# PART 11

## ResolveFX Overview

# Chapter 131

# ResolveFX

This section provides detailed explanations for each ResolveFX filter that's available on the Cut, Edit, Fusion, and Color pages.

For more information on how to apply and adjust ResolveFX on the Cut page, see Chapter 22, "Video and Audio Effects in the Cut Page."

For more information on how to apply and adjust ResolveFX on the Edit page, see Chapter 39, "Editing, Adding, and Copying Effects and Filters."

For more information on how to apply and adjust ResolveFX on the Fusion page, see Chapter 72, "Using OpenFX and ResolveFX."

For more information on how to apply and adjust ResolveFX on the Color page, see Chapter 126, "Using OpenFX and ResolveFX."

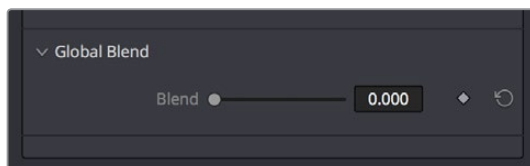# Contents

# Catalogue of ResolveFX Filters

DaVinci Resolve comes with a set of ResolveFX filters, many of which have been optimized for real time playback. These are located within their own category in the Effects Library of the Edit page and in the OpenFX browser of the Color page. These effects (or filters) work just like any other OpenFX plug-in.

ResolveFX come in two types. Some are CPU-based, while most are GPU-accelerated, depending on which type of processing is faster for a particular effect. Each ResolveFX filter's icon shows you which it is.
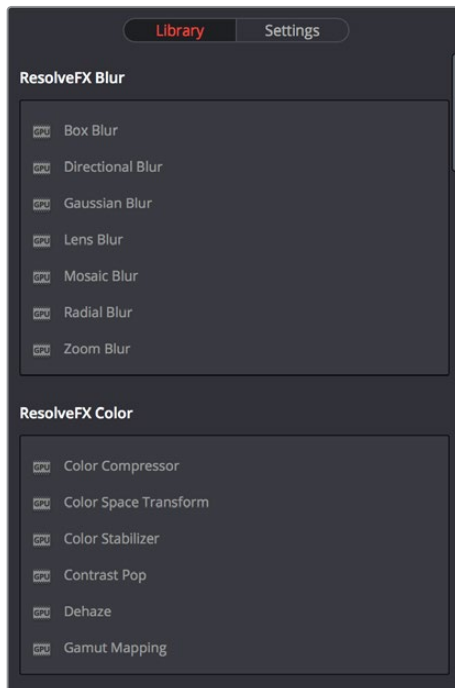


Icons show which ResolveFX filters are GPU-accelerated, versus those that are optimized for CPU processing

In addition to the different parameters built into each filter, every single ResolveFX filter has a Blend parameter that mixes that filter's effect against the original image. Each filter's Blend parameter appears at the bottom of that filter's settings.



The Blend slider found in the parameters of every ResolveFX filter

# Chapter 132

# ResolveFX Blur

The plug-ins in this category offer a wider variety of different blur methods than those found in the Blur palette.

# Contents

# Box Blur

A variable quality blur that ranges from very low quality to very soft.

- **Horizontal and Vertical Strength:** These sliders let you adjust the width and height of blur.
- **Gang:** This checkbox lets you adjust these parameters together or separately.
- **Number of Iterations:** Controls how smooth the resulting blur is, with 0 being the lowest and most "boxy" level of quality and 1 being the highest and smoothest level of quality. At low iteration values, box blurs can appear somewhat similar to lens blurs.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur, options include Black, Replicate, Reflect, and Wrap Around.

# Directional Blur

A blur that's constrained to a single angle.

- **Blur Strength:** How much blur you want.
- **Blur Angle:** The direction of blur.
- **Border Type:** lets you choose how the edges of the image are affected by this blur, options include Black, Replicate, Reflect, and Wrap Around.

# Gaussian Blur

What the name says.

- **Horizontal and Vertical Strength:** Two sliders let you adjust the Horizontal and Vertical Strength independently.
- **Gang:** This checkbox lets you keep the Horizontal and Vertical Strength values ganged together.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

# Lens Blur (Studio Version Only)

A high-quality simulation of optical lens blurring. Adjustable parameters let you achieve different kinds of "bokeh" effects, which are similar to those produced by different combinations of aperture design and lens spherical aberration corrections that affect the "circle of confusion" that creates visible shapes in areas of the picture with pinpoint highlights.

## Shape

The Shape group lets you choose what shape of aperture to simulate and affects the shape of the bokeh in this effect.

- **Shape Type:** Lets you choose what type of apertures you want to use.
  There are three options:

  - **Real Apertures:** Lets you choose a realistic option from the Aperture Shape pop-up menu below, with which to influence the shape of the bokeh effect. Aperture Shape options include Triangle, Square, Pentagon, Hexagon, Heptagon, or Octagon shaped aperture.

  - **Creative:** Lets you choose a more fanciful option from the Aperture Shape pop-up menu below, with which to influence the shape of the bokeh effect. These options simulate the kind of bokeh you could realistically achieve by placing a blackout filter with a custom shaped hole in the center in front of a lens. Aperture Shape options include Heart, Star, Starfish, Starburst, Petals, Lip, Eye, Droplet, and Leaf.

  - **External Input:** Uses any arbitrary graphic with a (preferably small) white shape against a black background to influence the shape of the bokeh effect. This shape must be a graphic or matte clip that's added to the Node Editor and can be connected in one of two ways. If the plug-in is dragged onto an ordinary corrector node, then you must use the Add OFX Input command to expose an RGB input with which to connect the image. If you've added the plug-in as a self-contained OFX node (named "Lens Blur"), then you can attach the image to the second RGB input of the Lens Blur node.
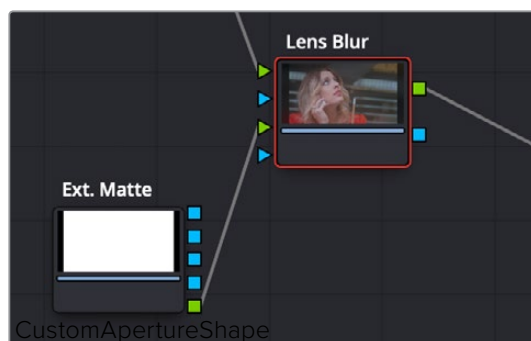


A custom shape used in a color node tree to create custom bokeh in the Lens Blur plug-in

- **Aperture Shape:** Provides different options for aperture shapes that influence the shape of this plug-in's simulated bokeh blur effect.

- **Preview Shape:** This checkbox lets you see the actual shape you've selected to use.

## Speed

The Speed Options group lets you adjust the quality/speed tradeoff of this plug-in.

- **Quality:** Three options, Full, Half (Faster), and Quarter (Fast), let you choose a suitable tradeoff between image quality and plug-in performance.
- **Horizontal and Vertical Crop:** Crops the shape image being used to influence the bokeh to a smaller size, in the event the large size of the graphic is slowing things down and you can crop out extra black from the edges. You won't notice a change to the result until you start cropping into the white part of the shape.

## Controls

The parameters available from the Controls group change depending on the Shape Type you've selected.

- **Blur Size/Scale:** Adjusts the overall amount of blur. At higher values, the shape of bokeh can be more clearly seen.
- **Blade Curvature:** (Only available with Real and Creative Apertures) Lets you round off the edges of the Aperture Shape you selected.
- **Rotation:** Lets you adjust the angle the shape appears at.
- **Anamorphism:** Lets you adjust the aspect ratio of this effect in order to match the lens blur created by anamorphic lenses.
- **Chroma Shift:** Lets you simulate chromatic aberration within the blur effect.
- **Highlights:** Lets you adjust how the highlights of the image affect the blur, dilating or eroding the image more or less depending on how high Smooth Strength is.
- **Apodization:** (Only available with Real and Creative Apertures) A slider that lets you adjust the simulated "Airy disk" pattern in the defocused effect being generated. Dragging the slider to the left toward negative values accentuate concentric rings around the bokeh pattern that simulate the effects of optical diffraction and add a pattern to the result, while dragging this slider to the right introduces positive values that gradually filter the edges of the simulated bokeh pattern, resulting in a progressively smoother result.
- **Catadioptric:** (Only available with Real and Creative Apertures) A slider that lets you simulate the effect of a shaped mirror element in a Catadioptric telescope to "improve" focus within the defocused bokeh effect this plug-in produces. At higher and higher values, the underlying image becomes progressively less blurry, while still being distorted by the bokeh shape being used which results in soft image overlays, creating a very different kind of simulated optical defocusing effect.

# Mosaic Blur

A simple, pixelated blur suitable for hiding the face of anonymous witnesses.

- **Pixel Frequency:** Lets you adjust the size of each pixel, thus determining the density and resolution of the resulting grid of pixels.
- **Smooth Strength:** Lets you blur the edges of adjacent pixels.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

# Radial Blur

A blur effect that simulates the motion blur that would occur were the image spinning around its center point.

- **Smooth Strength:** Adjusts how much blurring is applied.
- **X and Y Position:** Lets you move the center of the blur.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

# Zoom Blur

A blur effect that simulates the motion blur that would occur were a camera moving toward the image.

- **Smooth Strength:** Adjusts how much blurring is applied.
- **X and Y Position:** Lets you move the center of the blur.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

# Chapter 133

# ResolveFX Color

These plug-ins provide color processing methods that aren't
available in any of the Color Page palettes of the Color page,
and include several color management tools that can be applied
outside of Resolve Color Management (RCM).

# Contents

# ACES Transform

Lets you perform the kind of color transforms that the ACES Input Device Transform and ACES Output Device Transform parameters of the Color Management panel do, without the need to have ACEScc or ACEScct enabled.

- **ACES Version:** When you've chosen one of the ACES color science options, this pop-up becomes available to let you choose which version of ACES you want to use. As of DaVinci Resolve 15, you can choose from ACES 1.0.3 or ACES 1.1 (the latest version).

- **Input Transform:** This pop-up menu lets you choose which IDT (Input Device Transform) to use to process the image. It presents the same options that are available in the Color Management panel of the Project Settings.

- **Output Transform:** This pop-up menu lets you choose an ODT (Output Device Transform) with which to transform the image data for monitoring on your calibrated display and when exporting a timeline in the Deliver page. It presents the same options that are available in the Color Management panel of the Project Settings.

For more information about the options available in these parameters, see Chapter 7, "Data Levels, Color Management, and ACES."

> **NOTE:** This plug-in does ACES transforms correctly using the transforms specified by the Academy, whereas the Color Transform plug-in does transforms to the ACES color space colormetrically, which is not actually correct for ACES workflows.

# Chromatic Adaptation (Studio Version Only)

A Color category plug-in that lets you precisely transform an image that has been lit or processed assuming one specific color temperature to another user-selectable color temperature. This transformation alters the appearance of all colors in the image as perceived by the human vision system in the same way that a new illuminant would, whether that illuminant is a light in the environment being recorded or the color temperature of a display on which the image is shown. This plug-in is useful for performing specific color temperature transformations as part of color management workflows or for setting up precise color temperature adjustments as part of a creative grade.

You control this transformation by using pop-up menus to define the Illuminant Type of the source (typically the color temperature the camera was set to), and that of the target that you want to transform the image to. For both sets of controls, you can choose a Standard Illuminant from a list, a Color Temperature via a slider, or CIE 1931 xy coordinate values. This plug-in also takes into account the current color space and gamma of the clip, which default to the current Timeline Color Space.

This image transform is extremely precise because the image is first transformed from the Timeline Color Space to XYZ, and then it's transformed to match the LMS (long, medium, short) color space that models the cone response of the human eye to colors lit by different illuminants.

The Method pop-up menu provides a variety of different transform methods to choose from, defaulting to CAT02. Each option in the Method pop-up menu uses different measurement datasets to create individual CAT matrixes to guide this transformation. As a result, each method prioritizes different levels of accuracy for different sets of colors. For example:

- CAT02 has a non-linear component that compensates for the tendency of extremely saturated blues to go purple, a typical weakness of other methods. It usually gives the best result for the widest variety of measured data sets and works best for emissive sources (displays) and dim viewing environments.

- Bradford Linear is also a commonly used method, albeit one in which extremely saturated blues will go purple during the transform. It works well for both emissive sources in dim environments and for reflective sources (theater screens) and dark environments.

- Von Kries is one of the oldest methods in common use, although it's also one in which extremely saturated blues will go purple during the transform. This, as well as all other methods, are available if you need to match work done in another image processing application.

> **NOTE:** Be aware that all methods listed will match neutral colors perfectly; the only differences lie in how different ranges of saturated color are transformed.

# Color Compressor (Studio Version Only)

This filter lets you compress a range of colors toward a single target color. It works best when applied to similarly colored regions that have been isolated with a secondary qualifier or window. For example, if you're adjusting an irregularly lit product such as a soda can or a dress that must have a very specific hue, you can isolate that item and use this filter to push the range of Hue, Saturation, and Luminance closer to the ideal color that's identified using the color picker.



(Before/After) Using the Even plug-in to compress original range of hues of the jacket into a narrow "target" range within a secondary operation

- **Target Color:** A color control with an eyedropper button that you choose or sample a single set of Hue/Saturation/Luminance values you want to push all other colors toward.

- **Compress Hue, Compress Saturation, and Compress Luminance:** These sliders let you individually compress the range of colors you're adjusting in the image to more and more closely match the image. At 0, no compression is applied, at 0.500 the original

range of colors in the image have been adjusted to be halfway between their original values and the values of the Target Color, and at 1.000 the original range of colors has been set to be identical to the Target Color.

# Color Space Transform

Lets you perform the kind of color transforms that LUTs do, but instead of using lookup tables, this plug-in uses the same math used by Resolve Color Management (RCM) in order to do extremely clean color transforms without clipping.

## Color Space Transform

Exposes four pop-up menus that let you set an Input Colorspace, Input Gamma, Output Colorspace, and Output Gamma, in order to do controlled transforms from the Input settings to the Output settings, right within a grade. Resolve Color Management does not have to be enabled for you to use this filter.

## Gamut Mapping

The Color Space Transform plug-in provides Gamut Mapping controls to accommodate workflows where you need to transform one color space into another that has a dramatically larger or smaller gamut. These controls are similar to those found in the Color Management panel of the Project Settings.

Tone Mapping Method lets you enable tone mapping to accommodate workflows where you need to transform one color space into another with a dramatically larger or smaller dynamic range by automating an expansion or contraction of image contrast in such a way as to give a pleasing result with no clipping. There are three options, None, Simple, and Luminance Mapping.

- Choosing None results in no tone mapping at all.
- Choosing "Simple" uses a simple curve to perform this transformation, compressing or expanding the highlights and/or shadows of the timeline dynamic range to better fit the output dynamic range. Note that the "Simple" option maps between approximately 5500 nits and 100 nits, so if you're mapping from an HDR source with more than 5500 nits to an SDR destination there may still be some clipping of the highlights above 5500 nits.
- Choosing "Luminance Mapping" lets you use a customized curve operation to remap the gamma of the image and enables the Max. Input Luminance, Max. Output Luminance, and Avg. Input Luminance sliders.
  - The Max. Input (nits) checkbox and slider lets you set the reference maximum Luminance value (in nits) that you want to remap to the value set by the Max. Output (nits) checkbox and slider, which governs the maximum luminance level of the Output color space (in nits). Using these two sliders together, you can set which value from the Input Gamma is mapped to which value of the Output Gamma.
  - The Adaptation slider is designed to compensate for large differences in the viewer's state of visual adaptation when viewing a bright image on an HDR display versus seeing that same image an SDR display. For most "average" images this setting works best set between 0–10. However, when you're converting very bright images (for example, a snow scene at noon), then using a higher value will yield more image detail within the highlights.
- Choosing "Clip" hard clips all out-of-bounds values.

Gamut Mapping Method accommodates workflows where you need to transform one color space into another with a dramatically larger or smaller gamut by helping to automate an expansion or contraction of image saturation in such a way as to give a pleasing and naturalistic result with no clipping.

- Choosing None results in no Gamut mapping at all.
- Choosing Saturation Mapping from this menu enables saturation mapping to fit the range of saturation values from the Input Color Space and Gamma into the Output Color Space and Gamma. It enables the Saturation Knee and Saturation Max. controls.
  - The Saturation Knee slider sets the image level at which saturation mapping begins. Below this level, no remapping is applied. All saturation values from this level on up are remapped according to the Saturation Max. slider. A value of 1.0 is maximum saturation in the currently selected output color space.
  - The Saturation Max slider sets the new maximum level to which you want to either raise or lower all saturation values that are above the Saturation Knee setting. A value of 1.0 is maximum saturation in the currently selected output color space.
- Choosing "Clip" hard clips all out-of-gamut values.

> **NOTE:** While this plug-in has ACES settings, it does transforms to the ACES color space colormetrically, which is not actually correct for ACES workflows. For actual ACES workflows, use the ACES Transform plug-in, which uses transforms specified by the Academy.

# Color Stabilizer (Studio Version Only)

Designed to deal with clips that have inconsistencies in exposure and color, caused by manual changes to a lens' aperture setting or by a camera's auto exposure settings causing unwanted changes to color and brightness in the middle of a shot. The Color Stabilizer plug-in analyzes a frame of the clip that represents the desired exposure and color, and automatically adjusts every other frame of the current clip to match the analyzed levels.

> **IMPORTANT** The Color Stabilizer gives you the best results with clips that don't have clipped highlights. When used in the Color page, it's recommended to grade the image to bring all the highlights you want somewhere at or under a value of 1023, and then apply the Color Stabilizer to a node after this adjustment.

There are two ways of using the Color Stabilizer:

- The easiest way is to choose Entire Frame from the Region For Analysis pop-up menu. Then, move the playhead in the Viewer to the frame that represents the contrast and color you want the entire clip to have, and click the Analyze This Frame. Now, if you play through the clip, changes in contrast and color should be gone. This method works best for clips where the inconsistency you're trying to eliminate is fairly uniform, affecting the entire picture.
- Another way is to choose Overlay Rectangle from the Region For Analysis pop-up menu. This causes an onscreen rectangle to appear that you can resize and position over a specific region you want to sample for the duration of the clip. If the selected

feature you're analyzing is moving, then you can use the FX Tracker to track the subject so the selection box follows it (this is important for a consistent result). Once this is set up, move the playhead in the Viewer to the frame that represents the contrast and color you want the entire clip to have, and click the Analyze This Frame. Now, if you play through the clip, changes in contrast and color should be gone. This method works best for clips where there are parts of the picture that are supposed to have a change in brightness or color, such as when something moves into the frame, or a reflected highlight comes and goes because of the lighting scheme, at the same time as an otherwise undesirable change in contrast or color. You can use the selection box to specifically analyze the part of the frame that has the unwanted exposure change, while ignoring the desirable exposure change.

Depending on what option you choose from the Region for Analysis pop-up menu, different additional options appear.

## Analysis Region

If you choose "Entire Frame" from the Region For Analysis pop-up, these controls don't appear. A set of Source X/Y Position and Source Width/Height parameters let you transform the selection box that defines which part of the image is being analyzed.

## Channels to Stabilize

Once you've analyzed the frame that represents the best contrast and color for that clip, the Channels to Stabilize controls let you choose how you want to handle making the correction. The What to Stabilize pop-up menu lets you choose between stabilizing White Balance and Brightness, or R, G, B Channels Separately.

- If you choose White Balance and Brightness, two checkboxes let you choose whether or not you want to include Stabilize White Balance and Stabilize Brightness independently from one another.
- If you choose R, G, B channels separately, three checkboxes appear letting for Stabilize Red, Green, and Blue Channel, so you can pick which particular channels you want to correct.

The "Stabilize Levels How" pop-up lets you choose how to make the correction, with options to Match Levels and Contrast, Lift to Consistent Level, Gain to Consistent Level, each of which uses a subtly different method to make the necessary correction, so if one method doesn't work for the particular problem your clip is exhibiting, you can try the other methods to try and get a better result.

