: **888-456-6382**

- **Premium Plus Annual Contract**

Annual support contracts are available to meet your ongoing support needs. Sign up for an annual support agreement to receive one year of toll-free priority access person-to-person assistance. Get answers to installation, configuration and general usage questions.

- To order toll-free call: **800-846-0111**
- For support toll-free call: **800-683-5872**

For a list of **currently supported Level I and Level II products** and the **Telephone Support options pricing**, please visit our web-site at www.metacreations.com.

Technicians are available **Monday through Friday, 6am to 5pm Pacific Time.**

How to Contact Us

- Free On-line Support:
www.metacreations.com
- Standard Support: Toll call 831-430-4200
- Premium Pay As You Go: Toll-free call 888-456-6382
- Premium Plus Annual Contract:
 - To order toll-free call: 800-846-0111
 - For support toll-free call: 800-683-5872

International Support

The telephone support services listed here are available only in the U.S. and Canada. However, if you live outside of the U.S. and Canada, you can still access our free on-line support, and you can contact a local MetaCreations distributor or other third party that may provide technical support in your area. Visit our World Wide Web site at

www.metacreations.com

for information about how to contact a MetaCreations distributor in your country.

Installing Canoma

Installation instructions are provided for both Windows and Macintosh. Follow the instructions appropriate to your system.

Note

Canoma is intended for local installation only. Do not attempt to install it onto a network server.

System Requirements (Windows)

- Pentium processor
- Windows 95, Windows 98, Windows NT
- 32 mb free RAM (48+ mb recommended)
- 50 mb of hard-disk space
- 16 bit color (24 bit recommended)
- CD Rom drive (for install)

System Requirements (Macintosh)

- Power PC
- System 8.0 or higher
- 32 mb free RAM (48+ mb recommended)
- 50 mb hard-disk space
- 16 bit color (24 bit recommended)
- CD Rom drive (for install)

Web Installation

To install Canoma from the Web:

- 1** Go to the MetaCreations Web site.
- 2** Follow the instructions on the Web site to download the appropriate self-installing executable file (Windows or Macintosh).
- 3** Double-click the file to run it.
- 4** Follow the instructions provided by the installer. The installation dialog displays an important ReadMe.
- 5** Click Yes/Accept after reading the complete ReadMe.

Windows CD Installation

To install Canoma from a CD:

- 1** Launch Windows.
- 2** Insert the Canoma CD-ROM into your computer's CD-ROM drive. The Install Canoma dialog appears.
- 3** Double-click the Canoma icon.
- 4** Follow the instructions provided by the installer. The installation dialog displays an important ReadMe.
- 5** Click Yes after reading the complete ReadMe.

Macintosh CD Installation

To install Canoma on a Macintosh:

- 1** Insert the Canoma CD-ROM into your computer's CD-ROM drive. The Install Canoma dialog appears.
- 2** Double-click the Canoma icon.
- 3** Follow the instructions provided by the installer. The installation dialog displays an important ReadMe.
- 4** Click Accept after reading the complete ReadMe.

Canoma Installation Tip

- Macintosh tip: Increase available RAM available to Canoma by allocating unused RAM to Canoma. This can allow Canoma to run faster and handle larger files or larger renderings.

Be sure to leave some RAM for the system software, though! System software needs to be able to dynamically allocate RAM to itself when required.



2

Application Overview

Introduction

Canoma lets you quickly create 3D models from scanned or digital photographs. Canoma models can then be posted on Web sites, used in electronic catalogs, imported into traditional 3D modeling and animation software, or rendered as 2D image files.

The Canoma Workspace

This section leads you through the Canoma Workspace.

The first thing you'll notice about Canoma is that it doesn't have traditional floating palettes and toolbars. All of Canoma's features are

integrated into the Workspace, which takes over your entire screen. This helps keep everything uncluttered and easy to locate.



The Canoma Workspace takes over your screen and provides access to the Canoma controls.

Your operating system's standard menus and windows are still available from within Canoma. You can switch between Canoma and other applications, such as 2D paint programs, Web browsers, or 3D programs.

On Windows, Canoma always runs maximized. You can't reduce the window size, although you can minimize the Canoma window, using the minimize control or switch applications, using ALT-TAB or the application buttons in the Task Bar. On the Macintosh, you can switch applications by clicking inside the window for the other application or by using the Application List.

The Canoma Workspace is very flexible. Several controls "float" over the Workspace and can be moved by dragging them to other locations on the application workspace.

The Canoma Project Window

The Canoma Project Window is a square shaped window inside the Canoma application window. It's where you construct and view a Canoma model.

The Project Window is used when you edit your models, manipulating object wireframes in Edit mode. It's your work area where you'll pin 3D objects to picture elements. The Project Window can be resized to suit your needs (grab it by the lower left corner) and moved to another part of the Canoma workspace (by the title bar.)



The Canoma Project Window is where you construct 3D model.

The Project Window is also where you view the 3D models you create. The view you see of your model in the Project Window is taken through a stationary "camera." You can reposition the Canoma camera in order to view your model from different angles or distances. When you view a 3D model, you're in a three dimensional space. That means you can even view your model from below or above.



The Canoma Project Window is where you view your 3D models.

Just outside the Project Window are some information displays and buttons. Along the top of the window is the title of your project and its size. To the top right of the window are three buttons that toggle display options on and off. To the bottom right of the window are buttons that let you change the color for program elements such as the background, selected objects, unselected objects, objects in the stress display, shadows, and object constraints.

Camera Controls

Use the Camera Controls to change the position and function of the viewing camera.

Tip If you're familiar with Bryce 3D or Poser by MetaCreations, the Camera Controls feel very familiar.

The Edit and View buttons switch between:

- Edit mode, where you can see the wireframe objects that make up your model and

- View mode, where you can see the untextured or textured 3D model.

The Camera Crosses let you move the view of the camera specifically along X, Y, and Z axis. The Camera Trackball lets you rotate the camera in any direction and around any axis. The Banking and Field of View control spheres tilt your Camera and act like a wide-angle lens control. Refer to “Positioning the View of Your Model” on page 97 for more about positioning the camera around your model.



Use the Camera Controls to adjust the position of the 3D viewing camera.

The Creation Tab

The Creation Tab contains the 3D objects, like boxes, rectangles, and even editable polyline contours. Select one of these 3D objects, position it, then “pin” it to an element in your photograph. Once pinned into place, Canoma

uses that placement information to create a 3D model, which can then be “covered” with the pixels from your photographs.



Use the scrollbar on the Creation Tab to view all the objects you can choose.

Refer to “Working with Objects” on page 73 for more about the Creation Tab.

The Toolbar

The Canoma Toolbar holds the tools you’ll use to manipulate objects, view your work, and apply or edit textures. Click a button to activate that tool.

The Toolbar contains (from left to right):

- **Arrow** (select, pin, or apply beads)
- **Glue** (glue objects together)
- **Zoom and Pan** (move into, away from, or around your scene)
- **Point Pen** (add/delete polyline contour points)
- **Texture Brush** (change textures at a pixel level)
- **Quick and Quality Textures** (apply photograph pixels as textures for your 3D scene)

When a tool is selected, it is highlighted in the Toolbar. At the top of the Toolbar is a title that identifies which tool is active.



The Canoma Toolbar.

Selecting Objects

You can use the Object List to easily select an object in your scene. The Information button brings up a dialog of object settings for the selected object. You can even switch into Solo Mode, where it’s easier to see just the object that you’re working with.



Click the Information button for object settings, then use Solo Mode to focus on one object at a time.

2D Image Palette

A thumbnail of your photograph is displayed on the 2D Image Palette. This is a thumbnail of the active image. The 2D Image Palette opens downward to reveal all the photographs in your

project. Refer to “Using 2D Source Images” on page 70 for more about using the 2D Image Views window.



The 2D Image palette.

Texture Controls

The Texture Controls apply the pixels of your photograph to your 3D model. You can use Quick Texture (fast) or Quality Texture (slower, uses more memory, but looks better.) You can also use the Texture Resolution popup to choose a resolution setting for the textures you apply.



Choose Quick or Quality Texture, as well as a resolution setting.

Refer to “Working with Texture” on page 93 for more information about adding Texture.

The Animation Tab

The Animation Tab holds the controls you need to use in order to quickly define key frames and set options to create an animation. Move the camera, take a “snapshot,” move the camera, take another snapshot, then Canoma completes the work by interpolating between the keyframes you’ve snapped or “filling in the gaps.”



The Animation Controls.

The Animation Tab contains controls for adding and deleting keyframes, a looping option, a way to set the playback duration, and buttons for previewing your animation. Refer to “Previewing an Animation” on page 111 for more about the animation controls.

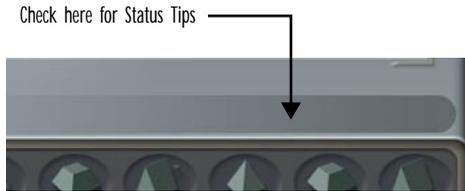
The Menu Bar

The Canoma Menu Bar contains eight menus: the File menu, the Edit menu, the View menu, the Model menu, the Texture menu, the Animation menu, the Window menu, and the Help menu. These menus provide another method of access to the Canoma feature set.

Status Tips

As you move the cursor over an element of the Canoma workspace, text in the lower right corner of the screen explains the purpose of

each. Use Status Tips to “browse” around the work area and become familiar with Canoma tools, palettes, and dialogs.



Status Tips help you become familiar with Canoma tools, palettes, and dialogs.

About Canoma

You can view information about which version of Canoma you are using.

To see Canoma information:

- Click the word Canoma.

Accessing the MetaCreations Web Site

You can access the MetaCreations Web Site directly from within the Canoma program.

To access the MetaCreations Web Site:

- Click the word MetaCreations. This launches your browser and opens the MetaCreations Web Site.



3

Tutorial

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 71 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.

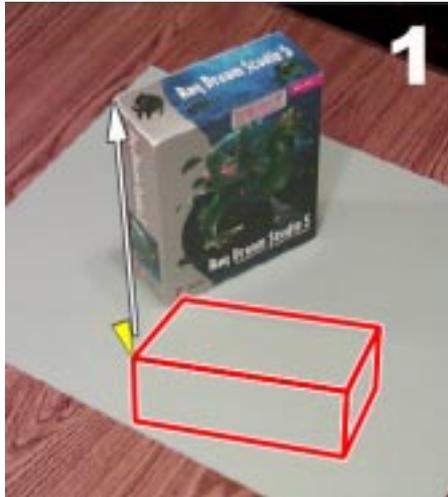
To start pinning:

- 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 (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

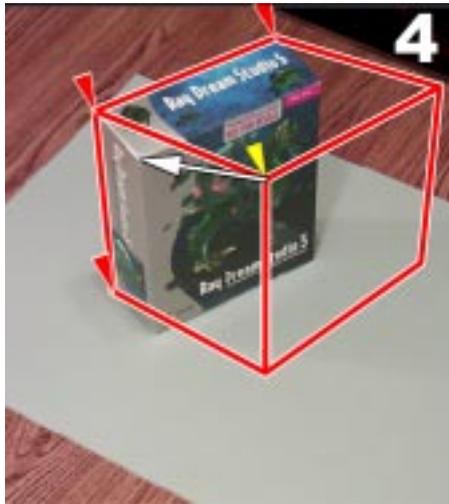
illustrations. Drag each corner in the same sequence as is shown below and try to be fairly precise.



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.



Drag another corner.



Try to be reasonably precise.

Lesson 2: Viewing Progress

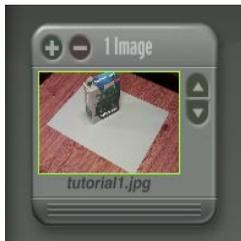
To look at the 3D model:

- 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 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:

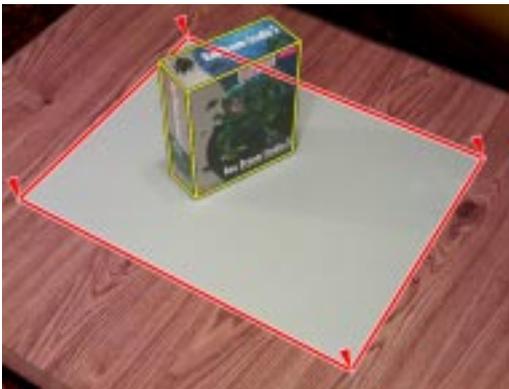
- 1 Click Edit to return to Edit mode.
- 2 Click the Creation tab.

- 3 Click the 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.



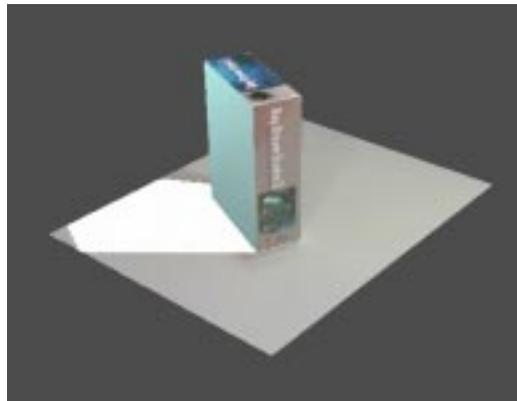
Pin corners.

- 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 33.

To open an existing project:

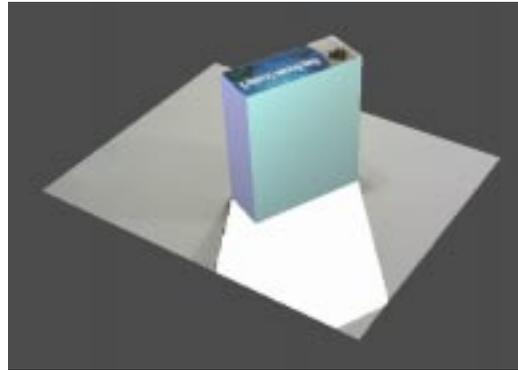
- 1 Select **File menu > Open**.
- 2 Open the file **Canoma: Tutorials: finished1.3dv**.

- 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.

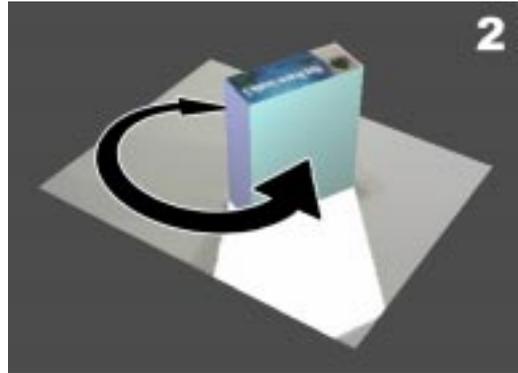


Roughly align the new wireframe to the second photograph, BEFORE you start pinning.

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.

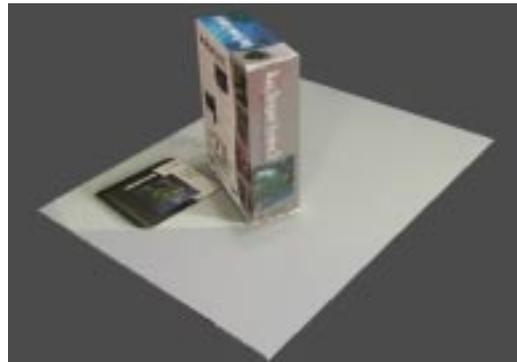


Fully textured.

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.



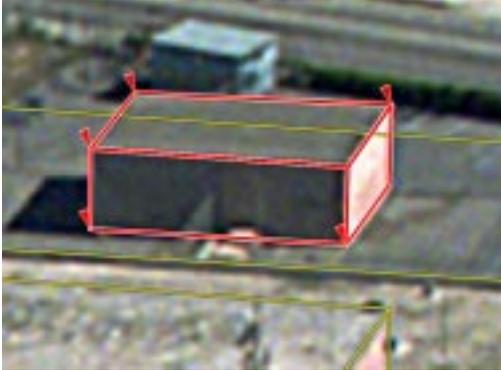
Add Quick Texture.

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.

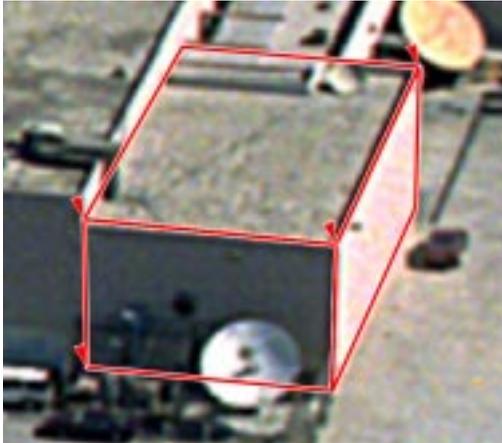
The Solo Mode button is only available when there is more than one object in your scene.

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.



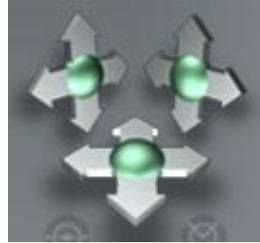
The final project.

