Resolve FX Overview

PART 12 — CONTENTS

Chapter 152

Resolve FX

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

For more information on how to apply and adjust Resolve FX on the Cut page, *see Chapter 31, "Video and Audio Effects in the Cut Page."*

For more information on how to apply and adjust Resolve FX on the Edit page, *see Chapter 46, "Editing, Adding, and Copying Effects and Filters."*

For more information on how to apply and adjust Resolve FX on the Fusion page, *see Chapter 84, "Using Open FX, Resolve FX, and Fuse Plugins."*

For more information on how to apply and adjust Resolve FX on the Color page, *see Chapter 149, "Using Open FX and Resolve FX."*

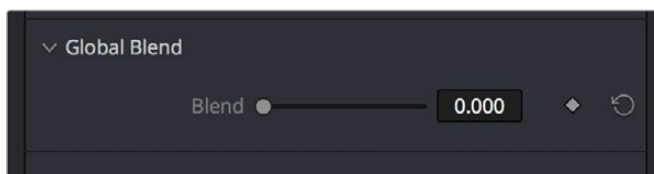## Contents

Catalogue of Resolve FX Filters

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

Resolve FX are shown as icons depicting each specific filter. Hovering the mouse pointer over the icon previews the filter in the Viewer, and moving the mouse pointer along the icon previews the filter over the length of the clip.
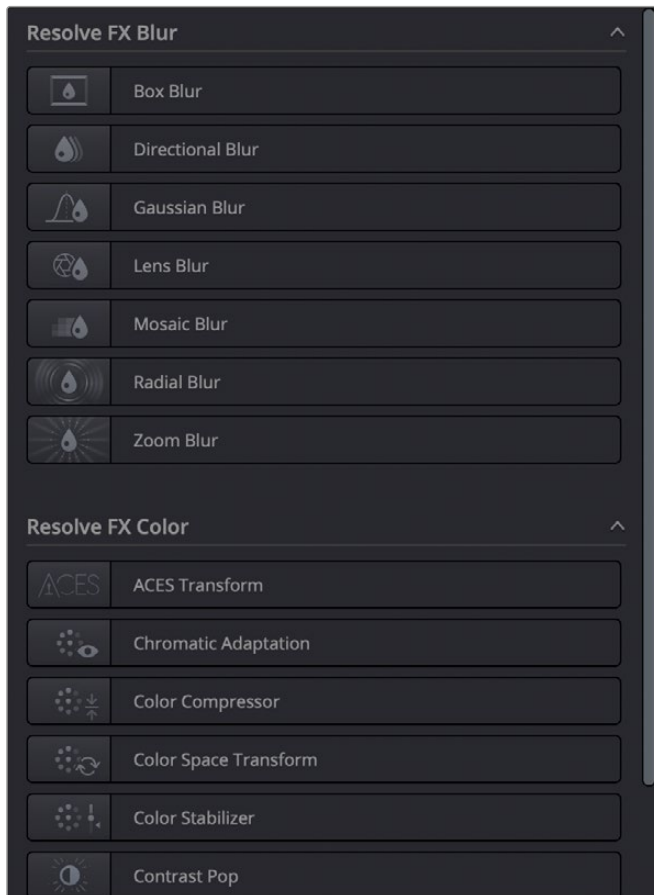
Icons showing categorized Resolve FX filters

In addition to the different parameters built into each filter, every single Resolve FX 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 Resolve FX filter

Resolve FX Blur

The plugins 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.

— **Blur Type:** When Blur Type is set to Realistic, the blur effect emulates a photographic motion blur. When set to Stylized, the blur effect is a simple and smooth digital blur.

— **Symmetric Blur:** When the Symmetric checkbox is turned on, the blur effect appears to be created from both directions, with the result being more of a double-image that's blurring along the blur angle, simulating motion blur in a camera. When off, the blur effect appears to be moving in a single direction, from the original position out along the blur angle.

— **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

Provides a smooth blur that resembles looking at the image through semi-opaque glass, reducing detail and noise.

— **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 plugin 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 plugin 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.
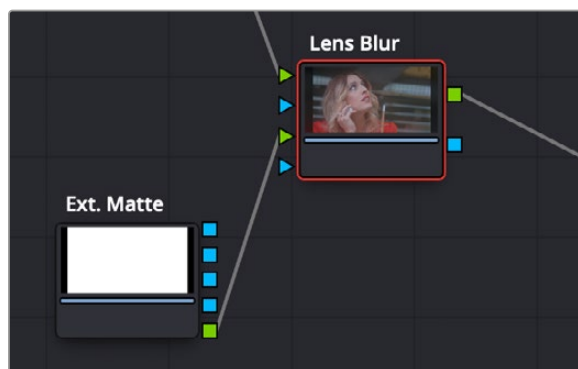
A custom shape used in a color node tree to create custom bokeh in the Lens Blur plugin

— **Aperture Shape:** Provides different options for aperture shapes that influence the shape of this plugin'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 plugin.

— **Quality:** Three options, Full, Half (Faster), and Quarter (Fast), let you choose a suitable tradeoff between image quality and plugin 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 plugin 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.

— **Cell Shape:** Lets you adjust the base shape of the mosaic. The options are Square, Hexagon, and Triangle.

— **Aliasing:** Lets you adjust how tightly each cell samples the area underneath it.

— **X Offset:** Shifts the grid left or right.

— **Y Offset:** Shifts the grid up or down.

— **Aspect:** Adjusts the aspect ratio of the cells.

— **Antialias Result:** With this box checked the effect performs extra processing to get cleaner lines between the cells.

— **In Power Windows Only:** Limits the showing of cells to those cells that are completely inside of a window only.

Radial Blur

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

— **X and Y Position:** Lets you move the center of the blur.

— **Smooth Strength:** Adjusts how much blurring is applied.

— **Blur Type:** When Blur Type is set to Realistic, the blur effect emulates a photographic motion blur. When set to Stylized, the blur effect is a simple and smooth digital blur.

— **Blur Symmetry:** Three options are available.

— **Symmetric:** The blur effect appears to be created in both directions, with the result being more of a double-image that's blurring in an arc around the X/Y Position, simulating motion blur in a camera.

— **Clockwise:** The blur effect appears to be moving in a single, clockwise direction.

— **Anti-Clockwise:** The blur effect appears to be moving in a single, counter-clockwise direction.

— **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

— **Move with Sizing:** Checking this box lets the blur center retain its relative position in the frame if the Input and Editing sizing are changed.

Zoom Blur

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

— **X and Y Position:** Lets you move the center of the blur.

— **Zoom Amount:** When Blur Type is set to Realistic, this slider becomes bi-directional. The center is 0, or no blur at all. Dragging to the right expands the blur effect outward from the position. Dragging to the left shrinks the image towards the Position, blurring outward from there.

— **Center Exclusion:** Controls the distance from the XY position that the Zoom Blur begins.

— **Blur Type:** When Blur Type is set to Realistic, the blur effect emulates a photographic motion blur. When set to Stylized, the blur effect is a simple and smooth digital 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.

— **Move with Sizing:** Checking this box lets the blur center retain its relative position in the frame if the Input and Editing sizing are changed.

Resolve FX Color

These plugins 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 9, "Data Levels, Color Management, and ACES."*

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

Chromatic Adaptation

A Color category plugin 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 plugin 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 plugin 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.
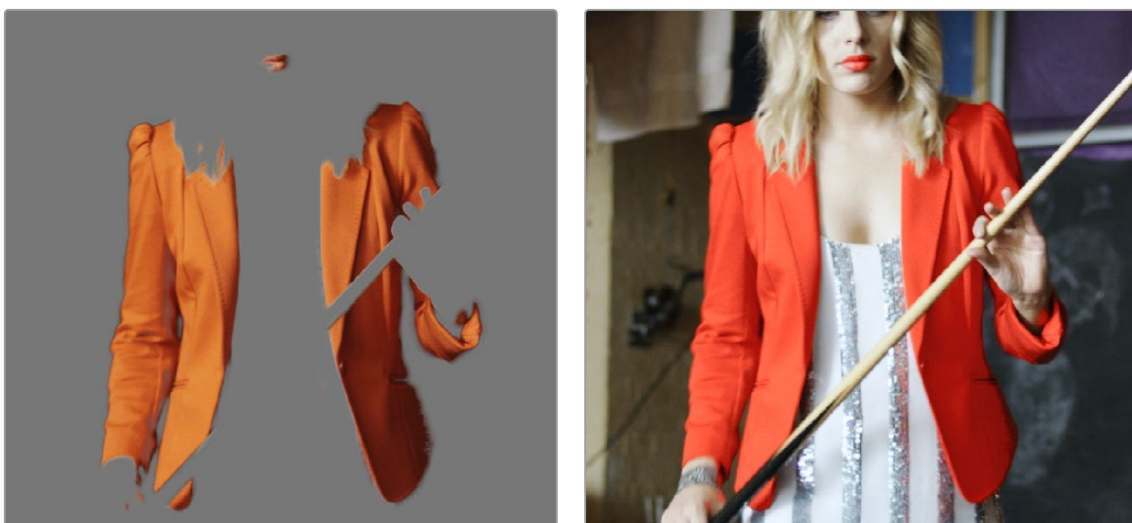
(Before/After) Using the Color Compressor plugin to compress original range
of hues of the jacket into a narrow "target" range within a secondary operation

— **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 plugin 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.

Tone Mapping

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.

— **None:** This setting disables Input DRT Tone Mapping. No tone mapping is applied to the Input to Timeline Color Space conversion at all, resulting in a simple 1:1 mapping to the Timeline Color Space.

— **Clip:** Hard clips all out-of-bounds values.

— **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.

— **Luminance Mapping:** Same as DaVinci, but more accurate when the Input Color Space of all your media is in a single standards-based color space, such as Rec. 709 or Rec. 2020.

— **DaVinci:** This option tone maps the transform with a smooth luminance roll-off in the shadows and highlights, and controlled desaturation of image values in the very brightest and darkest parts of the image. This setting is particularly useful for wide-gamut camera media and is a good setting to use when mixing media from different cameras.

— **Saturation Preserving:** This option has a smooth luminance roll-off in the shadows and highlights, but does so without desaturating dark shadows and bright highlights, so this is an effective option for colorists who like to push color harder. However, because over-saturation in the highlights of the image can look unnatural, two parameters are exposed to provide some user-adjustable automated desaturation.

— **Sat. Rolloff Start:** Lets you set a threshold, in nits (cd/m2), at which saturation will roll off along with highlight luminance. Beginning of the rolloff.

— **Sat. Rolloff Limit:** Lets you set a threshold, in nits (cd/m2), at which the image will be totally desaturated. End of the rolloff.

— **Use Custom Max Input / Output:** Checking these boxes and adjusting the slider below allows you to specify the minimum and maximum luminance of the input image 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.

— **Adaptation:** Used 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

The Color Space Transform plugin 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 plugin 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 plugin, which uses transforms specified by the Academy.

Advanced

This drop-down menu exposes the advanced features of the Color Space Transform effect.

— **Use white point adaptation:** Applies a chromatic adaptation transform to account for different white points between color spaces.

— Uncheck this box if you simply want to view the input color space's white point unaltered in the output color space. For example, wanting to use a P3-D60 mastered clip inside a P3-D65 timeline for reference purposes.

— Check this box to apply the chromatic adaptation transform to convert the input white point to match the output color space's white point. For example, wanting a P3-D60 mastered clip to cut in with other clips mastered in a P3-D65 timeline.

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 plugin 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 (Studio Version Only)

Lets you apply a DCTL wherever you can apply ResolveFX plugins. For more information on DCTLs and where they're installed, *see Chapter 197, "Creating DCTL LUTs."*

— **DCTL List:** A pop-up that lets you choose from the available DCTLs installed on your workstation.
— **Reload DCTL:** Allows users to refresh the currently loaded DCTL file content. This lets the user make changes in the DCTL using a text editor, then reload it to see the results.

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.

Despill

Removes the color cast on a subject caused by the reflection of light off the green or blue screen. This color cast remains even though the green screen has been keyed out. This stand alone Despill filter is useful for reducing spill from footage that has already been keyed (matted, rotoscoped, etc.), where you don't want to redo the key itself. It's also a useful addition to other keying plugins that don't have a Despill function.
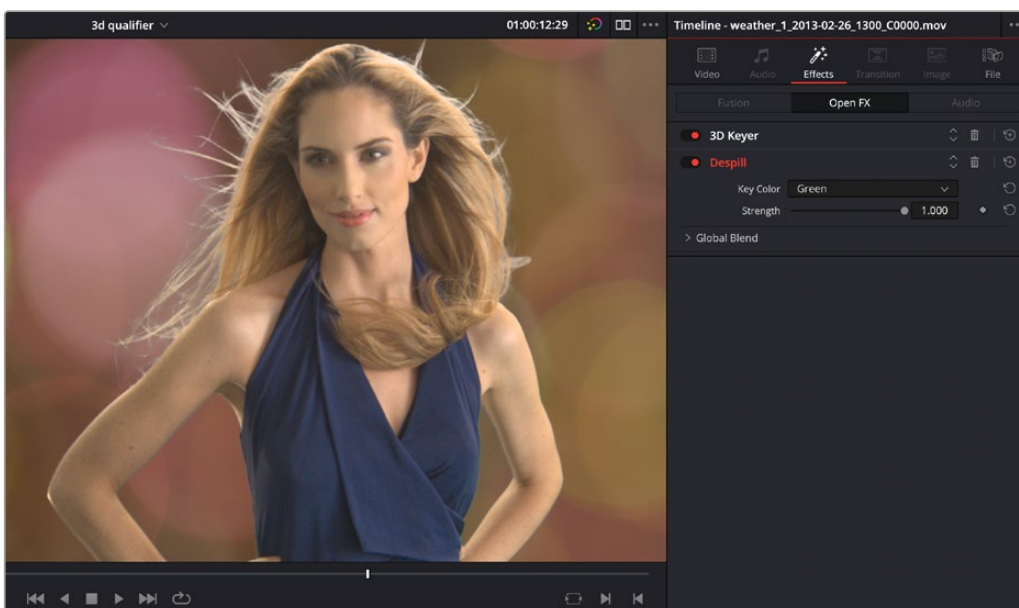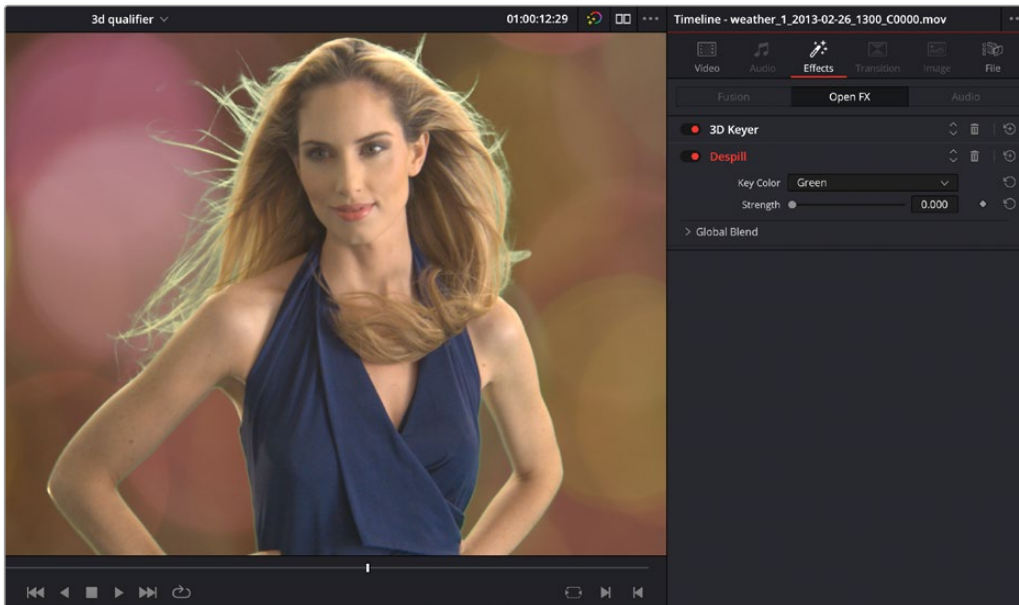
The Despill FX removing a green color cast from the subject's arms and hair. Above is no despill and below is full despill.

— **Key Color:** Sets the color cast to be removed from the subject. The choices currently are Red, Green, and Blue.

— **Strength:** The amount of Despill to apply. 1.000 is the full despill "on" amount used in the older version of the 3D keyer checkbox. Variable strength comes in handy as you can preserve more of the original color information if the context allows it. For example, depending on your color correction, you may get better despill results at a strength values less than 1.000.

False Color (Studio Version Only)

False Color is a creative effect that can be used for replicating camera HUDs, infrared sensors, and custom posterization looks by defining a set number of colors for the clip. The color set can either match the False Color setting in a specific Blackmagic Design camera or be picked from a list of creative style presets. The presets can be modified by setting the number of colors used and defining the tonal range each color represents.

Resolve FX False Color thermal preset and legend

General

— **Plugin Mode:** This menu is used to switch between using a specific Blackmagic Design Camera's False Color setting or accessing creative presets. When Specific Camera Model is chosen, the Camera Model section is displayed for selecting the camera and settings you want to use. When Creative is chosen, the Color bands section is displayed for choosing and customizing the preset.

Camera Model

The Camera Model controls are displayed when Specific Camera Model is chosen from the Plugin Model menu. These menus allow you to match the False Color from a camera configuration.

— **Camera:** Selects the exact Blackmagic Design camera sensor.
— **Camera Mode:** Selects the dynamic range setting.
— **ISO Level:** Sets the ISO or light sensitivity setting.

Color Bands

These controls are displayed when Creative is chosen from the Plugin Model menu. The Color Bands group of controls are used to select and modify the appearance of the False Color presets.

— **Camera:** Selects the exact Blackmagic Design camera sensor.
— **Camera Mode:** Selects the dynamic range setting.
— **ISO Level:** Sets the ISO or light sensitivity setting.

Preprocessing

This group of controls is used to apply tonal and blur processing to the image.

— **Blur:** Applies a blur filter to the False Color.

— **Black Level:** Increases or decreases the shadow range assigned to colors that fall lower on the False Color legend.

— **White Level:** Increases or decreases the highlight range assigned to colors that fall higher on the False Color legend.

— **Gamma:** Shifts the mid-tone range towards colors that fall lower or higher on the False Color legend.

Scale/Legend

This section is used to control the visibility and appearance of the False Color legend. The Legend is displayed to help viewers understand the color representation. Whenever you apply False Color, the Legend is generated and displayed. When you modify a preset, the Legend automatically updates to represent the new color scheme.

— **Show Scale:** Shows or hides the Legend on the left side of the frame.

— **Show Values:** Shows or hides numeric values on the Legend. These numeric values represent different scales based on the Value Style menu.

— **Show Labels:** Shows or hides data point labels on the Legend. The labels identify important data points along the tonal range, such as black clipping, white clipping, and middle gray.

— **Contrast:** Increases or decreases the transparency of the Legend's background underlay.

— **Value Detail:** Increases or decreases the number of axis value labels displayed on the Legend.

— **Value Style:** This menu includes three options for the scale used for the Legend's numeric values.

  — **Percentage:** Uses a percentage scale for the Legend, going from 0% at the bottom to 100% at the top.

  — **Hundredths:** Uses a Hundredths scale for the Legend, going from 0 at the bottom to 100 at the top.

  — **Normalized:** Uses a Normalized scale for the Legend, going from 0.0 at the bottom to 1.0 at the top.

Global Blend

— **Blend:** Lets you dissolve between the image with no False Color applied (0.0) and the image with False Color fully applied (1.0).