## Captured Analysis Values

Once you've analyzed the frame, another set of parameters appear showing the captured analysis values upon which the automated correction is based, so that you can make manual adjustments if necessary to improve the result. The parameters that are shown depend on the option you chose from the What to Stabilize pop-up menu.

- If you chose White Balance and Brightness, then you'll have a Normalized White Balance color control, and Low Level and High Level sliders.
- If you chose R, G, B Channels Separately, then you'll have Red, Green, and Blue High and Low Level sliders.

# Contrast Pop (Studio Version Only)

A more extreme and selective version of the Midtone Detail control found in the Color Wheels palette, designed to add either sharp high-contrast looks, or soft low-contrast looks to a selective portion of the tonal range of the image.

- **Detail Amount:** Lets you choose how much of this effect to apply. At 0, no effect is applied. At positive values progressively sharper contrast is added, while at negative values progressively softer low-contrast is applied.
- **Detail size:** Lets you choose which structures of the image are affected by this localized contrast adjustment, from smaller to larger.
- **Low and High Threshold:** These values let you define what range of image tonality is affected by this filter, allowing you to omit either shadows or highlights from this operation.
- **Softness:** Lets you soften the transition between the affected and unaffected areas of the image.

# DCTL

Lets you apply a DCTL wherever you can apply ResolveFX plug-ins. For more information on DCTLs and where they're installed, see Chapter 168, "Creating DCTL LUTs."

- **DCTL List:** A pop-up that lets you choose from the available DCTLs installed on your workstation.
- **Reload DCTL:** A button that lets you refresh the DCTL list pop-up if you've installed new DCTLs while DaVinci Resolve is running.

# Dehaze (Studio Version Only)

Designed to let you make fast, selective adjustments to color and contrast to reduce the visible effects of smog, airlight, and haze in an image. This filter automatically generates a simulated depth matte which is used to apply more of this corrective color adjustment to faraway parts of the image that would be more affected by haze effects and less color adjustment to closeup parts of the image. However, the simulated depth mask is not going to be perfect, so additional controls exist to let you make adjustments to it to achieve a better result.

- **Dehaze Strength:** This slider applies a simultaneous color and contrast adjustment. Raising Dehaze Strength subtly increases contrast (especially in the shadows) while rebalancing color toward the complement of the currently selected Haze Color and selectively intensifying saturation. Lowering Dehaze Strength decreases contrast and rebalances color toward the selected Haze Color itself while selectively lowering saturation.
- **Haze Color:** A color control with an eyedropper button that you choose or sample the color of smog, airlight, or haze in an image that you want to minimize.
- **Display Depth:** Lets you view the simulated depth matte that's being generated. It's useful to turn this on before adjusting the Shadow and Highlight controls below.
- **Shadow:** This slider raises or lowers darkest parts of the simulated depth mask that defines the parts of the image that are supposedly farthest away.
- **Highlight:** This slider lets you raise or lower the lightest parts of the simulated depth mask that defines the parts of the image that are supposedly closest to us.

# Gamut Limiter

Lets you limit the gamut to a specified standard. Useful in situations where the delivery color space is a large gamut such as Rec.2020, but the QC specification requires limiting to a smaller gamut such as P3, in order to limit the amount of saturation allowable in the final output. This is a limiting operation, so out of bounds values are hard clipped. This plug-in can be used regardless of whether or not Resolve Color Management is enabled. Because it's a limiter, it should probably be one of the last operations in any node tree to prevent useful image data from being clipped.

- **Current Gamut:** Choose the timeline gamut currently being used by the image.
- **Current Gamma:** Choose the timeline gamma currently being used by the image.
- **Limit Gamma to:** Choose the gamut you want to restrict the image to here.

These menus present the same options as the Resolve Color Management menus in the Color Management panel. For more information about the options available in these parameters, see Chapter 7, "Data Levels, Color Management, and ACES."

# Gamut Mapping (Studio Version Only)

The Color Space Transform plug-in provides Gamut Mapping controls to accommodate workflows where you need to transform one color space into another that has a dramatically larger or smaller gamut. These controls are identical to those found in the Color Space Transform plug-in's Gamut Mapping group and are similar to those found in the Color Management panel of the Project Settings.

- **Gamma:** A pop-up menu lets you specify what type of gamma the clip is supposed to have, so set this to whatever matches that image (this may match the timeline color space, but it depends on how you're working).
- **Tone Mapping Method:** Lets you enable tone mapping, to accommodate workflows where you need to transform one color space into another with a dramatically larger or smaller dynamic range by automating an expansion or contraction of image contrast in such a way as to give a pleasing result with no clipping. There are three options, None, Simple, and Luminance Mapping.
    - Choosing "Simple" uses a simple curve to perform this transformation, compressing or expanding the highlights and/or shadows of the timeline dynamic range to better fit the output dynamic range. Note that the "Simple" option maps between approximately 5500 nits and 100 nits, so if you're mapping from an HDR source with more than 5500 nits to an SDR destination there may still be some clipping of the highlights above 5500 nits.
    - Choosing "Luminance Mapping" lets you use a customized curve operation to remap the gamma of the image and enables the Max. Input Luminance, Max. Output Luminance, and Avg. Input Luminance sliders.

    **The Max.** Input Luminance slider lets you set the reference maximum Luminance value (in nits) that you want to remap to the value set by the Max. Output Luminance slider, which governs the maximum luminance level of the Output color space (in nits). Using these two sliders together, you can set which value from the Input Gamma is mapped to which value of the Output Gamma.

    **The Avg.** Input Luminance slider is designed to compensate for large differences in the viewer's state of visual adaptation when viewing a bright image on an HDR

display versus seeing that same image on an SDR display. For most "average" images this setting works best set between 0–10. However, when you're converting very bright images (for example, a snow scene at noon), then using a higher value will yield more image detail within the highlights.

- **Gamut Mapping Method:** Accommodates workflows where you need to transform one color space into another with a dramatically larger or smaller gamut by helping to automate an expansion or contraction of image saturation in such a way as to give a pleasing and naturalistic result with no clipping. Choosing Saturation Mapping lets you remap the saturation values of the image. It enables the Saturation Knee and Saturation Max. controls.

  - The Saturation Knee slider sets the image level at which saturation mapping begins. Below this level, no remapping is applied. All saturation values from this level on up are remapped according to the Saturation Max. slider. A value of 1.0 is maximum saturation in the currently selected output color space.

  - The Saturation Max slider sets the new maximum level to which you want to either raise or lower all saturation values that are above the Saturation Knee setting. A value of 1.0 is maximum saturation in the currently selected output color space.

# Invert Color

A Color category plug-in that lets you invert any color channel, including the alpha channel. This little plug-in has 101 uses in advanced workflows, especially when you need to invert Alpha or Key channels to do something specific. This is not a "film negative" plug-in; this is a simple inversion.

# Chapter 134

# ResolveFX Generate

These plug-ins generate imagery that can be used within grades and composites in different ways.

# Contents

# Color Generator

Generates a single color using a color picker control. Useful in conjunction with a layer node's ability to mix a color with an image using different composite modes.

- **Color picker:** You can click the color picker and use the resulting color controls to choose a color to be generated.

- **Eyedropper:** You can also click the eyedropper to sample a color from the image in the Viewer; the eyedropper always samples the image from the input of the current node, regardless of how the current image looks.

# Color Palette (Studio Version Only)

More of an analysis tool than a creative effect, this plug-in offers four Display modes from the pop-up menu at top: Color Palette, Shadow Region, Midtone Region, and Highlight Region.

- **Display Mode:** A pop-up that provides four different options.
  - **Color Palette:** By default this displays the eight most dominant colors in the image as rectangular swatches along the bottom, and the eight most dominant colors in each of the three main zones of image tonality (shadow, midtone, highlight) are displayed as smaller rectangular patches just above. This lets you see, at a glance, the color palette of any given shot, and this can be output for intrepid art directors who find it useful.
  - **Shadow Region, Midtone Region, or Highlight Region:** Displays a visual preview of which parts of the image fall into which regions (as currently defined by the Shadow and Highlight Threshold sliders). These previews are displayed with the current tonal region appearing saturated and all other parts of the image appearing black.

- **Number of Colors:** Defines the number of isolated colors. This can be set to display anywhere from 8 to 24 patches.

- **Shadow and Highlight Threshold:** The definition of where shadows, midtones, and highlights end and begin is controlled by the Shadow and Highlight Threshold sliders.

# Grid

As the name implies, this plug-in generates a grid with two sets of properties.

## General

These controls let you adjust the overall density and orientation of the grid.

- **Row Cells and Column Cells:** These sliders let you choose how many cells to divide the grid into, both vertically and horizontally.

- **Pan, Tilt, Zoom, Rotate, Width, Height, ShearX, ShearY, Pitch, and Yaw:** These controls let you transform the grid to serve whatever purpose is necessary.

## Line Properties

These controls let you control the properties of the grid lines themselves.

- **Line Color:** This color picker control and accompanying eyedropper let you choose a color with which to draw the grid.

- **Individual Hor. Line Width and Ver. Line Width:** These sliders let you adjust the thickness of all horizontal or all vertical lines.

- **Major Line Spacing:** This slider lets you set every nth line to be thicker, while the Major Line Width control lets you choose how thick to make these major lines.

# Chapter 135

# ResolveFX Light

The plug-ins in this category all replicate different optical and lighting effects. While most have been designed to quickly give you realistic results, all can be pushed harder to provide many artistic effects.

# Contents

# Aperture Diffraction

Found in the ResolveFX Light category, Aperture Diffraction models the starburst effect usually seen when shooting bright lights with small apertures, the physical cause of which is light-diffraction on the aperture blades of a lens. This plug-in simulates this, with the result being automatically applied to scene highlights that you can isolate and refine, with customizable virtual apertures.

Small regions of brightness exhibit a star pattern glow, as seen in the following image.



(Left) Original image, (Right) Applying Aperture Diffraction

Large regions of brightness exhibit a more even glow with shaping and texture that look like a natural optical effect. It can be used to create a different type of glow effect with a more realistic look in some situations than the Glow plug-in, though it's more processor intensive. In other situations, this plug-in opens up many different stylistic possibilities for glowing effects.
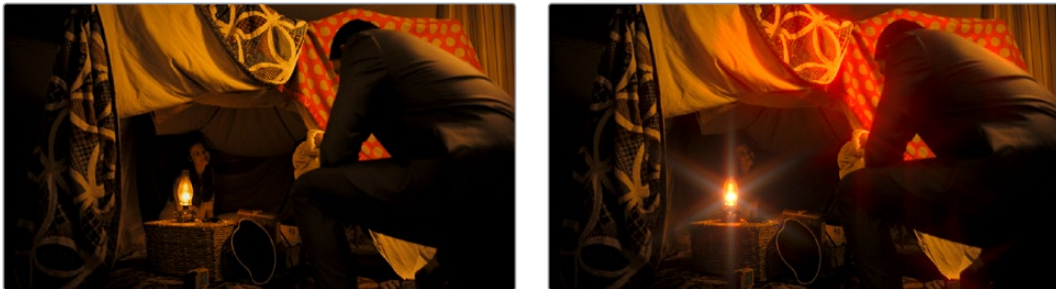


(Left) Original image, (Right) Applying Aperture Diffraction

## Output

These controls let you choose what image is output by this plug-in.

- **Select Output:** Lets you preview the image with different stages of the Aperture Diffraction effect applied, viewing the Isolated Source (to help when adjusting the Isolation controls), Preview Aperture (to help when adjusting the Aperture controls), Preview Diffraction Pattern (showing you the resulting diffraction pattern based on the aperture control settings), Diffraction Patterns Alone (showing you the glow effect that will be applied to the image by itself), and the Final Composite.

- **Quality:** Lets you choose a quality setting to trade off between quality and speed. Choices are Full, Half (Faster), Quarter (Fast).

## Isolation Controls

The Isolation controls let you choose which highlights in the scene generate visible glow and patterns. The effect of these controls can be directly monitored by setting Select Output to Isolated Source.

- **Color Mode:** A pop-up menu that lets you either choose to keep the colors of the different highlight regions that generate glow, or treat them all as grayscale brightness only (color controls later can change the effect). Grayscale is faster to process, but Color can result in some brilliant effects.

- **Brightness:** Sets the threshold at which highlights are isolated.

- **Gamma:** Lets you shape the isolated highlights.

- **Smooth:** Lets you blur details in the highlights that you don't want to be pronounced.

- **Color Filter:** Lets you choose a particular color of highlight to isolate (an eyedropper lets you select a value from the Viewer).

- **Operation:** Lets you adjust the resulting Isolation matte (options include Shrink, Grow, Opening, Closing) with a slider to define how much.

## Aperture Controls

The Aperture controls let you define the shape and texture of the resulting glow this plug-in creates.

- **Iris Shape:** Lets you choose a shape that determines how many arms the star pattern will have. Options are Triangle, Square, Pentagon, Hexagon, Heptagon, and Octagon.

- **Aperture Size:** Lets you alter the resulting diffraction pattern alternating between more of a star shape at higher values and a stippled wave pattern at lower values.

- **Result Gamma:** Lets you adjust how pronounced will be the glow that appears between the arms of the star patterns that appear.

- **Result Scale:** Lets you alternate between pronounced star patterns at high values and more diffuse glows at low values.

- **Blade Curvature and Rotation:** Let you alter the softness and orientation of the arms of each star.

- **Chroma Shift:** Lets you introduce some RGB "bleed" into the glow.

## Compositing Controls

These controls let you adjust how to composite the glow effect against the original image.

- **Normalize Brightness:** This checkbox scales the brightness of the glow to a naturalistic range for the image. Also, when Normalize Brightness is enabled, the Aperture Diffraction effect will keep to a consistent overall brightness as the scene changes.

- **Brightness:** Lets you adjust the intensity of the glow effect.

- **Colorize:** Lets you tint the glow effect using a Color control that appears when Colorize is raised above 0.

# Glow

A sophisticated, soft glow effect that's highly customizable with only a few key parameters.

- **Select Output:** Lets you preview the image with different stages of the glow effect applied, viewing the Shiny Regions, the isolated Glow Alone, or the Glowing Image.
- **Shine Threshold:** Defines the luminance level at which glow is triggered to appear on the image.
- **Spread:** Defines how far out shine extends from areas of the picture that trigger it.
- **H/V Ratio:** Lets you adjust the proportion of horizontal to vertical spread, allowing you to create "streaky" shine that extends farther in a particular dimension.
- **Relative Spread Red/Green/Blue:** Lets you adjust the spread within each color channel by a different amount, simulating a kind of chromatic aberration in the glow.
- **Brightness:** Adjusts the intensity of the glow effect.
- **Colorize:** A color picker and eyedropper let you choose a color with which to tint the glow.
- **Glow framing:** Lets you choose what happens when shine hits the edge of the frame, whether it's amplified by "Reflect in Camera" or whether it's moderated by a "Vignette" effect.
- **Composite Type:** Lets you choose a composite mode to use to blend the glow effect with the image. Defaults to Screen, which is good for gentle glows. Add lets you create hotter, more intense glows, while other composite modes let you create other varied effects.
- **Opacity:** Lets you adjust the transparency of the glow effect and is a fast way of "easing off" of a glow that you otherwise like, but that's too intense for the shot at hand.

# Lens Flare (Studio Version Only)

Simulates different kinds of lens flares resulting from the interplay of light through an aperture of selectable shape bouncing within layered optical elements in a lens. Lens Flares are completely computer-generated, so they're always created at your project resolution, whether it's 1080 or 8K. Four groups of controls give you a lot of ways to customize the presets to create your own effect:

## Lens Flare Preset

You can choose a type of flare from the Lens Flare Preset pop-up. If you manipulate the controls to create your own effect, this pop-up switches to Custom.

## Select Output

The Select Output pop-up lets you switch among the following viewing options:

- **Final Image:** (Default) Shows the lens flare composited against the current clip.
- **Flare Elements Alone:** Shows the isolated flare, making it easier to adjust.
- **Source Mask and Magnified Source Mask:** Let you see the mask created by the Light Source Masking controls below, which is used to limit the lens flare that's created.

## Light Source Masking

Three additional controls at the top let you create a quick and dirty luma key to create a mask that you can use for occluding the lens flare effect behind foreground elements in the scene. For example, if you're using lens flare to simulate the sun in the sky, these controls let you mask trees in the foreground so that the lens flare appears to be behind the trees, as the sun would be.

- **Enable Light Source Masking:** This checkbox enables the Mask Threshold and Virtual Light Source Size sliders. You can then choose either Source Mask or Magnified Source Mask to see the mask that's created by raising the Mask Threshold slider.

- **Mask Threshold:** Raising this slider pulls a fast Luma Key that masks off darker foreground elements (such as trees against the horizon) and limits the flare to areas of the picture where the light source of the flaring can "shine through" (In this example, shining between the trees on the horizon.).

- **Virtual Light Source Size:** This slider determines how quickly the center of a flare will disappear behind the luma-keyed mask you've created; higher values (simulating bigger light sources) cause a flare to disappear more slowly when passing "behind" a feature of the image that's being keyed via the Mask Threshold slider.

## Position

Position parameters let you adjust the X and Y Position of the simulated light source that's causing the flare. There are three ways you can adjust the flare position.

- You can Adjust the X and Y Position sliders.
- You can turn on the OpenFX Overlay in the Viewer and drag the on-screen control.
- You can motion track elements within the scene using the FX mode of the Tracker palette.

## Global Corrections

The Global Corrections group have parameters that let you quickly adjust the overall quality of the flare effect.

- **Global Scaling:** Lets you make every element of the flare effect larger or smaller at once.

- **Anamorphism:** Lets you stretch all flare elements horizontally to simulate an anamorphic lens' stretching effect.

- **Lens Center X and Y position:** Lets you offset the center of the simulated lens that's causing the flaring, about which the various elements of the flare pivot.

- **Global Defocus:** Lets you blur the overall flaring effect being created to soften the effect.

- **Global Brightness:** Lets you raise and lower the overall level of flaring being produced.

- **Global Saturation:** Lets you adjust the overall color intensity of the flaring.

- **Colorise Result:** Lets you choose how much to tint the flare, if at all. At a value of 0 (the default), no colorization is applied at all.

- **Colorization Color:** Lets you choose a color to use to colorize the flare via the Colorize Result slider above. You can use either a color control or eyedropper to sample color from the source RGB image of the current node.

## Aperture

The Aperture parameters let you define the aperture of the simulated camera apparatus through which the flare is being generated. The shape defined by these parameters affects the look of the "starburst element" of each flare, as well as the look of any aperture-shaped "ghost elements" you're turning on.

- **Aperture Blades:** Defines how many blades make up the aperture. You can choose from 3 to 16 (defaults to 6).
- **Angle:** Sets the angle of the resulting Aperture shape (defaults to 0.183).

## Elements

The Elements pop-up is a deceptively simple set of controls that let you expose the customization controls of each of the layers and elements that combine to create the simulated lens flare. Up to ten levels of elements can contribute to a lens flare effect. Each element and ghost shape has a different set of parameters unique to that type of element. Available elements in this pop-up menu include:

- **Full-Screen Glare:** A simulated overall flaring that covers the entire frame at its most intense. This glare increases as the flare nears the center of the screen and decreases as the flare moves toward the edges of the frame. Recommended for extremely big flaring effects. Parameters include:
  - **Glare Brightness:** A slider; set this to 0 to eliminate glare.
  - **Glare Color:** A color picker and eyedropper combination that lets you tint the glare.

- **Flare Spot:** Simulates the central light source that's triggering the flare. Parameters include Flare Size (set this to 0 to eliminate the flare spot), Flare Irregularity (which lets you create a more organic-looking, off-balance flare), Flare Softness, and Flare Color.