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 99 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.

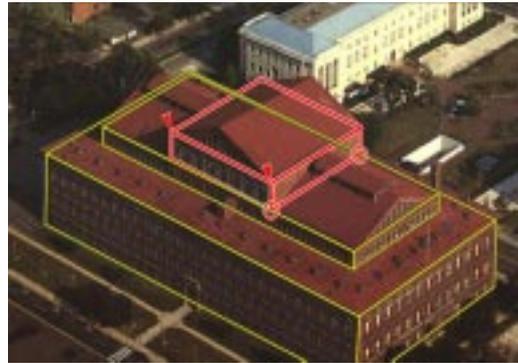
- 3 With the second wireframe still selected, click Stack and Aligned in the Selection Based options on the Creation Tab, then create a Box and pin it.

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.



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.

- 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 92 for more about how to avoid introducing unnecessary stress into your Canoma model.

Do not pin or glue the left-back corner of the roof. Since it can't be seen, it's not a good idea to introduce a pin or glue that could easily be inaccurate.



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

- 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.
- Switch to View mode to see the results. A perfect fit. If things went awry during this step, use Undo (ctrl-Z) and try again.
Now it's time to put a roof on the second level of the building.

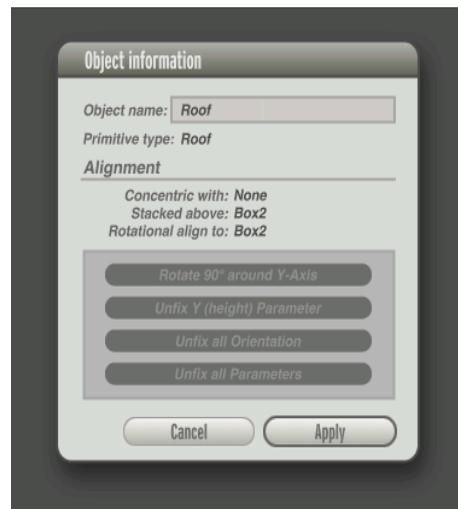
To add a final roof:

- Select the second Box that you created (the middle level of the building.)
- 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.
- With the roof wireframe still selected, click the object information button or select **Edit menu > Get Information**.



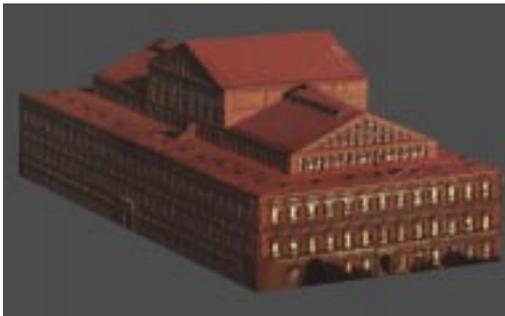
The object information button.

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 84 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**.

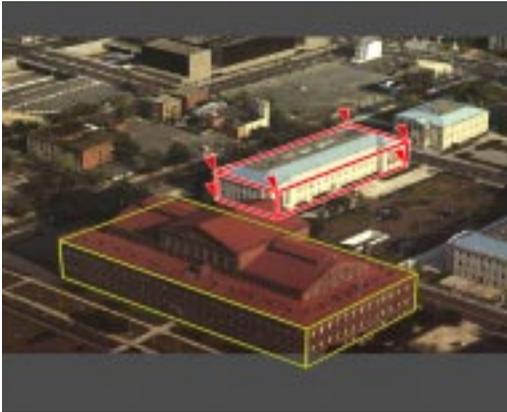
You'll recognize the red building from the previous tutorial, but now you'll model the whole area surrounding the red building. The trick is to model large structures first, as that establishes good perspective for Canoma. Only then should you proceed with more detailed models.

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.



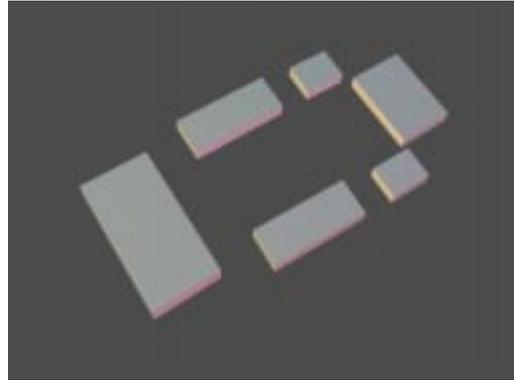
Use aligned duplicate (Shift + Cmd/Ctrl D) whenever possible.

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.

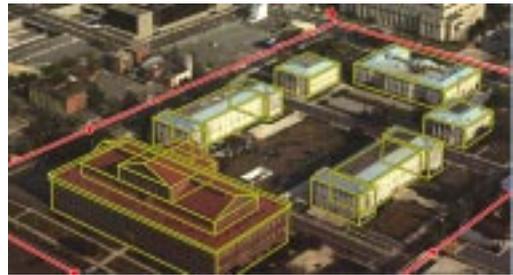
Lesson 3: Adding a Ground Plane

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

To create the ground plane:

- 1 Create a 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.

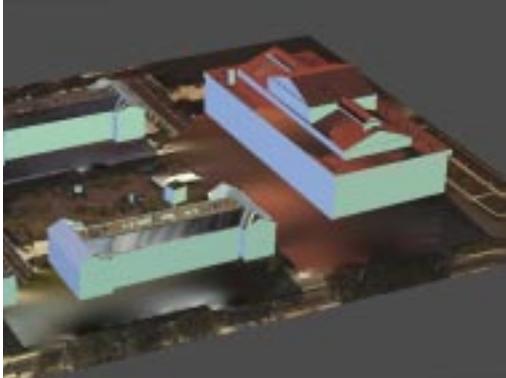
- 4 Switch to View mode.
- 5 Select **Texture menu > Mirror Textures**.
This tells Canoma to “steal” the texture from another place on the object, since pixel information is not available.

- 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.



4

Canoma Basics

Introduction

This chapter describes how to setup Canoma and shows you some basic techniques you'll need to know in order to create 3D models.

Customizing Canoma

Setting Canoma Preferences

Set Application Preferences to suit the way you like to work.

To open the Canoma preferences dialog:

- Select **File menu > Preferences** to display the Application Preferences dialog.



Setting Canoma preferences.

Saving Workspace Customizations

Canoma is intended to be a flexible, creative tool, so there are many ways you can customize it to suit your style of working. Move toolbars and palettes, resize the project window, or choose a color scheme.

The Maintain Custom Configured Workspace option toggles between discarding those changes or keeping them from session to session.



Save or discard changes you make to the workspace.

To save changes you make to the Canoma workspace:

- 1 Select **File menu > Preferences** to display the Application Preferences dialog.
- 2 Click the **Maintain custom configured workspace** option. A checkmark indicates that the option is selected.

The next time you start Canoma, your workspace is as you left it when the application was closed.

To discard changes you make to the Canoma workspace:

- 1 Select **File menu > Preferences** to display the Application Preferences dialog.
- 2 Click the **Maintain custom configured workspace** option. No checkmark is displayed when the option is not enabled.

The next time you start Canoma, your workspace is displayed in the default configuration.

Using the Active Guide

When you start creating objects and affixing them to photo elements, you can get some help from the Active Guide. This handy window offers tips to pace you through the creation and pinning of your first few primitives.



The Active Guide offers tips to help as you create and pin objects.

To turn the Active Guide on or off:

- 1 Select **File menu > Preferences** to display the Application Preferences dialog.
- 2 Click the Display Active Guide option. A checkmark indicates that the option is selected.

Choosing a 2D Image Editing Application and Image Format

Make subtle or major changes to the texture of a 3D modeled scene, using your favorite 2D pixel editing program or use Canoma to keep that 3D look, without creating a 3D scene. Edit an area of texture, then have Canoma display the results in proper 3D perspective. What a time saver! Refer to “Retouching or Editing Textures in 2D” on page 103 for more about editing a perspective image.

Select a default 2D pixel editing application, such as Painter or Photoshop. The default 2D pixel editing tool is opened whenever you use the Texture Brush from the Toolbar to edit the texture on the face of an object.



Selecting a 2D editing application.

You can also select a Default File Type to be used for the image files generated when you edit textures.

To select a 2D image editing application:

- 1 Choose **File menu > Preferences**.
- 2 Click the Browse button and navigate to select a 2D pixel editing program.
- 3 Click Apply.

To choose a default 2D Image File Type:

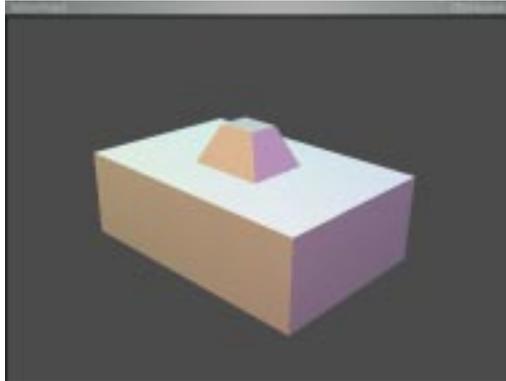
- Click the Image Format drop down list and choose a format.

Setting Up Your Workspace

Working in the Project Window

In Edit mode, Canoma’s Project Window shows the active photograph and any 3D wireframe objects you have created and placed. In View mode, the Project Window shows your textured

or untextured 3D model. Refer to “Using the Canoma Workspace” on page 71 for more about the Project Window.



The Project Window in 3D Preview mode.

Using the Camera Controls

The Camera Controls are used to position and rotate the camera that views your model. They can be repositioned on the workspace. Refer to “Using Canoma Camera Controls” on page 98 for more information about how to use the Camera Controls.



You can move the Camera Controls to another place on the workspace.

Understanding the Toolbar

The Canoma Toolbar holds the tools you’ll use to manipulate objects, view your work, and apply or edit textures. The Toolbar can be repositioned on the workspace. Refer to “The Toolbar” on page 24 for more about the Canoma Toolbar.



The Canoma Toolbar.

Changing Canoma Colors

You can customize the colors that Canoma uses to display application elements. Use the color selection buttons outside the lower right corner of the project window to select a color scheme that works best for you.

To change the background color:

- Click the Background Color button, then select a color. The default background color is dark gray.



Click to change the background color.

To change the color used to highlight the selected object:

- Click the Selected Object Color button, then select a color. The default selected object color is red.



Click to change the selected object color.

To change the color used to highlight unselected objects:

- Click the Unselected Objects Color button, then select a color. The default unselected object color is yellow.

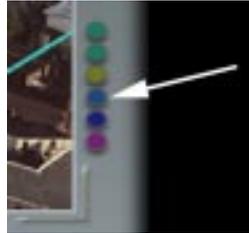


Click to change the color of unselected objects.

To change the color used for objects in the stress display:

- Click the Stress Display Color button, then select a color. The default stress display color is white. Refer to “Avoiding Model

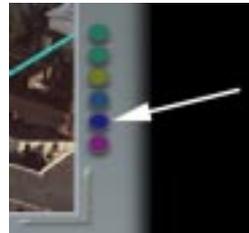
Stress” on page 92 for more about using the stress display to check for errors that place stress on the 3D model.



Click to change the stress display color.

To change the color used for shadows:

- Click the Shadow Color button, then select a color. The default shadow color is light gray. Refer to “Using Shadows” on page 91 for more about wireframe shadows.

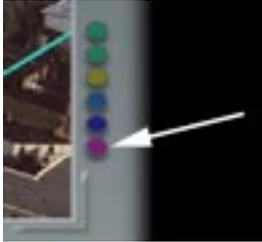


Click to change shadow color.

To change the color used for highlighting a selected object constraint:

- Click the Selected Constraint Color button, then select a color. The default selected constraint color is cyan. When

you move the cursor over a constraint, such as a bead or pin, the selected object constraint color is used.



Click to change the selected constraint color.

Creating a Canoma Project

A Canoma project is made up of photograph(s) or image(s) over which 3D primitives are projected. Refer to “Working with Canoma Projects” on page 72 for more about creating a new project or opening an existing project.

Organizing the Project Folder

It’s a good idea to create a project folder, before beginning work on your 3D model. A main project folder holds all of the photographs your project requires, as well as the Canoma project file (when saved.)

Because Canoma expects all project files to reside at the same hierarchical level, do not place photographs in a subfolder and take care to save the project file so that it resides in the main project folder. Any subfolders that are required by the project are created within the main folder by Canoma.

Using 2D Images

When you create a Canoma project, you’ll start by loading a photograph. This first photograph lays the groundwork for further work. Images are stored in the 2D Image Views palette. The 2D Image Views palette can also be repositioned on the workspace. Refer to “Using 2D Source Images” on page 70 for more information about that palette.

If you need better textures for the front of a building or the side of a box, you can add more detailed texture by adding photographs. For example, you might want to add detail for one side of a building, to show what offices are available. Refer to “Adding More Detail” on page 94 for more about using additional photographs to add detail.



The 2D Image Palette.

Creating 3D Models

The goal of Canoma is to make 3D wireframe primitives match underlying images. To do that, you pin the corners of wireframe primitives, such as boxes or pyramids, to get a reasonable match between the wireframe and the photograph. Refer to “Using the Canoma Workspace” on page 71 for more information about building 3D models. Refer to “Modeling Objects” on page 113 for some interesting modeling techniques.

Once created, you can view it as a 3D model, using Canoma's camera controls. Refer to "Using Canoma Camera Controls" on page 98 for more information about viewing your models.

Adding Texture

Adding texture is the process of mapping pixels of an underlying image to the surface of an object, without changing that object's geometry.

Canoma offers two types of texturing: Quick Texture and Quality Texture. Quality texturing 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 and takes more memory, but it looks better. Refer to "Working with Texture" on page 93 for more information about adding surface textures.



Canoma uses pixel information from the photograph to apply texture to a model.

Refer to "Retouching or Editing Textures in 2D" on page 103 for some great tips about editing areas of texture in a 2D program.



Use the Texture Brush to select an area to edit in a 2D pixel editing application, such as Painter or Photoshop.

Creating Animations

Animation is the process of recording the motion of the camera as a 3D model is being viewed.

To create an animation:

- Complete a 3D model.
- View it.
- While viewing, record keyframes.

Canoma creates a motion path from your recorded camera movements and then generates an animation. Refer to "Creating an Animation" on page 110 for more information about creating animations.

Undoing Operations

The Undo command and the Revert to Saved command let you discard the effects of changes you've made to your model.

You can Undo an operation up to 10 times in a row. You can also Redo what you've undone. If you've made changes and change your mind completely, you can discard any changes you've made, without exiting the program.

To undo the last operation:

- Choose **Edit menu > Undo** (or press **Cmd/Ctrl+Z**).

To redo the last operation:

- Choose **Edit menu > Redo**.

To revert to the last saved version of your model:

- Select **File menu > Revert to Saved**.

Saving and Closing

The Save command lets you save your work.

Saving the Project

To save a project file:

- 1 Choose **File menu > Save**.
- 2 Use the Save dialog controls to choose a location for your work, then click Save.

Be sure to save the project file so that it resides in the same folder as the project photographs. Canoma assumes that all project files are at the same hierarchical level.

To save a file under a different name:

- 1 Choose **File menu > Save As**.
- 2 Enter a new name and/or location in the fields provided and click Save.

A copy of your work is saved, leaving the original intact.

Be sure to save the new project file so that it resides in the same folder as the project photographs. Canoma assumes that all project files are at the same hierarchical level.

If texture was edited with a 2D pixel editing program, such as Painter or Photoshop, the resulting files from those edits are placed in a subfolder created by Canoma. This subfolder's name matches the new project name. If you do not want texture edits to apply to the copy, remove the texture edit files or remove the entire subfolder.

Closing Canoma

To close Canoma:

- Choose **File menu > Quit**, or press **Cmd-Q/Ctrl+Q**. When you close the application, Canoma asks if you want to save your work.

Importing, Exporting, and Rendering

Importing

Canoma supports the following 2D file formats for import into your model:

- JPG
- TIFF (includes alpha information)
- PNG (includes alpha information)
- GIF (includes alpha information)
- PSD (includes alpha information)
- BMP (Win only)
- PICT (Mac only)

Exporting

When you export your Canoma model for use on the Web or in another 3D program, Canoma automatically creates a folder to hold the various files that are created.

With Canoma, what you see is what gets exported. If you edit textures after emitting a model, those image files are not picked up by the exported model. If **Texture menu > Mirror Textures** is Off, untextured surfaces are untextured in the exported file. If **Texture menu > Mirror Textures** is On, untextured surfaces will be filled with pixels from the corresponding side.

Canoma supports the following file export formats:

- **MetaStream** (for posting on the Web)

When exporting to MetaStream, two file formats are generated:

- HTML which embeds (using the EMBED tag) MetaStream output generated by Canoma
- MTS file containing compressed geometry and textures.

Double-click the HTML file to open the output.

