NEMETSCHEK Vectorworks

Getting Started Guide

Renderworks®

2014

The contents of this guide and its exercises were originally created by Nemetschek Vectorworks, Inc.

Renderworks Getting Started Guide

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Section 1: Preface

Welcome to the Vectorworks Renderworks 2014 Getting Started Guide! This guide is designed to provide you with a strong base as you learn to use Vectorworks Renderworks to design, communicate, and document the designs that you are passionate about.

This guide cuts to the heart of Vectorworks, explaining the concepts, and methodologies needed to develop improvisational skills so that you can be efficient, and perhaps most important, you can be successful at realizing your most inspired visions.

This guide presents the tools, commands, and other details of the software in the context of workflows which are the discreet steps taken with the software that accomplish a specific architectural or design task. A workflow takes a familiar design task, such as creating a massing model from a series of planar elements, and present commentary, demonstration, and example steps to accomplish the task in a way that can be mastered, and used to accomplish real tasks that you encounter in the course of your practice. This concept forms the bridge from traditional design processes to the software implementation details, and best practices used to model these processes in Vectorworks Renderworks.

The workflows used in this guide are selected for the learning opportunities they present. There are often multiple workflows that deliver the desired result. A unique feature of this guide is the examination of the benefits, and drawbacks of alternate workflows. This discussion will help you develop workflow strategies of your own.

The Vectorworks Renderworks Getting Started Guide is essential required reading for all design professionals; from first-time users to the most experienced.

How this guide is organized

As with most tools this capable, a familiarity with multiple disparate topics is needed before enough skills can be mustered to work effectively with Vectorworks Renderworks. This guide has several features that make it unique in it's ability to deliver information about these skills.

The topics are integrated into the exercise so that the workflow can be seen as a whole. But it is also necessary to factor out each topic at times so that it can be examined on its own so that it's purpose, and benefits can be recognized as it is used throughout the exercise.

The benefit to you is that if you want to focus on any of this topical material, you may work through the guide by following the topic that interests you using a system of linked icons. We will explain these in the next section. Of course, we recommend that you work through this guide straight through at some point.

This guide explains the hows, and whys of Vectorworks Renderworks in the commentary through the Example. The heart of the Guide is the Example section which puts into context usage of the tools with the emphasis on best practice workflows in a complete project. Embedded videos follow each group of written steps exactly, but without the important tips, and notes in the text. In case you have ended up with an unexpected result after one of the steps, you can review the video immediately. At the end is the Further Exploration section which highlights common workflow variations which may not have been encountered in the Example.

This Guide is written as a companion to the help system, which does not contain step-by-step procedures. The help system serves as a comprehensive reference for the tools, commands, and dialog boxes that you will encounter here in this guide, and layer as you use Vectorworks Renderworks for your projects. Indeed, you are encouraged to read through the parallel material in the Vectorworks 2014 Help application when you want more information about a specific element being used in this guide. A link to the help system is provided at each tool, and command for this purpose.

The workflows in this guide have been developed to give you

the experience of using Vectorworks' Renderworks integrated snapping, hybrid, cursor, and other systems to draw fast, and accurately as you solve visual, and geometric design problems. It's a lot to digest all at once, yet it can be quite unsatisfying if you aren't using these features in concert. So, as you practice with Vectorworks, imagine improvising a solution to the tasks before you using various combinations of these features together. Those who succeed always embrace the tools to enhance their personal approach.

Still, it often is quite overwhelming to beginners at first, so take it in small pieces: Watch the videos that accompany the steps to see a practiced hand doing them. Then try the step over again so you'll get the sense of how the different parts are used together.

Also, it may help to think of using the various features linearly to get the job done. For instance, drawing a few extra guidelines can go a long way toward building the workflow in your mind as you work. The main thing is to understand, and embrace the goal of using Vectorworks' Renderworks systems efficiently.

So, from *where* did you come to Vectorworks?

This guide provides distinct paths through the material for use by different types of learners as well as by individuals who want to explore certain facets of Vectorworks separately. Of course, you can start at the beginning, and traverse sequentially until you get to the end, the necessary commentary will be presented at the appropriate time in the workflow; but your situation may be different.

You may be a user coming to Vectorworks Renderworks from another software, who simply would like to know what's different. Or perhaps you are a self-taught Vectorworks Renderworks user who would like some insight into well-established best practices so that you can consider updating your use of the software.

What if I don't understand one of the steps?

After each chunk of steps there is a video thumbnail that shows a movie of the steps just explained. Just click on the thumbnail, and watch the movie. There is no audio on these clips.

Terms Used in this Manual

Cursor, and Pointer

The cursor is the mark on the display that indicates where the next thing will happen. Most of the time the cursor looks like a skewed arrow. The cursor location is controlled by you with an input device. We use the term pointer to collectively refer to your mouse or any other device that you might be using for input. These would include the track-ball, tablet, track-pad, etc. Fingers may well be the only commonly used pointer, eventually; just as they were originally, before computers.

In Vectorworks, the cursor icon changes according to the context, so as you move the pointer, the cursor will change its form to give you information about any objects nearby. Each icon tells you something very specific. Although the cursor seems to change constantly as you move it around, we will only point out particular cursor icons when we need them. Just watch the cursor as we go, and you will learn to use the information it displays to create fast, and accurate models.

Pointer Gesture Terms

Pointer gestures are the ways that the pointer is used in Vectorworks to position the cursor, and issue commands.

- **Point**-To move the cursor over an object, usually to acquire a smart point. We'll get to this in a bit.
- **Press**-Hold the pointer left button down without releasing it. This is sometimes necessary when there is a short delay
- **Click**-Press the left pointer button, and immediately release it. In this guide, when you see the instruction to 'click' without modifiers, it means to click the left pointer button.
- **Right-Click**-Press the right pointer button, and immediately release it. If you have a single button mouse, this is done by pressing the Control key down on the keyboard before you click, and holding it down as you click the mouse button.
- **Double–click** To press, and release the pointer button twice quickly in rapid succession. Be sure to hold the pointer absolutely still while you are clicking.
- **Drag**-point the cursor, press the button, move the pointer to another location with the pointer button held down, and then release the button in the other location. There are only a few circumstances that this is done in Vectorworks.

Section 2: Commentary

Using Cameras

Let's talk for a minute about what a Renderworks camera is. In real life, you stand in front of a building with your camera, point the camera at a building, and then take a photo. You can do something similar in Renderworks using the camera tool: Click on the tool to select a camera, place it the scene and then point it at the object you're interested in showing. You can use many Renderworks cameras in a scene, each showing a different view of the object.

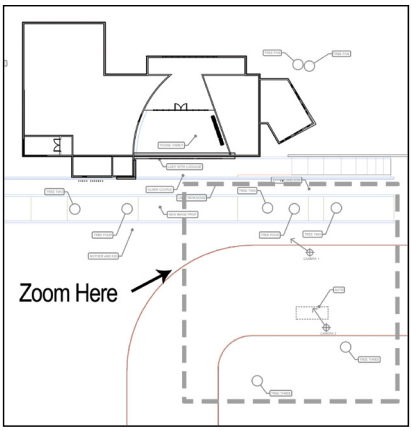
This exercise will use two Renderworks cameras to generate views that will be used in the renderings.

One camera will show an overall view of the building's front. The other camera will be oriented to display the building at an angle, and from a closer distance.

Now, where do we put the cameras? In this file, we'll place the cameras in the layer Site with Buildings which is currently the active layer, and contains all the objects in the scene; buildings, background items, etc. This is where we will place the cameras.

The bottom layer is called Entourage Locations, and is there only as a kind of map, to show the spots where we will place the items prepared during this tutorial. It's only there as a convenience, and you do not necessarily need such a layer when preparing renderings, It's really just there for this exercise.

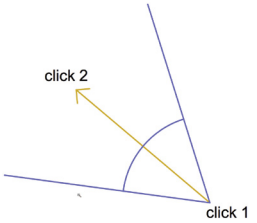
So, let's go ahead and place the cameras. First, we'll zoom in to the area where the cameras will be located. We can see that the two camera locations are marked.



Now let's place the first camera.

-In the Visualization Toolset, select the **Renderworks Camera** tool.

-With the tool selected, click once in the center of the marker called Camera 1. Then drag the cursor in the direction of the marker's arrow to set a direction, and click again to complete the action.



-By the way, the **Object Properties** dialog box may appear the first time you place a camera in a file. If it does appear, just click **OK** for now.

Now that we've placed the camera, how do we see what the camera sees?

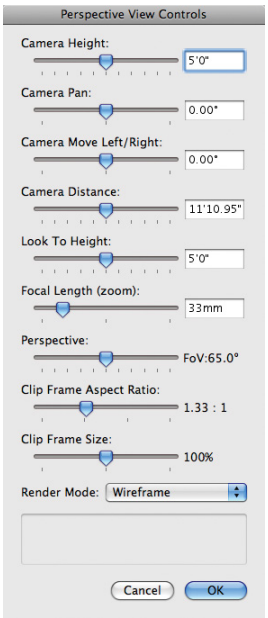
The camera is still selected. So let's go to the Object Info palette (under the Shape tab) and click on the **Display Camera View** button. The scene will immediately switch to a perspective view, exactly as seen by the camera.

If you can't see the perspective view, click on the **Fit to Page Area** button, up in the View bar, to center the view.

Note: the Entourage Locations layer is still visible. Make it invisible by changing the **Layer Options** to Active Only: **View>Layer Options>Active Only**.

Let's make an adjustment to the camera. We'll adjust the camera's height.

-In the Object Info palette, click on the **Fine Tune Camera View** button. The **Perspective View Controls** dialog box opens. The first slider at the top is the **Camera Height** control. In the white data field, enter the height: 6'-0" [1830mm].

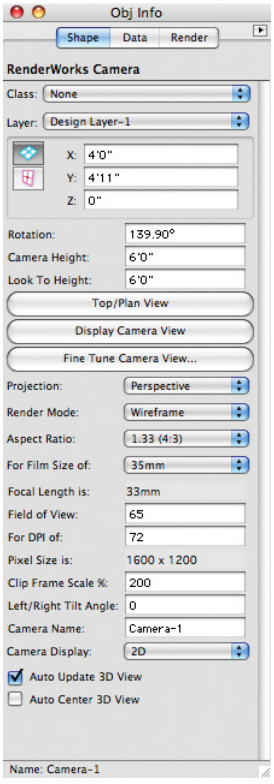


Now the camera is at the desired height, but it is tilting down slightly. To correct this, go to the **Look To Height** slider, and in the white data box enter the same height we entered previously: 1830mm. Click **OK**.

Now the camera's actual height, and the direction in which it looks are both exactly the same, so the camera's view is perfectly horizontal.

By the way, the **Perspective View Controls** dialog box contains a large number of camera controls, and these allow you to modify the camera's settings with very fine measurements, to suit your exact needs. Play with some of these, either by entering dimensions or moving the sliders, to see what changing these sliders actually does.

