



# 6

## Building Projects

### What's in this Chapter:

Working with Canoma Projects . . . . .	76
Working with Objects . . . . .	77
Pinning Objects . . . . .	92
Using Beads . . . . .	93
Using Glue . . . . .	94
Using Solo Mode . . . . .	95
Using Shadows. . . . .	95
Avoiding Model Stress. . . . .	96
Adding More Detail . . . . .	98



**Canoma  
User Guide**

# 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 77 and "Modeling Objects" on page 120 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 76, "Using the 2D Image Palette" on page 99, and "Adding More Detail" on page 98

for more about using source photographs. Refer to "Adding an Object" on page 88 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 126 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 122 for more about how Canoma is always working and "Avoiding Model Stress" on page 96 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 68 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 123 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 123 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 88 and “Freeing Necessary Parameters” on page 126 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 60 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 93 for how to view models in progress. Refer to “Using Canoma Camera Controls” on page 102 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 99 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 58 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 60 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.

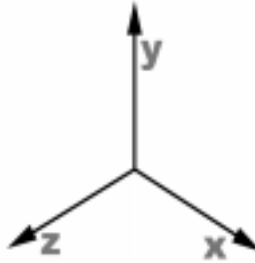
Model large elements around the entire photograph first. This establishes perspective (camera angle and focal length.) If you start modeling in great detail in one corner of a photograph, it's easy to imprecisely place a pin, causing Canoma to estimate a wrong perspective.

#### 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:

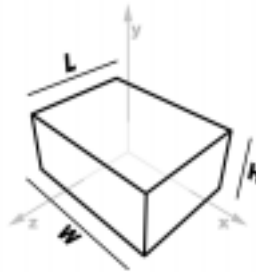


*Y points up - the "height" dimension. X points right - the "width" dimension. Z points towards you - the "length" dimension.*

### Selecting the Correct Object

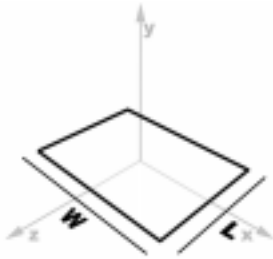
As you get ready to create objects and pin them to elements in a photograph, consider the following information about each object type.

- **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.*

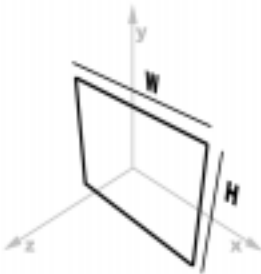
- **Rectangle** - The Rectangle can be used when the photograph element you're modeling is flat (no height).



*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.*

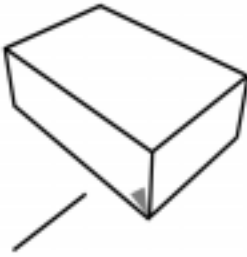
Guide Lines can be used to add “real world” information to your model. You can enter an absolute length measurement for a Guide Line.

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.

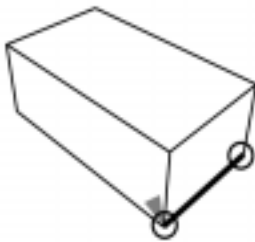
You can also use the Calibration option to automatically calibrate your entire model to reflect the length you enter. If Calibrate is checked, the entire scene is calibrated according to the Guide Line length you enter. If Calibrate is not checked, the scene does not change, except to reflect any length 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 88 for more about calibrating your picture.

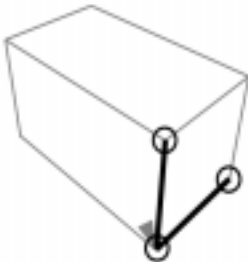
You can create a Guide Line, glue it to the side of a box, then duplicate it to force one or several objects to have the same dimensions. For example:



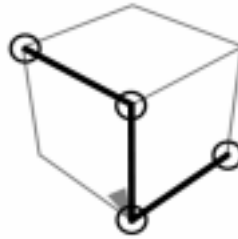
Create a Guide Line. Unfix all parameters.



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

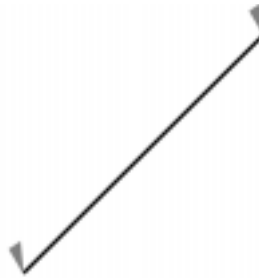


Glue the duplicate Guide Line to a 2nd edge, then duplicate the Guide Line again.