The proper usage of MetaStream objects is as embedded objects in a HTML page. This gives the page author full control over a wide range of rendering and interaction options described at the MetaStream Web site (<http://www.metastream.com>). If you were to just open a raw MTS file, the plug in runs with all attributes set to default values, which is unlikely to be correct for all cases.

Textures generated by Canoma are already lit (by real light) and do not need to be additionally shaded by synthetic lights, so texture shading is set to off.

Infini-D: If Infini-D is installed, the MTS file appears with an Infini-D icon and launches the application when double-clicked, so just double-click the HTML file.

Make sure the path and the filename are correct and that all required libraries are available or an error message is displayed. Should that happen, just open the HTML file.

- **OBJ file format** (for import into Poser, Bryce 3D, Ray Dream Studio, and other 3D programs)

Ray Dream Studio: The geometry and textures import nicely, but the bounding boxes are drawn incorrectly.

Poser: Exports to Poser Prop export a.pp2 file and several .bmp (Win)/.pict (Mac) textures. You then need to manually copy or move the .pp2 file to any immediate subfolder of Runtime\libraries\props and move or copy all the .bmp or .pict files to <PoserAppDirectory>\Runtime\textures\. The Canoma generated object or scene appears in the list of props (without a special icon) and the name you give the prop. You can place & work with the prop like any other. To make things simpler: Keep shortcuts/aliases to the Poser texture and prop type folders handy to where you generate the prop file, then just drag the files onto the shortcuts - faster than hunting the directory down. One word of caution: don't name two Canoma generated Poser props the same name or you will overwrite part of the other props textures.

Maxon Cinema: Maxon Cinema imports the OBJ geometry ungrouped and untextured.

NewTek Inspire 3D modeler: NewTek Inspire 3D modeler loads the geometry untextured.

- **VRML 2** (for use in Cosmo 2.1, Blaxxun Community Client, Visscape Superscape VRML, and 3D Studio Max)

Textures generated by Canoma are already lit (by real light) and do not need to be additionally shaded by synthetic lights, so texture shading is set to off.

The VRML that is exported contains one viewpoint for each source image and also an extra one for the current 3D view camera (which need not coincide with any source image point of view.) Typically, VRML browsers let you step between viewpoints. Consult your Browser documentation for details. For example, in Cosmo 2.1, PgUP and PgDn go to the Next/Previous viewpoint.

If you created an animation in Canoma, the starting point of the animation gets recorded in the VRML as a special viewpoint called “Tour.” After selecting “Tour” as your viewpoint in the VRML browser, click anywhere in the scene to start the animation you had in Canoma. After the animation is finished, the “Tour” automatically returns to the starting point, ready for another “click” to start it again.

Canoma exports VRML files as text files. Typically, these are not large compared to the associated texture files, but you can gzip the WRL file for extra compression, using the 3rd party gzip software utility. Remember to rename the .wrl.gz file extension back to .wrl, even though it is now compressed. Browsers use this extension to route contents to the correct plug-in (in this case VRML.)

If you import Canoma models into a 3D modeler and the objects seem too bright, either turn texture shading off altogether or attenuate your texture light emission.

- **Caligari trueSpace 3D**

All objects are exported as one group. All image viewpoints are saved as cameras in TS4. The first four are opened as views in the workspace. Canoma exports to .scn files, to load scenes. If you want to create separate reusable objects, load scene, ungroup, and Save Selected Objects as .cob files.

Due to a problem in TS4.0, some textures may display black. Registered users can upgrade to 4.1 by contacting Caligari directly. This fixes the problem.

- **AutoCAD DXF**

Files exported as DXF may import into 3D applications very small. In some cases, you can adjust the DXF units during import. In most cases, you should scale the model. In a very specific case using Artifice Design Workshop, the imported DXF model imports objects ungrouped. Group the model before scaling.

Rendering 2D Images

You can produce a 2D image of your Canoma scene. When a 2D image is rendered, Canoma automatically creates a folder into which it saves any associated image files.

When you render an image, a popup menu with output file size choices is displayed. Any rendered image is locked to the aspect ratio of your project window.

To render a 2D image of your model:

- 1 Select **File menu > Render Image**.
- 2 Set the desired size.

Rendering Animations

You can produce a QuickTime movie of camera movements around your Canoma scene. When an animation is rendered, Canoma automatically creates a folder into which it saves any associated animation files.

Note

To render an animation, QuickTime 3.0 must be installed. It is available on the Canoma CD, or can be downloaded at www.apple.com.

When you render an image, a popup menu with output file size choices is displayed. Any rendered image is locked to the aspect ratio of your project window.

At the time you render an animation, you can edit the module, setting additional options, including animation compression and frame rate.

You can also select to output your animation as a sequence of image files.

To render an animation:

- 1 Select **File menu > Render Animation**.
- 2 Set the desired size.
- 3 Select between outputting a QuickTime animation or a series of keyframe images.
Selecting to output as a series of keyframe images outputs single image files for each keyframe (BMP on PC, PICT on Mac). This generates as many single files as there are frames in your movie.
- 4 Press Edit, to edit the module you just selected.



5

Preparing Projects

Taking Photographs

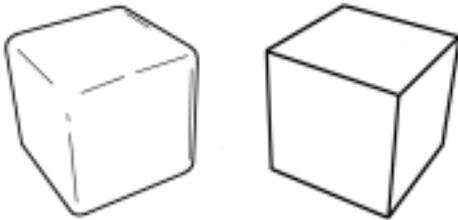
Good photographs are an important part of using Canoma to create models. As you venture on your own to make photographs, here are a few suggestions to help assure a successful project.

What Works Best

Canoma does best with objects that have sharp corners, rather than round ones. The trouble with round corners is that you can't really tell exactly "where the corners are". This is especially true if you have multiple images.

Canoma expects you to pin the same corresponding points in all photographs. Sometimes you can fake it and use beads or

other techniques to tell Canoma where corners might be located. However, if you keep “sharp corners” in mind, you won’t be disappointed.



Canoma works best with sharp corners. The object on the right has sharp corners and will give the best results when modeled.

Using Several Photographs

One of the best pieces of advice is not to be afraid of taking too many photographs. Photos are cheap, especially in this age of digital cameras, compared to redoing a photo shoot. Inevitably, some photos won’t turn out as well as others and you’re bound to need detail where you didn’t expect to need it. The best reward for taking as many photos as possible is the time and frustration you’ll save when you have lots of choices during modeling.

Varying the Angles

When you take several photographs of a single object or building, try to take them from very different angles. For example, take one from the front, then another from the side at a 90 degree angle from the first. This allows you to put pins for the same corners in multiple images, allowing Canoma to give you precise models.

Using a “Panorama” Approach

When you take photographs of a room or enclosed space, stand in one place and take some from the same position. Turn your head a little bit each time, just like you would if you were creating a panorama.

As you use this approach, make sure that you have some overlap between photographs. In particular, make sure that at least one object is visible in any pair of adjacent photographs. This is because you have to match up a model made from one photograph with something in the next photograph. Having an object on the left or right border makes the job much simpler.

Tip

It is also a good idea to create pictures with different exposures, in order to avoid big contrasts later. That way, you can select those that match best.

Working from Overviews to Detailed Photos

Overview Photos

Be sure to take plenty of overview photos. When you start modeling, you should start with an overview photo. Using overview photographs can make initial modeling easier. It can be difficult starting with a close-up view.

As you take overview photos of a scene, try to get at least some objects fully into view, so you can see their corners. If you cannot see corners, make sure you can at least see edges, for example where two walls meet or a wall and the floor. Also, try not to get too far away from the scene, since details fade and distortion sets in the further away you get from your subject.

Tip

Although most digital camera don't offer extremely wide angle lenses, scanned photographs where wide angle lenses (28-35mm) were used can introduce spherical distortions—where lines become curves. When this happens, precisely matching things in the photograph becomes difficult. Canoma can not undo these types of distortions.

Detailed Photos

When you need for a particular object in your model to have better textures, be sure you take extra close-up photographs of that object. When taking close up photos, try to keep the whole object in the photograph. Also, try to take a close-up from right in front of the surface.

For example, say you want to get a high-resolution version of a painting on your wall. Let us assume you already have pictures of the room, complete with edges and corners of the walls, which you used to model the wall and painting.

Take a close up image of just the painting, making sure you see all of it and perhaps its frame. Add that close-up to your model and pin the corners of the painting. Canoma automatically uses your close-up shot to get the best texture resolution.

Don't Move Things

This sounds simple, but try to take pictures of the same things. Don't move chairs, boxes, cars or anything while you're taking pictures. Canoma assumes objects do not move between photographs.

One Photo, One Image File

Use only one photograph per image file. If you used a scanner to digitize photos, don't scan more than one photo into a single image file. You can't load an image that contains several photos into Canoma and expect a successful modeling session.

If you did capture several photographs in one scanned image, you may need to split, rotate, edit or crop your scanned photos into individual image files. Save them as BMP or JPG, approximately 800x600 resolution, which works out to between 100-300Kb per image.

Modifying Photos

Even the best photographs sometimes need retouching. This can be especially useful when you're using a single image or have historical photos to use for modeling purposes. You might need to remove scratches, fine-tune colors, or colorize old photos, using an image editing tool, such as Painter or Photoshop. Should you need to edit photos, remember these important tips:

- Never change the aspect ratio or dimensions of a photo after you've already started using the image in a Canoma project. Canoma can't compensate for a distorted photograph.
- If you're using more than one photograph, be careful to adjust color, exposure levels, or lighting so that the photos match after you've finished editing.
- Avoid cropping photos. It's better to have lots of photos, with varying detail than to try and "crop out" images of objects within a photo. Canoma may get confused if all you feed it is bits and pieces of photographs.

- Avoid using photos with white borders or photos that were scanned from a book that include superfluous materials around the image you're scanning (such as bits of text.) White borders are common in older photos and Canoma treats the border or extra material as part of the image to be modeled. For best results, remove the white borders or superfluous material before loading the image into Canoma.

Controlling Exposure and Lighting

Try to use similar exposure and lighting settings for all the photographs of a scene or object. Canoma compensates for somewhat different lighting between photographs in fancy texturing mode, but it can't make the difference between sunny and rainy day photographs disappear.

Things to remember:

- Control contrast by putting small light objects on top of dark backgrounds or small dark objects on top of light backgrounds.
- Watch out for glare! You don't want glare to bounce off of shiny parts of important objects, obscuring necessary texture details.

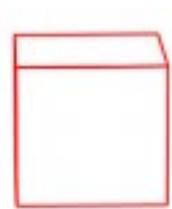
Handling Camera Location

If you can, take some photographs from slightly above your objects. If there is a block-like object in the scene, it is best to show 3 sides of it in the photo, because that allows you to put more pins onto a single box.

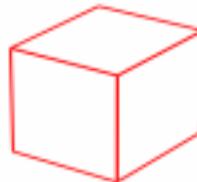
Make sure you see the bottom edges of objects or the floor in some pictures. Canoma works much better if you can point out some bottom corner or edges with pins or beads. Without that, wireframe bottoms might wobble around.



Photographs from this angle give very poor results.



This angle would be a little better, but not much.



Three visible three bottom corners gives excellent results.



6

Building Projects

How Canoma Works

Modeling 3D Objects

Canoma is designed to help you quickly build 3D models. Using information you give it, Canoma tries to find parameters such as: camera location, focal length (zoom), object positions, object orientations, and object dimensions.

To give Canoma information about how to construct these models, you'll affix 3D objects to photograph elements, using pins, beads, and glue. These constrain parameters into taking on correct values. Refer to "Working with Objects" on page 73 and "Modeling Objects" on page 113 for some interesting modeling techniques.

Tip

So, you've got your digital camera out and are eying your desk as a likely first project. Think again! Desktop areas are often cluttered with objects of varying difficulty and parameters. For a good first experience: do the Tutorials, start simple, then tackle more complex projects.

Using 2D Source Images

To create Canoma models, you must provide one or more photographs of the object(s) being modeled. For most projects many photographs are available. In general, multiple images provide views from different angles, making determination of perspective and object dimensions more accurate. When only one image is available, “on creation” options should be used to give Canoma additional parameter information. Refer to “2D Image Palette” on page 72, “Using the 2D Image Palette” on page 95, and “Adding More Detail” on page 94 for more about using source photographs. Refer to “Adding an Object” on page 84 for more about using “on creation” options.

Modeling from the Ground Up

Scenes are usually modeled from the ground up. Working from a ground plane, you place objects on the ground, then place objects on top of those, and so on. By default, you cannot have an object just “floating in space.” These restrictions make modeling a lot easier.

In general, the default constraints are useful, sometimes you may have to change them: for example if you know an object is not sitting on the ground plane or if it has an arbitrary orientation. In those cases you can “unlock” some or all of the fixed parameters. Refer to “Freeing Necessary Parameters” on page 119 for more about freeing object parameters.

Always Calculating

Canoma is almost always “active”. Unlike a draw or a paint program, which only reacts when you have the mouse button down, Canoma tries to calculate decent parameter values, even after you let go of a pin or bead.

Canoma tries to minimize the stress that can be caused by simple errors, like misplacing a pin, by adjusting across all objects simultaneously. A special Stress Display mode shows any disparity between how you position objects and how Canoma converts those instructions into 3D representations. Refer to “Listening to the Canoma “Heartbeat”” on page 115 for more about how Canoma is always working and “Avoiding Model Stress” on page 92 for more checking how Canoma is interpreting information as you work.

Before You Start

As you start to model, keep these basic concepts in mind.

- Model from less-detailed overview photos to more-detailed or close-up views. Add more images to supply additional texture detail.
- Choose a good first picture, one that shows a lot of your scene. Model a few elements in that picture, maybe three to ten, before even thinking about loading additional images. Refer to “Taking Photographs” on page 65 for more information on taking photographs that might make modeling easier.
- Start by affixing simple 3D objects to a photograph, like Boxes. Using a few simple objects helps establish perspective—the camera position, orientation, and focal length—for your scene. Refer to “Starting

Simple” on page 117 for more about using simple objects to set parameters.

- Use temporary objects to set perspective. For example, if there’s a staircase that needs to be modeled, try using a box for that element, then replace it later with a staircase. Refer to “Establishing Perspective” on page 117 for more about using temporary objects while modeling.
- All objects are by default created on the ground plane (except for on top objects.) In addition, objects are by default only able to rotate around their vertical axis. Refer to “Adding an Object” on page 84 and “Freeing Necessary Parameters” on page 119 for more about object parameters.
- Organize your project and all project photographs into a single directory or folder. Refer to “Organizing the Project Folder” on page 58 for more information about organizing your projects.

Using the Canoma Workspace

The Project Window

In Edit mode, Canoma’s Project Window shows the active photograph and any wireframes of objects you may have created to match that image. In View mode, the Project Window lets you view the project you’re creating.



The Canoma Project Window.

To resize the Project Window:

- 1 Move the cursor over the bottom right corner of the Project Window.
- 2 Click and drag the window to the desired size.

To move the Project Window:

- Click and drag the title bar above the Project Window.

To adjust the aspect ratio of your project scene:

- Click the Size Indicator above the right hand corner of the project window and enter a new aspect ratio.
When you render an image or animation, a popup menu with output file size choices is displayed, but any rendered image or animation is locked to the aspect ratio of your project window.

Camera Controls

The Camera Controls, used to view and rotate your project can be repositioned on the workspace. Refer to “Viewing Projects in Progress” on page 89 for how to view models in progress. Refer to “Using Canoma Camera Controls” on page 98 for complete information on how to use the Camera Controls.

2D Image Palette

The 2D Image Palette can also be repositioned on the workspace. Refer to “Using the 2D Image Palette” on page 95 for more information about the 2D Image Views palette.

To move either the Camera Controls or the 2D Image Palette:

- Click and drag the edge of the controls or palette to a new position.

Selecting Colors

You can customize your Canoma workspace even more by choosing different colors for such things as:

- background color (choose a color that makes viewing textures easy, the default color is dark gray)

- selected object wireframe color (the default color is red)
- unselected object wireframe color (the default color is yellow)
- stress wireframe color (the default color is white)
- shadow color (the default color is light gray)
- selected object constraint (the selected pin, bead, or point of glue)

Refer to “Changing Canoma Colors” on page 56 for more about how to customize colors in Canoma.

Working with Canoma Projects

A Canoma project is made up of photograph(s) or image(s) over which 3D objects are mapped. Refer to “Organizing the Project Folder” on page 58 for more about organizing your project.

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

To create a Canoma project:

- 1 Start Canoma.
- 2 Select the opening credits canvas, select **File menu > New**, or select **File menu > Add Image**.

Canoma supports the following 2D file formats: JPG, TIFF, PNG, GIF, PSD, BMP, and PICT.

To open an existing 3D project:

- Select **File menu > Open Project**.

Working with Objects

Matching Objects to Photo Elements

The goal is to make 3D objects match an underlying image. To accomplish that, you'll create objects and pin them to elements in a photograph, pinning as many corners of each wireframe as is needed to get a reasonable match between the wireframe and the photograph.