- **Starburst:** Rays of light stretching out from the center of the flare. Parameters include Starburst Size (set this to 0 to eliminate the starburst), Starburst Softness, Starburst Split Angle (which splits each streak of the starburst into a wider feathered pattern), Starburst Split Balance (which lets you adjust the brightness between each half of split streaks), and Starburst Color.

- **Ghost elements:** Seven available layers of Ghost Elements can be enabled and set to different optional shapes for each lens element you want to simulate. Each of the Ghost element layers can use one of five types of shapes, including:
  - **None:** Turns that particular ghost element off.
  - **Aperture Shape:** A polygonal shape defined by the number of blades in the aperture you've selected.
  - **Anamorphic Streak:** A wide horizontal artifact typical of anamorphic lenses.
  - **Disc Shape:** A round ring artifact.
  - **Bubble Shape:** An oval with haze within.
  - **Corona Rays:** A ring of streaks stretching outward.

  Ghost elements share many parameters in common, although specific elements have unique parameters. These parameters are as follows:
  - **Color:** A color picker and eyedropper combination that lets you colorize that specific element.

- **Position:** A slider lets you set that element's position along the optical path that's defined by the angle from the (Flare) Position X and Y to the Lens Center X and Y parameters. A value of 0 centers that element on the Lens Position, while larger values push that element farther and farther away from the Lens Position.

- **Size:** Sets the size of that flaring element, or in the case of the Anamorphic Streak, the width.

- **Height:** (Anamorphic Streak only) Sets the vertical thickness of the streak.

- **Center Brightness:** (Aperture, Disk, and Anamorphic Streak only) Defines the brightness in the middle of that element, filling it to appear as a solid element. Set this closer to 0 if you want the element to appear hollow.

- **Edge Brightness:** (All but Anamorphic Streak) Defines the brightness of the edge of that element. Raising this value while lowering the Center Brightness lets you create outlined element effects.

- **Softness:** Lets you blur that element.

- **Bristle Density:** (Corona Only) Lets you alter the number and arrangement of the optical bristles that appear. At lower values, fewer bristles appear, at higher values, more bristles appear. As you change the value of this parameter, the placement of bristles shifts, allowing you to change distribution as well as density with a single control.

- **Bristle Scale:** (Corona only) Lets you alter the thickness of the bristles that appear. Smaller values result in thicker bristles, higher values result in smaller bristles more tightly packed together.

- **Ringing:** (All types but Bubble) Simulates a pattern of diffraction artifacts. Higher values increase the number of rings or streaks comprising the element.

- **Chromatic shift:** Simulates chromatic aberration effects.

- **Eclipse Position:** Simulates where the outer (away from the center) or inner (toward the center) side of a Ghost Element doesn't exist because the light is occluded by the edge of a lens element or some part of the tube housing. Practically, this defines which side of the Ghost Element is affected by the other Eclipse parameters of size, softness, and chromatic shift. Adjusting this results in semi-circular ghost shapes of different kinds. At 0, there is no eclipse. At positive values, the eclipse starts from within the frame and pushes out; at negative values, the eclipse starts from the outside of the frame and pushes in.

- **Eclipse Size:** Defines the size of the eclipse region for that flare element. At higher values, more and more of the flare element is eclipsed.

- **Eclipse Softness:** Defines the softness at the transition from the eclipsed and non-eclipsed regions.

- **Eclipse Chromatic shift:** Lets you create a chromatic aberration effect at the boundary of the eclipsed region. At 0, there is no chromatic shift. At increasingly positive values, there's a shift toward blue. Toward negative values, there's a shift toward red.

- **Repeat:** Lets you use this element to spawn many duplicates defined by the following two parameters.

- **Repeat Position Seed and Repeat Size Seed:** At different values, these parameters let you pseudo-randomly redistribute the placement of repeated elements.

# Lens Reflections

Found in the ResolveFX Light category, Lens Reflections simulates intense highlights reflecting off the various optical elements within a lens to create flaring and scattering effects based on the shape and motion of highlights you isolate in the scene. It's an effective simulation that works best when there are light sources or specular reflections in the scene such as the sun, car headlights, light fixtures, fire and flame, or other lighting elements that are plausibly bright enough to cause such flaring.

Also, this plug-in really shines when these light sources move, as each layer of simulated reflections moves according to that element's position within the virtual lens being simulated, creating organic motion that you don't have to keyframe. Without intense highlights, the results of this filter will be somewhat abstract.
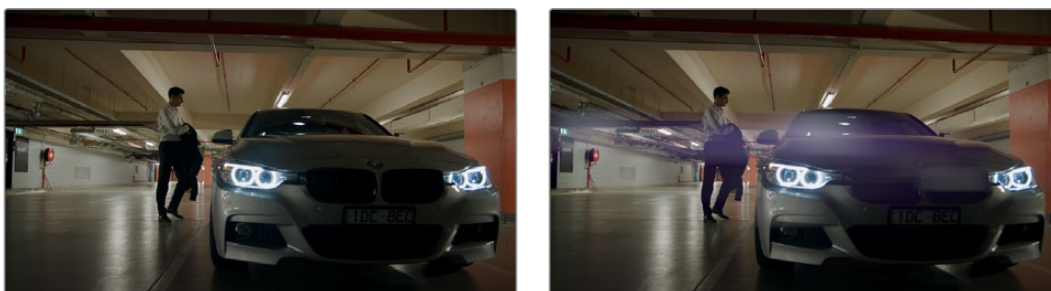


(Left) Original image, (Right) Applying Lens Reflections

## Output

The Output controls let you preview the image with different stages of the Lens Reflections effect applied.

- **Select Output:** Lets you choose to view the Isolated Source (to help when adjusting the Isolation controls), Reflections Alone (showing you the flaring effect that will be applied to the image by itself), or the Final Composite (the complete effect).
- **Quality:** This pop-up lets you choose how to render the effect. Options are Full, Half (Faster), and Quarter (Fast). The tradeoff is between quality and speed.

## Isolation Controls

The Isolation controls let you choose which highlights in the scene will generate lens reflections. The effect of these controls can be directly monitored by setting Select Output to Isolated Source. It's highly recommended to customize the Isolation controls for the image at hand when using this plug-in, as even more so than other plug-ins, the particular highlights used will have a huge impact on the resulting effect.

- **Color Mode:** A pop-up menu that lets you either choose to keep the colors of the different highlight regions that generate lens reflections, or treat them all as grayscale brightness only (color controls later can change the effect). Grayscale is faster to process, but Color can result in some brilliant effects.
- **Brightness:** Sets the threshold at which highlights are isolated.
- **Gamma:** Lets you shape the isolated highlights.
- **Smooth:** Lets you blur details in the highlights that you don't want to be pronounced.

- **Color Filter:** Lets you choose a particular color of highlight to isolate (an eyedropper lets you select a value from the Viewer).
- **Operation:** A pop-up lets you adjust the resulting Isolation matte (options include Shrink, Grow, Opening, Closing), and a slider lets you define how much.

## Global Controls

The Global controls let you quickly and easily adjust the overall quality of the Lens Reflections effect using a centralized group of parameters.

- **Global Brightness:** Lets you raise and lower the level of all reflections. Lowering brightness is a good way to make a large lens reflection effect more subtle, although images with small lens reflection effects may benefit from being a little brighter.
- **Global Blur:** Lets you defocus all reflections. This is another good way of making lens reflection effects of all kinds more subtle.
- **Anamorphism:** Lets you deform the reflection elements to simulate an anamorphic lens' stretching effect.
- **Global Colorize:** Lets you adjust the color intensity of the reflections, either intensifying the color of all reflections or desaturating it.

## Presets

A Presets pop-up provides a number of different settings to get you started. Selecting a preset populates the Reflecting Elements parameters below, at which point you can customize the effect to work best with the image at hand. It's highly recommended to customize these effects to suit the type of highlights in your image, in order to get the best results.

## Reflecting Elements

There are four groups of Reflecting elements, each with identical controls. This lets you create interactions combining up to four sets of reflections. The controls found within each group are as follows.

- **Brightness:** Lets you adjust the intensity of that reflection.
- **Position in Optical Path:** Lets you shift the reflection according to an element's position in the lens. Practically, this means that positive values will enlarge an inverted reflection based on the highlights, while reducing values toward 0 will shrink the reflection, and pushing this into negative values will invert the reflection and pull it into the opposite direction as it begins to enlarge again. A value of –1 positions the reflection right over the highlight that creates it.
- **Defocus type:** Lets you choose what kind of blur to use, choices include Box blur, Triangular blur, Lens blur (the most processor intensive), and Gaussian blur (the default).
- **Defocus:** Lets you choose how much to blur that element.
- **Stretch:** Lets you give the flare an anamorphic widescreen look.
- **Stretch Falloff:** Lets you taper the edges for a less uniform stretching effect.
- **Lens Coating:** A pop-up lets you choose common colors such as purple, green, and yellow that correspond to different anti-reflective lens coatings, as well as a selection of other vibrant colors. Defaults to none. When you choose any other option, a color control and eyedropper let you manually choose a color or pick one from the image. A Colorize slider lets you vary how much to tint the reflection by the selected color, although setting Colorize to 0 lets the flare take its color from the source highlights of the image, which can sometimes give you the most interesting look.

# Light Rays

A "rays of light" effect that simulates volumetric lighting emerging from light sources defined by a threshold you define. The effect mimics what are sometimes called "god rays" in the sky, or other highly directional glow effects.

## Main Controls

The Main controls include:

- **Select Output:** Lets you preview the image with different stages of the Lightray effect applied, viewing the Final Image, Lightrays Alone, and Source Regions.
- **Source of Rays:** Lets you choose the emitter of the rays, using Bright Regions or Edges.
- **Source Threshold:** A slider that lets you choose the limit at which light areas of the image emit rays.

## Position

Position parameters let you define the direction rays take.

- **Ray Directions:** A pop-up menu that lets you choose either "From A Location," which exposes controls to let you choose an X or Y position to define a point of origin that defines the angle of the light beams, or "At an Angle," which exposes controls to let you choose an overall orientation for the rays.

## Appearance

Appearance parameters let you customize the ray effect.

- **Ray Dropoff:** A pop-up with four options.
  - **Default (soft):** Produces soft, indistinct rays of light that appear to fade away as they stream out.
  - **Keep Shape of Source:** The edge of the light rays are defined by the shape that emitted them.
  - **CCD Bloom Harsh:** Severely raises the brightness of the part of the image that's emitting rays as Length is raised, resulting in harsh glow or bloom in the image.
  - **CCD Bloom Soft:** Gently raises the brightness of the part of the image that's emitting rays as Length is raised, resulting in a very gentle lightning of the image.
- **Length:** Lets you make the rays longer or shorter.
- **Soften:** Lets you blur the rays being emitted.
- **Brightness:** Lets you adjust how bright the rays are.
- **Color:** A color picker and eyedropper let you define a color with which to tint the rays.

# Chapter 136

# ResolveFX Refine

These plug-ins let you make different kinds of targeted improvements.

# Contents

# Alpha Matte Shrink and Grow
# (Studio Version Only)

This filter lets you refine the edges of alpha and key mattes in a variety of ways, shrinking and growing the edges, and opening and closing holes that appear within a matte. In the Color page, this filter can be applied to Qualifier or Window keys that have been routed to the RGB input of a corrector node, for adjustment and refinement, before connecting the result to the key input of a subsequent node for use isolating an adjustment.
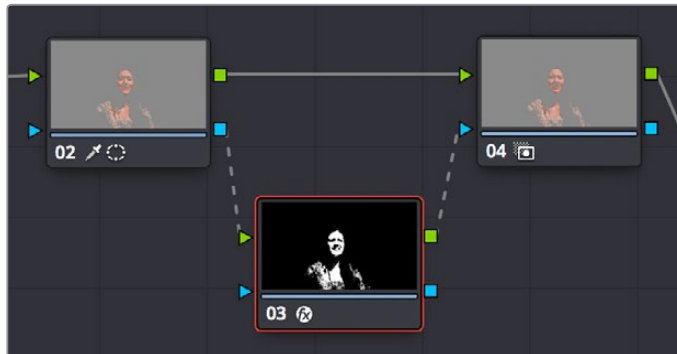


Applying the Alpha Matte Shrink and Grow filter to a key
matte that's fed to the RGB input of a separate node

- **Operation:** A pop-up menu lets you choose how you want to modify the alpha channel/ key. You can choose Shrink or Grow to dilate or erode the edges of the matte with great accuracy. Or, you can choose Opening or Closing to plug or expand holes within the key to clean up a ragged matte.
- **Operator Shape:** A pop-up menu lets you choose how corners and angles in the edges of the key are handled when you grow or shrink it. Circle is the default, and results in even expansion around the surface of the key that eventually averages all angles into a circular shape if you use extreme Radius settings. Square averages all angles into a more rectangular shape if you use extreme Radius settings. Diamond averages all angles into a diamond shape if you use extreme Radius settings.
- **Operator Radius:** A slider adjusts how much to Shrink, Grow, Open, or Close the key.
- **Repeat Operation:** A slider alters the effect of the Operator Radius setting to create more extreme adjustments.

# Beauty (Studio Version Only)

Beauty is a plug-in that lets you control texture. In Advanced mode, you can selectively smooth image detail that falls above a particular threshold (using the Smoothing Threshold slider), while preserving detail falling below a particular threshold (using the Texture Threshold slider). In this way, you can smooth larger textures you don't want, while either preserving or exaggerating smaller textures that you do want.

In the case of faces and skin, this plug-in provides another method of smoothing larger, unwanted blemishes, while preserving desirable edge detail and underlying structures such as pores, so you can improve the complexion of subjects on shoots where hair and makeup was not available, without over-softening realistic skin details and creating an overly fake plastic look.
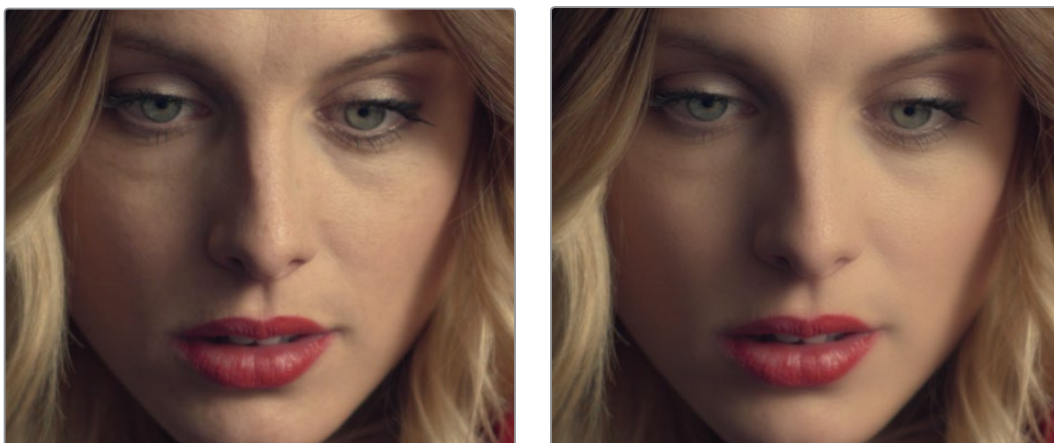
(Left) The original image, (Right) A face with Beauty applied
to soften the complexion while retaining fine facial detail

Please note that this plug-in is not only for skin detail, and it's not only for softening. Once you isolate the fine detail you want to preserve in a subject, you also have the option of exaggerating it to create highly textured results. This plug-in is effective for any subject with textures that need refinement.

> **TIP:** This plug-in is best used within a qualification that isolates the particular feature you're trying to smooth. The default settings apply a moderate amount of smoothing and fine detail recovery that's appropriate for faces in closeup but will not be universally appropriate for all situations, so some fine-tuning will always be necessary. For naturalistic results, this plug-in produces the best results when used in moderation.

## Operating Mode

The Beauty plug-in has two operational modes, including an Automatic mode with simpler operation when your objective is to create a maximally smooth or textured result while still preserving important details, and an Advanced mode that provides additional controls that let you preserve fine detail that you want, while smoothing coarse details that you don't want.

## Auto Controls

Automatic mode reveals easy-to-use controls for smoothing or coarsening detail.

- **Amount:** Lets you choose how much smoothing or coarsening to apply.
- **Scale:** Lets you reduce or increase the amount of smoothing or coarsening that's accomplished with the range of the Amount slider.

# Advanced Controls

Advanced controls reveal the full power of the Beauty plug-in, with preview modes to examine different aspects of this plug-in's behavior, while specifically adjusting the level of smoothing or coarsening you want, the amount of texture to preserve, and which additional features of the subject you want to recover from this operation to fine tune the result.

- **Show Split View:** Turns on a split-screen view that displays a grid of four images (in clockwise order from upper left): the smoothed or coarsened image, the Texture Recovery mask, the Feature Recovery mask, and the final result. The Split View works best with the Full Screen Viewer enabled (press Shift-F) while the Inspector is shown at right, so each quadrant is large while you make your adjustments.

## Smoothing

These parameters let you adjust how much smoothing to apply to the image.

- **Smoothing Threshold:** Raising this value increasingly smooths textures above the Texture Threshold (below). Using this control and leaving Diffuse Lighting at 0 preserves the contrast of the lighting on the feature you're smoothing.

- **Diffuse Lighting:** Another method of softening texture, but in such a way that the lighting of the subject also appears to become more and more diffuse (Similar to setting Midtone Detail to negative values).

- **Preview Smoothed:** Lets you view the image with only smoothing applied by the Smoothing Threshold and Diffuse Lighting sliders, with no texture recovery.

## Texture Recovery

These parameters let you adjust how much texture to put back into the smoothed result.

- **Texture Threshold:** Lets you set the threshold at which detail is reintroduced to the image. Texture Threshold must always be equal to or lower than Smoothing Threshold, so lowering Smoothing Threshold may also result in lowering Texture Threshold.

- **Add Texture:** Lets you exaggerate recovered texture (at values higher than 1), or minimize recovered texture (at values less than one).

- **Preview Texture:** Lets you view the isolated texture mask that's being recovered by the Texture Gain and Texture Threshold sliders, so you can fine tune what you want to preserve.

## Feature Recovery

These parameters let you recover edge detail.

- **Recovery Amount:** Lets you set the threshold at which detail is reintroduced to the image. Texture Threshold must always be equal to or lower than Smoothing Threshold, so lowering Smoothing Threshold may also result in lowering Texture Threshold.

- **Preview Recovery Area:** Lets you view the mask that's being generated by the Recovery Amount slider, so you can fine tune what you want to preserve. Preserved detail is white, discarded detail is black.

# Face Refinement (Studio Version Only)

Face Refinement is an incredibly sophisticated yet easy-to-use filter that lets you quickly make very targeted adjustments to people's complexions. When you apply this filter, imaging techniques are used to automatically detect a face, which is automatically tracked so long as it's somewhat turned toward the camera.

If multiple faces are present in the frame at the position of the playhead, then clicking the Analyze button once results in boxes being drawn over each detectable face. Click any of these boxes to choose which face you want to refine, and that box will be highlighted to indicate which face you'll be refining.



When multiple faces are detected, you can click a box to choose which one to work on

If only one face is present, clicking the Analyze button automatically analyzes that face; no boxes appear and this step is not necessary.