You may find the image on the screen to be be too small. To fix this, go to the Object Info palette, and then to the **Crop Frame Scale Percent** databox and enter 200. Basically we'll double the size of the image on the screen. Notice that the image still does not reflect the new crop frame size. For that, we need to update the view: still in the Object Info palette, click on the **Display Camera View** button and the image on the drawing will respond immediately..



One more item, before we place the second camera. Notice that there is a frame around the perspective view. This frame represents the boundaries of the image that is generated by the camera, and its size and proportion can be controlled via the **Perspective View Controls** dialog box (which, as you remember, we access by pressing the **Fine Tune Camera** Button in the

Object Info palette. This frame, called the Crop Frame, is useful when preparing images for a presentation, because you can see, and work with, the outer frame of the image. But if you are in the process of developing a model, rather than a final presentation, it might be better to not have a frame around the image; this way you can work more freely and see more of the model as it is rotated and moved around the screen. Basically you have more room to work on the model and move around the file without the frame present.

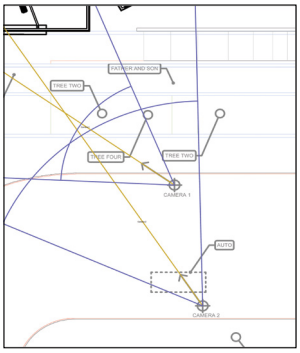
To remove the Crop Frame, go to **View>Perspective>Cropped**. Clicking on the word **Cropped** will toggle the crop frame on and off.

Note that a number of operations behave differently with the crop frame present or removed. For example, with the crop frame removed, using the **Pan** tool will change the viewpoint shown on the screen. But you can always restore the camera's view by switching to Top/Plan view, toggling the perspective crop back on.... and then double-clicking on the camera. There are other ways of doing this, which we'll discuss later.

To center the image on the screen, select the **Auto Center 3D View** checkbox.

Now we will place the second camera.

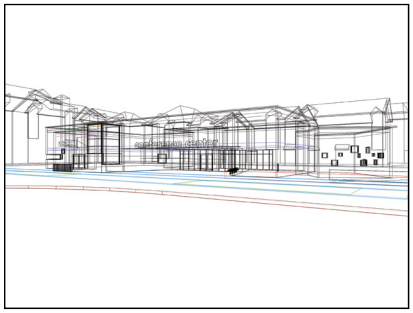
-Switch to Top/Plan view and zoom in again to the area shown earlier. Notice the location of the marker called Camera 2. In the Visualization palette, select the **Renderworks Camera** tool, and then click to place a new camera in the center of the Camera 2 marker. Point, move the cursor, and click to finish as we discussed earlier.



Note: The **Object Properties** *dialog box didn't open this time; it only opens the first time the* **Renderworks Camera** *tool is used in a file.*

Now that we have both cameras placed in the scene, how can we store, and then retrieve the views these cameras generate? Vectorworks provides a number of different ways to do this.

First, you can double-click directly on a camera object. To see how this works, let's double-click on one of the cameras. If necessary, click on the **Fit to Page Area** button, up in the View bar, to center the view.



Second, you can find the camera in the Visualization Palette, under the **Cameras** tab, and then double-click on it to see the camera's view.

Once you have the camera's view on the screen, you can save it as a Saved View, for later retrieval. Click on the **Saved Views** drop-down box in the View Bar, and drag the cursor to Saved View. In the **Save View** dialog box, give the view a name, and then click **OK**. To retrieve this view in the future, go to the **Saved Views** drop-down box and select the view you just saved.

You can also create a sheet layer viewport that shows the camera's view. With the camera's view on the screen, go to **View>Create Viewport**. You'll be asked if you want to link the camera to the viewport. We'll discuss this in a moment, but for now Click no.

The Create Viewport dialog box is now open. Complete making your desired adjustments (such as Create on Layer) and then click **OK**. The viewport now shows the camera's view. Even if you go back to the design layer now, and change the camera's position or settings, the viewport you just created will retain its original view.

You can also create a viewport that has a camera linked to it directly. Let's go back to the design layer containing the camera view.

Create a viewport (**View>Create Viewport**). This time, when asked if you want to link the camera to the viewport, select **Yes**.

Now the camera object will essentially become part of the viewport you're creating. To change the camera settings, you'll need to edit the viewport in the sheet layer first. Double-click on the viewport, and in the dialog that opens, click on Camera. Now you can change the settings via the Object Info palette, as we've done before, and then click on the **Return to Viewport** button to

complete.

The good thing is that, in this case, the camera will forever be linked to the viewport, so you could control the camera directly from the viewport, instead of going back to the design layer and making changes (or accessing the camera via the Visualization palette) and then creating a new viewport. But it's important to know that the camera object itself will disappear from view in the design layer; you will only be able to modify its settings by editing the viewport.

So now we're done placing the cameras in the scene. To finish up before moving on to the next task, make the Entourage Locations layer invisible by changing the layer options. This way you can be sure the information on that layer won't appear on the final renderings.

Exterior Lighting and Renderworks Styles

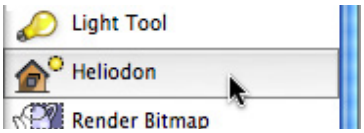
Exterior lighting in Renderworks is actually very simple to do. Once you have your model and cameras ready, all you need to do is add a sun for sunlight, and then apply a Renderworks Style. Why a Renderworks style? Because a style is actually a pre-made, one-step combo of settings that supply reflective light from the sky, a background image of the sky, and a number of other lighting and rendering quality settings, all of them rolled into a single command.

Now, exterior lighting in Renderworks typically has two sources. One is light from the sun, as I mentioned, and we can place this light in a scene using the **Heliodon** tool, which we'll discuss in a moment. And the other source of light comes from the sky; actually from the sky-dome. In Renderworks, light from the sky is placed in a scene using a special kind of light-emitting layer background. This kind of sky-light is included in all the Realistic Renderworks styles, so once you select one of these Styles, the lighting from the sky is automatically included in the lighting set-up for the file, without needing any further adjustments, in most cases.

Let's take a look at how each of these light sources are placed in a file. First, we'll place a sun.

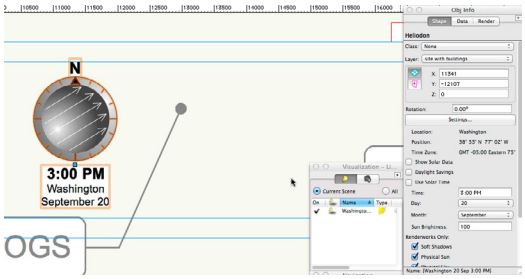
Make sure the file is open, and in Top/Plan view.

Now go to the Visualization toolset, click on the **Heliodon** tool, and then double-click anywhere in the drawing to place a Heliodon object, which represents the sun.



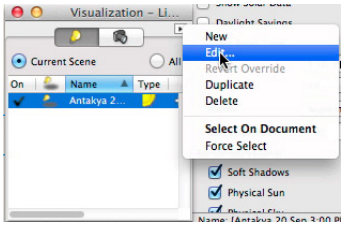
It doesn't really matter where the **Heliodon** tool is placed, but generally it's better to place it near the center of the drawing.

Now let's make some adjustments. With the Heliodon object still selected, go to the Object Info palette, and notice that you can adjust a number of settings directly within the palette. For example, click on the **Month** drop-down box and then select September. And now click in the **Time data** field and enter 3pm. Right away you can see the changes in the Heliodon icon, over here.



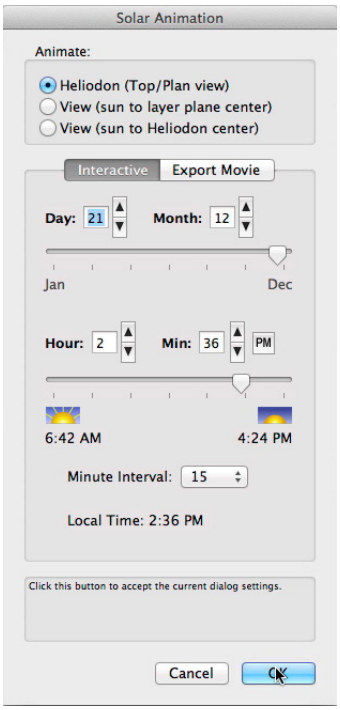
By the way, we can make changes to the settings in two other locations as well. First, in the Object Info palette, click on the **Settings** button. The **Settings** dialog box lets you adjust a number of different settings, as you can see here. You can choose your project's region and city, or you can manually enter the coordinates of a city you designate. Click **OK** to finish.

You can also control certain settings in the **Solar Animation** dialog box. Double-click on the Heliodon icon (or edit the Heliodon object via the visualization palette, like this.)



Many of these controls are actually intended for the solar animation function, which is actually outside the scope of this getting-started intro guide. But still, you see how you can easily make many adjustments to the sun using these interactive

controls. Just make sure the Heliodon setting is selected at the top of the dialog box.



Sometimes it's better to change the settings in the **Solar Animation** dialog box while you're in a rendered view, because then you can see the results right away, especially when rendering in OpenGL. So let's switch to a perspective view...and now let's render.

Now we can go to the Visualization palette and edit the Heliodon object, and as we change the settings, you can see the results.

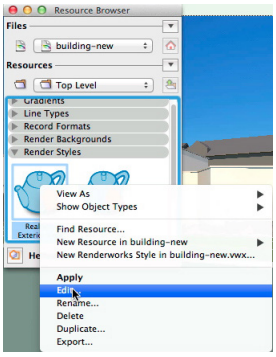
By the way, notice that light object icon, where you placed the Heliodon? It's there because of a Vectorworks preferences setting, and you can make this icon disappear. Up in the menu bar, go to **Vectorworks>Preferences**. In the **Vectorworks Preferences** dialog box, click on the **Display** tab at the top, and then click on the **Display Light Objects** drop-down box on the right, and select: Only in wireframe. And this way you can see the light objects (not just the sun, but all light objects) when in wireframe view, but not in the final renderings.

And now let's complete the exterior lighting for this model. We will select a Renderworks Style, which--as I mentioned earlier--is a pre-made combo of Renderworks settings that provide a number of things--reflective light from the sky, a graphic background image of the sky, and and also pre-made settings for lighting, rendering type and quality--all with a single command.for this exercise we'll use the **View** menu. [**View>Renderworks Style...**]

Go to Renderworks Style and select Realistic Exterior Final. Even though we have not yet applied textures to walls, windows and objects, you can immediately see the improved quality of the colors, the sky background, and the light bouncing between surfaces.

For a quicker rendering, although a somewhat lower-quality one, select Realistic Exterior Fast. The increased rendering speed makes it easier to use when working on the model.