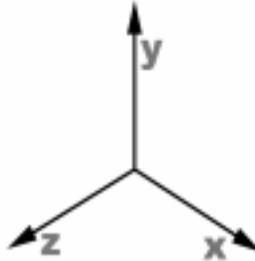
Model large elements around the entire photograph first. This establishes perspective (camera angle and focal length.) If you start modeling in great detail in one corner of a photograph, it's easy to imprecisely place a pin, causing Canoma to estimate a wrong perspective.

Tip

Want to import and place into your scene a model created in another 3D program?

- Create a simple Canoma object, to define the position and orientation for the object you are importing.
- Import, size and position the imported model, using the Canoma object for placement purposes.
- Delete the Canoma "helper" model.

The Canoma coordinate system is based upon the following definition:

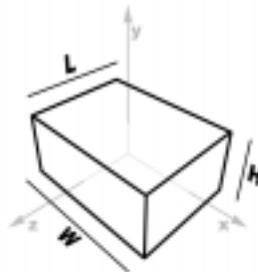


Y points up - the "height" dimension. X points right - the "width" dimension. Z points towards you - the "length" dimension.

Selecting the Correct Object

As you get ready to create objects and pin them to elements in a photograph, consider the following information about each object type.

- **Box** - A box is a good object to use when starting a scene. Helps to determine initial perspective. Often useful as temporary "helper" objects for the purpose of determining perspective. With a box, four pins are usually enough to get started.



The Box is a good choice when starting a scene.

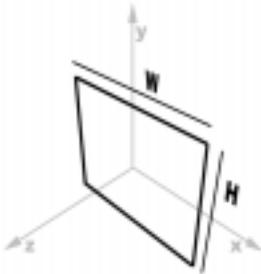
- **Rectangle** - The Rectangle can be used when the photograph element you're modeling is flat (no height).



The Rectangle.

When you need to model a carpet on the floor, where both are modeled as rectangles, a big one for the floor and a smaller one for the carpet, select the floor rectangle, then create the carpet rectangle with Stack selected. That raises the carpet rectangle slightly to avoid rendering problems when 2 rectangles exist in the same plane.

- **Vertical Rectangle** - The Vertical Rectangle can be used when the photograph element you're modeling has height, but no width or depth.



The Vertical Rectangle.

- **Guide Line** - A Guide Line is used when a geometric aid is required. A Guide Line

does not show up in 3D preview or 3D file export formats.



A Guide Line is a geometric helper.

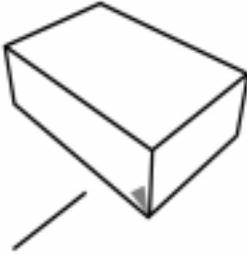
Guide Lines can be used to add “real world” information to your model. You can enter an absolute length measurement for a Guide Line.

When you select Object Information for a Guide Line object, you'll see two additional options. There is an entry box where you can enter the length of the line and a checkbox where you can have Canoma use the line length to calibrate your scene.

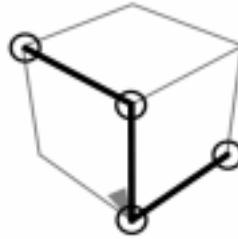
You can also use the Calibration option to automatically calibrate your entire model to reflect the length you enter. If Calibrate is checked, the entire scene is calibrated according to the Guide Line length you enter. If Calibrate is not checked, the scene does not change, except to reflect any length setting you may have entered for that line. When you enter a length (calibration or additional measurement), the length of the line is locked to that length. In order to unlock it and have it become a normal guide line again, delete the line and create a new one from scratch.

Refer to “Calibrating a Scene” on page 84 for more about calibrating your picture.

You can create a Guide Line, glue it to the side of a box, then duplicate it to force one or several objects to have the same dimensions. For example:

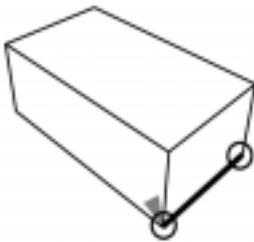


Create a Guide Line. Unfix all parameters.

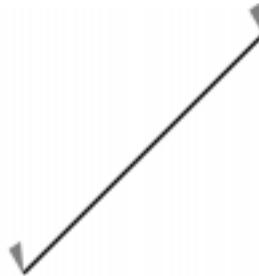


Glue the third Guide Line to a third side of the box. Like magic, you have a cube, with equal sides, thanks to the duplicated "yardstick." Pin anyplace on the box and watch the box change size, but remain a cube.

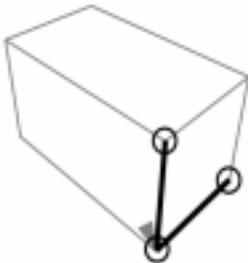
You can use a Guide Line to align objects.



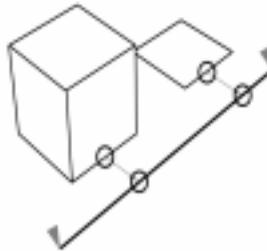
Glue the Guide Line to the edge of a box. Once glued, duplicate the Guide Line.



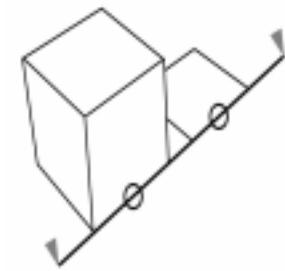
Create a Guide Line, then use pins or beads to fix it in place.



Glue the duplicate Guide Line to a 2nd edge, then duplicate the Guide Line again.



Use edge to edge glue to glue objects to the Guide Line, forcing alignment.

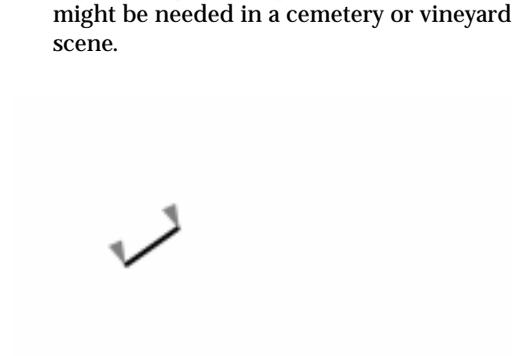


After aligning objects to a Guide Line.

You can use a Guide Line to distribute objects in space at equal distances, as might be needed in a cemetery or vineyard scene.



Glue objects to endpoints of Guide Lines.



Create a Guide Line, then use pins or beads to fix it in place.



Equally spaced objects.



Create additional Guide Lines (selecting concentric duplicate).

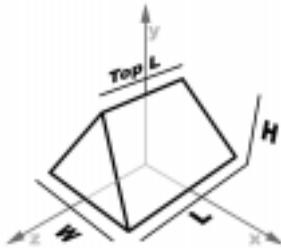
Try It

Experiment with using a Guide Line as a geometrical helper. Load an empty, gray 600 X 400 image as the background, then use a Guide Line to try and create a pentagon object with equal sides! Hint: you'll need more than 5 Guide Lines.

- **Roof and Slanted Roof** - Both a plain roof and a slanted roof are available.

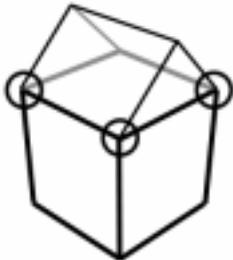


Roof.

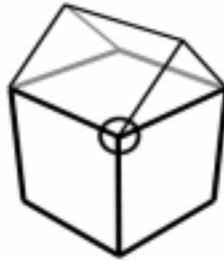


Slanted Roof.

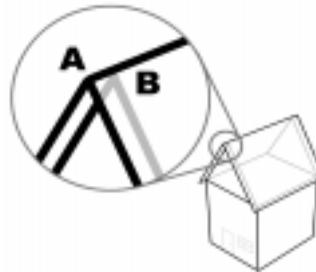
When doing roofs, it is often handy to glue corner corners to a base box.



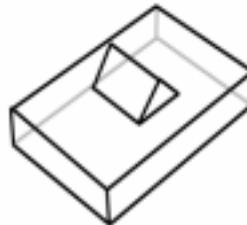
Glue three points to glue a roof into place.



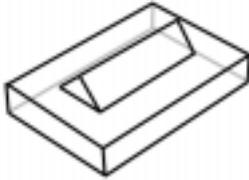
If a roof was created concentric, aligned, and stacked, a single "drop" of glue is enough. A roof doesn't have to fit exactly, but can overhand a little. Don't use glue when this is the case. Put a pin on an aligned, concentric, stacked roof



Watch out for common mistakes. Pinning a roof, forces the roofline to be flush with the building front wall. To allow the roofline to stick out a little, place a bead instead.

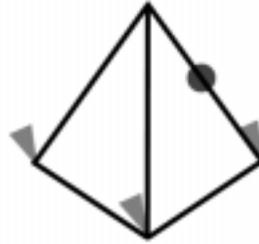


If an aligned stacked roof starts life at the wrong orientation, you can always rotate it 90 degrees.



After rotating.

- **Pyramid** - A pyramid is fairly sensitive to incorrect top pin placement.



Use beads on edges when the top of a pyramid can't be exactly seen.

- **Truncated Pyramid** - A pyramid with the top "cut off."



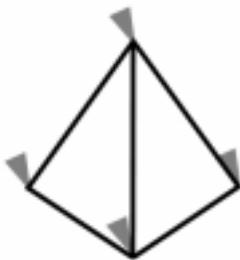
The Pyramid.

If you can not see the top of the pyramid in your photograph, use a bead on one or more of the vertical edges, instead.



A Truncated Pyramid is useful for roofs, towers, or (very) rough stand-ins for people.

- **Table** - With a table, all four legs have the same dimensions and are placed symmetrically around the table center.



It's tricky to use pins when securing a pyramid at the top.



A Table.

While you are pinning the table, the legs may temporarily “detach” or float outside the tabletop. This is not a problem. Pins or beads can return the unruly legs to their proper place.

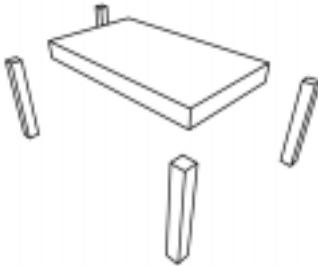


Table legs can temporarily “detach” or float outside the tabletop.

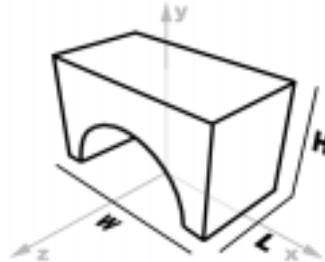
If that should happen:

- Recreate the table and pin it.
- Create an aligned concentric box.
- Unfix Y to allow the box to float upwards.
- Glue a top corner to the top of a table leg.
- Move the bottom of the box up with a bead.



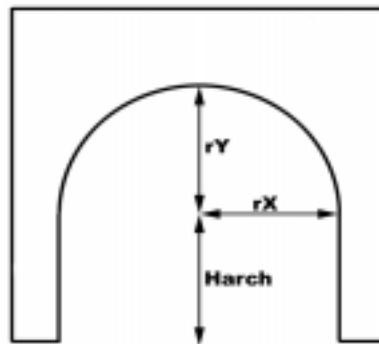
Tables can also be used to make chairs. To create the backrest, create a box, unfix all parameters, glue two of the corners.

- **Arch** - The arch can be tall and slim, short and squat, or thick and blocky.



An Arch can assume many sizes.

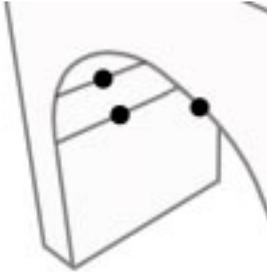
The center portion of an Arch is made up of two straight edges, joined by a semicircle.



The Arch portion of an Arch is made up of two straight edges, joined by a semicircle.

The shape of the Arch depends upon the curvature of that semicircle. Because you probably cannot see the exact top of the arched portion, place beads to help

Canoma determine where the straight sections end and the arched portion begins.

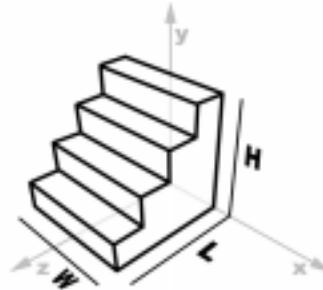


Beads help determine where the straight sections end and the arched portion begins.

It is tempting, but not advisable, to start modeling some photo elements, such as towers, using an Arch. Better to use a temporary helper Box, to establish where the whole structure is located. Then, place the arch and build other objects on top of it. Delete the helper Box after you've finished. If you start with an Arch as your first object, your model may feel "wobbly", because an Arch has more ways to change shape than a Box.

- **Stairs** - A very convenient object. You could create them with a bunch of aligned boxes, glued together, but that could get tedious. All steps are assumed to be the same height. Usually a few pins (around

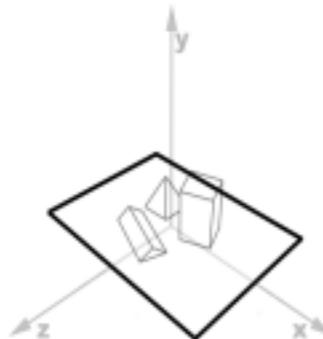
four) will position them correctly. You don't need to pin every step.



Stairs are convenient.

If you need other types of stairs, you can still use aligned boxes and even make them all the same height by using duplicated Guide Lines glued to each step's vertical edge.

- **Floor Rectangle** - Another convenience object. The Floor Rectangle simply creates a rectangle resized to be big enough to fit your whole existing scene. (Otherwise, it's just a normal rectangle.) Floor Rectangles can be really handy if you want a textured "ground plane."



Floor Rectangles conveniently create a resized rectangle, big enough to fit your whole scene.

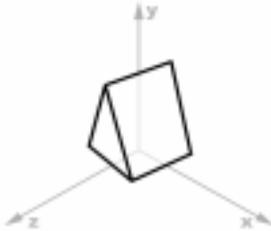
Note

The Curtain object also has transparency properties. From inside, the Curtain is visible. From outside, a Curtain disappears, allowing you to look through to the model!

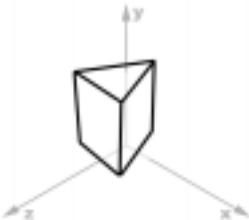
Objects with Editable Polyline Contours.

There are three objects with editable polyline contours:

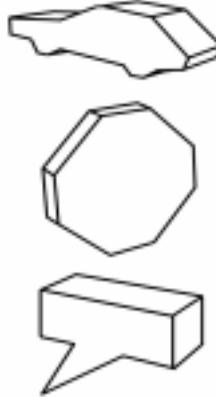
- **Translation Sweeps (horizontal and vertical varieties)** - Translation Sweeps are powerful objects that let you approximate complex geometry with a few clicks.



Horizontal Translation Sweep.



Vertical Translation Sweep.



Examples of Translation Sweeps, used to create interesting shapes, like logos, signs, or cars.

Tip

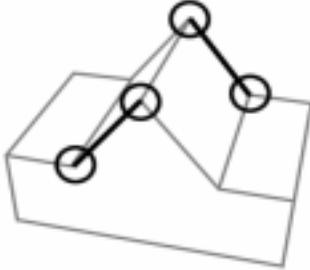
It's always a good idea to start simple. Don't use a Translation Sweep as the first object in a scene.

Translation Sweeps start life with a triangular contour. You can then add and delete points, to create a unique shape. A Translation Sweep must have a minimum of three contour points.

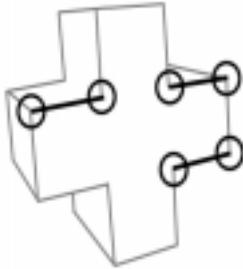
With Translation Sweeps, you can approximate curved contours, with several linear pieces. Remember that the pixels will do most of the work, so you don't need to be too precise. Approximated geometry works quite well.

You can make certain sides of a Translation Sweep the same length. Create a Guide Line, unfixing all parameters to allow it to rotate freely and move up or down. Glue it to one edge of the Translation Sweep. Duplicate the Guide Line, or aligned duplicate if the other edge is not only supposed to have the same length, but also

the same orientation as the first Guide Line. Glue corners of the cloned Guide Line to the second contour edge.



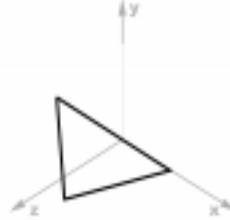
Use copied Guide Lines to make sides equal in length.



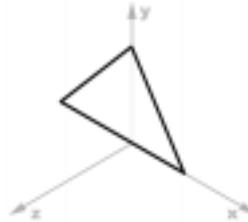
Use aligned duplicated Guide Lines if the sides are equal in length and have the same orientation.

