MANUAL

Pinnacle Systems Production Book, First Edition
(Composite Wizard, Web PDF Edition)

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COMPOSITE WIZARD

APPENDIX

INTRODUCTION

Pinnacle Systems Composite Wizard allows you to create world-class composites on your desktop computer system. When combined with keying software such as Pinnacle Systems Primatte Keyer™ or any footage with an alpha channel, this powerful effects tool gives you superior edge control, element color correction, and professional compositing features.

When building an After Effects® composite from blue/green-screen footage or layers with alpha channels, most problems occur in a few main areas:

Edges

Alpha edges may be tattered, aliased, overly sharp, colored or fringed. This is especially true when using a simple keyer on badly-lit blue/green screen footage

Element Flaws

The footage making up the composite may be poorly shot, the backing screen may be uneven, colors may be off, there may be spill, or rigs and wires in the way.

Advanced Integration

The challenges posed by creating advanced composites become more sophisticated. These include accurately matching color and tonal range between layers, creating blurs between multiple layers, simulating interactive lighting between layers and eliminating noise caused by keying or reflection.

Composite Wizard contains filters to address each of these problems. Developed and tested in conjunction with leading post-production facilities, Composite Wizard proved its worth in several major motion pictures even before its official release.

SYSTEM REQUIREMENTS

Macintosh

The Macintosh version of Composite Wizard requires:

- Adobe After Effects 4.1 or later (carbon versions for 5.x)
- Power Macintosh
- MacOS 9 or later

Windows

The Windows version of Composite Wizard requires:

- Adobe After Effects 4.1 or later
- Windows 98, 2000, or XP.

MACINTOSH INSTALLATION

1. Double-click the installer icon.
2. After reading and accepting the license agreement, enter your name and your product registration code. This code is your proof of license from Pinnacle Systems. Do not share it.

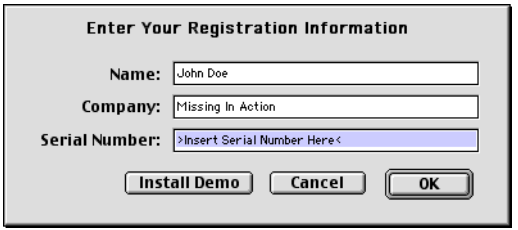


Figure 1:1 Composite Wizard Installer Dialog

If you do not have a product registration code you can install demo versions of the plug-ins. The demo version installation will install a fully functional copy of the plug-ins that will run for 5 days. After the 5 day demo period, the filters will continue to operate, but will generate a yellow X over the image. Contact Pinnacle Systems for your authorization code.

3. The installer will either install directly on your hard drive, or allow you to manually tell it where to place the Composite Wizard plug-ins folder.

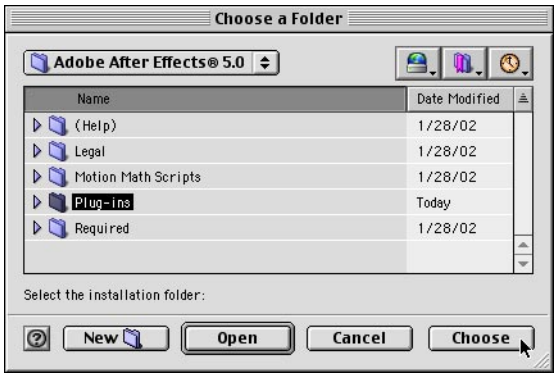


Figure 1:2 Locate the AE Plug-in Folder

The Image Lounge plug-ins folder belongs in the Plug-ins folder for After Effects.

4. If you need to move your copy of Image Lounge to a different copy of After Effects with a different serial number, you must reinstall from the original installer, and reenter your registration code.

After installation, launch After Effects. Your plug-ins will be serialized to your copy of After Effects. This process protects you by making it impossible for someone to copy the installed plug-ins from your computer and use them with a different copy of After Effects.

If you need to move your copy of Composite Wizard to a different copy of After Effects with a different serial number you must reinstall from the original installer, and re-enter your registration code.

Demo installers and demo plug-ins

Demo installers may be freely used, as long as the license is accepted. Demo plug-ins are functionally identical to the regular versions, except that they draw a big X in each frame. This will allow you to evaluate the plug-ins in your environment before committing to a purchase.

WINDOWS INSTALLATION

1. Insert the *Composite Wizard Foir Windows* CD-ROM into your drive, and double-click its icon to open it.

2. Double-click on the file *Composite Wizard.exe.*

Figure 1:3 Composite Wizard.exe

3. The Composite Wizard installation program begins. Follow the directions as they are presented to you.

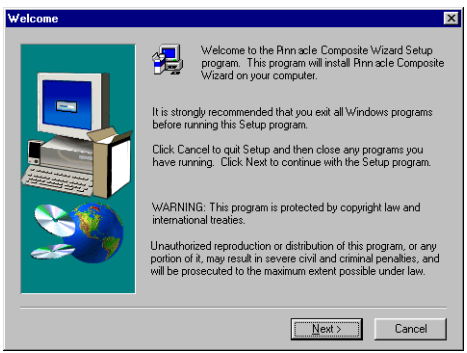


Figure 1:4 Windows Installer Welcome Screen

4. After agreeing to the Software License Agreement you will be presented with the User Information dialog.

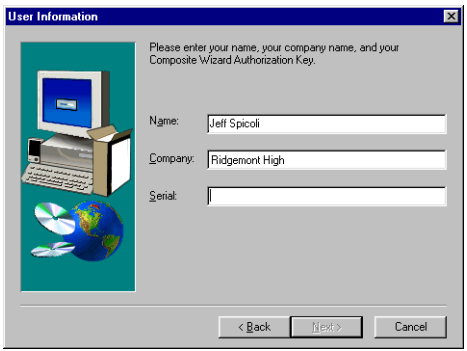


Figure 1:5 User Information Dialog

Here you are required to enter your Authorization Code to continue the install process. Your Authorization Code is located on a small sticker inside your Composite Wizard CD packaging. The *Next* button will be grayed out until the user information is correctly entered.

If you do not have an Authorization Code you can install demo versions of the plug-ins. The demo version installation will install a fully functional copy of the plug-ins that will run for 5 days. After the 5 day demo period, the filters will continue to operate, but will generate a yellow X over the image. Contact Pinnacle Systems for your Authorization Code.

5. After succesfully entering and then confirming your registration information, you will be presented with the Choose Destination Location dialog.

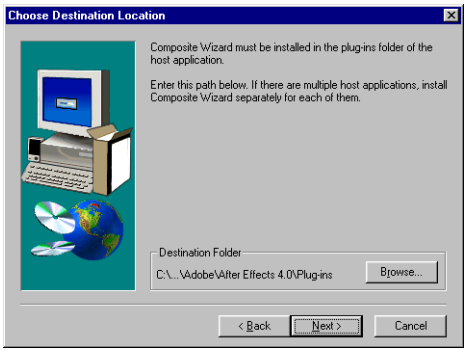


Figure 1:6 Choose Destination Location Dialog

The default location will be your After Effects plug-ins folder. If you want to put it somewhere else, you can direct the installer to the final location or move the folder after installation. Note that the installer looks for After Effects 4.1 or later by default. If you are using After Effects 4.0 you will need to manually select your After Effects 4.0 Plug-ins folder.

6. Click the *Next* button to install Composite Wizard.

7. After installation, launch After Effects. Your plug-ins will be serialized to your copy of After Effects. This process protects you by making it impossible for someone to copy the installed plug-ins from your computer and use them with a different copy of After Effects.

Demo installers and demo plug-ins

Demo installers may be freely used, as long as the license is accepted. Demo plug-ins are functionally identical to the regular versions, except that they draw a big X in each frame. This will allow you to evaluate the plug-ins in your environment before committing to a purchase.

USAGE NOTES

Blend with Original

All Composite Wizard plug-ins include a Blend with Original control to set the amount of the effect applied or to allow a gradual fade-in or fade-out of the effect. Set to 0%, the result is just the effect. Set to 100%, the result is as if the effect was disabled.

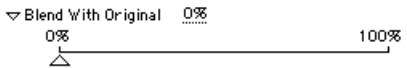


Figure 1:7 Blend With Original

Preview Alpha

Many of the Composite Wizard plug-ins include a Preview Alpha check-box that lets you see the alpha channel more clearly by replacing the image RGB with white. This is similar to the alpha preview button on the edge of a comp window. It stays on, however, allowing you to adjust controls while clearly seeing the layer's alpha change. Note that this shows only the current layer's alpha as produced by the effect. Succeeding effects and layers may obscure the alpha preview.

Note

One potentially confusing situation arises when using plug-ins that access the layer's image at different times or access other layers via a pop-up.

After Effects provides the image data to the plug-in without any layer masks, effects, or geometric transformations applied in the same comp. This can result in images not lining up, a masked out image showing up unexpectedly, or missing effects. Even animating the position of a layer within a comp is bypassed in this case.

The solution is to precompose the accessed layer, moving the layer mask and any effects into the new comp.

The Composite Wizard plug-ins that might run into this problem are noted in their descriptions:

- CW Super Compound Blur
- CW Denoiser
- CW Wire/Rig Zapper
- CW Re-Matter

FUNCTION GROUPS

Edge Control

Composite Wizard contains five powerful plug-ins to soften and control the edges of your layer, making them look organic and integrated with the other layers.

- CW Edge Blur
- CW Edge Blur EZ
- CW Matte Feather
- CW Matte Feather EZ
- CW Matte Feather Sharp

The primary operations of edge control are Feathering, which gradually decreases the opacity of an edge as it moves outward, and Blurring, which softens only the edge of a layer. A combination of these functions solves the lion's share of compositing problems.

Element Correction

Composite Wizard contains seven powerful plug-ins to correct and integrate layers to make world-class composites.

- CW Miracle Alpha Cleaner
- CW Wire/Rig Zapper
- CW Super Blur
- CW Denoiser
- CW Smooth Screen
- CW Spill Killer
- CW Spill Killer EZ
- CW Zone HLS

These operations include Screen Correction, which eliminates unwanted elements of blue/green screens, and Color Adjustment, which gives you sophisticated control over color problems. Correcting the elements of your composite allows you to create the best final image possible.

Advanced Compositing

Composite Wizard contains seven sophisticated plug-ins to integrate layers to a truly professional standard. These plug-ins perform color matching between layers, integrating wrapped light between layers, reducing video and grain noise, and interlayer blurring. These tools can make the difference between a good composite and a truly professional image.

- CW Composite Color Matcher
- CW Light Wrap
- CW Deluxe Edge Finder
- CW Deluxe Edge Finder EZ
- CW Compound Blur
- CW Re-Matter

Composite Wizard is specifically designed to support interlayer blurring, actually blending edge pixels of different layers while controlling all edge blurs at once for even more organic results.

About interlayer Blurring

The basic process works like this: you create a duplicate comp containing all your layers, apply an edge definition plug-in (Edge Border or Edge Border Pro) to each duped layer, creating a complex edge-blur mask. You hide the edge-definition layer and use it as a blur map for a Composite Blur tool on the original comp. Interlayer blurring is especially useful for film-res composites, or any time when you really want the layers to interact as completely as possible.

Interlayer blur is explained in detail as a part of "Tutorial 1: Ducks" on page 49.

CW COMPOSITE COLOR MATCHER

One of the biggest problems in compositing is keeping consistent color ranges from layer to layer — making the foreground and background elements appear as if they co-existed in the same space. Balancing an element's tonal and exposure ranges to seamlessly blend into a new environment can often involve multiple and repeated applications of color filtering effects such as Levels, Color Balance (HLS), and Gamma/Pedestal/Gain.

CW Composite Color Matcher allows you to easily integrate an element into a composite environment by balancing the element's colors to match the general color balance of the environment into which it is being placed. This is accomplished quickly, with just a few mouse clicks, and yields superior results to hours of tweaking with conventional filters.

CW Composite Color Matcher will automatically identify dominant white point, mid point, and black point samples with the push of a button. For finer control, both eyedropper and swatch selection can be used. In most cases you'll click the *All* button to have the filter sample the image and make basic color choices, use the eyedropper if the chosen colors aren't appropriate, then click on the swatch to fine-tune the results if needed.

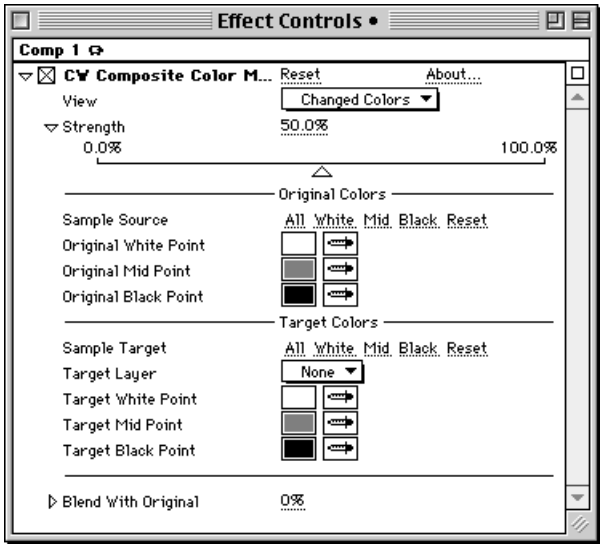


Figure 1:8 CW Composite Color Matcher

View

This pop-up controls whether you are viewing the original colors of the layer or the changed colors.

- **Changed Colors** is the default. This shows the image with the CW Composite Color Matcher effeect applied, and is the proper setting for rendering.
- **Original Colors** allows you to view the original, uncorrected layer. Use this setting when using the eyedroppers to select colors.

Strength

This slider determines how much the original colors are adjusted towards the target colors. There may still be some effect when set to 0%.

Original Colors

These controls determine the original colors to be corrected by the filter. In most cases, the defaults (white, gray, black) will give the best results.

Occasionally you will find yourself working with source footage that is very bright, very dark, or tinted by colored lighting. In these cases the white, mid, and black points should be sampled to ensure accuracy.

Sample Source

Clicking one of these buttons will cause CW Composite Color Matcher to sample the color range of the source image, then load the representative color(s) into their respective color swatches.

- **All** automatically samples all three zones (White Point, Mid Point, and Black Point). This is almost always the first step in using the filter.
- **White**, **Mid**, and **Black** allow you to sample the zones independently.
- **Reset** returns the swatches to their default white, gray, and black.

Original White Point

Original White Point specifies the color of the brightest pixels in the source image. This becomes one end of a transition curve that defines the colors of the layer.

Original Mid Point

Original Mid Point specifies the color of the pixels closest to the middle of the value range in the source image. This becomes the center of a transition curve that defines the colors of the layer.

Original Black Point

Original Black Point specifies the color of the darkest pixels in the source image. This becomes one end of a transition curve that defines the colors of the layer.

Target Colors

These controls specify the colors to which the source footage will be adjusted — in most cases you will be adjusting the colors of a foreground element tothe colors of a background layer. In most cases, simply clicking the Sample Target buttons (*All*, *White*, *Mid*, and *Black*) will make a great color match. Some fine tuning with the swatches and eyedroppers may be necessary.

Sample Target

The Sample Target buttons function are used to sample the color range of the composite environment (background layer). They work in exactly the same manner as the Sample Source buttons.

Target Layer

This popup menu determines which layer in your composition you are trying to match (usually a background plate). The layer selected here will be the color source for any Sample Target operations.

Target White/Mid/Black Point

Clicking one of these buttons will cause CW Composite Color Matcher to sample the color range of the layer designated in the Target Layer popup menu, then load the representative color(s) into their respective color swatches. They work in exactly the same manner as Sample White Point, Sample Mid Point, Sample Black Point.

Tips

Unless the source has a noticeable color tint, it's best to start with the default white, gray, black for the source samples

Be careful to pick representative colors. If there's a tiny patch of black, but a lot of dark green, try setting your target black point to dark green — it will look more real.

Don't be afraid to experiment — sample with a push-button, fine tune with a swatch. After a little practice, it becomes very intuitive.

Remember you can keyframe all attributes. That means color shifts in the background can be matched in foreground layers. Enable keyframing for the color swatches and push the buttons whenever the matching drifts off to set new color keyframes

Usage

Figure 1:9 shows two elements, a foreground shot of a man, and background shot of a raging inferno. As you can see the colors in the foreground are muted and pale, compared to the vibrant reds and yellows of the background. CW Composite Color Matcher can easily fix this difference and generate a much more realistic composite.

Figure 1:9 Color Match Elements

We begin by sampling the highlights, midtones, and shadows of the composite environment by first designating it in the Target Layer popup menu, then clicking the *All* button.

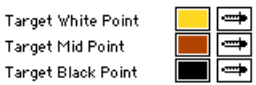


Figure 1:10 Sampled Background Colors

As soon as the Aull button is pressed CW Composite Color Matcher remaps the foreground colors to match the background. Figure 1:11 shows the original and remapped foreground.

Figure 1:11 Remapped Foreground Colors

The next step is to sample the foreground colors in the same manner as we did to the background. After the colors are again remapped you need to decide if the effect of sampling the foreground improved the effect. If it did not improve it, click the *Reset* button next to Sample Source to go back to the standard white/gray/black color scheme.

Finally, adjust the *Strength* and *Blend With Original* sliders until you achieve the desired effect. Figure 1:12 shows the final color adjustment.

Figure 1:12 Final Color Adjustment

CW DELUXE EDGE FINDER

CW Deluxe Edge Finder creates a precise border of a layer's alpha channel, complete with subtle softening and blurring of the edge. The resulting alpha can be used to limit various effects to the edge areas of a clip, allowing precise control over the exposure, color balance, sharpness/blurriness/transparency, etc. of the edge of composited elements.

When used as a control layer in *CW Super Compound Blur*, incredibly realistic composites can be synthesized, offering subtle blending of elements from several clips into one convincing composite.

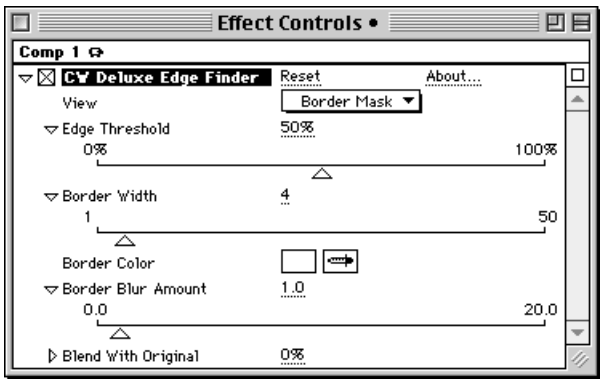


Figure 1:13 CW Deluxe Edge Finder

View

This pop-up specifies the results displayed.

- **Composite** creates a border around the area defined by the alpha channel, then displays the RGB layer overlayed with the edge effect. Useful for determining border settings in interlayer blurring. Viewing the composite shows how much of the edge will be effected relative to the RGB layer.
- **Border** creates a border around the area defined by the alpha channel and makes the inside of the layer totally transparent — for use in interlayer blurring with transparent objects.
- **Border Mask** creates a border around the area defined by the alpha channel and fills the layer with black — for use in interlayer blurring.

When using Border or Border Mask view modes it's best to make sure that you don't have a background element in the composition — in these two modes the filter is designed to work over a black background and be used as a control layer in another composite.

Edge Threshold

Edge Threshold specifies where the center of the border will be drawn, relative to the edge of the alpha. Higher numbers pull the border inside of the alpha edge.

Border Width

Border Width controls the width of the border, and therefore the width of the final edge blur. Higher numbers create thicker borders.

Figure 1:14 Border Widths of 4 and 16

Border Color

Border Color controls the color of the border. For interlayer blurring, leave the blur white. For halo or glow effects, other colors may be used.

Border Blur Amount

Border Blur Amounts blurs the border to soften aliasing caused by complex alpha shapes. Higher numbers return more blur.

Figure 1:15 Border Blurs of O and 2.9

Tips

CW Deluxe Edge Finder creates a more ideal blur profile, but aliasing can cause mirage ripples in moving layers. Adding blur can reduce this problem. In extreme cases, you may find that changing to *CW Deluxe Edge Finder EZ* may be less problematic.

Glows and halos can be easily created with CW Deluxe Edge Finder in Composite View mode.

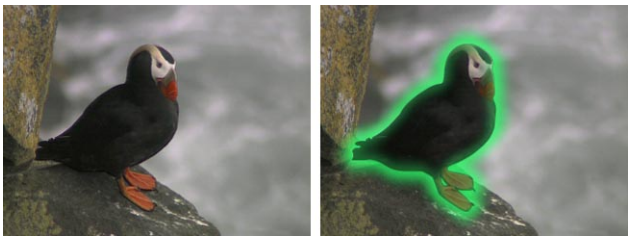


Figure 1:16 Radioactive Puffin Halo Effect

CW DELUXE EDGE FINDER EZ

CW Deluxe Edge Finder EZ is a simplified version of CW Deluxe Edge Finder that controls the edge with a simple Border Width slider.

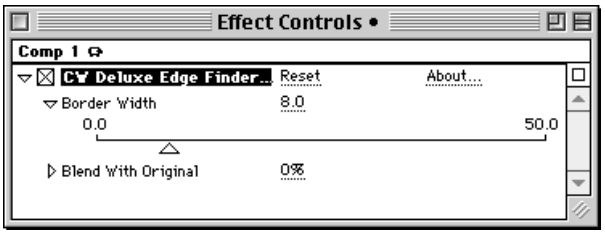


Figure 1:17 CW Deluxe Edge Finder EZ

Border Width

Border Width controls how wide the border will be around the alpha. The amount of blur and smoothing is handled automatically. This is the fastest, easiest way to define the edge-blur region. CW Deluxe Edge Finder EZ can create some interesting effects in itself, especially when used with text.

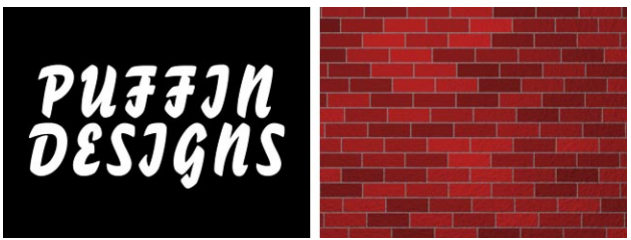


Figure 1:18 Puffin Designs Neon Sign Effect

Usage

Figure 1:18 shows a text alpha channel and an image of a brick wall. Using nothing but these two elements and a few solid layers, the text image was used as the source for multiple layers of track mattes,all generated entirely by CW Deluxe Edge Finder EZ.

Figure 1:19 Edge Matte Masks A Pink Solid

After creating the neon tube effects, the filter, with a blur value of 100 pixels, was also used on the text layer to generate the glow matte for the wall. CW Composite Color Matcher was used to tint the wall the same color as the neon.

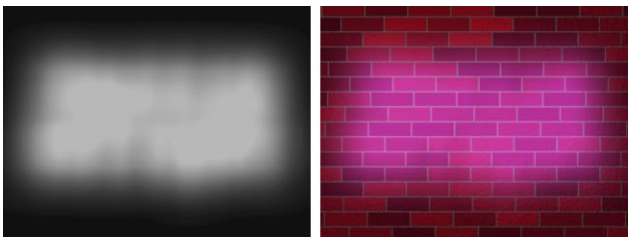


Figure 1:20 100 Pixel Blur Used As Glow Matte

A few more layers were created using colored solids and track mattes to generate layers for highlights, darker glows, shadows, and the like.

After some final touch-up work on a couple of layers using the Levels filter, the final neon sign effect was complete.

Figure 1:21 Puffin Designs Neon Sign Complete

CW DENOISER

CW Denoiser applies a savvy averaging function across pixels from a sequence of frames, effectively reducing or altogether eliminating film and video noise. This kind of *denoising* can be very useful to clean up dark areas of images that pick up *chatter* from film emulsion or video camera sensors. Once a clip has been processed with Denoiser, images will exhibit sharper details and will be less troublesome when applying additional image processing effects, such as keyers or color correction.

CW Denoiser is able to distinguish between areas in a clip that are moving or changing and areas that are locked off and static, selectively denoising only the static images, thus preserving the full detail of areas that are in motion.

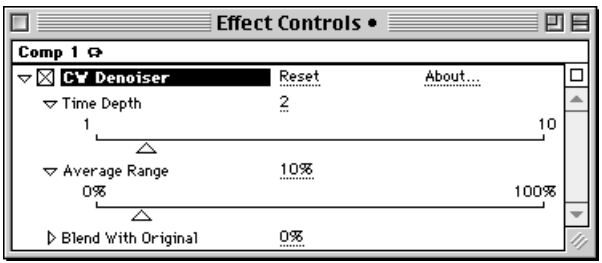


Figure 1:22 CW Denoiser

Time Depth

Time Depth specifies how many frames Denoiser will consider when determining what is noise. Higher numbers mean more frames and more accurate results, but slower rendering.

Average Range

Average Range determines the range of values around a pixel's average that are treated as noise.. Higher numbers remove more noise.

Tips

If there's a lot of motion in the image, then a higher Time Depth will be wasted effort. If the scene is relatively static, then a high Time Depth can remove practically all the noise.

Denoiser works best in subtle situations. With higher settings, detail may be smoothed out in an undesirable way.

Because of After Effects' pipeline, some layers may need to be pre-comped before using CW Denoiser. Time referencing works like viewing an external target layer, and bypasses masking, etc. If you find that your layers aren't behaving as you would expect, try precomping them first.

CW EDGE BLUR

CW Edge Blur applies an isolated blur pass that only affects the edges of your image, as defined by the alpha channel. This type of edge treatment can be used in compositing of multiple images to correct ragged edges, to make computer generated graphics, animations, and text look more organic and photo realistic, and to successfully blend and integrate multiple images together in a more convincing fashion.

CW Edge Blur uses Composite Wizard's *Super Blur* algorithm for its edge treatment, which quickly and easily produces high-quality blur effects. It finds the edge of the composite element and blurs the edge pixels outward.

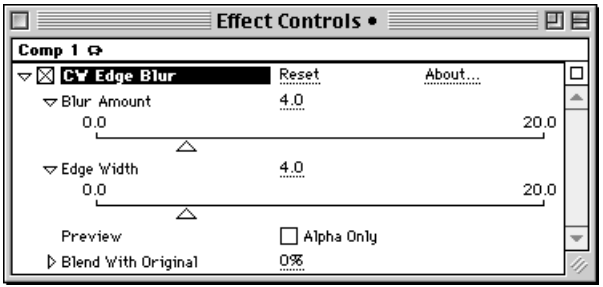


Figure 1:23 CW Edge Blur

Blur Amount

Blur Amount specifies the amount of blur that is applied to the alpha edge. Higher numbers create more blurring.

Edge Width

Edge Width controls how wide the blurred area will be based on the alpha edge. Figure 1:24 shows Edge Widths of 4 and 20.

Figure 1:24 Edge Widths of 4 and 20

Tips

Keyframing the Edge Width value allows you to compensate for perspective changes, like someone walking out of frame close-up in a keyed composite. As they recede, the width of the edge should decrease, so the whole layer doesn't blur out.

CW EDGE BLUR EZ

CW Edge Blur EZ is a simplified version of CW Edge Blur that controls the blurring and edge size with a simple *Blur Amount* slider.