Now, as mentioned earlier, all of the Renderworks settings that make up a Renderworks Style can be adjusted manually as well. If you go to the Resource Browser, for example, you'll find the Renderworks Styles there, under Render Styles. Right-click on one of them, and then select Edit to see the different settings it controls.



Even though they are highly automated, these tools are actually very sophisticated as well. For example, see what happens when you change the settings for the Heliodon from morning to evening. First, let's render in Fast Renderworks to see things better. Now let's go the Heliodon's Object Info palette, and change the month to August, and the time to 6pm. Notice how not only the color of the light has changed--but also the appearance

of the sky.

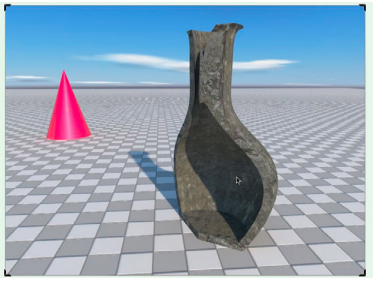
By the way, this only happens when the Physical Sky and Physical Sun checkboxes are selected, in the Heliodon's Object Info palette.

All of these settings are described in other support materials provided by Nemetschek, both in the Help resources, and in detailed training manuals. But the main thing to keep in mind, is that most exterior renderings may not require many adjustments. In most cases, all you need to do is place a Heliodon object in the scene, and then select a Renderworks Style, and you'll get a good quality exterior rendering.

One of the things that can really enhance the appearance of a rendered scene, is the application of textures to walls and objects. And that is the topic of our next task.

Image-Based Textures

You can think of Renderworks textures as images that are wrapped around objects, like decals, tightly attached to the surfaces of those objects. In actuality they're more complicated than that, because, depending on the method with which they're attached and then adjusted in their location, also called texture mapping, they can not only be attached to the surface of objects, but actually go through those objects, so that if you were to cut them open you could see the textures go all the way through.

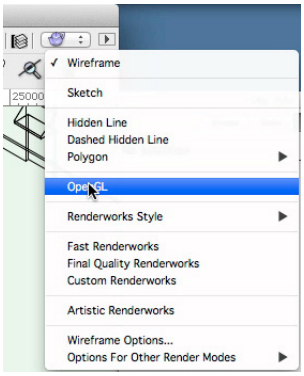


These textures can have all kinds of special attributes. They can be opaque, they can give the appearance of having some three-dimensionality to them, they can be made transparent, they can be made to be shiny or reflective--they can have many different features. But at the core, they are essentially images wrapped onto objects.

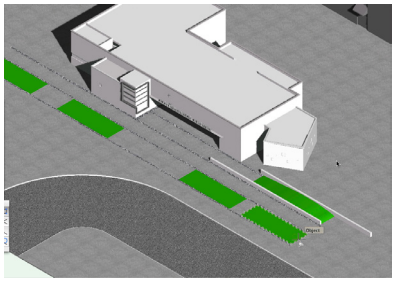
Now, we're going to look at three types of textures, and different ways of applying them to objects. One of these textures is already included in the exercise file, and we'll apply it to a few simple extruded objects. Another texture is based on a graphic image of travertine stone that we will import into the file, convert it to a texture, and then apply it to walls in our model. And then we'll create the third texture completely within Vectorworks, using built-in tools that come with Renderworks, and without importing any graphic images from the outside. This particular texture will be both transparent and shiny, and will represent glass in the model's doors and windows.

Let's open the file for this task, building-new-textures.vwx. It's a modified version of the file that we used for previous tasks, and has a few textures already applied.

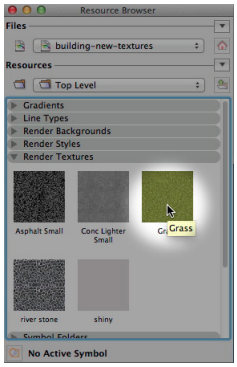
So, first switch to Right Isometric view. Let's zoom in a little. And now render in OpenGL. By the way, to render a scene you can use a menu command, as we've been using, but you can also use the Render button up in the **View** bar, like this.



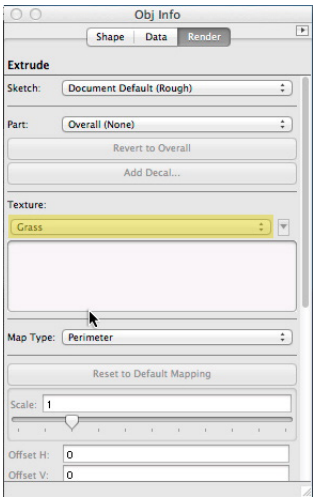
Let's look at the OpenGL rendering. You can see some green-colored objects in the scene, over here.



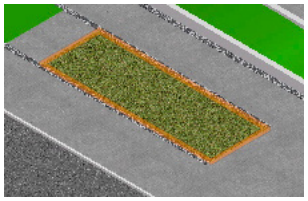
These are simple extruded shapes that represent landscaped areas with grass, so we'll apply a grass texture to those objects. The texture is already in the file and can be found in the Resource Browser, here.



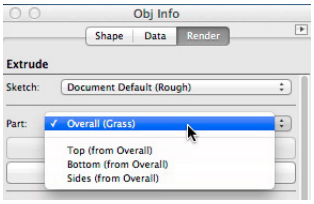
Select one of the green objects. And now in the Object Info palette, click on the Render tab, at the top. This is the place in the Object Info palette where you can apply textures and control their appearance on the object. Go down to Texture, click on the drop-down box, and then choose the texture we'll use, Grass.



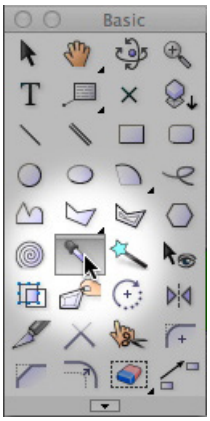
See how the texture is immediately evident on the 3-D object we selected. By the way, when you click on the Texture drop-down box, you can see the textures that come already installed with Renderworks, and select from the list if you need one. Your own list, incidentally, might appear a little different than this one.



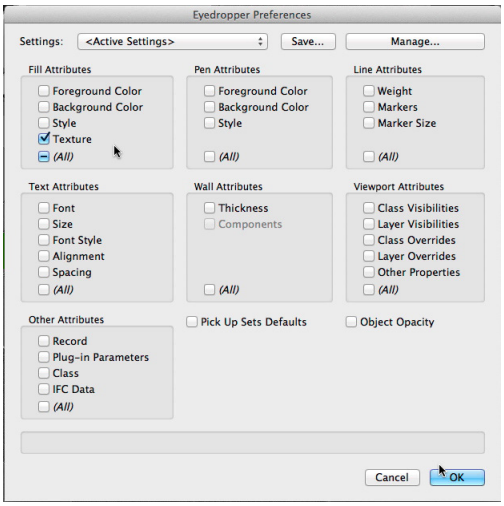
One other thing, if you click on the Part drop-down box, here, you'll see that for this kind of extruded object you can actually apply the texture to specific faces of the object, if that's what you want. You can select the surface that will receive the texture. And you can even apply different textures to different faces, by selecting a specific face, and then choosing a texture. But for this exercise, let's leave this in Overall for now.



Let's apply this texture to the other green objects. We'll use the Eyedropper tool. In the Basic toolset, which is this one, select the eyedropper tool.

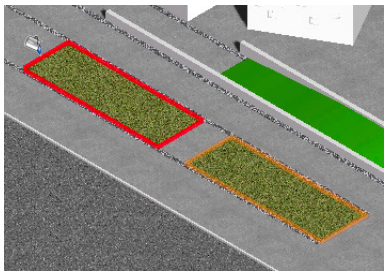


And now press the Preferences button in the Tool bar. And then select the desired setting that you want to transfer from the first object that we completed, to the rest. In this case, we're transferring the fill attribute: Texture.



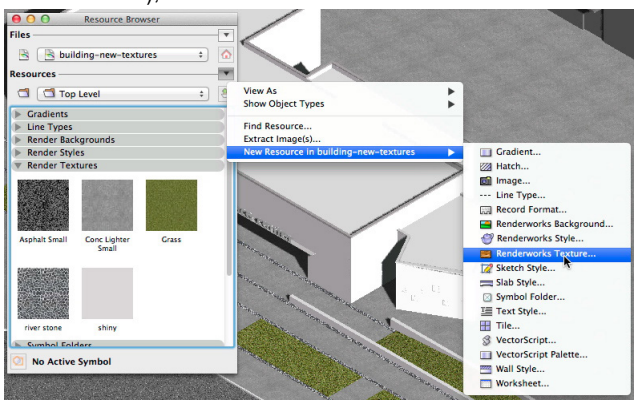
Click on the surface that we've already textured, to "pick up" the

texture, and in the Tool bar click on the bucket icon, and then click on the next object--make sure it highlights, first--, in order to "pour" the texture into it. You can see the texture once it the file has re-rendered.



And now continue clicking on each of the other objects to apply the texture to them as well. Make sure the cursor is over the edge of each object in order to confirm, with the highlight, that you've selected the right object, before clicking to apply the texture. That's really important, to make sure you haven't selected the wrong object for this texture.

We're done with the grass texture, and now we'll create a stone texture, and then apply it to the walls of the model. In the Resource Browser, click on the Resource Menu button...here... and select New Resource in Building New Textures (which is the name of the file), and then Renderworks Texture.

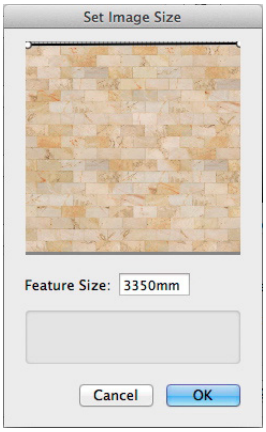


Now in the Edit Texture window, let's give the texture a name: Stone. And under Color, select Image.

And now the program asks you whether to import an image file, or reuse one that already exists in the file. We'll be importing an image, so select: Import an Image File. And now navigate to the place where the image file is located; which is the folder containing this Vectorworks exercise file. The image file's name is travertine.png. Select it and then click Open. You'll see the Edit Image Color dialog box; leave things as they are, just click **OK**.

So now, we've created a new texture, we named it, and then we imported an image, which is the basis of the texture. Now that we've done all that, we need to modify the texture a bit, to make it the right size. In the Size area, on the bottom right-hand side, click on the Set By Image button. In the Set Image Size window, grab the little round handle at the upper left side of the window, and then drag it over to the right edge. That's our dimensioning device.

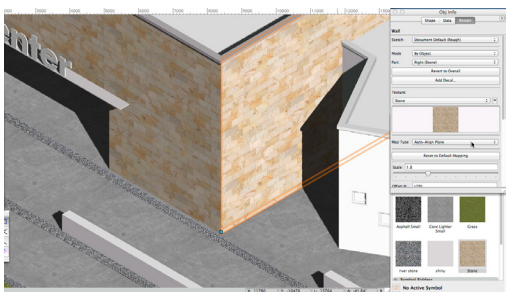
Next to Feature Size enter: 3350mm, and then click **OK**.