Flicker Addition

Why remove flicker with the Resolve FX Flicker Removal plugin when you can add it instead? Found in the Resolve FX Transform category, the Flicker Addition plugin 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 plugin 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.

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 plugin 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 9, "Data Levels, Color Management, and ACES."*

Gamut Mapping (Studio Version Only)

The Color Space Transform plugin 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 plugin'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.

  — **None:** This setting disables Input DRT Tone Mapping. No tone mapping is applied to the Input to Timeline Color Space conversion at all, resulting in a simple 1:1 mapping to the Timeline Color Space.

  — **Clip:** Hard clips all out-of-bounds values.

  — **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.

  — **Luminance Mapping:** Same as DaVinci, but more accurate when the Input Color Space of all your media is in a single standards-based color space, such as Rec. 709 or Rec. 2020.

  — **DaVinci:** This option tone maps the transform with a smooth luminance roll-off in the shadows and highlights, and controlled desaturation of image values in the very brightest and darkest parts of the image. This setting is particularly useful for wide-gamut camera media and is a good setting to use when mixing media from different cameras.

  — **Saturation Preserving:** This option has a smooth luminance roll-off in the shadows and highlights, but does so without desaturating dark shadows and bright highlights, so this is an effective option for colorists who like to push color harder. However, because over-saturation in the highlights of the image can look unnatural, two parameters are exposed to provide some user-adjustable automated desaturation.

    — **Sat. Rolloff Start:** Lets you set a threshold, in nits (cd/m2), at which saturation will roll off along with highlight luminance. Beginning of the rolloff.

    — **Sat. Rolloff Limit:** Lets you set a threshold, in nits (cd/m2), at which the image will be totally desaturated. End of the rolloff.

— **Use Custom Max Input / Output:** Checking these boxes and adjusting the slider below allows you to specify the minimum and maximum luminance of the input image 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.

— **Avg. Input Luminance:** Used 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 plugin that lets you invert any color channel, including the alpha channel. This little plugin 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" plugin; this is a simple inversion.

Resolve FX Generate

These plugins 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 plugin 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 plugin 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.

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

Resolve FX Key

DaVinci Resolve includes several Resolve FX dedicated to compositing and keying tasks that are applied directly on the Timeline.

Contents

3D Keyer

Based on the 3D Qualifier in the Color page, the 3D Keyer offers a fast, simple way of pulling a key to isolate a range of color in the image by dragging your mouse pointer over the parts of the image you want to key. Each time you drag over the image you add to or subtract from the cloud of values you're carving out of a three-dimensional representation of all available colors; you don't see this representation, but this "under the hood" functionality is what gives the 3D Keyer its name.

> **TIP:** If you're looking to isolate a range of luma values in the image, you should use the HSL or Luma keyer.

The 3D Keyer is a good one to start with if you're trying to key a blue screen or green screen background. Its interface of dragging the mouse pointer over the screen color you want to remove, coupled with its high quality and extreme specificity, makes it a fast and accurate tool to use in a variety of circumstances. The 3D Keyer's greatest strength is the speed with which you can sample areas of the picture to extract from the final key. However, this can also be a weakness if your initial samples aren't giving you satisfactory results because, unlike the Delta Keyer in the Fusion page, there aren't many ways to fine-tune the key as it's being generated. On the other hand, for well-lit subjects you want to key, two or three samples is all you need.

Selection Range Controls
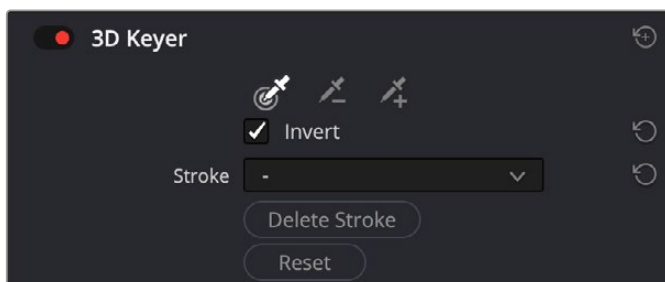
The 3D Keyer Selection Range controls

The Selection Range buttons in the Inspector let you define a key by sampling pixels in the Viewer with the mouse pointer.

— **Picker:** Chooses the initial color to qualify. Longer strokes will tend to give you a better key. In the Edit page, the Timeline Viewer Overlay must be set to Open FX.

— **Picker -:** Removes a color region from the qualifier; also available by holding down the Option key.

— **Picker +:** Choses an additional color region to add to the initial qualifier.

— **Invert:** Inverts the current key; qualified areas are then unqualified and vice versa.

— **Stroke:** Stores the list of picked (+) and unpicked (-) colors, along with their respective RGB values.

— **Delete Stroke:** Deletes the current stroke selected in the Stroke drop-down menu.

— **Reset:** Deletes all strokes and resets the 3D Keyer to its default state.

Behaviour Options

These controls adjust the fundamental parameters and modes of the 3D Keyer.

— **Colorspace:** This drop-down menu lets you choose whether you're sampling colors in YUV, HSL, HSP, or LAB colorspaces. YUV is the default, but if you find you're not getting satisfactory results, you can choose another colorspace from the drop-down menu to see if that works any better.

— **Soft:** Provides a softer edge to the key that is more forgiving of Chroma and Luma adjustments. The more gentle drop-off is suitable for situations like subtle light changes across a face. Use the Shadow / Midtone / Highlight Matte Finesse controls in conjunction with this mode to fine tune the result.

— **Flat:** The default mode. Each color selected is 100% keyed, and adjustments are made for small color variations. This is the ideal mode for chroma keying a green or blue screen. Additionally, turning up the Pre-Filter setting in the Matte Finesse controls can make for a smoother, flatter key.

— **Tight:** Only keys the exact color picked, and does not apply any softening based on color ranges. You chose that exact color, and only that exact color. Single pixel sharpness levels are expected. This can be used for difficult keying jobs, requiring adjusting the filter and softness manually in the Matte Finesse Controls.

— **Luma:** Functions similar to the Tight setting, but ignores all chroma data. This mode is used for black and white footage.

— **Despill:** If you're using the 3D qualifier to pull a blue or green screen key to create transparency, this slider lets you adjust an automatic color correction that eliminates blue or green spill from the image, while retaining the image's original color.

Usage Options

The Key Map, shown in the upper left, showing a qualifier that attempts to select the sand in the background (blue lines), while deselecting the pirate's hats (red lines)

These settings control the user feedback tools from the 3D Keyer in the Viewer. In the Edit page, the Timeline Viewer Overlay must be set to Open FX.

— **Show Paths:** A checkbox that lets you turn the visibility of the lines you're drawing to sample the image on and off. Turning lines off does not affect the key in any way.

— **Smart Show Paths:** With this checkbox enabled, the lines will only be visible as they are being drawn, and disappear when the mouse button is released.

— **Auto-B/W Highlight:** With this checkbox enabled, the Viewer automatically switches to Highlight B/W mode while drawing a line, to better show you the resulting key in real time. When the button is released the Viewer will switch back to its original viewing mode.

— **Show Key Map:** Check this box to show the Key Map in the Viewer. The Key Map is composed of the Color Space box, and the Brightness Range. The Color Space box is laid out roughly in the same manner as the Color Wheels, with primary colors laid out around its edge. The exact colors and layout is determined by the Color Space that you choose in the 3D Keyer. The Brightness Range is represented as a bar underneath the Color Space, with left being black and right being white. Inside the Color Space and Brightness Range lie the individual colors that you chose with the pickers in the Strokes List.

— **Key Map Zoom:** Controls the zoom level of the Key Map, so you can see finer detail, if necessary.

Key Adjustments

This set of tools allows you to manually adjust the parameters of the actual key. Feedback from these tools can be seen in the Key Map overlay in the Viewer.

— **Chroma Tolerance:** Click and drag left and right to expand or contract the range of colors selected by the key.

— **Chroma Softness:** Click and drag left and right to change the sensitivity to similar colors selected by the key. This determines whether the key is a hard cutoff or a soft selection of similar colors.

— **Adaptive Chroma Softness:** Checking this box allows the keyer to operate consistently in both highly saturated and desaturated regions of the image at the same time. The majority of the time you will want to leave this on. The exception is if you are having difficulty in manually adjusting chroma softness in Soft or Flat mode, then turning Adaptive Chroma Softness off will give you more range to work with. Adaptive Chroma Softness is automatically disabled in Tight and Luma modes as it is contrary to those mode's functionality.

— **Luma Dark:** Expands or contracts the dark areas of the key in the brightness range.

— **Luma Light:** Expands or contracts the bright areas of the key in the brightness range.

— **Dark Softness:** Controls how well defined the low end of the brightness range is. This determines whether the key is a hard cutoff or a soft selection of similar brightness levels.

— **Light Softness:** Controls how well defined the high end of the brightness range is. This determines whether the key is a hard cutoff or a soft selection of similar brightness levels.

— **Chroma Rotate:** Moves your selected color region within the color space, changing its chroma based on its rotation around the central origin point.

— **Chroma Tilt:** Moves your selected color region within the color space, changing its chroma based on its vertical position

— **Chroma Shift:** Moves your selected color region within the color space, changing its chroma based on its horizontal position.

TIP: All of the parameters above are key-framable, allowing you to animate the key over time. For example, you may have qualified a shirt where the actor walks through different colored light in a scene. By key framing the parameters above, you can hold the same key on the shirt as it changes colors in the actual scene.

Matte Finesse

You may find that sampling the screen color is not enough to overcome some problems. Issues such as chattery edges, holes, or noisy bits can sometimes be easily fixed using the Matte Finesse controls. These controls filter the output of the Keyer and are adjustments that are made to the matte itself, so they may work well in some instances and poorly in others, depending on what you're trying to do. The Matte Finesse tools are split into two banks of controls labeled 1 and 2.

— **Pre Filter:** This slider attempts to clean up the image before colors are sampled. This adjustment can be useful when you have footage containing MPEG blocking artifacts.

— **Clean Black:** Clean Black is a specialized operation that eliminates noise (seen as white speckling when viewing a high-contrast highlight) in the black area of a key that omits the regions of the image you don't want to isolate, and shrinks the key by making the dark parts of a key darker the higher you raise this parameter, pushing dark gray areas of the key toward black. The practical result is that raising Clean Black lets you "fill holes" in the background portion of a key and erode translucent edges.

— **Clean White:** Clean White is another specialized operation that eliminates noise (seen as black speckling when viewing a high-contrast highlight) in the white portion of a key that include areas of the image you're isolating, and expands the key by making light parts of a key lighter the higher you raise this parameter, pushing light gray areas of the key toward white. The practical result is that raising Clean White lets you "fill holes" in the foreground portion of a key and grow translucent edges.

— **Black Clip:** Raising Black Clip applies a "lift" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward black. The range is 0 to 100, with 0 being the default setting.

— **White Clip:** Lowering White Clip applies a "gain" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward white. The range is 0 to 100, with 100 being the default setting.

— **Blur Radius:** In small amounts, blurring a key does well to take the edge off problem edges. However, blurring a key can also feather the edges of a key past the border of the subject you're keying, with the result being a visible "halo" around your subject, depending on the adjustment you're making. The range is 0 to 2000, with 0 being the default. With such a large maximum blur radius, combined with the capabilities that the In/Out Ratio provides in customizing the direction of spread, you can turn some pretty precarious mattes into surprisingly smooth and useful results.

— **In/Out Ratio:** Controls whether the "Blur Radius" is applied equally to the inside and outside of the edge of the matte (zero), applied only within the matte (negative values), or applied only outside the matte (positive values). Using In/Out Ratio can help eliminate fringing when using the Blur Radius parameter. However, you can also use In/Out Ratio even in situations where no Blur Radius is applied at all. Raising In/Out Ratio will fill in small black holes in the matte, while lowering In/Out Ratio below 0 will eliminate speckling by pushing small white bits of the matte toward black.

— **Morph Operation:** This 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 to clean up a ragged matte.

— **Morph Radius:** Adjusts how much to shrink, grow, open, or close the key.

— **Shadow:** Adjusts key strength based on the darker parts of the original image.

— **Midtone:** Adjusts key strength based on the midtones of the original image.

— **Highlight:** Adjusts key strength based on the brighter parts of the original image.

— **Post Filter:** Performs a final clean-up of the key, using the original image for reference; useful for bringing back some fine detail in sharp edges or hair.

Garbage Matte

These controls let you crop out unwanted things in the frame that are also being keyed, such as lighting fixtures, boom microphones, tracking patches, etc.

— **Matte Shape:** You can choose either a Rectangle or Ellipse with which to crop around the subject you're keying. Choosing None turns off Garbage Matte. When a garbage matte is enabled, the Open FX Overlay mode of the Viewer shows an on-screen control for adjusting the shape and position of the garbage matte.

— **Edge Softness:** Lets you soften the edges. Defaults to 50; the range is 0 (no softening) to 100 (maximum softening).

— **Invert:** Inverts the garbage matte.

— **Center X and Y:** Lets you adjust and keyframe the position of a garbage matte.

— **Bounding Width and Height:** Lets you adjust the width and height of the garbage matte.

— **Rotation:** Lets you adjust the angle of the garbage matte.

Output

The Output controls let you choose how the image is output, composited, and displayed in the Viewer.

— **Output:** This menu offers three options for which channels are output from the effect.

    — **Alpha Highlight:** Displays the transparent part of an alpha channel as gray and the solid part of an alpha channel in full color.

    — **Alpha Highlight B/W:** Displays the black and white alpha channel, which is often helpful when sampling additional areas to key.

    — **Final Composite:** The keyed image is displayed composited over any video track below it.

— **Use Alpha:** A common control in many Resolve FX and 3rd party Open FX plugins; this checkbox determines if the alpha channel is used when compositing over another video track. It can be used instead of choosing RGB Only (Blank Alpha) from the Output menu.

To use the 3D Keyer in the Edit page:

1   Apply the 3D Keyer to a green screen or blue screen clip that's on a higher track than the background.

2   In the Inspector, enable the Show Paths checkbox to view the sampled areas once you begin.

3   From the Viewer Overlay menu in the lower-left corner of the Timeline Viewer, choose Open FX Overlays.

4   In the Viewer, click and drag to draw a sampling stroke across the screen color you want to remove.

5   The transparency immediately takes effect, showing the keyed subject against whatever clip appears on the video track underneath it in the Timeline as a composite. To see the matte you created for further adjustment, choose Alpha Highlight or Alpha Highlight B/W from the Output drop-down menu.

6   If necessary, you can add or subtract areas from the screen color selection using the add/subtract Color range controls. Alternatively, with the default Sample eyedropper selected, you can hold down Shift to add to the screen color selection or hold down the Option key to remove from the screen color selection.

Ordinarily, it's a good idea not to select more than two or three times. If you make too many selections in the image, the result can be a key with hard, jagged edges that can sometimes be more difficult to adjust later on.

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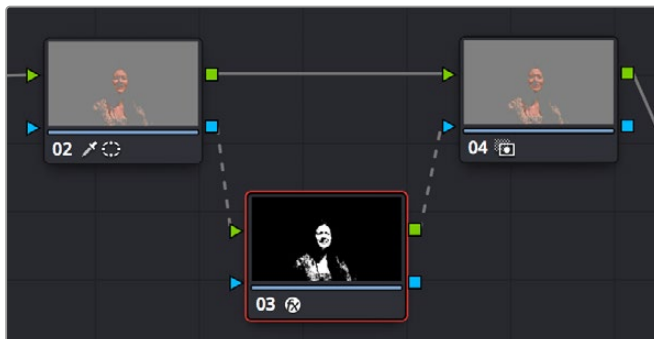
Applying the Alpha Matte Shrink and Grow filter to a key
matte that's fed to the RGB input of a separate node

— **Operation:** A drop-down 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 drop-down 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.
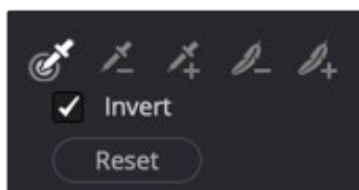
HSL Keyer

Based on the HSL Qualifier in the Color page, the HSL Keyer is a general-purpose keyer that uses three color components, hue, saturation, and luma, to define a key. In many instances, the HSL Keyer is not as immediately accurate as the 3D Keyer and will include a broader portion of the image for any given sample. On the other hand, if the 3D Keyer is not giving you satisfactory results for a particular shot, the HSL Keyer can sometimes do a better job. The HSL Keyer also gives you the option of disabling color components that you don't want to contribute to the final key. You can pull a saturation-only key, or a hue-only key, for instances where that may solve the issue at hand.

The most straightforward way to use any keyer is to sample the image in the Viewer. When you sample one or more pixels, the hue, saturation, and luma values are analyzed and set different ranges. There are several eyedropper controls available to sample color and soften the selection.

Selection Range Controls

The Selection Range buttons in the Inspector let you define a key by sampling and softening pixels in the Viewer with the mouse pointer.
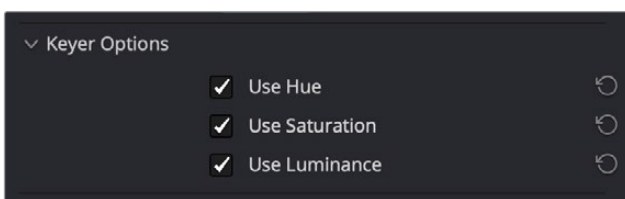

HSL Keyer Color Range controls

— **Sample Eyedropper:** This is the first control you use whenever sampling the image. It defines the initial range of the qualification; you must use this tool before any of the others. Clicking once with this tool selects a single pixel value, while clicking and dragging selects a range of image values that add together.

— **Add/Subtract Color Range:** These two controls let you add areas of the image to, or subtract them from, the currently selected inner range of values that define the core of the key. As with the eyedropper, you can click on single pixels or drag over a range of color.

— **Add/Subtract Softness:** These two controls let you redefine the softness that transitions from the inner range of the key, falling off towards the outer edge of the key. Like the other sampling controls, you can click on single pixels or drag over a range of color.

— **Invert:** Inverts the sampled color to become opaque, and areas not sampled become transparent.

— **Reset:** Resets all the sampled colors while retaining the general control settings.

Keyer Options

One of the HSL Keyer's strengths, and one of its most underutilized features, is that you can enable or disable each of the three HSL components using the Hue, Sat, and Lum checkboxes. This lets you ignore specific color components while focusing on others that may be more important. For example, if you're trying to key the saturated parts of an image, regardless of the hue or brightness, you can turn off Hue and Lum so that only Sat is used to sample it.

HSL Keyer options

Matte Finesse

You may find that sampling the screen color is not enough to overcome some problems. Issues such as chattery edges, holes, or noisy bits can sometimes be easily fixed using the Matte Finesse controls. These controls filter the output of the Keyer and are adjustments that are made to the matte itself, so they may work well in some instances and poorly in others, depending on what you're trying to do. The Matte Finesse tools are split into two banks of controls labeled 1 and 2.

— **Pre Filter:** This slider attempts to clean up the image before colors are sampled. This adjustment can be useful when you have footage containing MPEG blocking artifacts.

— **Clean Black:** Clean Black is a specialized operation that eliminates noise (seen as white speckling when viewing a high-contrast highlight) in the black area of a key that omits the regions of the image you don't want to isolate, and shrinks the key by making the dark parts of a key darker the higher you raise this parameter, pushing dark gray areas of the key toward black. The practical result is that raising Clean Black lets you "fill holes" in the background portion of a key and erode translucent edges.