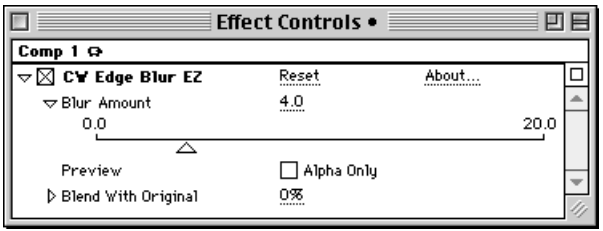


Figure 1:25 CW Edge Blur EZ

Blur Amount

Blur Amount specifies the amount of blur that is applied to the alpha edge. Higher numbers create more blurring.

CW LIGHT WRAP

CW Light Wrap is the secret to seamless layer integration. This is achieved by wrapping the edges of a foreground layer with soft light from a selected background layer, producing a powerful level of integration by creating the illusion that light from the background layer is reflected along the edges of the foreground layer.

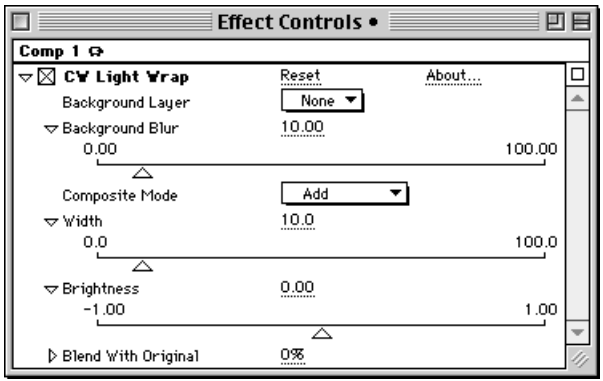


Figure 1:26 CW Light Wrap

Background Layer

This pop-up specifies which layer to use as a light source.

Background Blur

Background Blur determines the amount of blur applied internally to the background image before the wrap is applied — this does not alter the background layer in any way, it merely softens the light wrap effect.

Composite Mode

This pop-up determines the compositing mode used in the Light Wrap. These are the same transfer modes found in After Effects.

Add or *Lighten* usually works best for backlighting, while negative Light Wrap can be accomplished with *Darken* and lower *Brightness* settings.

Width

Width controls the width of the light wrap. Higher settings make a bigger backlight wrap on the layer.

Width is independent of Background blur, allowing you to set a high blur and then control the width of the Light Wrap independently.

Brightness

Brightness controls how bright the Light Wrap will be. Higher settings are brighter. Negative numbers are darker. If the Background Layer is not the same size as the layer the Light Wrap is applied to, Light Wrap will automatically scale the Background Layer to fit.

Usage

Figure 1:27 shows the foreground element that we will use to demonstrate the Light Wrap effect. The actress was shot against a bluescreen, and the matte was pulled using the *Primatte Keyer.*

Figure 1:27 Foreground Element

The left image in Figure 1:28 shows the initial composite over the background. The background has an incredible amount of backlighting, which is not represented correctly in the foreground element.

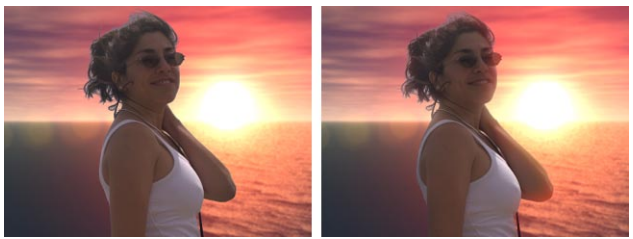


Figure 1:28 Before and After CW Light Wrap

The right image shows the image with CW Light Wrap applied — the actress now appears to be standing in front of a bright light source. The effect is particularly noticeable on her left arm and the side of her face, where they meet the yellow of the sun.

Figure 1:29 Uncorrected and Corrected Foregrounds over Black

If we remove the background element, and compare the corrected and uncorrected foreground elements over solid black, the effect the filter has on the image is clearly visible. The composite mode used here was *Hard Light* — note how it only tints the side of the actress actually facing the sun.

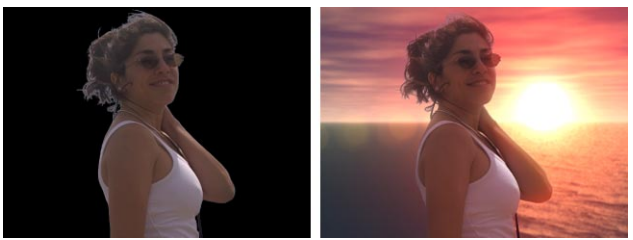


Figure 1:30 The Original Clip and the Completed Composite

To round out the scene we've applied CW Composite Color Matcher to adjust the foreground tones to match the background, giving us a perfect composite. You'll soon find yourself using CW Light Wrap and CW Composite Color Matcher together quite often when compositing.

CW MATTE FEATHER

CW Matte Feather reates a gradual change (feathering) from opaque to transparent at the edge of a layer's alpha. It can be used to correct dirty or ragged layer edges where the keyer didn't do a precise enough job. It can also be used to soften a hard edge from a CG object to help make it fit into an organic scene.

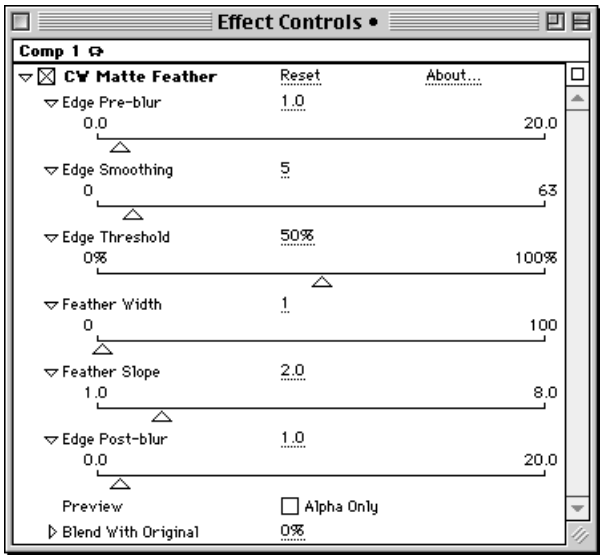


Figure 1:31 CW Matte Feather

While this may appear to be similar in function to such filters as CW Edge Blur, keep in mind that feathering and blurring are two different things. While edge blurring can indeed produce a feathered edge, an edge feather is a modification of the alpha channe only, and does not directly affect the RGB channels at all. This makes it the superior choice for situations where the matte edge is rough or jagged.

CW Matte Feather gives the user a great amount of control over where and how the matte feather is applied — very useful when faced with a difficult layer to composite.

Edge Pre-Blur

Edge Pre-Blur blurs the edge of the alpha before applying the feathering effect, great for eliminating jaggies. Low settings are recommended, as it changes the shape of the edge and may cut into the layer in unwanted ways if set too high.

Edge Smoothing

Edge Smoothing smooths the alpha edge into a rounder shape. Good for making the overall edge profile softer. Low settings are recommended.

Edge Threshold

Edge Threshold determines where the edge begins to become transparent, relative to the absolute edge of the alpha. Higher numbers move the Edge Threshold inward. A setting of 0 places the feather edge right at the actual alpha edge.

Feather Width

Feather Width controls the width of the area affected by the feathering. The higher the number, the thicker the feathered edge.

Feather Slope

Feather Slope specifies the abruptness of the transition from opaque to transparent. Lower numbers make the transition more gradual.

Edge Post Blur

Edge Post Blur adds blur effect to the edges using the Super Blur algorithm, allowing you to get rid of any remaining edge hardness.

Usage

In order to demonstrate how effective CW Matte Feather can be on even the roughest of mattes Figure 1:32 shows an element with an extremely rough alpha channel.

Figure 1:32 Jaggy Puffin Alpha Channel

In a compositing environment this kind of matte is completely unacceptable, but these are the results you get sometimes when using certain chromakeyers, or when generating lumakey mattes.

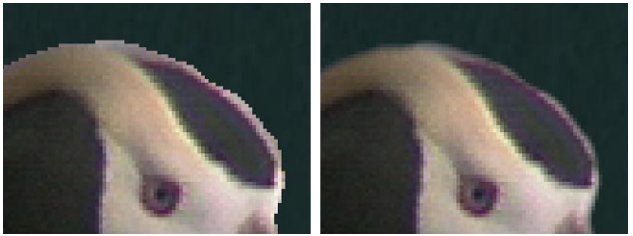


Figure 1:33 Jaggies Smoothed

Figure 1:33 shows the same image in a composite scene, both before and after applying CW Matte Feather. The effect it has on the final composite is obvious.

Tips

Start with defaults, adjust Feather Width first, then Edge Threshold, then Edge Post Blur. 70% of all layers can be fixed using these three controls. If the Edge Post Blur isn't subtle or precise enough, set it to 0% and follow your CW Matte Feather effect with a CW Edge Blur effect.

Very high Feather Width settings can create edge-density effects that make clouds or glass objects appear more real.

CW MATTE FEATHER EZ

CW Matte Feather EZ is a simplified version of CW Matte Feather that controls the blurring and edge size with a simple *Blur Amount* slider. It is designed to be fast, easy, and intuitive. Many times, an edge can be corrected with one simple adjustment.

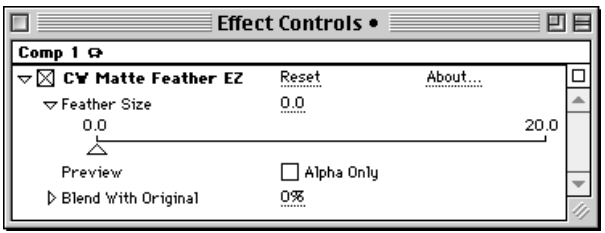


Figure 1:34 CW Matte Feather EZ

Feather Size

Feather Size controls how much the edge is feathered, gradually reducing the alpha while fading the edge to total transparency.

Tips

In addition to making the layer's edge fit into the composite, Feathering can be used as a soft matte choker, to eliminate unwanted fringe and chatter caused by low quality keying or source footage.

CW MATTE FEATHER SHARP

CW Matte Feather Sharp blurs and feathers the alpha edge using a process optimized for complex, hard-edged shapes. Using other blur/feather filters on images with sharp edges usually results in a softening of any hard angles. CW Matte Feather Sharp uses algorithms specifically designed to maintain hard edges while feathering them.

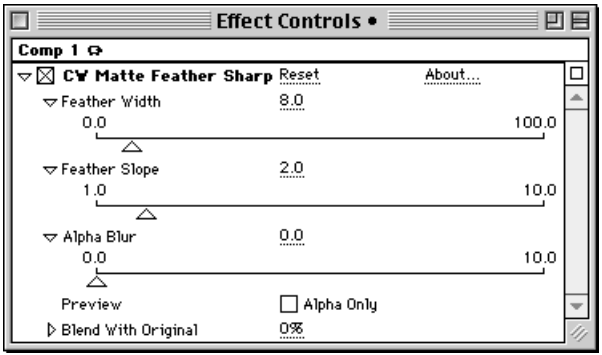


Figure 1:35 CW Matte Feather Sharp

Feather Width

Feather Width controls the width of the feathered edge. Higher numbers create wider edge feathers.

Feather Slope

Feather slope specifies the abruptness of the transition from opaque to transparent. Lower numbers make the transition more gradual.

Alpha Blur

Alpha Blur blurs the entire alpha, adding a uniform softness while maintaining geometric characteristics.

Usage

The left image in Figure 1:36 shows a stone texture image, masked by an incredibly jaggy alpha channel, and composited over solid black — the right image shows the effect that CW Matte Feather Sharp has on the matte. While the rough edges have been smoothed away, the sharp points and corners of the matte remain pristine.

Figure 1:36 CW Matte Feather Sharp Filter Applied

For the purpose of comparison, take a look at Figure 1:37, which shows us the same composite, with both *CW Edge Blur EZ* and *CW Matte Feather EZ* filters applied to smooth the edges. Since the CW Matte Feather Sharp operation from Figure 1:36 used a Feather Width of 5, that is what we'll use here.

Figure 1:37 CW Edge Blur EZ and CW Matte Feather EZ

The left image, CW Edge Blur EZ, shows a great deal of lost sharpness. The right image, CW Matte Feather EZ, retains much more detail in the points and corners. However, as Figure 1:38 shows, if we increase the blur value to 10 and compare it to CW Matte Feather Sharp, the difference becomes clear.

Figure 1:38 CW Matte Feather Sharp and CW Matte Feather EZ

Even at very high amounts, the feathering in CW Matte Feather Sharp is far superior to other methods in composites containing sharp points and corrners.

CW MIRACLE ALPHA CLEANER

When extracting alphas using procedural keyers such as traditional bluescreen, luminance, or difference keyers, there can sometimes be a trade-off between acceptable edge detail and foreground noise in the resulting alpha, otherwise known as *chatter.*

CW Miracle Alpha Cleaner allows you to zap grain, break away holes in the matte, and fix many other problem areas that would otherwise require a separate manual matte touch-up.

CW Miracle Alpha Cleaner is like a detergent that applies a cleanup pass to your alpha, identifying dirt and other artifacts based on a combination of their size, alpha level, and proximity to the principal element in your alpha.

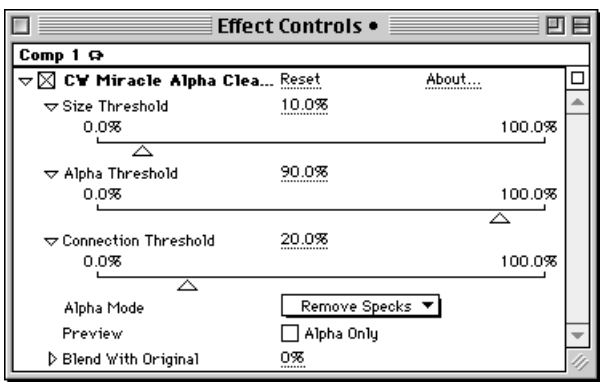


Figure 1:39 CW Miracle Alpha Cleaner

Size Threshold

Size Threshold determines which alpha pixels will be removed, based on their proximity to each noise or *chatter* area. The value slider controls the size of the cleanup area with 100% representing the largest cleanup area, or about 1/5 of the screen, and 0% representing no cleanup area. Turn this control up to get rid of larger noise patches in the alpha. Noise or chatter pixels outside the size threshold are left unaffected.

Alpha Threshold

Alpha Threshold determines which alpha pixels will be removed, based on pixel luminance or alpha opacity. Noise or chatter pixels (inside the Size Threshold area) with a luminance value below the Alpha Threshold will be set to 0. The higher you push the slider, the more alpha pixels will be cleaned up. Note that Connection Threshold also contributes to the selection process.

Connection Threshold

Connection Threshold determines which alpha pixels to remove based on their proximity to major objects in the alpha. The higher the number, the more non-essential pixels will be removed. Turn Connection Threshold up if you find your alpha growing *tendrils* after cleaning.

Usage

Figure 1:40 is an example of a matte pulled from a noisy bluescreen, which produced an alpha channel with quite a bit of background noise. Applying CW Miracle Alpha Cleaner removes quite a bit of that noise, even with the default settings.

Figure 1:40 CW Miracle Alpha Cleaner Applied

To try and get rid of the remaining noise, found at the sides and corners of the matte, we can increase the correction threshold. However, when it's moved high enough to remove all the unwanted edge noise it also removes fine detail, such as hair and eyelashes. Figure 1:41 shows this effect; pay attention to the wisps of hair coming off the top of the actress' head.

Figure 1:41 Fine Detail Can Be Lost

A better way to proceed would be to use a *garbage matte* to simply mask out any nonessential areas of the alpha channel. Figure 1:42 shows how our garbage matte can get rid of problem areas while keeping all the detail in the matte, ensuring a perfect composite.

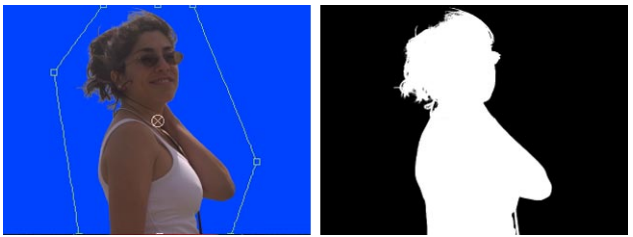


Figure 1:42 Garbage Matte Out the Edges

Now that we've seen how CW Miracle Alpha Cleaner can reduce noise, let's see how it fills holes.

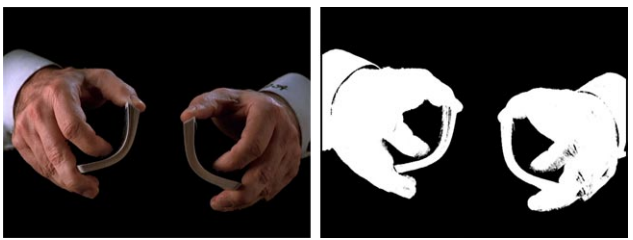


Figure 1:43 Lumakey Matte

Figure 1:43 shows a matte created by a lumakey. Note the black areas in the matte around the edge of the magician's cuffs and on the wrinkled areas of the fingers on his left hand.

Figure 1:44 CW Miracle Alpha Cleaner Applied

After applying CW Miracle Alpha Cleaner the black areas simply disappear.

Figure 1:45 CW Matte Feather EZ and CW Composite Color Matcher

To finish out the composite we'll use CW Matte Feather EZ to soften the edges a little bit, and CW Composite Color Matcher to alter the foreground colors.

CW RE-MATTER

CW Re-Matter applies a matte image in the RGB channel to the original layer image. It works somewhat like After Effects' Set Matte, except that the matte is the current image in the current layer, and the original image is the image from the current layer without any effects, masks, or transforms.

Sometimes keyers need a little help cleaning up their masks before applying them to the images. With CW Re-Matter, you set your keyer to generate a mask image, alter the mask with other effects, then use CW Re-Matter to apply the mask to the original layer image and produce the composite.

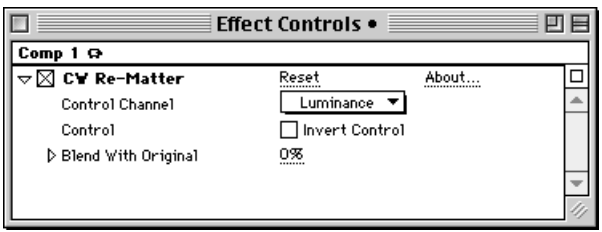


Figure 1:46 CW Re-Matter

Control Channel

Control Channel specifies the attribute of the image data that will be used as the alpha channel.

Note that *Brightness* is in HSB space, where pure colors and white have a brightness of 1.0, while luminance is in HSL space, where only white has a full luminance of 1.0.

Invert Control

Turn this checkbox on to invert the control channel.

CW SMOOTH SCREEN

As video and film production becomes more and more digital, bluescreen and greenscreen footage is frequently required to meet production needs. While most people have heard of a bluescreen, very few realize that filming one is a science, and often a shoot will take place with a dirty, poorly lit, or creased screen. As a result, compositors are often given horrible footage, and then expected to extract a perfect matte.

CW Smooth Screen corrects uneven blue- or greenscreen footage caused by lighting or surface problems by first comparing RGB pixels in the unkeyed foreground image to a sampled screen color, then adjusting the screen pixels accordingly, smoothing out the background before keying. This produces superior results from even the simplest of color keyers by easily eliminating shadows, hot spots, creases and other anomalies that would create problems for the keyer.

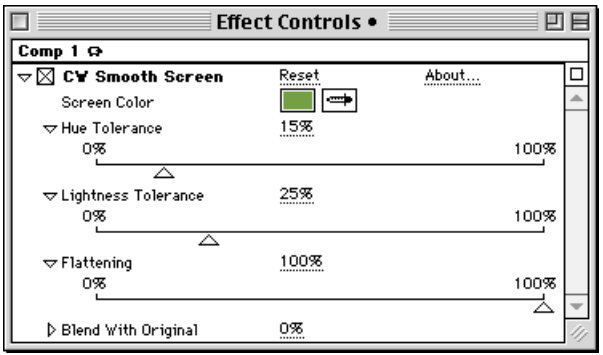


Figure 1:47 CW Smooth Screen

Screen Color

Screen Color allows you to specify the desired screen color — either select a color from the color picker or sample the background with the eyedropper. Any pixels close in value to the screen color will be corrected towards that color. The easiest way to use CW Smooth Screen is to click the eyedropper on a backing area that is well lit and close to the foreground subject.

Hue Tolerance

Hue Tolerance controls which pixels are corrected according to hue variation. Lower settings correct only pixels with hues very similar to the sampled color, while higher settings also correct hues that are less similar.

Lightness Tolerance

Lightness Tolerance specifies which pixels are corrected by lightness variation. Lower settings correct very similar pixels and higher settings correct pixels that are less similar. Typically, you will set Lightness Tolerance much higher than Hue Tolerance, as Screen anomalies usually come from bright and dark spots.

Flattening

Flattening specifies how much correction to apply to pixels. As more correction is applied, you may see artifacts such as choking of the foreground image in spill areas. Higher numbers deliver more color correction

Usage

Figure 1:48 shows a bluescreen image before and after applying CW Smooth Screen.

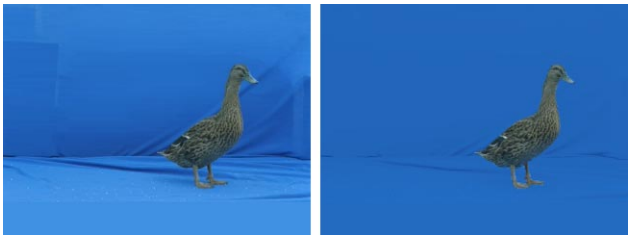


Figure 1:48 Uncorrected Bluescreen and CW Smooth-ed Screen

Note how the areas of light and dark blue seen in the left image are removed, leaving a field of relatively solid blue.

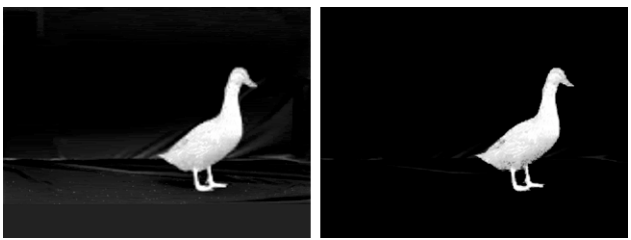


Figure 1:49 Matte Before and After CW Smooth Screen Applied

The effect this can have on matte creation is astounding. Figure 1:49 shows two examples of a standard Linear Color Key. In both examples the keyer is using identical settings. In the right image, however, we previously applied CW Smooth Screen, giving us a substantially cleaner matte.

CW SPILL KILLER

CW Spill Killer mathematically analyzes and corrects for colored spill, caused by bounced light from the surface of a blue or green screen. When a foreground element is contaminated by reflected spill light, CW Spill Killer removes the spill from the contaminated pixels without harming their original color. It will also correct many spill situations that other spill suppressors cannot, including fringe and motion-blur areas.

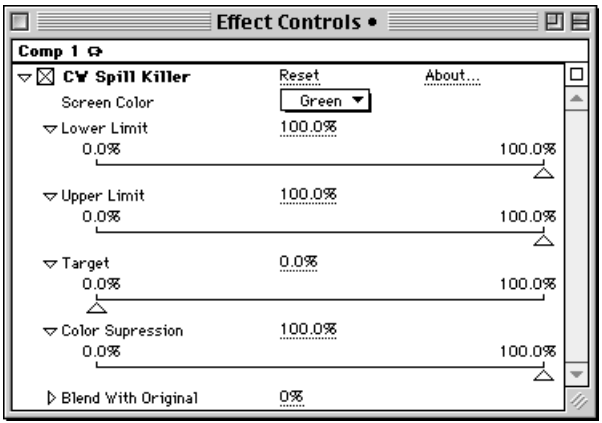


Figure 1:50 CW Spill Killer

Screen Color

Use this pop-up menu to select Red, Green or Blue screens.

Lower Limit

Lower Limit specifies the lower value of selected pixels. The lower the number, the wider the selected range. When Lower is set to 100%, and Upper is set to 0%, the smallest possible range of pixels are affected.

Upper Limit

Upper Limit determines the upper value of selected pixels. The higher the number, the wider the selected range. When Lower is set to 0%, and Upper is set to 100%, the largest possible range of pixels are affected.

Target

Target controls the absolute maximum color level to which the screen can be corrected. 0% will allow total removal of the screen color, while 50% will set the target to midway between the other two channels' values.

Color Suppression

Color Suppression specifies an amount of suppression to apply, ranging from none (0%) to all the way to the Target value (100%).

Tips

Start with Target set to 0% and Suppression set to 100% — this will create a saturated, easily-seen correction. Next, adjust the Lower and Upper Limits and you'll be able to clearly see what parts of the image you are affecting. When the Limits are set properly, adjust Target and Suppression to make a more acceptable color shift.

Usage

Figure 1:51 shows an actress filmed against a bluescreen. The effect that blue spill has on the foreground layer is easily seen when the shot is composited against black. Blue tint is clearly visible on her shirt, arms, and hair.

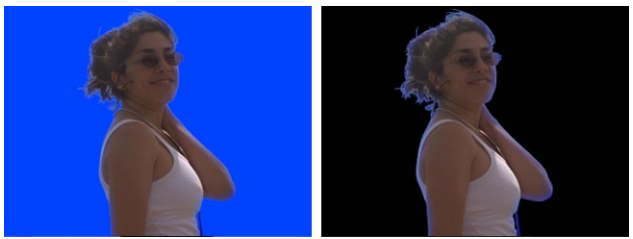


Figure 1:51 Blue Spill

Figure 1:52 shows a close-up view of the blue spill on the side of the actress. CW Spill Killer quickly and easily removes the blue tint while leaving the shirt its natural color.

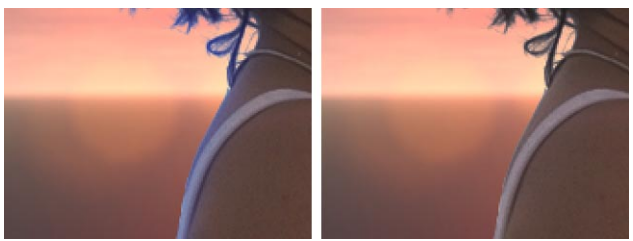


Figure 1:52 CW Spill Killer Before and After

Figure 1:53 shows the final composite, with the blue spill removed and the color adjusted by CW Composite Color Matcher.

Figure 1:53 The Completed Composite

CW SPILL KILLER EZ

CW Spill Killer EZ is a simplified version of CW Spill Killer. Depending on the color relationship between the foreground and background elements, CW Spill Killer will occasionally be required to correct some spill situations that CW Spill Killer EZ cannot. CW Spill Killer provides more specific control than EZ but is more demanding.