By the way, the right side of the Edit Texture dialog box is actually the preview for this texture, and you'll notice it looks blurred. That's because the sample size that is shown in the preview window is too small. So next to Object Size, enter 3000mm and then hit the Tab button. We're done making this texture, so press the **OK** button.

Now let's apply the texture to the building's walls....or at least to some of them, anyway. Let's zoom in closely to the lower right-hand corner of the building, so we can see better. Now select the main front wall of the building. In the Object Info palette, click on the Render tab.

First thing we'll do, is select the part of the wall to receive our new texture. Click on the Part drop-down box and select Right. Now we'll select a texture: click on the Texture drop-down box and select: Stone. Render in OpenGL to see the effect. Now select the wall to the right of it, and repeat the process: in the Object Info palette, click on the Part drop-down box and select Right. And then click on the Texture drop-down box and select: Stone.



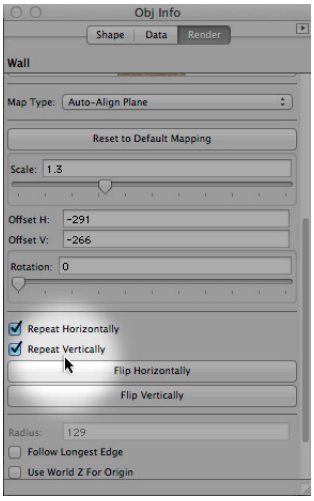
Now, these are unstyled walls, and we've applied the texture to them manually. There are other methods available, such as applying textures to wall styles, to classes, and so on, and these are described in the support materials. But the easiest and most straightforward way of applying a texture to unstyled walls, is to do it manually as I just showed here.

Let me talk for a minute about repetitive textures and the images that are used to create them. When you use repetitive textures, such as the stone texture we used here, that shows stone blocks applied to an entire wall, or--for example--brick textures, the actual image that we import doesn't need to be the full size of the entire wall. In our building here, for example, the front wall is more than 36 meters long; as you can imagine, that would be a huge texture. Instead, the image that we use for such a texture actually represents only a small portion of the overall size of the wall, and then the texture is repeated multiple times upon the surface of the wall, or the object you're texturing, as if it were a tile. And in fact, the process is called tiling.

Let's take a look at an example. Here's a building that has a brick texture applied, but only a single instance of the image used for the texture is shown on each wall. It isn't tiled, in other words; there's only one tile showing.

But once the texture is fully tiled, you can see it covering all of the walls, without being able to distinguish where one tile ends and the next one begins. That's because the image that is used to create the texture has been specially modified, along its edges, to repeat seamlessly when it is applied to a surface as a tile.

This is something you can control via the Object Info palette, by selecting the Repeat Horizontally and Repeat Vertically checkboxes, near the bottom of the palette. If these items are Deselected, you will only see a single instance of the tile. If you select these checkboxes, the image tile will be distributed across the surface you're texturing.



Now, if you'd like to create your own images to use as textures that you can tile across surfaces, it's not enough to just run out with your camera and photograph a brick wall. You'll need to modify the image properly--and that means straightening out lines, correcting lens distortions, and treating the edges for seamless repetition. You can do this in Photoshop, and in other programs also, but be aware that it can be a great deal of work, and not always easy to do. Let me show you what I mean.

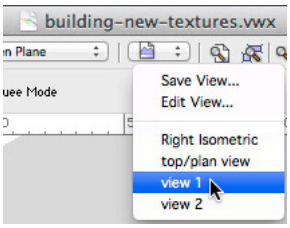
Here's an example of the same building we saw earlier, but with a different brick texture. And this texture used an image that was developed properly. The texture tiles across the walls nicely, and you can't tell where it ends or starts.

And here is the same building but with a different texture, this one made with an image that didn't receive the correct treatment.

Now, Renderworks already comes with a large number of excellent textures, and there are outside sources for images that

can be used for tiling textures as well; some of them are available on the internet, for example. But the main thing to keep in mind is that the images you use must be modified so that they can tile seamlessly, without visible borders.

Anyway, back to our exercise. Let's take a look at the appearance of the building in perspective, now. Switch to Saved View 1, and render with the Renderworks Style: Realistic Exterior Final.



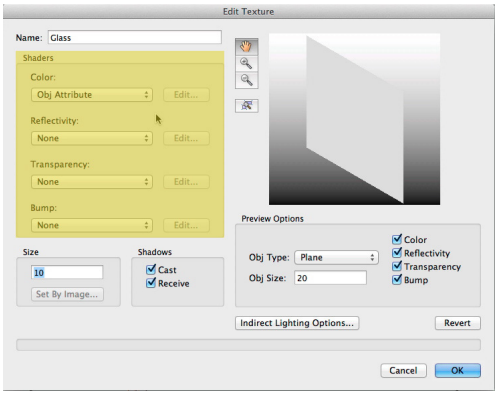
You can see that the glass in the doors and windows is opaque white, instead of transparent. So our next item is to create a glass texture for doors and windows, a texture that will be transparent and reflective.

Procedural Glass Texture

In part 2 of this texturing exercise, we will create a glass texture and then apply it to doors and windows.

Go to the Resource Browser, click on the Resource menu button, and then select New Resource in Building-New-Textures, and then select Renderworks Textures. In the Edit Texture dialog box, give the new texture the name: Glass.

Now, take a look at the left side of the Edit Texture dialog box. Each texture is made up of four shader types. These shader types are actually individual components that give the texture certain features: color, reflectivity, transparency and bump (which gives the texture a three-dimensional appearance). Not all textures require all four of these shader types, and for this glass texture, we'll only use three: Color, Reflectivity and Transparency. Let's start with Color.



In the Shaders area on the left, click on the Color drop-down box, and select Color. And now we need to select a color, so click on the Edit button, next to the drop-down box. And select a color for the glass. For this exercise, the color should be nearly black, but just a little bit lighter, really a very dark grey. The reason for this, is that the color black will make the glass almost completely transparent in the rendering, very clear and clean-looking. But adding a little bit of white will make the glass just slightly opaque, to make the window stand out a bit in the rendering. So select a dark grey, and after selecting the color, click **OK**.

Now let's make the glass reflective. We do that by choosing a Reflectivity shader. Click on the Reflectivity drop-down box, and select Glass, which is one of the reflectivity shaders. Now click on the Edit button next to the Glass shader's drop-down box, and select a Center Color, which will give the glass a slight tint of color when viewed from certain angles. Select a very dark green, like this one.... but not too dark, otherwise it will just look grey in the rendering. After selecting the color click **OK**.

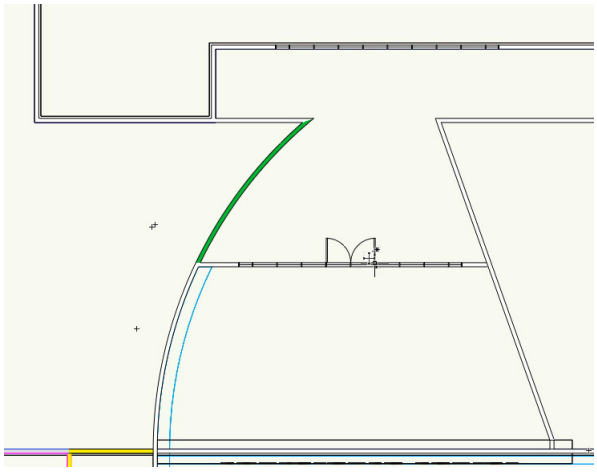
And finally we need to make the glass transparent. Click on the Transparency drop-down box and select Glass, which is one of the different transparency shaders available. Now click on the Edit button next to the Transparency shader's drop-down box, and this is where you can adjust a number of the glass

transparency's features. In this case we're increasing the amount of light that can pass through the glass, that is, making it a little more transparent than the default. So in the Transmission data field, enter 90.

You can see that there is a certain pattern to creating these textures using the built-in tools provided by Renderworks. Basically each texture can be composed of up to four shader types. Select the shader types that are appropriate for the texture, and then click on the shader type's edit button to make adjustments. It's worth experimenting with the different shaders that you can find under shader types, because sometimes the one you need may not be immediately evident. For example, in some cases when creating a glass texture with Reflectivity, it is better to choose the Mirror shader, instead of the Glass shader for that shader type.

Now click **OK** to finish, and we're done with the glass texture. There's one last thing we need to do with the glass texture, and that is apply it to the doors and windows.

In this file, all the doors and windows have been set up to have the glass placed in a separate class called Glazing-Clear. Let's take a look at this. Switch to Top/Plan view, and then zoom in and click on the entry door.



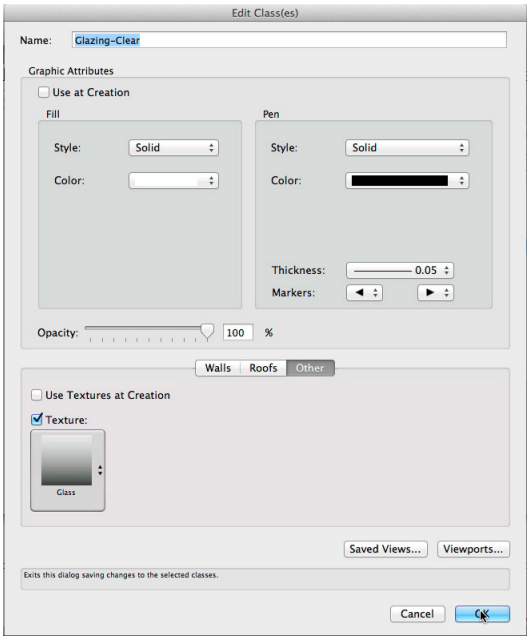
In the Object Info palette, under the Shape tab, click on the Settings button, and in the Door Settings dialog box, click on Classes, on the left. Now look at the last three items in the Classes list, in the center column. You can see that Glazing, Sidelight Glazing and Transom Glazing have all been placed in the Glazing-Clear class. It's not just the doors, but the windows in this model have also been set up in a similar way.

Why is this important? Because in Vectorworks, it's possible to assign a particular texture to a specific class, and so when you put an object in that class it will automatically display the assigned texture as soon as you render.

In this case, since all the doors and windows have their glazing assigned to the Glazing-Clear class, all we need to do is assign the new glass texture that we just created, to that class, and then all the doors and windows will automatically display the new glass texture when we render.

Let's open the **Organization** dialog box, and click on the classes tab, which is the first on on the top left. You can see the Glazing class, so let's click on the little triangle to open it up....and now select Clear, and then click the Edit button at the bottom. So now we're editing this class.

The bottom part of the Edit Classes window is where you assign textures to this class. You'll see three tabs here, where you can select walls, roofs or Other. In this case, the glass in the windows are not roofs or walls, so click on Other. Now we need to select an assigned texture, so click on the Texture checkbox, and then on the selection tool beneath it, and select the texture Glass.