After you've selected which face to track (if necessary), you need only click the Analyze button at the top of the Face Refinement controls to "auto-magically" track the face through the trackable range of motion that this plug-in is capable of, and an outline of the face's major features appears to let you follow its progress.
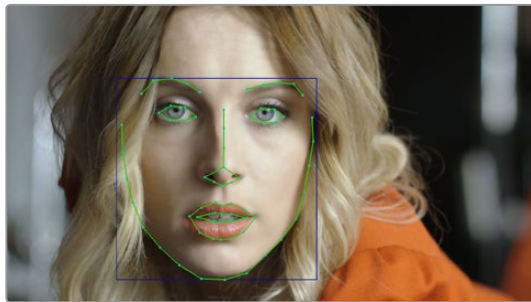


The Face Refinement filter automatically detecting a performer's face

Once the face has been tracked, you're ready to work. This plug-in divides the tracked face into different zones for common operations colorists often perform to quickly eliminate blemishes, adjust the hue and saturation of complexions in regionally appropriate ways, modify lighting, sharpen desirable detail, and refine makeup. Because all adjustments are fit to the proportions of the face that's been detected and tracked, all you need to do is make the adjustments you need and DaVinci Resolve takes care of the rest.

## Main Controls

The top two controls let you initiate the Face Refinement process.

- **Analyze:** This button initiates the process of using the facial detection of the Face Refinement plug-in to detect the face you want to make adjustments for, and track its motion throughout the range of the clip. You only need to do this once, and the data will be stored.

- **Show overlay:** To impress your clients and see how well Face Detection is tracking the face you're working on, you can turn on this checkbox, which turns on the wireframe tracking that shows you which facial details are being detected.

## Skin Mask

These controls let you adjust the skin mask this plug-in automatically generates in order to limit the effect to only the face of the person you're targeting.

- **Use mask:** This checkbox enables DaVinci Resolve to sample the dominant skin tone values within the face to create a complexion-focused key to isolate the skin tones of the image. However, since it's still possible to have blonde hair, wood panelling, or other skin-colored features in the frame that inadvertently get included in this key.

- **Use face mask:** Turning on this checkbox places a circular garbage mask that follows the face to eliminate these accidental inclusions.

- **Face mask size and Face mask softness:** These sliders let you adjust the face mask to better fit the face you're working on, if necessary.

- **Refine mask:** This slider lets you adjust the face mask to smooth or eliminate gaps in the key.

- **Show mask:** This checkbox makes the face mask being generated visible, which can be helpful to see while you're tuning it.

- **Show overlay:** To impress your clients and see how well Face Detection is tracking the face you're working on, you can turn on this checkbox, which turns on the wireframe tracking that shows you which facial details are being detected.
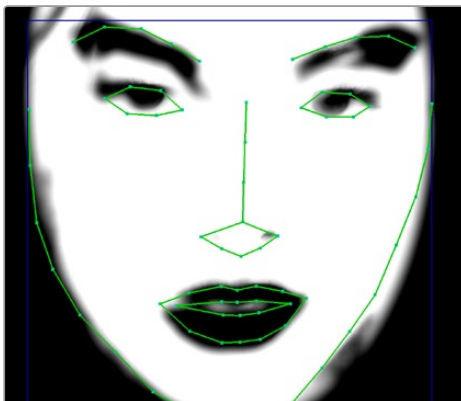


Limiting the key with the face mask

# Texture

The Texture controls have three Operating Modes that let you choose the method you want to use to control skin texture. Beauty Automatic and Beauty Advanced provide the texture controls available in the Beauty plug-in, while Smoothing provides the previously available texture adjustment controls.

## Beauty Automatic Controls

Automatic mode reveals easy-to-use controls for smoothing or coarsening detail.

- **Amount:** Lets you choose how much smoothing or coarsening to apply.
- **Scale:** Lets you reduce or increase the amount of smoothing or coarsening that's accomplished with the range of the Amount slider.

## Smoothing Controls

- **Smoothing:** This slider removes detail from the areas isolated by the Skin Mask controls, smoothing the complexion. Its operation depends on the settings of the Detail Size and Detail sliders below. You may find you can increase Smoothing more dramatically as you increase Detail using the Detail Size and Detail sliders described below.
- **Detail Size and Detail:** Once you've used the Smoothing slider, you can then use these sliders to selectively put subtle skin details back into the image; Detail Size determines the maximum size of details you want to put back into the face, and Detail is a sharpening operation that lets you adjust how visible these small details are. By combining smoothing and subtle preservation of small details, you can get a much more naturalistic result than were you to simply leave the entire face unnaturally smooth.
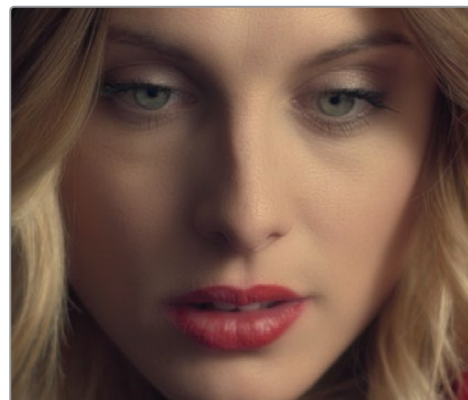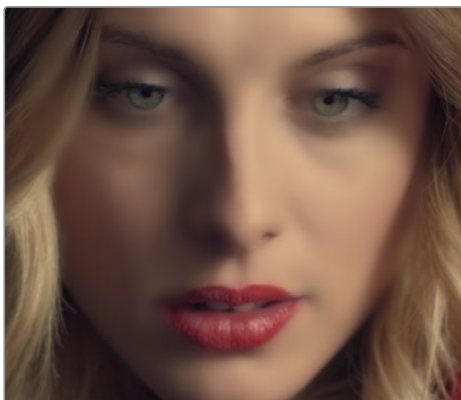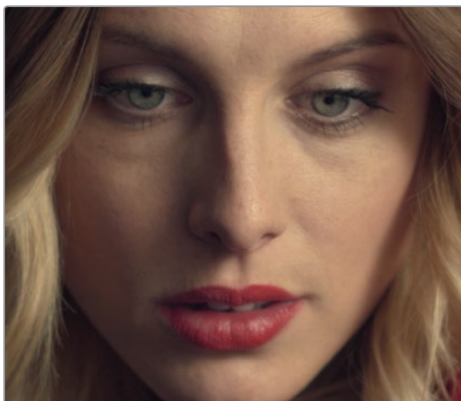


(Top) The original image, (Bottom Left) Only smoothing complexion, (Bottom Right) Using Detail Size and Detail to put natural texture back into the smoothed result (results exaggerated for print)

## Color Grading

These controls let you make color adjustments to the overall face.

- **Contrast:** This slider lets you lighten the face in a natural way by keeping the shadows dark even while you brighten the face, making it easy to bring actors out of the background.

- **Midtone:** Lets you add a more luminous quality to the skin tone.

- **Color boost:** Specifically boosts saturation in the lowest saturated parts of the face.

- **Tint:** Provides a limited range of naturalistic hues emphasizing orange through red (but extending to green and magenta) with which to tweak complexion.

- **Desaturate shadow:** This slider lets you selectively desaturate the darkest shadows on the face to keep things looking natural, or to desaturate more aggressively in order to stylize the face in a different way. Also useful when using the other adjustments of this plug-in makes the shadows too colorful. Moving this slider into negative values will add saturation.

- **Shine Removal:** This slider is an inverse contrast adjustment designed to ameliorate sweat and shine on a person's face, although moving this slider into negative values will also accentuate shine.
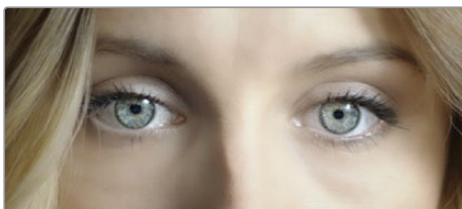
## Eye Retouching

These controls target just the eyes and surrounding area of the face.

- **Sharpening:** This slider lets you selectively add sharpening just to the eyes and eyelashes, which lets you instantly add focus to any performer.

- **Brightening:** This slider lets you whiten the eyeballs.

- **Eye Light:** This slider lets you brighten the region of the face around the eyes that's often thrown into shadow by the subject's forehead in situations with imprudent lighting.

- **Eyebag Removal:** This slider uses a variety of techniques to smooth, color-adjust, and brighten the area under the eyes most susceptible to eye bags with tired talent.
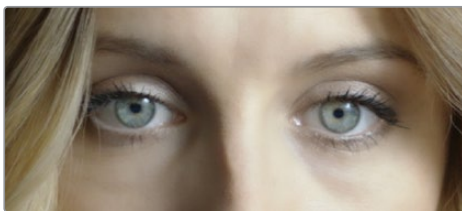


Eyes with no special adjustment



Eyes with adjustment

## Lip Retouching

These controls target just the lips and surrounding area of the mouth.

- **Hue:** This slider lets you adjust the color of a subject's lips or lipstick.
- **Saturation:** This slider lets you adjust the intensity of lip color.
- **Upper Lip Smooth:** Lets you smooth out fine age lines that can appear above lips.

## Blush Retouching

The parameters in this group let you modify the hue of the blush region of a subject's cheek, letting you correct an unwise makeup choice, or push a subject's blush color around to add makeup that wasn't there.

- **Hue:** This slider lets you adjust the hue of the cheeks.
- **Saturation:** This slider then lets you intensify or remove blush color.
- **Size:** This slider lets you adjust the size of the blush area of the cheeks.

## About Forehead, Cheek, and Chin Retouching

The next three groups of controls borrow a technique from portrait painters, who've long taken advantage of the "traffic light" approach to rendering skin hues, that observes that foreheads are often a bit yellow, the middle of the face is usually a bit red, and chins can be a bit green. A combination of unequal sun exposure, capillary distribution, and follicle growth account for this, but the bottom line is that faces are seldom a single unified hue. This means that there may be a region of the face that would benefit from individual adjustment (cheeks that have gotten too much sun, for example). But it also means that when you allow a bit of hue variation into your face grade, you can achieve a more naturalistic result.



(Left) A face graded with a single hue, (Right) A face graded with slight variation in the forehead, blush area, and chin

> **TIP:** For a variety of reasons, people are extremely sensitive to the hues of skin tone, so tiny variations that can be difficult to identify nevertheless have a significant impact on the resulting visuals. Unless you're aiming to create a special effect, these controls are meant to be used sparingly.

## Forehead Retouching

As the name implies, adjusts color and texture on the forehead.

- **Hue and Saturation:** These sliders let you adjust forehead color.
- **Smooth:** This slider lets you apply a specific smoothing operation to the forehead to ameliorate wrinkles and worry-lines.

## Cheek Retouching

Simple color adjustment controls affecting the entire cheek area, and not just the blush area.

- **Hue and Saturation:** These sliders let you adjust the color of the cheek, eye, and nose area.

## Chin Retouching

Simple color adjustment controls over the chin of the face.

- **Hue and Saturation:** These sliders let you adjust the color of the chin, running up alongside the sides of the face (the beard area).

# Chapter 137

# ResolveFX Revival

This category consists of plug-ins that let you fix common technical, damage, and quality problems that bedevil programs being finished, remastered, or restored.

# Contents

# Automatic Dirt Removal
## (Studio Version Only)

The Automatic Dirt Removal plug-in uses optical flow technology to target and repair temporally unstable bits of dust, dirt, hair, tape hits, and other unwanted artifacts that last for one or two frames and then disappear. All repairs are made while maintaining structurally consistent detail in the underlying frame, resulting in a high quality restoration of the image. Fortunately, despite its sophistication, this is a relatively easy plug-in to use; just drop the plug-in on a shot, adjust the parameters for the best results, and watch it go.



(Left) Original image, (Right) Using Automatic Dirt Removal

> **NOTE:** This plug-in is less successful with vertical scratches that remain in the same position for multiple frames and is completely ineffective for dirt on the lens that remains for the entire shot.

## Main Controls

The primary controls used to adjust how much dirt is removed from the image.

- **Motion Estimation Type:** Lets you choose from among None, Faster, Normal, and Better. This tunes the tradeoff between performance and quality.

- **Neighbor Frames:** Lets you choose how many frames to compare when detecting dirt. Choosing more frames of comparison takes longer to process, but usually results in finding more dirt and artifacts.

- **Repair Strength:** This slider lets you choose how aggressively to repair dirt and artifacts that are found. Lower settings may let small bits through that may or may not be actual dirt, while higher settings eliminate everything that's found.

- **Dirt Size Threshold:** This slider lets you tune how large a detected bit of dirt must be to be removed. Raising this parameter lets you omit things like film grain from the operation but may allow smaller bits of dirt through.

- **Show Repair Mask:** This checkbox lets you see the dirt and artifacts that are detected by themselves, so you can see the effectiveness of the results as you fine tune this filter.

## Fine Controls

These controls let you fine tune the effect in an effort to perfect the tradeoff between removing dirt successfully and preserving true image detail.

- **Motion Threshold:** This slider lets you choose the threshold at which pixels in motion are considered to be dirt and artifacts. At lower values more dirt may escape correction, but you'll experience fewer motion artifacts. At higher values, more dirt will be eliminated, but you may experience more motion artifacts in footage with camera or subject motion.
- **Edge Ignore:** This slider lets you exclude hard edges in the picture from being affected by dirt or artifacts that are removed. Higher values omit more edges from being affected.

# Chromatic Aberration
# (Studio Version Only)

A Revival category plug-in that lets you manually correct the slight color fringing that results from chromatic aberration in a lens. "Estimated Red/Blue Fringes" checkboxes display an "alignment guide" that visually isolates each of two types of fringing against gray.



(Left) The original image in close up, showing chromatic aberration, (Right) The image with Estimated Red Fringes enabled, letting you see the specific problems as differences between red and cyan stripes

This makes it easy to make manual adjustments to correct the problem, using the Scale and Edge controls to individually adjust Red/Cyan and Blue/Yellow fringing.



(Left) The original image in close up, showing chromatic aberration as a cyan fringe along the right of the smokestack and as a red fringe along the closest corner of the building, (Right) The corrected image in close up; this fringe is gone

Advanced Options provide additional parameters for problem shots. Center X and Y parameters let you offset the center of the lens if you're dealing with a reframed and re-rendered shot. Balance parameters can help exaggerate hard-to-see fringing to make it easier to correct, and the Fringe Magnification parameter enlarges the fringe indicators that are displayed when you turn on either of the Estimated Fringes checkboxes.

# Dead Pixel Fixer (Studio Version Only)

If you have clips that were shot on a camera with one or more "dead" or "stuck" pixels in the sensor, you may have black or white spots that are fixed in place in the image. This filter is designed to let you place crosshairs on each dead or stuck pixel, identifying them so you can use different methods of fixing the problem.

To fix dead or stuck pixels, apply the Dead Pixel Fixer filter, make sure the OFX onscreen controls are enabled in the viewer, and then click on each pixel you need to fix with the mouse to place crosshairs on it. You can click anywhere on the image to place as many crosshairs as you like, there's no limit. You can also Option-click to delete crosshairs you no longer need. To move any crosshairs, simply drag it to another location.
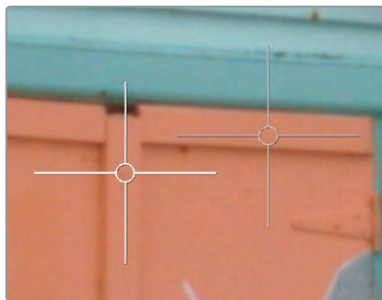


Multiple dead pixel removal targets

When you place multiple crosshairs, you can click to select whichever crosshairs you want to adjust the controls for. Each crosshairs can have different control settings, or you can select multiple crosshairs by Command-clicking all the ones you want to adjust.

## Remover-Patch Properties

These controls let you adjust the operation of selected crosshairs you've placed in the Viewer.

- **Fill-in Method:** This pop-up menu provides two methods of fixing problem pixels: "Blend from surround" and "Clone from Elsewhere." Blend from surround is the default, which automatically blends surrounding pixels to eliminate the problem. Clone from Elsewhere exposes a second sample control that you can drag onto an adjacent part of the picture to clone pixels to fix the problem.
- **Remover size:** This slider lets you change the size of the region you're fixing.
- **Soften:** Lets you switch between a hard (value of 0) or soft (value of 3) edge.
- **Points:** A parameter without any controls, save for keyframing, lets you animate the selected remover patch by keyframing it.

## Control Visibility

The Control Visibility pop-up menu lets you choose whether the source and target onscreen controls are visible as you work. Show (the default) leaves all onscreen controls visible all the time. Auto Hide hides all onscreen controls whenever you're dragging one, letting you see the image as you adjust it without having these controls in the way. Hide makes all onscreen controls invisible, so you can see a clean version of the image with the effect, however you can still edit the effect if you remember where the controls are.

# Deband (Studio Version Only)

Low bit-depth media that has areas with shallow gradients of color, such as a sky or a wall, often exhibit color banding, seen as visible stripes, because there aren't enough color values to smoothly represent the gradiation from light blue to darker blue in the sky.
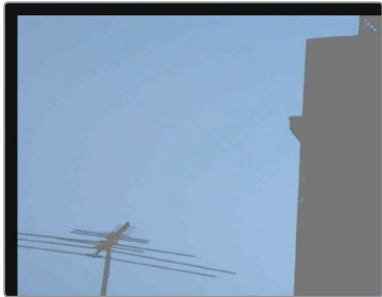


An example of banding in the sky of an image

This filter is designed to isolate the edges of color banding and minimize them by dithering pixels from either side to soften the transition. This filter works best when applied to regions of the image that have been isolated with a secondary qualifier or window, otherwise you risk all edges within your image being dithered and thus softened (although this can be an interesting stylistic effect).
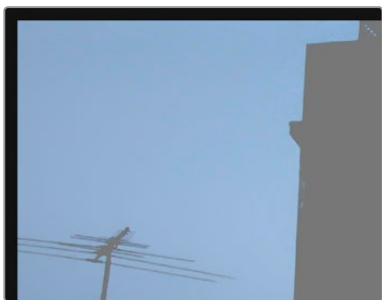


Minimizing banding using the Deband filter

## Deband Parameters

Deband controls include:

- **Edge Threshold:** Adjusts how well-defined an edge needs to be in order to be affected by this filter; lowering this excludes fainter edges, while raising this includes them.
- **Radius:** Lowers or raises the intensity of dithering in areas that will be affected.
- **Post Refine:** Narrows (by lowering) or widens (by raising) the areas affected by dithering.
- **Display Edge:** A checkbox that shows you a black and white high-contrast preview of which edges are being detected for dithering, which can help you fine-tune your results.

# Deflicker (Studio Version Only)

Introduced in DaVinci Resolve 15, this plug-in replaces the previous Timelapse Deflicker filter, and solves a far broader variety of problems in a much more automatic way. The new Deflicker plug-in handles such diverse issues as flickering exposure in timelapse clips, flickering fluorescent lighting, flickering in archival film sources, and in certain subtle cases even the "rolling bars" found on video screens shot with cameras having mismatched shutter speeds. Two key aspects to this filter are that it only targets rapid, temporally unstable variations in lightness, and that it's able to target only the areas of an image where flickering appears, leaving all other parts of the image untouched. As a result, this plug-in can often repair problems once considered "unfixable."
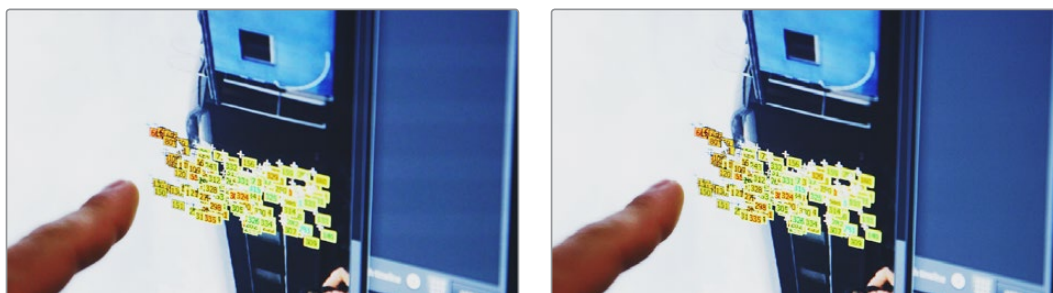


(Left) Original image with flicker, (Right) Result setting Deflicker to Fluoro Light, (clip courtesy Redline Films)

## Main Parameters

By default, the top section of this plug-in exposes a single control, which in many cases may be all you need.