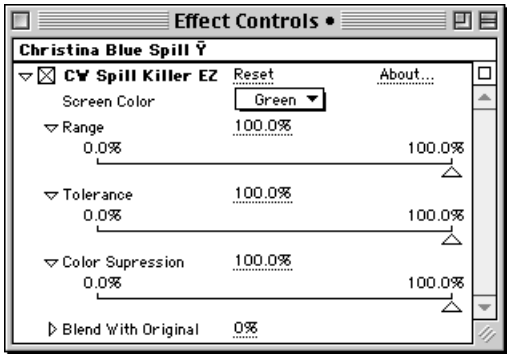


Figure 1:54 CW Spill Killer EZ

Screen Color

Use this pop-up menu to select Red, Green or Blue screens.

Range

Range specifies the lower value which determines which pixels will be corrected. The lower the setting, the more pixels will be affected. Range also defines the limit of spill suppression. The lower the setting, the more correction will occur.

Tolerance

Tolerance controls the upper value defining which pixels will be corrected. The higher the setting, the more pixels are affected. In most cases, 100% tolerance is recommended.

Color Suppression

Color Suppression determines how much of the screen color is suppressed. Although 100% suppression works in many cases, this can vary substantially based on source footage.

Tips

To correct bright fringing around edges instead of soft, reflected spill, set Range high and Tolerance low. To affect as much of the image as possible, set Range low and Tolerance high.

CW SUPER BLUR

CW Super Blur creates two attractive blur types at about twice the speed of other software-only blurs. Blurs and rack-focus effects can be extremely important in creating a realistic look in a composite. Unfortunately, even fast blur plug-ins can take a long time to render. CW Super Blur allows you to use your blurs and not take a big rendering hit.

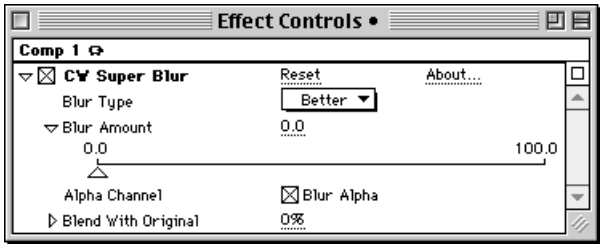


Figure 1:55 CW Super Blur

For a detailed explanation of the wide range of blur types available to you in Composite Wizard, please refer to “Blurs” on page 122 in the Appendix.

Blur Type

This pop-up contains two choices, Faster and Better. Both blurs are proprietary algorithms which produce high-quality blurs at dramatically faster speeds.

- **Faster** creates a Box blur effect at an extremely high speed.
- **Better** creates a better looking Gaussian blur, but is still twice as fast as other software-only blurs.

Figure 1:56 CW Super Blur Fast and Better

Figure 1:56 shows the difference between Fast and Better blur modes. Both examples use a Blur Amount of 20.

Blur Amount

This slider sets the amount of blur from 0.0 to 100.0.

As with many After Effects plug-ins, clicking the underlined middle numeric value pulls up a dialog box which allows you to type in the value directly. This dialog box also displays the maximum and minimum allowable values which, in most cases, are beyond the values displayed on the slider.

Blur Alpha

This checkbox allows you to apply the blur effect to the alpha channel as well as the RGB. Disabling Blur Alpha allows you to blur the image while keeping the edge of your alpha, giving you additional control when making complicated composites.

CW SUPER COMPOUND BLUR

CW Super Compound Blur extends the power of CW Super Blur by allowing the blur intensity to be set by a control layer, such as an element's Luminance, Hue, Saturation, Brightness, or individual R, G, B, A channel.

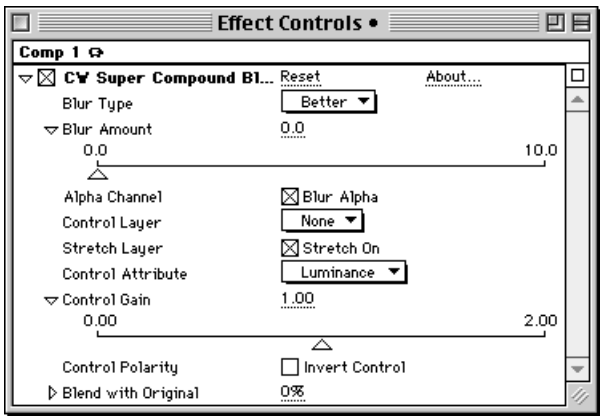


Figure 1:57 CW Super Compound Blur

For a detailed explanation of the wide range of blur types available to you in Composite Wizard, please refer to "Blurs" on page 122 in the Appendix.

Blur Type

This pop-up contains two choices, Faster and Better. Both blurs are proprietary algorithms which produce high-quality blurs at dramatically faster speeds.

- **Faster** creates a box-blur type effect at an extremely high speed.
- **Better** creates a better looking Gaussian effect and is still twice as fast as other software-only blurs.

Blur Amount

This slider sets the amount of blur from 0.0 to 100.0.

As with many After Effects plug-ins, clicking the underlined middle numeric value pulls up a dialog box which allows you to type in the value directly. This dialog box also displays the maximum and minimum allowable values which, in most cases, are beyond the values displayed on the slider.

Blur Alpha

This checkbox allows you to apply the blur effect to the alpha channel as well as the RGB. Disabling the Blur Alpha checkbox allows you to blur the image while keeping the edge of your alpha, giving you additional control when making complicated composites.

Control Layer

Control Layer specifies the layer or element that will control the blur. For interlayer blurring, this would be the edge comp containing all the CW Edge Finder layers.

Stretch Layer

Stretch Layer specifies how to handle a Control Layer that's a different size than the current layer. When the Stretch On box is checked, the Control Layer will be stretched to fit the current layer.

Control Attribute

Control Attribute specifies which attribute of the Control Layer will be used to control the blur. Luminance is the most common choice, but the other attributes allow for very specific control.

Control Gain

Control Gain alters the contrast of the control layer, and consequently the amount of blurring produced. Higher numbers return more blur.

Usage

Figure 1:58 shows an apple before and after a 50-pixel blur was applied with CW Super Compound Blur. The Control layer was created with CW Deluxe Edge Finder, and limits the blur to the defined edge area.

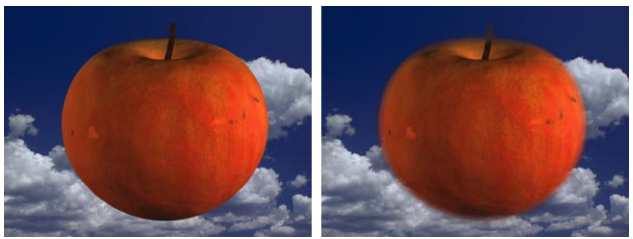


Figure 1:58 Control Layer and Blurred Edge

Note how the edge of the apple is extremely blurry while the interior of the apple is clear and perfect.

The interlayer blur process is explained in detail as a part of "Tutorial 1: Ducks" on page 64.

CW SUPER RACK FOCUS

CW Super Rack Focus brings z-buffer control to the Composite Wizard SuperBlur algorithm, allowing for the creation of realistic depth of field simulation when a z-buffer or "depth map" is available. Depth Maps are grayscale images that can indicate the distance from the camera to different points within an image. CW Super Rack Focus can reference this depth map to progressively blur an image as it recedes in space away from the viewer. By animating the virtual camera parameters within CW Super Rack Focus, the feel of a camera operator changing focus as a scene progresses can be created with startling realism.

The Appendix contains detailed explanations on the terms, concepts, and techniques associated with z-depth maps, their use, and creation. It also explains such concepts as rack focus, focal point, and depth of field. The Appendix begins on page 98.

For a detailed explanation of the wide range of blur types available to you in Composite Wizard, please refer to "Blurs" on page 122 in the Appendix.

Max Blur

Max Blur controls the maximum amount of blur applied to the layer. Higher numbers produce more blur.

Focal Point

Focal Point controls where in the depth map the image will be in focus. By animating this control, you can create rack focus effects.

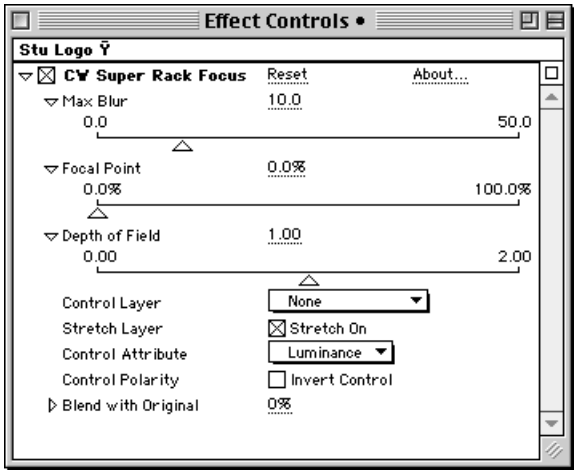


Figure 1:59 CW Super Rack Focus

Depth of Field

Depth of Field works in tandem with the Focal Point value to determine the degree of focus in the image. The Focal Point determines *where* in the depth map the image is in focus — Depth of Field determines how far in front of and behind that point the focus extends.

Control Layer

Control Layer specifies the layer or element that will control the blur.

Stretch Layer

Stretch Layer specifies how to handle a Control Layer that's a different size than the current layer. When the Stretch On box is checked, the Control Layer will be stretched to fit the current layer.

Control Attribute

Control Attribute specifies which attribute of the Control Layer will be used to control the blur. Luminance is the most common choice, but the other attributes allow for very specific control.

Control Polarity/Invert

CW Super Rack Focus normally interprets a depth map as black being closest, and white being furthest away. Checking this box inverts your depth map, so that white is closest and black is furthest away. This is particularly useful when working with 3D programs that generate an inverted z-map

CW WIRE/RIG ZAPPER

CW Wire/Rig Zapper replaces unwanted objects like wires and rigs with colored pixels, cloned/offset pixels, or pixels stitched from either side. Time offset cloning is also available, allowing you to pull pixels from past or future frames to cover the unwanted object.

Though wire and rig removal can be accomplished by duplicating comps or painting frame-by-frame, CW Wire/Rig Zapper offers a fast, automated solution appropriate for most situations.

CW Wire/Rig Zapper includes an intuitive custom user interface for quickly cleaning up large volumes of production work.

View

This pop-up controls whether the area inside the Selection Box displays the original layer or the final product.

- **Before** mode is used for setting the keyframes, so you can see what's underneath the Selection Box.
- **After** mode is for previewing and final rendering.

Replacement

This pop-up designates which technique will be used to replace the pixels specified by the Selection Box.

- **Mask** cuts a hole in the alpha, revealing the layer underneath.
- **Clone** copies pixels from a space offset or time offset source. Clone is the equivalent of a Rubber Stamp tool.
- **Stitch** pulls pixels from the edges and duplicates them across the selection.
- **Color** fills the Selection Box with a specified color.

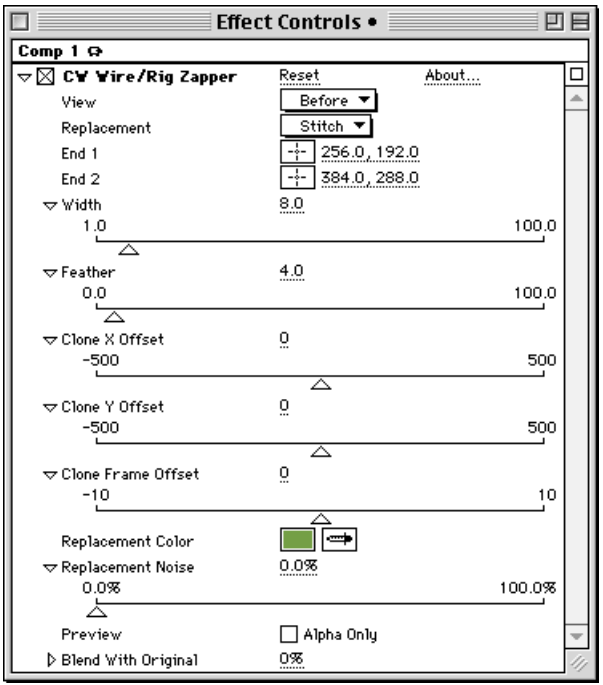


Figure 1:60 CW Wire/Rig Zapper

End 1 & 2

End 1 & 2 determines the end positions of the Selection Box. End 1 & 2 are points at the center of each end of the Box. The box sides are inset somewhat from these ends so that the point control user interface doesn't obscure the edge of the box.

Width

Width controls the width of the Selection Box. Higher numbers make for wider selection areas.

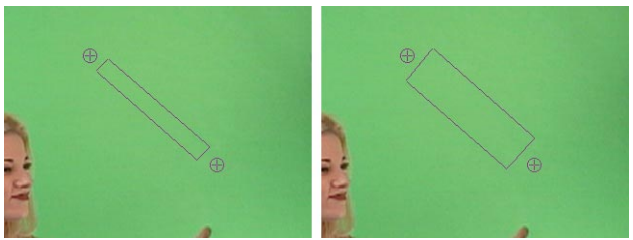


Figure 1:61 Selection Box, Widths 8 and 20

Clone X Offset

Clone X Offset specifies the x-axis pixel offset for cloning when using Clone Replacement mode. Positive numbers move the offset to the right, negative numbers move it to the left. Changing this value also changes the position of the dashed-line Clone Box in the comp.

Clone Y Offset

Clone Y Offset specifies the y-axis pixel offset for cloning when using the Clone Replacement mode. Positive numbers move the offset down, negative numbers move it up. Changing this value also changes the position of the dashed-line Clone Box in the comp.

Clone Frame Offset

Clone Frame Offset allows you to clone from previous or future frames. Negative numbers clone from previous frames, positive numbers clone from upcoming frames.

Replacement Color

Replacement Color determines the color that will replace the selection area when using Color Replacement mode.

Custom User Interface Features

At any time, you can drag the sides of the Selection Box to widen or narrow the box. This greatly speeds the process of object removal and keyframing. The draggable sides are the ones without the End Point Markers.

Hold down the option key while dragging, moving, or resizing the Selection Box to see a real time update. Click and release the option key to update the preview of the Selection Box edges.

When in Clone Replacement Mode, a bulls-eye handle appears in the center of the Selection Box. Dragging the bulls-eye will drag out the Clone Offset box. Figure 1:62 shows our greenscreen source and part of the undesired rigging being cloned out.

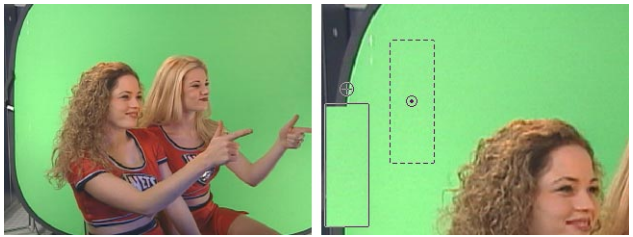


Figure 1:62 Clone Replacement Mode in action

This dashed-line box indicates exactly where the clone pixels are being copied from. The drag-offset allows for fast, intuitive positioning for speedy production work.

Click anywhere in the Effects Controls dialog box to hide the custom Selection Box in the comp window. Click on the name of the plug-in (CW Wire/Rig Zapper) in the Effects Controls dialog box to unhide it.

Tips

To quickly eliminate wires and unwanted objects from blue/green screen layers, use CW Wire/Rig Zapper prior to keying. Use the eyedropper to set Replacement Color to your blue/green color screen color, then use Primatte Keyer to pull a clean, wire-free key.

Clone Frame Offset can be very useful for object removal without a backing screen. If an object moves through frame, Clone Frame Offset can bring pixels from a frame when the object wasn't there to seamlessly eliminate the unwanted object. All parameters are keyframable, making it very easy to adjust the size, position and shape of the area being corrected or being cloned from.

CW Zone HLS

CW Zone HLS allows you to control the Hue, Lightness, and Saturation levels of a clip by individually adjusting the HLS parameters for the clip's highlight, midtone, and shadow zones. This is incredibly useful for precise color adjustments.

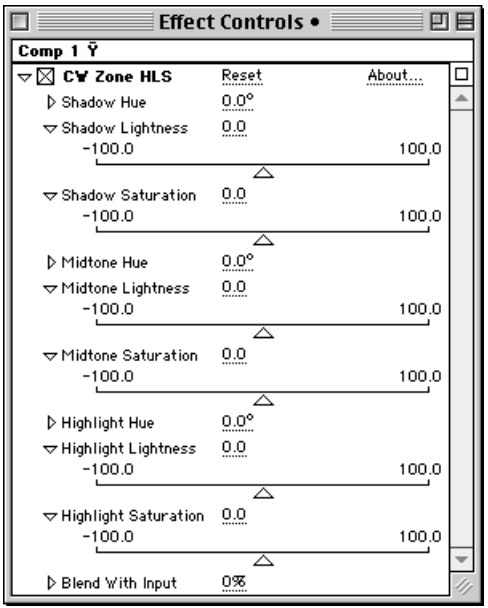


Figure 1:63 CW Zone HLS Interface

HLS Color Model

The HLS color model contains three fundamental characteristics of color, based upon how human beings perceive color:

- **Hue** is what we think of when we think of an object's color. When we say an apple is red we are referring to its hue.
- **Lightness** is the intensity of the color, a measure of the color's value in terms of light versus dark.
- **Saturation** is the measurement of the purity of the color. Fully pure colors are 100% saturated. Colors at 0% saturation have no hue, and appear as grayscale.

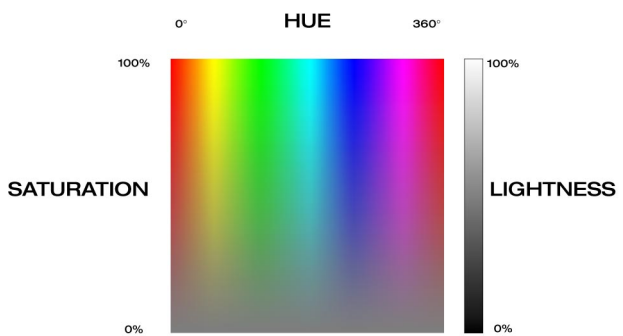


Figure 1:64 HLS Color Model

It's easy to understand how the components of the HLS color model work together if you think of choosing a color in terms of a step-by-step process. We'll choose red as our example color.

1. The first step is to choose a color, or in other words a hue. In Figure 1:64 the hue is represented by the pixels running along the top of the square spectrum. These pixels are at full intensity. The color we want, pure red, is located at both 0° and 360°.
2. The next step is to determine the saturation. At the top of the square the colors are 100% saturated and pure, and at the bottom the colors are completely desaturated and are gray. We want pure red, so we choose a saturation of 100%.
3. As soon as we have made these two initial choices the color we choose appears at the center of the lightness gradient. Whatever combination of Hue and Saturation we choose is what appears at the 50% mark on the Lighhtness gradient. Because we chose pure red, Lightness now shows black at 0%, red at 50%, and white at 100%. To choose pure red we need to keep Lightness set to 50%, where the color is not altered by black or white.

To recap: *Hue* chooses the color, *Saturation* determines how intense the color is, and *Lightness* determines how light or dark the color is.

Hue (Shadows, Midtones, Highlights)

The Hue value is measured in degrees from 0 to 360°. These degrees represent the color values found on a color wheel. Pure red (both 0° and 360°) is located at 3 o'clock — the degrees are are measured counterclockwise from that point. Adjusting this value will alter the color tint of the particular zone (shadow, midtone, or highlight) of the layer.

Figure 1:65 Adjusting the Midtone Hue, Value 120°

Saturation (Shadows, Midtones, Highlights)

The Saturation value is measured from -100 to 100. -100 is equal to 0% saturated, or grayscale. 100 is equal to 100% saturated, or completely pure. Increasing the value makes the colors in the particular zone more intense; decreasing it makes the colors closer to gray.

Figure 1:66 Adjusting Midtone Saturation, Values -50 and 100

Lightness (Shadows, Midtones, Highlights)

Like Saturation, the Lightness value is measured from -100 to 100. -100 is equal to 0% bright, or pure black. 100 is equal to 100% bright, or pure white. Increasing this value makes the colors in the particular zone lighter (closer to white), and decreasing it make the color closer to black.

Figure 1:67 Adjusting Midtone Lightness, Values -50 and 50

ABOUT THESE TUTORIALS

All the files associated with these tutorials can be found on your Composite Wizard Install CD in the folder named *Tutorials*. Opening this folder will reveal individual folders containing all the source files for each tutorial lesson. Each of these individual folders will contain:

- An After Effects 4.1 format completed project file
- An *Elements* folder, containing all the source movie and image files needed to complete the lesson
- A *Rendered* folder, showing how the lessons should look when successfully completed.
- *A Before & After* folder containing two-frame QuickTime movies showing the project before and after the particular effect(s) was applied.

The Project Files

The After Effects project files, when opened, show the tutorials completed as per the steps described in the lesson. For most layers in the projects the Effects have been disabled, and must be enabled before you can see them in action. To enable effects check the *Effect* checkbox next to the name of the specific layer in the Time Layout window.

NOTE TO WINDOWS USERS

These project files were originally created on a Macintosh. Due to Windows file naming conventions the file nomenclature may be slightly different for Windows users. For example, the Macintosh QuickTime movie file “1.Ducks w/alpha” has been renamed “ducks with alpha.mov”. We apologize for any inconvenience this may cause.

TUTORIAL 1: DUCKS

This tutorial will utilize the following plug-ins:

- CW Miracle Alpha Cleaner
- CW Spill Killer
- CW Deluxe Edge Finder
- CW Super Compound Blur

Figure 1:68 Tutorial 1

1. Create a new After Effects project. Add in the following elements:

- 1.Ducks w/alpha
- 2.DuckBG Still

2. Create a new composition and name it *1.Clean Up Matte & Spill*. Add both elements to it.

Matte and Blue Spill Cleanup

The first thing we're going to do is clean up the matte to remove the white dots on the floor, and remove the blue tint from the duck's body.

1. Make sure that the duck layer is selected, then apply *CW Miracle Alpha Cleaner*. Luckily for us the default settings work perfectly for the degree of chatter in this particular shot, and the white specks on the floor disappear instantly.

Figure 1:69 Clean Up the Matte and Remove Blue Spill

The next thing we need to do is remove the blue tint from around the edges of the ducks body. Figure 1:70 shows a close-up of the duck; the blue spill can be easily seen in the left-hand image. The right image shows how the duck looks with CW Spill Killer applied.

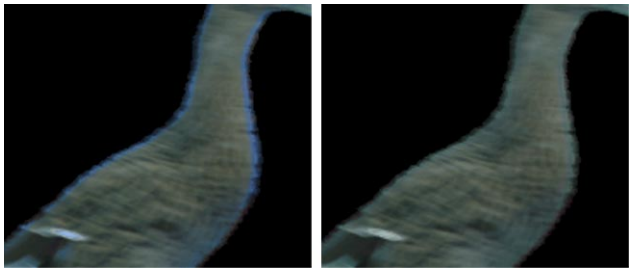


Figure 1:70 Before and After Applying CW Spill Killer

2. Apply *CW Spill Killer* to remove the blur tint.

The first thing you will notice is that the duck now takes on a magenta color. If you look at the CW Spill Killer controls you will see that the *Screen Color* selector is set to Green.

3. Because our footage was shot against a bluescreen and the resulting color spill is blue, set this to *Blue*.

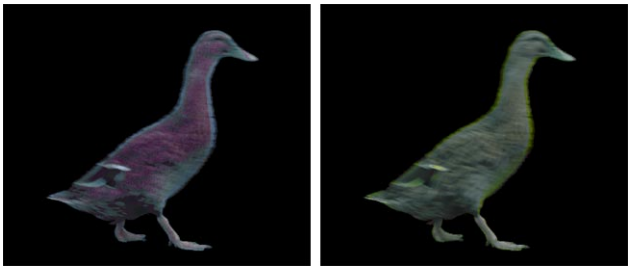


Figure 1:71 Magenta and Yellow Tinting

Once the Screen Color is set to Blue, however, the duck will take on a yellow tint. Don't worry, this is completely normal.

A quick note about Spill Removal

The process of removing spill from an image can be rather complicated. Without going into *too* technical an explanation, spill is removed by lowering the levels of the particular spill color found in the image.

RGB color space is comprised of three primary colors, *Red*, *Green*, and *Blue*. These primary colors combine to the create the three secondary colors of *Cyan*, *Magenta*, and *Yellow*. Cyan is created by mixing blue and green, magenta is created by mixing red and blue, and yellow is created by mixing red and green. This combination of primary and secondary colors makes up the visible color spectrum in RGB space.

Any time you lower the levels of one of the primary colors it has an effect on the entire color range. For example, if you were to remove all red from an image you would no longer have one of the primary components necessary to make magenta or yellow. With only the primary colors blue and

green remaining, the image would take on a noticeable cyan tint. If you look at a color wheel you can see that the cyan is located directly opposite the color red — red is at 3 o'clock and cyan is at 9 o'clock. Cyan and red are therefore said to be *inverse* colors.

If you were to remove all the blue from an image you would leave only the color components of red and green — when combined, these colors form yellow. Yellow is the *inverse* color of blue.

When CW Spill Killer is first applied, by default, the Spill Color popup is set to green, and the Spill Suppression amount is 100%. These two settings tell CW Spill Killer to remove 100% of the green from the image. Doing so left the only the primary colors red and blue, which combined to form the secondary color magenta. This is why the duck originally had a strong magenta tint.

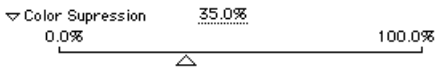
When you changed the Spill Color menu to blue, the duck instantly turned yellow. The yellow is so strong because the Spill Suppression slider is still set to 100%. We don't want to remove *all* the blue from the duck, just enough to remove the obvious tint.

In many instances you may find CW Spill Killer a better choice — it is far easier to use and less likely to cause major tonal shifts in your images.

4. To find the right amount of suppression needed to get the duck looking normal, move the Color Suppression slider to the left a few degrees at a time until you find a suppression level that works.

Figure 1:72 0% Suppression, 100% Suppression, and Perfect Spill Suppression

A level of around 35% will give you the most natural-looking color.



5. When finished, close the composition and all associated windows.

Creating the Edge Layer

At the end of this project our duck is going to be composited over a background element. In order to assist with this composite we are going to create an Edge Layer, which will eventually be used as a control layer in *CW Super Compound Blur* to give precise, subtle blur to the edges of our duck. (This will be explained in greater detail at the end of this lesson.)

1. Create a new composition named *2.Duck Edge*, and add in the 1.Clean Up Matte & Spill comp.

2. Apply *CW Deluxe Edge Finder* to the duck layer.

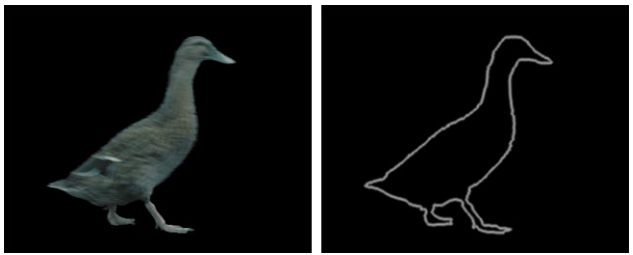
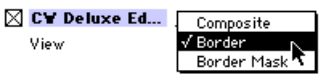


Figure 1:73 CE Deluxe Edge Finder Applied

Our duck is immediately replaced by a duck-shaped outline. By default our View selector is set to *Border Mask*, which creates a border around the alpha channels, then fills the layer with black.