Click **OK** to finish, and then click **OK** again to close the **Organization** dialog box. Now we're done assigning the glass

texture to the Glazing-Clear class, so let's switch to a perspective view and render to see the result.

Now the methods that we've used here to apply textures to objects, are just a few of the ways that we can apply textures. Vectorworks offers many different methods for this, including applying textures to specific faces of objects and not others, assigning textures to different wall styles, so that when you use such a wall style the textures are immediately displayed when you render, and there are other methods as well.

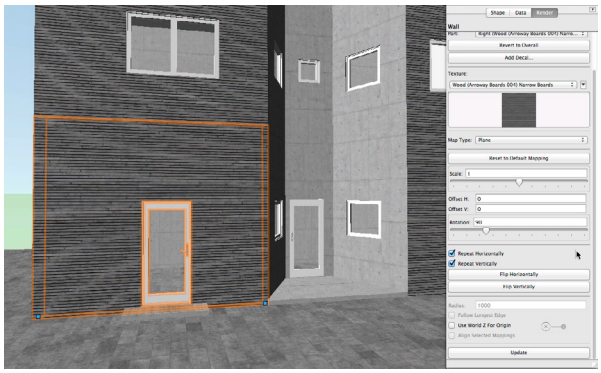
The ones we show here are among the most easy to use, but once you become more familiar with Renderworks and begin to do more work with it, it's worth looking up all these other methods in the support materials, because if the files are set up to use them, they can actually save you a great deal of time and effort.

Mapping Textures

In the last part of this texturing tutorial we'll discuss three tools that are available for adjusting the size and location of textures on surfaces. Until now we've just talked about placing textures on surfaces. Once you've placed a texture, though, you'll often need to adjust it's position. Renderworks provides a number of tools for adjusting the location of the texture on the surface of an object, and also for changing the apparent size of the texture as well, beyond the size you specified when the texture was originally created.

Let's take a look at a sample project; this is a similar building to one we saw earlier, but with different textures applied. The first tool we can use to adjust the texture's placement on the surface of an object is the Object Info palette.

So let's zoom in, and then select one wall here, and now take a look at the Object Info palette. Click on the Render tab to access the rendering controls, and scroll down to the bottom half of the palette, which contains a variety of texture mapping controls. Texture mapping refers to the process of placing textures on surfaces, and then adjusting their size and location. In this tutorial we're looking at a few specific items.

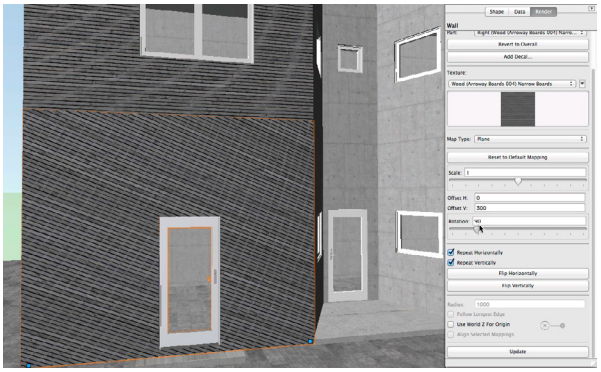


By the way, when you're adjusting textures on walls, before making any changes in the Object Info palette, make sure that the correct wall surface is selected in the Part drop-down box, otherwise you may not see any changes taking place. In this case, the texture is applied to the Right side of the wall, so I'm making sure the Part drop-down box has the Right side selected.

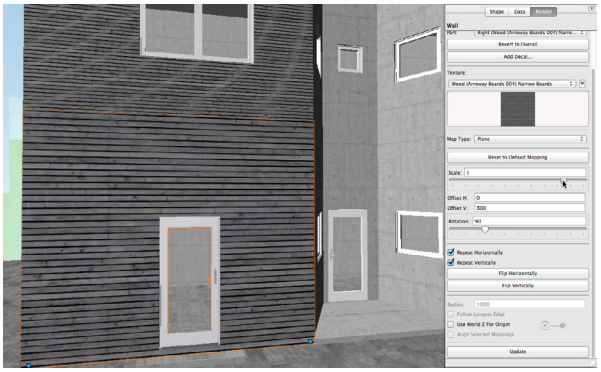
Back to the bottom of the Object Info palette. First, note the two Offset data fields. Entering horizontal and vertical dimensions here will move the texture in those directions on the surface of the object. So in the Offset V data field, V for vertical, I'll enter 300mm, and the change is visible right away, since the scene is rendered in OpenGL. Sometimes, if the image is broken up a little bit, force a redraw by double-clicking on the Pan tool, in the Basic palette.

Now there are other controls here that change the position of the texture directly. For example, we can change the rotation value,

either by entering a value in degrees, or moving the slider interactively, like this.



And we can also change the size of the texture on the object, by changing the Scale value above. You can do this, again, either by entering a value in degrees, or moving the slider interactively. Moving the slider all the way to the right will double the scale of the texture. But you can always enter a larger or smaller number manually in the data field, and then press the tab key to see the result.



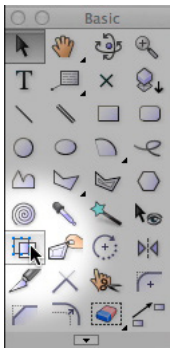
The last item is the Use World Z for Origin checkbox, near the very bottom of the palette.

This item helps align textures on different layers. When the walls or objects on each layer have this item selected, the textures will usually align vertically in a seamless fashion.

Let's try it here. First I'll increase the scale of the second floor texture to match the one on the lower floor. And now I'll select the Use World Z for Origin checkbox for each of these walls.

How well they align depends on a number of things, including the nature of the texture itself, but when you have a problem making sure that objects on different layers have their textures align vertically, try selecting the Use World Z for Origin checkbox.

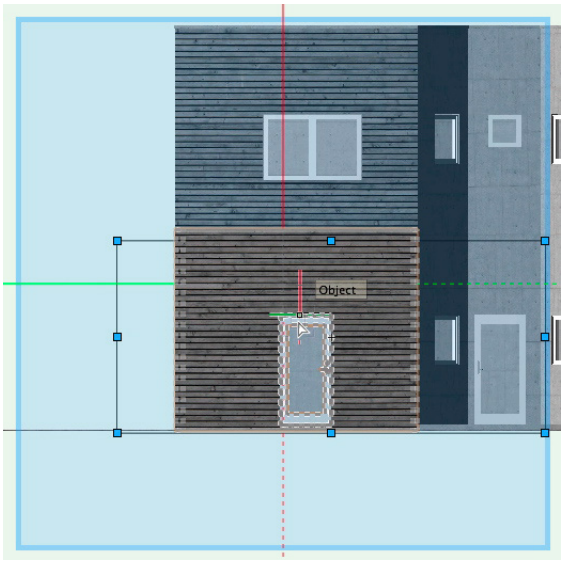
Another tool for aligning and selecting textures is the Attribute Mapping Tool. This tool is located in the Basic palette, here....



First, I'll switch to a Front view, in order to see this more clearly, and then render in OpenGL.

Now, the Attribute Mapping Tool lets you manipulate a texture on an object's surface directly. To use this tool, select it in the Basic palette, and then click the wall or surface on which the texture is located, to select it. You may need to select the Original Repeat Mode in the Tool bar, in order to see the entire repeating texture.

Now move the cursor over the surface, and you'll see a set of blue markers, or control handles. Move the cursor over the center marker, shaped like a diamond, until the cursor changes into a cross. Then you can click and drag the texture into position. You can move the texture, and snap to corners or other elements, and even rotate the texture on the surface.

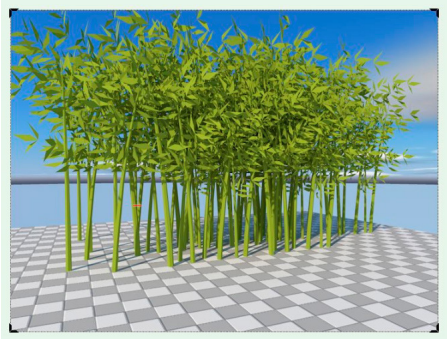


Now all of these tools have more capabilities than I've shown here, and it's definitely worth experimenting with them to see what they offer. What we see in this tutorial are the basic aspects of these tools, but much more is available once you become

familiar with them, material that is documented in the Help and other sources. But the main point is that after you've applied a texture to a surface, you can adjust its location, and its size, by using the Object Info palette's controls, or the Attribute Mapping Tool.

Creating Image Props

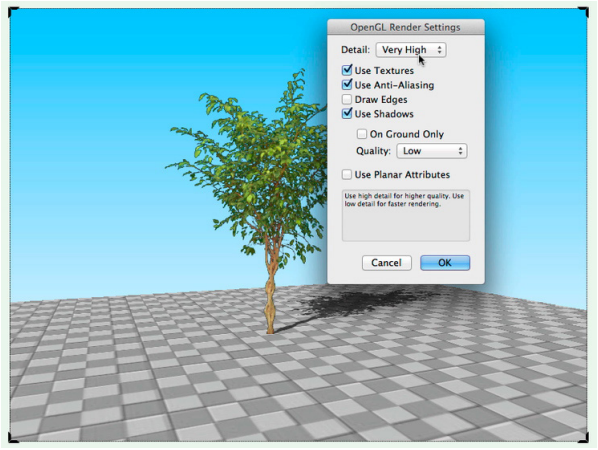
If you want to add images of trees, people, cars and other accessories to a scene (in architecture this is often called Entourage), you have a few options. It's possible to create or import 3-D models of these things, but sometimes these models can be so big and complex that they make the file unwieldy to use, and slow to render. Here's a quick example, of a very very simple 3-D model of bamboo, originally a Sketchup model, that has over 12,000 separate objects and polygons within it.



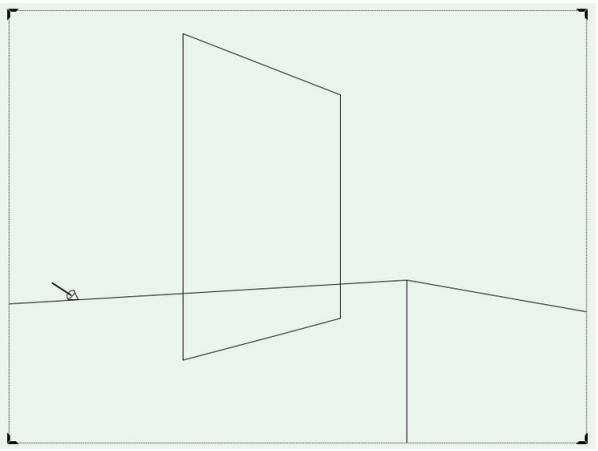
You can imagine that a more complex model that requires each 3-D polygon to be calculated and rendered could add a significant burden on the computer's brainpower, and this can actually slow things down quite a bit, depending on the computer's power and the complexity of the model.