— **Clean White:** Clean White is another specialized operation that eliminates noise (seen as black speckling when viewing a high-contrast highlight) in the white portion of a key that include areas of the image you're isolating, and expands the key by making light parts of a key lighter the higher you raise this parameter, pushing light gray areas of the key toward white. The practical result is that raising Clean White lets you "fill holes" in the foreground portion of a key and grow translucent edges.

— **Black Clip:** Raising Black Clip applies a "lift" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward black. The range is 0 to 100, with 0 being the default setting.

— **White Clip:** Lowering White Clip applies a "gain" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward white. The range is 0 to 100, with 100 being the default setting.

— **Blur Radius:** In small amounts, blurring a key does well to take the edge off problem edges. However, blurring a key can also feather the edges of a key past the border of the subject you're keying, with the result being a visible "halo" around your subject, depending on the adjustment you're making. The range is 0 to 2000, with 0 being the default. With such a large maximum blur radius, combined with the capabilities that the In/Out Ratio provides in customizing the direction of spread, you can turn some pretty precarious mattes into surprisingly smooth and useful results.

— **In/Out Ratio:** Controls whether the "Blur Radius" is applied equally to the inside and outside of the edge of the matte (zero), applied only within the matte (negative values), or applied only outside the matte (positive values). Using In/Out Ratio can help eliminate fringing when using the Blur Radius parameter. However, you can also use In/Out Ratio even in situations where no Blur Radius is applied at all. Raising In/Out Ratio will fill in small black holes in the matte, while lowering In/Out Ratio below 0 will eliminate speckling by pushing small white bits of the matte toward black.

— **Morph Operation:** This 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 to clean up a ragged matte.

— **Morph Radius:** Adjusts how much to shrink, grow, open, or close the key.

— **Shadow:** Adjusts key strength based on the darker parts of the original image.

— **Midtone:** Adjusts key strength based on the midtones of the original image.

— **Highlight:** Adjusts key strength based on the brighter parts of the original image.

— **Post Filter:** Performs a final clean-up of the key, using the original image for reference; useful for bringing back some fine detail in sharp edges or hair.

Garbage Matte

These controls let you crop out unwanted things in the frame that are also being keyed, such as lighting fixtures, boom microphones, tracking patches, etc.

— **Matte Shape:** You can choose either a Rectangle or Ellipse with which to crop around the subject you're keying. Choosing None turns off Garbage Matte. When a garbage matte is enabled, the Open FX Overlay mode of the Viewer shows an on-screen control for adjusting the shape and position of the garbage matte.

— **Edge Softness:** Lets you soften the edges. Defaults to 50; the range is 0 (no softening) to 100 (maximum softening).

— **Invert:** Inverts the garbage matte.

— **Center X and Y:** Lets you adjust and keyframe the position of a garbage matte.

— **Bounding Width and Height:** Lets you adjust the width and height of the garbage matte.

— **Rotation:** Lets you adjust the angle of the garbage matte.

Output

The Output controls let you choose how the image is output, composited, and displayed in the Viewer.

— **Output:** This menu offers three options for which channels are output from the effect.

  — **Alpha Highlight:** Displays the transparent part of an alpha channel as gray and the solid part of an alpha channel in full color.

  — **Alpha Highlight B/W:** Displays the black and white alpha channel, which is often helpful when sampling additional areas to key.

  — **Final Composite:** The keyed image is displayed composited over any video track below it.

— **Use Alpha:** A common control in many Resolve FX and 3rd party Open FX plugins; this checkbox determines if the alpha channel is used when compositing over another video track. It can be used instead of choosing RGB Only (Blank Alpha) from the Output menu.

To use the HSL Keyer in the Edit page:

1   Apply the HSL Keyer to a clip on video track 2 or higher.

2   From the Viewer Overlay menu in the lower-left corner of the Timeline Viewer choose Open FX Overlays.

3   Click and drag across the screen color you want to remove.

4   The transparency immediately takes effect, showing the keyed subject against whatever clip appears on the video track underneath it in the Timeline as a composite. To see the matte you created for further adjustment, choose Alpha Highlight or Alpha Highlight B/W from the Output drop-down menu.

5   To add or subtract from the matte, click the plus or minus Color Range control, and click or drag across the portion of the keyed image.

6   To add softness to the outer range of the key you're creating, click the plus Softness control and then click or drag across the portion of the image you'd like to include as a soft edge.

Luma Keyer

Based on the Luma Qualifier in the Color page, the Luma Keyer pulls a key from the luma channel. It's identical to the HSL Keyer with H and S turned off. Although not often used by itself, the Luma Keyer can produce very dramatic effects when used in conjunction with Composite modes.

Selection Range Controls

The Selection Range buttons in the Inspector let you define a key by sampling pixels in the Viewer with the mouse pointer.
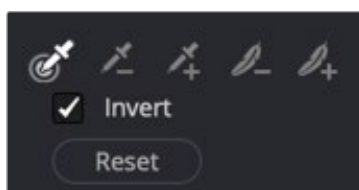
Luma Keyer Selection Range controls

— **Sample Eyedropper:** The first control you use whenever sampling the image. It defines the initial range of the keyer; you must use this tool before any of the others. In the Edit page, the Timeline Viewer Overlay must be set to Open FX. Clicking once with this tool selects a single pixel value, while clicking and dragging selects a range of image values that add together.

— **Add/Subtract Luma Range:** These two controls let you add areas of the image to, or subtract them from, the currently selected luma range that defines the core of the key. As with the eyedropper, you can click on single pixels, or drag over a range of color.

— **Add/Subtract Softness:** These two controls let you redefine the softness that transitions from the inner range of the key, falling off towards the outer edge of the key. Like the other keying controls, you can click on single pixels, or drag over a range of color.

— **Invert:** Inverts the sampled luma range to become opaque, and areas not sampled become transparent.

— **Reset:** Resets the sampled luma range while retaining the Output control settings.

Matte Finesse

You may find that sampling the screen color is not enough to overcome some problems. Issues such as chattery edges, holes, or noisy bits can sometimes be easily fixed using the Matte Finesse controls. These controls filter the output of the Keyer and are adjustments that are made to the matte itself, so they may work well in some instances and poorly in others, depending on what you're trying to do. The Matte Finesse tools are split into two banks of controls labeled 1 and 2.

— **Pre Filter:** This slider attempts to clean up the image before colors are sampled. This adjustment can be useful when you have footage containing MPEG blocking artifacts.

— **Clean Black:** Clean Black is a specialized operation that eliminates noise (seen as white speckling when viewing a high-contrast highlight) in the black area of a key that omits the regions of the image you don't want to isolate, and shrinks the key by making the dark parts of a key darker the higher you raise this parameter, pushing dark gray areas of the key toward black. The practical result is that raising Clean Black lets you "fill holes" in the background portion of a key and erode translucent edges.

— **Clean White:** Clean White is another specialized operation that eliminates noise (seen as black speckling when viewing a high-contrast highlight) in the white portion of a key that include areas of the image you're isolating, and expands the key by making light parts of a key lighter the higher you raise this parameter, pushing light gray areas of the key toward white. The practical result is that raising Clean White lets you "fill holes" in the foreground portion of a key and grow translucent edges.

— **Black Clip:** Raising Black Clip applies a "lift" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward black. The range is 0 to 100, with 0 being the default setting.

— **White Clip:** Lowering White Clip applies a "gain" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed toward white. The range is 0 to 100, with 100 being the default setting.

— **Blur Radius:** In small amounts, blurring a key does well to take the edge off problem edges. However, blurring a key can also feather the edges of a key past the border of the subject you're keying, with the result being a visible "halo" around your subject, depending on the adjustment you're making. The range is 0 to 2000, with 0 being the default. With such a large maximum blur radius, combined with the capabilities that the In/Out Ratio provides in customizing the direction of spread, you can turn some pretty precarious mattes into surprisingly smooth and useful results.

— **In/Out Ratio:** Controls whether the "Blur Radius" is applied equally to the inside and outside of the edge of the matte (zero), applied only within the matte (negative values), or applied only outside the matte (positive values). Using In/Out Ratio can help eliminate fringing when using the Blur Radius parameter. However, you can also use In/Out Ratio even in situations where no Blur Radius is applied at all. Raising In/Out Ratio will fill in small black holes in the matte, while lowering In/Out Ratio below 0 will eliminate speckling by pushing small white bits of the matte toward black.

— **Morph Operation:** This 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 to clean up a ragged matte.

— **Morph Radius:** Adjusts how much to shrink, grow, open, or close the key.

— **Shadow:** Adjusts key strength based on the darker parts of the original image.

— **Midtone:** Adjusts key strength based on the midtones of the original image.

— **Highlight:** Adjusts key strength based on the brighter parts of the original image.

— **Post Filter:** Performs a final clean-up of the key, using the original image for reference, useful for bringing back some fine detail in sharp edges or hair.

Garbage Matte

These controls let you crop out unwanted things in the frame that are also being keyed, such as lighting fixtures, boom microphones, tracking patches, etc.

— **Matte Shape:** You can choose either a Rectangle or Ellipse with which to crop around the subject you're keying. Choosing None turns off Garbage Matte. When a garbage matte is enabled, the Open FX Overlay mode of the Viewer shows an on-screen control for adjusting the shape and position of the garbage matte.

— **Edge Softness:** Lets you soften the edges. Defaults to 50, the range is 0 (no softening) to 100 (maximum softening).

— **Invert:** Inverts the garbage matte.

— **Center X and Y:** Lets you adjust and keyframe the position of a garbage matte.

— **Bounding Width and Height:** Lets you adjust the width and height of the garbage matte.

— **Rotation:** Lets you adjust the angle of the garbage matte..

Output

The Output controls let you choose how the image is output, composited, and displayed in the Viewer.

— **Output:** This menu offers three options for which channels are output from the effect.
  — **Alpha Highlight:** Displays the transparent part of an alpha channel as gray and the solid part of an alpha channel in full color.
  — **Alpha Highlight B/W:** Displays the black and white alpha channel, which is often helpful when sampling additional areas to key.
  — **Final Composite:** The keyed image is displayed composited over any video track below it.

— **Use Alpha:** A common control in many Resolve FX and 3rd party Open FX plugins; this checkbox determines if the alpha channel is used when compositing over another video track. It can be used instead of choosing RGB Only (Blank Alpha) from the Output menu.

To use the Luma Keyer in the Edit page to key a subject:

1 Apply the Luma Keyer to a clip on video track 2 or higher.

2 From the Viewer Overlay menu in the lower-left corner of the Timeline Viewer choose Open FX Overlays.

3 Either click a pixel in a bright or dark part of the image you want to key out, or click and drag across a range of pixels within that subject.

4 The transparency immediately takes effect, showing the keyed subject against whatever clip appears on the video track underneath it in the Timeline as a composite. To see the matte you created for further adjustment, choose Alpha Highlight or Alpha Highlight B/W from the Output drop-down menu.

5 To add or subtract from the matte, click the plus or minus Luma Range buttons, and then click or drag across the portion of the keyed image.

6 To add softness to the outer range of the key you're creating, click the plus Softness button and then click or drag across the portion of the image you'd like to include as a soft edge.

Resolve FX Light

The plugins 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
## (Studio Version Only)

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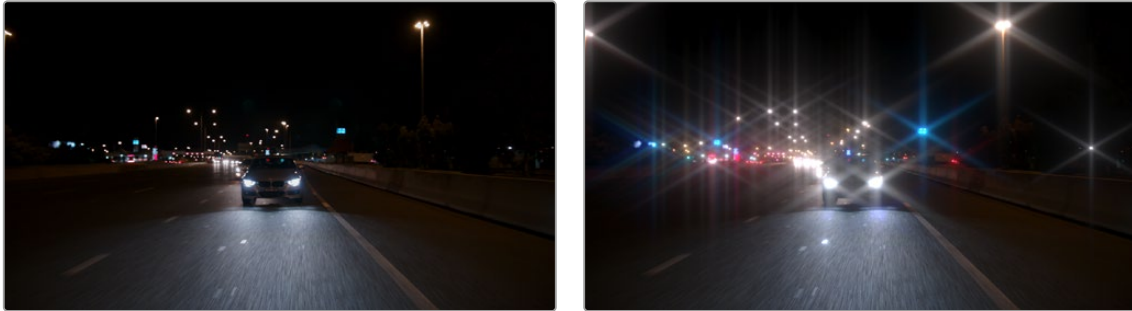
(Left) Original image, (Right) Applying Aperture Diffraction

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 plugin, though it's more processor intensive. In other situations, this plugin opens up many different stylistic possibilities for glowing effects.
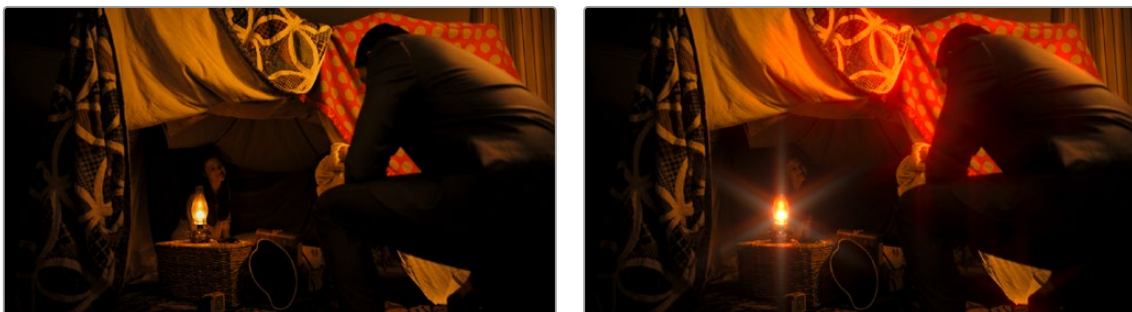
(Left) Original image, (Right) Applying Aperture Diffraction

Output

These controls let you choose what image is output by this plugin.

— **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 plugin 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.

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

— **H/V Ratio:** Alters the horizontal/vertical ratio of the aperture, allowing you to replicate an anamorphic glow.

— **Angle:** Sets the angle of the aperture.

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

Diffraction Controls

— **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.

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.

Shape and Spread

— **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.

Color and Composite

— **Gain:** Adjusts the brightness of the glow effect.

— **Gamma:** Adjusts the spread of the glow effect.

— **Saturation:** Adjusts the intensity of the glow's color.

— **Color Filter:** 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.

Halation (Studio Version Only)

An effect that mimics the subtle light scatters, reflections, and analog blooms of light reflecting back through the dye layers of motion picture film. This usually presents itself as a fine red/orange tinted glow around high contrast bright regions, like lights or reflections. Halation can also be caused by light reflections within processing and development equipment, or in the camera itself. These minor flaws can add a subtle organic and analog look to digital files.
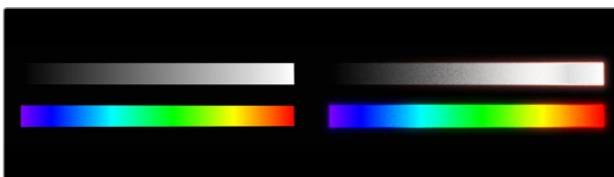
The Halation effect can add an organic and analog look to your digital files. Original (L), Halation (R).

There are a variety of tools and controls to give you fine detail on exactly how the halation will appear.

The shot before the Halation effect

The Halation effect on the same image; note the halation in the
water reflections and the woman in the white t-shirt.

Processing Color Space

Lets you chose the color space for the Halation effect. The default is the same as the current timeline.

Isolation

The Isolation controls define which regions of your clips will form halation halos.

— **Threshold:** The level low clip level for the Halation effect.

— **Normalization:** The high clip level for the Halation effect.

— **Film Saturation Level:** The level below which all color is suppressed and saturated to white. Especially useful in HDR workflows, so the resulting Halation effects are visible at HDR brightness levels.

— **View Isolated Regions:** Shows only the regions isolated for generating the Halation effect.
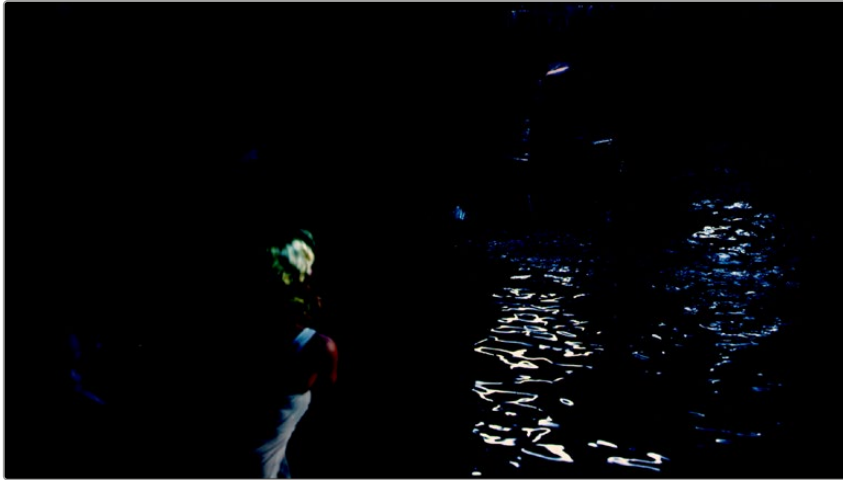
The View Isolated Regions checkbox shows you the areas that will be affected by the halation.

Dye Layer Reflections

The Dye Layer Reflections controls give you the ability to fine tune the physical characteristics of the halation glow.

— **Strength:** Controls the brightness of the reflection.
— **Gamma:** Controls the how the glow spreads out.
— **Saturation:** Controls the intensity of the color of the glow.
— **Spread:** Defines the extent of the dye reflection.
— **Fine Tune Relative Spread:** Checking this box allows you to manually adjust the red, green, and blue reflection distances.

Secondary Glow

The Secondary Glow controls add additional halation characteristics.

— **Strength:** Controls the brightness of the secondary glow.
— **Gamma:** Controls how the glow spreads out.
— **Spread:** Defines the extent of the glow around bright detail.
— **Filter:** Limits the color of the glow in the selected color.

Basic Grain

These controls are a subset of the Film Grain effect for quick grain settings. If you prefer, you can add an instance of the full Film Grain effect after the Halation effect on the same node for greater detail.

— **Append Gain internally:** Turns on the simplified grain control.
— **Strength:** Adds grain to the halation layer.
— **Size:** Controls the size of the grains in the halation layer.
— **Softness:** Softens the grain texture.
— **Saturation:** Applies saturation on the grain.

Global Adjustments

— **View Glow Alone:** This checkbox shows the Halation effect alone before it's added to the frame. This is a useful setting to turn on when modifying any of the above tools.
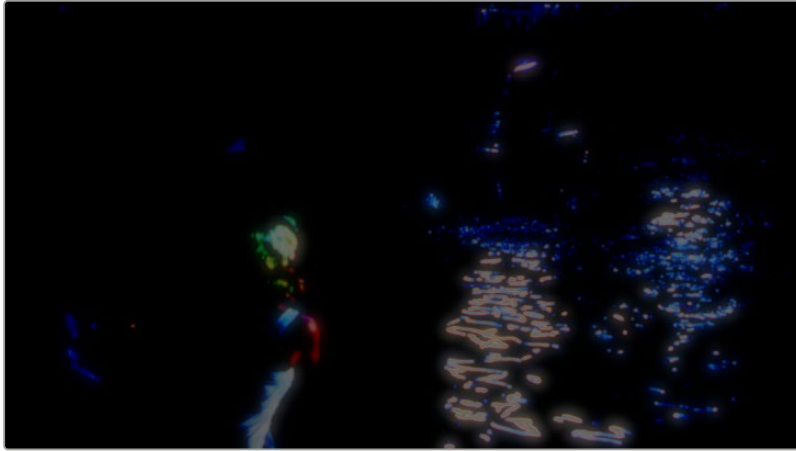
The View Glow Alone checkbox shows you only the Halation effect in isolation and not blended with the underlying image.