3. Set the View selector to *Border*.



While you won't notice any immediate difference, this is because we are viewing the duck against a black background. Figure 1:74 shows the Border and Border Mask settings viewed against a background image. Whereas Border Mask fills the area with black, Border simply creates a border around the alpha channel, leaving the inside totally transparent.

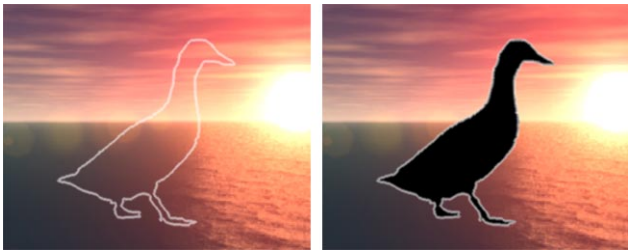


Figure 1:74 Border and Border Mask Settings

4. Set the View selector to *Composite.*

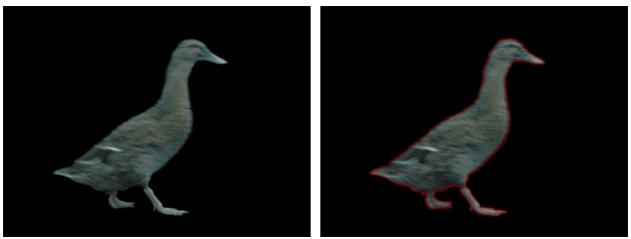


Figure 1:75 Composite View, With a Red Border

When set to Composite view you can see the original image with the border displayed over the top of it. Figure 1:75 shows our duck seen in Composite mode with the border colored red for clarity. Composite mode is a good mode to work in when determining your border settings as you can see exactly what parts of the duck will be affected by the blur.

5. Set your Border Blur to just over 1, leaving all other settings as they are, then set your View selector back to Border. Once your border looks like the border seen in Figure 1:73, close the Composition.

6. When finished, close the composition and all associated windows.

Creating the Composite

We will now create the composite of the ducks over the background image.

1. Create a new composition named *3.Comp w/Edge Feather*, and add in both the 1.Clean Up Matte & Spill comp and the 2.DuckBG Still image.

Figure 1:76 The Composite, Before and After

2. Apply *CW Matte Feather* to the duck layer.

CW Matte Feather creates a gradual feathering along the edge of a layer's alpha channel. We are going to use it to soften the matte edge created by our bluescreen keyer.

3. Set *Edge Pre-blur* to 1.6.

Edge Pre-blur blurs the original edge before feathering, which helps to eliminate jaggies. Be careful not to set this too high, as it changes the shape of the edge and may cut into the layer in unwanted ways.

4. Set *Edge Smoothing* to 1.

Edge Smoothing smooths the edge of the alpha channel into a rounder shape, making the overall edge profile softer.

5. Set *Edge Threshold* to 80%.

Edge Threshold determines the point where the matte edge begins to become transparent, relative to the absolute edge of the alpha channel. Higher numbers will move this point inward.

The effect these settings have had on our composite so far is dramatic to say the least, and can be easily seen by looking at the duck's feet.

Figure 1:77 Effect of Feather settings

Where the edge created by the bluescreen key created a rather jaggy, rough edge we now have a smooth, natural composite.

6. Set *Edge Post-blur* to 2.1.

Edge Post-blur adds a blur to the matte edge after all other calculations are complete, allowing you to get rid of any remaining edge hardness.

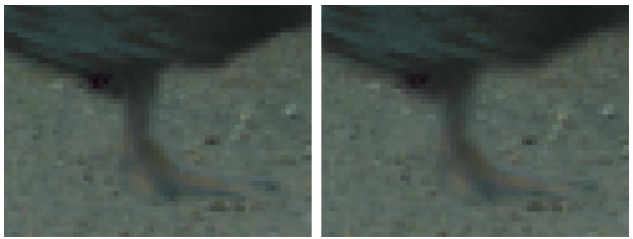


Figure 1:78 Edge Post Blur Applied

This effect is not really noticeable unless you zoom in very closely to the composite and then watch while you apply it. Don't underestimate the importance of these sorts of controls, though. It is the smallest details that make the difference between a perfect CG shot and an obvious CG shot.

7. When all these steps have been completed, close the Composition.

Applying Interlayer Blur

The final step in our project is to apply *interlayer blur*, which is essentially the icing on the cake as far as the composite is concerned.

After Effects contains a number of different blur functions, as does Composite Wizard itself. In the previous steps, we blurred the edges of the alpha channel using CW Matte Feather, greatly enhancing the natural look of the composite. With most blur functions, however, you simply blur the foreground *over* the background without changing the background itself. While this will most assuredly help the realism of a composite, it is not the most accurate approach as far as nature is concerned.

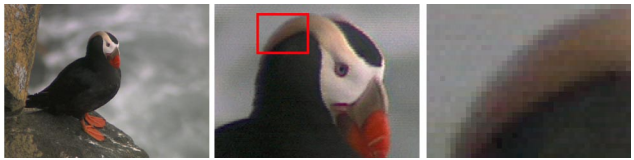


Figure 1:79 Puffin Edge Blur Example

Figure 1:79 shows a picture of a puffin sitting on a rock, with crashing waves in the background. If we zoom in on a small section of his head we can see how the edge of the puffin blends with the background imagery.

To illustrate this point, Figure 1:80 shows the same puffin, rotoscoped out of its surroundings, and composited over a completely different background.

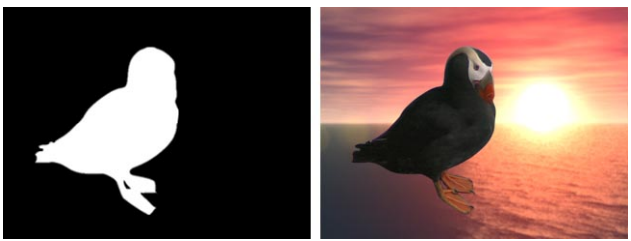


Figure 1:80 Puffin Rotoscoped Matte and Composite

Figure 1:81 shows the edge of the puffin against the new background. The left image shows the edge created by the rotoscoping process. It's

your standard, crisp antialiased edge. The middle image shows the edge when edge blur is applied, where the edges of the RGB image are blurred over the background. The right image shows the edge when the alpha channel has been blurred, which in this case creates a more believable blur.

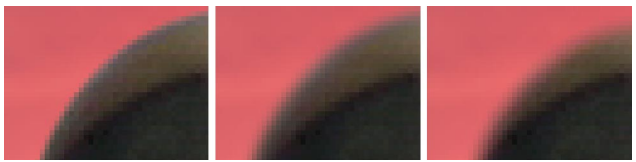


Figure 1:81 Standard Rotoscope Edge, Edge Blur, Matte Blur

While these different edge blurring techniques all have their place in the world of compositing, they have one main drawback. Because of the layered nature of compositing — one layer composited on top of another — the blurring only takes place on the foreground image. As a result the foreground is mixed with color from the background, while the background remains pristine.

This of it like this: Using paint and a wide brush, you paint two different color brush strokes right next to each other. You then take your finger and run it down the length of the common edge. As you do so the two colors mix together, creating a new color — one color doesn't spread out while the other color remains pure. When you blur only one layer, however, your layers are essentially doing just that.

The Interlayer Blur Process

Now that you have a basic understanding of *why* you would want to use interlayer blur, let's get a quick overview of *how* it is done. The process will be explained in greater detail as the lesson progresses.

Figure 1:82 shows the foreground, foreground alpha, and background elements we'll be using. The strange color scheme is to provide high-contrast between the various elements, easily showing the interlayer blur process.

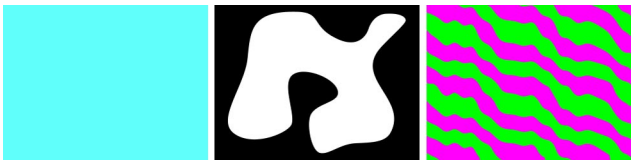


Figure 1:82 Foreground, Foreground Alpha, and Background Elements

The first step is to create a new Composition, add the foreground element, and generate the edge map from its alpha channel.

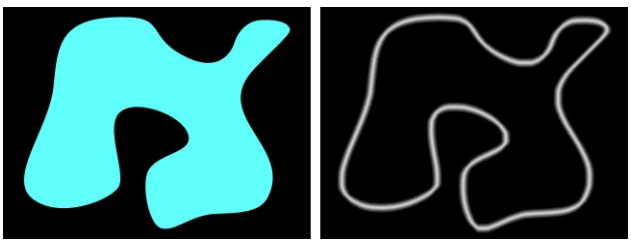


Figure 1:83 Generating the Edge Map

Once the edge map is completed, we precompose the foreground and background elements in a new composition. Figure 1:84 shows the overall composite, plus a zoom in on a smaller region, which shows the crisp antialiased edges of our elements.

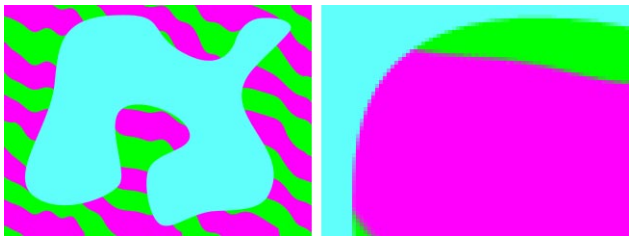


Figure 1:84 The Precomposed Foreground and Background, Zoomed In

At this point we create a new Composition and add in both the precomp layer and the edge layer, then set up the edge layer as a mask for the precomp layer. Figure 1:85 shows how the edge layer masks out the precomp layer.

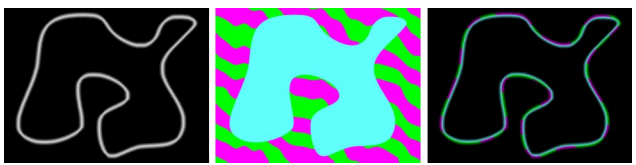


Figure 1:85 The Edge Mask, the Precomp Layer, and the Completed Mask

The left image in Figure 1:86 shows a closeup view of the masked precomp layer. Note that the masked edge contains pixels from both the foreground and background elements.

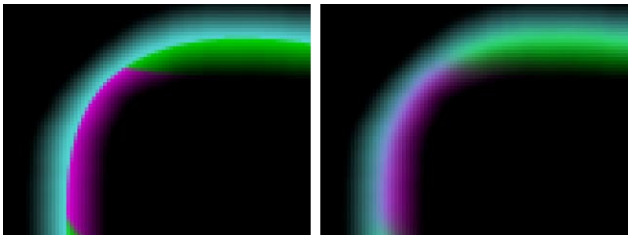


Figure 1:86 Masked Precomp Layer Before and After Blurring.

The right image shows the precomp layer after blur is applied. As you can clearly see the foreground and background elements are being blurred together. The distinct line separating the green and magenta areas is all but gone, and colors from both elements are now intermixed. Figure 1:87 shows the same effect as applied to a larger view of the layer. Note the lack of distinct lines separating the colors in the right image.

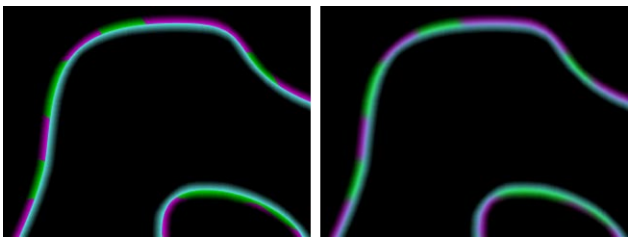


Figure 1:87 The Precomp Layer Before and After Blurring

To see the finished effect, simply apply an unblurred precomp layer *underneath* the masked and blurred precomp layer.

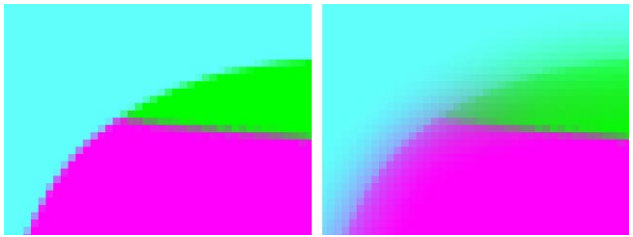


Figure 1:88 Final Composite with Blur Layer Disabled and Enabled

Figure 1:88 shows our composite before and after the blur layer is enabled. As you can see the background and foreground elements are blended together in a much more natural manner: magenta and green pixels are mixed in with the cyan, and cyan pixels are mixed in with the magenta and green.

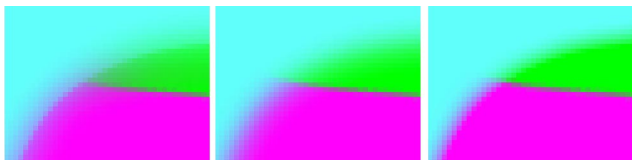


Figure 1:89 Interlayer Blur, Edge Blur, and Matte Feather

Figure 1:89 shows Interlayer Blur, Edge Blur, and Matte (alpha channel) Feathering. The interlayer blur provides the most natural transition between foreground and background, the "dirtiest" mixture of pixels from both elements, if you will.

Finishing the Composite

Now that you know everything there is to know about Interlayer blur, let's apply that technique and finish the composite.

1. Create a new composition named *4.Interlayer Blur*, and add in both 2.Duck Edge, and 3.Comp w/Edge Feather.

(If you open the project file provided on the CD there will be an additional layer in this composition, called *Add Mix Back*. This layer was accidentally included, so simply delete it.)

2. Turn off the visibility of the edge layer.

3. Apply *CW Super Compound Blur* to the duck layer.

In the explanation of interlayer blur from page 55, the blur effect was applied to the entire main image — that blurred imaged was then masked out by using the edge layer as a track matte, and an unblurred copy of the same image was placed underneath it to finish the composite. In this instance, however, there is no need to use a track matte, because CW Super Compound Blur allows you to isolate the blur effect through use of a Control Layer.

By designating the edge layer as the control layer, the blur effect will only be applied to the edges of the duck element, eliminating the need for the extra steps. If you were attempting this process using a blur filter without the ability to use a control layer, the track matte/composite steps would be required.

4. Set the *Control Layer* to 2.Duck Edge, then increase the *Blur Amount* to 10. Leave all other settings at their default. Setting the edge layer as the Control Layer confines the blur to the edge area. Figure 1:90 shows the edges before and after applying CW Super Compound Blur

Figure 1:90 Edges Before And After Blur

If we were to temporarily use the edge layer as a track matte for the duck layer you can easily see the effect the blur has on the edges. The blurred edges in the edge layer perfectly match the edges underneath, giving the most natural edge transitions possible.

Figure 1:91 Edges Isolated to see Effect.

Modifying the Edge

If you like, without closing 4.Interlayer Blur, open 2.Duck Edge and play around with the edge settings. Because 2.Duck Edge is used as a control layer for 4.Interlayer Blur, any changes made to the edge will also be applied to the final composite, giving you an incredible level of control over how the background and foreground elements are blended together.

TUTORIAL 2: FISH

This tutorial will utilize the following plug-ins:

- CW Miracle Alpha Cleaner
- CW Spill Killer
- CW Composite Color Matcher

Figure 1:92 Tutorial 2 Completed

Precompose the Fish

The first step in this project is to take the source files for the fish elements and precompose them.

1. Create a new After Effects project. Add in the following elements:

- Fish 1 blue screen.mov
- Fish 1.alpha.mov
- Fish 2 blue screen.mov
- Fish 2.alpha.mov
- Water.fg.mov
- Water.mg.mov
- Water.bg.mov

2. Create a new composition and name it *Fish 1 Precomp*. Add the files *Fish 1.alpha.mov* and *Fish 1 Blue Screen.mov*.

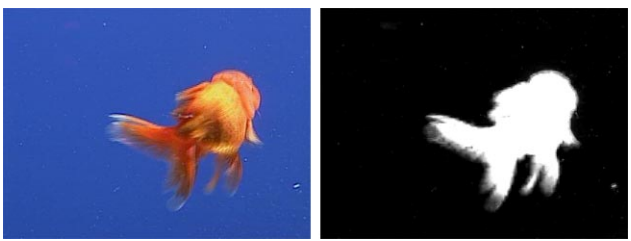


Figure 1:93 Fish 1 Precomp Elements

What we have here is the original bluescreen footage as well as the matte created by a bluescreen key. Because the elements are separate files we're going to precompose them here so that we can treat them as a single file in our main composition.

3. Activate the Transfer Controls, and designate Fish 1.alpha.mov as a Luma track matte for Fish 1 blue screen.mov.

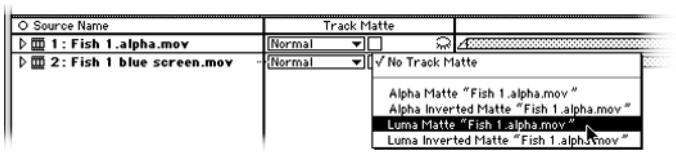


Figure 1:94 Fish 1 Precomp Final

The track matte masks the blue areas, leaving the fish and the floating food particles.

4. Close the composition, then create a new composition and name it *Fish 2 Precomp*. Add the files *Fish 2.alpha.mov* and *Fish 2 Blue Screen.mov*.

5. Perform the same steps as before, creating a track matte for the elements. When finished, close the composition.

6. Create a new composition named *1. Precomp* and add both Fish 1 Precomp and Fish 2 Precomp.

Figure 1:95 1.Precomp

You will end up with a single composition window containing both fish. As we continue with the lesson we can now treat this entire composition as a single layer in the main comp, which is significantly easier than trying to manage four individual files.

Precompose the Water

Now that the fish are taken care of we need to precompose their watery environment. The elements we will be using were created using the *IL Fractal Clouds* filter in the Image Lounge plug-in set. You can find more information on IL Fractal Clouds on page 35.

1. Create a new composition and name it *Water Precomp*. Add in the files *Water.bg.mov (*background) and *Water.mg.mov* (midground), with the latter layer on top.

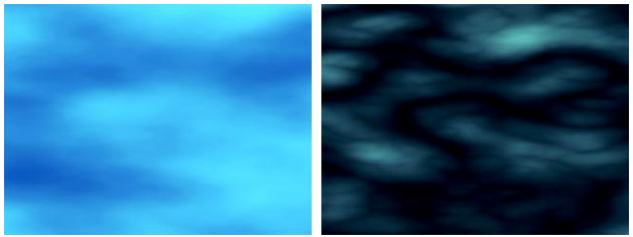


Figure 1:96 Water Precomp Elements

2. Set the opacity of the *Water.bg.mov* layer to 50%.

3. Set the transfer mode of *Water.mg.mov* to Screen. This will make the black areas transparent and allow the layer below it to be visible.

4. Finally, we'll adjust the colors in the MG layer. to give it a green hue. Select the After Effects filter *Color Balance (HLS)*, and set the Hue value to 281°. Figure 1:97 shows the look of the water precomp when completed.

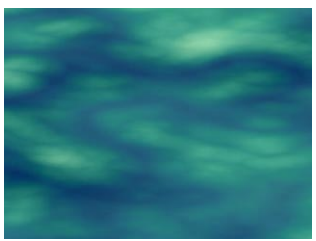


Figure 1:97 The Completed Water Precomp

Cleaning the Matte

Now that we've precomposed all our elements we're going to put them all together to complete the shot and perform a few cleanup operations.

1. Create a new composition and name it *2.Comp*. Add in the composition Water Precomp and then place 1.Precomp on top of it. For now turn off the visibility of the Water Precomp layer.

As you may remember from when we precomposed the fish elements there's all kinds of floating debris in the water, and when the bluescreen footage was keyed that debris showed up as noise in the matte. Before we can complete the shot we need to clean this junk out of the matte.

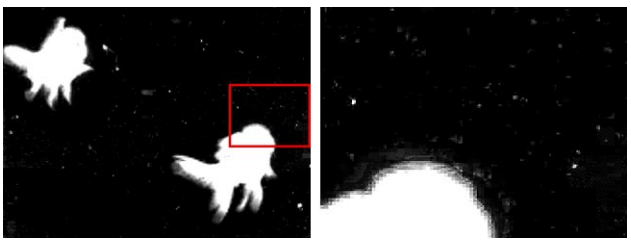


Figure 1:98 Matte Noise, and Closeup

2. Apply *CW Miracle Alpha Cleaner*. By default the Alpha Mode popup is set to *Remove Specks*, which is what we want.

3. Set the *Size Threshold* to 0% and the *Alpha Threshold* to 100%.

4. Check the *Alpha Only* checkbox to view the alpha channel. Zoom in on the edges of one of the fish. Note the got a hard, jaggy edge.

5. Drag the *Connection Threshold* down to 0%. Connection Threshold removed noise based on how close it is to major matte elements. Because of the great amount of fine detail on the edges of the fish (the fins, etc.,) we want this value all the way down in order to retain it.

6. Zoom back out and view the scene. All the flaky noise is now removed, while the fine fish detail remains intact.

Figure 1:99 Matte Noise Before and After

When the bluescreen element was originally filmed pieces of floating debris in front of the fish picked up the blue tint from the background. These blue flecks created holes in the matte during the keying process. We'll now add CW Miracle Alpha Cleaner again to clean up these holes. If you zoom in on either of the fish you can see these dark areas clearly.

7. Apply *CW Miracle Alpha Cleaner.*, and set the Alpha Mode popup to Fill Holes. Set the Size Threshold to 0% and the Alpha Threshold to 100%.

8. Once again set the Connection Threshold to 0%. As you do note how the white matte interior loses its jagged edge.

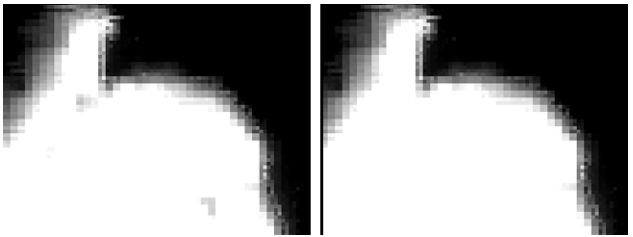


Figure 1:100 Matte Holes Filled Before and After

Spill Suppression

These same fine details areas on the fish, being semi-transparent, have picked up a blue tint from their background. We're going to use CW Spill Killer to remove it.

1. Add *CW Spill Killer*, and set the Screen Color popup to *Blue*. As in the Ducks tutorial the fins take on a yellow tint.

2. Reduce the *Color Suppression* amount until the fins take on a natural color (around 20%).

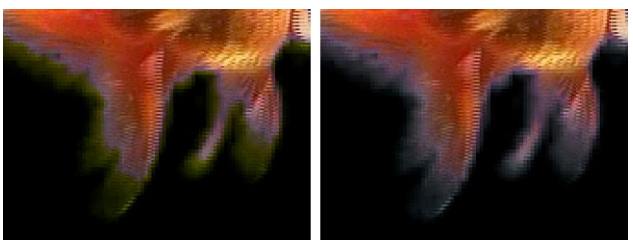


Figure 1:101 Fins Before and After Spill Suppression Applied

Color Correcting the Foreground

Now that the matte is all cleaned up we're ready to start the final composite process by making the fish more closely resemble the colors of their water environment.

1. Turn on the visibility of the Water Precomp layer.

2. Select the 1.Precomp layer and apply *CW Composite Color Matcher*.

This filter is a snap to use: to automatically select a representative sample of a highlight, midtone, and shadow area in the foreground, simply click the All button — CW Composite Color Matcher will remap the foreground colors to match those in the background. Before doing the same step for the background layer, set the Target Layer popup to 3. Water Precomp.

Play around with the Strength and Blend With Original sliders until you end up with fish colored like those shown in Figure 1:102.

Figure 1:102 Fish Before and After Color Correction

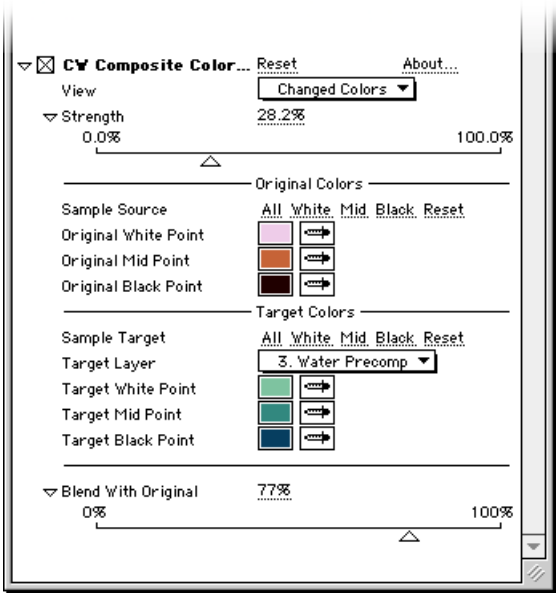


Figure 1:103 CW Composite Color Matcher Settings

Finishing the Project

As a final step we're going to add in another water layer to give the foreground some movement and action.

1. Add the file *Water.fg.mov* (foreground) as the top layer in the composite.

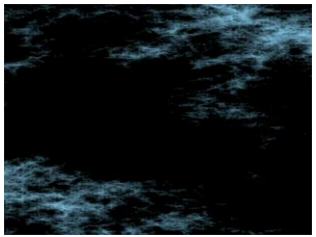


Figure 1:104 Water Foreground Element

2. To make the black areas transparent set the transfer mode to Screen.

3. To soften the effect set the layer's *Opacity* to 30%.

Figure 1:105 The Water Foreground, and Before and After

Figure 1:105 shows the completed shot, before and after the foreground water element is applied.

Final Notes

For those of you who also own the Image Lounge plug-in set you'll continue with this fish project when doing its tutorials. In addition to seeing how the water layers were created, you'll use the *IL Fractal Brimstone* particle system to create animated bubbles, and use the same water foreground element from this lesson as a displacement control layer for *IL Ultra Displacer*.

Figure 1:106 Fish CW and IL

Figure 1:106 shows a closeup view of one of the fish. The left image shows the project how it looks currently, while the right image shows how much better it looks with the additional bubble and displacement effects of Image Lounge. The displacement, in particular, looks spectacular when in motion.

TUTORIAL 3: GOLDEN GATE

This tutorial will focus on the following three plug-ins:

- CW Super Rack Focus
- CW Wire/Rig Zapper
- CW Zone HLS

This is actually a three-part tutorial, using the same elements in three individual projects highlighting the plug-ins listed above.

CW SUPER RACK FOCUS

Figure 1:107 CW Super Rack Focus

What is rack focus?

Some of you may not be familiar with the term *rack focus*. If this is the case please know that you've seen a rack focus a million times in movies and simply never known what it was called.

Focus is one of the most important tools available to a filmmaker, allowing him to draw attention to certain objects, or draw it away from others. A rack focus occurs when the camera operator manually changes focus from one area of the scene to another. This technique is used frequently in

feature film work, and can be used quite effectively in the digital realm to simulate a film look.

The Appendix contains detailed explanations on the terms, concepts, and techniques associated with z-depth, and explains such concepts as rack focus, focal point, and depth of field. The Appendix begins on page Right.