For Horizontal Translation Sweeps (where the contour is vertical, but the extrusion axis is horizontal), the two lower contour points which sit on the floor level are fixed at $Y=0$. This allows them to stay on the floor, rather than float about. These fixed contour points can be changed to free parameters. If these fixed contour points are deleted through contour editing, remember that replacement points have free parameters and you will need to manually fix the object once again to the floor. You can't directly "refix" parameters, but you can use Guide Lines and glue to bring Translation Sweep corners to specific planes, lines, or locations.

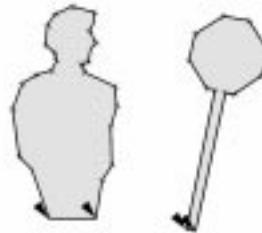
- **Polygon (horizontal and vertical varieties)**
- polygons are very similar to Translation Sweeps. They are also powerful objects that let you approximate complex geometry with a few clicks.



Polygons (horizontal).



Polygons (vertical).



Examples of Polygons.

Tip

It's always a good idea to start simple. Don't use a Polygon as the first object in a scene.

Polygons start life with a triangular contour. You can then add and delete points, to create a unique shape. A Polygon must have a minimum of three contour points.

With Polygons, you can approximate curved contours, with several linear pieces. Remember that the pixels will do most of the work, so you don't need to be too precise. Approximated geometry works quite well. As with Translation Sweeps, you can use can make certain sides of a Polygon the same length, with the help of some glue and Guide Lines.

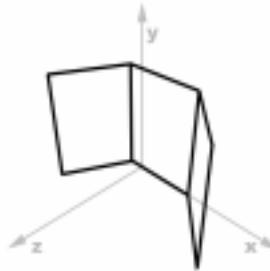
Tip

Use Polygons for “cut-out” trees and people. Of course, they'll be quite thin. Alternately, you can completely mask obstructions by using the Alpha channel in your source images. Refer to “Using the Alpha Channel” on page 106 for more about using the Alpha channel.

For vertical Polygons, the two lower contour points which sit on the floor level are fixed at $z=0$. This allows them to stay on the floor, rather than float about. These fixed contour points can be changed to free parameters. If these fixed contour points are deleted through contour editing, remember that replacement points have free parameters and you will need to manually fix the object once again to the floor. You can't directly “refix” parameters, but you can use Guide Lines and glue to bring Polygon corners to specific planes, lines, or locations.

- **Curtain** - A special object to allow better modeling for walls in rooms. The curtain is only visible from one side. You can actually

look right through it from the other direction.

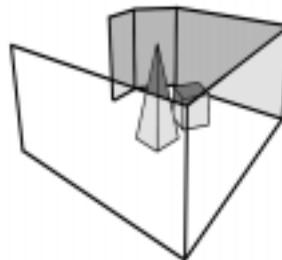


A Curtain.

Tip

It's always a good idea to start simple. Don't use a Curtain as the first object in a scene.

You can create a curtain which represents a wall in a room (or create several.) As seen from inside the room, the curtain is visible and textured. When you navigate outside the room in 3D Preview mode, the curtain walls disappear, allowing you to look right inside the room (like a television studio set.) Had you used rectangles for the walls, the view from the outside would still show the rectangle obscuring the room's interior.



From outside, curtains are invisible!

Note

The Floor Rectangle object also has some transparency properties. From above, it is solid. From below, it's transparent.

You can add and delete contour points with the curtain like you can in the Translation Sweep and the Polygon. A curtain must have a minimum of three contour points.

Calibrating a Scene

You can use the Calibrate option to automatically calibrate your entire picture to reflect the Guide Line length you enter.

Note

Consider calibrating a Canoma scene an advanced option. Be aware that when you force a numeric calibration, it affects your entire project.

Typically, you use calibration for the first length that you enter, in order to establish overall scale for the scene. This scale is used if a scene is to be exported to VRML. As more measurements for other line objects are added, leave the calibration box unchecked, since you want all measurements respected at the same time, i.e., have them treated like constraints, that involve solving for scene parameters.

To calibrate a scene:

- 1 Select or create a Guide Line object.
- 2 Click the Object Information button to display the Object Attributes for the Guide Line.
- 3 Enter a numeric value for Guide Line length or use the scaling slider to set that dimension.

- 4 Select Calibrate. A checkmark is displayed when Calibrate is selected.

Only one Calibration setting is allowed. You can Calibrate anytime. When you click Calibrate, any prior Calibration setting is replaced.

Adding an Object

Setting Selection Based Options

At the time that you create an object, orientation and alignment options are available. Selecting these options at creation provides Canoma with important information that can help you create more accurate models. Selection based options are available when an object is selected, since they define the parameters of the object to be created in relation to the selected object.

- **Stack** creates an object directly on top of the currently selected object. Refer to "Stacking Objects" on page 86 for more information about creating objects on top of other objects.
- **Align Rotation** creates an object with a rotation parameter the same as the selected object.
- **Concentric** creates an object with the same center as the currently selected object.

For example, say you want to model a tower. The base is modeled using a box, then you want to place a pyramid on top of the box to model a spire. The top of the pyramid should be exactly above the center of the box—or concentric to it. In general, concentric means "objects having the same center." Canoma stretches the definition of concentric a little. In Canoma, concentric means "has the same center in Z and X",

not in Y. The Concentric option is very handy for building linear structures and for placing roofs onto buildings.

To add an object:

- 1 Click the Creation tab to display the Canoma objects.



Object s.

- 2 Set object properties.



Set Selection Based Options.

- 3 Click the desired object. If you can't see the object you want, use the slider to view more objects.

A wireframe of the selected object is displayed on top of your photograph.

Selecting an Object

When an object is selected, its wireframe turns red. Refer to “Changing Canoma Colors” on page 56 for more about changing wireframe colors.

To select an object:

- As you move the cursor over an object in the Project Window (or close to the wireframe), its yellow wireframe is highlighted (thickened.) Click down to select it.
- Click the pop-up object menu below the Project Window. Keeping the mouse button depressed, scroll through the list and release the mouse button when the correct object is highlighted.

Deleting an Object

To delete an object:

- 1 Select the object that you want to delete.
- 2 Press the delete key, or Right/Opt-click the object you want to delete, then select Delete Selected.

Checking Object Information

You can inspect object information and make some changes to objects, using the Object Information dialog.

Object information includes:

- Name (editable)
- Object Type (not editable)
- Guide Line object Dimensions, Scaling, and Calibration options (editable)
- Selection Based Options (options selected at time of creation) - Concentric, Stack, Align (not editable)
- Alignment options:

- Rotate by 90 degrees (available)
- Unfix Y parameter (available once)
- Unfix all parameters (available once)
- Unfix orientations (available once)

To review or change object information:

- 1 Select an object.
- 2 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.

Stacking Objects

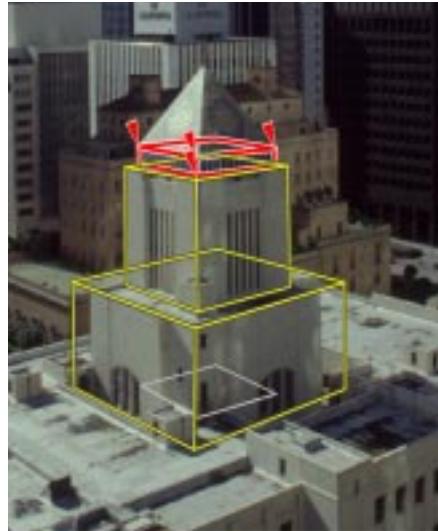
Usually, scenes are modeled from the ground up. Working from a ground plane, you place objects on the ground, then place objects on top of those, and so on. Refer to “Adding an Object” on page 84 for more about object selection options.

When you create an object on top of another object, its origin’s z-coordinate is not free, but is bound to the height of its base object.

To stack an object on top of another:

- 1 Make sure the object upon which you want to place another object is selected, i.e. make sure that it is red.

If the desired wireframe is yellow, click somewhere inside the correct wireframe object to select it.



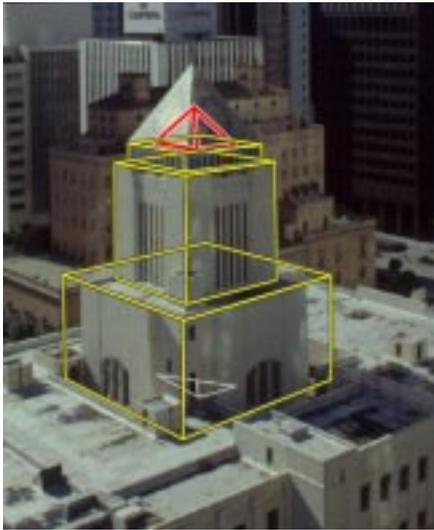
Select the object on top of which you plan to build.

- 2 Click the Creation tab.

3 Choose an object and select Stack.

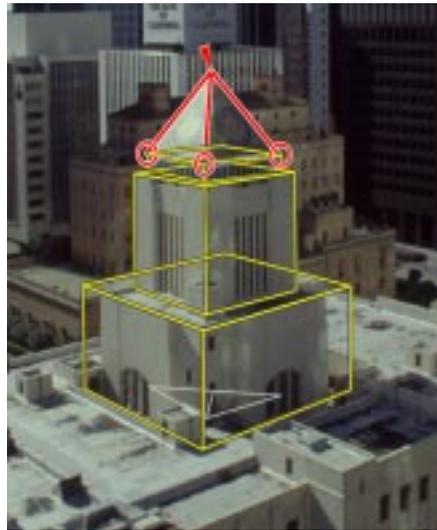


Select Stack.



Choose an object.

4 Pin the on top box to its underlying object.



After pinning

Duplicating Objects

Use duplicate whenever you are sure two objects have the same dimensions. It reduces the number of pins you need to place and at the same time makes the 3D project more precise.

Fewer pins are required for pinning a duplicated object, because some dimensions are known to Canoma from the first object.

To duplicate an object:

- 1 Select the existing object that you want to duplicate.
- 2 Choose **Edit menu > Duplicate**.

An object with the same dimensions as the original is created.



Use duplicate when objects have the same dimensions

If you are sure that both the original and the duplicate have the same orientation, use the Aligned Duplicate option. This will result in more precise models.

To create an aligned duplicate:

- 1 Select the existing object that you want to duplicate.
- 2 Select **Edit menu > Aligned Duplicate** or press Shift/Ctrl + D.

An object with the same dimensions as and aligned to the original is created.

To roughly align an object:

- 1 Canoma creates objects at default positions and orientations. If there is a big discrepancy between the initial perspective for a new object and the picture's perspective, use the Camera controls to roughly align the two before starting to place pins. Refer to "Using Canoma Camera Controls" on page 98 for more about using the Camera.

Pinning Objects

Once an object is created, it then can be pinned to an underlying photograph. Pinning a wireframe to a picture feels like pinning the corners of a springy wireframe to a tackboard, using push-pins. Refer to "Deleting All Constraints" on page 90 for how to delete all constraints (pins/beads/glue) for a selection.

To pin an object:

- Click and drag each corner of the object to the corners of the element you are modeling in the photograph.



Drag wireframe corners to the corners of each element being modeled.

A triangle appears when the cursor is over a corner of the wireframe. If you make a mistake, you can always Undo (Ctrl-Z.) Refer to "Undoing Operations" on page 59. Refer to "Deleting All Constraints" on page 90 for how to delete all constraints (pins/beads/glue.)

To delete a pin:

- Right/Opt-click the pin you want to delete, then select Delete Pin.

Viewing Projects in Progress

To look at a 3D project:

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



Drag the trackball to rotate the project.

Refer to “Using Canoma Camera Controls” on page 98 for more information about using the camera controls to view your 3D project.

Using Beads

Defining Edges

Close-up views often have the problem that you cannot see a whole object you previously modeled. You can use a second (of three) techniques to position objects. Pins are for corners, but beads are for edges (and glue is

used to align objects.) Refer to “Deleting All Constraints” on page 90 for how to delete all constraints (pins/beads/glue) for a selection.

To add a bead to an object:

- 1 Move the cursor over any edge (rather than corner) of an object. A little disk appears.
- 2 Click to create a bead.



Use beads to position an object's edges.

- 3 Drag a bead to position an object edge.

Tip

If a bead does not stay exactly on an edge, your model is probably stressed. You may have pinned a corner of an object incorrectly. See “Avoiding Model Stress” on page 92 for more about controlling stress in your models.

To delete a bead:

- Right/Opt-click the pin you want to delete, then select Delete Bead.

Using Glue

Gluing Objects Together

Use glue to align objects precisely. When you create an object aligned with another object, Canoma only has to find a single, common rotation angle, instead of figuring out two vertical axis rotations.

With Canoma, you can use these gluing techniques:

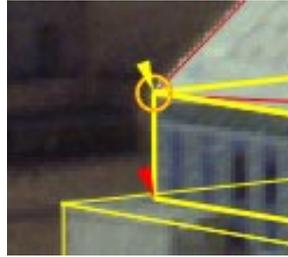
- Glue point to point
- Glue point to edge
- Glue edge to corner or to Guide Line.

Refer to “Using Glue to Align Objects” on page 121 for more about gluing techniques. Refer to “Deleting All Constraints” on page 90 for how to delete all constraints (pins/beads/glue) for a selection.

To add glue:

- 1 Hold down the Cmd/Ctrl key and click on the corner of the object that you want to align with another object
- 2 While continuing to hold down the Cmd/Ctrl key, drag that corner over the appropriate corner of the object with which you are trying to align the first.

A little yellow pin is visual feedback that you are gluing two object together.



Yellow pins tell you that one object is being glued to another.

- 3 Let go of both the Cmd/Ctrl key and the mouse button.

To delete glue:

- Right/Opt-click the glue you want to delete, then select Delete Glue.

Deleting All Constraints

To delete all constraints (pins/beads/glue) of a selected object:

- Right/Option-click the pin you want to delete, then select Delete Constraints of Selection.

To delete all constraints (pins/beads/glue) of a selected object in the current image:

- Right/Option-click the pin you want to delete, then select Delete Constraints of Selection in this Image.

Using Solo Mode

As you add more objects, some with objects on top of them, the display can get cluttered. Using Solo Mode reduces confusion. When you use Solo Mode, you can see clearly the wireframe for the current object, but all other wireframes are displayed very faintly. This can really help when there are many objects in your scene.

To use Solo Mode:

- Click the Solo Mode button to switch off all objects except the currently selected, or select **View menu > Show only Selection**. Unless you've changed colors, the selected wireframe is red.



The Solo Mode button

To switch back from Solo Mode to normal editing:

- Click the Solo Mode button again, or reselect **View menu > Show only Selection**.

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

Solo Mode lets you see where objects are located and also lets you quickly select one for further work, without having to switch in and out of Solo Mode.



Use Solo Mode to reduce confusion.

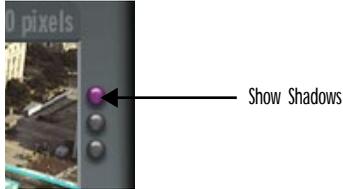
Using Shadows

Canoma can cast shadows from objects. Shadows can land on other objects or on the ground plane.

Shadows help you see when an object is on top of something else (the shadow shows up) or if it's sitting at the same level (no shadow.) The distance of a shadow to an object can help you judge how high the object is above another object or above the ground plane. Shadows can act as subtle cues about the 3rd dimension. Shadows are turned Off by default

To turn shadows On:

- Click the Show Shadows button, or select **View menu > Show Shadows**.



Click the Show Shadows button.

To turn shadows Off:

- Click the Show Shadows button or select **View menu > Show Shadows**.

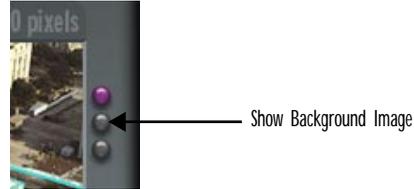
Displaying the Background Image

In 3D Preview Mode, you can opt to display the photograph as a background image. This can make it easier to see textured models in relationship to surrounding pixels. Displaying the background image is also useful when you want to quickly edit textures. Refer to “Working with Texture” on page 93 for more about editing textures. The background image is turned Off by default

To turn background image On:

- 1 Generate textures, then switch to 3D Preview mode.

- 2 Click the Show Background Image button or select **View menu > Show Background Image** to displays your photograph, along with your textured models.



Click the Show Background Image button.

To turn background image Off:

- Click the Show Background Image button or select **View menu > Show Background Image**.

Avoiding Model Stress

It is important not to "mislead" Canoma. For example, when you tell Canoma that an object has the same orientation as another, but it really does not, Canoma can yield inaccurate results. When that happens, the model is "stressed" or unnatural. Refer to “Monitoring Stress in the Model” on page 120 and “Listening to the Canoma “Heartbeat”” on page 115 for more about controlling stress in Canoma models.

The Stress Display can help pinpoint exactly which pins or beads feel the most "wrong" to Canoma (might have been placed wrong by accident or as the result of an incorrect guess.) When too much stress is present, it's best to delete any potentially inaccurate pins or beads. The Stress Display is turned Off by default.