- **Deflicker Setting pop-up menu:** The top two options, Timelapse and Fluoro Light, are presets that effectively eliminate two different categories of flickering artifacts. If neither of these presets is quite as effective as you'd hoped, a third option, Advanced Controls, opens up the Isolate Flicker controls at the heart of this plug-in to let you tailor it further to your needs.

## Isolate Flicker

Hidden by default, these controls only appear when you set Deflicker Setting to Advanced Controls, and let you choose how to detect motion in the scene so that flickering may be correctly addressed relative to the motion of subjects and items within the frame where it appears.

- **Mo.Est. Type:** Picks the method DaVinci Resolve uses to analyze the image to detect motion. Despite the names of the available options, which options will work best is highly scene dependent. The default, Faster, is less processor intensive, but less accurate, however this can be an advantage and actually do a better job with high detail images that would confuse the Better option. Choosing Better is more accurate, but more processor intensive, and Better will try harder to match fine details which can sometimes cause problems. None lets you disable motion analysis altogether, which can work well (and will be considerably faster) in situations where there's no motion in the scene at all. The default is Better.
- **Frames Either Side:** Specifies the number of frames to analyze to determine what's in motion. Higher values are not always better; the best setting is, again, scene dependent. The default is 3.

- **Motion Range:** Three settings, Small, Medium, and Large, let you choose the speed of the motion in the frame that should be detected.
- **Gang Luma Chroma:** Lets you choose whether to gang the Luma and Chroma Threshold sliders or not.
- **Luma Threshold:** Determines the threshold above which changes in luma will not be considered flicker. The range is 0–100, 0 deflickers nothing, 100 applies deflickering to everything. The default is 100.
- **Chroma Threshold:** Determines the threshold above which changes in chroma will not be considered flicker. The range is 0–100, 0 deflickers nothing, 100 applies deflickering to everything. The default is 100.
- **Motion Threshold:** Defines the threshold above which motion will not be considered flicker.

## Speed Optimization Options

Closed by default, opening this control group reveals two controls:

- **Reduced-Detail Motion checkbox:** On by default, reduces the amount of detail that's analyzed to detect flicker. In many cases, this setting makes no visible difference but increases processing speed. Disable this setting if your clip has fine detail that is being smoothed too aggressively.
- **Limit Analysis Area checkbox:** Turning this on reveals controls over a sample box that you can use to limit deflickering to a specific region of the image. This option is useful when (a) only one part of the image is flickering, so focusing on just that area speeds the operation considerably, or (b) part of the image is being smoothed too much by deflickering that's fixing another part of the image very well.

## Restore Original Detail After Deflicker

Closed by default, opening this control group reveals two controls:

- **Detail to Restore slider:** Lets you quickly isolate grain, fine detail, and sharp edges that should not be affected by the deflicker operation, preserving those fine details exactly.
- **Show Detail Restored checkbox:** Turning this checkbox on lets you see the edges that are detected and used by the Detail to Restore slider, to help you tune this operation.

## Output

The Output pop-up menu lets you choose what Deflicker outputs, with options to help you troubleshoot problem clips. Here are the available options:

- **Deflickered Result:** The final, repaired result. This is the default setting.
- **Detected Flicker:** This option shows you a mask that highlights the parts of the image that are being detected as having flickering, to help you evaluate whether the correct parts of the image are being targeted. This mask can be very subtle, however.
- **Magnified Flicker:** This options shows you an exaggerated version of the Detected Flicker mask, to make it easier to see what the Deflicker plug-in is doing.

# Dust Buster (Studio Version Only)

This plug-in is also designed to eliminate dust, dirt, and other imperfections and artifacts from clips, but it does so only with user guidance, for clips where the Automatic Dirt Removal plug-in yields unsatisfactory results. This guidance consists of moving through the clip frame-by-frame and drawing boxes around imperfections you want to eliminate. Once you've drawn a box, the offending imperfection is auto-magically eliminated in the most seamless way possible. This works well for dirt and dust, but it also works for really big stains and blotches, as seen below.



(Left) Drawing a box around dirt in the original image, (Right) Result in the Dust Buster plug-in

This plug-in works similarly to, but supersedes the legacy Dust Removal feature, which only worked on select image sequence formats and wrote new media files on disk. The Dust Buster plug-in works on any format of movie clip and works non-destructively, storing all image repairs within the plug-in without creating new media. Best of all, this plug-in is able to do its magic with only three controls.

- **Mode:** Selects how imperfections within the bounding box you draw are fixed. By default, Auto just takes care of things without you needing to think about this. However, if you're not satisfied with the result, you can undo and choose a different method from this pop-up method. Here are all the options that are available to you.

  - **Auto:** The default method. Once you've drawn a bounding box, the two frames prior to and the two frames after the current clip will be analyzed and compared to the current image. The best of these 5 frames will be drawn upon to remove the imperfection in the current frame. Images two frames away are prioritized since that will avoid the appearance of frozen grain, but only if they're suitable.

  - **Prev/Next Frame:** If you draw a bounding box from left to right, the next frame will be drawn upon to remove the imperfection. If you draw a bounding box from right to left, the previous frame will be used.

  - **Prev–1/Next+1 Frame:** If you draw a bounding box from left to right, the image two frames forward will be drawn upon to remove the imperfection. If you draw a bounding box from right to left, the image two frames back will be used.

  - **Spatial Fill:** In cases where the other two modes yield unsatisfactory results, such as when the underlying image has fast or blurred motion, this mode uses surrounding information in the current frame to remove the imperfection.

- **Show Patches:** Off by default. Turning this checkbox on lets you see every bounding box you've drawn to eliminate imperfections. While the patches are shown, you can Shift-click to select individual patches, group select patches by Command-dragging a bounding box, and delete unwanted patches individually by Option-clicking them.

- **Reset Frame:** Resets all of the bounding boxes drawn on the current frame, so you can start over.

# Object Removal (Studio Version Only)

A Revival category plug-in that's best used in the Color page, Object Removal uses the DaVinci Neural Engine to attempt to remove an object in the frame as automatically as possible. This plug-in works best when removing a moving object that passes over a temporally stable background, or dirt on the lens of a shot where the camera is in motion. Smaller objects get better results than larger objects, but your results really depend on the footage. Here's a simple procedure that shows how to do this.

To remove a moving object from a clip:

1   In this example, a drone is flying through a long shot that's being simultaneously recorded. We'll remove the drone using a window to identify the feature to be removed using the Object Removal plug-in.
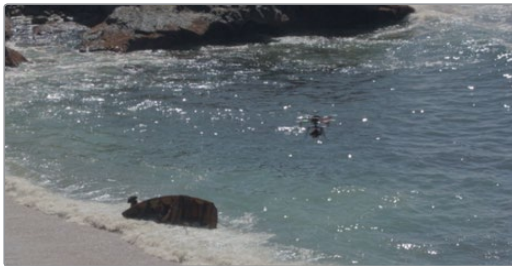


The original shot with a drone that needs to be removed

In simple cases, it's often easiest to apply the Object Removal effect to a Corrector node, so you can use a window or qualifier within that node to isolate the feature you want to remove. That's what we'll do in this example.

2   Use the Window palette to draw a window around the object that needs to be removed. You'll get the best results using windows or masks that hug the feature being removed fairly closely.

3   Track or keyframe the window to move with the feature you're removing. Again, you'll get better results the closer your window hugs the object being removed, and it's good to have some softness at the edge of this window.



The object that needs to be removed is isolated with a window

4   Drag and drop the Object Removal plug-in onto the node in which you've just isolated the feature to be removed.

5   Right-click the node in the Node Editor and choose "Use OFX Alpha" to enable the Object Removal plug-in to use whatever key has been created within that node to do its work.

6   Click the Scene Analysis button, and wait for the analysis to finish. If the object you're removing is moving but the camera is locked, you can turn on the "Assume No Motion" checkbox to improve your results in this case.

If your footage is ideal for object removal, the object will disappear once analysis is complete, replaced by a seamless background derived from detail found on neighboring frames.
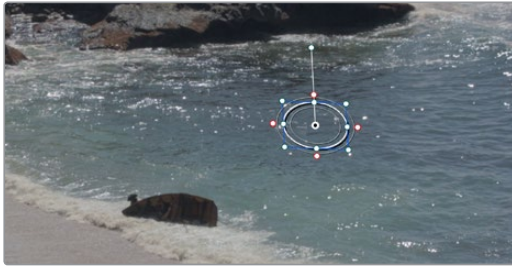


The result after object removal analysis is complete

The Object Removal plug-in is highly footage dependent, and you won't always get this good a result this easily. Problems with the result are shown via gray, either gray fringing or solid gray filling the replacement window. Gray shows you where the current settings are failing to find background content with which to fill in the patch you're removing. If this happens, there are two things you can try.

- If you notice while playing through the analyzed result that the object removal mask has gray fringing on some frames, you can try adjusting the "Search Range" slider, which is the distance, in frames, from the current frame that the Object Removal plug-in is searching for replacement image detail. For example, if the Search Range is 20, it searches +/-20 frames from the current location, or 40 frames total. The allowance of 10 frames means we look at every 4th frame. You will generally get the best results for the smallest range that gives an acceptable result.

- If you're noticing that the object removal mask is filled entirely with gray on some frames, this means that background fill couldn't be easily generated for those frames. In this case, you can try clicking the "Build Clean Plate" button, which takes a "best guess" approach to generating a background with which to fill the frame and integrates this with frames that could be successfully filled in.

- If the patch is successfully filled, but the result isn't blending well with the background, you can try changing the Blend mode. The default is Linear, which is a simple cloning operation, but you can also choose Adaptive Blend, which can provide better results except in certain situations where the edges of the replacement patch have a different color or brightness than the background.

# Patch Replacer (Studio Version Only)

The Patch Replacer is a quick fix when you need to "paint out" an unwanted feature from the image. For those of you who've been using windows and Node Sizing to do small digital paint jobs, this plug-in offers more options and a streamlined workflow.

On adding the plug-in, an onscreen control consisting of two oval patches appears, with an arrow connecting them indicating which patch is being copied into the other. The oval to the left is the "source" patch, used to sample part of the image, and the oval to the right is the "target" patch, used to cover up the unwanted feature using pixels from the source patch.

To use the Patch Replacer, simply drag the target patch over the feature you want to obscure, resize it to fit using the corner controls (the source patch is automatically resized to match), and then drag the source patch to an area of the image that can convincingly be used to fill the target patch.
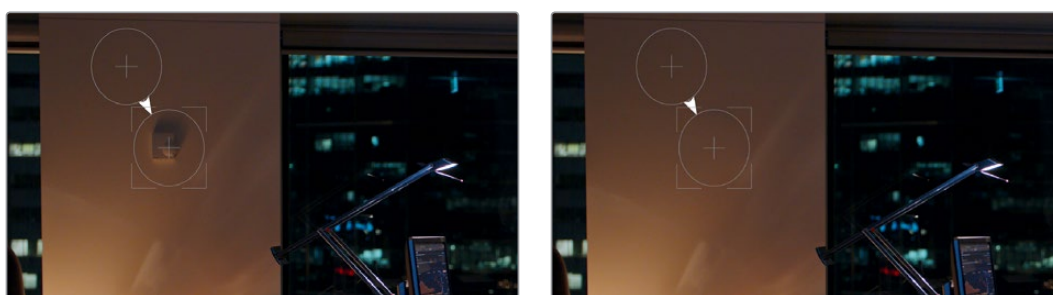
(Left) Original image, (Right) Removing the thermostat with the Patch Replacer

The source and target patches can be motion tracked using the FX tracker, so this tool is effective even if the subject or camera is moving.

## Main Controls

The Fill-in Method pop-up menu is arguably the most important, as it defines what method to use to fill the destination patch with whatever is in the source patch. The rest of the primary controls work differently depending on which Fill-in method you choose.

- **Clone:** Simply copies the source patch into the target patch. When Clone is selected, the Replacement Detail slider (which defaults to 1) lets you fade out the source patch, while Region Shape lets you choose a different kind of shape to use, and Blur Shape Edges lets you feather the edge of this operation, to more convincingly blend the source with the target area.

- **Adaptive Blend:** A much more sophisticated method of obscuring the target area using pixels from the source patch, and in many cases will yield better results more quickly than cloning. The source patch is copied into the target patch in such a way as to combine the source detail with the lighting found inside of the target area, creating in most instances a fast, seamless match. The Keep Original Detail checkbox, when turned on, merges detail from the source and target patches to create a composite, rather than a fill. The Blur Shape Edges slider works a bit differently with Adaptive Blend selected, but the idea is the same, feathering the effect from the outside in to obscure instances where there's a noticeable border around the target area.

- **Fast Mask:** Eliminates the source patch, doing instead a quick neighboring pixel blend that works well with small patches but can betray a grid pattern on larger patches. Region Shape and Blur Shape Edges are both adjustable.

## Patch Positions

Source X and Y, Target X and Y, and Target Width and Height are provided as explicit controls both for numeric adjustment, should that be necessary, and also to allow for keyframing in case you need to change the position and/or size of the source and fill patches over time.

Keep in mind that the source and target patches can be motion tracked using the FX tracker, although two checkboxes, Source Follows Track and Target Follows Track, let you disable FX tracker match moving when necessary.

## Onscreen Controls

The Control Visibility pop-up menu lets you choose whether the source and target onscreen controls are visible as you work. Show (the default) leaves all onscreen controls visible all the time. Auto Hide hides all onscreen controls whenever you're dragging one, letting you see the image as you adjust it without having these controls in the way. Hide makes all onscreen controls invisible, so you can see a clean version of the image with the effect, however you can still edit the effect if you remember where the controls are.

# Chapter 138

# ResolveFX Sharpen

These plug-ins offer a newer and more detailed method of sharpening specific details in images than the sharpen operation found in the Blur palette. Three different plug-ins offer different ways of using the same fundamental algorithm to perform different tasks.

# Contents

# Sharpen (Studio Version Only)

The Sharpen filter functions by separating the image into four levels of detail, the underlying structure, the fine scale details, the medium scale details, and the large scale details, each of which encompasses differently sized structures that comprise the overall image. In this way, the Sharpen filter lets you apply different amounts of sharpening to each of the fine, medium, and large structures of the image, giving you enormous control over how these different structures of image detail are affected.

## Main Controls

Controls the overall sharpening effect.

- **Sharpen Amount:** The primary global control that lets you add sharpening to the image. To refine the result, use the controls in Detail Levels to choose how much sharpness to apply to each size of structure this plug-in can operate upon. 1.800 is the default value. 0 is no sharpening, 5.000 is maximum sharpening.

## Detail Levels

Lets you customize the sharpen effect in a variety of highly specific ways.

- **Fine Detail Size:** This slider adjusts the threshold of what is considered to be a fine detail, although this also alters which image structures are affected by the Medium and Large Details sliders as well. Lowering this slider omits larger structures of the image from sharpening. The default is 0.050.
- **Fine Detail:** At its default setting, the Fine Details slider governs the sharpness of extremely fine detail such as skin pores and strands of hair, or small speckles on textured surfaces. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.
- **Medium Details:** This slider governs the sharpness of coarser detail such as freckles, wrinkles, clusters of hair, and surface details with greater edge definition. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.
- **Large Details:** This slider governs the sharpness of the largest details in the image, such as eyelids, the shadows at the edges of lips and noses, and the edges where hair meets the face, and the most contrasty edge details throughout the image. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.

## Chroma

A special purpose control that you want to handle with care.

- **Sharpen Chroma:** Selectively sharpens the chroma of the image while leaving the luma (Y) alone.

# Sharpen Edges (Studio Version Only)

A variation of the Sharpen filter that's streamlined for detecting edges to create a key used to limit sharpening to the selected edge details of an image. This is a good filter to use when attempting to make mildly soft-focus clips less objectionable.

## Main Controls

Controls the overall sharpening effect accomplished with this plug-in.

- **Sharpen Amount:** The primary global control for adding sharpening to the edges detected by this filter.
- **Sharpen Radius:** Controls the granularity of the detail that's added using Sharpen Amount.

## Edge Detection Controls

These controls let you customize the sharpen effect in very specific ways.

- **Display Edges:** This checkbox lets you see a grayscale preview of the edges that are being detected for sharpening while you use the other controls in this group. If you turn this checkbox on, you can see precisely the effect that the four other controls in this section have on the key that determines which parts of the image are sharpened.
- **Pre Denoise:** Smooths the matte to remove individual pixels of noise. Reducing Pre Denoise lets you minimize edges from the key that you don't want to sharpen and soften edges that are jagged because of excessive noise. Raising Pre Denoise adds more edges to the sharpening operation and strengthens the edges that are already there.
- **Edge Detect Threshold:** Lets you adjust how strong edge detail needs to be in order to be included in the key. Reducing this parameter includes more edges in the operation, while raising it excludes edges from the operation.
- **Edge Mask Strength:** Lets you increase the intensity of the edges in the key. Reducing Edge Mask Strength diminishes the edges and reduces the intensity of sharpening in those areas. Raising Edge Mask Strength intensifies the edges and adds more of the image within the region of each detected edge to the sharpening operation.
- **Edge Blur:** Lets you control the softness of the edges in the key. Reducing Edge Blur sharpens the key and narrows the edges that are affected by sharpening. Increasing Edge Blur softens the key and potentially includes a wider area of image detail in the sharpening operation.

# Soften and Sharpen (Studio Version Only)

A variation of the Sharpen filter that's streamlined for letting you both smooth some details and add sharpness to other details of the image based on the size of the structures. It can be used with any image for which you want to smooth some features while sharpening others, but this is an operation that's often used for minimizing unwanted blemishes, wrinkles, or scarring when used within a window or qualifier that's isolating the skin.

The advantage of using Soften and Sharpen is that you can use the Small Texture slider to leave a bit of natural skin detail intact, such as pores and other small naturalistic details, while you use the Medium and Large Texture controls to smooth out unwanted details in whatever proportion gives you a naturalistic result.

> **TIP:** The best way to achieve a more natural result is to leave Small Texture at 0 or just above, while reducing Medium Texture just enough to minimize whatever details merit minimizing and reducing Large Texture by somewhat less to minimize larger blemishes, while leaving overall face detail intact. This is the logic behind the default values of Small 0.000, Medium −0.800, and Large −0.300.

## Main Controls

Each of the Small, Medium, and Large Texture sliders can be moved into both negative and positive values. A value of 0 means no change is made to the corresponding details of the image. Negative values remove the corresponding details from the image, eventually leaving only the underlying smooth structure of the image at −1.000. Positive values add sharpness to the corresponding details of the image, to a maximum value of 1.000.

- **Small Texture:** Affects extremely fine detail such as skin pores and strands of hair.
- **Medium Texture:** Impacts coarser detail such as freckles, wrinkles, and clusters of hair.
- **Large Texture:** Affects the largest details in the image such as eyelids, eyebrows, the edges of lips and noses, and the edges where hair meets the face.

> **TIP:** What's identifiable as a small, medium, or large structure depends in large part on how the subject of the shot is framed. These structures differ depending on whether you're grading a subject in a long shot (where they appear small) versus a subject in closeup (where they appear large).

## Adjust Small Skin Texture Granularity

This control lets you adjust the distinction between the Small and Medium/Large texture controls in the previous group of controls.

- **Small Texture Size:** Defines the threshold that differentiates Small Textures from Medium and Large Textures, to help you fine-tune the Small Texture that you want to preserve. Raising this value includes more of the image as small details, while lowering this value excludes more of the image from small details.

# Chapter 139

# ResolveFX Stylize

The plug-ins found in this category all enable different ways of creating artistic modifications to the image.

# Contents

# Abstraction (Studio Version Only)

A deceptively powerful filter that lets you create a wide range of cartoon-like renders by simplifying an image into adjustable pools of similar color with optional outlines.