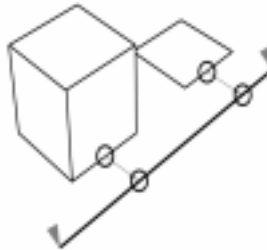


Glue the third Guide Line to a third side of the box. Like magic, you have a cube, with equal sides, thanks to the duplicated "yardstick." Pin anyplace on the box and watch the box change size, but remain a cube.

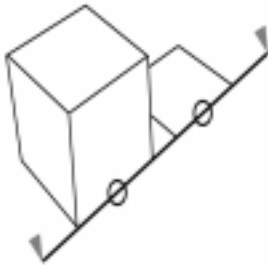
You can use a Guide Line to align objects.



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



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.*



*Equally spaced objects.*



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



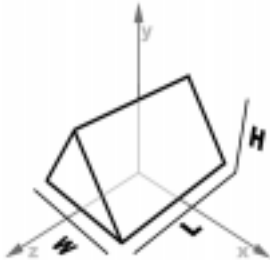
*Create additional Guide Lines (selecting concentric duplicate).*

## Try It

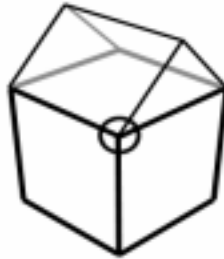
Experiment with using a Guide Line as a geometrical helper. Load an empty, gray 600 X 400 image as the background, then use a Guide Line to try and create a pentagon object with equal sides! Hint: you'll need more than 5 Guide Lines.



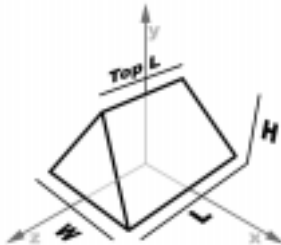
- **Roof and Slanted Roof** - Both a plain roof and a slanted roof are available.



*Roof.*

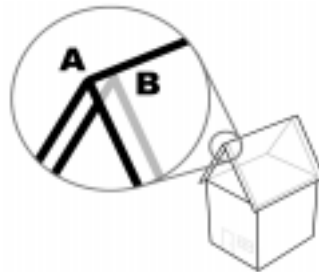


*If a roof was created concentric, aligned, and stacked, a single “drop” of glue is enough. A roof doesn’t have to fit exactly, but can overhand a little. Don’t use glue when this is the case. Put a pin on an aligned, concentric, stacked roof*

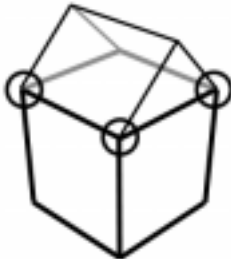


*Slanted Roof.*

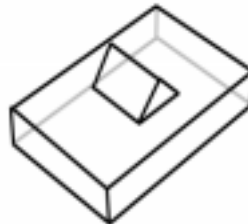
When doing roofs, it is often handy to glue corners to a base box.



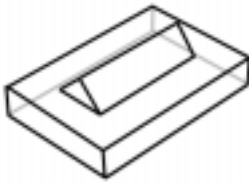
*Watch out for common mistakes. Pinning a roof, forces the roofline to be flush with the building front wall. To allow the roofline to stick out a little, place a bead instead.*



*Glue three points to glue a roof into place.*



*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.



*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.



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



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

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



*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.



*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.

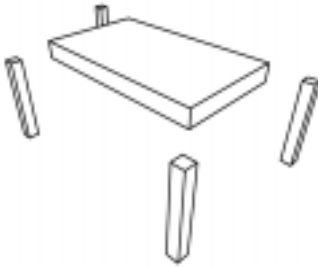


Table legs can temporarily “detach” or float outside the tabletop.

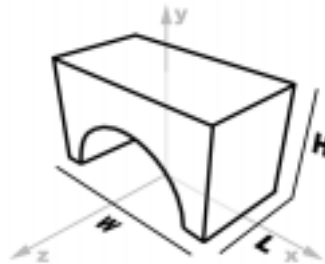
If that should happen:

- 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.



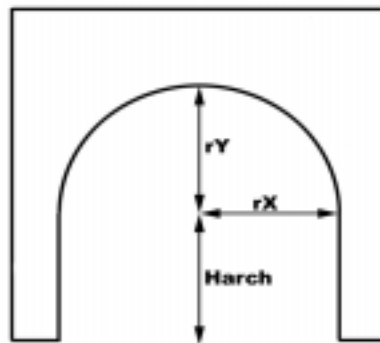
Tables can also be used to make chairs. To create the backrest, create a box, unfix all parameters, glue two of the corners.