— **Reduce Highlights:** Reduces the effect where it will brighten the scene without contributing to the halo. This essentially confines the halo to the edges of a region without blowing out the region itself.
— **Aspect Ratio:** Stretch or squeeze the glow and grain horizontally for anamorphic projects.
— **Detail Loss:** Removes sharp detail that the film stock should not have captured by defocusing the image under the effect.

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.

Checking the Move With Sizing checkbox lets the lens flare retain its relative position in the frame if the Input and Editing sizing are changed.

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 (Studio Version Only)

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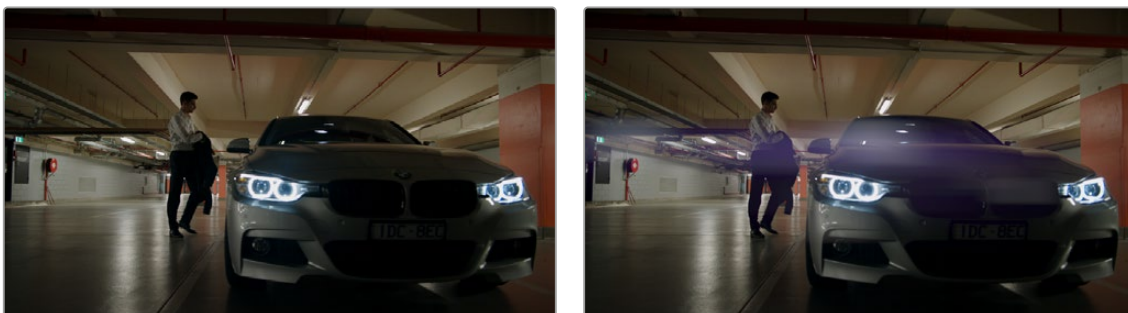
(Left) Original image, (Right) Applying Lens Reflections

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 plugin, as even more so than other plugins, 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.

Resolve FX Refine

These plugins let you make different kinds of targeted improvements.

Contents

Beauty (Studio Version Only)

Beauty is a plugin that lets you control texture. In Ultra Beauty mode, you can selectively smooth image detail that falls above a particular threshold, while preserving detail falling below a particular threshold. 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 plugin 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 plugin 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 plugin is effective for any subject with textures that need refinement.

> **TIP:** This plugin 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 plugin produces the best results when used in moderation.

Operating Mode

The Beauty plugin 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 Ultra Beauty mode that provides additional controls that let you preserve fine detail that you want, while smoothing coarse details that you don't want.

Automatic

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.

Ultra Beauty

The Ultra Beauty controls reveal the full power of the Beauty plugin, with preview modes to examine different aspects of this plugin'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.

Smoothing

These parameters let you remove imperfections. There are two smoothing methods to chose from. Apply these controls with enough strength to get rid of all the details to be smoothed away. The damage from over-smoothing will be reversed in Detail Recovery. To see the effects of the smoothing alone, reduce the Detail Recovery strength, and texture to zero.

— **Flatten:** Reduces texture and filters out detail.
  — **Strength:** How much smoothing effect is applied to the image.
  — **Levels:** Controls how strongly abstracted the image is to smooth levels.
  — **Quality:** Controls the sharpness of the resulting effect. Full being the sharpest and Fastest being the blurriest.

— **Filter:** Flattens smooth areas the image, leaving edges only where they divide flat regions from each other.
  — **Strength:** How much smoothing effect is applied to the image.
  — **Filter Radius:** Controls what scale of details are being filtered.
  — **Edge Threshold:** Controls at what level an edge will be preserved or smoothed over. A low threshold will preserve even weak edges, while a high threshold will smooth over an increasing number of edges unless they are very high contrast.

Detail Recovery

These parameters let you restore the areas of the original video around the image edges, adding detail back into the image.

— **Strength:** Determines the amount of recovered detail.

— **Width:** Controls how far to either side of the edges image detail is recovered.

— **Gamma:** Controls whether to recover all edges, or only the stronger ones. A higher gamma reduces the amount of edges recovered.

— **Blur:** Softens the map of edges where detail is to be recovered.

— **Preview Edges / Details:** Enable this checkbox to show the areas where image detail is to be recovered; this allows you to see directly how the other controls in this section will affect the image.

— **Preview Recovery:** Enable this checkbox to show the actual detail being recovered alone over a neutral gray background.

Texture Recovery

These parameters let you restore areas of fine texture from the original video in flat areas away from the edges.

— **Texture:** Determines the amount of recovered texture to restore.

— **Scale:** Lets you set a threshold below which texture is extracted from the original image and applied to the result.

— **Detail / Edge Balance:** Lets you bias the recovery towards all textures (a negative value), or only to stronger details like edges (a positive value).

— **Preview Texture:** Enable this checkbox to show the actual texture being recovered alone over a neutral gray background.

Grain

These parameters let you add grain to the image to simulate detail in areas of the video with bad or no texture. Grain will only appear in smooth areas and will not cover the recovered edges.

— **Strength:** Controls the amount of grain added to the image..

— **Size:** Controls the size of the individual grains.

— **Softness:** Softens the grain texture.

— **Saturation:** Applies saturation to the grain.

Custom Mixer

The Custom Mixer is an advanced version of the Layer node. It takes two inputs and combines them based on the Alpha channel of the second input. The Custom Mixer has controls to mix sources, blend effects, and interpolate between grades with per-channel control and mixing options. You can use this tool in a variety of ways to control the relative intensity between the sources, or simply as an alternative to the Layer Node but with slider controls.

The Custom Mixer should be added directly as an FX node, not dragged on top of a Corrector node. To add the Custom Mixer to your Node Graph, drag the Custom Mixer icon from the Resolve FX Refine section of the Effects library, directly into the Node Graph. You can also drag it on top of an existing link in the Node Graph to place it inline.

The Custom Mixer node is connected in the following way. The first and second RGB (Green) inputs are input 1 and input 2 respectively. The alpha of the second input controls the blend of input 2 onto input 1. The alpha of the 1st input does not affect the result; it is passed through the node to the output key.
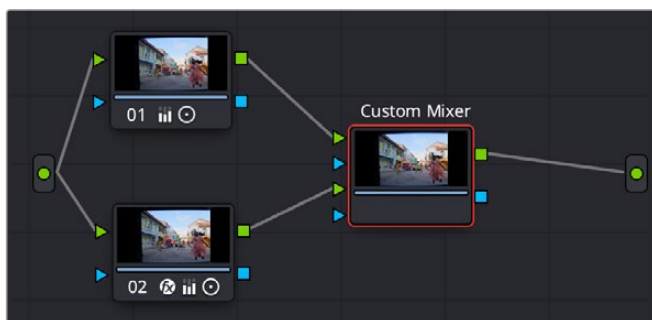
The Custom Mixer Node connections: Input 1 (Green triangle above), and
Input 2 (Green triangle below). The alpha from Input 2 controls the blend of Input 2
onto Input 1 and is what you modify in the Custom Mixer controls.

The Custom Mixer has two main modes chosen by the Mix mode; both have the same behavior, just different controls to change how the input affects the output.

Blend

Blends the second input onto the first input. The normal range is from 0 (fully input 1) to 1 (fully input 2), however you can set the blend factor up to 10 times more or less by typing the numbers directly into the fields. This allows you to enhance the difference between inputs beyond the appearance of either one alone. All the sliders can be keyframed independently.

— **Blend Input 2 onto 1:** Controls the strength of each source, based on the color channels of the selected color space (RGB, YUV, XYZ, etc.). These can be adjusted separately if the Gang checkbox is unchecked.

— **Gang:** Check this box to gang the channels of the custom mixer together, or uncheck to adjust separately.

Combine

Combines the inputs together, allowing you to change the relative strength of each input's contribution to the mix. The normal range is from 0 (fully input 1) to 1 (fully input 2), however you can set the blend factor up to 10 times more or less by typing the numbers directly into the fields. This allows you to enhance the difference between inputs beyond the appearance of either one alone. All the sliders can be keyframed independently.

— **Input 1 Contribution:** Controls the strength of input 1's source, based on the color channels of the selected color space (RGB, YUV, XYZ, etc.). These can be adjusted separately if the Gang checkbox is unchecked.

— **Input 2 Contribution:** Controls the strength of input 2's source, based on the color channels of the selected color space (RGB, YUV, XYZ, etc.). These can be adjusted separately if the Gang checkbox is unchecked.

— **Offset:** Controls the offset of the combination, based on the color channels of the selected color space (RGB, YUV, XYZ, etc.). These can be adjusted separately if the Gang checkbox is unchecked.

— **Gang:** Check this box to gang the channels of the custom mixer together, or uncheck to adjust separately.

Advanced Options

Sets the composite type, as well as the color space and gamma of the resulting mix.

— **Composite Type:** Sets the composite type used for the mixer from the drop-down menu.

— **Color Space:** Sets the Color Space used for the blend. The default is the current Timeline color space.

— **Gamma:** Sets the Gamma used for the blend. The default is the current Timeline color space.
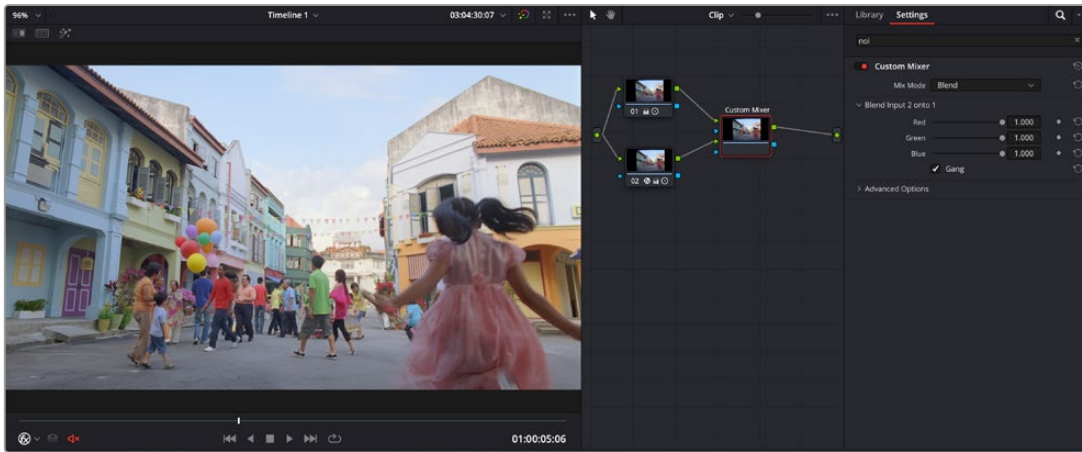
The initial setup of the Custom Mixer, Node 1 is the original image, Node 2 is identical but with a Noise Reduction effect applied to it.
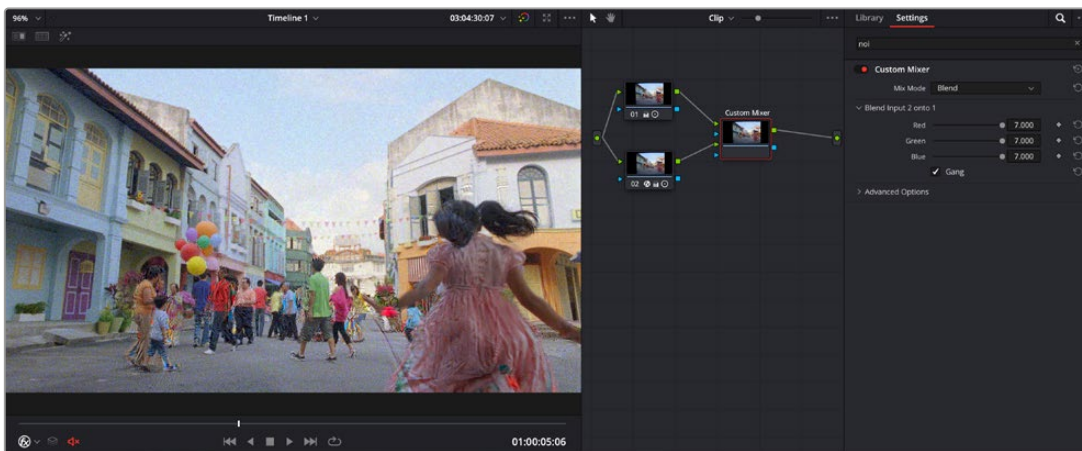
The final setup of the Custom Mixer, by extending the blend factor by 7, the mixer actually adds noise to the image instead.

For the example above, by applying the Noise Reduction FX to Node 2, and directly connecting the same image from Node 1 to the Custom Mixer, the only difference between the inputs is the noise pattern from the effect itself. By manually turning the blend up past 1, you are blending in more of the noise than you started with. So by using Noise Reduction in conjunction with the Custom Mixer, you can actually add additional noise to an image that perfectly matches the original grain pattern without having to find a similar external grain or noise source.

Depth Map (Studio Version Only)

Depth Map creates an Alpha channel based on the perceived distance of objects in your clip. By being able to isolate a specific depth region, the opportunities to manipulate the resulting image are greatly expanded. For example, combined with a Fast-Noise plugin you could simulate a fog effect, but confined only to the distant background of your shot. You could enhance a foreground object like a person, increasing contrast, saturation, and sharpness, similar to using a qualifier. You can use a Depth Map to fix video issues, for example fixing a color temperature problem by isolating a far window that was shot in daylight causing background actors to be tinted blue, while leaving the foreground subject that was shot with studio lighting unaffected. Depth Map can also be combined with DaVinci Resolve's other windows and keying tools to form more complex rotoscoping and keys with less effort.

The resulting Depth Map Alpha channel is visualized as a black and white image, with white being the area that is affected by the resulting changes and black areas remaining unchanged.

The Depth Map creating an Alpha channel based on "distance"

Main Controls

These controls set the main parameters of the Depth Map.

— **Quality:** Depth Map is a very computationally intensive effect. The quality setting allows a Faster mode to speed up the responsiveness to adjustments, while the default Better mode gives the best results and should be turned on when the adjustments are finished.

— **Depth Map Preview:** By default this box is checked, and shows you the current Depth Map for making adjustments. When this check box is disabled, the resulting alpha can then be used for grading on other nodes. If you applied the effect to a corrector node, make sure to right click on the Depth Map's node and select "Use OFX Alpha" to have the node correctly pass the effect's Alpha channel.

— **Invert:** Checking this box reverses the Depth Map, switching its transparent and opaque regions.

Resulting Map Adjustment

These controls let you determine how the Depth Map's contrast is adjusted.

— **Adjust Map Levels:** When deselected (default), you can use DaVinci Resolve's grading tools (lift, gamma, gain, etc.) to adjust the full range of the Depth Map. When enabled, this option clips the Depth Map's levels to 0 and 1. This functions as a preview of what will happen to the Depth Map when used as an Alpha channel where the values are always clipped to 0 and 1 by DaVinci Resolve.

— **Far Limit:** This control adjusts the black levels of the Depth Map.

— **Near Limit:** This control adjusts the white levels of the Depth Map.

— **Gamma:** This control adjusts the intermediate depth values to be brighter or dimmer compared to the fixed black and white levels.

Isolate Specific Depth

These controls allow you to sweep backwards and forwards in the scene by depth, allowing you to isolate a specific depth range to adjust.

— **Isolation:** This checkbox turns the depth isolation tools on or off.
— **Target Depth:** This controls the specific depth you want to isolate. 1 is fully in the foreground, while 0 is fully in the background.
— **Tolerance:** Sets the range to either side of the Target Depth to include in the Depth Map.
— **Softness:** This sets a subtle ramp-in and ramp-out of the selected range, giving it a more organic selection.

Map Finesse

These controls modify the resulting Depth Map's Alpha channel for use in grading.

— **Post Processing:** This control turns the Map Finesse tools on or off.
— **Expand / Contract:** This control dilates or erodes the overall shape at the edges, useful for fine tuning the boundary between the affected and unaffected regions of the map.
— **Blur:** This control softens the boundary of the map, allowing it to blend more smoothly into the resulting image.
— **Post-Filter:** This control blends the map to the smooth areas and edges of the image. It is used to prevent later grading effects from visibly varying within the region.

For example, say you have footage shot of a person on a rainy day, but the background is too distracting and contrasty. By creating a depth map that isolates only the foreground person, we can then apply a Fast Noise smoke effect to only the background, making it look like a foggy mist, and less distracting.

The original footage with a distracting background

The same footage with a Fast Noise Smoke effect node to simulate a fine mist, however it covers the entire frame, including the main subject. The mist belongs in the background only to be more realistic.

By placing a node with Depth Map applied between the original nodes, you can use the effect to pull a key based solely on "distance" from the camera. In this case, we have selected the background (white) and excluded the woman with the umbrella (black). Note the fine detail in the furry coat, which would be difficult to get with an HSL or window qualifier.

The final result of the process shows the main subject in the foreground with the Fast Noise smoke effect limited only to the background.

> **TIP:** To create more believable Depth of Field adjustments, use the Depth Map effect in conjunction with the Tilt-Shift Blur effect. You can feed the results of the Depth Map directly into the Tilt-Shift Blur effect as a blur map by connecting the key output of the Depth Map node to the key input of the Tilt-Shift Blur node and selecting "From Alpha In" in the Map Source drop-down in the Depth of Field section of the effect. From there adjust the Focus Sweep to dial in the area you want to isolate. If you're not getting the expected results, try inverting the Depth Map.

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 plugin is capable of, and an outline of the face's major features appears to let you follow its progress.
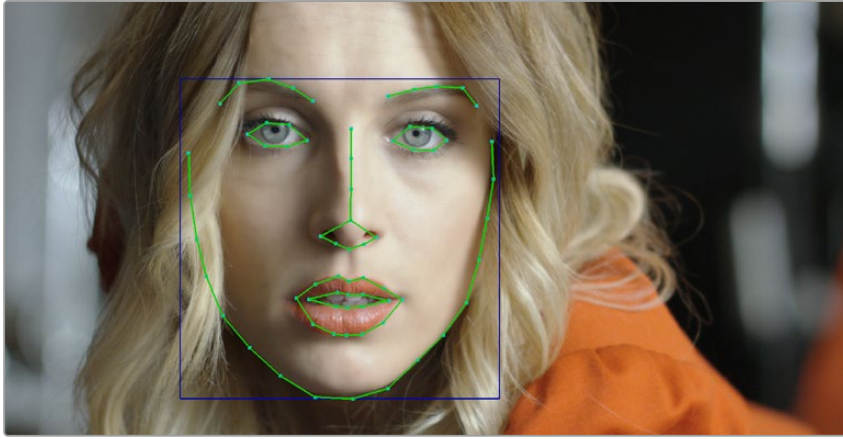
The Face Refinement filter automatically detecting a performer's face

Once the face has been tracked, you're ready to work. This plugin 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 plugin 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 plugin 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.
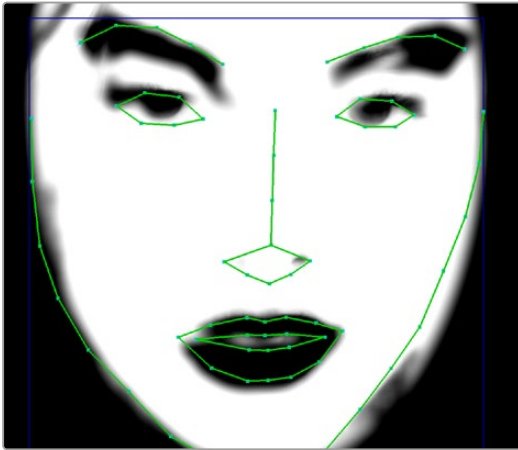
Limiting the key with the face mask

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 plugin, 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)

Beauty Advanced

These controls are identical to the Advanced controls of the Beauty plugin, covered previously in this chapter.