To turn stress display On:

- 1 Click the Show Stress Display button, or select **View menu > Show Stress Display**.



Show Stress Display

Click the Stress Display button.

The Project Window changes to display two sets of objects. One set is the wireframes you pinned. The other set—the gray wireframes—represent 3D objects that Canoma constructed according to your pin and bead “instructions.” If your wireframes look skewed in comparison, simply repair the offending corners or adjust any wayward beads.

To turn stress display Off:

- Click the Show Stress Display button or select **View menu > Show Stress Display**.

Working with Texture

Adding texture is the process of having Canoma map the pixels of an underlying image to the faces of 3D objects.

Canoma offers two types of texturing:

- Quick Texture - fast, but can leave gaps where photographic information is missing.
- Quality Texture - compensates for brightness differences between photographs that can show up as seams. Fills in white gaps for which there is no

available information, by filling the holes with surrounding pixels. Quality texturing takes longer, but it looks better.



Quick (the rabbit) and Quality (the turtle) Texture buttons

Adding Textures

To add Quick Texture to a model:

- 1 Select **Texture menu > Quick Resolution** to set the desired resolution.
- 2 Click the Quick Texture button.

To add Quality Texture to a model:

- 1 Select **Texture menu > Quality Resolution** to set the desired resolution.

A resolution setting of 1:1 uses all the pixels in your source image. It gives you the highest definition, but it will take longer to complete the application of texture.

- 2 Click the Quality Texture button.
- 3 Use the arrow to popup a menu of resolution choices.

Stealing Textures

Sometimes you only have one photograph. When that's the case, there is no pixel information for the back of objects in the model you create. There's a quick way to steal textures from a textured side and apply it to the side that has no texture information. There are times when this can help complete the illusion of a fully textured model.

To apply stolen textures to untextured object panes:

- Select **Texture menu > Mirror Textures**.
The next time you use Quick or Quality Texture, Canoma automatically calculates opposing side information and steals textures for objects that would otherwise have no texture information.

Canoma has a good idea of where it can steal textures from for most objects. Setting **Texture menu > Mirror Textures to On** causes Canoma to steal all possible textures for all untextured areas in your scene. Sometimes, however, Canoma can't find a good place from which to steal a texture, even though it might be obvious to you where you'd like the stealing to take place. For example, in Translation Sweep objects, corresponding faces are not predefined by Canoma.

When "where to steal" is not defined, you can use texture editing to steal it yourself! Refer to "Retouching or Editing Textures in 2D" on page 103 for more about editing textures with a 2D pixel editing program, like Painter or Photoshop.

To manually steal textures for untextured object panes:

- 1 Use the Texture Brush to click the pane of the object that displays the texture that you want to "steal."
- 2 Once your 2D pixel editing program is open, quickly copy the texture and return to Canoma without saving.
- 3 Use the Texture Brush to click the pane of the object where you want the "stolen" texture to be applied.

- 4 Once your 2D pixel editing program is open, paste the copied texture, rescale the source pixels if necessary, save your edits, and return to Canoma. You might also need to flip the source pixels horizontally or vertically, before saving.

Adding More Detail

One photograph can't show all object sides. To include texture information for areas that are not textured in the initial photograph, you can add more photos to your project. For example, if you need better textures for the front of a specific building or need to fill in texture for the back of a product box, you can add more detailed information with additional photos.

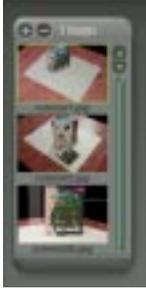
Imagine doing some architectural photographs:

- first create a project using an aerial photograph,
- next add detail from close-up shots taken at ground level.

Close-up views often have the problem that you cannot see a whole object you previously modeled. As you position the wireframe, remember: pins are for corners that you can see, beads are for edges or for when you cannot easily see the whole object, and glue is for aligning objects.

Using the 2D Image Palette

A thumbnail of the currently selected photograph is displayed on the 2D Image Palette. The 2D Image Palette opens downward to reveal a tray where you can access all the photographs in your project.



The 2D Image Palette shows the currently active photograph. Click the drawer handle to open a tray of all the images in your project.

To add an image:

- Choose **File > Add Image** or click the 2D Image Views add button.

Tip

Always roughly align new photographs with your model, before starting to pin.

To select an image:

- 1 Click and drag the 2D Image Palette drawer handle downward to see more photographs.

The scrollbar at the side of the palette lets you scroll through all of your images.



Drag the scrollbar to scroll through images.

- 2 Click a thumbnail in the palette to select it as the active photograph or use the selection arrows in the top right corner to move through the list of photos. A yellow border around an image thumbnail indicates that the image is currently selected.

To delete an image:

- 1 Click the 2D Image Palette drawer handle to see a tray of all the photographs in your project.
- 2 Click a thumbnail in the palette to select it as the active photograph.
- 3 Click the - button or press the delete key to remove the image from the Image Views palette.

To set the maximum texture resolution:

- 1 Select **Texture menu > Resolution Max.**
- 2 Choose a resolution size from the popup menu.

Tip Setting the Maximum Texture Resolution can be handy, since very high resolution texture images can consume large amounts of memory.



7

Viewing Models

Positioning the View of Your Model

When you position a view, you're affecting the position and orientation of a camera, not the scene. The scale and position of objects remains constant; only your view of the model changes.

Using the camera controls while in Edit mode switches the application to View mode. What you see in View mode is either flat shaded or textured (if you have applied textures.) While in View mode, you can also use the Pan tool inside the Project Window to move the image.

Canoma has three sets of controls for positioning your view of the model:

- a **Trackball**, which is useful for small objects directly in front of the photographer
- the **Camera Cross controls**

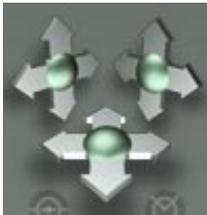
- **in-view navigation controls**, which are useful for moving around in large environments like interiors or city scenes.

The Trackball lets you adjust the position of the camera, as well as its orientation. Use the Trackball to rotate your model.



Use the Trackball to rotate your model.

The Camera Cross controls let you change the position of the camera along X, Y, and Z axes.

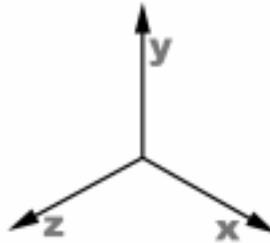


The Camera Cross controls change the position of the camera along X, Y, and Z axes.

Using Canoma Camera Controls

Using the Trackball

The Trackball lets you rotate the camera around its origin point. The Trackball doesn't rotate the model, it just changes the camera's location (Offset) and orientation (Rotation) relative to your model. In Canoma, coordinates are figured in the following way:



The Canoma X, Y, and Z axes.

To move the camera using the Camera Trackball:

- Drag the mouse over the Camera Trackball control. The view of your model moves in the direction you drag.

Using the Cross Controls

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.

There are three Camera Cross controls:

X-Y Cross

The X-Y Cross provides control for horizontal and vertical motion. The sphere at the center of the cross lets you move the camera in both the X and Y axis.

This control affects your camera's position (Offset) only, not its orientation (Rotation.)



Use these controls to move the camera along the Y axis.

X-Z Cross

The X-Z Cross provides control for horizontal and depth motion. The sphere at the center of the cross lets you move the camera in both the X and Z axis.

This control affects your camera's position (Offset) only, not its orientation (Rotation.)



Use these controls to move the camera along the X axes.

Y-Z Cross

The Y-Z Cross provides control for vertical and depth motion. The sphere at the center of the cross lets you move the camera in both the Y and X axis.

This control affects your camera's position (Offset) only, not its orientation (Rotation.)



Use these controls to move the camera along the Z axis.

To move the camera in two axes at once:

- Drag the sphere at the center of one of the Camera Cross controls. The cursor becomes a four-way arrow.

The motion of your mouse determines the direction of the camera movement:

X-Y Cross: moving up, down, left, and to the right, moves the camera up, down, left, and to the right.

X-Z Cross: moving up, down, left, and right moves the camera forward, backward, left, and to the right.

Y-Z Cross: moving up, down, left, and right moves the camera up, down, forward, and back.

Using the In-View Navigation Controls

The In-View Navigation Controls are right inside the Project Window and are available in 3D Preview Mode. These controls are useful for moving around in large environments like interiors or city scenes.

Using the In-View Navigation Controls feels like driving a car into your model, with forward and reverse gears. If you press the Ctrl key while you click-drag inside the project window, you can slide up, down, left and right. Either

way, the speed at which you move depends upon how far you move the mouse from the point where you originally clicked down.

To use the In-View Navigation Controls:

- Click inside the project window and drag up to move straight forward in your scene.
- Click inside the project window and drag down to move straight backward in your scene.
- Click inside the project window and drag left to turn left in your scene.
- Click inside the project window and drag right to turn right in your scene.
- Ctrl-click inside the project window and drag up to move straight up in your scene.
- Ctrl-click inside the project window and drag down to move straight down in your scene.
- Ctrl-click inside the project window and drag left to slide left in your scene.
- Ctrl-click inside the project window and drag right to slide right in your scene.

Tip

To get a predictable feel for the In-View Navigation Controls, make the Project Window small, so that the program draws faster and the motion is smoother.

Banking Control

The Banking control sphere rolls your Camera, creating the effect of a tilted horizon.



The Banking Control.

To bank the camera:

- Click the Bank control and drag right or left.

Field of View

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.

To increase/decrease the camera's field of view:

- Click the Field of View control and drag up or down.

Zooming and Panning

The more accurately you pin objects, the more accurately Canoma can figure things like: camera location, focal length (zoom), object positions, object orientations, and object dimensions.

Zooming

It is usually helpful to zoom in on what you're pinning, to improve accuracy. In Canoma, there is a difference between moving the camera and using the Zoom tools.

When you move the Camera, you're moving in 3D space. When you use the Pan and Zoom tools, you're transforming a 2D projection of your 3D model. When you use the Zoom tool, you are essentially making the 2D projection larger or smaller, your camera position in 3D space does not change.

To Zoom in:

- 1 Click the Zoom tool in the Toolbar.



The Zoom tool.

- 2 Click inside the Project Window.

Canoma scales the 2D projection of your model larger, creating the illusion of zooming in. The place in the Project Window where you clicked becomes the center around which the image is enlarged. (Remember, your 3D camera position remains unchanged.)

You can also right-click (Win)/option-click (Mac), then drag a rectangle to zoom into a specific area.

To zoom out:

- 1 Click the Zoom tool in the Toolbar.
- 2 Press and hold the Opt/Alt key.

Tips You can always inspect progress in 3D preview mode.

- 3 Click inside the Project Window.

Canoma scales the 2D projection of your model smaller, creating the illusion of zooming out.

To zoom into a specific area:

- 1 Click the Zoom tool in the Toolbar.
- 2 Press and hold the mouse button, as you drag a marquee around an area of your scene.

Canoma centers on the marquee and scales the 2D projection of your model so that the area in the marquee fits your Project Window.

To reset to non-zoomed:

- Double-click inside the Project Window to reset to a non-zoomed view.

Panning

Panning works like zooming. When you use the Panning tool, you are moving a 2D projection of your model right and left, up and down in front of the camera. Your camera position in 3D space does not change.

To pan around your model:

- 1 Click the Pan tool in the Toolbar.



The Pan tool.

- 2 Press and hold the mouse button, as you drag the Pan cursor inside the Project Window, in the direction you want your model to move.

Resetting the Viewpoint

At anytime, you can reset your viewpoint to match that of an underlying photograph.

To reset the camera:

- 1 Open the 2D Image Views palette to display the 2D Images in your project.
- 2 Click on a desired thumbnail in the 2D Image Views palette to reset the camera to the viewpoint of that photo (available in both Wireframe and 3D Preview modes).



Photographs in your Canoma project are displayed in the 2D Images Views palette. Click on the bottom of the palette to open it, then click on the desired photograph to reset the camera to the viewpoint of that photo.

Tip

Resetting the camera can be handy, especially after you zoom in or when you want to edit a wireframe for a different photo.



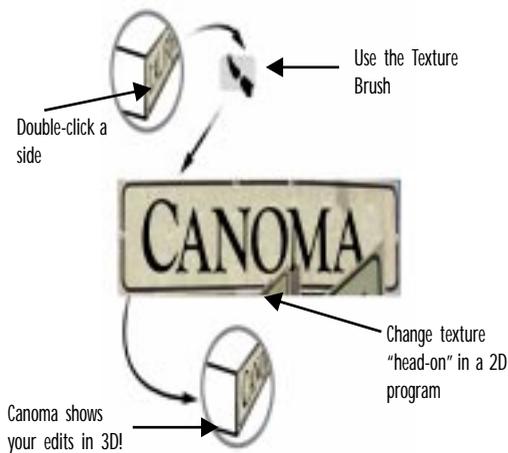
8

Editing Textures

Retouching or Editing Textures in 2D

With Canoma, you can edit the texture on a 3D object, using a 2D pixel editing tool, like Painter or Photoshop. After you edit the image in 2D “head on” view, Canoma automatically displays the results of your edits, in proper perspective. You can then output a 3D model or render a 2D image that reflects your changes.

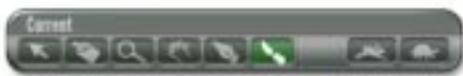
Each time you edit an area, Canoma saves file of the resulting image in a subfolder, inside the main project folder. If you create a composite (layered) file during editing, be sure to save a version of that file in another location, in case you need to do any re-editing.



The results of your edit is shown in 3D perspective.

To edit textures:

- 1 Click the View button to switch to 3D Preview mode.
- 2 Click the Texture Brush in the Toolbar.



Texture Brush

- 3 Click the face of the object, where you want to make changes. Canoma opens the 2D editing program, with the area you selected ready for editing. You can now edit in “head on” view.

Note If you have not chosen a 2D pixel editing program, such as Painter or Photoshop, Canoma asks you to choose one.

- 4 Complete any edits you want to make to the image—add text like “This apartment for rent.”, retouch something, or change colors.
- 5 Save your edit. Chose the file type (JPG, TIFF, BMP, or PIC) that is saved when you edit textures. Refer to “Choosing a 2D Image Editing Application and Image Format” on page 55 for more about selecting a default file format.

Tip

If you create a layered file while editing, you might want to save a copy of the layered file to a backup directory (using Save As.) Flatten the image. Save the flattened version under the same filename as Canoma created when your 2D editing program was opened.

Note

Always maintain the same aspect ratio when editing textures on an photograph that has been modeled. You can change image resolution, but not the aspect ratio. Being able to change the resolution of particular portions of a Canoma model can be very useful. For example, you might want to increase the resolution to add readable text.

- 6 Click back inside Canoma’s program window. The edited textures are displayed in proper 3D perspective.

Editing for 2D Renders

Canoma’s Show Background Image is a simple way to edit perspective images. Imagine that you have to create a billboard or an advertisement on a vehicle, such as a bus or a

house. The source you have available is a photograph of the object on which the ad is supposed to be placed. Usually, this is a perspective photograph (i.e. not head on). It might contain some context, like a surrounding freeway or other buildings.

To edit texture for a 2D render:

- 1 Load a photo into Canoma and quickly pin a box to where you want to edit texture.



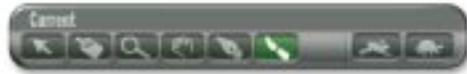
Original image, loaded into Canoma.

- 2 Click the Quality Texture button, selecting a high resolution setting.
- 3 Click View to see the textured box.
- 4 Click the Show Background Image button to displays your photograph in the background, along with your textured 3D model.



Click the Show Background Image button.

- 5 Click the Texture Brush in the Toolbar.



Texture Brush

- 6 Click the face of the object, where you want to make changes. Canoma opens the 2D editing program, with the area you selected ready for editing. You can now edit in “head on” view.

Note If you have not chosen a 2D pixel editing program, such as Painter or Photoshop, Canoma asks you to choose one.

- 7 Complete any edits you want to make to the image—add text like “This apartment for rent.”, retouch something, or change colors.
- 8 Save your edit. Chose the file type (JPG, TIFF, BMP, or PIC) that is saved when you edit textures. Refer to “Choosing a 2D Image Editing Application and Image Format” on page 55 for more about selecting a default file format.

Tip If you create a layered file while editing, you might want to save a copy of the layered file to a backup directory (using Save As.) Flatten the image. Save the flattened version under the same filename as Canoma created when your 2D editing program was opened.

Note

Always maintain the same aspect ratio when editing textures on an photograph that has been modeled. You can change image resolution, but not the aspect ratio. Being able to change the resolution of particular portions of a Canoma model can be very useful. For example, you might want to increase the resolution to add readable text.

- 9 Click back inside Canoma's program window. The edited textures are displayed in proper 3D perspective.
- 10 Render the image.



After editing textures in Canoma.

Using the Alpha Channel

Every image contains a number of channels that store data about the makeup of the picture. For instance, channels can contain masks, colors, or bump information.