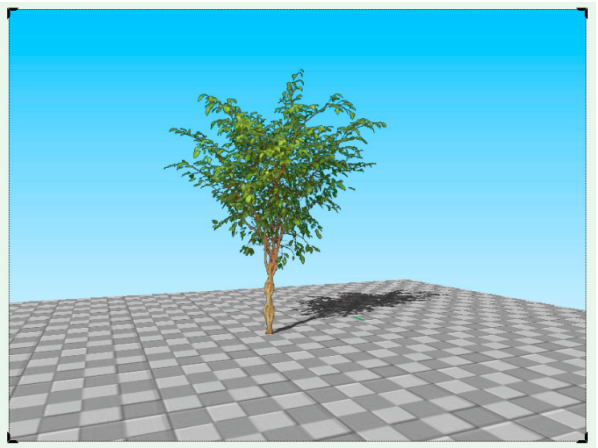
Now with some renderings you really do need complicated 3-D entourage. But in other cases, you can take advantage of a much faster and simpler technology, called image props. With Renderworks, you can create a simple, flat object containing an image--or actually a texture--of an entourage item, such as a tree. This called an image prop, and it's a kind of flat billboard that has special features that increase the sense of realism. An image prop can be a lot simpler than a complicated 3-D model, and it's often a good alternative to complicated entourage.

Let's take a look at a specific example. Accompanying this part of the tutorial is a file called "image prop example.vwx". Let's open the file, and you can immediately see, in wireframe view, the outline of the flat imageprop, over here. And now render in OpenGL. By the way it's a good idea to set it to the best OpenGL rendering quality . Go to **View>Rendering>OpenGL Options**, and make sure the settings are the same as these. Set the **Detail** to Very high, and select **Use Textures**, **Use Anti-Aliasing** and **Use Shadows**.



So there are a number of things worth noticing. First is that the image has a transparent background, meaning that you can see around and in-between the leaves of the tree. Another is that even though the image-prop is flat, and may not be pointing toward the viewer when you see it in wireframe view, when the image is rendered, it appears oriented properly. You can see it here, when we render in wireframe and then in OpenGL.





These two features, transparency (also called a transparency mask) and the rotation toward the viewer when rendered, are basic and important features of image props. The transparency capability means that you can create a 3-D appearance very simply using flat objects one behind the other so that you can see them overlapping, and the rotation toward the viewer means that you can place these objects anywhere in the scene without worrying about orienting them properly to a specific view, because when you render the scene they will always appear rotated toward the viewer.

Now, a large number of image props are already provided with Renderworks, ready to drop into a scene. All of them have these basic features of transparent backgrounds, and rotation toward the viewer. In this tutorial we'll take a look at how you create an image prop, and then we'll switch back to the main model file that we've been working on until now, and place a variety of image props in different locations around the model, to increase its realism.

The image prop we're creating is the one shown in this example. So first we'll need a graphic image file as the basis of the image prop. You'll find it in the folder containing this tutorial, it's called tree five image.png. And now let's switch to a Top/Plan view.

The process of making an image prop is a straightforward, step-by-step procedure, so I'll just call out the steps one by one.

Step 1: go to the menu command **Model>Create Image Prop**.

The **Choose Prop Image** dialog box will open, asking us to select an image to be used in the image prop. We're not re-using an image, instead we'll import one.

Step 2-Click on: Import an Image File, and then click **OK**.

The Import QuickTime Image Document dialog opens.

Step 3 -Navigate to the folder containing this exercise. The image file to be used for this image prop is located in this folder, and it's called it's called tree five image.png.

Step 4-Select the image and then click on the Open button.

The Image Prop Options dialog box opens.

Step 5-In the Name data field, type a new name for

this image prop: tree five.

Step 6-Under Dimensions, change Height to 3660mm, and make sure that the Lock Aspect Ratio checkbox is selected. This way when you change the height, the image will automatically acquire the correct width.

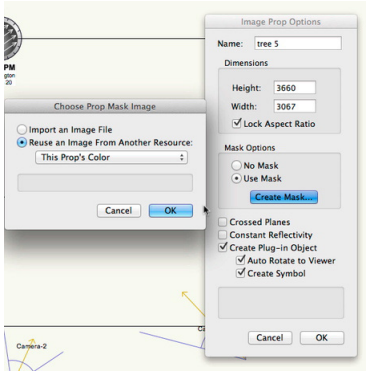
Now we'll make the background color of the image transparent, so that only the image of the tree itself will be seen.

Step 7-Under Mask Options, select Use Mask, and then click on the Create Mask button.

The Choose Prop Mask Image dialog box opens. To create the transparency mask (required in order to make a portion of the image transparent) we'll reuse the image we have already selected:

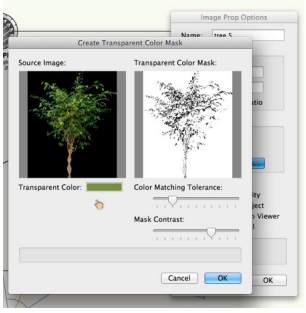
-Click on Reuse an Image from Another Resource.

-Leave the drop-down box at This Prop's Color (if that is not the default selection, click on the drop-down box and select This Prop's Color).Click **OK**.

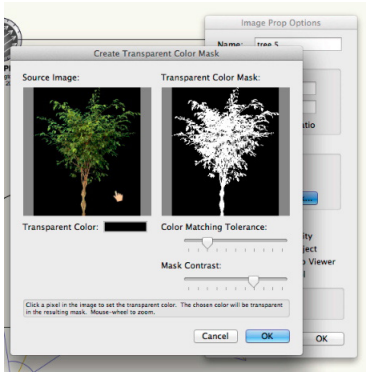


Step 9-In Create Mask dialog box, Select Transparent Color, and click **OK**.

The Create Transparent Color Mask dialog box opens. We will now select the color to be used as a transparent color mask (anything in that color will be transparent in the image prop). Notice that the original image, which you can see here, has been prepared with a uniform background of a single color, because when you make an image prop, it is easier to pick out a single color and make it transparent.



Step 10-In the left window, click on the black background color. This will make it transparent.



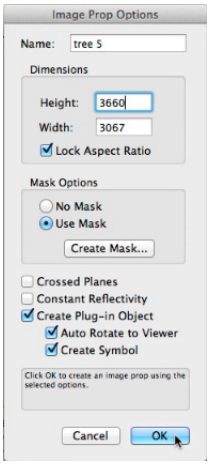
-Click **OK**.

Now we're back in the **Image Prop Options** dialog box.

Step 11-Deselect **Constant Reflectivity**. This setting increases (or maintains) the brightness of the image prop, even when it is in the shade. We don't need that for this example.

Step 12-Make sure the **Create Symbol** checkbox is selected. This will make the image prop into a symbol that can you can place repeatedly throughout the scene.

And the final step-Make sure the remaining options are as shown below. These are: height, Lock Aspect Ratio, Create Plug-in Object (this will automatically make the symbol into an image prop plug-in object when you place it in the scene); Auto Rotate to Viewer and Create Symbol.



-Click **OK**.

And now notice that an image prop has been placed in the center of the drawing. It's flat, so you will only notice a thin line. But if you change to a Right Isometric View you'll see the outline of the image prop. Now switch to Saved View 1, and then render with Realistic Exterior Fast.

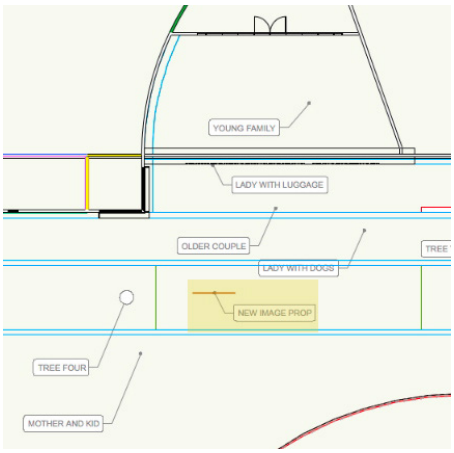
Now, notice that with the new image prop selected, the Object Info palette provides a few controls, such as height, width, and other items. You always make some changes top the image prop by modifying these settings directly in the Object Info palette, like this.

So now we're done making the image prop, and we can copy and then paste it into our building file that we've been working on during this tutorial. So, let's copy the image prop... and now we'll open the building exercise file. For this part of the tutorial, the building exercise file is located in the same folder as the rest of the material used here. So open the file building-new-entourage.vwx. And once the file is open, go to **Edit>Paste** it in place, like this. The image prop will be pasted into the interior of the building, but we'll move it shortly to its correct position.

As you may remember, this exercise file has a layer containing a kind of placement map for the different items we'll be placing in the drawing. Let's make it visible by changing layer options and making the other layer visible. Go to **View>Layer Options>Show/Snap Others**.

Notice in the front center of the building a label called New Image Prop. Grab the image prop we just created and move it over to the label location.

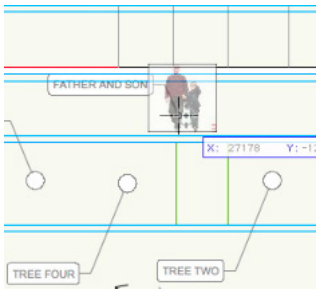
And now all that remains is to go to the Resource Browser, select individual image props that are already included in the file, and



then copy them onto the locations shown in the placement map that is visible.

So let's go to the Resource Browser, and make sure that the browser shows the active file, like this, and double-click on the Symbols/plug-in objects folder to expose its contents. And now simply drag and drop each image onto the appropriate spot in the

drawing. We'll start with the "father and son" imageprop. Select it in the resource browser, then drag it over to the drawing and place it here. And do the same with each of the remaining image props.



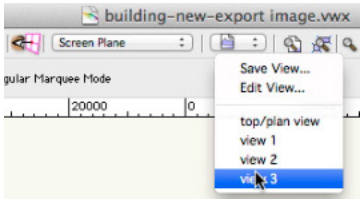
The file also includes one 3-D entourage item, a car symbol. Use the same process to place it in the scene too. Click to select it in the Resource Browser, and then drag and drop it onto the right spot.

Once you're done placing all the image props and entourage items, change the layer visibility back, switch to Saved View 2, and render with the Realistic Exterior Final renderworks style.

Export Image

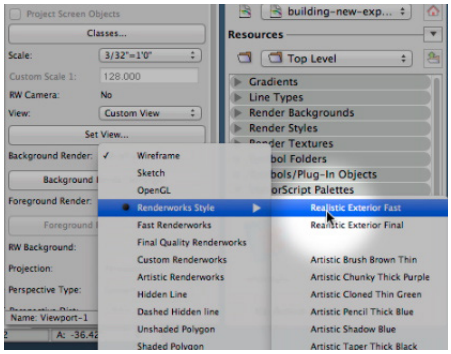
Up to this point, we have prepared a model, applied textures to walls and other objects, and then placed entourage in the scene; trees, people and a car. Now we can render the scene, and after rendering, we can then either print it directly, or export the rendering for use with other programs.