For a detailed explanation of the wide range of blur types available to you in Composite Wizard, please refer to "Blurs" on page 122. in the Appendix.

Precompose the Scene

1. Create a new After Effects project. Add in the following files:

- 1.GG Bridge
- 2.GG Bridge Edges
- 3.GG Bridge w/alpha
- 4.Blue Sky Clouds
- 5.Light Flash Emphasis
- 6.srf text

This tutorial will follow the same basic compositing technique you first became familiar with in the Ducks tutorial. As such our first step is going to be to precompose the main elements.

2. Create a new composition and name it *1.Precomp*. Add the files *4.Blue Sky Clouds*, *3.GG Bridge w/alpha*, and *6.srf text* in that order.

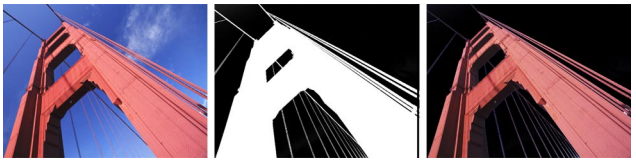


Figure 1:108 Bridge Element and the Primatte -keyed Matte

The clouds movie was created using the *IL Fractal Clouds* filter, the same filter used to create the water elements in the fish tutorial. The text layer was created in Photoshop. The bridge layer is a photograph of one of the towers of the Golden Gate Bridge, which is just a stone's throw from 's offices. Because of the relatively clear background Primatte Keyer was used to extract a gorgeous matte, as seen in Figure 1:108.

Your precomp should look like Figure 1:109. Once it does close the composition.

Figure 1:109 CW Super Rack Focus Precomp

Blur the Edges

1. Our next step is to create an edge layer. Create a new composition and name it *CG Bridge Edge*.

2. Apply *CW Deluxe Edge Finder*. Set the Edge Threshold to 25%, the Border Width to 3, and the Border Blur Amount to 1.5. Set the View popup menu to *Border Mask*. When your edge layer looks like Figure 1:110 close the composition.

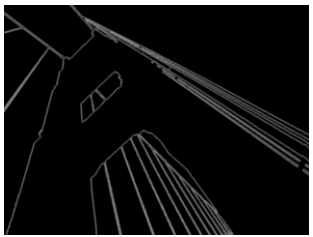


Figure 1:110 The Edge Layer

We'll now use the edge layer to blur the edges of the foreground and background and create a more natural-looking composite.

3. Create a new composition named *2.EdgeBlur*. Add in the layers *1.Precomp* and *2.CG Bridge Edges*. Turn off the visibility of the edge layer.

4. Apply *CW Super Compound Blur*. Set *2.CG Bridge Edges* as the Control Layer. Turn *Blur Alpha* off, and set the Blur Amount to 3.9.

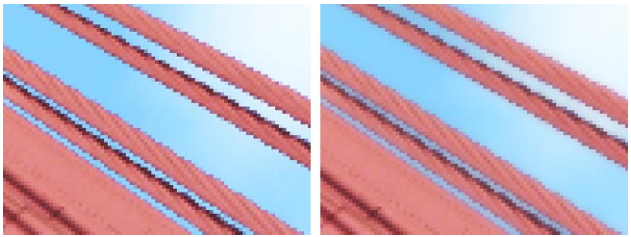


Figure 1:111 Edge Blur Before and After

This will subtly blur the edges of the composite.

Simulating Z-depth

Those of you experienced in 3D animation will be familiar with the concept of z-depth. When working in 2-dimensional space the horizontal axis is given the letter designation *X*, and the vertical axis is designated as *Y*. The *Z* in this case refers to the letter designation given to the 3rd dimension, the axis that comes "out of the screen", so to speak, toward and away from the viewer.

Most 3D applications can output a grayscale z-depth file, which blur plugins in both Composite Wizard and Image Lounge can use to determine a sense of depth through focus. Without going into a lot of detail, the darker pixels receive the least blur and the lighter pixels receive the most blur.

In this tutorial, however, we aren't dealing with a 3D rendered scene — we're using a photograph. What we are going to do in the next step is simulate a z-depth map by using the basic gradient ramp feature of After Effects.

The Appendix contains detailed explanations on the terms, concepts, and techniques associated with z-depth maps, their use, and creation. The Appendix begins on page 97.

1. Create a new composition and name it *CG Bridge Z Ramp*.
2. Add a new black full-frame solid.
3. Add in *3.CG Bridge w/ Alpha* over the solid.
4. With the solid layer selected, apply the *Ramp* filter, located under the Synthesize submenu.

What we want to do is simulate a depth map, where the white areas are the *closest* to the camera and the black areas are the *furthest* away. Using the bridge layer as a guide, create a black-to-white gradient on the solid. Figure 1:112 shows the crosshair positions at the start and end points of the gradient.

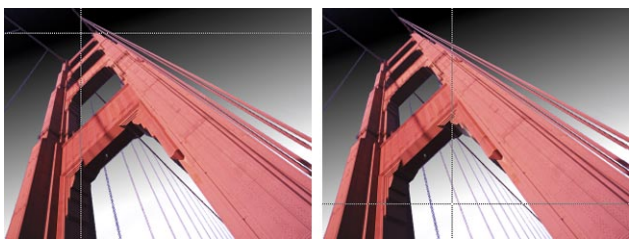


Figure 1:112 Gradient Start and End Points

5. Turn off the visibility of the bridge layer.
6. Activate the transfer controls, and set 3.CG Bridge w/ Alpha as an alpha track matte for the solid layer. Figure 1:113 shows the creation of the simulated z-depth map.

Note how you can almost imagine the top of the bridge being lost in a thick, dark fog. This trick is a great way to simulate depth in a non-CG image.

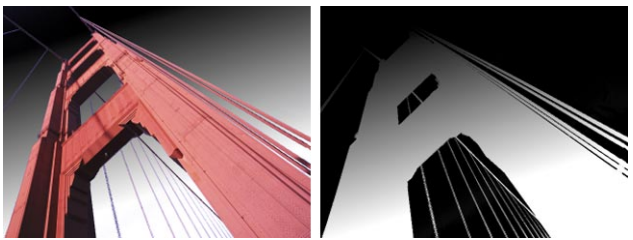


Figure 1:113 Creating the Simulated Z-Map

The Rack Focus

Now that all the setup is done, let's create our rack focus effect.

1. Create a new composition and name it *3.Super Rack Focus*.
2. Add the composition layers *2.Edge Blur* and *CG Bridge Z Ramp*, and the file *5.Light Flash Emphasis*. Turn off the visibility of the z-ramp.
3. Apply *CW Super Rack Focus* to the edge blur layer, and set the z-map layer as the control layer.

At this point feel free to experiment with different blur settings. Experiment with animating the *Focal Point* and *Depth of Field* parameters. If you

like, feel free to open the example project provided and see the settings that we used. This technique does not take long to master, and is one of the subtle effects that can be used to make a good shot look great.

CW ZONE HLS

CW Zone HLS allows you to control the Hue, Lightness, and Saturation (HLS) levels of a clip by individually adjusting these parameters for Highlight, Midtone, and Shadow *zones*. This is incredibly useful when doing precise color tweaking.

Figure 1:114 CW Zone HLS

1. Create a new After Effects project and import the file *1.CG Bridge*.
2. Create a new composition and add the bridge element.
3. Apply CW Zone HLS.

There's really not much of a specific step-by-step way to use this plug-in. Start adjusting parameters and see how they effect the tonal properties of the image. Feel free to use our settings as a guide.

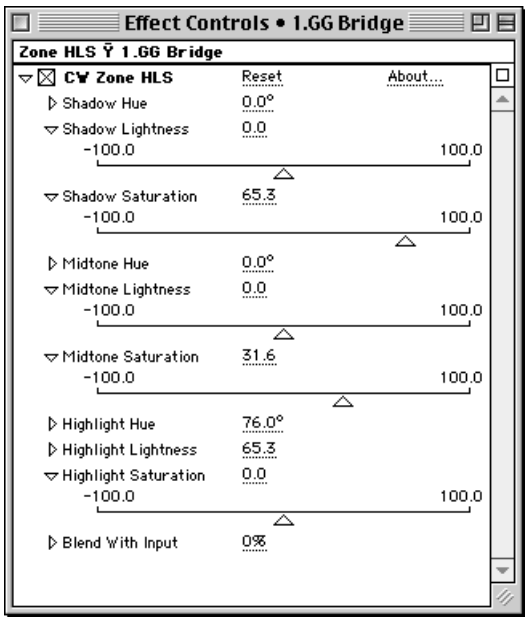


Figure 1:115 CW Zone HLS Settings

Try loading in some of your own images and apply the filter to them.

CW WIRE/RIG ZAPPER

Many times during a bluescreen shoot their will be hard-edged objects that are not intended to be a part of the final keyed element. These can be things like wires (commonly used to simulate an actor or an object floating or flying,) or standard set rigging: lights, *mic* booms, cables, stands, etc. CW Wire/Rig Zapper provides an easy, convenient way to remove these kinds of unwanted objects.

Figure 1:116 CW Rig Zapper Final

1. Create a new After Effects project and import the file *1.CG Bridge*.
2. Create a new composition and add the bridge element.

Take a look at the cables seen in the upper left hand corner of the image. We're going to use three separate passes of CW Wire/Rig Zapper to remove these cables.

3. Apply *CW Wire/Rig Zapper* and look at the center of the image. You will see a rectangle and two points sitting at roughly a 45° angle.

This rectangle represents the "zap" region — whatever is located within it will be removed.

4. Position the region over the first cable. By default our replacement method is set to *Stitch*.

Stitch will sample the pixels at the edge of the region and pull them in to paint out the cable. This is the setting you would most commonly use to remove wires and other long, straight objects.

5. Set the View popup menu to *After* to see the results of the operation.

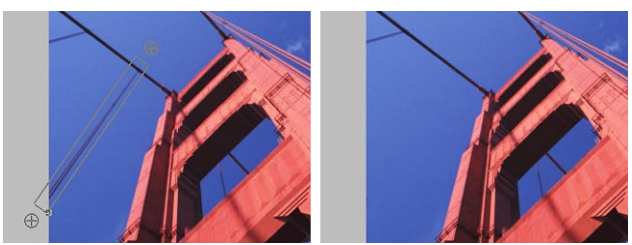


Figure 1:117 Cable Before and After Being Zapped

That's basically all there is to it. Apply two more CW Wire/Rig Zapper passes to remove the other two cables from that portion of the image. Refer to the project file provided on the CD for more information. when finished your scene should look Figure 1:118.

Figure 1:118 Before and After

For additional practice try removing other items from the image, such as the shadow left by the cables you just removed.

TUTORIAL 4: KEVIN IN HEAVEN

This tutorial will utilize the following plug-ins:

- CW Miracle Alpha Cleaner
- CW Denoiser
- CW Spill Killer
- CW Matte Feather
- CW Edge Blur
- CW Composite Color Matcher
- CW Light Wrap
- CW Deluxe Edge Finder
- CW Super Compound Blur

For this tutorial we have employed the services of Kevin, who, during well-deserved breaks from his career as a jetsetting high-fashion runway model, is an actual employee of Pinnacle Systems. In this lesson we are going to take a standard photograph of Kevin and create the scene shown above. This project is comprised almost entirely of techniques learned in previous lessons.

Figure 1:119 Kevin In Heaven Final

Set up the Project

1. Create a new After Effects project. Add in the following elements:

- 1.kevin w/alpha
- 2.Clouds
- 3.FG Flare
- 4.BG Fire.mov

2. Create a new composition named *1.Miracle Alpha Cleaning*, and add in the *1.kevin w/alpha* element.

The Kevin element was filmed on an overcast day without any additional light cast on the foreground. A standard Luma Key extraction was performed to generate the matte. Figure 1:120 shows both the original element and the Luma Key matte.

Figure 1:120 Kevin and the Luma Matte

As you can see there is not only a gaping hole in the matte in the head area but there is unwanted junk in the bottom left corner. we're going to apply two CW Miracle Alpha Cleaner passes to remove these items.

Clean Up the Matte

1. Set the background color of the composition to a pale yellow, which will aid in seeing the matte holes.
2. Apply *CW Miracle Alpha Cleaner*. Set the Alpha Mode popup menu to *Fill Holes*.

As soon as Fill Holes is selected a large portion of the hole disappears. In order to have the rest of the holes filled in we need to increase the size tolerance.

3. Drag the *Size Threshold* slider up until all the matte holes are filled in (around 30%).

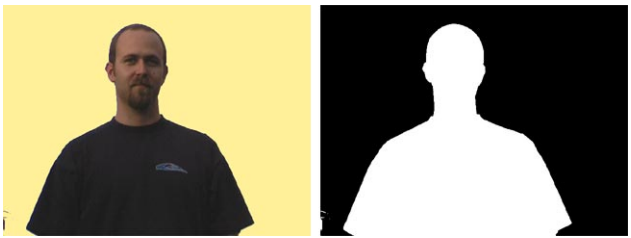


Figure 1:121 Matte Holes Filled

Next we're going to run another CW Miracle Alpha Cleaner pass to get rid of the junk in the bottom left corner.

4. Once again apply CW Miracle Alpha Cleaner. This time increase the Size Threshold until all the debris is removed, as seen in Figure 1:122.

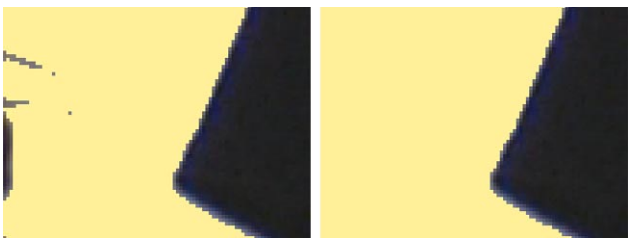


Figure 1:122 Unwanted Matte Objects Removed

Create the Edge Layer

Next we're going to create an edge layer so we can blur the edges later in the project.

1. Create a new composition named *2.Edge Border* and add the 1.Miracle Alpha Cleaning element.

2. Apply *CW Deluxe Edge Finder*. Set the Edge Threshold to 37% and the Border Blur Amount to 2.2.

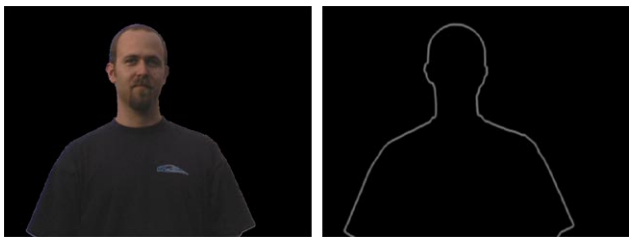


Figure 1:123 Kevin Edge Layer

Precompose the Scene

Next we'll take all these layers and set up our basic scene.

1. Create a new composition named *3.Precomp* and add the following elements in order: *4.BG Fire.mov*, 1.Miracle Alpha Cleaning, and *2.Clouds*.

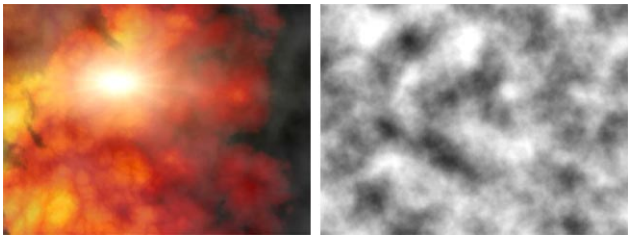


Figure 1:124 Kevin Background and Foreground Elements

The background element was created using a combination of the fractal filters in Image Lounge, and a Knoll Lens Flare Pro flare was applied on top. The foreground element was created using IL Fractal Clouds.

2. Scale the clouds element so that it matches the size of the rest of the composition, then set its *Opacity* to 5%. Finally, activate the transfer controls and set it's transfer mode to *Add*.

This will really play down the foreground clouds, keeping the attention of the viewer on the background and Kevin himself. When completed your composition should look like Figure 1:125.

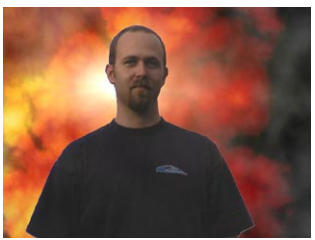


Figure 1:125 Kevin Basic Precomp

Clean Up the Foreground

Now that our scene has been precomposed let's perform some cleanup operations on the foreground and finish the shot.

Take a look at Kevin's chest area. There is quite a bit of ambient noise. Noise of this kind can come from numerous sources, especially on elements shot on video. Noise can also be introduced if a clip is compressed with a lossy compression codec.

1. Apply *CW Denoiser*. Set the Time Depth to 4 and the Average Range to 2%. The noise disappears.

Figure 1:126 CW DeNoiser, Before and After

Even though Kevin was filmed outside the overcast lighting conditions have created a slightly blue-ish cast over his shoulders and the top of his head. We can easily remove this with CW Spill Killer.

2. Apply *CW Spill Killer*. Adjust the amount of color suppression until the blue tint is removed (around 30%).

Figure 1:127 Blue Tint Removed

The original matte for the Kevin element was generated from a Luma key. Keys generated in this manner are known to often produce hard matte edges, and this is exactly what has happened in this case. Our next step is to soften the matte edges.

3. Apply *CW Matte Feather*. Adjust the Feather Size until the matte edges are nice and soft, around 1.2.

CW Matte Feather works by blurring the matte edge *inward,* slightly shrinking the matte.

Figure 1:128 CW Matte Feather, Before and After

Now that we've successfully removed the ratty edges from the foreground we'll apply a little blur to soften the edges even more.

4. Apply *CW Edge Blur*. Set both the Blur Amount and the Edge Width to 2, which will soften the edges nicely.

Figure 1:129 CW Edge Blur, Before and After

At this point we've succesfully cleaned the foreground edges. Now all that's left is to color correct the foreground and really sell the idea that Kevin is actually in this strange, cloudy environment.

5. Apply CW Composite Color Matcher. As in the fish tutorial, feel free to express your own artistic flair and adjust Kevin's coloring as you see fit, or use the settings provided below.

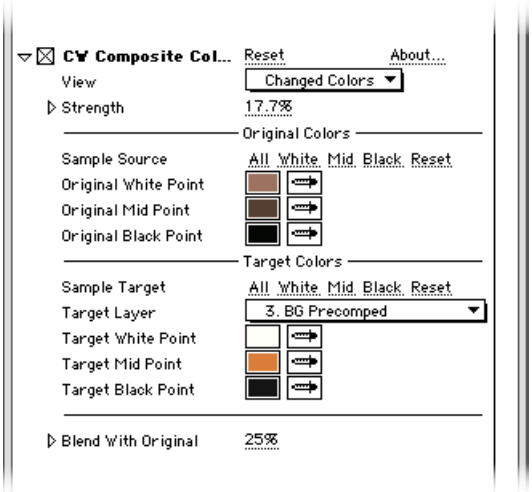


Figure 1:130 Kevin Color Correction Settings

When completed, your shot should look like the right image in Figure 1:131.

Figure 1:131 CW Composite Color Matcher, Before and After

Because our cloud background appears to be a light source, due to the fire-like colors and the lens flare, Kevin needs to appear backlit. CW Light Wrap will allow us to do just that by taking background pixels from around the edge of the Kevin element and "wrapping them around" the edges, giving the illusion of light peeking around Kevin's body.

6. Apply *CW Light Wrap*. Set the Background Layer popup to the *4.BG Fire.mov* element. This determines from which layer CW Light Wrap will pull pixels to wrap around Kevin.

As with CW Composite Color Matcher the settings used here depend entirely on the user's artistic preference. Adjust the sliders and note how they effect the final look of the foreground element. Try changing the Composite Mode. Or, if you like, use our settings:

7. Set *Background Blur* to 18; *Composite Mode* to Overlay; *Width* to 55; and Brightness to 0.15.

As you can see in Figure 1:132 the light wrap effect greatly enhances the believability of the shot.

Figure 1:132 CW Light Wrap, Before and After

For those of you thirsty for more, CW Light Wrap will be covered in greater detail in the next lesson.

Completing the Shot

Now that we've got all the cleanup and correction out of the way it's time to finish the shot by blurring the edges and adding a foreground flare.

1. Create a new composition named *4.Final Composite*, and add the following elements in order: *3.Precomp*, *2.Edge Border*, and *3.FG Flare*.

2. Turn the visibility of the 2.Edge Border and 3.FG Flare layers.

3. Apply CW Super Compound Blur. Designate 2.Edge Border as the control layer. Set the Blur Amount to 5.6, and the Control Gain to 2.

This gives us a gorgeous edge blur, comprised of pixels from both the foreground and background elements, as seen in Figure 1:133.

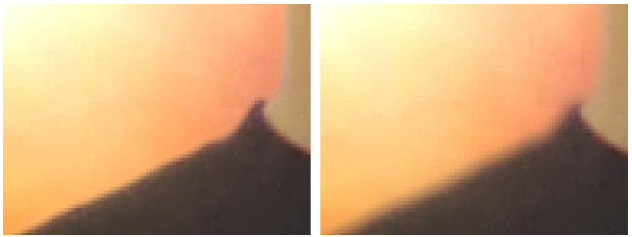


Figure 1:133 CW Super Compound Blur, Before and After

The final step is to add the foreground flare element. This was created seperately using Knoll Lens Flare Pro. The alpha channel for the Kevin element was used as an obscuration layer for the flare, giving the flare the appearance of going *behind* Kevin by disappearing when its position and the alpha channel intersect.

4. Enable the visibility for the flare layer and set it's transfer mode to *Screen*.

5. At the default time of 0:00:00:29 the flare is currently "behind" Kevin's head and is obscured. In order to see it move your current time to 0:00:00:16.

Figure 1:134 The Foreground Flare Element

As you can see in Figure 1:134 the flare looks completely real, and adds a dazzling effect to the project.

Final Notes

This lesson was essentially a wrap-up of all the lessons that preceded it. In order to get the most out of Composite Wizard you really need to have a good understanding of these techniques, especially *why* you want to use them, rather than just *how*. This is a great project to experiment with — tweak it to your heart's content until you feel that you have a firm grasp of the concepts relayed here.

TUTORIAL 5: LOGO INTEGRATION

This tutorial will utilize the following plug-ins:

- CW Miracle Alpha Cleaner
- CW Spill Killer
- CW Deluxe Edge Finder
- CW Super Blur

Figure 1:135 Logo Integration Final

Unless you're specifically working for a big-name Hollywood visual effects studio, chances are that at some point you're going to find yourself creating a flying logo animation. Whether it's a commercial that the mom-and-pop store down the street is going to run on local TV, or a multi-million dollar spot for a soft drink company to run during the SuperBowl, flying logos make up a huge portion of the motion graphics market. This lesson is going to show you how to integrate a logo rendered out of a 3D application with 2D elements and filter effects created using Composite Wizard, Image Lounge, and Knoll Lens Flare Pro.

About Knoll Light Factory

While the Kevin lesson used pre-rendered elements from Knoll Light Factory, this lesson actually uses the plug-in itself. Those of you who already own Knoll Light Factory for After Effects are ready to begin the lesson and can skip the rest of this paragraph. Those who have not yet purchased Knoll Light Factory will find a demo version available on the Composite Wizard CD.

If you need to install the Knoll Light Factory demo you must first quit After Effects. Once you're done installing, make sure that *Knoll Light Factory* can be found under the Knoll submenu of the Effect menu, then continue on with the lesson.

Set up the Project

1. Create a new After Effects project. Add in the following files:

- 1.Logo Beauty Pass.mov
- 2.Logo Alpha.mov
- 3.Desert Sun BG.mov
- 4.Flare Spikes.mov

- Water.bg.mov
- Water.mg.mov

These last two water elements are the same ones used in the fish lesson, and can be found in the *Fish CW* folder on the install CD.

Precompose the Background

As in the previous projects, we'll start out by precomposing the background elements into a single layer.

1. Create a new composition named *1.BG Precomp*, and add in the following elements in order: *Water.bg.mov*, *Water.mg.mov*, and *3.Desert Sun BG.mov*.
2. Set the transfer mode of both 3.Desert Sun and Water.mg.mov to *Screen*.
3. Turn off the visibility of 3.Desert Sun layer for the moment.
4. Select the Water.mg.mov layer and apply the After Effects filter *Color Balance (HLS)*. Set the Hue to -45°.

Combined with the Water.bg.mov element we now have a nice light blue cloud background.

5. Turn on the visibility for the desert sun layer.

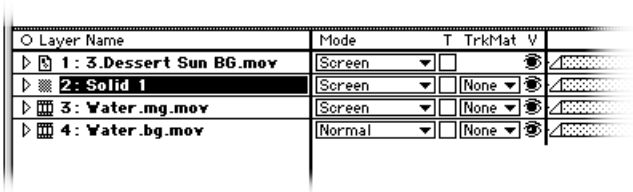
This PICT image was created in Adobe Photoshop using the Knoll Light Factory plug-in. Knoll Light Factory is available as a plug-in for After Effects, Photoshop, and Electric Image Universe. For more information on Knoll Light Factory, please visit Pinnacle Systems website at:

http://www.pinnaclesys.com

At this point your should look like Figure 1:136. The next step is to add our live Knoll Light Factory element.

Figure 1:136 Background Precomp

6. Create a new solid the same size as the composition, 100% black. Place it between the sun layer and the top water layer. Set its transfer mode to *Screen*.



7. With Solid 1 selected, apply *Knoll Light Factory*.

8. Click the work *Options…* at the top of the Knoll Light Factory interface. This brings up the *Lens Editor*.

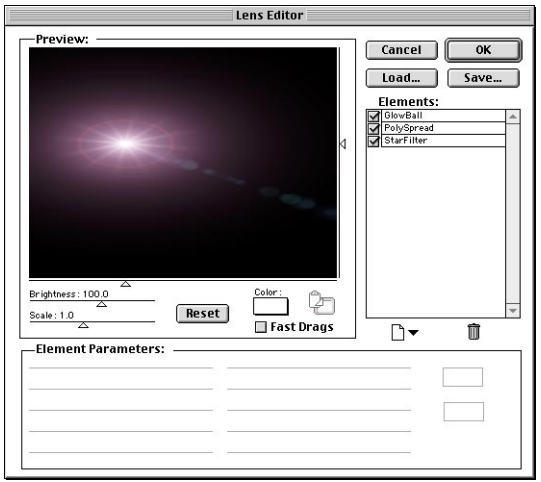


Figure 1:137 Knoll Light Factory Lens Editor

The lens editor is where you create your own custom lens flares. For this lesson, however, we're going to be using a preset flare. When you installed Knoll Light Factory it also installed a folder full of preset lens flare styles named *Knoll Light Factory Custom Flares*.

9. Click the *Load* button in the top right corner of the editor window, and navigate to the Knoll Light Factory Custom Flares folder.

10. Locate the file *Desert sun.lfp* and click *Open*.

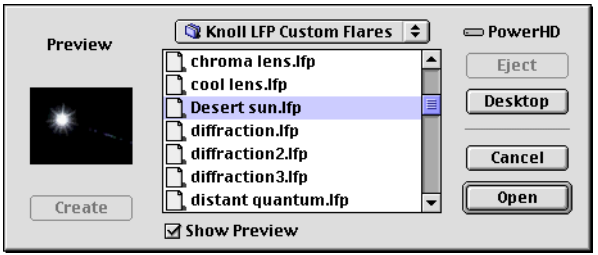


Figure 1:138 Desert Sun.lfp

The custom flare Desert sun is now visible in the Lens Editor. In the top right corner you will see a section called *Elements*, under which you will find all of the different individual lens flare elements that make up this flare. Disable all of them except for the two PolySpread elements, as seen in Figure 1:139.