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 plugin 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.

(Left) Eyes with no special adjustment, (Right) 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).

Relight (Studio Version Only)

Relight allows you to add light sources to your scene, realistically illuminating the objects within it. Unlike a Power Window whose shape is fixed on screen, Relight analyzes the shapes of people and objects to create a Surface Map and uses that map to reflect light appropriately. When dialed-in properly, this effect can provide the illusion of light following the curves of an object, reflecting off highlights, and disappearing into shadows.

Relight is useful in situations when you wished you had another light in the scene, want to accentuate an existing light to match another shot, or increase the realism of day-for-night grading.

> **NOTE:** The Relight effect creates the illusion of depth with its analysis of the surfaces in a scene, but it does not calculate 3D relationships between objects in the scene. Shapes cannot be made to cast shadows, and depth information cannot be produced.

Setting up Relight

Analyzing the image to create a Surface Map is very computationally intensive. Calculating the effects of light sources to an existing analysis is comparatively very fast. By default, adding Relight to a node will create the map and add a light in one step. This is convenient, but adjusting the light position re-runs the effect, and hence re-runs the analysis. So it can be slow to work with. Fortunately it is possible to split the work across two nodes, caching the analysis in the first node and adjusting the light positions in the second node. This is described in detail below.

Note that you can add multiple light sources reusing the same analysis. If you have, say, three separate lights in the same scene, reusing one analysis, then this will run three times faster than repeating the analysis for each light.

And as an advanced option, the split approach allows you to use a Surface Map which has been saved out to file, or a Surface Map from other software. Computer graphics software can often render "surface normals" of 3D models along with the images they create and these can be made compatible with Relight. In this context a "normal" is a geometric term describing which way a surface is oriented. There is no universal format for surface normals; see the External Map settings for some options which can help with using these as Surface Maps in the plugin.

Here is a sample node graph splitting the Relight in two:
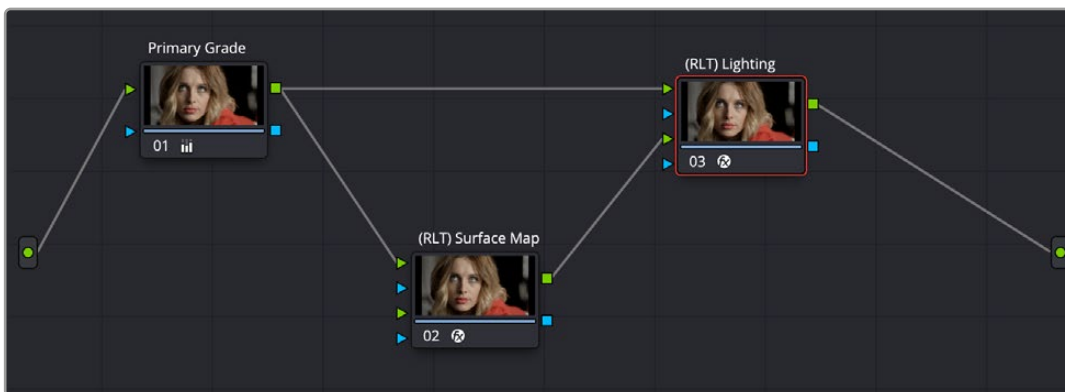
How to set up a dual Relight Node Tree with two separate Relight nodes, configured as above. These have been labeled Surface Map and Lighting for clarity.

In the above example, you have the source video and two Relight nodes. This is how they're set up:

— The source video is connected to the first RGB input (top green triangle) of both nodes.

— The first Relight Node ((RLT) Surface Map) creates the Surface Map for the image by selecting "Output Surface Map" checkbox in the Relight effect's settings. When checked, the plugin goes into analysis-only mode and other options disappear. You can enable Node Caching to automatically generate the Surface Map in the background when you aren't using DaVinci Resolve. The RGB output of this node is connected to the second RGB input (bottom green triangle) of the second Relight Node.

— In the second Relight Node ((RLT) Lighting), set the first option "Surface Map" from its default ("Use Internal") to "Use Input 2." The other settings all remain visible; this node is where you will adjust the light properties.

You can add Power Windows, Qualifiers, or masks to either node, or to separate nodes and connect them via the first Alpha channel (top blue triangle) of either node. For example, you could select a person using the magic mask and use it to limit the lighting to just that person and not the background.

The output of the Relight Surface Map. This goes into the input of the Relight Lighting node.

Using Relight

When first placing Relight on a node and turning off the lighting preview, there is no visible change to the image. This is because the map of what the light is illuminating is in the Alpha channel, ready for all of DaVinci Resolve's color grading tools to go to work. The simplest place to start is to increase Gain (dial it up directly or add color); often changes to gamma and saturation may be appropriate.

For a day-for-night effect you can invert the Alpha to darken all of a scene except the light areas, to achieve a day-for-night effect but with a "light source" that is the original scene lighting.

The Relight Settings

These controls allow you to adjust the intensity, type, and direction of the light that reflects off the surface map. Most are keyframable, and positions can be attached to the FX Tracker, allowing things like moving a light source as if it were attached to an object, or moving a spotlight to follow a person as they move through the scene. Controls and their groups are:

— **Surface Map:** This chooses which mode you will use to create the Surface Map.

   — **Use Internal:** Generates the Surface Map and immediately uses it in this node.

   — **Use Input 2:** Receives the Surface Map from another Relight Node. Use this on the second node of a dual Relight Node setup.

— **Output Surface Map:** Checking this box causes this copy of the effect to output a multi-colored map of the input frame. This Surface Map can then be fed into a second Relight effect (set to "Use Input 2" as above) where the light sources are placed and adjusted.

— Directional / Point Source / Spotlight

— **Directional:** Creates a light source that emits from a specific direction at an infinite distance.

— **Point Source:** Creates a light source that emits from a central point.

— **Spotlight:** Is also a point source but it is directed into a cone shape.

— **Relighting Map Preview:** Checking this box reveals the Alpha channel of the effect of this light. Unchecking this box shows the current image but with the light mask in the Alpha channel.

— **Diffuse Reflection Properties:** These controls determine the quality of the emitted light.

— **Brightness:** This controls the strength of any grading that is applied to the scene. It does not add brightness changes on its own but amplifies the changes you make in the grading tools.

— **Softness:** This controls the size of the light emitter, effectively determining how harsh or gentle the gradient is between light and dark.

— **Distance Falloff:** This controls how much reflections will dim with distance to the light source.

— **Light Properties:**

— **Brightness:** This controls the strength of any grading that is applied to the scene. It does not add brightness changes on its own but amplifies the changes you make in the grading tools.

— **Reach:** This controls how much reflections will dim with distance from the light source.

— **Contrast:** This determines how harsh or gentle the gradient is between light and dark.

— **Surface Properties:**

— **Glossiness:** Gives the illusion of a metallic sheen to reflective surfaces.

— **Specularity:** When there is any glossiness added, this controls how metallic/shiny that glossiness is.

— **Shadow Softness:** Controls how much the light penetrates into shadows due to ambient reflections, beyond where it would reach otherwise.

— **Spotlight :**(shown only with Spotlight option enabled)

— **Beam Angle:** Sets how broad the cone of light is. This control is also available graphically in the Viewer.

— **Edge Softness:** Controls the softness of the edges of the light cone/beam.

— **Light Position:** These controls are for the the position of the light emitter for all light types. They can be adjusted directly, but more easily, they can be adjusted graphically in the Main Viewer. Ensure that the Main Viewer's mode is set to Open FX Overlay with the icon at the bottom left.

In Directional mode:

— **Azimuth / Elevation XY :** Controls the direction the light is coming from.

In Point and Spotlight modes:

— **Source Follows FX Tracker:** Check this box to have the light source follow the FX tracker.

— **Light Source XYZ:** These controls determine the light emitter's position in 3D space.

In Spotlight mode:

— **Spot Follows FX Tracker:** Check this box to have the light source follow the FX tracker.

— **Spot Target XY:** These controls determine the position of the base of the spotlight cone.

When you are in Use Input 2 mode, there are options for using an externally-generated Surface Map.

— **Rescale Oversaturated:** Different applications use different scalings of the Surface Map. A common format looks like the Relight plugin's internal ones but with the colors intensely saturated and can be dark or black in some areas. If your imported surface map has this appearance, check this box to re-interpret it.

— **Reinterpret Left/Right:** Check this box to swap the direction of your external surface map if your map surfaces are appearing concave instead of convex.

— **Reinterpret Up/Down:** Check this box to swap the direction of your external surface map if your map surfaces are appearing lit from below when the light is above them.

When you are generating an analysis internally with Use Internal, or you are using Output Surface Map, you will also see an Advanced Options group with an option related to Blanking Regions. These will not apply in the majority of cases; they are only for fixing some specific situations. They are for forcing different behavior at the edges of the frame in these special cases:

— The source video has letterboxing or some framing border "baked in," meaning that the incoming frames have black pixels at the edges that were not added by DaVinci Resolve. Letterboxing added by DaVinci Resolve (e.g., a 21:9 frame fit to a 16:9 timeline) does not need any special treatment. You will recognize that there is a problem because the Surface Map AI will treat the scene as if the black areas are actually objects or attached to objects in frame. Objects in contact with the black bars may appear to blend into those areas.

— The source video has pillarboxing, same as with letterboxing above. For example, if a 4:3 source video was captured to a 16:9 clip with black borders before it was used in DaVinci Resolve.

— A case where a wide clip was inserted into a narrower timeline correctly, but after resizing or effects were applied you wish for the plugin to process the original blanking areas because there is now content there. This case will appear obvious, in that the analysis will stop at the original blanking boundary, cropping-away areas you want to analyze.

If you encounter any of these special cases your options are:

Blanking Regions

— **Process Entire Frame:** Tell the AI to ignore any information about the timeline shape and just process all the visible pixels.

— **Handle Automatically (default):** The AI will process only the area that DaVinci Resolve knows your media is in

— **Auto + Extra Crop:** This is recommended for cropping away black bars, it uses DaVinci Resolve's knowledge of which pixels were occupied by your media but lets you crop out the framing or letterboxing relative to its shape. This is recommended because it will stay consistent as you adjust timeline settings.

— **Manual Cropping:** Simply lets you override whatever the framing of the content is, ignoring any of DaVinci Resolve's knowledge of the shape of your media.

The Relight On-Screen Controls

Several of the controls for positioning the light source are available graphically in the Viewer; make sure that Open FX Overlay is selected in the lower left of the Viewer to see them.


In the Directional mode, you can drag the emitter (red rays) around the frame to set the Azimuth/Elevation controls.
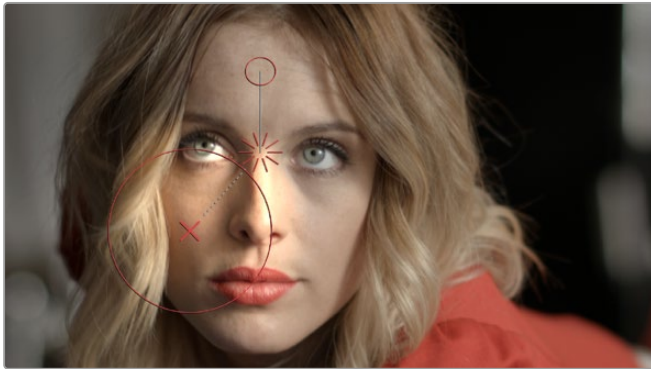
In the Point Source and Spotlight modes, you can move the emitter (red rays) to change XY coordinates, and the circle to adjust the emitter's Z coordinates. If in Spotlight mode you can drag the X to change the XY coordinates of the Spot Target, and scale the large circle to adjust the Cone Angle.

Example

In this example, we will be relighting the scene below. Shot during a cloudy overcast day, the director likes the flat look on the building. Unfortunately, the muted drab lighting also affected the model, which he wants to pop more out of the scene. We are going to use the Relight tool to add a phantom sunbeam directly to the model and not to any of the surrounding fence or walls.
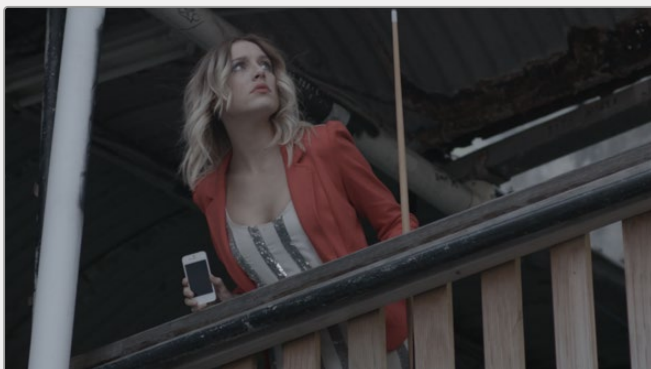

The model's lighting is flat and drab. We want to change it by adding an artificial sunbeam falling on her that wasn't there in the shot. We also want to keep the fence and background as they are.

The first tool we will use is the Magic Mask to isolate the model from her environment.

The model's lighting is flat and drab. We want to change it by adding an artificial sunbeam falling on her that wasn't there in the shot. We also want to keep the fence and background as they are.

Isolating the model with a Magic Mask to isolate the effect

Next we will add two different relight nodes, one to create the surface map, the other to receive it and actually relight the shot. The node tree is explained below.
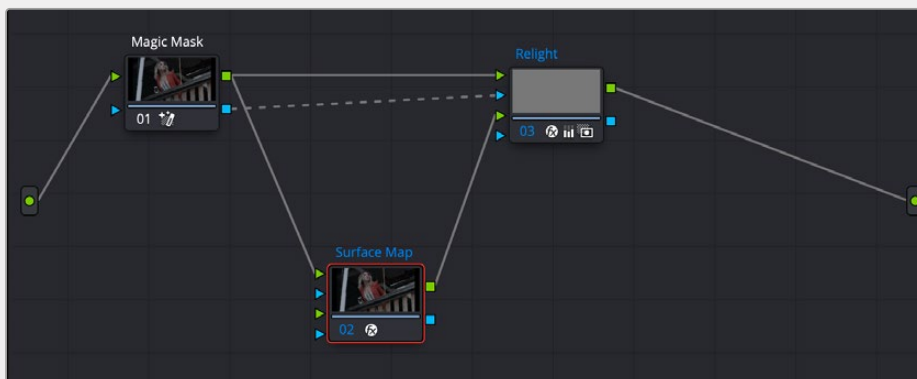
The Relight node tree; there are two Relight nodes, one called Surface Map and one called Relight.

We feed the RGB output of the Magic Mask to the top RGB inputs of both nodes. We also feed the Alpha output of the Magic Mask into the Relight node. This way the Relight effect will only apply to the model we selected using the Magic Mask and leave the background alone.

In the first node (Surface Map), we select Use Internal from the Surface Map option. We also check the Output Surface Map checkbox to pass that generated map to the second (Relight) node. We then complete the connection by dragging the RGB output of the Surface node to the bottom RGB input of the Relight node. In the Relight node, we then select Use Input 2 in the Surface Map option in the Inspector.

The surface map generated by the Surface Map node

Now that we have the node tree setup correctly, the Surface Map is generated in its node; make sure it's node cache is set to On. Then we can work directly in the Relight node and select a Directional light. Using the Relighting Map Preview checkbox and the on screen controls, we can then see exactly where the lighting effect will take place, and how it will follow the curves of the subject.

With the Relighting Map Preview box checked, you can see exactly where and how the Relight will affect the subject. Unchecking the box lets you see the final color output.

The last thing we need to do is actually create our new light properties, so by using the Primaries Wheels controls in the Relight effect, we can increase the gain and color it slightly yellow/orange and increase the saturation to mimic a golden hour sunbeam on our subject, where there was only a flat cloudy day before.
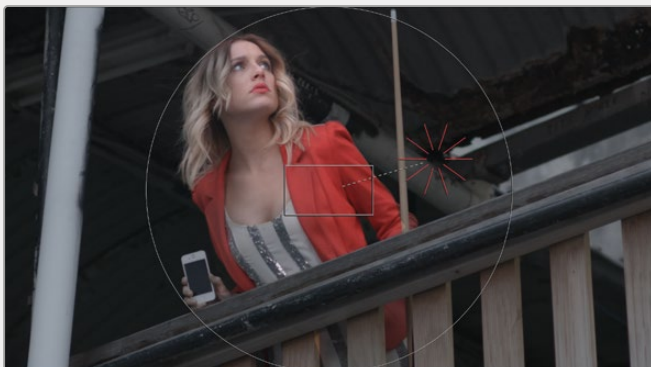
With the Relighting Map Preview box checked, you can see exactly where and how the Relight will affect the subject. Unchecking the box lets you see the final color output.

Adjusting the Primaries gain and saturation wheels in the Relight node to add the character of the light, selling the illusion that the model is leaning over the fence into a sunbeam.

Resolve FX Revival

This category consists of plugins 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 plugin 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 plugin to use; just drop the plugin on a shot, adjust the parameters for the best results, and watch it go.

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

> **NOTE:** This plugin 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 plugin 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, Green/Purple, 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 patches on each dead or stuck pixel, identifying them so you can use different methods of fixing the problem.

In many respects, the Dead Pixel Fixer is similar to the Dust Buster, however the Dust Buster effect is designed to repair transient bits of dust and dirt that only last for a frame or two, whereas the Dead Pixel Fixer is designed to work on blemishes that are fixed in place for the duration of a clip.

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 a patch on it. You can click anywhere on the image to place as many patches as you like, there's no limit. You can also Option-click to delete patches you no longer need. To move any patches, simply drag it to another location.
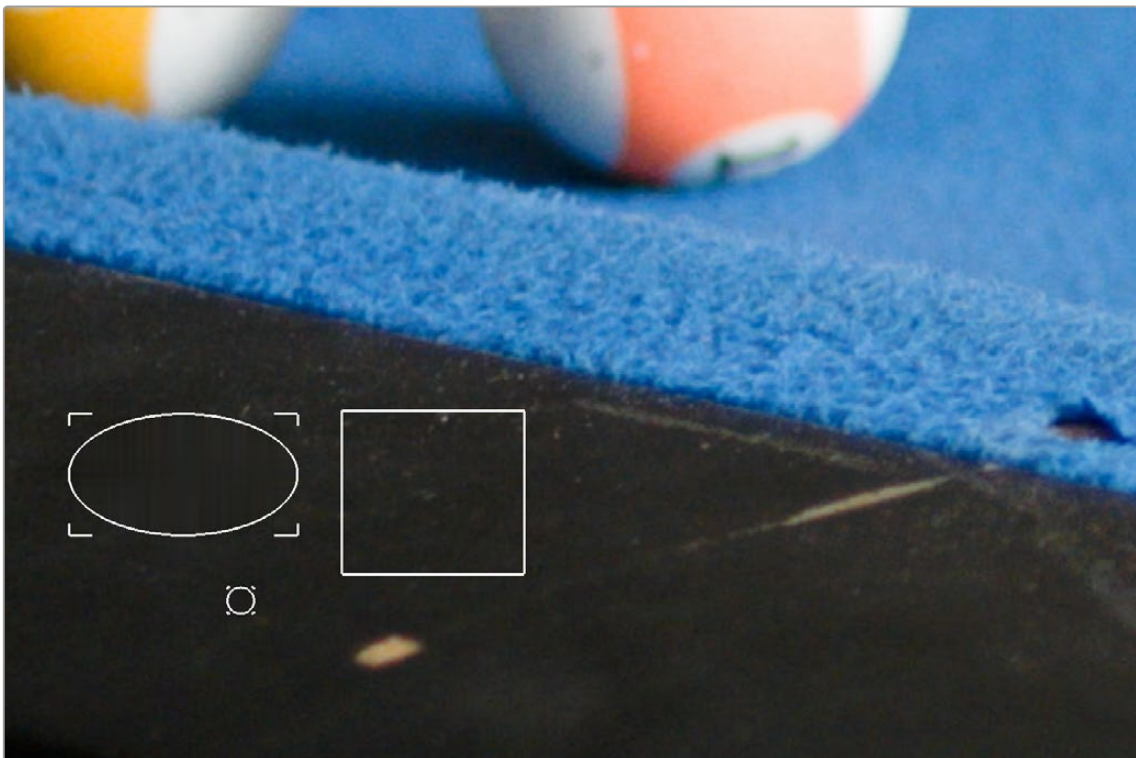
Multiple dead pixel removal patches

When you place multiple patches, you can click to select whichever patches you want to adjust the controls for. Each patch can have different control settings.