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



An Arch can assume many sizes.

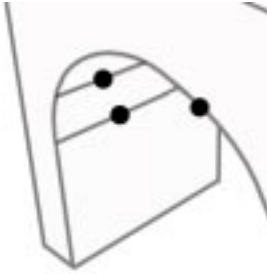
The center portion of an Arch is made up of two straight edges, joined by a semicircle.



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

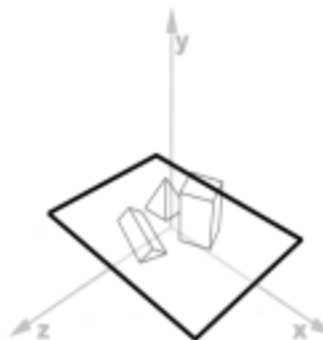
four) will position them correctly. You don't need to pin every step.



*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.*

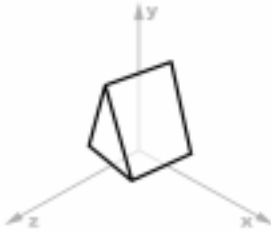
## Note

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!

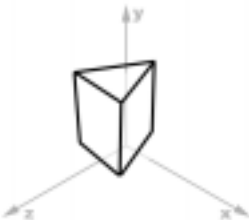
## Objects with Editable Polyline Contours.

There are three objects with editable polyline contours:

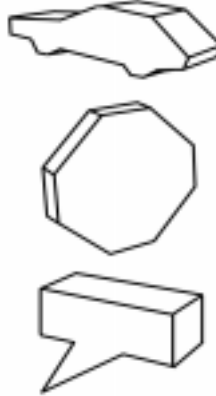
- **Translation Sweeps (horizontal and vertical varieties)** - Translation Sweeps are powerful objects that let you approximate complex geometry with a few clicks.



*Horizontal Translation Sweep.*



*Vertical Translation Sweep.*



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

## Tip

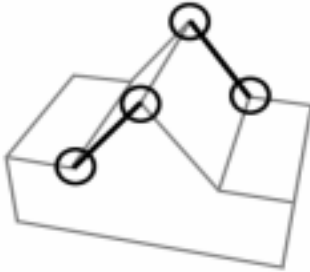
It's always a good idea to start simple. Don't use a Translation Sweep as the first object in a scene.

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.

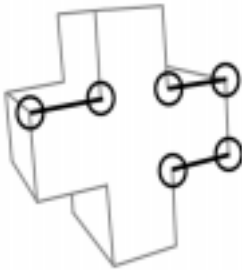
With Translation Sweeps, you can approximate curved contours, with several linear pieces. Remember that the pixels will do most of the work, so you don't need to be too precise. Approximated geometry works quite well.

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.



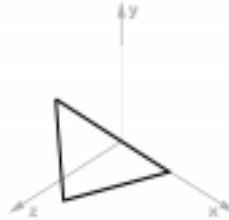
*Use copied Guide Lines to make sides equal in length.*



*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.

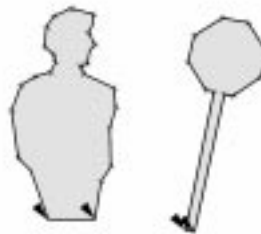
- **Polygon (horizontal and vertical varieties)**
  - polygons are very similar to Translation Sweeps. They are also powerful objects that let you approximate complex geometry with a few clicks.



*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.

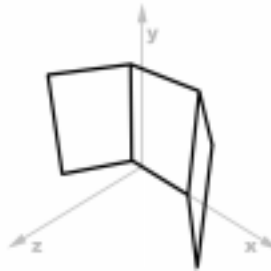
### Tip

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 112 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.

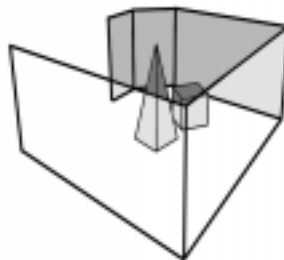


*A Curtain.*

### 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 90 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 58 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

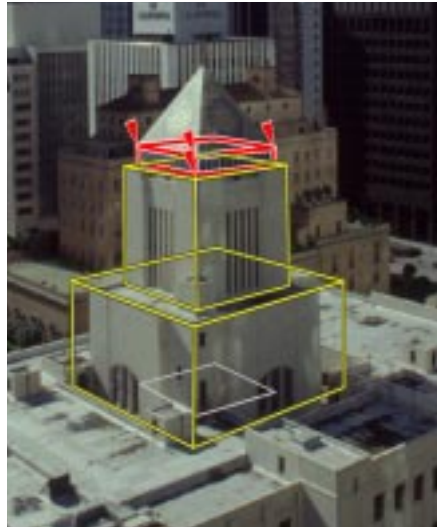
Usually, scenes are modeled from the ground up. Working from a ground plane, you place objects on the ground, then place objects on top of those, and so on. Refer to “Adding an Object” on page 88 for more about object selection options.