Until now we've worked entirely in design layers, but for this exercise we'll be working with a sheet layer viewport showing a saved, perspective view. Let's open the Vectorworks file for this exercise, building-new-export image. The file already has a sheet layer viewport prepared, and you can find it by going to saved view 3.



Now, what you see here is a viewport containing a wireframe view of the scene, based on a saved view developed in the design layer, earlier. As far as lighting goes, the design layer already contains a Heliodon object representing the sun, so we only need to render the viewport with a Renderworks Style. A render style automatically includes light from the sky, so that's all we need to complete the rendering.

To do that, click on the viewport to select it, and in the Object Info palette, click on the Background Render drop-down box, and then to Renderworks Style and Realistic Exterior Fast.



We're using Realistic Exterior fast here so that we can see the rendering quickly, but for the final rendering you can use Realistic Exterior Final.

Now, unlike a design layer, a viewport will not start rendering automatically as soon as you choose a rendering method. Instead, you have to update the viewport to get the rendering process started. And you do this by clicking on the Update button in the Object Info palette, here.

Now that the viewport has rendered, we'll export the image as an image file that can be used for various purposes, such as a web presentation, or printed materials such as brochures, reports or simply large rendered images. Now you can export the image as a PDF, of course, but in this tutorial we're focusing on image formats such as JPEG and TIFF, which are often used for web design and printed presentations.

To export an rendered image, go to **File>Export>Export Image**

File. In the **Export Image File** dialog box, arrange the settings as shown here. Beginning in the upper left side, in the Export Area you have several different options, which are pretty much self-explanatory, but let me focus on two specific options.

Current View will export the sheet with the rendering exactly as shown on the screen, so if you are zoomed out and include a lot of empty area around the image, that is exactly what the rendering will include.

Marquee allows you to draw a fence–or marquee–around the specific portions of the rendering you want to include in the image.

Each Page as Separate Image will export the area within the margins, and is most often used when exporting an image from a viewport. If you have more than one page set up in your Page Setup settings, it will export all the pages (or actually the areas within the margins of all the pages) as separate images. For this tutorial, we'll use this selection.

In the Dimensions area, make sure **Lock Aspect Ratio** is selected. This way, if you change the height of the exported image, for example, the width will adjust automatically to the correct dimension. We'll come back to Resolution in a minute.

Print size. Once you have selected Each Page as a Separate Image, which we talked about a minute ago, you can leave Print Size alone, since it will automatically reflect the size of the image, which is based on the size of the sheet you're using. In this case, we are using an A4 sheet with margins that are shown in the viewport.

Now let's select the format of the image we are exporting. In the Format area, click on the File Type drop-down box and select a format. JPEG and PNG are good for viewing on monitors, or for web design. TIFF is a good choice for printing. Photoshop will export a file in native Photoshop format.

Once you're done selecting the export options, click on the Save button. The Export as QuickTime Image Document opens, and you can select a spot to save your image, and a name for the image, and then you can click the Save button to finish exporting.

Let's go back for a minute to to the **Export Image File** dialog box. **File>Export>Export Image File**.

Under dimensions, you can see a data field where you can change the resolution, when certain formats are selected, such as TIFF or JPEG. Generally, it's best to have the Resolution here, march the resolution of you sheet layer viewport. If your sheet layer resolution is at 300dpi, then it's best to have the export image file resolution at 300dpi as well, and the same for 72dpi, they way we have it here. They should both match. Now, here's what I mean.

Let's take a quick close-up look at the viewport rendering, and zoom in to see some detail. When you zoom in, to about here, you can see that the image is blurry, and some diagonal lines actually appear to have steps in them.

That's because the sheet layer on which the viewport resides is currently, and by default, set to a low resolution of 72 dots per inch, which is good for viewing on a screen, but really too rough for most printing purposes. Printing normally needs a much higher resolution in order to preserve the sharpness and quality of the printed image. For printing purposes, a resolution of 300 dots per inch is often a good setting. And here's a comparison, at a different scale so we can see this effect clearly, of this viewport at 72 and 300 dpi.

[Now let's zoom out again.]

To increase the resolution of the sheet layer, you have to edit

the sheet layer, and you can do that in the **Organization** dialog box, or in the Navigation palette, if it was installed with your Vectorworks package. Let's open the **Organization** dialog box: go to **Tools>Organization**, and then click in the Sheet Layers tab at the top of the dialog box. The "renderings" sheet layer will be highlighted, and if not, click to highlight it now. Click on the Edit button at the bottom of the window, and in the Edit Sheet Layers dialog box, change the DPI setting, from 72 to 300. Click **OK** to close this dialog box, and then click **OK** again to close the **Organization** dialog box.

So now you can see the candy-stripe indicator around the edge of the viewport, here, which means you have to update the viewport, since we've changed the settings.

Go to the Object Info palette, and click on the UPdate button. The viewport will start re-rendering, but it will render much more slowly this time, because it has to calculate and display a much larger number of dots on the screen. So just keep in mind, that for screen viewing you can use a low DPI figure for the sheet layer, such as 72, but for printing you need a higher number, even though it takes a lot longer to render.

OK, let's stop the rendering. And let's change the resolution back to 72dpi, for now. Click on the layers button up here to open up the **Organization** dialog box, and then in the **Organization** dialog box, click on the Edit button. In the Edit Sheet Layers dialog box, change the DPI back to 72.

And now let's update the viewport again in the Object Info palette, and once that's done, we'll export the image: **File>Export Image** File.

So now under Dimensions, adjust the resolution to match the resolution of the sheet layer. If you set the sheet layer to 300 dpi, for example, set this one here to match. You don't want the sheet layer to be at 300dpi, with all that rendering time involved, and then export at only 72dpi and lose all the sharpness that you worked so hard to achieve when you increased the resolution of the sheet layer.

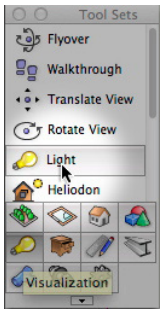
Once you're done selecting the export options, click on the Save button. The Export as QuickTime Image Document opens, and you can select a place to save your image, and a name for the image, and then you can click the Save button to finish exporting.

Interior Night Lighting

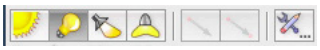
For interior night-time scenes, you have to insert lights in order to illuminate a space, just as you would in real life. Vectorworks provides a number of different light types, most of which are accessible using the Light tool in the Visualization palette.

Let's open the file for this exercise: Building Lobby Night.vwx. Now let's switch to Saved View 1 and render with OpenGL. You can see that the scene is dark because there are no lights placed in the space. So to begin, we will place lights in the room, but first we switch to Top/Plan view to see this more clearly.

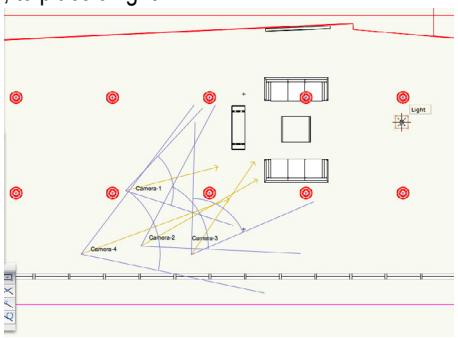
Let's place the first light. Go to the Visualization palette and click on the light tool.



And then, up in the Tool bar, select the kind of light you prefer. Vectorworks provides a number of different lights here. You can select a directional light (equivalent to the sun), a point light (as in a bare light bulb) or a spot light (which similar to a flood light or a regular spot light, which casts light in a specific direction).



For this tutorial, we'll use a point light, so click on the Point Light Mode button, in the Tool bar and then click once in the scene, over here, to place a light.



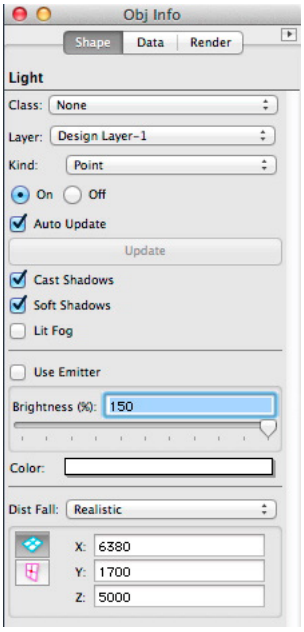
The first time you do this during a Vectorworks session, the Light Preferences dialog box will open. You can leave the settings as they are, for now. We'll be adjusting them in the Object Info palette.

As soon as you've placed the light, go to the Object Info palette. Let's make some changes. Notice that the light is already set up to cast shadows, but for this tutorial, let's also select Soft Shadows, for a better rendering.

Next, let's adjust the brightness. We're putting a light in a very tall space, so we should make the light brighter. For now, let's make this 150%.

And finally, let's adjust the Distance Falloff setting. This setting controls the rate at which the light falls off with distance. Click on the Dist Fall drop-down box, and take a look at the options. There are three options here; the first has no distance falloff at all, the second is called Smooth, and causes the light to fall off linearly, and the third selection, called Realistic, causes the light to fall off in a much more accurate, realistic fashion. Let's choose Realistic.

Finally, let's raise the light to the correct height. Down at the bottom of the Object Info palette, there is a Z data field. Remember that Z refers to height or elevation, so click in the data field and enter 5000mm.



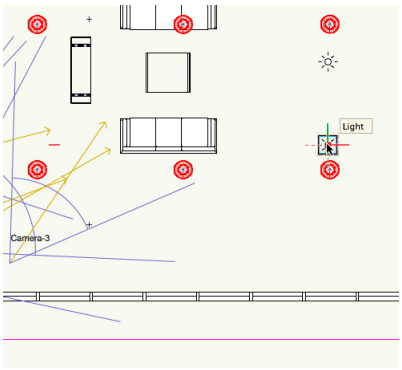
Switch to a Front view, and verify that the light is indeed at that height, right under the ceiling.

Now let's take a look and see how much light is in the scene now.

Switch to Saved View 1, and render with Realistic Interior Fast.

Notice that the amount of light here is really not sufficient to illuminate the entire room; this light's brightness is equivalent to about a 150-watt incandescent bulb. So to add more light to the room, we can either increase this light's strength, or add more lights to the room. For this tutorial, we will add more lights.

Switch to Top/Plan View, and make sure the light is selected. And now press the Option key and drag down an extra light, to about here.