General

These top level controls let you choose how to draw patches with which to repair blemishes in the frame, whether or not to show their on-screen controls, and how.

— **Patch Style:** There are three different kinds of patches you can draw to deal with different kinds of blemishes in the frame.

    — **Draw Rect:** Click and drag to place a rectangular patch of any size from one corner to the opposite corner. Once drawn, you can click on any edge of the overlay and drag to reposition it.

    — **Draw Ellipse:** Click and drag to place an elliptical patch of any size from one corner to the opposite corner. Once drawn, you can click on any edge of the overlay and drag to reposition it.

    — **Place Patch:** Lets you place small patches specifically for tiny details such as dead pixels. When you choose this option, a New Patch Size slider appears that lets you adjust the size of the patches you're about to place prior to placing them. Once drawn, you can click on the edge of any patch and drag to reposition it.

— **New Patch Size:** (only when Place Patch is selected) Lets you choose how large of a patch to place using the Place Patch tool.

— **Show Patches:** This checkbox lets you show or hide the onscreen outline of every patch in the Viewer.

— **Hide During Interaction :** Hides the onscreen outline of every patch in the Viewer while you're moving a patch; this makes it easier to see the effect of moving the patch on the image, without the outline getting in the way.

Patch Type

There are three methods you can use to attempt to fix the contents of a selected patch. When drawing new patches, the currently selected Patch Type will determine what the next patch will be. When you've selected an existing patch, changing the Patch Type will change how that patch works.

— **Spatial:** Automatically fills the interior of the selected patch with pixels drawn from the surroundings of the patch, using the Fill Method. This works well for small blemishes, but for large blemishes a pattern might be discernible, which gives away the effect.

— **Clone:** Clone mode copies part of the image to fill a shape or patch placed over the thing you want to remove. In this mode, clicking and dragging to place a Rect or Ellipse over an imperfection is followed by a second click to place the sample region you want to clone. Clicking once to place a Patch will be followed by a second click to place the sample region. Selecting an existing shape or patch and choosing Clone lets you click on the shape to position the clone region. The sample region is indicated by a dotted shape that's connected to the original shape.

— **Blend Clone:** Operates similarly to Clone mode, except the copied part of the image that fills the Rect, Ellipse, or Patch is blended with the image to integrate it more softly.

— **Fill Method:** When using the Spatial Patch Type, the fill method determines how the blemish in the image is repaired.

    — **Grid:** Samples the pixels surrounding the Rect, Ellipse, or Patch, and blurs them inward both horizontally and vertically. Extremely effective for tiny blemishes. For larger blemishes, a grid-like pattern may emerge.

— **Horizontal:** Samples the pixels to the left and right of the Rect, Ellipse, or Patch, and blurs them inward.

— **Vertical:** Samples the pixels to the top and bottom of the Rect, Ellipse, or Patch, and blurs them inward.

— **Patchy:** Samples pixels from all around the Rect, Ellipse, or Patch, and expands and blurs them together to create a soft, non-uniform region with which to repair the blemish. Doesn't have the patterning of the grid methods of fill, but produces an extremely smooth result.

— **Smooth:** Simply uses a gaussian blur to repair the blemish.

Patch Options

These options let you customize the effect of a patch filling over a blemish.

— **Mute:** Lets you turn a particular patch on or off via keyframing. Useful for blemishes that only show up for a few pixels of a shot.

— **Variability:** (Spatial patches only) Raising this parameter lets you make the Fill Method less uniform.

— **Soft Edges:** Lets you soften the edges of the patch.

— **Size Adjust:** Lets you change the size of a patch after its creation.

Advanced Controls

These controls let you customize the UI of this effect.

— **Clone Sticks to Mouse:** When enabled, drawing or placing a Rect, Ellipse, or Patch in Clone or Blend Clone mode immediately switches to positioning the sample region, making it faster to use.

— **New Patches Stay Selected:** When enabled, patches stay selected after you draw them, in preparation for further customization.

— **UI Line Thickness:** Lets you choose how thick the on-screen outlines should be.

— **Patches Stick to:** This parameter lets you deal with fixing dead pixels or blemishes on clips that have been stabilized.

— **Source:** Patches you place stay put, unless you apply motion stabilization to the shot, in which case the patches are transformed along with the image so they remain "stuck" to the feature in the source clip they're fixing.

— **Scene:** If you're eliminating a blemish on a moving subject, you can use the FX Tracker to track the thing you're fixing, so the patch follows along with it.

— **Output Mode:** This lets you see different representations of the patched effect you're creating. There are four options.

— **Patched Result:** The final result, with each patch repairing the blemish it's covering.

— **Patch Locations:** Shows a key where each placed patch is white against black.

— **Differences:** Shows the difference of each patch against the original image.

— **Difference Magnitude:** Shows a more pronounced Differences representation.

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
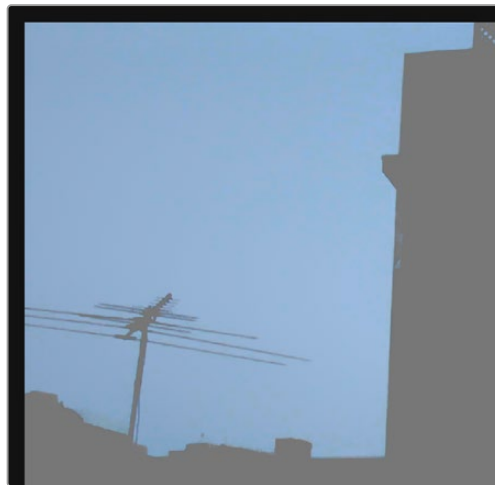
Minimizing banding using the Deband filter

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).

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 plugin replaces the previous Timelapse Deflicker filter and solves a far broader variety of problems in a much more automatic way. The new Deflicker plugin 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 plugin can often repair problems once considered "unfixable."
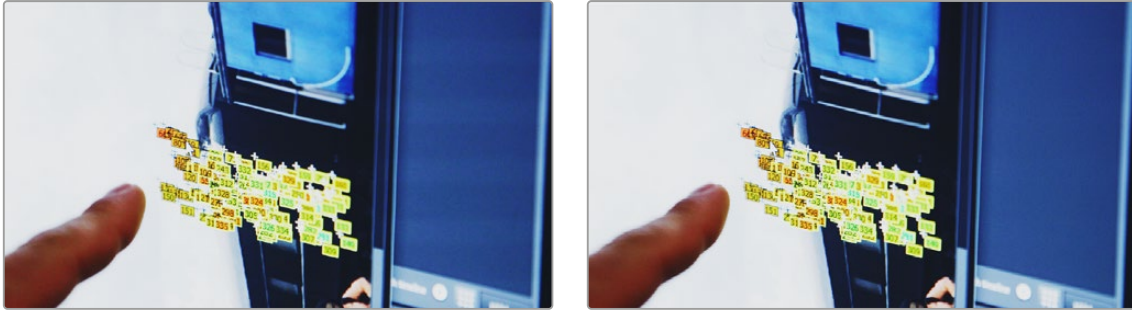
(Left) Original image with flicker, (Right) Result setting Deflicker to Fluoro Light, (clip courtesy Redline Films)

Main Parameters

By default, the top section of this plugin 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 plugin 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 plugin is doing.

Dust Buster (Studio Version Only)

This plugin 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 plugin 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 plugin

In many respects, the Dust Buster is similar to the Dead Pixel Fixer, however the Dust Buster effect is designed to repair transient bits of dust and dirt that only last for a frame or two, whereas the Dead Pixel Fixer is designed to work on blemishes that are fixed in place for the duration of a clip.

General

These top level controls let you choose how to draw patches with which to repair temporally unstable dust and dirt in the frame, whether or not to show their on-screen controls, and how.

— **Navigation Controls:** Four buttons let you jump to frames on which you've drawn patches. There are four buttons:

— **First Modified Frame:** Jumps the playhead to the first frame of that clip with a patch.

— **Last Modified Frame:** Jumps the playhead to the last frame of that clip with a patch.

— **Next Modified Frame:** Jumps the playhead to the next frame forward with a patch.

— **Last Modified Frame:** Jumps the playhead to the last frame back with a patch.

— **Patch Style:** There are three different kinds of patches you can draw to deal with different kinds of blemishes in the frame.

— **Draw Rect:** Click and drag to place a rectangular patch of any size from one corner to the opposite corner. Once drawn, you can click on any edge of the overlay and drag to reposition it.

— **Draw Ellipse:** Click and drag to place an elliptical patch of any size from one corner to the opposite corner. Once drawn, you can click on any edge of the overlay and drag to reposition it.

— **Place Patch:** Lets you place small patches specifically for tiny details such as dead pixels. When you choose this option, a New Patch Size slider appears that lets you adjust the size of the patches you're about to place prior to placing them. Once drawn, you can click on the edge of any patch and drag to reposition it.

— **New Patch Size:** (only when Place Patch is selected) Lets you choose how large of a patch to place using the Place Patch tool.

— **Show Patches:** This checkbox lets you show or hide the onscreen outline of every patch in the Viewer.

— **Hide During Interaction :** Hides the onscreen outline of every patch in the Viewer while you're moving a patch; this makes it easier to see the effect of moving the patch on the image, without the outline getting in the way.

Patch Type

There are six methods you can use to attempt to fix the contents of a selected patch. When drawing new patches, the currently selected Patch Type will determine what the next patch will be. When you've selected an existing patch, changing the Patch Type will change how that patch works.

— **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 sampled 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 a suitable match to the content of the current frame.

— **+/- 1 Frame:** In this mode, 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.

— **+/- 2 Frames:** 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:** Automatically fills the interior of the selected patch with pixels drawn from the surroundings of the patch, using the Fill Method. This works well for small blemishes, but for large blemishes a pattern might be discernible, which gives away the effect.

— **Clone:** Clone mode copies part of the image to fill a shape or patch placed over the thing you want to remove. In this mode, clicking and dragging to place a Rect or Ellipse over an imperfection is followed by a second click to place the sample region you want to clone. Clicking once to place a Patch will be followed by a second click to place the sample region. Selecting an existing shape or patch and choosing Clone lets you click on the shape to position the clone region. The sample region is indicated by a dotted shape that's connected to the original shape.

— **Blend Clone:** Operates similarly to Clone mode, except the copied part of the image that fills the Rect, Ellipse, or Patch is blended with the image to integrate it more softly.

— **Fill Method:** When using the Spatial Patch Type, the fill method determines how the blemish in the image is repaired.

  — **Grid:** Samples the pixels surrounding the Rect, Ellipse, or Patch, and blurs them inward both horizontally and vertically. Extremely effective for tiny blemishes. For larger blemishes, a grid-like pattern may emerge.

  — **Horizontal:** Samples the pixels to the left and right of the Rect, Ellipse, or Patch, and blurs them inward.

  — **Vertical:** Samples the pixels to the top and bottom of the Rect, Ellipse, or Patch, and blurs them inward.

  — **Patchy:** Samples pixels from all around the Rect, Ellipse, or Patch, and expands and blurs them together to create a soft, non-uniform region with which to repair the blemish. Doesn't have the patterning of the grid methods of fill, but produces an extremely smooth result.

  — **Smooth:** Simply uses a gaussian blur to repair the blemish.

Patch Options

These options let you customize the effect of a patch filling over a blemish.

- **Mute:** Lets you turn a particular patch on or off via keyframing. Useful for blemishes that only show up for a few pixels of a shot.
- **Variability:** (Spatial patches only) Raising this parameter lets you make the Fill Method less uniform.
- **Soft Edges:** Lets you soften the edges of the patch.
- **Size Adjust:** Lets you change the size of a patch after its creation.

Advanced Controls

These controls let you customize the UI of this effect.

- **Clone Sticks to Mouse:** When enabled, drawing or placing a Rect, Ellipse, or Patch in Clone or Blend Clone mode immediately switches to positioning the sample region, making it faster to use.
- **New Patches Stay Selected:** When enabled, patches stay selected after you draw them, in preparation for further customization.
- **UI Line Thickness:** Lets you choose how thick the on-screen outlines should be.
- **Output Mode:** This lets you see different representations of the patched effect you're creating. There are four options.
  - **Patched Result:** The final result, with each patch repairing the blemish it's covering.
  - **Patch Locations:** Shows a key where each placed patch is white against black.
  - **Differences:** Shows the difference of each patch against the original image.
  - **Difference Magnitude:** Shows a more pronounced Differences representation.

Frame Replacer (Studio Version Only)

The Frame Replacer allows you to reuse or blend adjacent frames together to help remove any corrupt frames or artifacts that show up for the duration of just a single frame. It's useful for fixing problems like a damaged film frame or a video frame that has pixelated digital breakup.

- **Replace This Frame:** Checking this box selects the specific frame in the clip that you want to replace. This will also automatically apply a keyframe at the appropriate location in the clip.
- **Replacement Method:** Allows you to choose the method by which the new frame is created.
  - **From Previous:** Replaces the selected frame with the one immediately before it, effectively duplicating the frame.
  - **From Next:** Replaces the selected frame with the one immediately after it, effectively duplicating the frame.
  - **Blend Prev/Next:** Replaces the selected frame with a blend of the frames immediately before and after it.
  - **Optical Flow:** Replaces the selected frame using DaVinci Resolve's optical flow technology with a blend of the frames before and after it.

Noise Reduction (Studio Version Only)

Based on the Noise Reduction controls in the Color page, the Resolve FX Noise Reduction is divided into two types of GPU-accelerated noise reduction designed to subdue noise in problematic clips. Both methods of noise reduction can be used separately or together, in varying amounts depending on the needs of the particular material you're working on.

Temporal NR Controls

The Temporal NR controls analyze images across multiple frames to isolate noise from detail. Motion estimation settings let you exclude moving subjects from this operation to prevent unwanted motion artifacts.

— **Frames Either Side:** The number of frames on either side of the current frame that you want averaged to separate detail from the noise. You can choose between 0 and 5 frames. 0 applies no frame averaging; higher values apply more frame averaging, at the expense of being significantly more computationally intensive. A higher frame setting may yield a better analysis, but may also yield unwanted artifacts if there are fast-moving images in the frame. A value of 1 may yield better results for fast-moving images. If you need to use higher frame values, but see artifacts, you can also try adjusting the Motion Threshold to fix the issue.

— **Motion Est. Type:** Picks the method DaVinci Resolve uses to detect motion in the image. The default, Faster, is less processor intensive, but less accurate. Choosing Better can effectively exclude motion more accurately, but is more processor intensive. None lets you disable motion estimation altogether, resulting in the application of Temporal NR to the entire image.

— **Motion Range:** Three settings, Small, Medium, and Large, let you set the speed of motion that Motion Estimation should expect to exclude. A Small setting assumes slow-moving subjects with little or no motion blur, allowing Temporal NR to affect more of the image at a given Motion Threshold setting. A Large setting assumes fast motion with blur occupying a larger area of the image, which excludes more of the image from Temporal NR at the same Motion Threshold setting. Choose the setting that gives you the best compromise between reducing noise and the introduction of motion artifacts when adjusting the Motion Threshold parameter.

Temporal Threshold Controls

The Temporal Threshold parameters allow you to control which image characteristics get more or less noise reduction.

— **Luma Threshold:** Lets you determine how much or how little Temporal NR to apply to the luma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine detail from the image.

— **Chroma Threshold:** Determines how much Temporal NR os applied to the chroma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine color detail from the image. However, you may find you can raise the Chroma Threshold higher than the Luma Threshold with less noticeable artifacting.

— **Gang Luma Chroma:** Ordinarily, the Luma and Chroma Threshold parameters are ganged together so that adjusting one adjusts both. However, disabling this checkbox unganges these parameters, allowing you to adjust different noise reduction amounts to each component of the image, depending on where the noise happens to be worst.

— **Motion:** Defines the threshold separating which moving pixels are in motion (above this threshold) versus which moving pixels are static (below this threshold). Using Motion Estimation, Temporal NR is not applied to regions of the image that fall above this threshold, to prevent motion artifacts by not applying frame-averaging to parts of the image that are in motion. Lower values omit more of the image from Temporal NR by considering more subtle movements. Higher values apply Temporal NR to more of the image by requiring faster motion for exclusion. You can choose between 0 and 100, where 0 applies Temporal NR to no pixels, and 100 applies Temporal NR to all pixels. The default value is 50, which is a suitable compromise for many clips. Be aware that if you set too high a Motion Threshold, you may see artifacts in moving parts of the image.

— **Blend:** Lets you dissolve between the image as it's being affected by the Temporal NR parameters (at 0.0) and the image with no noise reduction (100.0). This parameter lets you easily split the difference when using aggressive temporal noise reduction.

Spatial NR Controls

The Spatial NR controls let you smooth out regions of high-frequency noise throughout the image, while attempting to avoid softening by preserving detail. It's effective for reducing noise that Temporal NR can't.

— **Mode:** The Mode drop-down menu lets you switch Spatial NR between three different algorithms. All three modes of operation use the same controls, so you can switch between modes using the same settings to compare your results.

— **Faster:** Uses a computationally lightweight method of noise reduction that's good at lower settings, but may produce artifacts when applied at higher values.

— **Better:** Switches the Spatial NR controls to use a higher quality algorithm that produces greatly superior results to Faster, at the expense of being more processor intensive to render and not allowing you to decouple the Luma and Chroma Threshold sliders for individual adjustments to each color component.

— **Enhanced:** Does a significantly better job preserving image sharpness and detail when raising the Spatial Threshold sliders to eliminate noise. This improvement is particularly apparent when the Spatial Threshold sliders are raised to high values (what constitutes "high" varies with the image you're working on). At lower values, the improvement may be more subtle when compared to the "Better" mode, which is less processor intensive than the computationally expensive "Enhanced" setting. Additionally, "Enhanced" lets you decouple the Luma and Chroma threshold sliders so you can add different noise reduction amounts to each color component, as the image requires.

— **Radius:** Options include Large, Medium, and Small. A smaller radius offers greater real-time performance and can provide good quality when using low Luma and Chroma Threshold values. However, you may see more aliasing in regions of detail when using low NR Threshold values.

Setting Radius to be progressively larger results in higher quality within areas of greater visual detail at high Luma and Chroma Threshold values, at the expense of slower performance. An NR Radius of Medium should provide suitable quality for most images when using medium NR Threshold settings. As with many operations, there's an adjustable tradeoff between quality and speed.

Spatial Threshold Controls

The Spatial Threshold parameters allow you to control which image characteristics get more or less noise reduction.

— **Luma:** Lets you determine how much or how little noise reduction to apply to the luma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine detail from the image.