The alpha channel of an image is like a grayscale map that accompanies an image. It is primarily used as a "mask." Areas in the alpha channel that are white are ignored by the program as it computes the picture and areas that are black are recognized and computed (appearing opaque).

The most common use for alpha channels in Canoma is to mask out small obstructions like light poles, people, cars, or trees. When alpha channel information is used, Canoma does not use pixels from masked out regions in the source photograph. Instead, it tries to find another photograph that shows the same area of the object and gets the pixels from there. If no other photograph is available you can use Quality texture to fill in missing pixels with a "washed out" version of surrounding pixels. With Quick texture, you see the masked area as white when no other photograph is available to fill in the pixels.

To use alpha channel information:

- Select **Texture menu > Enable Alpha Channels.**



A 2D image without alpha channel information.



Alpha channel information is added. Black pixels are masked out



What displays when modeling is done with Quality texturing.



9

Creating Animations

How Animation Works in Canoma

To create an animation, first complete a 3D model, then view it—recording keyframes to illustrate the motion of the camera. Canoma creates a motion path from your recorded keyframes and generates an animation.

The steps to creating an animation are as follows:

- Create the model.
- Decide how the camera should move in order to view the model.
- While viewing the model, create key frames, which indicate how the camera position or orientation has changed.
- Review the animation, using the Animation Preview Controls.
- Render the animation as a QuickTime movie or as a set of frames.

Creating an Animation

Canoma's animation tools are designed to help you quickly and easily animate the process of viewing your 3D model. When you animate the camera, you're changing the view of your model over the course of the animation. Since you're in 3D space, you can move the camera to any position in the model. You can have your camera move around the model, zoom into it, or even fly over it. It is not designed to be a complete 3D animation environment. For more precise control over animation parameters, you can use MetaCreations's other 3D programs.

You can create Canoma animations of any length; however, it's easier to create relatively short animations. If necessary, you can use a movie-editing program to splice animation clips together.

Using the Animation Controls

The Animation Controls, located on the Animation Tab at the bottom of the screen are the tools you'll use to create animations. They contain controls for adding or deleting keyframes, and for previewing animations.



Click the Animation tab to display the Animation Controls.

Creating Keyframes

To add a keyframe:

- 1 Click the Animation tab to display the Canoma Animation Controls.
- 2 Click the Add Keyframe button (or click inside an empty slot in the Keyframe Strip) to add the current view of your model as a keyframe in your animation.



Click the Add Keyframe button to add the current camera view of your model as a keyframe in your animation.

Tip

Use the scroll bar to scroll through the frames of your animation.

To delete a keyframe:

- 1 Click a keyframe to select it.
- 2 Click the Delete Keyframe button or press the delete key to delete a keyframe from the animation.



Click the Delete Keyframe button to delete the selected keyframe in your animation.

Tip

You can hold down the Option key and click on the Delete Keyframe button to delete all keyframes in the animation.

Setting Animation Options

You can set how long your animation plays, or the duration.

To set how long the animation plays:

- Double-click the Duration display, then enter a time, in seconds.

You can set your animation to play continuously, looping back to the beginning when it reaches the last frame.

To set an animation to loop:

- Select the Loop option. A checkmark means that Loop has been selected.

Previewing an Animation

The Animation Preview Controls let you preview the frames in your animation.



The Animation Preview Controls.

To play an animation:

- Click the Play/Pause button to start playing your animation.



The Play/Pause button.

To pause/resume an animation:

- 1 Click the Play/Pause button to pause your animation.
- 2 Click the Play/Pause button again to resume playing.

To stop an animation:

- Click the Stop button.



The Stop button.

Note

If you want to continue from the point where you stop an animation, use the Play/Pause button to pause it, instead of the Stop button, because the Stop button resets an animation to the first frame.

To advance to the next keyframe in your animation:

- Press the Next button.



The Next button advances to the next keyframe in the animation.

To advance to the final keyframe in your animation:

- Hold down the Alt/Option key and press the Next button.

To return to the previous keyframe in your animation:

- Press the Prev button.



The Prev button returns to the previous keyframe in the animation.

To return to first keyframe in your animation:

- Hold down the Alt/Option key and press the Prev button.

Rendering an Animation

When you've developed an animation of camera movements around your Canoma scene, the next step is to render it as a QuickTime movie or as a set of sequential image files.

When an animation is rendered, Canoma automatically creates a folder into which it saves any associated animation files. To render an animation, Quicktime 3.0 must be installed. Quicktime 3.0 is available on the Canoma CD, or can be downloaded at www.apple.com.

Remember, you can always load Canoma animation files into a motion-graphics application, where you can add effects and perform other post-production tasks. Refer to "Rendering Animations" on page 63 for instructions on how to render your animation.



10

Advanced Modeling

Modeling Objects

Canoma is great for generating models of man-made objects, almost on any scale—from objects on top of a tabletop, to furnished interiors and buildings, to entire cities.

Canoma is not aimed at modeling highly irregular or complex objects, such as mountains, trees or human beings. MetaCreations has other great software for doing all of those, such as Bryce 3D for landscapes and Poser 3 for human models.

Canoma works by combining well known techniques of perspective projection, first discovered during the renaissance in Italy, with the latest in mathematical techniques and interactive user interface design.

Requiring relatively little user input, Canoma tries to find parameters such as:

- camera location
- focal length (zoom)
- object positions

- object orientations
- object dimensions.

Initially, most parameters are free to take on any value. The process of mapping 3D objects by adding pins, beads or glue constrains parameters into taking on correct values.

As you begin modeling—and while you have only very few pins or beads placed on the wireframe objects—there may be a lot of parameter combinations that could satisfy your constraints. When that is the case, objects may seem to rotate freely or change depth arbitrarily. But, as you add more constraints, you will literally “pin down” the parameter needs for your model.

Adding Source Images

For most projects many photographs are available. In general, that is preferable, because multiple images provide views from different angles, making determination of perspective and object dimensions more accurate. Sometimes, only one source image is available. For the single image case, it is often important to provide additional information to Canoma.

For example, when you create an object, you have a choice of creating it on the ground plane or on top of another object. You can also tell Canoma that a new object has the same orientation as the currently selected one. By default, objects rotate independently. By telling Canoma that two objects have the same orientation, Canoma has to figure out one less parameter (rotation.)

Perspective projection can be ambiguous. For example, does an object appear to be large because it is very close to the camera (but small in size) or does it appear to be small because it is far away from the camera (but huge in size.) Both might look the same on a photograph. Because of this, additional information must be

provided in the form of “on creation” constraints or subsequent pin, bead or glue constraints.

If you only have a single image project, the “on creation” constraints become essential, and it is advisable to learn and use them. If multiple images are available, these initial constraints become less critical, although they can still be very useful for improve model accuracy. While the mathematics of these constraints can be complicated, their appearance and meaning is easily understood. It is not necessary to have a deep understanding of the mathematics to effectively make models with Canoma.

Free vs. Constrained Parameters

Usually scenes are modeled from the ground up. Working from a ground plane, you place objects on the ground, then place objects on top of those, and so on. By default, you cannot have an object just “floating in space.” These restrictions make modeling a lot easier.

Each object in the Canoma world has a location in three-dimensional space (called the origin, with an x, y, and z coordinate). Each object has three rotation parameters to define its orientation in space. Finally, each object has a number of additional parameters based on its type. For example, a box may have width (the X axis), height (the Y axis), and length (the Z axis), whereas a rectangle has only length and width.

The task Canoma has is to figure out reasonable values for all these parameters. To reduce the workload, by default we reduce the number of parameters that have to be determined. So, objects are created on the ground plane (fixing their origin Y-coordinate to 0) and can only rotate around a vertical axis, fixing the other two rotation angles at 0. degrees.

When you create an object on top of another object, again its origin's Y (height) coordinate is not free, but bound to however high its base object is. If you create an object aligned with another one, instead of having to figure out 2 vertical axis independent rotations, Canoma only has to find a single, common rotation angle. The more information you can provide about an object when it is created, the better.

In general, the default constraints are useful, sometimes you may have to change them: for example if you know an object is not sitting on the ground plane or if it has an arbitrary orientation. In those cases you can “unlock” some or all of the fixed parameters.

For example, to allow an object to float up or down arbitrarily, unlock its origins Y-coordinate. To allow it any orientation in space, unlock all rotations. You should really only do this when you have multiple images of the object from different angles, since Canoma now needs more information, since it has more parameters to figure out.

In general, the more (correct) information you provide to Canoma the better. Use the “on creation” constraints (on Floor/on Top, aligned, concentric etc.) whenever you can and only place pins or beads where you can actually see object corners or edges.

Misleading Canoma and Stressing a Model

It is also important not to “mislead” Canoma. For example, if you tell it a block has the same orientation as another one, but they really do not, then Canoma will yield inaccurate results and the model will feel “stressed” or unnatural. The same is true for pins or beads that you place—if you do not see a corner of an object,

don't place a pin where you think it might be, since chances are you will not be putting it into the right place.

Canoma does not know that you're estimating a corner and instead tries to accommodate your input as “the truth”. Misleading pins can cause inaccurate models and unexpected discrepancies between the displayed wireframe and the 3D preview. There is a Stress Display, in case you notice such discrepancies. This display helps pinpoint which pins or beads feel the most “wrong” to Canoma and might have been placed by accident or as the result of an incorrect guess. Refer to “Avoiding Model Stress” on page 92 for more information about using Canoma's Stress Display. In these cases, you are better off deleting the offending pins or beads.

In some cases, you can throw Canoma off spectacularly. For example if you glue the top of an object to the base of another one that is actually standing on the floor. The wireframe will move in big jumps in a proverbial “boing” like motion. If this happens, chances are high that you've provided some wrong input. It's best to Undo (always available) and try again—perhaps you just accidentally glued a wireframe to the wrong corner or edge. In Canoma, you can Undo up to 10 times in a row. You can also redo what you've undone.

Listening to the Canoma “Heartbeat”

Canoma is almost always “active”. Unlike a draw or a paint program, which only reacts when you have the mouse button down, Canoma tries to calculate decent parameter values, even after you let go of a pin or bead.

If your model is consistent and not under a lot of stress, this “heartbeat” is almost unnoticeable. Nothing much changes on the screen after you stop moving a constraint.

On the other hand, if you provide inconsistent input, Canoma tries to find reasonable parameter values regardless of the incorrect pins or beads. When this happens, it can take a few seconds. During those seconds, you might see wireframes change—not just the object you manipulated, but potentially all the objects in your scene. Canoma tries to minimize the stress (or errors) across all objects simultaneously. A heartbeat display shows Canoma’s level of activity.

Using Geometric Tricks

If you are an architect or designer, you are probably familiar with geometry in your daily work. You can apply this knowledge to modeling in Canoma.

For example, if you want to make a number of objects line up, just create a Guide Line object and glue those objects to the Guide Line.

- If you only glue a corner of an object, that corner is on the Guide Line, but the orientation of the object is still arbitrary.
- If you create an object aligned to a Guide Line or glue two corners of an object to a Guide Line, you’ve fixed the orientation of the object to be parallel with the Guide Line.

You can also create a Guide Line or a Guide Line on top of another object and then glue one of its endpoints to a corner of another object that is floating in space. The other object’s corner is then forced to lie at the same height as the Guide Line (which by default is horizontal by the way.) This can be handy to constrain contour points on a translation sweep

for example. Refer to “Objects with Editable Polyline Contours.” on page 81 for more about translation sweeps.

If you want to make a box with equal length and width, just create a Guide Line, glue it to the corners along one side, duplicate the Guide Line object and glue the copy along the other side of the box. Since the Guide Line objects have the same lengths, they force the box to have equal length and width.

You can create temporary helper objects just for the purpose of “attaching” other objects and later on delete the helper objects. Be careful though. As you delete the helper object, all of its constraints (such as glue) are deleted and this can cause (depending on how you constructed them) other objects to move. Guide Line helper objects are particularly useful because they do not show up in the 3D Preview or 3D file format exports, so you do not need to delete them.

Another example of when a temporary object is useful is for establishing perspective. If you can see tiles on a floor, they might serve as a good starting point to establish perspective. Begin by modeling those. Later, after you add more objects, and maybe a ground plane or floor rectangle, you can delete the original helper tiles (since they are very close - coplanar - with the floor, leaving them in might cause rendering artifacts in the 3D preview or in exported file formats.

If you are modeling a small object on a tabletop that does not really have very explicit shapes (lots of bevels for example), just place a cardboard box (like the one this software came in) alongside your “difficult” object. Model the cardboard box first to establish perspective and then continue with your actual objects. Later, you can delete the box (or “scaffold”) object.

Establishing Perspective

Starting Simple

Start modeling with simple objects first, like boxes. These have few internal parameters and help establish a perspective—the camera position, orientation, and focal length—for your scene.

Starting with a box is always a good idea. Don't start with a translation sweep, a polygon, or a curtain. Refer to “Objects with Editable Polyline Contours.” on page 81 for more about those objects. These have too many “free” parameters and do not help establish a good camera perspective.



Use simple objects to establish camera perspective.

Modeling the First Image

It's tempting to load in all your images, do a box in one image, switch to another image, try to pin the box there, then go back to the first image to create another object. This is not the best way to get good results.

Choose a good first picture, one that shows a lot of your scene. Model a few objects in that picture, maybe 3 to 10, before even thinking about loading additional images. Once you've done some modeling, then add another image. Using this method, it is easier for Canoma to orient models correctly, because it is less likely to confuse rough alignment orientation, than when only one Box or Rectangle is present.

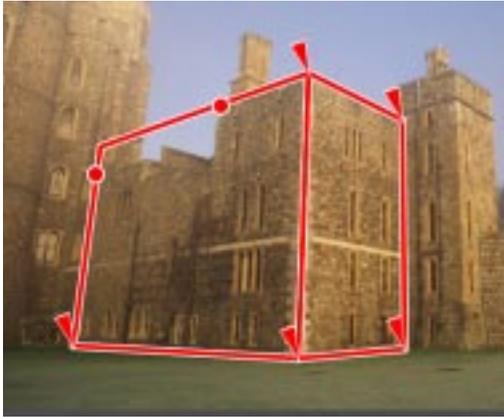


Model several objects in the first picture, before loading in additional photos.

Using Temporary “Helper” Objects

Use temporary objects to “bootstrap” perspective. For example, suppose there is a staircase or translation sweep that needs to be modeled as part of your scene. Try using a box for that element and pinning it into place, even though you know you'll replace it later with the staircase or translation sweep.

Just having the box there initially helps Canoma establish perspective. After a perspective is determined, adding more objects "solidifies" it to such an extent that the temporary helper object can then be deleted.



Temporary objects help establish perspective.

Creating the Same Orientation

Sometimes several objects will share the same orientation. A good example of this is skyscrapers in a typical American grid-like city layout. When this is the case, let Canoma know.

Select one object whose orientation is the same as the one you are about to create. When you create the new object, hold down the Shift key. The two objects will then always be at the same orientation. This improves the quality of your

3D model. It also improves the accuracy of Canoma, since there will be fewer independent parameters (rotations in this case) to calculate.



Select an object whose orientation is the same as the object you are about to create, then use Shift-Create on top to lock in that orientation.



With orientation locked to first object.

Duplicating Objects with the Same Dimensions

When you duplicate objects that have the same dimensions, it results in a more precise model. This is especially useful if you have only one source image.

In the following example, all the balconies are known to be of equal size. After the first box was created and pinned, **Edit menu > Duplicate** was used for subsequent balconies.



All the balconies are known to be of equal size.

In this case, since the balconies are not only the same size but even share the same orientation, **Shift-Command/Control-(D)uplicate** can be used to create aligned clones. If you wanted to get extra fancy you could put spacer objects (like a Guide Line) between them, also duplicated, to ensure that equal spacing between the boxes is also maintained. That's not necessary in this case, but could be handy in other circumstances.

Freeing Necessary Parameters

Each object in your model has parameters, such as a location in three dimensions (X,Y,Z) and an orientation (3 angles). In addition, each object has type-specific parameters. For example, a box has length, width and height. Canoma tries to calculate out all these parameters. To make it easier, Canoma fixes certain parameters to begin with.

For example, all objects are by default created on the ground plane, i.e. their Y-location is initially fixed at 0 (except for on-top objects, which start life at Y=height of their base object.) Similarly, objects are by default only able to rotate around their vertical axis (the X-axis). The other two orientation angles are held fixed at 0 degrees. In many situations that works just fine, but sometimes you'll need to free some of these parameters to avoid getting a wrong model.

A typical "problem" case is a computer monitor. You might be tempted to model the computer screen in front of you. But if you look closely, the monitor is usually on a stand, so it does not rest on the table plane, but rather slightly above it. Second, a monitor is usually tilted slightly backwards.

To selectively free up necessary parameters:

- Select **Model menu > Unfix Y parameter**. This allows an object to float in height, just what is needed for the monitor to rise a little above the table.
- Select **Model menu > Unfix all rotations** or bring up the Object Information dialog for that object and click the Unfix all

Rotations button. This allows a selected object to freely rotate in space, like tilting the monitor backwards.