## Main Controls

These controls create the foundation of this effect.

- **Pre Blur:** Simplifies the image by blurring unwanted details prior to this filter taking effect.
- **Abstraction Strength and Iterate Abstraction:** These parameters work together to then smooth the image, creating pools of simplified color within the details of the image.
  - **Abstraction Strength:** Must be higher than 0 for the Iteration No. parameter to have an effect. Higher Abstraction Strength simplifies image detail even more by averaging adjacent regions of color together.
  - **Iterate Abstraction:** Reduces the amount of small detail in the image even further by "widening" adjacent areas of similar color to blend together as one.

## Quantization Controls

These controls simplify the pools of color even more aggressively by quantizing the bit depth used to stylize the image. The result is an even sharper flattening of each region of color.

- **Quantization:** A checkbox turns this function on.
- **Steps:** Raising this parameter lets you subdivide each region of color into a greater number of separate regions.
- **Softness:** Lets you blur the border between each level of color.

## Draw Edge Controls

Adds an edge to the regions of color created by this effect.

- **Draw Edge:** Enables edge drawing.
- **Edge Strength:** Raising this value results in thicker and better-defined edges.
- **Edge Detection Threshold:** Raising this value restricts edges to only the boldest edge details in the picture.

# Blanking Fill

This plug-in is specifically designed to quickly fill black frame blanking with a stylized image derived from the clip itself, to make blanking less intrusive for viewers in documentaries and news segments. In the following example, the Blanking Fill plug-in is used to add image to the left and right of "pillarboxed" standard definition 4:3 video that appears within a High Definition or Ultra High Definition 16:9 aspect ratio.
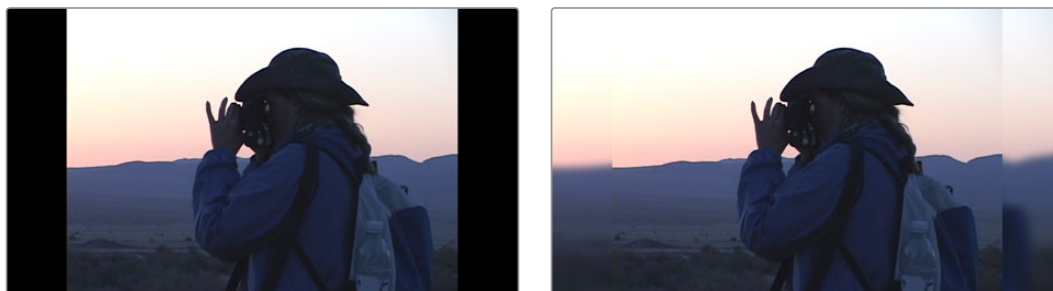


(Left) Original standard definition image, (Right) Image with default Blanking Fill applied

A variety of controls let you easily customize this effect to suit your own purposes.

## Source

These controls let you transform the clip in different ways, which also affects how that clip is used to fill the blanking area.

- **Zoom:** Zooms the clip while keeping it within the native domain of definition. Good for quickly cropping unwanted pixels around the edges so they're hidden and aren't used for blanking fill.

- **Gang Left/Right Sliders:** On by default, locks both sliders together so moving one moves the other by a mirrored amount.

- **Crop Left and Right:** Crops both the left and right edges of the image and increases the area at the sides with blanking fill.

- **Gang Top/Bottom Sliders:** On by default, locks both sliders together so moving one moves the other by a mirrored amount.

- **Crop Top and Bottom:** Crops both the top and bottom edges of the image and increases the vertical area with blanking fill.

### Fill Extent

These controls let you choose how the current duplicate of the image is stretched to fill the blanking area.

- **Zoom Mode:** There are three options:
  - **Stretch to Timeline:** Automatically warps the image to stretch it to fit the full frame. Keeps features in the blanking fill area level with where they appear in the original image.
  - **Zoom to Timeline:** Automatically zooms into the image to fit the full frame. Results in the clip looking "inset" from the blanking fill image.
  - **Manual:** Reveals Expand and Aspect sliders that let you manually choose how much to zoom and stretch the image to fit the blanking fill area.

– **Warp Top Layer:** lets you use onscreen controls to choose a section of the edge of an image to stretch out to fill blanking in the frame. In this mode, there are two sets of onscreen controls you can use to customize the result:

A set of outer handles let you choose how far out to warp the edges of the image to fill whatever blanking there is. These default to the project frame size.

A set of inner handles lets you choose how much of the image you want to stretch out. These default to the current title safe boundary. If you customize these, choosing too narrow an edge results in a more extreme warping and stretching effect, while choosing a wider edge to stretch looks more natural, but affects more of the frame.

- **Expand:** (Only appears when Zoom Mode is set to Manual) Zooms the image.
- **Aspect:** (Only appears when Zoom Mode is set to Manual) Stretches the image.



(Left) The original 4:3 image edited into a 16:9 timeline with black pillar boxing to the left and right as a result, (Right) The image with Blanking Fill set to Warp Top Layer, stretching the left and right edges to fill the blanking area

## Fill Appearance

These controls let you change the look of the image being used to fill the blanking area.

- **Blend Edges:** Lets you feather the edges where the original image meets the blanking fill area.
- **Blur Background:** Lets you choose how much or how little to blur the image that fills the blanking fill area.
- **Fade Amount:** Lets you fade or tint the blanking fill area. At 0, there's no fade applied. At 1.000, the blanking area is filled with a solid color defined by the Fade Color control.
- **Fade Color:** A color picker/eyedropper combination that lets you choose a color with which to fade, tint, or fill the blanking fill area.

# Drop Shadow

Lets you add a simple drop shadow to any clip, using that clip's native or generated alpha channel to create the shape of the shadow.

- **Shadow Strength:** Lets you choose how solid the drop shadow appears.
- **Drop Angle:** Lets you choose the angle the drop shadow appears at. At 0 the drop shadow is centered.
- **Drop Distance:** Offsets the drop shadow farther in the direction of the Drop Angle
- **Blur:** Softens the drop shadow.
- **Color:** Tints the drop shadow.

# Edge Detect

An edge detection effect with options for customizing which edges create outlines.

- **Mode:** Lets you choose between RGB and Grayscale edges. RGB is the default.
- **Edge color:** (only enabled if Mode is set to Grayscale) Lets you colorize the edge outlines that are generated.
- **Threshold:** Determines the lightness level that's used for edge creation.
- **Smooth:** Lets you soften these edges.
- **Brightness:** Lets you adjust edge intensity.
- **Denoise Type:** Can be switched between Soften and Sharpen, to preprocess the image.
- **Denoise Strength:** Raise this slider to emphasize dominant outlines and de-emphasize weak ones.
- **Edge Mask Overlay:** This checkbox lets you superimpose the edges created with this filter over the RGB image via a multiply operation.

# Emboss

An emboss effect with several options to create different kinds of outline and emboss effects.

- **Emboss Style:** This pop-up lets you choose from among Relief, Emboss Over, Sobel, and Laplacian types of embossing.
- **Power:** Lets you adjust how pronounced the emboss effect is.
- **Angle:** Lets you choose the apparent angle at which the emboss effect is rendered.

## Channels

Three checkboxes let you choose to use the Red, Green, and Blue channels to create this effect.

# JPEG Damage

Simulates the kinds of minor or major artifacts you get when doing JPEG compression; useful for simulating compression damage.

- **Quality:** Lets you lower the bit depth of the image.
- **Resolution:** Lets you increase the size of macroblocking artifacts that appear.
- **Block Aspect Ratio:** Lets you adjust the macroblocks to be more square or rectangular.
- **Frequency Scale:** Sharpens the effect.
- **Scale Component:** Lets you base this effect on All Frequencies, the X-Frequency, or the Y-Frequency.

# Mirrors

An effect that lets you reflect part of the image in any direction you like. At its simplest, this can create a split mirror effect like that found at the end of Prince's "When Doves Cry." At its most complicated, multiple reflections can be set up, to create whirling Kaleidoscope patterns in the image.

## Main Controls

These controls let you choose what kind of effect this plug-in has.

- **Mirror Placement:** Lets you choose different types of mirror effects including Individual (a simple reflection), Rosette, and Kaleidoscope.
- **Reflect at Borders:** Lets you add another reflection of the image whenever the angle and position of your reflection would result in offscreen black coming into the frame.

## Individual Controls

When Mirror Placement is set to Individual, a series of six sets of Mirror parameters lets you add multiple mirrored edges in different combinations; by default only one is on, but you can turn more edges on to create more complicated mirror effects. Each group of Mirror parameters has the following parameters:

- **Enable Mirror:** Turns that mirror reflection on.
- **X and Y Position:** Positions the center of the mirror split reflection.
- **Angle:** Lets you adjust the angle of the seam along which a reflection will run.
- **Flip:** Flips which side of the image is reflected.

## Rosette Controls

When Mirror Placement is set to Rosette, a single set of parameters creates a variety of circular patterns.

- **X and Y Position:** Positions the center of the circular rosette reflection.
- **Angle:** Lets you adjust the orientation of the rosette pattern about its center.
- **Wedge Width:** Lets you adjust the thickness of the wedges around the outside of the rosette pattern, and by extension how many wedges there will be. Thicker wedges results in fewer reflections around the rosette pattern and thinner wedges result in more reflections around the rosette pattern.

## Kaleidoscope Controls

When Mirror Placement is set to Kaleidoscope, a single set of parameters lets you create a variety of kaleidoscopic images:

- **X and Y Position:** Positions the center of the mirror split reflection.
- **Center Size:** Lets you shrink or expand the cells comprising the kaleidoscopic image.
- **Angle:** Lets you adjust the angle of the seam along which a reflection will run.
- **Number of Sides:** Three sides produce a triangular pattern, while four sides produce a rectalinear pattern aligned with the currently selected angle.

# Pencil Sketch in DaVinci
## (Studio Version Only)

A plug-in with highly customizable controls for making an image look like it was drawn.

- **Sketch Stroke Controls:** Parameters to control the thickness of outlines, the threshold at which they appear around objects in the frame, and their length.

- **Sketch Tone Controls:** Parameters to control how many levels of tonality are in the rendered result, and contrast controls to influence how much of the image falls into shadows, mid-tones, and highlights.

- **Sketch Texture Controls:** Parameters to apply a customizable stippled texture over the image, with a checkbox to auto animate it.



(Left) The original image, (Right) The image with Pencil Sketch applied

# Prism Blur

Simulates flat chromatic aberration and a vignetted lens.

- **Blur Strength:** Lets you blur the primary image.

- **X and Y Position:** Let you change the center of the effect within the frame about which chromatic aberration is created.

- **Aberration Distance:** Adjusts how far the aberration effect appears from the source image.

- **Aberration Strength:** Intensifies the zoom blur used to create the chromatic aberration effect to intensify it.

- **Vignette Size:** Lets you add edge vignetting to the image; setting this to 0 removes the vignette, while 1 is the maximum size of a vignette using this filter.

- **Vignette Sharpness:** Lets you adjust the feathering of the vignette effect; lowering this value softens the edge, while raising this value sharpens, but never fully eliminates the softness from this edge. The Vignette effect is designed to fall off in a way that simulates how a lens would exhibit vignetting.

# Scanlines

Simulates television scanlines, or any effect where you want alternating lines to darken the image. A variety of parameters makes this an extremely flexible effect that can be applied in numerous ways.

## Appearance

Let you customize the type of scanline effect you want.

- **Line Frequency:** Lets you choose how many or few lines are superimposed on the image; fewer lines automatically space themselves to be thicker as they're uniformly distributed across the image.
- **Line Sharpness:** Lets you blur the border between each line, softening the effect.
- **Line Angle:** Lets you rotate the lines to appear at any angle; the default is 0 which results in horizontal lines.
- **Line Width:** Lets you increase or decrease the width of the blanking lines that obscure the image (which default to black but are tinted by the Color 2 parameter), thus increasing or decreasing the amount of image showing through.
- **Line Shift:** Lets you offset the lines being overlaid on the image. Animating Line Shift lets you create a rolling scanlines effect.

## Color

Lets you tint and shift channels of the alternating scanlines created by this filter. Exaggerated, this can create numerous other stylistic effects.

- **Color 1 and Color 2:** Color picker and eyedropper controls that let you tint each alternating set of lines (eyedroppers let you sample a color from the RGB image being input into the current node).
- **Shift Red, Green, and Blue:** Lets you offset individual channels.
- **Scanlines Only:** Lets you see just the scanlines in isolation while you adjust them.

## Composite

Lets you choose how to composite the scanlines effect against the original image.

- **Scanlines Only:** Lets you output an image consisting only of the scanlines patter you've created. Good for creating different kinds of patterned textures and mattes.
- **Composite Type:** Lets you choose which composite mode is used to blend the scanline effect into the

# Stop Motion

This plug-in is used to replicate the stuttering motion effect found in stop motion animations. Traditional stop motion animation exposes each frame of the shot individually, while the subject is manually moved in tiny increments between frames. An extremely labor intensive process, often individual frames were repeated in a shot to speed up the production which resulted in a staccato motion cadence.
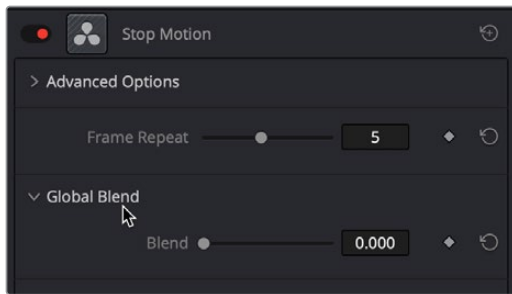
The controls for the Stop Motion ResolveFX

The Main controls are:

- **Frame Repeat:** Selects how many frames (from 1-10) to duplicate in the shot. A larger number makes a more staggered cadence.
- **Blend:** Lets you adjust the amount of blending of the clips original frame rate, with the repeating frames you've selected above. 0 is none, and 1.00 is the full frame rate of the clip.

# Stylize (Studio Version Only)

A plug-in that lets you apply one of a variety of painterly styles to an image based on analyses of different paintings, in such a way as to provide a temporally stable result for moving images as the style strokes will appear to be applied to individual objects in the scene that move and flow in a consistent way. There are two controls:

- **Styles:** A pop-up menu lets you choose an artistic style to apply to the image.
- **Style Scale:** This slider lets you adjust how large or small the applied art strokes should be applied.



(Left) The original image, (Right) The image with Style Transfer applied and set to Dance with a Style Scale of 4

> **TIP:** This plug-in is more flexible than you think, if you apply Style Transfer in a layered way against the original image. You can do this using a duplicate layer in the Edit page, or using two nodes representing the Style Transfer effect and original image connected with a Merge node in the Fusion page or a Layer node in the Color page. Once that's set up, simply combine the Style Transfer output with the original image using composite modes and opacity adjustments for more sophisticated blending. In particular, using the Luminosity composite mode lets you combine the texture from the Style Transfer while retaining the color of the original image, or using the Saturation composite mode lets you combine the color from the Style Transfer while retaining the texture of the original clip.

# Tilt-Shift Blur

Simulates depth-of-field effects using a progressive blur that's applied with a generated Z-depth map. The default settings create a "miniaturization" illusion, where the image appears to be tiny due to the top and bottom depth-of-field settings used.

## Main Controls

These controls select and control the overall effect.

- **Blur Type:** You can choose between Fast Blur and Lens Blur (Lens Blur is the default).
- **Blur Strength:** A slider lets you adjust the amount of blur you add.

## Lens Iris

The Lens Iris controls are only available when Blur Type is set to Lens Blur. This is a simplified set of controls from those of the Lens Blur filter.

- **Iris Shape:** Lets you choose what type of apertures you want to use, with which to influence the shape of the bokeh effect. Aperture Shape options include Triangle, Square, Pentagon, Hexagon, Heptagon, or Octagon shaped aperture.
- **Blade Curvature:** (Only available with Real and Creative Apertures) Lets you round off the edges of the Aperture Shape you selected.
- **Rotation:** Lets you adjust the angle the shape appears at.
- **Anamorphism:** Lets you adjust the aspect ratio of this effect in order to match the lens blur created by anamorphic lenses.
- **Highlights:** Lets you adjust how the highlights of the image affect the blur, dilating or eroding the image more or less depending on how high Smooth Strength is.

## Depth of Field

Additional Depth of Field settings let you adjust the depth map being used to create the depth-of-field effect.

- **Depth Map Preview:** This checkbox lets you see the grayscale depth map directly while making these adjustments. The white area will be blurred, while the black area will be unaffected.
- **Center X, Center Y, and Angle:** These parameters let you transform the depth map.
- **In Focus Range:** Lets you expand or contract the black center of the depth map that defines the blurred region.
- **Near Blur Range and Far Blur Range:** Two parameters let you individually adjust the falloff of the white bottom and top of the depth map.

# Vignette

A plug-in with two modes for creating vignette effects of different kinds.

- Basic mode gives you Size, Anamorphism, and Softness controls for quickly creating a traditional lens vignetting effect to darken the edges of the frame. A Color control lets you tint the vignette.

- Advanced mode adds Border Shape, Rotation, Center, Transparency, and Composite Type controls for customizing this vignetting effect even more specifically.

# Watercolor (Studio Version Only)

A variation on the Abstraction filter, this filter reduces images into simplified washes of softly blended colors, in a very painterly fashion.

- **Channels:** This pop-up menu lets you choose whether to use Luminance or RGB to derive the smoothed color from.

- **Show Gradient:** This checkbox lets you see the boundaries that define each area of smooth color, based on the value you choose from the Smoothness slider below.

- **Smoothness:** Adjusts the amount of detail in the final result. Low smoothness values result in more detail in the smoothed result, while higher values result in larger pools of lower detail yet smoother color.

# Chapter 140

# ResolveFX Texture

These plug-ins are designed to add texture to images, t
o replicate both naturalistic and other effects.

# Contents

# Analog Damage (Studio Version Only)

A Texture category plug-in that simulates different kinds of signal degradation resulting from analog transmission and recording, Analog Damage can be used to create "old TV" or "junky videotape" effects of various kinds. A Preset pop-up menu lets you choose from a variety of different looks, while a Custom option lets you create your own.



(Left) The original image, (Right) The image with Analog Damage applied

It has the following categories of parameters:

- **Telecine Source:** Options for lens vignetting and automated shutter weave to the left and right.
- **Broadcast Signal:** Options for customizable noise, detail loss, signal ghosting, and chroma misalignment.
- **Color Dials:** Television-signal specific color adjustment controls.
- **Scan:** Controls to simulate problems with television scanning. H- and V-Shift let you "roll" the television signal, while V-Hold interacts with the V-Hold Latch parameter to make it easy to use simple key framing to trigger animated vertical rolls that "bounce" in a realistic way for broadcast. Overscan and vertical scale interact with Vertical Blanking to produce distortions that seamlessly loop to duplicated images at the top and bottom of the frame.
- **Scan lines:** Simulate customizable television scan lines that are capable of simulating moire and color artifacts.
- **TV Construction:** Controls to simulate issues with CRT phosphor brightness, tint, and defocus, and the ability to add a customizable curved border and warped screen curvature.
- **VHS:** Lets you add a customizable "Restless Foot" to simulate recorded tape artifacts.

> **TIP:** Using the Analog Damage plug-in on the Fusion page makes it possible connect Modifiers to add automatic animation (such as Perturb) to different parameters in order to quickly and easily create automated video damage effects.