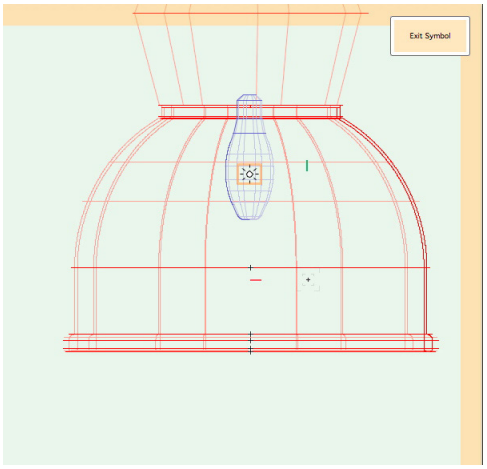
Switch back to Saved View 1 and render with Realistic Interior Fast. You can see that there's quite a bit more light now, but even more light is still needed.

Before going on, notice that the rendering is displaying these little icons of light objects. These are useful to see when you're working in wireframe view, but not so desirable in a rendering. We can make them invisible in the renderings by doing this: go to the **Vectorworks Preferences**...click on the **Display** tab at the top, and then on the right side, next to **Display Light Objects**, click on the drop-down box and select Only in Wireframe. Then click **OK**. Now the scene will re-render, but without showing those light icons.

So now we'll add more lights in the room. To make this easier, and also to increase the visual realism of the scene, the file includes models of light fixtures, already placed under the ceiling, as you can see over here. There are ten of these models, distributed throughout the room. Switch to Top/Plan view for a second, and now you can see the fixtures. Let's switch back. These light fixture models are symbols, actually, but they don't contain any light objects in them, so our next task is to edit this symbol, and then add a light object. And once we've added a light object to the symbol, that light will automatically appear in each instance of that symbol in the room. It's a way of increasing the number of lights in the room using a symbol, instead of adding ten individual lights one by one.

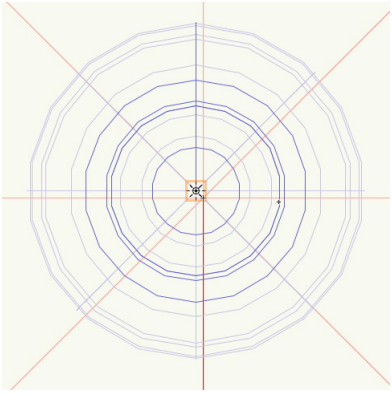
First, let's render in Wireframe. And now let's delete the lights we added earlier, since we're replacing them with the light fixtures we're editing. And now double-click on one of the light fixtures in order to edit the symbol. In the Edit Symbol dialog box, select 3D Component, and now we're looking at a side view of the fixtures in the symbol. Let's zoom in, to where we can see the model of the light bulb in the fixture.

Now let's insert a light object. In the Visualization palette, click on the Light Tool, and then in the Tool Bar, select Point Light Mode. Now click in the drawing, roughly in the middle of the light bulb, here.



Let's go to the Object Info palette, to make some adjustments. Select Soft Shadows. Change the Brightness to 150, just as we had it before, and then click on the Distance Falloff drop-down box and select Realistic.

One more thing to do. We need to make sure the light object is centered on the light fixture, so switch to Top/Plan view and then on the Fit to Objects button, in the View Bar, and we can see that the light is indeed centered in the model.



Click on the Exit Symbol button, on the upper right side, and we're back in the scene. Let's switch to Saved View 2, for a wider view of the room.

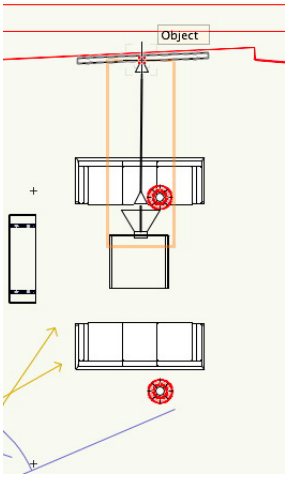
Now render with Realistic Interior Fast.. It may take a little bit of time because darker scenes can sometimes take a bit longer to render.

Let's recap for a minute. First we created a single light object, and placed it in the scene. Then we added another one, to add more light. And finally, we deleted those lights, and instead added a light object to a symbol of a light fixture that was already in the scene. Once we edited that one symbol, the light appeared in each instance of the symbol throughout the scene, so we added a great deal more light to the scene that way.

For a better quality view, render with Realistic Interior Final. But just be aware the the rendering will take considerably longer than Realistic Interior Night Fast.

Before we finish we'll do one more thing. Let's add a couple of spot lights to illuminate the artwork on the walls. Switch to Top/Plan view, first. Now go to the Visualization palette, click on the Light tool, and then up in the **Tool bar**, select the spot light mode.

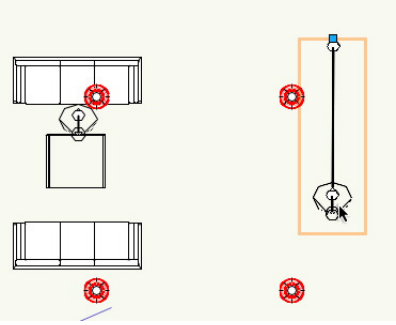
Now we'll place the light. Click once near the sofa, here, and then drag the cursor over to the artwork next to the wall, and click on the artwork.



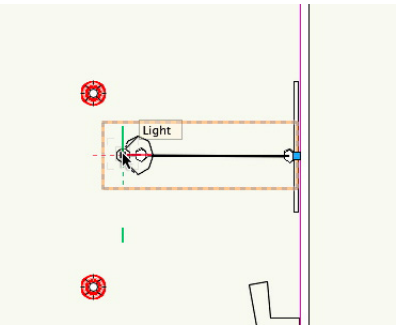
Now we've placed a spot light, and let's make a few adjustments in the Object Info palette. Select Soft Shadows, and in the Distance Falloff drop-down box select Realistic. Give the light a brightness of 300%.

Now let's adjust the height of this light. In the Z data field, enter 5000 mm. And in the Look To data field, enter 1000mm. This means the light is right under the ceiling, and it's pointing to a target that is at 1000mm above the floor. Now switch to Saved View 3 and render with Realistic Interior Fast, to see the light in action.

Now add one more spot light on the second artwork. Switch to Top/Plan view, and duplicate the first spot light by pressing the Option key and dragging the duplicate to the side.



In the Object Info palette, go down to the Pan data field, and next to the existing figure, enter -90, and then press tab. This will rotate the fixture to the right. Now drag the fixture so it aligns with the second artwork, here, and then switch to Saved View 2.



Render with Realistic Interior Fast, to see the result.

Let me mention a couple of things about spot lights. Let me switch here to wireframe for a minute...The spot light has a number of interactive controls that can make it easier to adjust for particular effects. For example, the spread and beam diagram, in the Object Info palette, lets you manually get ahold of the controls for the beam and the spread, and make adjustments visually. And the same with the pan and tilt controls at the bottom; you can

enter numbers manually, but you can also drag the sliders and then see the effects interactively; especially when rendering in OpenGL (depending on the file).

One other item. We're using these lights in their simplified format, in keeping with the spirit of this Getting Started Guide. But these lights also have more capabilities and refinements, all of which are documented in the support documentation. For example, when you have a light selected, you can go to the Object Info palette and select Use Emitter, and this will allow you to select a brightness for the light based on real-life lighting data, using either Lumens or Candelas as the lighting unit. A 100-watt incandescent bulb, for example, emits around 1750 lumens, and this can be replicated using these controls.

Now these lights that we have worked with in the tutorial are just a couple of several different types of lights available. There are also linear lights, similar to neon or fluorescent in their light output, and there are area lights--similar to fluorescent ceiling fixtures, and there's even a texture, called Glow, that can emit light and be incorporated into a light fixture. All of these are discussed in the support information available via help and other manuals, but at the core, these are all variations on the lights we created, and worked with in this exercise.

Interior Day Lighting

One of the joys of working with Renderworks is rendering interior scenes that are lit by the sun through openings or windows. The light comes in and bounces off the interior surfaces, and this results in subtle combinations of shades, shadows and colors. What's even better is the ease with which this can be done. All that is needed is to place a Heliodon in the scene, adjust it for the best angle of light and then simply render.

Let's take a look at the process. Open the file used in this exercise: building lobby day.vwx. It's in plan view, and the first thing we'll do is place a Heliodon. Click in the Visualization palette, and then select the **Heliodon** tool. Now click in the scene to place the Heliodon.

Now we'll adjust the Heliodon's settings for this exercise. Later we'll take a look at modifying these settings for the best results.

With the Heliodon selected, we'll go to the Object Info palette, and click on the Settings button. In the Settings dialog box, make the following changes.

For Region: USA

City: Bangor

Now click **OK**.

And then back in the Object Info palette, click on the **Solar Animation** button. In the Solar Animation dialog box, make sure Heliodon is selected, at top....and now make the following changes.

Day: 4

Month: 2

Hour: 1

Minutes: 30

Click **OK**.

Now we're done making adjustments to the Heliodon for this tutorial, so let's take a look and see how this scene will render. Go to Saved View 2, and then render in the Renderworks Style: Realistic Interior Fast.

Now that we have the basic rendering, there are a few things we can do to tweak the lighting for better results. First, let's see if adjusting the position of the Heliodon will improve the lighting.

Let's render in OpenGL first, so that we can observe the position of the sunlight immediately. The speed of OpenGL rendering is important here. [render now]

By the way, if you're not seeing shadows, you'll need to arrange the OpenGL settings to display shadows. Go to: **View>Rendering>OpenGL Options**, and arrange the settings

as shown here (and these settings also control other features as well):

Detail: High

Use Textures: selected

Use Anti-aliasing: selected

Use shadows: selected

Quality: High

Click **OK** to finish.

Now let's adjust the position of the Heliodon. The Heliodon object is still selected, so go to the Object Info palette and click on the **Solar Animation** button, at the bottom.

In the **Solar Animation** dialog box, move the Day and Hour sliders to adjust the position of the Heliodon, and of the shadows. Be aware that OpenGL does not display light bouncing between surfaces, so the image will appear darker than when rendered in a Renderworks Style.

Once you've found a suitable position for the Heliodon, click **OK**. And now render in Realistic Interior Fast.

There's one more easy adjustment we can make, and that is changing the strength of the Heliodon's light. In some cases with sunlit interiors, increasing the Heliodon's brightness can make a significant difference in the quality of the lighting.

The Heliodon is still selected, so go to the Object Info palette, and in the Sun Brightness data field enter: 200, then hit the Tab key, or the return or enter keys. The scene is currently rendered, so it will re-render as soon as the keys are pressed. Then, as soon as the scene renders you'll see the difference right away.

Here's the scene with the Heliodon brightness at 100, and here it is with brightness at 200.

The difference is even more pronounced when the scene is rendered with Realistic Interior Final, which increases the number of light bounces between adjacent surfaces.

So you can see that lighting an interior with the sun is a simple business with Renderworks. The key points are to have a Heliodon with the correct adjustments to bring light into the interior of the space, in such a way that light bounces around the surfaces inside the room. And don't forget that shadows can add a great deal of interest to a scene as well.

And finally adjust the Heliodon's brightness to improve the rendering, if that is necessary.