Unfix all rotations in order to position the monitor.

Refer to “Checking Object Information” on page 85 for more about setting object parameters.

Be careful. Freeing parameters comes at a cost. In order to figure out what the height or the other rotations should be, Canoma needs more information. This can come from additional source images or you may be able to use glue as described later in this chapter. To be safe, only unfix parameters when you have multiple source images with which to work.

Monitoring Stress in the Model

When you specify pins and beads in your source images, imagine that you are applying little springs between where you place them and the wireframe beneath. As long as the pins and beads are consistent with perspective projection, everything is fine. But in theory, you can pull a corner of a box to some wildly wrong

location. The wireframe follows (beads try to, but will eventually separate from their edge). When this happens, the underlying 3D model is no longer be what you expect.

Normally, this does not happen, but it can in the following circumstances:

- 1 You model a beveled or round object and cannot see corners, so you "guesstimate" where the pins should be. You could guess wrongly.
- 2 You misinterpret the wireframe and put a pin in a spot where it really just should not be.

A good way to monitor model stress is to use the Stress Display frequently. Turn the Stress Display On to check for differences between the wireframes you placed and the 3D objects Canoma constructed according to your pin and bead “instructions.”

Another way to detect stress is to watch when you delete a suspected pin or bead, if the wireframe jumps a lot before settling down again (the proverbial "boing" in our spring analogy), something is wrong. You can always undo the deletion to see if another pin on the object is the real culprit.

Canoma tries to minimize stress across all the pins and beads that you place. Sometimes a single wrong pin can introduce a lot of stress. It is best to either delete or correct that wayward pin.



Sometimes a single wrong pin can introduce a lot of stress. Here, the lower left pin causes stress, because the building sits on a slope.

Using Glue to Align Objects

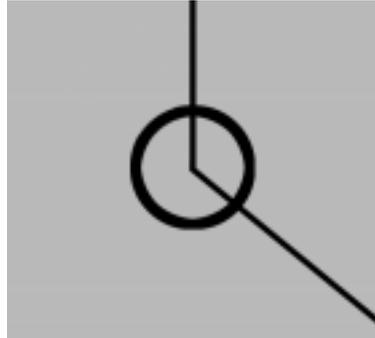
If you know that certain objects are connected, you can tell Canoma, just by using glue. This is useful when you have only a single source photograph in your project. When you have multiple photographs, Canoma can usually figure out on its own that objects are supposed to be connected.

For increased model quality, it can still be a good idea to add this information via glue. The usefulness and techniques for creating glue will now be explained in more detail.

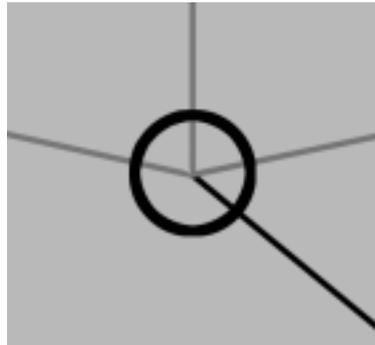
Tip

To create aligned objects, you can use the Align option when creating an object. Glue, however, is more flexible and allows objects to actually be connected, not just aligned.

Using Point To Point Glue

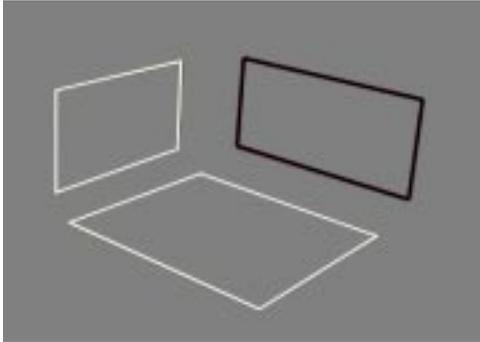


Glue point to point by Ctrl-dragging one point over the other:



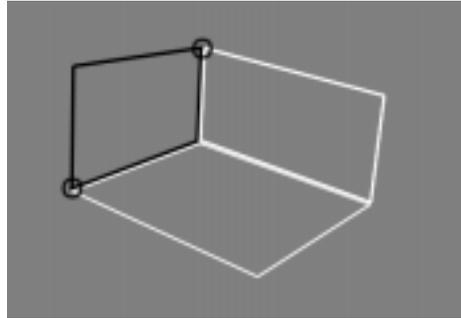
Done. The object moves to satisfy the glue and shows a circle as feedback that there is glue between points.

Don't "overglue"

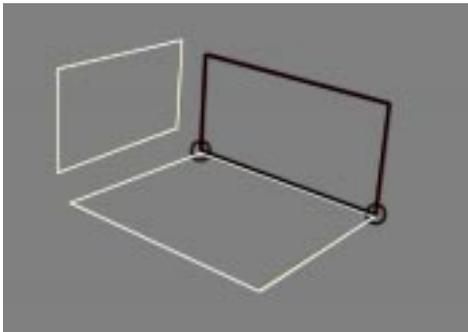


Typical situation. Several rectangles are joined using glue.

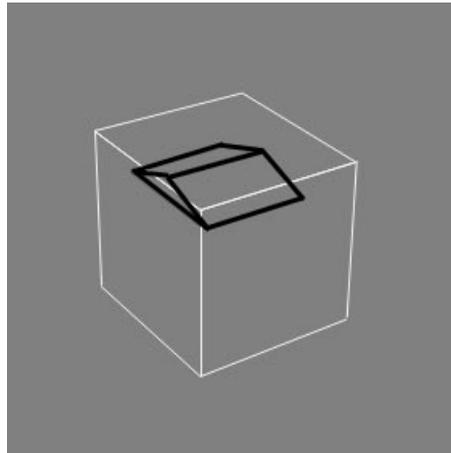
To attach the second rectangle and force it to be the same height as the first vertical one, glue their adjoining bottom corners together. There is no need to put glue at the top corners. The final glue is applied at the far left corner.



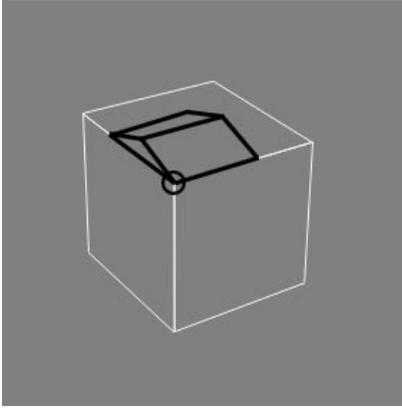
Attaching the second rectangle.



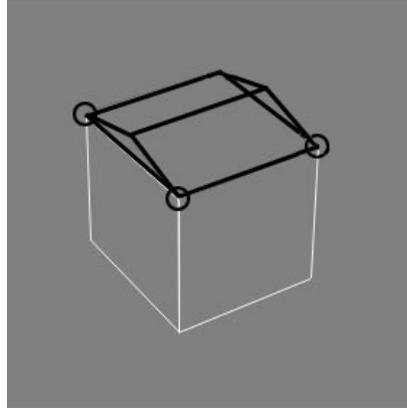
The first rectangle is joined using 2 point to point glue operations. You can see the rings indicating glue.



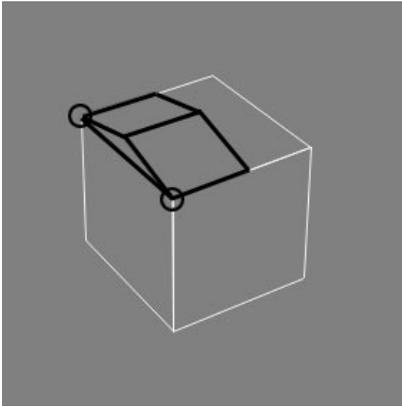
A box with a roof created on top of it.



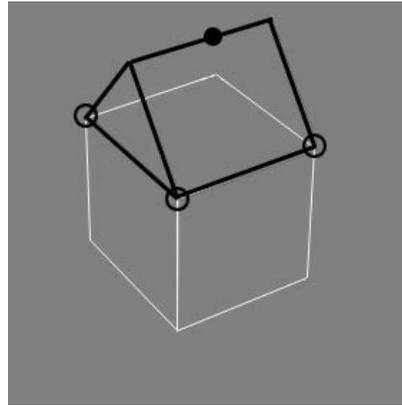
Glue one corner of the roof.



And, finally a third. Three is enough, that determines the orientation and size of the roof's base.



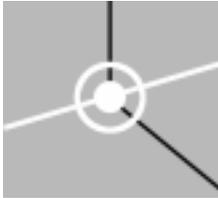
Then another.



Once the roof base is glued, you can pull up the roof to the desired height with a bead (or you could use pins at the corners).

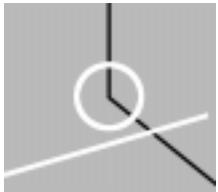
Using Point to Edge Glue

When the points of two objects do not coincide, but you know that the point of one object lies on the edge of the other object, you can use Point to edge glue.



Create point to edge glue by Ctrl-dragging one point over the other object's edge.

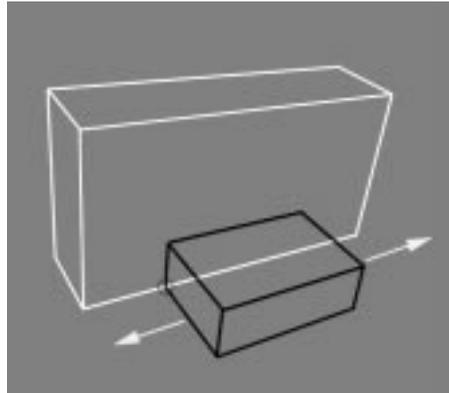
The object moves to satisfy the glue and shows a circle to indicate that there is glue between the points. The glued object can still slide along the edge, but the corner point always stays on the edge.



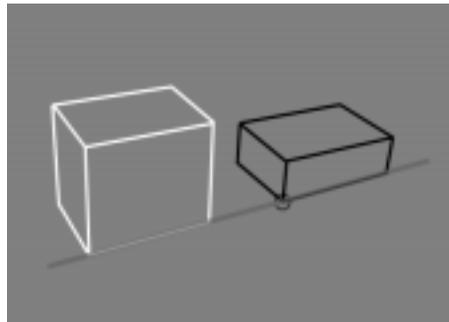
Done.

Point to edge glue can also be applied when a glued object isn't actually touching the other object. Since the glued object is free to slide

along the edge, it can even slide "off" the edge. (In fact, mathematically it still slides along the extension of the edge.)



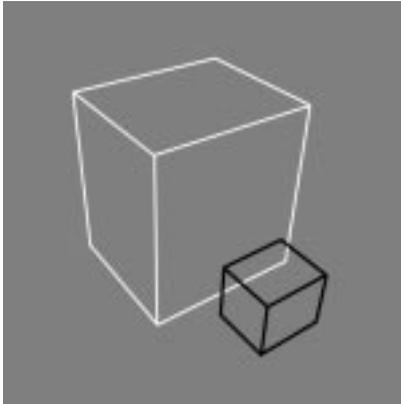
A glued object can slide along or even off an edge.



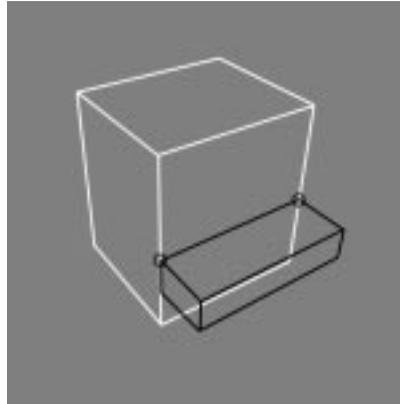
In this case, the two object fronts are aligned.

Another way to do align two objects is to create a Guide Line object (which is only visible in wireframe mode, so you don't need to worry about it messing up your model), then glue both object's front corners to the Guide Line object.

- Positioning an Object on the Side of Another.



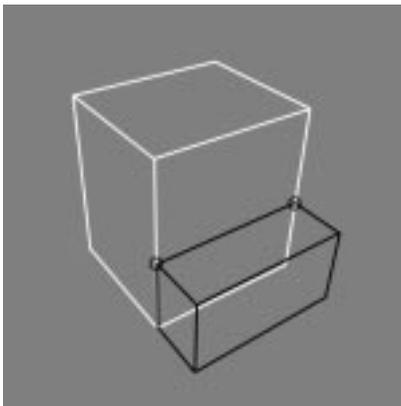
Here is an aligned box (created using Shift during creation). Its corners are glued to the indicated vertical edges of the other box.



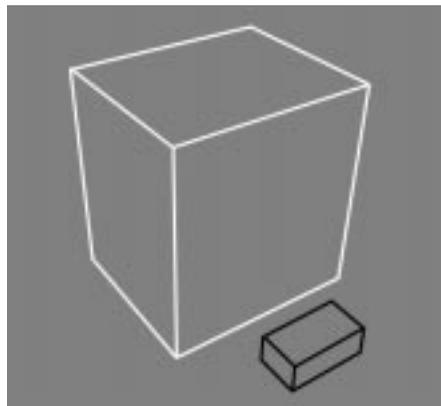
And this is the result. The new box is attached very neatly to the big box and can slide up or down as required.

Creating a Balcony

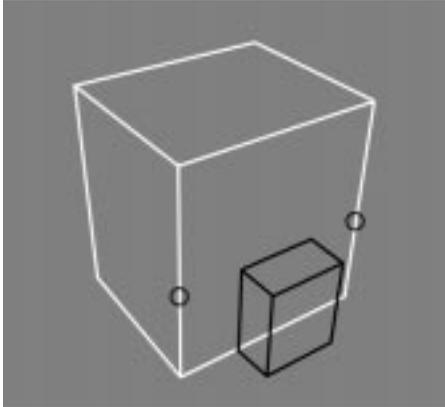
This technique allows a new object to be attached entirely within the face, rather than to the edges of another object.



The result after gluing. The bottom of the new box is still fixed to the ground plane. But you can let it float up by selecting Model menu > unfix Y parameter, then use some beads to move the bottom of the box upwards.

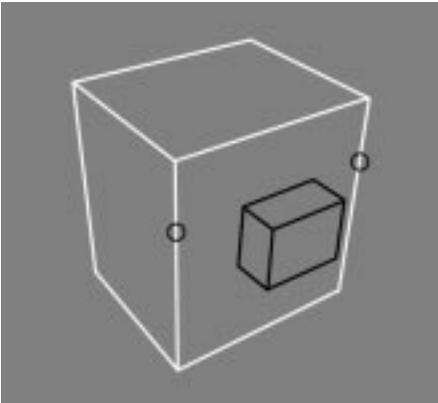


Use an Edge-to-edge glue. Ctrl-click the top back edge of the small box and glue it to each of the front vertical edges of the big box as indicated.

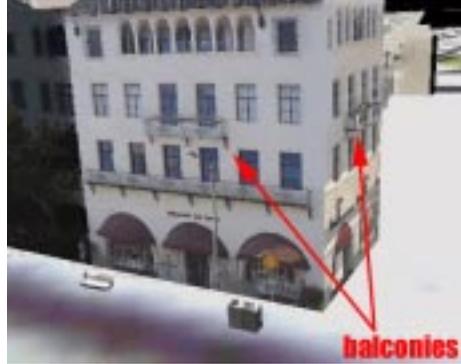


The result after 2 Edge-to-edge glue operations.

The small box's back is now forced to lie on the side face of the big box. It is still sitting on the ground plane. Once again, select **Model menu** > **unfix Y parameter** and use beads to move the little box upwards.



Voila! A balcony, neatly glued to the side of a big box, but still free to slide up or down and to change width and height.



A real world example. The two balconies were modeled using this technique.

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If you must ship the Program and Documentation to an authorized Company Distributor, dealer or to Company, you must prepay shipping and either insure the Program and Documentation or assume all risk of loss or damage in transit. To replace a defective medium during the ninety (90) day warranty period, if you are returning the medium to Company, please send us your name and address, the defective medium and a copy of your receipt at the address provided below. In no event will Company be liable to you for any damages, direct, indirect, incidental or consequential, including damages for any lost profits, lost savings or other incidental or consequential damages arising out of the use or inability to use such Program and Documentation, even if Company has been advised of the possibility of such damages or for any claim by any other party. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages so the above limitation or exclusion may not apply to you. In no event will Company liability for damages to you or any other person ever exceed the amount of the license fee paid by you to use the Program regardless of the form of the claim.

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General

This Agreement is governed by the laws of the state of California (except federal law governs copyrights and register trademark(s)). If any provision of this Agreement is deemed invalid by any court having jurisdiction, that particular provision will be deemed deleted and will not affect the validity of any other provision of this Agreement. Should you have any questions concerning this Agreement, you may contact MetaCreations Corp. at this address:

MetaCreations Corp.
6303 Carpinteria Avenue
Carpinteria, CA 93013
(805) 566-6200 phone
(805) 566-6385 fax

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