# Film Damage

Found in the ResolveFX Texture category. After you've used the new ResolveFX Revival plug-ins to fix damage in archival footage, you can turn around and use the Film Damage plug-in to make brand new digital clips look worn, dirty, and scratched instead. When used in conjunction with the Film Grain and Flicker Addition plug-ins, you can convincingly recreate the feel of poorly kept vintage archival footage.
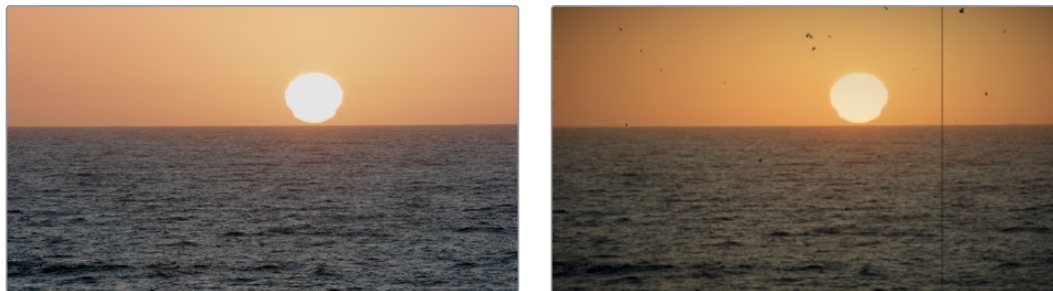


(Left) Original image, (Right) Result with Film Damage

## Blur and Shift Controls

The three parameters at the top let you alter the foundation of the image to begin creating the look of an older film.

- **Film Blur:** Adds just a bit of targeted defocusing to knock the digital sharpness out of the image.

- **Temp Shift:** Defaults to warming the image just a bit to simulate the warmer bulb of a film projector, although you can use it to cool or warm the image in varying amounts.

- **Tint Shift:** Defaults to yellowing the image to simulate damage to the film dyes, but you could move the slider in the other direction to add a bit of magenta, simulating a different kind of dye failure.

## Add Vignetting

These parameters simulate lens vignetting darkening the edges of the image.

- **Focal Factor:** Adjusts how far the vignetting extends into the image.

- **Geometry Factor:** Affects how dark the vignetting is and how pronounced the edges are.

- **Tilt Amount:** Affects how balanced the vignetting at the top of the image is versus the bottom of the image.

- **Tilt Angle:** Affects how balanced the vignetting left of the image is versus the right, but only when Tilt Amount is set to something other than 0.

## Add Dirt

These parameters let you simulate dirt particles (not dust) that have adhered to the film. These are larger specks, although there's several ways you can customize these.

- **Dirt Color:** This control lets you choose what color you want the dirt particles to be (black simulates dirt on a print, while white simulates dirt on a negative).

- **Changing Dirt:** This checkbox lets you alternate between simulating temporally unstable dirt on the film (checkbox on) and dirt on the lens that doesn't move (checkbox off).

- **Dirt Density:** Lets you choose more or less dirt particles appearing over time. Dirt Size lets you choose the average size of dirt particles to appear.
- **Dirt Blur:** Lets you defocus the dirt, so it's not so sharp.
- **Dirt Seed:** Changes the random distribution of dirt when you change this value, but for any given value, the results for any given set of control adjustments remain consistent.

## Add Scratch

Five sets of Add Scratch parameters let you add up to five scratches to the image, simulating something scratching the emulsion while the film played.

- **Scratch Color:** Lets you choose the color you want the scratch to be (scratches can be a variety of colors depending on the depth of the scratch, type of film, and method of printing).
- **Scratch Position:** Lets you adjust the scratch's horizontal position on the image.
- **Scratch Width and Scratch Strength:** Let you adjust the scratch's severity.
- **Scratch Blur:** Lets you defocus the scratch.
- **Moving Scratch:** This checkbox lets you choose whether the scratch is jittering around or not.
- **Moving amplitude:** Determines how far it moves. Moving Speed determines how fast it moves.
- **Moving Randomness:** Determines how it meanders about.
- **Flickering Speed:** Determines how much the scratch flickers lighter and darker in severity.

# Film Grain (Studio Version Only)

Composites a procedurally generated layer of simulated "film grain" over the image. Individual simulated grains with falloff are generated to match the resolution of the project.

## Main Controls

These controls let you quickly choose and apply a film grain effect.

- **Film Grain Presets:** This pop-up lets you quickly choose from among different 8mm, 16mm, and 35mm film grain effects.
- **Composite Type:** Lets you choose a composite mode with which to combine the image with the grain simulated by this plug-in.
- **Opacity:** Lets you fade the Film Grain effect against the original image.
- **Grain Only:** This checkbox lets you see just the grain layer that you're creating, so you can evaluate its look prior to it being composited into the image.

# Grain Params

The Grain Params group lets you adjust the quality of the grain.

- **Texture:** Larger values create more separation between the grains generated by this plug-in, while smaller values bunch them up closer together to create denser grain patterns.

- **Grain Size:** Larger values zoom into the individual simulated grains generated by this plug-in, while smaller values zoom out.

- **Grain Strength:** Adjusts the contrast of the simulated grain layer. Higher values produce more contrast, lower values less.

- **Offset:** Lightens or darkens the entire simulated grain layer. The practical effect is that lower values emphasize lighter grains, while higher values emphasize darker grains.

- **Symmetry:** An asymmetrical contrast adjustment. Lower values darken the lighter grains, while higher values brighten the darker grains.

- **Softness:** Lets you blur the grain layer to create even softer transitions from one grain to another.

- **Saturation:** Lets you make the grain more or less colorful. At a value of 0, grain is monochrome.

# Advanced Controls

In the Advanced Controls, the Shadow, Midtone, and Highlight Gain controls let you adjust the amount of grain that's composited into each of these tonal regions of the image.

# Chapter 141

# ResolveFX Transform

The plug-ins in this category allow different types of animated and non-animated transforms than are possible in the Sizing palette or Clip Transform controls of the Inspector.

# Contents

# Camera Shake (Studio Version Only)

This effect replicates random camera motion for Horizontal and Vertical position, Rotation, and Zoom. A variety of parameters are provided to let you customize the quality of motion, from slow meandering drift to abrupt, jagged jerks and pops.

## Main Controls

The primary controls governing how much camera shake is added.

- **Motion Scale and Speed Scale:** These sliders let you adjust the overall amplitude and speed of camera shake that's introduced to the image.
- **Motion Blur:** Lets you add simulated motion blur to the image being shaken, which can add a more realistic look to the motion. Motion blur is more visible on fast-moving motion, as DaVinci Resolve is simulating the effect of a motion picture camera's shutter speed on exposed subjects in motion.

## Shake Levels

These controls let you adjust the intensity of camera shake.

- **Pan Amplitude:** Lets you set how much horizontal motion you want.
- **Tilt Amplitude:** This slider lets you choose how much vertical motion you want. These sliders are completely independent of one another.
- **Rotation Amplitude:** Lets you introduce rotational motion to the camera shake, as well.
- **PTR Speed:** This slider lets you choose how fast the Pan, Tilt, and Rotation camera shake is.
- **Zoom Amplitude:** This slider lets you add zooming to the camera motion being created.
- **Zoom Speed:** This slider lets you choose how fast this random zooming should occur.
- **Zoom Type:** This pop-up menu lets you choose how to add zooming; you can choose Outward Only, Inward Only, or Outward and Inward. If you choose Inward Only, you don't have to worry about blanking appearing around the edges of the frame.

## Shake Quality

These controls let you customize the type of shaking you want.

- **Motion Method:** This pop-up menu lets you choose from different ways of generating the motion this plug-in introduces. You can choose from SINE, Rectified SINE, Rectified SINE (Invert), and Square Wave (good for popping or flickering motion).
- **Phase:** This slider lets you set the starting point of the camera shake you're creating, based on the Motion Method and Amplitude settings you've chosen.
- **Randomness Scale:** This slider lets you introduce irregularity to the Horizontal, Vertical, and Rotational motion of the camera shake. The greater this value, the more irregularity will be introduced.
- **Randomness Speed:** This slider lets you choose between smoothly erratic motion (at lower values) or more jagged motion (at higher values).
- **Pause Length:** This slider lets you adjust the frequency of intermittent pauses that break up the random motion added by this filter.

- **Pause Interval:** This slider lets you adjust the duration of intermittent pauses that break up the random motion added by this filter.
- **Pause Randomness:** This lets you add a degree of randomness to the intervals that happen.
- **Random Seed:** This slider lets you alter the value that sets what random values are being produced. Identical values result in identical randomness.

## Blanking Handling

These controls let you determine what to do when camera shake causes blanking past the edge of the image.

- **Border Type:** This pop-up menu lets you choose how you want to fill the empty spaces at the edge that appear if the camera shake you create pushes the image out of the current frame size of your project. Four options let you choose to Replicate, Reflect, or Wrap-Around the image to fill the gap.
- **Zoom to Crop:** This slider lets you zoom in on the image to crop out unwanted blanking being introduced by the Camera Shake effect.

# Flicker Addition

Why remove flicker with the ResolveFX Flicker Removal plug-in when you can add it instead? Found in the ResolveFX Transform category, the Flicker Addition plug-in adds rapidly animated exposure changes to make the image appear to flicker, creating animated effects that would be difficult to keyframe manually. When applied to an image in different ways, this plug-in can be used to simulate torchlight, firelight, light fixtures with old ballasts or frayed wiring, or any temporally unstable light source. For example, you could key only the highlights of a night-time image, and use Flicker Addition to affect those isolated highlights.

Two groups of controls let you control the quality of this flickering.

## Main Controls

These controls let you choose how to apply the flicker, and its overall speed and intensity.

- **Flicker Type:** This pop-up menu lets you apply the flicker as a Lift, Gamma, Gain, or Vignette adjustment.
- **Range slider:** This lets you set how widely the flickering will vary.
- **Speed:** This lets you adjust how quickly the flickering is animated.
- **Smoothness:** This slider lets you adjust the temporal quality of the flickering, whether it changes abruptly from one value to another (at lower settings) or whether it makes more continuous transitions from one value to another (at higher settings).
- **Flicker R, G, B Channels:** Three checkboxes let you choose which color channels are affected by this flickering.

### Flicker Quality

These controls let you adjust the details of how the flickering animates.

- **Randomness Scale:** This slider lets you introduce irregularity to the Horizontal, Vertical, and Rotational motion of the camera shake. The greater this value, the more irregularity will be introduced.
- **Pause Length:** This slider lets you adjust the frequency of intermittent pauses that break up the random motion added by this filter.
- **Pause Interval:** This slider lets you adjust the duration of intermittent pauses that break up the random motion added by this filter.
- **Pause Randomness:** This lets you add a degree of randomness to the intervals that happen.
- **Random Seed:** This slider lets you alter the value that sets what random values are being produced. Identical values result in identical randomness.

## Match Move (Studio Version Only)

> **TIP:** Match move workflows are now much more effectively accomplished in the Fusion page using the tools and methods found there.

The Match Move filter is a patch-based tracker that follows a pattern region defined by a tracker control. You can place as many trackers as you like by applying this filter to a node and clicking on a feature you want to track in the Viewer. Ideal features for tracking are high contrast details that have sharp angles that are clearly defined.

Each tracker control consists of (a) a center point that indicates where the tracked motion path will be centered, (b) an inner box that identifies the patch of image you're tracking (that can be resized), (c) an outer box that defines the search region for the track (that can also be resized), and (d) a patch window that shows you a zoomed in closeup of the patch you're tracking. Patch windows can be resized, and the other tracking controls hidden or shown, using controls in the Display Options section of the Match Move controls.
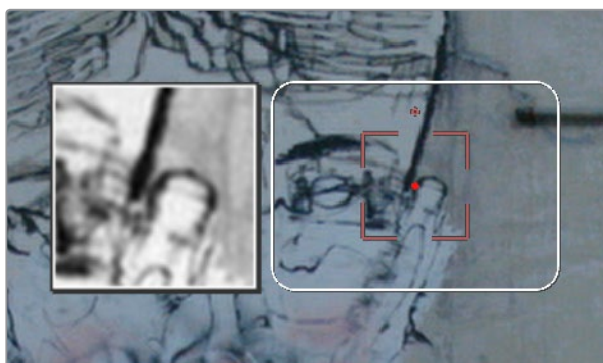


A tracker control in the Match Move filter

If you've accidentally placed a tracker control somewhere you don't want one, you can either drag anywhere within the inner box to move it to another location, or you can Option-click it to delete that tracker.

Once placed, you can choose how much image detail is considered for analysis by resizing that tracker control. To resize a tracker, move the pointer over the edge of the inner box, and drag to shrink or enlarge it.

This plug-in will automatically derive as much motion data as the number of trackers you've placed allows:

- One tracker tracks horizontal and vertical position (pan and tilt).
- Two or more trackers also track rotation.
- Four or more trackers also track perspective.
- If you place six or more trackers, then the Match Move filter is capable of automatically choosing the best tracker data from the overall collection to give you the most accurate track that's possible.

## A Match Move Workflow

The following example shows the simplest complete workflow for importing a foreground clip to composite with a match move to follow a background clip that's already in the timeline. This workflow is suitable for such operations as placing a graphic as a sign on a side of a building, or into the display of a phone.

**To match move:**

1   Open the Media Pool in the Edit page, right-click a clip you want to match move to a clip in the Timeline, and choose "Add as Matte For Color Page Clip" to add it to the Color page Node Editor of the currently selected clip as a Timeline Matte. This is currently the only way you can match move and composite a foreground clip against a background clip in the Color page.

2   Open the Color page, make sure the background clip you want to match move to is selected, then open the OpenFX library and drag the Match Move plug-in directly onto the connection from the last node in the tree to the Output, to add it as a stand-alone FX node.
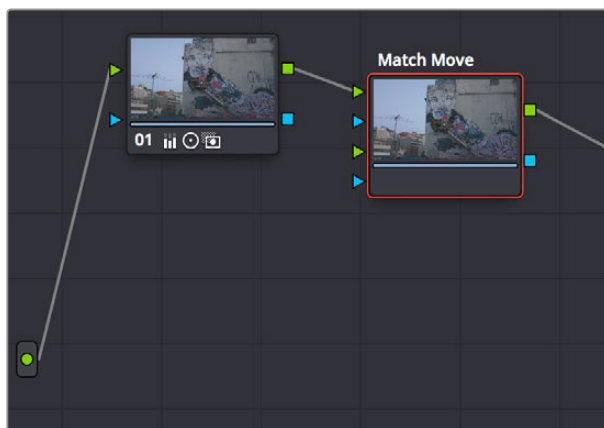


Adding the Match Move filter as a stand-alone FX node

3   Right-click any corrector node in the node tree (Node 01 in this example) and choose the clip you added in step 1 in the Add Matte > Timeline Mattes submenu of the contextual menu to expose that clip as an Ext. Matte node. Delete the connection between the new Ext. Matte node and the node it's connected to, and then reconnect its RGB output to the second input of the FX node.
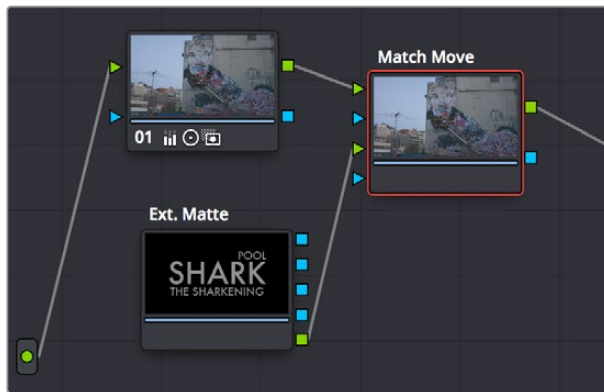
Connecting the foreground image to the second input of the FX node

4   Select the FX node, make sure the OpenFX onscreen controls are enabled, choose whether you want to start at the first or last frames of the clip to begin the tracking process, and then click within the Viewer to place tracker controls on the surface of the image you're going to attach the foreground image to. If you want to do a perspective track, place at least four tracker patches in areas you know won't be occluded by other things in the frame. Choose features that are high contrast and angular for the best results, and try to make sure the features you track won't go offscreen or be occluded by other features within the frame. As you place tracking controls, their patch window will be tinted the color of the channel that DaVinci Resolve automatically determines will provide the best tracking result.


Adding tracker controls to the feature you need to Match Move to

5   (Optional) If necessary, you can delete trackers you don't want by Option-clicking them.

6   Now that your tracker controls are all set up, you're ready to begin the tracking analysis. If the playhead is at the beginning of the clip, click Track Forward, otherwise click Track Backward. DaVinci Resolve will automatically analyze all tracker controls within the clip until the last frame of the clip is reached.
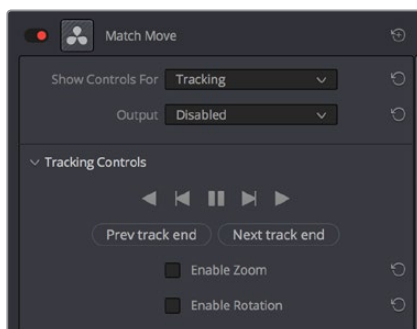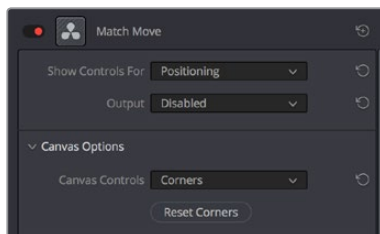

Using the Tracking controls

**7**  (Optional) If anything occludes a patch that's being tracked, or if the tracked feature starts going off the edge of the frame, that tracker control may veer off course and will eventually turn off. If this happens, there's a way to continue the track that's surprisingly easy:

**a**  Click the Track Forward or Track Backward button again to stop the analysis.

**b**  Move the playhead back to the last good frame of tracking data, then click the inner box of each tracker control that went wrong to make sure they're turned on (you know it's on if the patch window is displayed), and then click "Clear tracking forward" or "Clear tracking backward" as necessary to delete the incorrect tracking data. When you're done, click the inner box of each tracker that went wrong to turn it back off again, so it doesn't continue trying to track incorrectly (you know it's off if the patch window is hidden).

**c**  Now, place additional trackers on different features of the same surface to replace the trackers that you had to turn off.
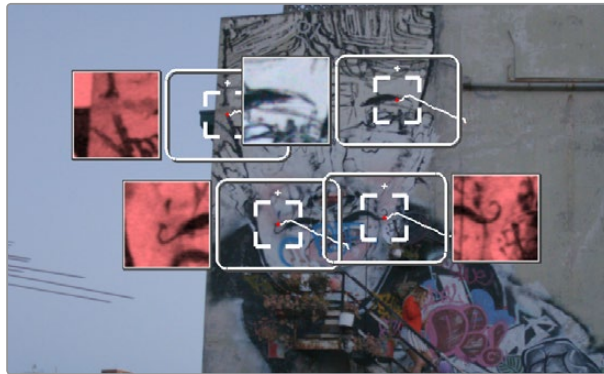


Placing more tracking controls to cover for tracking controls that turn themselves off when going offscreen or being occluded by other moving features in the image

**d**  Click "Track forward" again to continue the track, and DaVinci Resolve will automatically use those additional features to continue the analysis.

**e**  When the analysis is complete, turn the trackers you disabled back on again. All trackers that are turned on contribute data to the match move, for whichever ranges of frames they contain valid tracking data.

**8**  When DaVinci Resolve finishes its analysis, move the playhead back to the first frame of the track, and choose Positioning from the "Show controls for" pop-up menu. This takes you to the next stage in the Match Moving process.



Choosing the Positioning controls

**9**    A grid appears, covering the Viewer. This is the positioning canvas, and it lets you corner-pin the area in which the foreground image you connected in step 3 will be composited and tracked. You can corner-pin and resize it by dragging it by the corners, and you can move it by dragging the center.
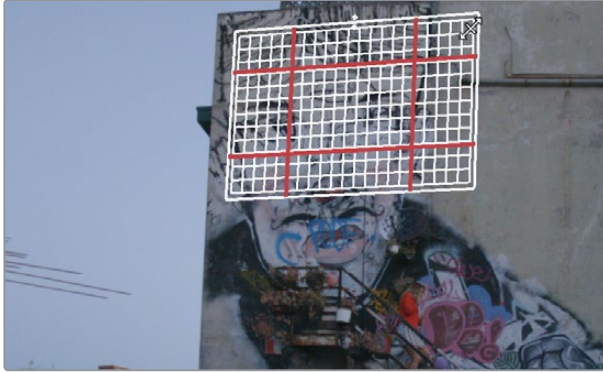


Resizing the canvas to fit the foreground image into the background

**10**    Once you've positioned the grid, scrub back and forth to verify that it tracks correctly and looks right once it's in motion.