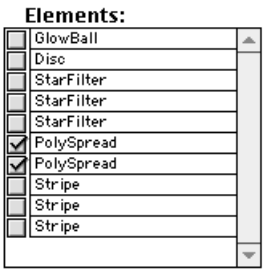


Figure 1:139 Disabled Lens Flare Elements

At this point your lens flare should look exactly like the flare in Figure 1:140.

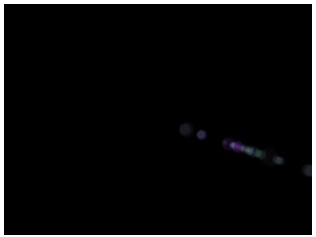


Figure 1:140 Correct Lens Preview

11. When you are finished editing click the *OK* button in the top right corner.

12. Go to the Knoll Light Factory interface in the Effects Controls window and set the *Brightness* to 140.

13. To correctly position our lens flare click the Light Source Location crosshair button and position the flare directly in the center of the sun flare in the top layer.

Figure 1:141 shows the background layer before and after the Knoll Light Factory filter effect is applied.

Figure 1:141 Knoll Light Factory, Before and After

Precompose the Foreground

As in the fish tutorial, our foreground element and its corresponding matte are separate files, which we will now precompose into a single layer.

1. Create a new composition named *2.Logo Precomp*, and add the files *1.Logo Beauty Pass.mov* and *2.Logo Alpha.mov*.

2. Turn off the visibility of 2.Logo Alpha.mov, and designate it as a track matte for the beauty pass.

What is a beauty pass?

Some of you may be unfamiliar with the term *beauty pass*. When you are in a situation where you are generating multiple passes of the same object, such as motion control camera work or 3D animation, you will often find yourself in a situation where you have a light pass, a specular pass, a shadow pass, a reflection pass, etc. These passes are all intended to be combined together in a compositing program to produce a single shot.

The beauty pass is the most important shot of all — it is the pass which will be enhanced later by all the other passes, and it most resembles the desired final output. Figure 1:142 shows the beauty pass, the alpha mask, and the final precomposed foreground element.

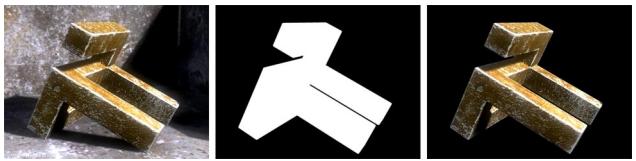


Figure 1:142 Beauty Pass, Alpha Mask, and Precomped Foreground

Precompose the Scene

1. Create a new composition named *3.Comp.Precomp*, and add the following elements in order: *1.BG.Precomp*, *2.Logo.Precomp*, and *4.Flare.Spikes.mov*.

2. Temporarily turn off the visibility of the flare spikes layer.

As we did in the Kevin and Golden Gate tutorials we're going to apply CW Light Wrap to simulate a backlighting situation and create some beautiful edge effects between the foreground and background.

3. With the logo layer selected apply *CW Light Wrap*.

4. Designate 1.BG.Precomp as the *Background Layer*. This tells CW Light Wrap what layer to use to determine the color of the light wrap effect.

As soon as you designate a background layer the light wrap effect can be seen applied to the logo. Next we will tweak these settings to create the desired effect.

5. Set *Background Blur* to 0.

Background Blur performs a blur computation on the background layer before the light wrap is calculated. This blur is internal to the light wrap calculation only, and it not visibly applied to the layer. Background Blur is used to soften hard lines present in the background, creating a more natural color blend in the wrap effect.

6. Leave *Composite Mode* set to Add.

The composite mode determines how the light wrap effect is applied to the layer. This functions in exactly the same manner as the standard After Effects transfer controls.

7. Set the *Width* to 30.

The Width setting determines how wide the blur effect spreads from the edge of the layer. Increase and decrease this value while looking and the composite and it is very easy to see the change. The width slider controls how "powerful" the light wrap effect is.

8. Leave *Brightness* set to 0.

As its name suggests, the Brightness slider adjust the brightness properties of the applied effect. You can use Brightness in conjunction with the Composite Mode setting to create a negative light wrap, simulating a brightly lit front and a very dark background.

Figure 1:143 CW Light Wrap, Before and After

Figure 1:143 shows a before and after for the light wrap. As you can clearly see the effect is has on the foreground object is significant, and greatly adds to the believability and overall artistic value of the shot.

With our light wrap applied we are now ready to color correct the foreground.

9. Apply *CW Composite Color* Matcher to the foreground layer. Set the View popup menu to *Original Colors*.

As we did in previous lessons, we will now sample three colors from the foreground element which represent the tonal highlight, midpoint, and shadow areas. There are two ways to do this — the easiest way is for the plug-in to do the sampling for you. You can also sample the colors manually for precise control, which is what we'll do in this lesson.

10. Click on the eyedropper next to Original White Point and select the lightest color you can find in the foreground image. Don't be in a hurry, because pixels can vary greatly even when they are right next to each other, and it is important to be as accurate as possible when using this plug-in. When you have found the lightest color click once on the foreground to sample it.

11. Repeat the process for *Original Mid Point* and *Original Black Point*.

Figure 1:144 Sampling Light, Midtones, and Dark Areas

Figure 1:144 shows the three areas selected as a representative sample of foreground color. The three colors used in the example project are shown below. Your samples need to match these as closely as possible.

The next step is to obtain a representative sample of the background layer, which will be used to remap the foreground colors.

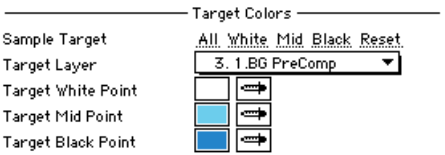
12. Set the Target Layer popup menu to *1.BG.Precomp*.

The Target Layer designates the layer from which the plug-in should sample color, which in this case is the background layer.

13. As before, click on the eyedroppers in the Target Colors section and choose a representative sample of light, midtone, and dark background colors.

Figure 1:145 Sampling the Background Layer

Figure 1:145 shows the three areas selected as a representative sample of background color. The three colors used in the example project are shown below. Your samples need to match these as closely as possible.



14. Once all your color samples are selected, set the View popup menu to *Changed Colors* to see the effect.

Figure 1:146 CW Composite Color Matcher, Before and After

As you can see in Figure 1:146 the effect is quite striking. In this case it is also too strong.

15. Reduce the amount of color change by reducing the *Strength* value from its default 50% to around 24%.

Figure 1:147 Reducing the Color Match Strength

Another way to reduce the amount of color change is through the *Blend With Original* slider. As its name suggests this controls the percentage of the original image that is mixed with the color corrected image.

16. Increase the Blend With Original slider and note the effect. We settled on a value around 20%.

Figure 1:148 Blend With Original, 0% and 20%

Now, in order to truly appreciate the impact these two effects have had in our composite Figure 1:149 shows a before and after for comparison. The difference is absolutely stunning.

Figure 1:149 Light and Color Effects, Before and After

17. For the final step in precomposing the shot, turn on the visibility for the *4.Flare Spikes.mov* layer, activate the transfer controls, and set its transfer mode to *Screen*.

The Flare Spikes is another layer of lens flare artifacts that enhances the flare in the background layer. Figure 1:150 shows their effect.

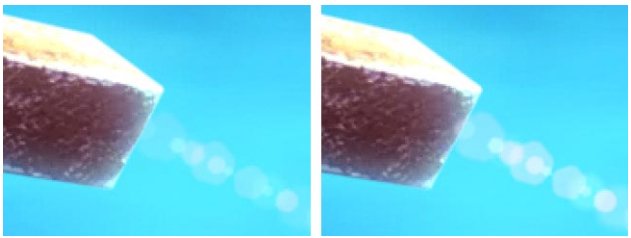


Figure 1:150 Flare Spikes Visibility Off and On

Finishing the Project

We have only one filter effect left to apply, which will put the final layer of polish on all the work we just did.

1. Create a new composition named *4.Final Comp*, and add in the pre-comp layer we just completed.

Because of the way the background looks, (nondescript and drifting,) coupled with the way in which the light wrap and color correction have blended the foreground and background together, the composite appears to have a sort of atmospheric effect, as if there were a fine layer of fog between the viewer and the logo. To enhance this effect we're going to soften the entire composite by applying a little blur, which will really bring the whole project together.

2. Apply *CW Super Blur*, and soften the image with a 2-pixel blur.

Figure 1:151 CW Super Blur, Before and After

As with so many of the steps we take in these tutorials this is a relatively minor tweak but its effect is quite noticeable and dramatic. So often the littlest steps can make all the difference in a shot.

And now, finally, we will once again compare the uncorrected precomp to the finished project. This really helps you gauge just how worthwhile these types of enhancements are to something as “simple” as a flying logo.

Figure 1:152 Logo Integration, Before and After

TUTORIAL 6: LOGO RACK FOCUS

This tutorial will utilize the following plug-in:

- CW Super Rack Focus

Figure 1:153 CW Super Rack Focus Final

This lesson will guide you through the process of pulling a rack focus on an animated logo.

The Appendix contains detailed explanations on the terms, concepts, and techniques associated with z-depth maps, their use, and creation. It also explains such concepts as rack focus, focal point, and depth of field. The Appendix begins on page 97.

For a detailed explanation of the wide range of blur types available to you in Composite Wizard, please refer to "Blurs" on page 122. in the Appendix.

Set up the Project

1. Create a new After Effects project and add in the following elements:
   - 1.Logo Beauty Pass.mov
   - 3.Logo Z Depth.mov
2. Create a new composition named *1.Rack Focus* and add both elements to it. Make *3.Logo Z Depth.mov* hidden by turning off its visibility or simply placing it behind the beauty pass.

Unlike most of the previous tutorials there's no precomping or nested layers — you just get to jump in with both feet and begin.

Setting up the Lens

The first things we need to do before actually pulling the rack focus determine the desired Depth of Field for our digital camera lens, and decide how much blur we want the filter to apply.

1. Go to frame 120 (4 seconds). This is a good frame on which to test Depth of Field settings because of the flat background.
2. Apply the filter *CW Super Rack Focus*.

As soon as you apply the filter the entire scene becomes blurry. This is because we haven't yet told the plugin to base the blur on the z-map.

3. Designate 3.Logo Z Depth.mov as the Control Layer.

The blur becomes much more specific, with the foreground having the least amount. Now we simply have to tweak our setting suntil we have the look desired.

4. Play around with the Depth of Field slider until you have a look you are satisfied with. We settled on a value of 0.65.

5. Adjust the Max Blur slider until you have an appropriate amount of blur. We used a setting of 15.

Once your settings are finalized we're ready to animate.

Animating Rack Focus

If we were working with a real camera and wanted to perform a rack focus we would manually adjust the focusing ring of the camera lens while we filmed the shot. Working digitally, we are going to keyframe the Focal Point value to achieve the same effect.

1. Move the current time marker to the first frame. To begin we want the foreground in focus and the background slightly blurry, and a value of 36% works quite nicely.

Figure 1:154 Frame 1, Focal Point 36%

2. As the camera move begins, frame 50 (1:20) shows us the logo almost entirely perpendicular to the camera. At this frame we'll focus on the background — a value of around 73% achieves this effect.

Figure 1:155 Frame 50, Focal Point 73%

3. At frame 96 (3:06) we start to see the back of the logo. At this point we should begin to pull focus back to the foreground. Set a keyframe here to keep the Focal Point at 73%.

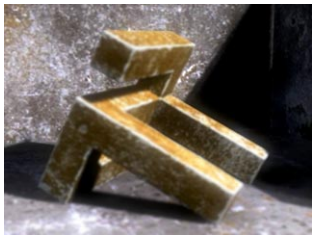


Figure 1:156 Frame 96, Focal Point 73%

4. We'll set our final keyframe at frame 120 (4:00). This leaves us around a second of footage after this frame to display our new Focal Point settings before the clip ends. To pull the focus back to the foreground set a keyframe of around 30%.

Figure 1:157 Frame 120, Focal Point 30%

5. Render the animation. You'll be amazed at the life and realism the rack focus gives to the clip.

TUTORIAL 7: MR. STU COMP

This tutorial will utilize the following plug-ins:

- CW Miracle Alpha Cleaner
- CW Light Wrap
- CW Composite Color Matcher
- CW Super Blur

Figure 1:158 Mr. Stu Final

This project is similar to the Kevin tutorial in that it involves matte cleanup and color correction. This lesson, however, creates more of a "real-world" situation in that the composite takes place over video footage and not a fractally-generated background. There are two individual projects in this lesson: *1.Mr. Stu Outdoors* and *2.Mr. Stu Stairs*. It is assumed that you have completed all the previous tutorials in this series, and as such there is not much "hand-holding" — if you find yourself getting lost simply refer to the previous tutorials to get up to speed.

About the Mr. Stu Movie

The main element in the two projects contained in this lesson is the Mr. Stu movie. Figure 1:159 shows the original bluescreen footage, the keyed matte, and the masked Mr. Stu movie.

Figure 1:159 Mr. stu Elements

The bluescreen footage was shot with a DV camera, and as such is a relatively low chroma clip. Low-chroma images can often cause problems during the keying process. The semi-transparent hair detail presents a particularly challenging aspect to this shot.

We used the Pinnacle Primatte Keyer to generate this matte. Even with a difficult, relatively low-quality video clip such as this, Primatte Keyer makes matte creation a snap.

For more information on Primatte Keyer, install the demo version located on the Composite Wizard CD.

Set up the Project

1. Create a new After Effects project and add in the following files:

- 1.Mr.Stu w/alpha
- 2.Outdoors BG
- 3.Outdoors Stairs BG
- 4.CW Logo

2. Create a new composition named *Mr. Stu Flipped Horizontal*, and add in the file *1.Mr.Stu w/alpha*.

Figure 1:160 Mr. Stu Original and Flipped

The first thing we want to do is flip the Mr. Stu clip horizontally. This is for purely cosmetic reasons — Mr. Stu himself is lit from the right side, whereas the scene in which he is being composited is lit from the left. Flipping him horizontally will take care of any issues that would otherwise arise from this lopsided lighting.

MR. STU OUTDOORS

1. Create a new composition 2:05 in length, name it *1.Mr.Stu Outdoors,* then add in the file *2.Outdoors BG*, followed by the composition *1.Mr.Stu w/alpha*.

2. Set the in point of the Mr. Stu clip to 0:00:00:04, and the in point of the background clip to -0:00:01:02.

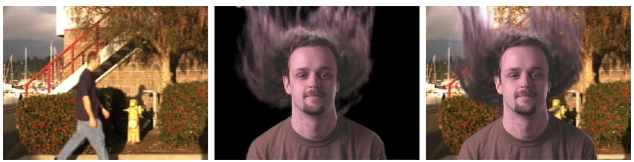


Figure 1:161 Mr. Stu Outdoors Elements

As you can see the foreground element looks seriously out of place over the background — it clearly needs to be color corrected and have the edges smoothed. The first thing we're going to do, though is blur the background a little.

Blur the background

There are two reasons for doing this. First, the background footage is very grainy, and blurring it little will take some of the harshness out of the clip. Second, it will add to the overall look of the shot by giving the background a subltle sense of depth if field.

1. Apply CW Super Compound Blur to the background, and give it a Blur amount around 0.5. Too much blur will ruin the effect; blur values under 1 give just enough of a slight blur.

Clean up the foreground

Because the coloration of the foreground is significantly different than the background, our next step will be to perform color correction.

1. Apply *CW Composite Color Matcher*. Sample the foreground and background colors by selecting *All* next to Sample Source and Sample Target, or by using the eyedroppers.

2. Increase the *Strength* value to around 80%.

Figure 1:162 Mr. Stu Before and After Color Correction

The next step is a subtle one, involving *CW Light Wrap*. In all the previous projects CW Light Wrap was used in a strong backlighting situation to create a very obvious effect. Here we are going to use CW Light Wrap to create a very subtle edge effect, and significantly improve the way the hair looks over the background while leaving the rest of the foreground mostly unmodified.

3. Apply CW Light Wrap, and designate 2.Outdoors BG as the *Background Layer*.

As expected the foreground element now has a bright halo around its perimeter.

4. Set the Composite Mode to *Hard Light*.

Hard light is a combination of two transfer modes, *Multiply* and *Screen*. Which mode is applied depends on the underlying color at the edge. Lighter colors, such as the semi-transparent artifacting at the edges of the hair, will assume the colors of the background, which essentially makes this bright artifacting disappear.

5. Increase the *Background Blur* amount to around 14, and decrease the *Width* to 6 or 7.

To easily see the effect of CW Light Wrap on this layer, click the checkbox in the Effect Controls dialog next to CW Light Wrap to enable and disable the effect. The change in the edges, while subtle overall, is quite dramatic in the way the foreground blends with the background. Turning off the visibility of the background layer shows the effect with even greater clarity. The light areas of the hair edge fully assume the color of the underlying pixels.

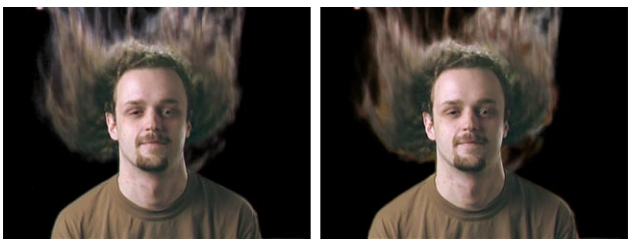


Figure 1:163 CW Light Wrap Effect Before and After

Clean the Matte

The final step is to do a little bit of matte cleanup. The bottom right corner of the Mr. Stu layer contains a little bit of chatter which needs to be removed.

1. Apply *CW Miracle Alpha Cleaner*, and enable the *Alpha Only* check-box.

At its default settings the filter causes the matte edge to become harsh and jaggy.

2. Set the *Connection Threshold* to 0%, the *Alpha Threshold* to 100%, and the *Size Threshold* to around 45%.

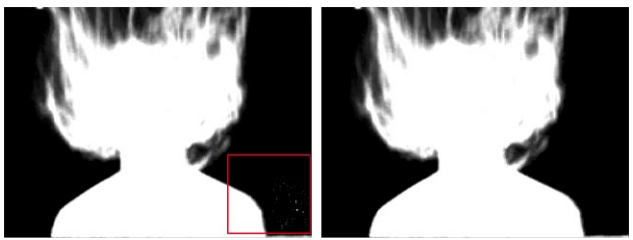


Figure 1:164 Mr. Stu Matte Cleanup

The small specks are removed, and the smooth edges of the hair are maintained.

Final Notes

Close all windows and look at the final composite. This project, as well as the second one in this lesson which you will do next, truly highlight the power of these tools. For comparison, take these elements and try and perform the same composite using the toolset available to you before you purchased Composite Wizard.

Figure 1:165 Mr. Stu Outdoors Before and After

When you look at the completed shot in action pay close attantion to the hair edges. If you like, render out a pass without the CW Light Wrap filter applied to the foreground and compare the hair between the two shots. This lesson provides you with a clear example of how you can often do amazing things with a tool that are not part of its predesigned “purpose”.

MR. STU STAIRS

This is the last project in the Composite Wizard tutorials. As you can see the steps for the entire project take less than a page. There is very little in the way of explanation here, as these steps should by now be second nature to you.

Set up the composition

1. Create a new composition 2:15 in length, name it *2.Mr. Stu Stairs,* then add in the files *3.Outdoors Stairs BG* and *4.CW Logo*, followed by the composition *1.Mr.Stu Flipped Horizontal.*

2. Set the in point of the background clip to -0:00:02:16, and the in point of the Mr. Stu clip to 0:00:00:14.

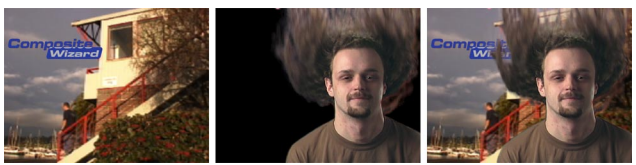


Figure 1:166 Mr. Stu Stairs Elements

3. Drag the foreground elemend to the right so that Mr. Stu is positioned in the righthand third of the frame.

Blur the background

As we did in the previous example, we'll apply a subtle blur to the background element to smooth it out.

1. Apply *CW Super Blur* and set the Blur Amount to around 2.

Clean the Foreground

Once again we need to perform a number of operations on the foreground to ensure a good composite.

1. The first step is to color correct the foreground. Apply *CW Composite Color Matcher* and sample the foreground and background colors. Set the Strength slider to around 80%.

2. Just as we did in the previous lesson, apply *CW Light Wrap* to clean up the hair edges. Set the Composite Mode to *Hard Light*, the Blur Amount to around 15, and the Width to around 6.

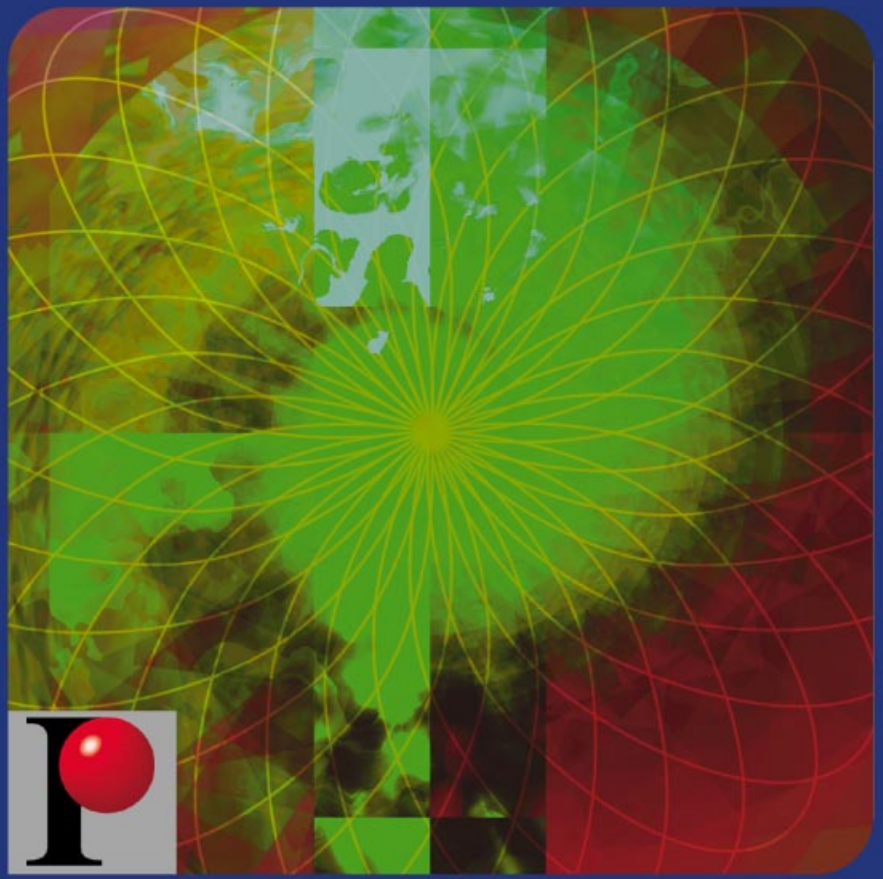
As a final step we're going to apply a Levels adjustment to tweak the coloration of the foreground.

3. Apply *Levels*, and set the Gamma levels for both the red and green channels to 0.9.

Figure 1:167 Mr. Stu Stairs Before and After

CONGRATULATIONS!

You have now completed all of the tutorials for Pinnacle Systems Composite Wizard. Please feel free to install the demo versions of our other plug-in sets — *Primatte Keyer*, *Image Lounge*, and *Knoll Light Factory* — to see how well they integrate to meet your compositing, effects, and matte creation needs.



APPENDIX

ABOUT THE APPENDIX

The appendix contains detailed explanations of concepts essential to getting the most out of both *Composite Wizard* and *Image Lounge*. Rather than explain these items multiple times throughout the documentation we have decided to combine them here, allowing us to explain them in much greater detail.

Calculating Z-Depth

This chapter is essentially a primer on z-depth: what it is, what you can do with it, and how the filters use it.

Using Z-Maps

This chapter tells you what you can do with a z-map once you have one.

The Science of Focus

Everything you ever wanted to know about focus: how cameras work, depth of field, circles of confusion, and how these concepts relate to the filters.

Creating Z-Maps (3D)

How to create a depth map in a 3D application. This chapter explains all the concepts behind z-map creation.

Creating Z-Maps (2D)

This chapter is sort of a part two to the previous chapter. This explains how to create a z-map for a 2D image.

Blurs

There are many different kinds of blurs available in both *Composite Wizard* and *Image Lounge*—this chapter makes sense of them.

CALCULATING Z-DEPTH

Many of the plug-ins detailed in this book, (such as the Composite Wizard filters *CW Super Blur* and *CW Super Rack Focus*, and the Image Lounge filters *IL TrueCamera Blur* and *IL TrueCamera Rack Focus*,) contain functionality specifically designated to be controlled by a grayscale depth map, commonly referred to as a *z-map*. Because many of you will undoubtedly not be familiar with z-maps, their creation, or their use, this section will explain these concepts in detail.

Why "Z"?

The term z-map might be a little misleading to those who are not familiar with working in 3D space. Anyone who has ever taken a high school geometry class will understand the concept of two-dimensional space: the x-axis represents horizontal space and the y-axis represents vertical space. Whenever you work in packages such as Commotion, Photoshop, or After Effects you are working solely in 2-dimensional space. When you work in 3D you have, in addition to the x- and y-axes, a z-axis, representing depth. Think of it like this: if you're looking at an image on your monitor the x-axis goes from left to right, the y-axis goes from top to bottom, and the z-axis is actually goes in and out of the screen, closer or further away from you.

A z-map is a grayscale image, similar to an alpha channel, that is a graphical representation of depth. An alpha channel uses 256 levels of gray to determine masking, transparency, etc.—in a z-map every pixel in a scene is assigned a 0-255 grayscale value based upon its distance from the camera. Traditionally the objects closest to the camera are white and the objects furthest from the camera are black. This grayscale image is then used as a control layer to determine how much of a particular effect an individual pixel in an image receives.

The term "z-map" may be misleading in the sense that the depth does *not* have to occur along the true z-axis of the original 3D environment. When simulating depth in a 2D environment the z-axis is always relative to the camera. If you think of the eyes of the viewer as the "camera", the z-axis is always facing in and out of the monitor screen, no matter how the scene in the clip may be positioned.

How it works

In order to illustrate how z-depth works and how the grayscale z-map relates to 3D space we're going to use the example scene shown below in Figure 1:1. The scene is comprised of a ground plane, upon which sits a red cone, a blue sphere, and a green inverted cone.