— **Chroma:** Lets you determine how much or how little noise reduction to apply to the chroma component of the image by smoothing out regions of high-frequency noise while attempting to preserve the sharpness of significant edge details. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine color detail from the image. However, you may find you can raise the Chroma Threshold higher than the Luma Threshold with less noticeable artifacting.

— **Gang Luma Chroma:** Ordinarily, the Luma and Chroma Threshold parameters are ganged together so that adjusting one adjusts both. However, you can ungang these parameters to adjust different amounts of noise reduction to each component of the image. For example, if an image softens too much at a certain level of noise reduction, but you find more color speckling than luma noise, you can lower the Luma Threshold to preserve detail while raising the Chroma Threshold to eliminate color noise.

— **Blend:** Lets you dissolve between the image as it's being affected by the Spatial NR parameters (at 0.0) and the image with no noise reduction (100.0). This parameter lets you easily split the difference when using aggressive spatial noise reduction.

Global Blend

— **Blend:** Lets you dissolve between the image with no noise reduction (1.0) and the image with both Spatial NR and Temporal NR at their current settings (0.0).

Using Noise Reduction

The following procedure suggests a method of using the Noise Reduction (NR) parameters to achieve a controlled result.

Applying noise reduction to an image:

1   Enable Temporal NR by choosing 1 to 5 frames from the Number of Frames pop-up menu. Keep in mind that more frames dramatically increase the render time of this effect, while it may or may not significantly improve the result, depending on your material.

2   Choose options from the Motion Est. Type and Motion Range drop-down menus corresponding to how much motion is in the image. If there's a lot of motion, you may need to choose Better and Large. If there's not very much motion, lesser settings may suffice.

3   With Luma and Chroma Threshold linked, slowly raise either parameter until you just start to see a reduction in noise within nonmoving areas. Then make smaller adjustments to determine the maximum amount you can add without creating artifacts or overly softening detail.

4   If there's obviously more chroma than luma noise in the image, you can disable Luma/Chroma linking at a satisfactory level of luma noise reduction, and then raise the Chroma Threshold to address color speckling in the picture.

5   Suppose you're not satisfied with the tradeoff between the maximum possible threshold of noise reduction and the prevention of motion artifacts. In that case, you may want to adjust the Motion Threshold setting, lowering it to omit more of the motion from the noise reduction operation, or raising it to include more motion. If you're still not satisfied, you can also try better Motion Est. Type and Motion Range settings.

Keep in mind that the strength of Temporal NR is to reduce noise in unmoving parts of the image. When you've achieved the best tradeoff between noise reduction in the still areas and avoidance of motion artifacts in the moving areas of the image, it's time to turn to Spatial NR to further eliminate noise throughout the rest of the picture.

6   Enable Spatial NR by raising either the Luma or Chroma Threshold parameters, which are linked by default, until you strike a suitable balance between the reduction of noise and an unwanted increase in image softness.

7   It's recommended to choose the Enhanced option from the Spatial NR mode pop-up, as it will yield the best possible results. However, this can be processor-intensive, so if you need better real-time performance, you can switch the mode to Faster and compare results.

8   If there's obviously more chroma than luma noise in the image, you can disable Luma/Chroma linking at a satisfactory level of luma noise reduction, and then raise the Chroma Threshold to apply more aggressive Spatial NR to address color speckling in the picture.

9   If you've had to use a high Spatial NR Luma or Chroma Threshold setting to reduce noise visibly, and areas of detail look a bit chunky or aliased, you can choose a larger setting from the Radius pop-up menu to enable a more detailed analysis of the scene.

This will result in higher visual quality, but larger NR Radius settings are more processor-intensive and may reduce real-time performance if you don't have adequate GPU resources available to your system.

10   If you've found suitable noise reduction settings, but the result is too aggressive and makes the image appear too processed, you can try raising the Spatial NR and/or Temporal NR Blend parameters to fade between the noise reduction added by each set of controls, and the image as it was before you added noise reduction.

Try Applying Temporal NR First, then Applying Spatial NR

Because Temporal NR analyzes multiple frames for its noise isolation, it tends to be better at preserving detail accurately in regions of the image where there's little motion. If you try applying Temporal NR first and get a successful result, even if only in part of the image, you may reduce how much Spatial NR you have to apply, thus improving the overall quality of your final result.

Keep in mind that while Temporal NR does a great job in unmoving parts of an image but is less effective when dealing with subjects in motion, Spatial NR can reduce noise everywhere in the frame falling below its threshold, even when there's motion. Ultimately, a combination of the two is almost always going to be a winning combination.

Spatial NR Radius, How Large Should You Go?

Larger NR Radius settings can dramatically improve the quality of high-detail regions in shots where you're using aggressive Spatial noise reduction, but it's not necessary to always jump to the large Radius setting, which provides the highest precision. In many cases, when evaluating an image that you're applying noise reduction to, you may not be able to perceive the additional quality. You'll waste processing time on an unnecessary level of correction.

It's a good idea to evaluate the full-frame image on a large enough display to see the noise you're working on within the viewing context of the intended audience. Zooming really far into a clip while applying noise reduction may encourage you to use higher quality settings than are necessary because an excessively enlarged detail of an image lets you see subtle changes that you wouldn't notice at actual size.

Object Removal (Studio Version Only)

A Revival category plugin 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 plugin 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 plugin.
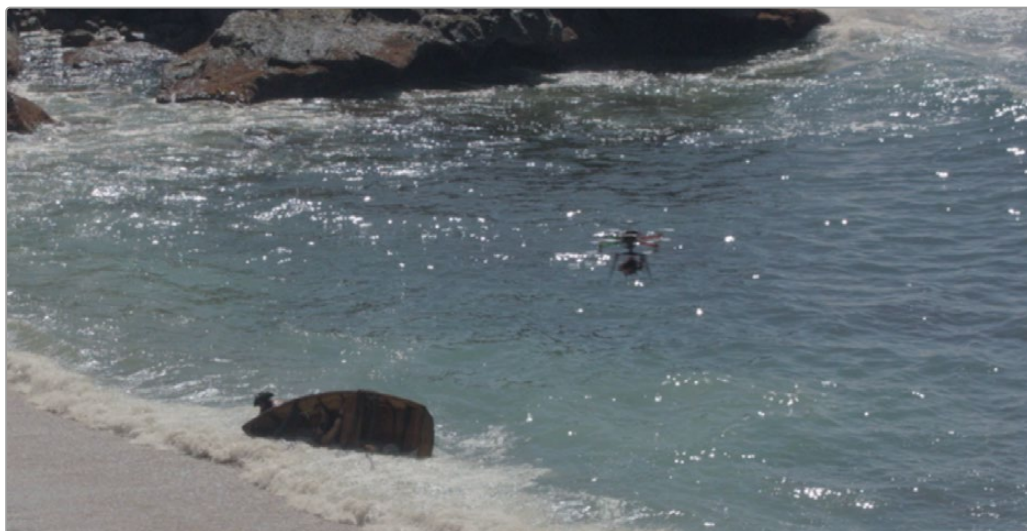
The original shot with a drone that needs to be removed

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 plugin onto the node in which you've just isolated the feature to be removed.

5   The "Use OFX Alpha" option will be activated automatically in the node's contextual menu to enable the Object Removal plugin 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.
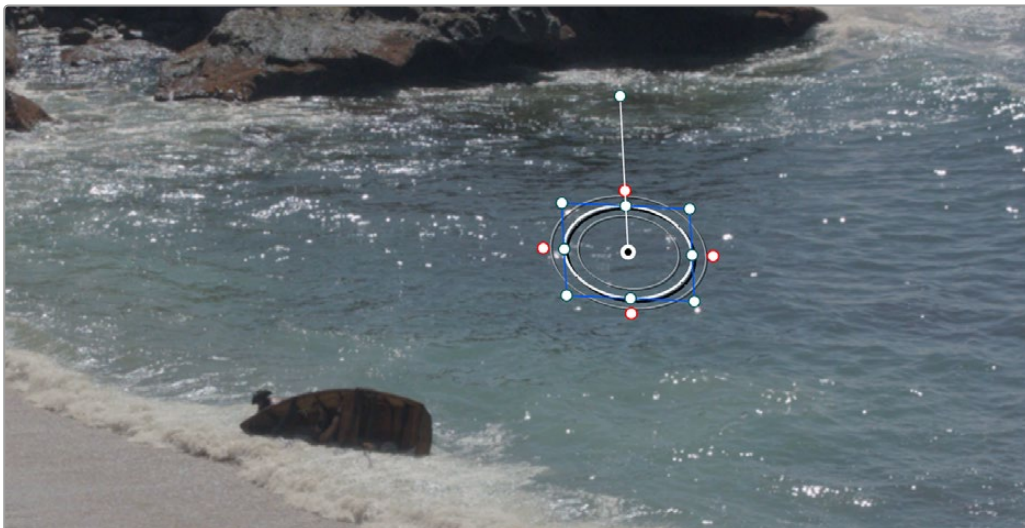
The result after object removal analysis is complete

The Object Removal plugin 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 plugin 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.

— The Scene Mode drop-down menu provides different methods of analyzing the scene, for improving the analysis of how the area that needs to be replaced moves, to best determine how to fill the hole left by the object being removed. Background analyzes the entire image except for the object region. Boundary analyzes the boundary area surrounding the object region. Object is for analyzing an object that moves with the background, like a sticker that's on a window while the camera moves.

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 plugin offers more options and a streamlined workflow.

On adding the plugin, an onscreen control consisting of two patches appears, with an arrow connecting them indicating which patch is being copied into the other. The patch to the left is the "source" patch, used to sample part of the image, and the patch 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.
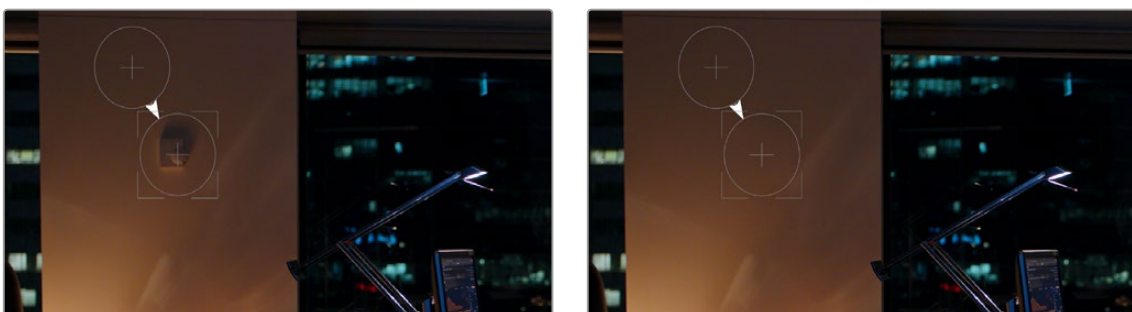
(Left) Original image, (Right) Removing the thermostat with the Patch Replacer

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.

The Align Source to Target button moves the source patch directly over the target patch, allowing you to quickly reset and iterate the location of the source patch.

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.

Resolve FX Sharpen

These plugins offer a newer and more detailed method of sharpening specific details in images than the sharpen operation found in the Blur palette.

Three different plugins 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 plugin 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 plugin.

— **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.

Resolve FX Stylize

The plugins 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 plugin 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 plugin 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.
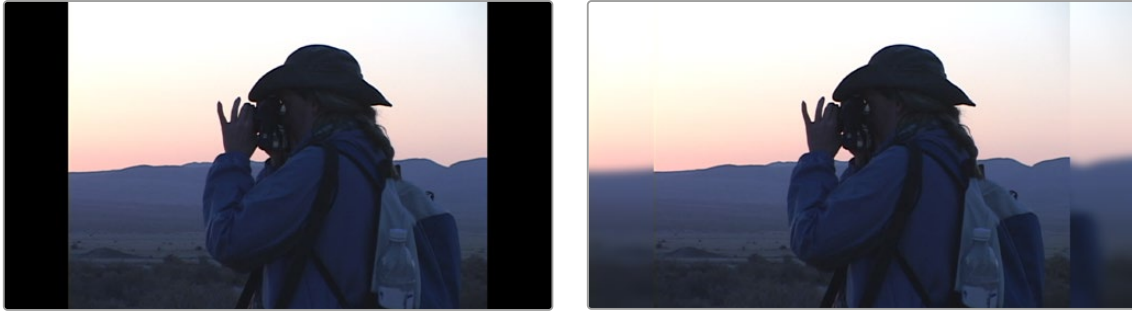
(Left) Original standard definition image, (Right) Image with default Blanking Fill applied

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

These controls let you add a drop shadow to "lift" the foreground image against the blanking fill image.

— **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.

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 that isolates high-contrast boundaries with options for customizing which edges create outlines. With the edges isolated, this allows you to sharpen soft clips or to create a glow around a subject.
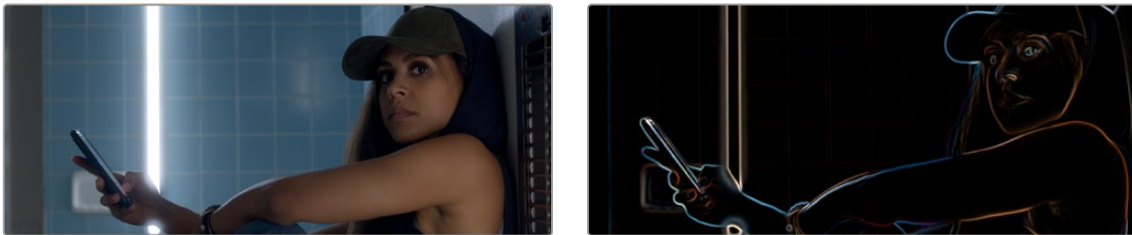
(Left) Original image, (Right) Image with default edge detect applied

Main

— **Mode:** Lets you choose between RGB and Grayscale edges. RGB is the default. RGB finds edges based on color and brightness, while Grayscale detects edges based solely on brightness changes.

— **Edge color:** (only enabled if Mode is set to Grayscale) Lets you colorize the edge outlines that are generated.

Detection

These controls determine the strength and parameters of the detected edges.

— **Edge Width:** Lets you set the thickness of the resulting edges.

— **Brightness:** Lets you set how bright you want the edges to be.

— **Gamma:** Applies a gamma curve to the edge detection. A gamma below one adds brightness to mid-strength edges, making more edges "detected," while a gamma above one darkens mid-strength edges, reducing the edges to all but the strongest detected.

— **Blur:** Softens the final result, allowing the edges to blend in more naturally.

— **Edge Mask Overlay:** This checkbox overlays the edges on top of the current frame to observe the filter's results. Unchecking this box shows only the detected edges.

Filters

These controls determine how the edges are blended with the original frame.

— **Preprocess:** Lets you choose which method of de-noising filtering to use. The default is None.

— **Filter:** Reduces texture and filters out detail at the chosen Scale parameter below.

— **Flatten:** Flattens smooth areas of the image, leaving edges only where they divide between other flat regions in the image. The Strength parameter below controls the amount of this smoothing.

— **Half-Edges Only:** Edges are detected between regions of different brightness. This option lets you determine which side of the edge to keep. The default is None (both sides of the edge are kept).

— **Keep Light Side:** Edge selects only the brighter half of the edge. Useful, for example, in creating a light-wrap effect on a person's face as only the lighter (face side) of the edge is selected, limiting the increased brightness of the light wrap to the face only and not the background. The Half-Edge Gain slider allows you to further boost the brightness of the edge, separately from the main Brightness control.

— **Keep Dark Side:** Edge selects only the darker half of the edge. Useful, for example, in creating a glow effect on a person's face as only the darker (background side) of the edge is selected, allowing a halo to form around the face, but not on it. The Half-Edge Gain slider allows you to further boost the brightness of the edge, separately from the main Brightness control.

Advanced Options

These controls allow you to select some advanced parameters for the effect.

— **Normalize Per Frame:** Performs a brightness adjustment on each incoming frame to a consistent level, causing edges to remain visible as the scene changes brightness or flickers. Use this setting if your scene has content that has constant changes in brightness levels, otherwise uncheck this box.

— **Clamp Brightness:** Keeps the output edges from becoming too bright if the contrast of the content is too high.

> For example, if you wanted to make a slight glow around the woman in the frame below using edge detect:
>
> — Select RGB Edges, Check the Edge Mask Overlay box, and adjust the Blur to about .5 to blend them into the frame subtly.
>
> — Next select Flatten from the Preprocess control to smooth out the fine details in the image, ensuring that only the highlights from the woman's hat, arm, and phone are detected, as well as the bright fluorescent light on the wall. These are what we want to "glow." Adjust the Strength slider to taste.
>
> — Then select "Keep Dark Side" in the Half-Edges Only box. This ensures that the glow radiates out from the edges and not onto the woman and the light. Adjust the Half-Edge Gain slider to taste.

The shot before the Edge effect

The Edge Detect effect only on the same image
with the parameters described above

The Edge Detect result; notice the glow coming from the light
and around the woman's hat, arm, and phone.

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.

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 plugin 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 Resolve (Studio Version Only)

A plugin 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 image.

Sky Replacement

Replacing a drab, colorless sky with a more vibrant one or matching skies shot on different days are common colorist tasks that are made more efficient with the Sky Replacement effect. The benefits of using Sky Replacement instead of traditional compositing methods are a focused specific toolset allowing you to:

— Dynamically match the foreground to the brightness and color cast of the sky.

— Use Tracking options to move the sky along with the clip's camera movement.

— Add realistic computer generated sky elements, like sky color, horizon haze, clouds, and light sources.

(Left) The original bland sky, (Right) The image with a new better looking sky.

Selecting the Sky to be Replaced

It should be noted that the Sky Replacement effect does not do any sky selection itself, but rather takes that selection from other tools and focuses on blending the selection seamlessly with either a background plate of another sky or its own artificial sky generator. The benefit of separating the sky selection and the replacement tools is deliberate, as qualifying a sky is usually trivial, while getting a good mask at the horizon is not. This allows the colorist to use the right qualifier (HSL, Window, Magic Mask, etc.) for the particular scene, and then pass that on to the Sky Replacement effect. Another benefit of this arrangement is that the Sky Replacement effect can be applied to the same node as your qualifier, letting you select and replace the sky all in one node, and both tools can be updated concurrently as you use them.

To select the sky to be replaced and connect it to the Sky Replacement FX:

1 In a color node, use any Qualifier (Power Window, HSL, 3D, Magic Mask, etc.) to get a clean key of the sky and horizon.

2 Then drag the Sky Replacement effect from the Effects Library onto the same node.

3 Or create a new color node, drag the alpha output from the previous node (blue square), to the alpha input of the new node (blue triangle), and drag the Sky replacement effect from the Effects Library to the new node.

Selecting the Replacement Sky

Once your original sky is qualified, you have two choices on what to replace the sky with, either an artificially generated sky (created in the Sky Replacement Parameters below), or new footage of a previously shot sky as a background plate.

To connect a sky background plate to the Sky Replacement FX:

1   In a color node, qualify the sky and add the Sky Replacement FX.

2   Right-click on the node with the Sky Replacement FX, and select Add OFX Input from the drop-down menu. An additional color and alpha input appear on the node.

3   Drag the clip of the sky background plate from the Media Pool into the Node tree to make a new external matte of the clip.

4   Add a serial node off the external matte to make a new color node, so you can reposition and grade the sky background plate as necessary.