**11**    Choose Compositing from the "Show controls for" pop-up menu to expose the compositing controls.

**12**    Set the Output pop-up menu to "Composite" to output the final match-moved composite. If necessary, you can use the Composite Type and Plate Cropping controls to choose how the foreground image is blended with the background and whether you need to crop unwanted parts of the image from the edges.



The final match moved composite

At this point, you've finished the match move.

## Main Controls

The "Show controls for" pop-up menu lets you choose one of four pages of controls that take you through the match moving workflow. The Output pop-up menu lets you choose what you want to output, with choices for Disabled, Positioning Reference, and Composite.

# Tracking Controls

The Tracking Controls govern the first stage of the match moving process, and this page of controls provides everything you need for setting up, executing, and refining multi-patch motion tracks.
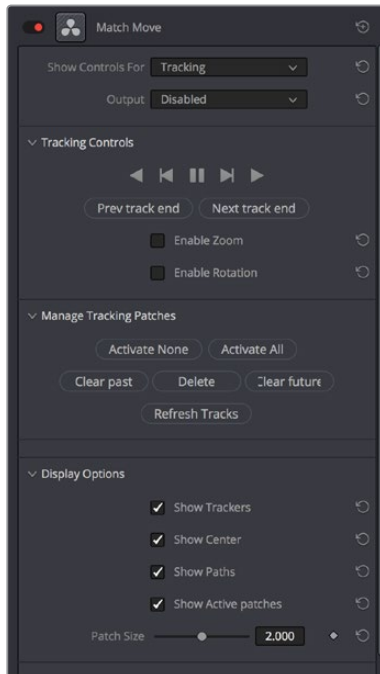


The controls that are exposed when Main Controls is set to Tracking Controls

**The Tracking Controls group**

The primary controls used to initiate tracking. These consist of the tracking buttons that let you execute tracks either automatically using the outer Track Forward or Track Backward buttons, or manually using the inner Track Next or Track Previous buttons. The middle button lets you pause tracking.

The Next Track End and Previous Track End let you jump to previous and subsequent tracked sections of frames; in cases where there may be gaps in your tracking data, these controls let you jump to different segments of contiguous tracking data.

Two checkboxes let you choose whether you want to track and analyze Zoom and/or Rotation. These must be set before you begin tracking.

**The Manage Tracking Patches group**

The two buttons at the top let you choose which tracking patches are enabled to contribute to the overall match moving result, or disabled. Activate None and Deactivate All let you turn all patches on or off at once.

Clear Past and Clear Future let you clear bad tracking data forward or back in time from the playhead's current position, for enabled tracker controls. Delete Tracking lets you delete the tracking data at the current frame only for enabled tracker controls.

Refresh Tracks updates a tracker control's patch when the feature it's tracking changes shape, color, or lighting enough to interrupt the track. Select one or more trackers and click Place New Patch in Track to update the tracked feature at that frame.
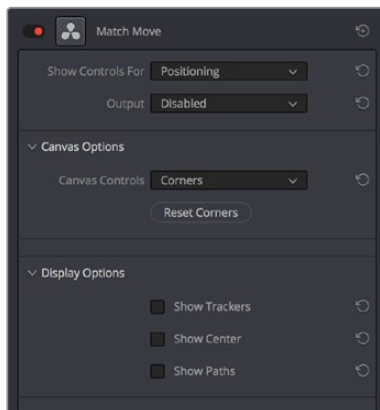
**The Display Options group**

This group lets you turn the visibility of different onscreen controls off and on. Checkboxes let you Show Trackers, Show Center (the red tracking center point), Show Paths (the tracked motion paths), and Show Active Patches. A slider lets you adjust the size of each patch window.

Show Comp Result lets you see the composited foreground layer against the background layer.

## Positioning

The Positioning controls govern the second stage of the match moving process. They provide everything you need to transform the foreground image to fit against the background by moving, corner-pinning, and resizing.



The controls that are exposed when Main Controls is set to Positioning

**Canvas Options**

The Canvas Controls pop-up menu lets you switch between corner-pin controls, where dragging the four corners  lets you corner-pin, dragging the center lets you reposition, and dragging the top, bottom, and sides lets you resize vertically or horizontally.

A Reset Corners button lets you reset the grid to full screen, if you need to scrap what you're doing and try again.

**The Display Options group**

This group lets you turn the visibility of different onscreen controls off and on. Checkboxes let you Show Trackers, Show Center (the red tracking center point), and Show Paths (the tracked motion paths).

Show Comp Result lets you see the composited foreground layer against the background layer.

## Compositing

The Compositing controls govern the third stage of the match moving process, to use when fitting the foreground image against the background image to make a seamless composite. Note, if you need to color correct the foreground image to match the background, you'll need to add a corrector node between the Ext. Matte that's routing in the foreground image into the Color page and the FX node that's doing the compositing.
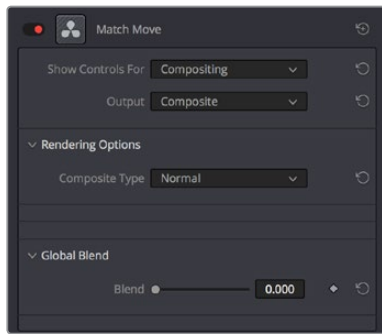
The controls that are exposed when Main
Controls is set to Compositing

### Rendering Options

The Composite Type pop-up menu lets you choose whether the composite that's being output is an overlay of the Ext. Matte over the background, or the background Plate only.

### Plate Cropping

Four sliders let you crop the Left, Right, Top, and Bottom of the image, if necessary.

### Global Blend

The Blend slider, present in every ResolveFX plug-in in DaVinci Resolve, lets you adjust the opacity of the effect, effectively controlling the opacity of the foreground layer.

## Stabilizing

The Stabilizing controls actually have nothing to do with match moving, but instead allow you to use the motion tracking accomplished with the Tracking Controls to stabilize the image. An Edge Behavior pop-up menu lets you choose how to handle blanking around the edges as a result of the background image being transformed to keep the subject of the frame in place.
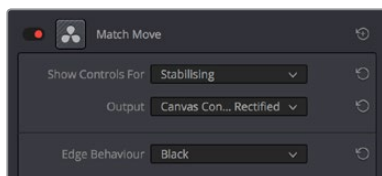


The controls that are exposed when Main
Controls is set to Stabilizing

# Chapter 142

# ResolveFX Warp

The filters in this category let you warp the image in different ways, creating procedural or custom distortion effects, some of which can be automatically animated. The Warper plug-in is a point-based free-form Warp tool.

# Contents

# Dent

A warp effect that creates different types of circular bowing and folding effects.

- **DentType:** This lets you choose from six different types of "dent" warping effects. The options are Type 1, Type 2, Type 3, Sine, Cosine, and Black Hole.
- **X and Y:** Position sliders let you offset the center of the warp.
- **Size:** This lets you adjust the diameter of the warp.
- **Strength:** This lets you adjust the extent and direction of the warp, lowering this below zero "pulls" the image into the center of the effect, while raising this above zero "pushes" the image outward to buckle according to the DentType you've chosen.
- **Edge Behavior:** This eliminates any blanking caused by negative distortion by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.

# Lens Distortion

Lets you add convex or concave lens distortion to an image, to make it warp by bulging outward or bulging inward, similar to a poorly made lens. This filter could also be used in a corrective manner, to compensate for images exhibiting barrel distortion. Additionally, the amount of distortion applied to each color channel can be varied, in order to create the effect of chromatic aberration using the curvature of the distortion you're adding for a more accurate effect.

- **Red, Green, and Blue Distortion:** These sliders are ordinarily locked together by the Gang checkbox. When adjusted as ganged, moving these sliders to the left (negative values) increases "fisheye" distortion, while moving these sliders to the right (positive values) creates an inverted "fisheye" effect that bows the image inward rather than outward. Turning Gang off lets you set the Red, Green, and Blue Distortion sliders to different values, introducing more accurately simulated chromatic aberration to the image.
- **Fine Adjustment:** This checkbox results in the distortion sliders operating within a much smaller range, enabling more precise adjustments.
- **Edge Behavior:** The options available in this pop-up eliminate blanking caused by negative distortion by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.
- **X and Y Position:** These sliders let you change the center of the distortion effect.

> **TIP:** To resize a clip with an extreme distortion effect that introduces blanking around the edges of the frame, you'll need to use the Zoom control found in the Node Sizing mode of the Sizing palette. Edit and Input sizing will only zoom the image within the border created by blanking.

# Ripples

A warp effect that creates different types of ripples.

## Main Controls

These controls govern the type of ripple and the quality of optional ripple shine that you want.

- **Ripple Shape:** Lets you choose from Circular, Square, Horizontal, Vertical, Exponential, Star, and Radial ripples.
- **Wave Shape:** Lets you choose from Sinusoidal, Triangular, Fresnel In, Fresnel Out, and Natural waves.

A set of Shine parameters lets you overlay a simulated shine on top of these ripples.

- **Shine:** A checkbox lets you turn this shine on and off.
- **Shine Direction:** Lets you add a light shine to the peaks of the ripples. Works best at low shine strength.
- **Vertical Shine Height:** Lets you adjust the thickness of the highlights running along the ripples.
- **Shine Size:** Lets you adjust the length of the highlights running along the ripples.
- **Shine Strength:** Lets you adjust the overall appearance of the shine.
- **Animate:** This checkbox, if checked, reveals a Speed slider that lets you set how quickly the ripple effect auto-animates the phase of the currently configured ripple effect, without the need to use keyframes.

## Ripple Controls

A separate set of Ripple parameters lets you enable up to five overlapping ripples.

- **X and Y Position:** Lets you change the center position of each set of ripples.
- **Amplitude:** Lets you adjust the "height" of each ripple caused by this effect.
- **Frequency:** Lets you choose how many ripples are being created.
- **Decay:** Lets you adjust the falloff of the ripple effect, where ripples gradually diminish as they reach the point of decay.
- **Phase:** Lets you adjust the phase of the ripple effect relative to the center origination point. If you want to animate a ripple simply, you can also choose to keyframe the Phase parameter to create the same effect created by the Animate checkbox above.

# Vortex

Vortex begins as an S shaped warp effect, but you can adjust the parameters to create many types of warping effects.

- **X and Y position:** Two sliders let you offset the center of the warp.
- **Size:** Adjusts the diameter of the warp.
- **Angle:** Adjusts the direction and intensity of the warp effect; setting Angle below 0 twists the image to the left, while raising Angle over 0 twists the image to the right.
- **Power:** Rotates the area that's affected to create a harder border between what is warped and what isn't.
- **Swirl:** Intensifies the effect, twisting the image into an even tighter swirling effect.

# Warper (Studio Version Only)

The Warper is a free-form image warper that uses points, rather than a mesh or splines, to push and stretch features in an image as if they were on a sheet of rubber. While the Warper has a lot of options and settings, getting started is really easy.

To warp a feature of the image, just click on it to add a warp point, and drag to push that part of the image in the direction you want it to go. By default, warp points influence the entire image, which is pinned down at the corners. This system makes it simple to warp large regions of the image, such as when you want to warp an edge of the image to get rid of a boom dip. Warp points are gray unless they're selected, in which case they're white.
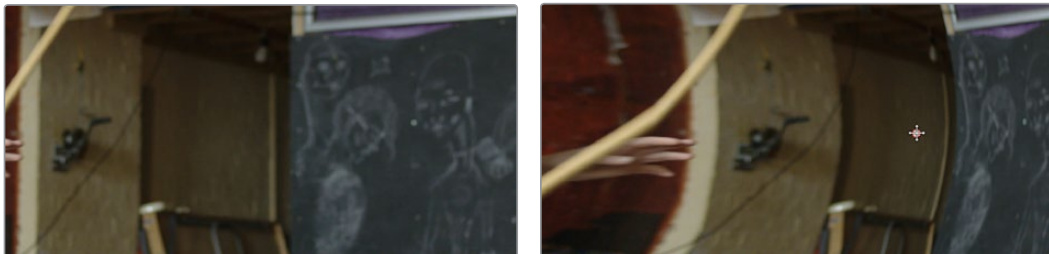


(Left) The original image (Right) The image warped with a single control point

To "pin down" parts of the image you don't want to warp, Shift-click to place limiter points (which are red, pink if they're selected). By combining warp points with limiter points, you can quickly create extremely specific warp effects to squish and stretch features in an image in any way you want.



(Left) The original image (Right) The image warped with control (gray) and limiter (red) points

As you work, you can Option-click any unwanted warp or limiter point to delete it. To start from scratch, you can click the Warper plug-in's master reset control in the OpenFX Inspector.

Additionally, you can use the FX mode of the Tracker palette to motion track the feature you're warping. Then, by setting the Tracking pop-up menu to FXTracker, every warp and limiter point you've placed will move along with the feature you're tracking, meaning you can create warp effects that move along with someone's face, with a car driving on the road, or with something in a shot with camera motion.

Additionally, starting in version 16, warp and limiter points can be keyframed via the Warp Scale and Warp Point Positions parameters.
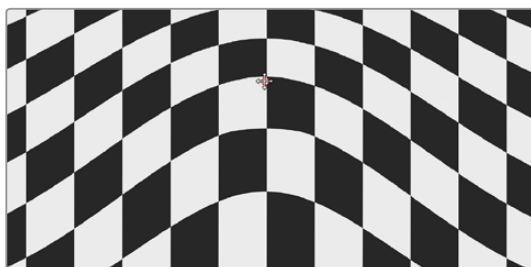
## Effect Options

These controls affect how warp points that you add will affect the image.

- **Warp Limits:** A pop-up menu lets you choose how to treat the edges of the image when you're warping it. There are three modes:

  - Corners (the default) lock the four corners of the image in place, but allow the sides to bulge in or out as you warp and allowing blanking to creep in.

  - Edges locks the full width and height of all four edges in place as you warp, preventing blanking. Distance locks parts of the image that are n pixels away, but the default setting is very permissive.

  - Manual allows the entire image to be warped without locking any part of it, allowing for extreme warps all along an entire edge of the image, but requiring you to place at least one limiter point prior to adding a warp point.

- **Warp Sharpness:** A pop-up menu lets you choose one of three methods of interpolating how the image bends around a Warp point: Sharp, Rubber-Sheet (the default), and Rounded. Sharp produces the "most pointy" warps, while Rounded produces the most gently curved warps. Rubber-Sheet strikes a balance between the two extremes.
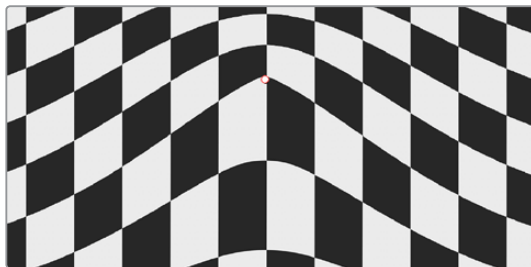


Sharp



Rubber-Sheet
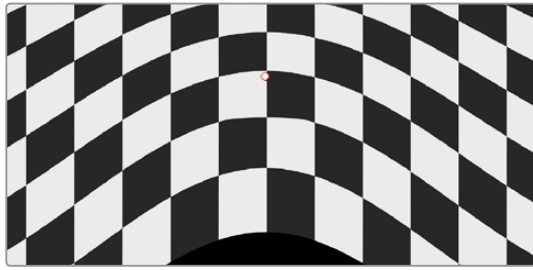
Rounded

- **Edge Behavior:** A pop-up menu eliminates any blanking caused by warping that affects the edge of the image by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.

- **Quality:** A pop-up menu lets you choose from among three methods of calculating the warping effect you're creating: Faster, Default, and Better. Each choice is an obvious trade-off between image smoothness and performance.

- **Warp Scale:** This slider lets you scale the overall warp effect you're creating. Setting this to 0.000 reduces the warp effect to nothing, while raising it to the maximum value of 2.000 doubles the warp effect. Warp Scale can be keyframed to animate the warping effect.

## Onscreen Controls

The second set of controls lets you customize which of the Warper's onscreen controls appear, with different options that make it easier to see certain things in various situations.

- **Render a reference grid:** This checkbox superimposes a reference grid over the image to make it easier to see what kind of warping you're applying.

- **Show Warp Boundaries:** This pop-up menu has three choices for letting you see which areas of the image will be locked off by limiter points you place in the image.
  - None hides this information and is the default setting.
  - As Border shows a red line at the boundary where warping becomes locked off.
  - As Mask dims the area that's protected from warping by limiter points.
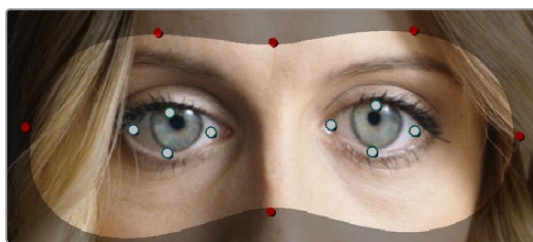

Show Warp Boundaries set to As Mask

- **Control Visibility:** This pop-up menu lets you choose whether the warp and limiter points you create are visible as you work. Show (the default) leaves all control points visible all the time. Auto Hide hides all control points whenever you're dragging one, letting you see the image as you adjust it without having control points in the way. Hide makes all control points invisible. You can add new control points, but you can't see existing control points to edit them.

- **Show:** This pop-up menu lets you choose how to represent warp points, and there are two options.
  - Warp Points (the default) simply shows warp points as gray dots.
  - Warp Vectors display pairs of controls connected by a line; a round dot shows the anchor, or the part of the image the warped portion of the image came from, and an arrow shows the destination, where you've warped that part of the image to. Seeing the anchor and destination of each warp operation can sometimes be useful when you're doing something complex.
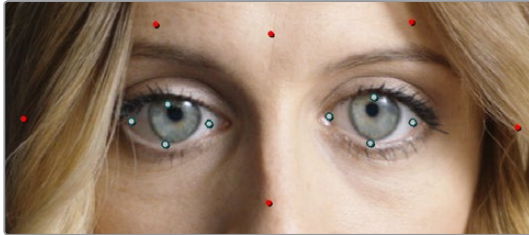

Warp points
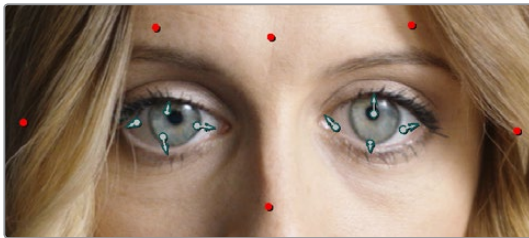

Warp vectors

- **Scale Controls:** This slider lets you shrink or grow the control points or warp vector handles to the most convenient size for the task at hand.

- **Warp Point Positions:** A parameter without any controls, save for key framing controls, that lets you keyframe the position of warp and limiter points. All points are keyframes within a single parameter and keyframe track, visible in the timeline of the Edit page, or the Keyframe Editor of the Fusion and Color pages.

# Waviness

- **Waviness Type:** Lets you choose Vertical or Horizontal waviness.
- **Scale:** Lets you choose the size of the waves.
- **Strength:** Lets you adjust the amplitude.
- **Phase:** Lets you "move" the wave and is a good parameter to keyframe if you're animating this effect manually.
- **Animate:** A checkbox that reveals a Speed slider that lets you set how quickly the Waviness effect auto-animates without the need to use keyframes.