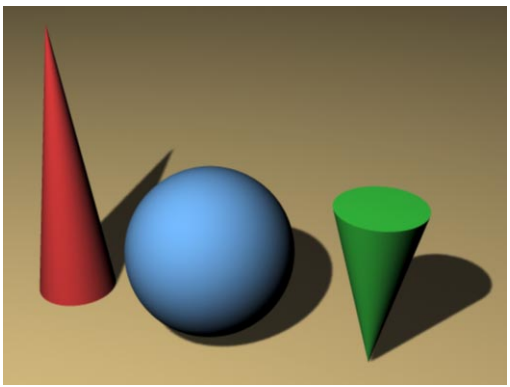


Figure 1:1 Example Scene

Imagine we have a camera positioned directly above our shapes, looking straight down. The closest point to the camera is the top of the red cone. The next highest points are the tops of the both the blue sphere and the green cone, which are at the same height. Figure 1:2 shows a side view of this scene, easily showing the distances to the camera.

Figure 1:2 Distance from Camera

The z-map is generated by the camera in the 3D application, and as such the only pixels it will represent are those seen by the camera on a given frame. To illustrate this point, imagine that in Figure 1:2 above we dropped a huge bedsheet onto our objects. By the time it finished collapsing and came to rest it would probably have a shape similar to that seen in Figure 1:3. The visible area is the only area considered when the z-map is calculated. For example, think back to the Golden Gate lesson, where you simulated a z-map. Let's say there was a hot air balloon obscured behind the bridge, and the camera couldn't see it—that object would have absolutely no bearing on how the z-map was created.

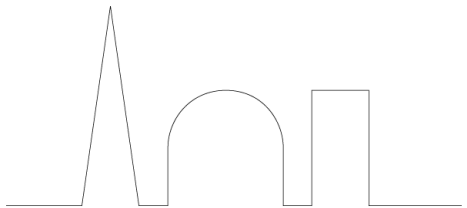


Figure 1:3 The Visible Object Surfaces

Because only visible objects are calculated the green cone is actually seen as a circle, because the wide top surface of the cone obscures all the points below it. So, as we said before, the top of the red cone is the closest point to the camera, and the ground plane is the farthest point from the camera.

Figure 1:4 Grayscale Values Based on Depth

When the z-map is calculated the topmost point of the red cone will render as pure black, and the ground plane will render as pure white. All points in between will assume a shade of gray based upon their proximity to the camera. The amount of a particular effect assigned to a given pixel in a scene is dependent upon the value of its corresponding z-map pixel—the lighter the pixel the more effect is assigned.

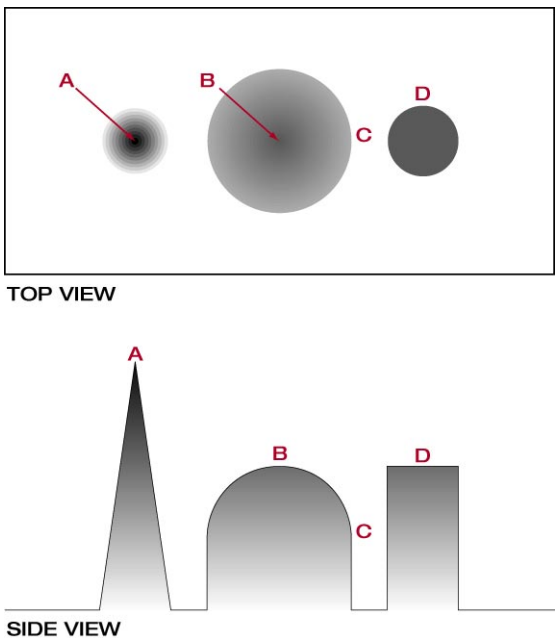


Figure 1:5 Z-depth Map from Top

Figure 1:5 shows the top and side views of our scene—the top view is our z-map. (Note that the black outline around the top view is there only to show the outer perimeter of the ground plane, and would not be there in the actual z-map.) Four corresponding points have been identified in both views. ***A*** shows the highest point in the scene, the top of the red cone, and is solid black. ***B*** and ***D*** show the next highest points, the tops of the sphere and inverted cone. Note that because the top of the inverted cone is flat, it is represented by a solid color due to the lack of change in depth. In the case of the sphere, however, only the pixel representing the very top point has the same gray value as the top of the inverted cone. The outside edge of the sphere, represented by ***C***, shows the extents of the sphere's visible depth. The z-map generated here is a gradient, based on depth, between the highest visible point and the lowest visible point in the sphere.

A Practical Example

Okay, enough with the theory, it's time to see a real z-map in action. Figure 1:6 shows the beauty pass from the logo tutorial and its corresponding z-map.

Figure 1:6 The Beauty Pass and Z-Map

The frontmost point of the 3D logo is solid black. The further away from the camera a point on the logo lies the lighter it's corresponding z-map pixel. The walls behind the logo, being the farthest points in the scene from the camera, are the lightest pixels in the z-map. The very farthest point in the scene, the corner of the two walls and the ground plane, is pure white.

How your computer sees the Z-map

If we were to look at the z-map in 3D space it would look something like Figure 1:7. In the rightmost image we see the extruded z-map from its side. Note the black-to-white gradient from the front to the back. While we humans see the z-map simply as a grayscale image your computer sees it as depth.

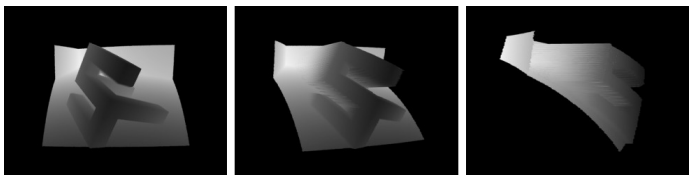


Figure 1:7 Three Views of the Extruded Z-Map

And that's exactly what a z-map is: a 2D grayscale representation of 3D depth. Figure 1:8 shows three views of the beauty pass extruded in 3D space according to the values of the z-map.

Figure 1:8 The RGB Image Extruded by the Z-Map

USING Z-MAPS

Okay, so now you have your z-map, what can you do with it? Well, the most common use is to use it as a control layer for a blur operation, simulating what a real camera would see—this directly relates to the previous depth of field discussion, and will be covered in detail a little later. So, before we start discussing blur control layers, let's take a look at some other uses for z-maps.

Where there's smoke...

Figure 1:9 shows three elements of a composition: a scene of a room containing a large piece of machinery, rendered in a 3D animation program; its corresponding z-map; and a clip of floating smoke filmed over a black background.

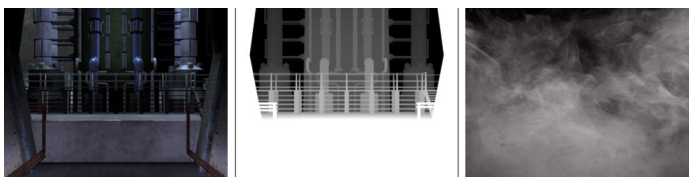


Figure 1:9 Scene, Z-map, and Smoke

Let's say the task before us was to give the sense that this scene was filled with heavy smoke from a nearby fire. What we will do is use the z-map to give our smoke element a sense of depth, like it's actually *inside* our scene.

The first step is to precompose the background layer, which involves compositing the smoke element over the rendered scene at some degree of transparency. Figure 1:10 shows the precomped background—it looks very fake, and really *looks* like one image over another.

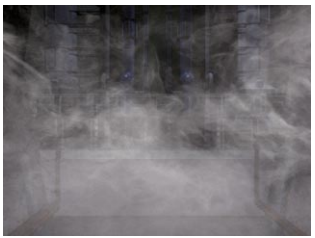


Figure 1:10 Precomped Background

The next step is to precompose the foreground, which involves taking the rendered scene and using the z-map to determine the scene's opacity by means of a Luma track matte.

Figure 1:11 Transparency Determines by Z-Map

Figure 1:11 shows the rendered scene before and after the track matte is applied. In the right image the scene looks significantly darker because the background color in the composition is black.

Figure 1:12 Z-Smoke Final

As a final step, we compose the foreground over the background. The transparent areas in the foreground allow the smoky composite in the background to be seen, creating the illusion of a room full of smoke.

... There's Fire

This same technique can be applied to a composition of many layers to create complex scenes, such as is shown in Figure 1:13. This example utilizes seven different precomposed layers. The fire is generated by *IL Fractal Fire*, the heat distortions are created using *IL Ultra Displacer*, and *CW Light Wrap* and *CW Composite Color Matcher* are used to color correct the foreground. The z-map was invaluable in making the fire look integrated into the seen instead of just placed on top of it.

Figure 1:13 Z-Map Fire and Smoke Example

This example clearly shows that z-maps are useful for much more than simple depth blurring.

Depth through Blur

The most direct use of a z-map, and the use that most directly relates to Composite Wizard and Image Lounge, it to use the z-map as a control

layer for a blur effect applied to a clip. When a z-map is used in this manner the map functions in exactly the same way as an alpha channel. The lighter the pixel in the z-map the more blur is applied to the image.

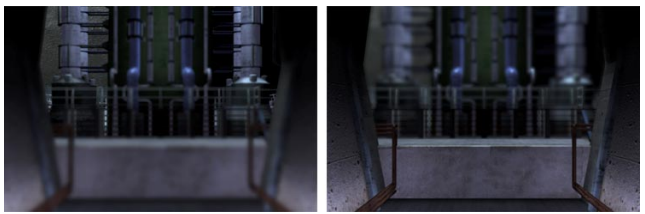


Figure 1:14 Foreground Blur and Background Blur

The left image in Figure 1:14 shows our scene, where the z-map has determined how a blur effect is applied. The lighter the z-map pixel the more blur is applied to the scene,—the foreground (which has the lightest pixels) is the most blurry, and the background is in focus. If we invert the z-map, so the background pixels are lightest, the background blurs and the foreground is sharp and in focus.

Calculating blur in this manner most closely resembles the way blur actually occurs on film, and can greatly enhance the believability of a shot.

Rack Focus

The effect that Z-maps have on a scene can be animated as well, allowing for the simulation of dynamic focus effects, otherwise known as a *rack focus*.

Let's take a look at the first, middle, and last frames of a three-second rack focus effect, and see how the corresponding z-map control layer determines the blur location and amount.

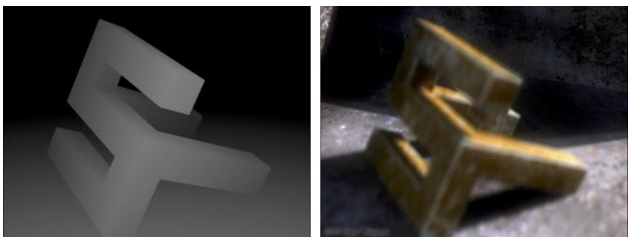


Figure 1:15 Rack Focus Frame 1

Figure 1:15 shows the first frame of the rack focus effect. The lighter areas of the z-map are at the front of the object, and the corresponding areas of the beauty pass are blurred.

Figure 1:16 Rack Focus Frame 45

Half way through the animation we find that almost all of the z-map is black, and as a result the entire scene is in focus. The significance of this will be elaborated upon later when we discuss Depth of Field.

Figure 1:17 Rack Focus Frame 90

Figure 1:17 shows the last frame of the rack focus. This is essentially the opposite of the first frame—the foreground is solid black and in perfect focus, while the background is blurred and out of focus.

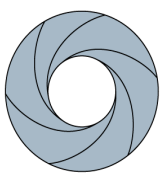
THE SCIENCE OF FOCUS

Circle of Confusion

During our discussions on z-depth the word *focus* was used extensively. But what exactly does it mean to say that an image is in focus? We all know that it means the “opposite of blurry”, but how do you measure exactly how in or out of focus an image is?

Film and video images are created when light passes through lenses onto a plane of light sensitive material, such as unexposed film or a CCD. (A CCD, or *Charge Coupled Device*, is a light-sensitive device used to capture images in such items as video cameras, scanners, and digital cameras.) Adjusting the lenses so that images appear to be in focus is an important part of this process, and understanding how this occurs is an important part of understanding how *IL TrueCamera Blur* and *IL TrueCamera Rack Focus* accurately simulate out-of-focus images.

The key to this operation is the *aperture*, also known as the *iris*. The iris is the adjustable opening through which light, after entering the camera through the lens, passes through the lens en route to the film; in most cases this opening is a hole of adjustable size formed by several overlapping blades that are ganged to open and close together.



The manner in which these blades control the diameter of the opening is similar to the functionality of the iris of the human eye. The images recorded on the film or CCD are projections of light through this hole.

The light projected through the iris forms a cone inside the camera, and if the point of this cone lands squarely on the light sensitive plane, the recorded image will be in focus. Figure 1:18 shows such an in-focus situation. Light from the sun bounces off the soccer player—after passing through the lens to enter the camera, it then passes through the iris and makes contact with the film. Because the point of the light cone lands squarely on the film the soccer player is in focus.

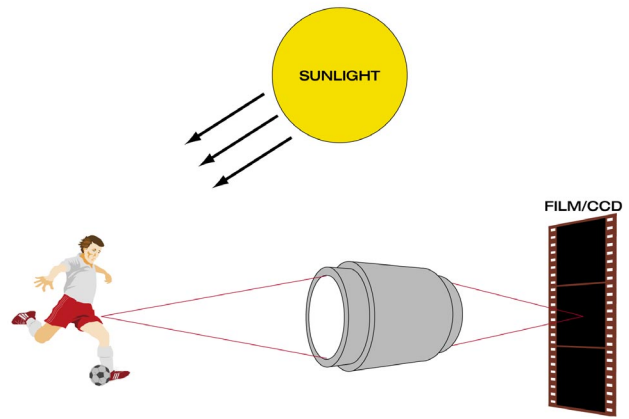


Figure 1:18 The Image In Focus

Light rays that travel different distances to the lens, however, will have cones of varying lengths, so only objects at a certain distance will be truly in focus. This distance is referred to as the *focal distance* or *focal point*.

It is possible to have objects nearer and farther from the lens than the focal point appear to be in focus. This occurs when the cone intersects the light sensitive plane near enough to its apex that the size of the cross-section is smaller than the resolution of the film's grain, or the CCD's pixel array. Making the iris smaller, or "stopping down," is one way to narrow the cone and allow more of an image to appear to be in focus—another way is to switch to a wider lens. Wide angle lenses have the appearance of better depth of field than telephoto lenses—because the magnification factor of a wide-angle lens is less than that of a telephoto, the variation in the position of the cone peak with variation in the subject distance is smaller. (For example, if you were to change from a wide to a long lens without changing the position of the camera, you would get a different depth of field. However, if you were to change from a wide to a long lens, and then physically *move* the camera so that the size of the filmed image was identical for each lens, the depth of field would, in fact, be the same.)

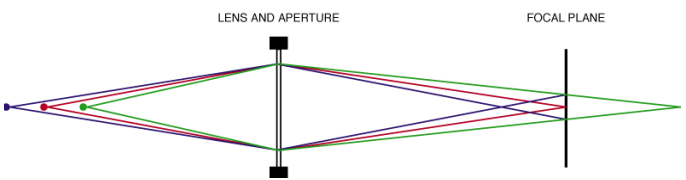


Figure 1:19 Circle of Confusion

That little cross-section of the cone referred to earlier represents what is called the Circle of Confusion. It's called that because it's usually circular—actually the shape of the iris itself. The Circle of Confusion in Figure 1:19 is the point where the cones of the green point and the blue point intersect at the focal plane. Out of focus images reveal this circular representation of the lens failing to resolve the image. The classic example is a close-up of an actor with city light behind them—each out-of-focus pinpoint of light is projected onto the film as an enlarged representation of the camera's aperture. Sometimes these circles can appear to have bright edges due to light bouncing off the edges of the metal iris blades themselves.

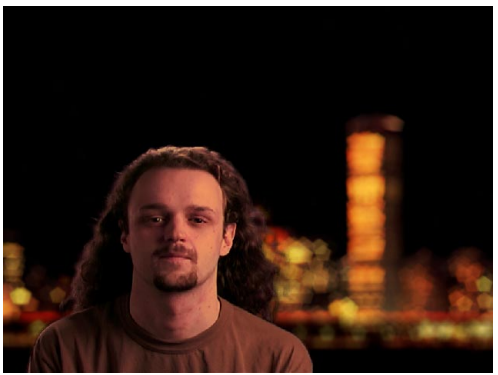


Figure 1:20 Circles of Confusion, Classic Example

Circles of confusion projected onto film or CCD through an aperture, resolving either within the threshold of the imaging plane's resolution or outside of it—that's how photographic images are acquired.

Depth of Field

Figure 1:19 shows a diagram of three dots representing points in space. The light reflected from the red dot falls squarely on the focal plane and is in perfect focus. The blue dot and green dot represent the maximum distances from the focal point that will appear in focus. Anything situated past the blue dot or in front of the green dot will appear out of focus. The blue and green dots represent the acceptable *Depth of Field* for our virtual camera lens.

Depth of field is a constant value—in our diagram it is the distance between the green and blue dots. The red dot determines the area the lens is focused on; the blue and green dots determine the acceptable range in front of and behind the red dot where the image is in focus.

Earlier we showed three frames of a three-second rack focus effect. Let's see how that same scene can elaborate on depth of field. We'll use the same color scheme here as in Figure 1:19: red for the focal point, green for the near extent of depth of field, and blue for the far extent of depth of field.

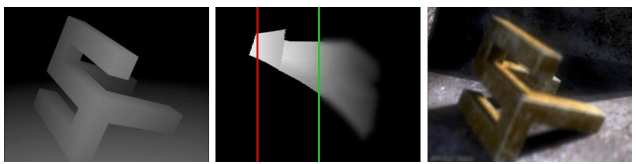


Figure 1:21 Depth of Field Frame 1

Figure 1:21 shows Frame 1 of our rack focus. If you look at the z-map image on the left the blur area extends from the front of the scene to the back side of the logo. From the logo to the wall the scene is in focus.

Now look at the middle image: the focal point of the lens on this frame is the far wall (red). The green line shows the near extent of the depth of field—everything in front of this line is blurry. There is no blue line in this diagram to show the far depth of field because that area is obscured by the wall at the back of the scene.

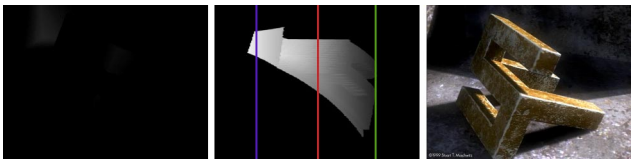


Figure 1:22 Depth of Field Frame 45

Figure 1:22 shows the focal situation at frame 45, the middle frame of our rack focus. The z-map is almost entirely black, and as such the entire scene is in focus. At this frame the focal point of the lens (red) is the center of the scene. The near extent of the depth of field (green) is the front of the image, and the far extent (blue) is the back of the image. Because the entire scene fits inside the depth of field the entire scene is in focus. Notice that the distance from the red line to the green line has not changed—that distance is constant no matter where the focal point is positioned.

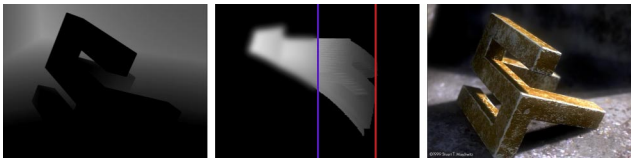


Figure 1:23 Depth of Field Frame 90

Figure 1:23 shows the last frame, frame 90. The focal point is the very front of the logo, and the far extent of the depth of field is the back side of the logo. Everything past the blue line is out of focus. As before, note that the distance between the red line and the blue line is unchanged.

Digital Depth of Field

One of the advantages to working digitally (as opposed to actually filming with a traditional camera) is that our depth of field is not determined by lens type. When working with an actual camera the lens chosen for a particular shot has a known depth of field which cannot be modified. The digital world, however, does not have this physical limitation. All of the Rack Focus and TrueCamera plug-ins found in Composite Wizard and Image Lounge contain a *Depth of Field* value, which allows you to essentially create your own custom digital lenses.

CREATING Z-MAPS (3D)

The preceding chapters of the Appendix have explored everything you could ever want to do with a z-map… which is great if you know how to make one. For those of you who don't, this chapter is for you.

There are two main ways to create a z-map: with a 3D application or by faking it in 2D. If the depth effect you are going to apply is intended for a rendered 3D element you're better off making one in the 3D application itself, it's the most accurate way. For a 2D scene (i.e. video or film footage) you can either fake one with gradients or replicate the scene precisely in a 3D application and create it there—it goes without saying that the gradient method is the easiest of the two.

We'll start out explaining the 3D technique and then follow up with the 2D technique. Each section will provide a detailed explanation of the process involved. It is important that you read both sections, however, as the 3D section will explain the entire process and the 2D section will only cover how to fake it with gradients.

Creating 3D Depth Maps

The following technique is not specific to any one 3D application or platform, so it should translate well into your package of choice. Before we begin, however, you should check the documentation provided with your 3D software and see if it contains the ability to automatically export depth data, either in a proprietary format or as a grayscale image. If you package exports depth in a proprietary format you'll need an application to convert it to grayscale.

In order to explain the technique we're going to use the scene in Figure 1:24 as an example. This scene is a still, but the steps to create the z-map are identical for both moving and still scenes.

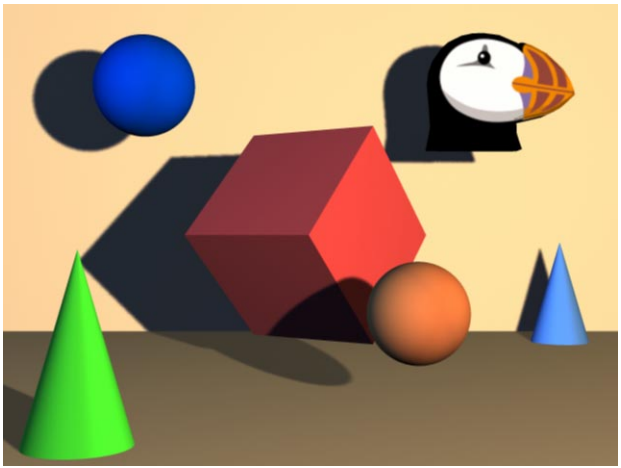


Figure 1:24 Example Scene

The first step is to set up your project, including all the lights, textures, etc. Creating the z- map is the last thing you do in a project, after everything else is finalized and complete. It's best to create the z-map after you've done the final render for your project because any changes you make to the scene are going to require another render of the z-map.

What is camera fog?

Practically every commercial 3D rendering program has some kind of fog function that you can apply to the render camera. *Fog* functions are so named because they function in exactly the same manner as regular fog. Figure 1:25 shows our example scene with a black fog effect applied. The farther away an object is the darker the fog makes it appear.

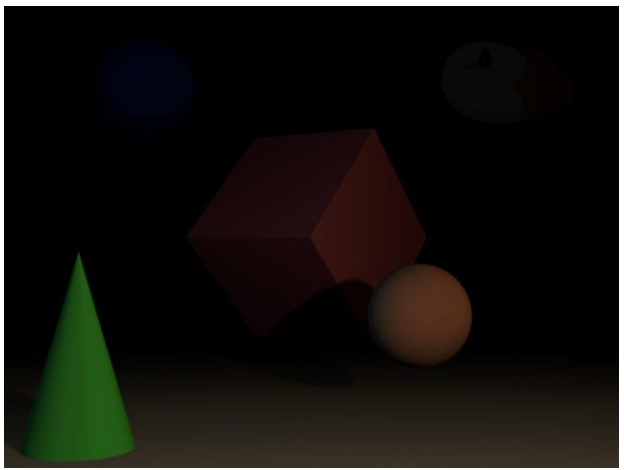


Figure 1:25 Black Fog Applied to the Scene

To illustrate the point, imagine yourself standing in the middle of a thick fog. You can see clearly for about 10 feet or so in front of you. After that things start to fade out, and you can't see anything past around 40 feet in front of you. Digital fog works in exactly the same manner.

Technique Overview

To create the z-map we're going to use the program's fog function to determine the depth in our scene. Think about how we need the z-map to look: the objects closest to the camera need to be black, and the objects farthest from the camera need to be white. We're going to make every object in our scene solid black, and then use white fog to simulate the depth.

Setting up the scene

The first thing you need to do is make every object in your scene matte black. *Matte black* means that the object is a flat, non-shiny black color. No specular highlights, reflections, or anything of that nature. The best way to set this up will undoubtedly differ greatly depending on your 3D application. Just make sure that every single piece of geometry is solid matte black—no exceptions.

Digital fog is applied to a scene as a *post process*. A post process is any calculation that takes place after the main render is completed. Fog is added into the scene by the software at the end of the render. Since it's not a part of the rendered scene it's not affected by scene properties such as light.

Camera fog is said to be *fully luminant*, which means that it doesn't need a secondary light source to be visible. In fact, when we render out our z-map we're not going to have any lights on in our scene at all, it's just going to be our matte black geometry and our fully luminant white fog.

Setting up the fog

This section explains how to set up the fog. Remember that while this is pretty standard functionality for 3D applications, your particular program of choice might require a slightly different setup.

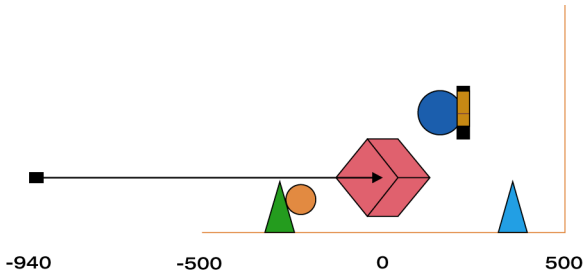


Figure 1:26 Diagram of Scene from Side

Figure 1:26 shows a side view of our scene. The numbers at the bottom represent the position in meters along the z-axis. The long arrow represents the camera—the square end represents the location of the digital camera itself, and the arrow end designates the point in space that the camera end is pointed at. The red cube is situated at 0, the center of our scene. The ground plane is 1000 meters long, stretching in space from 500 to -500. The camera is positioned at -940, and the camera's reference point is at 0.

When you set the fog settings for a camera you usually have two controls, one for the start point of the fog and one for where it ends. If you looked at this fog from the side it would appear to be a simple gradient. The first thing you need to do is determine the locations of the closest and furthest items in your scene, as this has direct bearing on the start and end settings for the fog. If you refer again to Figure 1:26 you can see that the piece of geometry closest to the camera is the beginning of the ground plane, which is positioned along the z-axis at -500. The point furthest away from the camera is the back wall, which sits at 500.

Fog start and stop points are almost always calculated relative to the position of the camera. Our camera is situated at -940. The closest geometry is at -500. There is a distance of 440 meters between the camera and the closest geometry. The farthest point is at 500, which is 1440 meters away from the camera. These two settings, 440 and 1440, represent the values we will enter as the start and stop distances for the fog.

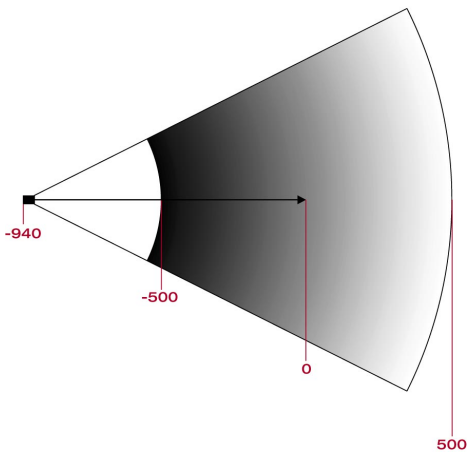


Figure 1:27 Fog Settings.