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.



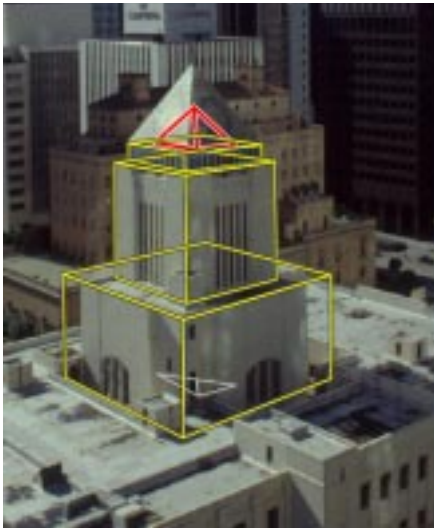
*Select the object on top of which you plan to build.*

- 2 Click the Creation tab.

- 3 Choose an object and select Stack.

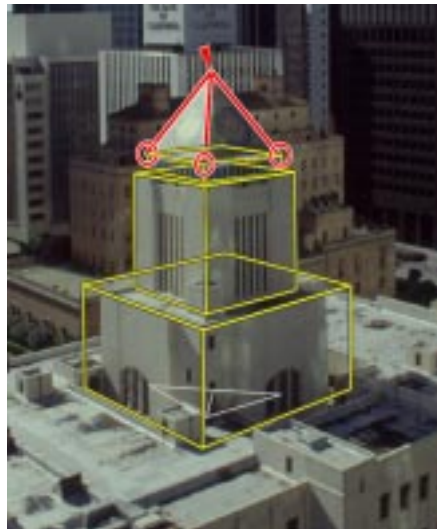


*Select Stack.*



*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 + Cmd/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 102 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 94 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 (Cmd/Ctrl + Z.) Refer to "Undoing Operations" on page 61. Refer to "Deleting All Constraints" on page 94 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 102 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 94 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 96 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:

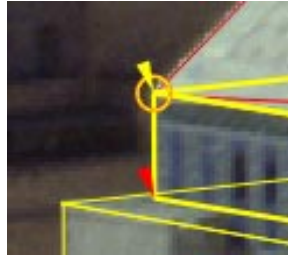
- Glue point to point
- Glue point to edge
- Glue edge to corner or to Guide Line.

Refer to “Using Glue to Align Objects” on page 127 for more about gluing techniques. Refer to “Deleting All Constraints” on page 94 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

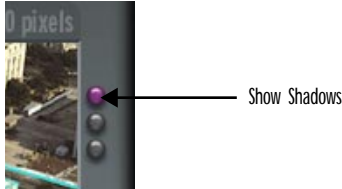
Canoma can cast shadows from objects. Shadows can land on other objects or on the ground plane.

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**.

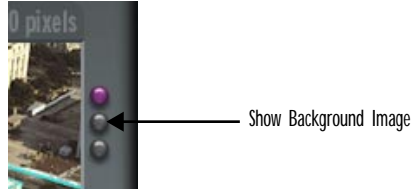
## Displaying the Background Image

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 97 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

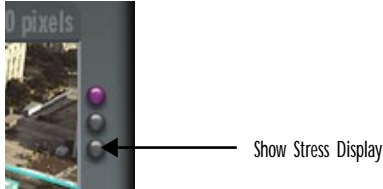
It is important not to "mislead" Canoma. For example, when you tell Canoma that an object has the same orientation as another, but it really does not, Canoma can yield inaccurate results. When that happens, the model is "stressed" or unnatural. Refer to “Monitoring Stress in the Model” on page 126 and “Listening to the Canoma “Heartbeat”” on page 122 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**.



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 110 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.

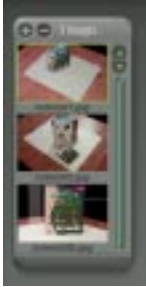
Imagine doing some architectural photographs:

- 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.