Figure 1:27 shows a diagram of these fog settings applied to white fog. At -500, the start point of our fog, our scene is black. (The scene is black in the sense that there is no fog at the start point and thus no *whiteness* is applied to our solid black geometry.) As we progress through the scene along the z-axis the white fog gets thicker and thicker, ending up totally white along the back wall.

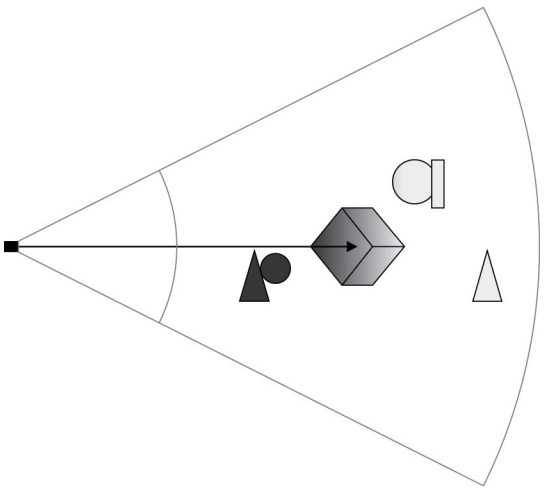


Figure 1:28 Fog Alters Black Geometry

Figure 1:28 shows how these fog settings will color our black geometry. The closest objects will be black and the farthest will be white.

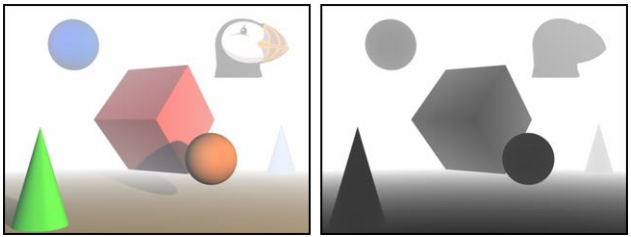


Figure 1:29 White Fog With Colored and Matte Black Geometry

Figure 1:29 shows our scene with white fog applied, first to the standard scene and then to the scene with matte black geometry and no lights. This image on the right is a completed z-map, ready for use in After Effects. And just to show you that we weren't fooling around Figure 1:30 shows the first and last frames of a rack focus effect created in *IL TrueCamera Rack Focus* using our sample scene and the z-map above.

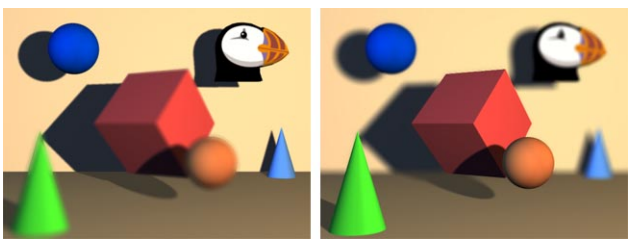
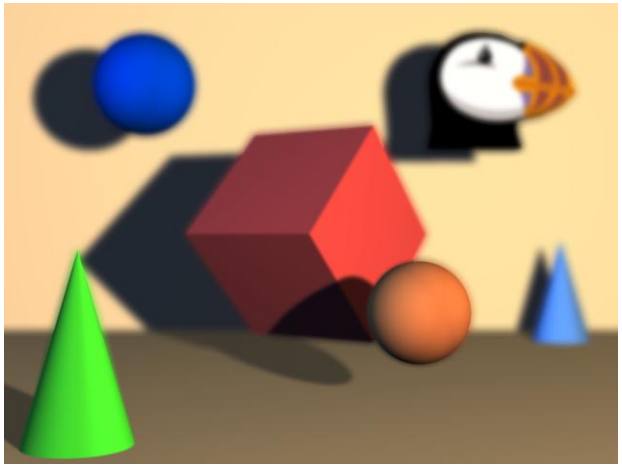


Figure 1:30 Sample Scene Rack Focus

This technique may seem a little confusing, especially if you've never done it before, but with a little practice you'll get the hang of it in no time.



The steps

So, now that the process has been explained to you here's a quick recap of the steps, in order.

1. Finalize your scene. If possible wait until you have completed the final render.
2. Find the distances of the nearest and closest points to the camera.
3. Set up your white camera fog. Set the start point for the fog to be the closest object and the end point to the farthest object. (See "Issues to be aware of" below for exceptions to this rule.)
4. Set the material properties of all the geometry in your scene to matte black. Turn off all textures, reflections, specular highlights, and the like. Do not, however, turn off any bump or displacement effects that alter the physical shape of your objects.
5. Turn off all lights in the scene.
6. Render.

Issues to be aware of

For most scenes, especially indoor scenes and outdoor scenes that do not cover a great distance, setting the fog to start and stop at the object extents is a reasonable thing to do, especially if it's to be used in a filter like IL TrueCamera Rack Focus, where you can fully animate the gray levels in the z-map itself. However, there are definitely situations where you aren't going to want to set your fog extents this way.

The images in Figure 1:31 are a perfect example of such a situation.

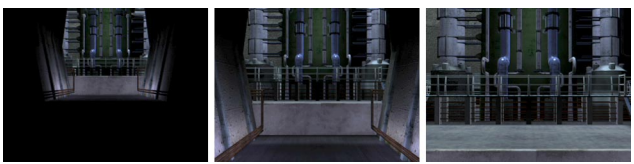


Figure 1:31 Hallway Animation 5 Seconds

These three images are frames 1, 105, and 150 of a 450 frame (15 second) animation done for a major sports franchise. The scene, as specified by the client, was to be an enormous industrial warehouse containing a giant machine, supposedly around the size of an oil drilling platform. This

machine would be revealed at the end of the animation to be a giant press, which would slam together and create the team helmet worn by the players. The camera was to start at the end of a long, dark hallway and slowly enter into the large main warehouse area containing the machine. The animators decided to render out a z-map to simulate depth of field, which would heighten the sense of scale desired by the client.

If the animators had rendered out a z-map based on the entire length of the hallway PLUS the entire length of the warehouse the effect would not have been nearly as noticeable and it would have made the distance look smaller. The farther away something is the blurrier it appears, so the shorter the distance between the start and stop extents of the fog the more of the image will be out of focus.

Figure 1:32 Hallway Animation Frames and Z-Maps

Figure 1:32 shows the same three frames of the animation with their corresponding z-map frames. The animators settled on a fog distance equal to the distance from the front of the machine to the back wall of the warehouse, which means that until the camera reaches the very front of the machine (around frame 7) there is always blur to one degree in the background. This blur continually adds to the sense of immense depth that the client requested.

Figure 1:33 Final Render With Blur

CREATING Z-MAPS (2D)

Now that you've been exposed to the process of creating a z-map in a 3D application we'll take a look at how you can use this same technique on a regular old piece of 2D video footage. We're going to be using a combination of Commotion, Photoshop, and After Effects to do this effect, but the technique is by no means specific to these packages.

Figure 1:34 Car Footage Example Frames

Figure 1:34 shows the first, middle, and last frames of a 90-second clip of a car driving from the far background to right past the camera. (Those of you who own Commotion will be very familiar with this clip—it's been used in tutorials and demos since the company was first started.) What we want to do is add a depth blur to this image, so that as the car gets closer to the camera it becomes less and less blurry, eventually appearing in perfect focus right before it goes out of frame.

The process

In order to achieve the desired effect we are first going to have to separate the car from the background element. We'll also have to create a z-map for the background so we can set the focus for the scene, and create an animated z-map for the car so that its blur settings can change while the rest of the scene remains constant.

Roto the car

The first thing we're going to do is create a matte for the car, and we'll do it using Commotion's powerful rotosplines. Starting at frame 1 we're going to draw a spline around the outline of the car, then animate the position of that spline over the length of the clip so that it always remains aligned with the car's outline. Once that is done the spline will be used to render an animated matte for the car.

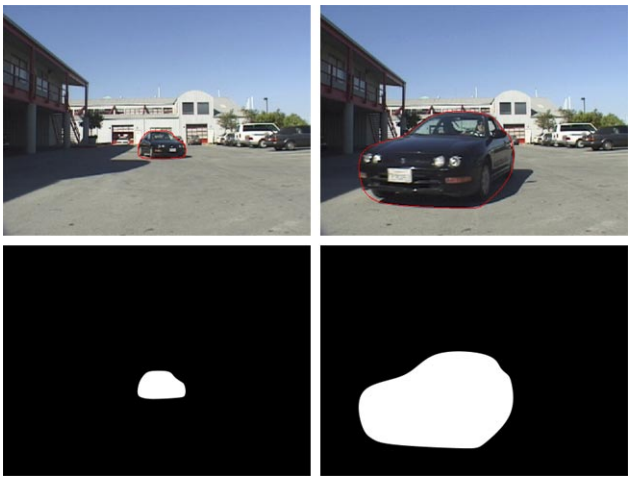


Figure 1:35 Car Rotospline and Matte

Figure 1:35 shows frames 27 and 65 of the clip. The upper pictures show the red rotospline around the car, and the bottom pictures show the matte generated by that spline. This matte should be rendered out as a separate file, not into the alpha channel of the car clip itself.

Isolate background elements

The next step is to create the z-map for the background. Since our camera is locked off for the entire clip the background doesn't change, which means we only have to create a single frame, and for this task we're going to use Photoshop. If the background was moving you could use After Effects for basic movement, or a Commotion/After Effects solution for complicated movement. The gradients could be created either with After Effects built-in gradient features or using the Image Lounge filter *IL Alpha Ramp*.

At the very end of our clip the car goes out of frame, leaving us with a clean background plate to work with. We start by placing a copy of this frame inside Photoshop. Then, using tools like the *Polygonal Lasso Tool* and the *Magic Wand*, we begin to isolate areas of the frame. Once these areas are isolated they should each be placed each on their own individual layer.

Figure 1:36 Selecting the Sky

For example, Figure 1:36 shows the sky area selected by multiple clicks of the Magic Wand tool. Once the area was isolated a new layer named *Sky* was created, and the selected area was filled in with a solid color. (The solid colors are only used to differentiate the different sections from each other. Because there will initially be some overlap in selected areas, the regions will eventually have to be added and subtracted from each other, and differing colors assists in doing so.)

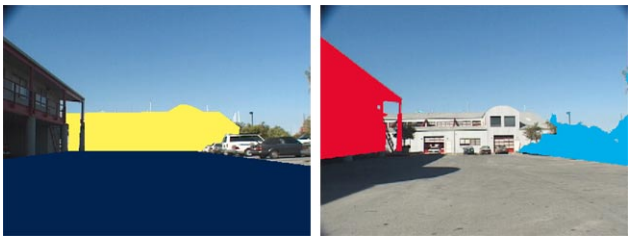


Figure 1:37 Selecting the Remaining Areas

Figure 1:37 shows the remaining areas, each isolated on their own layer and filled with a solid color. If you were to turn on all these layers at the same time you would see Figure 1:38.

Figure 1:38 All Layers Turned On

Determine the depth

Now we're going to start creating our gradient ramps, but before we do we have to determine the progression of depth in the image. If you were to look at our five layers, which one do you think would be the farthest away from the camera? It would be the green sky, so the sky area is going to be solid white. The layer closest to the camera is the ground, so the front of the ground layer will be black.

We start out by creating a new layer in Photoshop, which is going to be our grayscale z-map layer, and filling it with white, which represents the sky area. Starting from the sky and working our way back towards the camera the next farthest item is the yellow building. Since this building is perpendicular to the camera it will all be at one depth, and thus will be one color. Using the yellow building layer to load in that area as a selection, we'll fill it with a color slightly darker than white, around 90% gray. Figure 1:39 shows the selected area and the filled gray area.

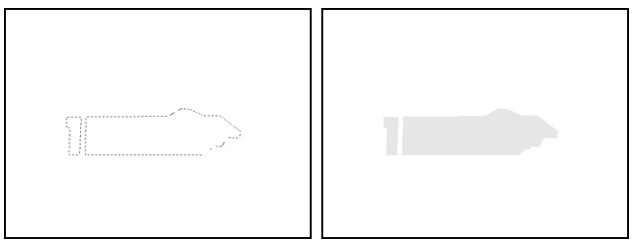


Figure 1:39 Setting the Back Building

This now gives us a starting point for the gradient ramps for the other items in the scene. Figure 1:40 shows the ground area loaded in as a selection and a black to 90% gray gradient applied.

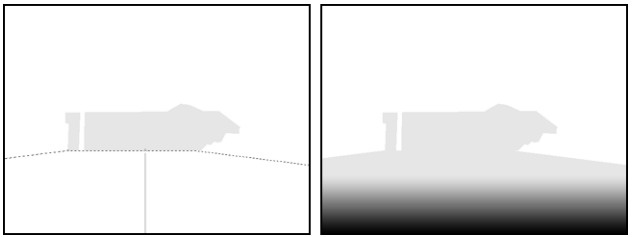


Figure 1:40 Applying the Ground Gradient

Simply repeat this process for each individual element in the scene, tweaking and making alterations to the gradients as necessary. Figure 1:41 shows the completed z-map for the background element in our clip.

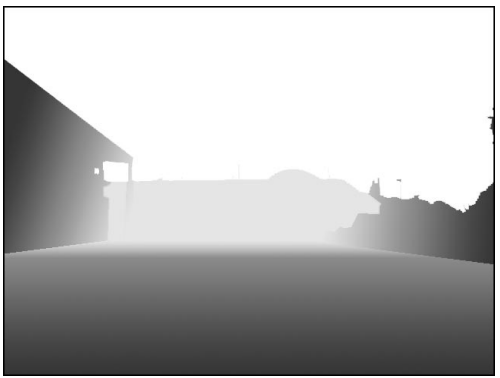


Figure 1:41 The Completed Z-Depth Background.

The final step is to take this still image into After Effects and integrate it with the roto footage of the car created in Commotion.

Finish the Z-map

Before we begin let's take a look at our two depth map elements, the car layer and the background layer.

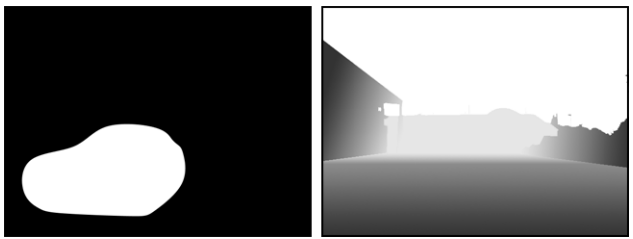


Figure 1:42 Depth Map Elements

Imagine the white car in our gray scene. As the scene progresses what is going to happen to the color of the car? Well, because it gets closer to the camera the color of the car must get darker as time goes on. To simulate this we'll keyframe a *Levels* adjustment on the car layer.

Before we begin we must make sure that the car is masked out with an alpha channel. If your car layer doesn't have an alpha channel it's very easy to set a duplicate copy up as a Luma track matte of itself.

Once this is completed make sure the project is at frame 1, then apply Levels to the car layer. Decrease the *Output White* level until the car begins to match its surroundings. Once you are satisfied with the car's color set a keyframe for the Output White value and advance to the last frame. Set the Output White level all the way to 0 for pure black, then scrub through the clip to preview the animation.

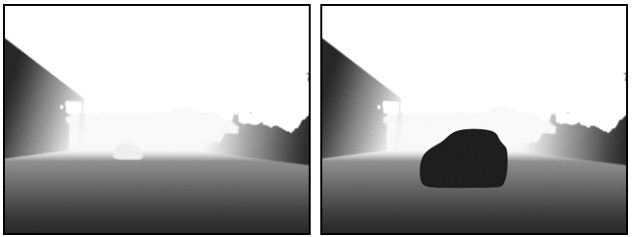


Figure 1:43 Car Depth Map Final

The car progresses from white to black as it advances toward the camera, providing a perfect matte with which to simulate depth of field using *IL TrueCamera Rack Focus*.

Figure 1:44 Final Effect

Figure 1:44 shows the depth blur effect in action. Note how blurry the background areas are, and how blurry the car is on the first frame. By the time the car gets to the front of the shot, however, it is back in perfect focus. Figure 1:45 shows the final effect in greater detail.

Figure 1:45 Car Depth Map Final

About this technique

As you can see creating depth maps in this manner is not for the light-hearted. We were fortunate in that the camera was locked off, which allowed us to create a single frame for the background map, and we had only one moving object to rotoscope. Nonetheless this should provide you with a clear understanding of how to modify the process for your own production needs. Good luck!

BLURS

The previous sections have shown you a multitude of ways to use depth maps to perform a variety of effects, the most common of which is to simulate depth of field through blurring. *Composite Wizard* and *Image Lounge* provide you with a number of different blur options. This section will elaborate on the different blur types available to you. As with many of the other chapters in the Appendix we will be using the logo image below as our master example image.

Figure 1:46 Blur Master Image

In *CW Super Blur* and *CW Super Compound Blur* you have two types of blur available to you: Faster and Better. *Faster* blurs with a Box blur, and *Better* blurs with a Gaussian blur.

Box Blur

A Box blur is the fastest of all the blur modes available to you in CW and IL. While it works well with soft scenes, the edges of the box effect can cause unpleasant artifacting in high-contrast scenes.

Figure 1:47 Box Blurs of 10 and 20

Box blurs are very fast to calculate because the blur has straight edges and a uniform profile. The blur produced by a Box blur is practically identical to TrueCamera Blur with a 4-sided iris.

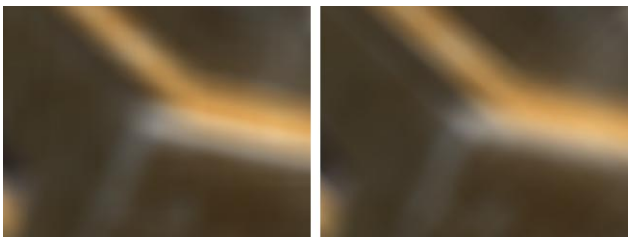


Figure 1:48 Box Blur, and TrueCamera Blur with 4-Sided Iris

TrueCamera Blur is covered in detail later in this chapter.

Gaussian Blur

If you are familiar with the blur options available to you in such programs as Commotion, Photoshop, or After Effects, you will undoubtedly be familiar with Gaussian blur.

Figure 1:49 Gaussian Blurs of 10 and 20

Gaussian blurs produce round blurs with an emphasis on the center. This eliminates the artifacting on high-contrast scenes, and produces a very pleasant appearance. The Gaussian blur profile is exponential and bell-shaped, and produces an effect more akin to viewing the scene through a piece of lightly frosted glass than viewing it through an out-of-focus lens. Gaussian blurs are fairly quick to calculate, though not as quick as Box blurs.

Blur profiles

While explaining Box and Gaussian blurs above we referred in both instances to the blur *profile*. Without going into too technical of an explanation, the profile of the blur refers to the type of curve that would be created if the blur's mathematical algorithm were plotted onto a standard X/Y graph.

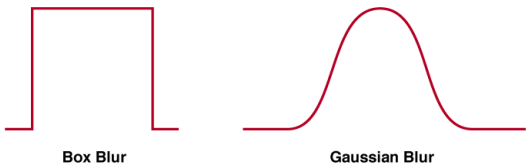


Figure 1:50 Box and Gaussian Blur Profiles

The Box blur produces a square, box-like profile—the profile shape is actually where Box blur gets its name. Because the profile is such a simple shape, the blur calculates quickly but with results that are less pleasing to the eye, essentially a quality-for-speed trade-off.

The Gaussian blur profile is exponential and bell-shaped. It has a tapering effect at the edges and is most active at its center, and as such is said to have an emphasis on the center. By comparison, the Box blur is applied evenly to the whole blur area with no tapering of the effect.

Box versus Gaussian

The following examples highlight the differences between Box and Gaussian blurs by showing their effect on a single white square on a plain black background.

Figure 1:51 Box Blur, Value 30

Figure 1:51 shows a Box blur with a value of 30. The square artifacts from the Box algorithm can be easily seen at the corners of the square. The human eye naturally picks up on straight lines, making them distracting to the overall scene, which is why Box blur is not recommended for high contrast scenes. If, instead of black and white, this image was comprised of two shades of red that were very similar in tone, the artifacts from the Box blur algorithm would be far less noticeable.

Figure 1:52 Gaussian Blur, Value 30

Figure 1:52 shows a Gaussian blur with a value of 30. Note the soft, round effect it applies to the corners and the subtle gradiation it applies to the edges. A Gaussian blur produce a much more natural, lifelike blur than a Box blur.

Now that you have specific examples of both blur types, refer again to Figure 1:50 and compare the individual blur profiles to the effect their blurs produce. The Box blur produces square, harsh edges, much like its mathematical profile. The Gaussian blur is round, soft, and has tapered edges, exactly like its profile.

To see a more dynamic example, Figure 1:53 shows 12-pixel Box and Gaussian blurs applied to a high-contrast checkerboard pattern. The Gaussian blur is soft and evenly applied, while the Box blur shows horizontal and vertical artifacting in the white areas of the image.

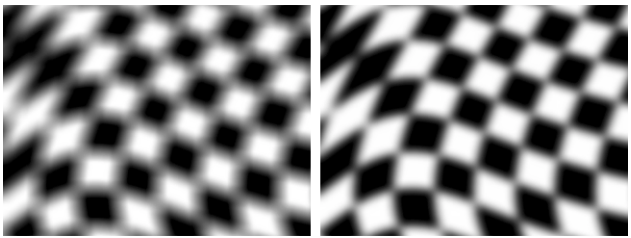


Figure 1:53 Box and Gaussian Blurs, Value 12

To see a practical example of the difference the blur types have on our logo image it's best to zoom in closely. Figure 1:54 shows the front point of the logo object with 10-pixel Box and Gaussian blurs applied.

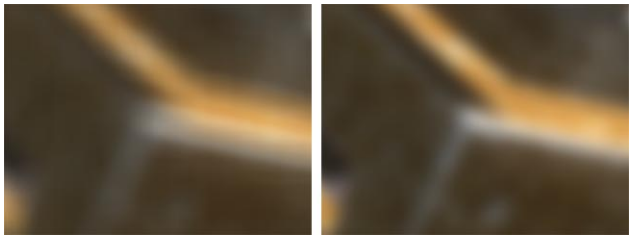


Figure 1:54 Box and Gaussian Blurs of 10

The Box blur gives off a noticeably square blur, caused by its equal, linear calculations both horizontally and vertically. The Gaussian blur is more even, round, and tapered.

TrueCamera Blur

IL TrueCamera Blur and *IL TrueCamera Rack Focus* use general convolution blurs, which can simulate the appearance of the circles of confusion produces by an iris, but are computationally expensive. Since the circle of confusion is actually calculated as an image within the plug-in, you can affect its shape, angle, and the profile of the intensity.

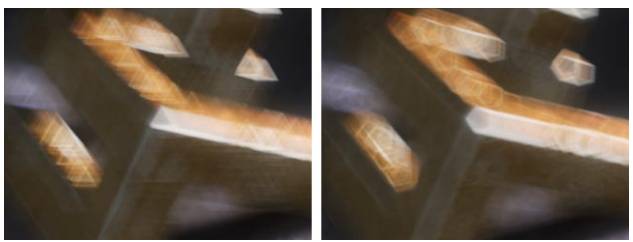


Figure 1:55 3- and 5-Sided Iris Artifacts

The resulting blur is more physically accurate than other types, but requires substantially more time to produce. If you are trying to accurately simulate the kind of blur you see in film, TrueCamera Blur is your best choice.

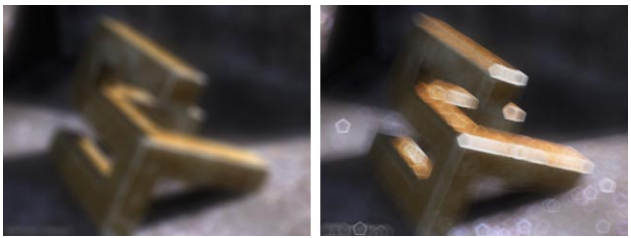


Figure 1:56 TrueCamera Blur Value 10, Plus Iris Enhancement

Figure 1:56 shows two views of a TrueCamera Blur value of 10. The left image uses the default settings, and the right image has TrueCamera's iris enhancement features applied. The intensity of artifacting in the image is not dependent on the amount of blur.

TrueCamera Versus Gaussian

To show the superiority of the TrueCamera Blur algorithm over other blur methods at simulating focus blur, let's take a look at some side-by-side examples. Figure 1:57 shows a composite of Mr. Stu against the Dallas skyline at night. No blur has been applied to the background layer.

Figure 1:57 Mr. Stu In Dallas

Traditionally, Gaussian has been the blur of choice when trying to simulate focus blur. Figure 1:58 shows the skyline with a 10-pixel Gaussian blur. This nicely softens the background and greatly improves the sense of distance between Mr. Stu and the skyline.

Figure 1:58 Gaussian Blurred Skyline

Let's now take a look at the skyline with a 10-pixel TrueCamera Blur applied. (To better show the artifacting, this image is shown larger than the previous images.)

Figure 1:59 TrueCamera Blurred skyline

The iris enhancement features of the TrueCamera Blur algorithm provide a significantly better blur—not only is it more accurate in a scientific sense, it also produces a blurred image more pleasing to the eye.

Depth Blurs

Blurs with depth control (z-maps) are much more complex than those that uniformly blur an image. A uniform blur can calculate many pixels at once,

while a z-mapped blur must cope with the possibility that adjacent pixels can have wildly different blurs.

CW Super Compound Blur is the fastest of the depth-blur filters because it uses the z-map to vary the compositing of a uniform blur with the original image. *CW Super Rack Focus* uses a more sophisticated algorithm that calculates the blur separately at each point, producing a better-looking result, but more slowly. Figure 1:60 shows both these blurs at their default settings, with a z-map applied as a control layer and a blur value of 20.

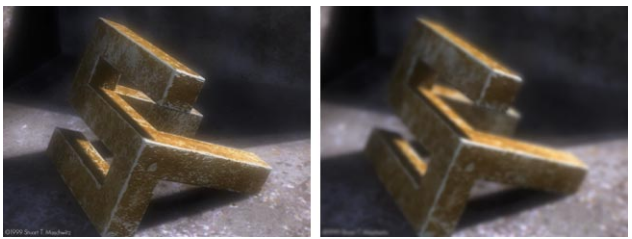


Figure 1:60 Super Compound Blur and Super Rack Focus, Value 20

The simpler z-mapped blurs produce a physically-incorrect result, though. If you look through the lens of a 35mm camera at two objects at different distances, but whose images overlap, you'll see that a sharp object in front obscures the blur of an out-of-focus object in the background, but a blurry front object is not obscured by a sharp background object. In fact, the blurry edge of the frontmost object bleeds over the sharp background object, an effect that is not reproducible with normal Z-mapped blurs such as Adobe's *Compound Blur* or Pinnacle's *CW Super Rack Focus*. Only *IL TrueCamera Rack Focus* has the ability to calculate this obscuration in a physically-accurate way.