5   Connect the color output of the new color node (green square) to the Sky Replacement color input (the lower green triangle on the node). This will now use the video of the background plate for the sky replacement.
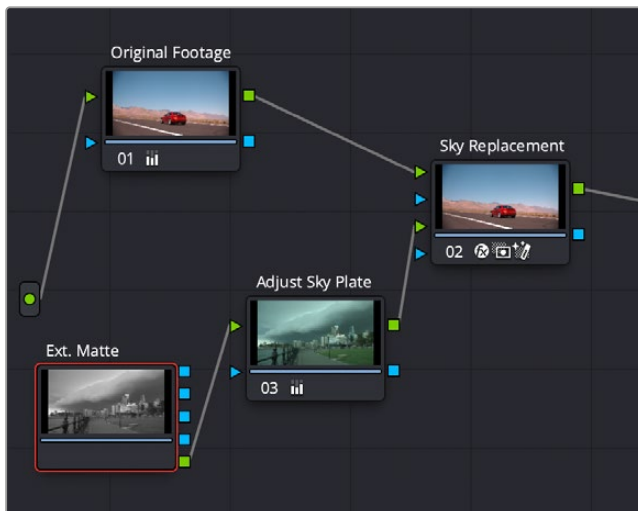
The node tree showing how to add your own sky background plate footage to the Sky Replacement effect.

Sky Mask Adjustments

These options let you make final adjustments to the source mask from whatever qualifier you've used.

—   **Preview Mask:** Check this box to see the mask as a black and white matte; white is where the new sky will come through.

—   **Shift Edge:** Shifts the mask boundary into, or away from, the horizon.

—   **Refine:** Adjusts the mask boundary to the image edges.

—   **Black Level:** Adjusts the transparency level of the mask.

—   **White Level:** Adjusts the opacity level of the mask.

Source Sky Appearance

These tools let you customize the look of the new incoming sky. They have no effect on the artificial sky, but only on a video clip used as a sky background plate.

—   **Color Space:** Lets you adjust the incoming sky's color space. Defaults to timeline settings.

—   **Gamma:** Lets you adjust the incoming sky's gamma. Defaults to timeline settings.

—   **Detail:** Lets you adjust the incoming sky's midtone detail.

— **Brightness:** Lets you adjust the incoming sky's brightness.

— **Saturation:** Lets you adjust the incoming sky's saturation.

— **Temperature:** Lets you adjust the incoming sky's color temperature.

— **Tint:** Lets you adjust the incoming sky's tint.

— **Opacity:** Lets you adjust the incoming sky's opacity, if you want to blend it in with the sky from the original footage.

The same car shot with a more dramatic storm footage used as the replacement sky, adjusted with the Source Sky Appearance tools.

Artificial Sky

These options let you generate realistic looking artificial sky elements. They are broken into three categories: Sky, Cloud, and Hotspot (stand in for the sun or moon). By default, the opacities for these elements are all set to zero (off). In order to see them, you must increase the opacity for each category to a positive number.

— **Preview Artificial Sky:** Checking this box shows all the Artificial Sky categories alone, without being composited with the foreground plate.

— **Sky Opacity:** Lets you adjust the opacity of the sky. Zero is totally off, and one is completely opaque. Any value in between is used to blend the artificial sky in with the source sky.

— **Sky Color:** Lets you set the color of the sky.

— **Horizon Color:** Lets you set the color of the horizon haze that blends with the sky color.

— **Horizon Softness:** Lets you adjust how soft the horizon blends into the sky.

— **Horizon Height:** Lets you set how high the horizon reaches in the frame.

— **Horizon Angle:** Lets you adjust the angle of the horizon.

— **Cloud Opacity:** Lets you adjust the opacity of the clouds in regards to the sky. Lower values blend the clouds in more; higher values make them stand out.

— **Cloud Color:** Lets you set the color of the clouds.

— **Cloud Scale:** Lets you set the size of the noise pattern that creates the clouds, letting you choose how close the clouds are to the foreground.

— **Cloud Shape:** Lets you adjust the horizontal/vertical ratio of the clouds. Lower values equal puffier (cumulus) clouds, while higher values make them more lengthened (cirrus).

— **Cloud Tilt:** Lets you adjust the angle of the sky relative to the ground, to match the foreground angle.

— **Cloud Detail:** Lets you determine the ratio of large to fine detail in the clouds.

— **Cloud Fill:** Lets you adjust the amount of cloud cover in the sky.

— **Cloud Contrast:** Lets you adjust how contrasty the cloud cover is compared to the sky.

— **Cloud Time:** Lets you change the noise pattern of the clouds. Using this control with keyframes will let you change the cloud pattern over time.

— **Hotspot Brightness:** Lets you adjust the intensity of the hotspot. Zero is no hotspot. There is an on-screen control for this option in the Viewer.

— **Hotspot Color:** Lets you adjust the color of the hotspot.

— **Hotspot Position:** Lets you adjust the position of the hotspot. There is an on-screen control for this option in the Viewer.

— **Hotspot Size:** Lets you adjust the size of the hotspot.

— **Hotspot Sharpness:** Lets you adjust the sharpness of the edges of the hotspot.

Sky Position

These tools let you track the motion in the foreground clip, in order to realistically move the sky along with any camera movement.

— **Match Motion:** Lets you choose which tracking method to use.

  — **Keyframing Only:** Lets you manually adjust the sky movement by keyframing the position controls.

  — **Track Foreground:** Automatically performs a track based on the foreground elements in the composite.

  — **Track Original Sky:** Automatically performs a track based on the sky in the original clip. Only works when the sky has existing details like clouds. This is the best and most reliable tracking method to use if your footage allows.

  — **Use FX tracker:** Links to the track generated by the FX tracker in the tracker controls.

— **Adjust Size:** Lets you adjust the size of the sky, so that it can cover the range of motion defined in the tracker.

— **Adjust Position:** Lets you manually adjust the X and Y positions of the sky.

— **Auto-Size for Motion:** Analyzes the track and automatically sets the size and position of the sky to encompass the track's extents.

— **Flip Horizontal:** Flips the sky on its horizontal axis.

Sky Integration

These controls help you match the attributes of the final sky to the foreground footage.

— **Preview Final Sky:** Check this box to view only the final sky output, including motion and any keyframed parameters.

— **Lens Distortion:** Adjust this to warp the sky to match the curvature of the original camera lens.

— **Lens Defocus:** Adjust this to move the sky out of focus and match the depth of field of the original lens.

— **Exposure:** Lets you adjust the overall brightness of the sky.

Foreground Appearance

Turning on these controls automatically attempts to adjust the overall look of the foreground, based on an analysis of parameters of the final sky.

— **Adjust Foreground:** Check this box to activate the Foreground Appearance tools below.

— **Auto Adaptation:** Selects the method by which the Foreground Appearance analysis is generated.

— **None:** No automatic settings are applied. You can manually adjust the parameters below.

— **Globally Applied:** The color cast is calculated from the visible sky and then applied globally to the foreground, with no variations in brightness. However, the color cast will update dynamically if the sky changes over time.

— **Match Horizon:** The color cast is calculated from the visible sky but is weighted towards the horizon, its distance set with the Localization control. This will make brighter/darker areas of the sky apply bright/darker changes to the foreground. For example, if you have a dark sky but a moon on the horizon, the foreground will be brighter around the moon than elsewhere. This also updates dynamically over time.

— **Adaptation Amount:** Lets you select how much adaptive color adjustment to make.

— **Localization (Match Horizon only):** Lets you determine how far or near the color cast reaches from the horizon.

— **Brightness:** Lets you adjust the foreground's gain or brightness.

— **Saturation:** Lets you adjust the foreground's saturation.

— **Temperature:** Lets you adjust the foreground's color temperature.

— **Tint:** Lets you adjust the foreground's tint.

Sky Replacement Workflow

Here's a sample workflow for replacing the sky with one generated by the artificial sky tools.

This is the original clip, with the sky we want to replace. To start with, we simply make a new color node.

The original shot we want to replace the sky on.

Next we need to qualify the sky. For this clip, we can apply the Magic Mask (object) tool to the node to select just the sky we want to replace. You could also use the HSL qualifier, 3D qualifier, or even a power window to do the same thing.
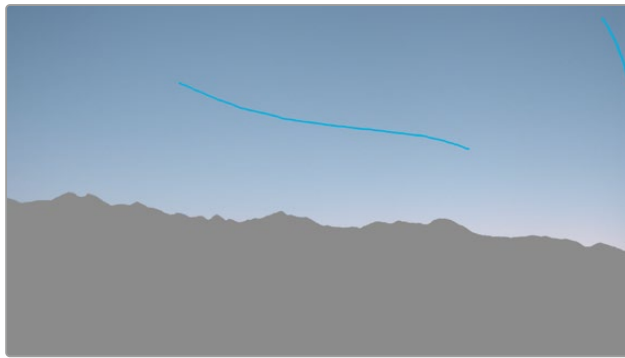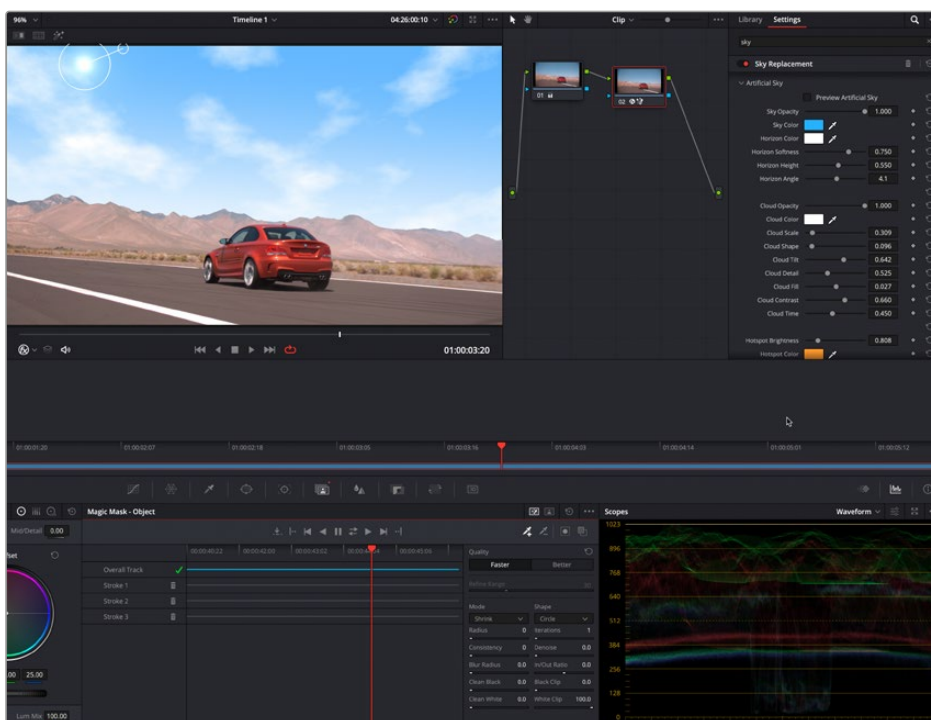
The sky qualified using the Magic Mask tool.

Now that the sky is selected, we can drag and drop the Sky Replacement effect from the Effects Library onto the same node that our Magic Mask is on.
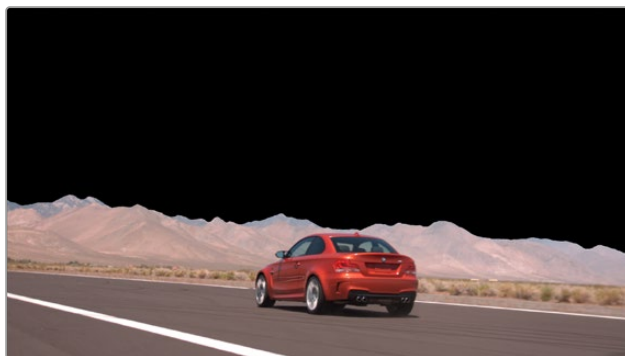
The black area is where we will create our new sky.

Now that both toolsets are active on the same node, we can adjust both the Magic Mask and the Sky Replacement parameters at the same time. This makes the complete sky replacement a one node process.

You can use both the Magic Mask (or any qualifier) and the Sky Replacement tools on the same node.

Using the Artificial Sky Controls, we can create a new, more interesting sky. Then, using the Sky position tools, we can track the sky to the camera movement of the original clip. Finally, adding the Foreground Appearance toolset, we can seamlessly blend the foreground and sky together.

The final replaced sky that tracks with the camera movement.

Stylize (Studio Version Only)

A plugin 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 plugin 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 (Studio Version Only)

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.

— **Map Source:** Lets you choose the source for the depth map. Custom (default) lets you create the depth map in the effect. From Alpha In and From Second Input allow you to import depth maps created in other nodes.
— **Center X, Center Y, and Angle:** These parameters let you transform the depth map.
— **Focus Sweep:** Lets you dial in a region based on "distance" for isolation. White areas of the depth map are affected by the blur, while black areas of the depth map are ignored.
— **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.
— **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.

TIP: To create more believable Depth of Field adjustments, use the Depth Map effect in conjunction with the Tilt-Shift Blur effect. You can feed the results of the depth map directly into the Tilt-Shift Blur effect as a blur map, by connecting the key output of the Depth Map node to the key input of the Tilt-Shift Blur node, and selecting "From Alpha In" in the Map Source dropdown in the Depth of Field section of the effect. From there adjust the Focus Sweep to dial in the area you want to isolate. If you're not getting the expected results, try inverting the depth map.

Vignette

A plupin 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.

Resolve FX Temporal

DaVinci Resolve comes with several Resolve FX that focus on the application of an effect over time.

Contents

Motion Blur (Studio Version Only)

This effect replicates the Motion Blur panel in the Color page's Motion Effects palette. The Resolve FX version allows you to use these tools across the other pages in the program. Motion Blur settings use optical flow-based motion estimation to add artificial motion blur to clips that have none. This can be useful in cases where a program was shot using a fast shutter speed, and you later decide that the resulting video has too much strobing. By analyzing the motion within a clip, the Motion Blur settings can selectively apply blurring to the image based on the speed and direction of each moving element within the scene.

Three parameters let you set how much motion blur to add, and at what quality:

— **Motion Est. Type:** A setting of Better provides more accurate pixel mapping at the expense of being more processor intensive. Faster provides a more approximate result but is less processor intensive.

— **Motion Range:** Determines what speed of motion to consider when defining regions being blurred.

— **Motion Blur:** Raise this parameter to add more motion blur to the image, lower it to add less. The range is 0–100, where 0 applies no motion blur, and 100 applies maximum motion blur.

— **Blur Direction:** Allows you to chose which way the blur extends from the current frame. The options are: Both Directions, From Previous Frame, and Towards Next Frame.

— **Granularity:** Adjusts how much detail is added to the blur.

Motion Trails (Studio Version Only)

The Motion Trails effect copies the image to create ghost-like trails on moving images. This effect can be used to simulate clips shot with long shutter speeds and analog video feedback effects.

General

The first two sliders control the number and strength of the copied frames.

— **Trail Length:** Determines the number of copies that are used to create the trails.

— **Dropoff:** Sets the fade applied to each copied frame. The Dropoff value is compounded. For instance, using a value of .5 applies 50% opacity to the first copy, 25% to the second, 12.5% to the third, and so on.

Advanced Options

The advanced options are used to control how the overlapping copied frames are blended.

— **Composite Gamma:** The Composite Gamma menu provides four options for controlling the brightness of the overlapping frames.

 — **Timeline:** Uses the Timeline Color Space setting in the Project Settings to control the overlapping brightness. This setting, by default, is Rec. 709, Gamma 2.4.

 — **Rec. 709:** Uses a Rec. 709 color space with Gamma 2.2 to control the overlapping brightness.

— **Linear:** Uses Linear Gamma, often producing much stronger highlights.

— **Custom:** Provides a custom gamma slider which defaults to Gamma of 2.4. Setting this to a value of 1.0 is the same as setting the menu to Linear.

— **Input Alpha:** There are three choices in the Input Alpha menu that determine how the alpha channel is used for blending the frames. All three options assume there is an alpha channel present on the clip that has the Motion Trail applied.

— **Ignore:** This is the default option and will cause the alpha channel to be ignored. Disabling the Use Alpha checkbox when Ignore is selected will cause the alpha to act as a stencil effect for the trails.

— **Onto Current:** Uses the alpha channel for the trails, but instead of compositing it over the lower video track, the trails are composited over themselves using the current frame.

— **Onto Black (Alpha Out):** This option uses the alpha channel for the trails and compositing over the lower video track, assuming the Use Alpha checkbox is enabled.

Move Trail

This group of controls determines the offset, direction, size, and rotation of the copies. Adjustment amounts are applied as offsets from one copy to the next. For instance, if rotation is set to 5 degrees, the first trail copy is rotated 5 degrees, the second trail copy is rotated 10 degrees, the third copy is rotated 15 degrees, and so on.

— **Pan:** Adjusts the offset of the trail copies from the original image.

— **Pan Angle:** Changes the angle at which the trails are offset from the original image. The values are shown in degrees.

— **Zoom:** Adjust a scale adjustment, successively, to each copy.

— **Rotate:** Applies an angle of rotation, successively, to each copy.

— **Reuse Current Frame:** When this checkbox is disabled (the default), each copy uses the frame after the copy before it. For instance, the first copy is the current frame -1, and the second copy is the current frame -2. When this checkbox is enabled, all copies use the same frame as the current frame in the clip.

— **Border Type:** This menu determines how edges of the frame are handled when the copies are scaled smaller than the timeline resolution.

— **Black:** The area outside the image is set to black.

— **Soften:** This control blends the edges of the rectangular frame borders to give the images a more organic appearance.

— **Replicate:** Duplicates the outermost pixels along the edge of the image. The pixels are stretched out from each side to reach the timeline resolution boundary.

— **Reflect:** The image is flipped and flopped to create a mirrored image that extends to the timeline resolution frame boundary.

— **Wrap-Around:** Duplicates the image to create a video wall effect, used to fill in the space to the timeline resolution frame boundary.

Smear (Studio Version Only)

The Smear effect simulates motion blur in a clip by blending a user-definable number of frames.

— **Frames Either Side:** Determines the number of frames that are blended on either side of the current frame. For instance, entering a value of 2 uses two frames before and two frames after the current frame to create the effect.

— **Luma Threshold:** This control sets how bright a pixel must be to contribute to the smear effect. A lower value causes only darker pixels to be smeared. A higher value includes brighter pixels in the effect.

— **Chroma Threshold:** This control sets how saturated a pixel must be to contribute to the smear effect. A lower value causes only low saturated pixels to be smeared. A higher value includes more saturated pixels in the effect.

Stop Motion

This plugin 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.

Advanced Options

— **Set Reference Frame:** Selects the current frame in the Viewer as the reference frame.

— **Reference Frame:** The frame number of the reference frame used for the skip pattern. The frame number is calculated from the start of the entire original media clip (frame 0).

— **Sampling Variation:** This slider increasingly produces more uneven motion in the clip.

General

— **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.

Resolve FX Texture

These plugins are designed to add texture to images, to replicate both naturalistic and other effects.

Contents

Analog Damage (Studio Version Only)

A Texture category plugin 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 plugin 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.

Detail Recovery (Studio Version Only)

Detail Recovery is a utilitarian effect that lets you extract image detail from the second input, in order to re-add it to the image coming in the first input. In this way, you can selectively add detail back to an image in which it's been removed. Because of how it works, this is an effect that's intended to be used on the Color page.

To use Detail Recovery, you must add it to the node tree as a Resolve FX node (dragging it directly from the Open FX library into the node tree as its own node), in order to expose both of the RGB inputs that appear on the node when you do this. By default, the first RGB input is for the image you want to add detail to, and the second RGB input is for the image you're extracting image detail from.

In the following example, Node 1 is the base grade, and Node 2 is a grade in which the highlights are being blown out for stylistic effect. The Detail Recovery node is then being added to add specific image detail from Node 1 back to the output of Node 2.
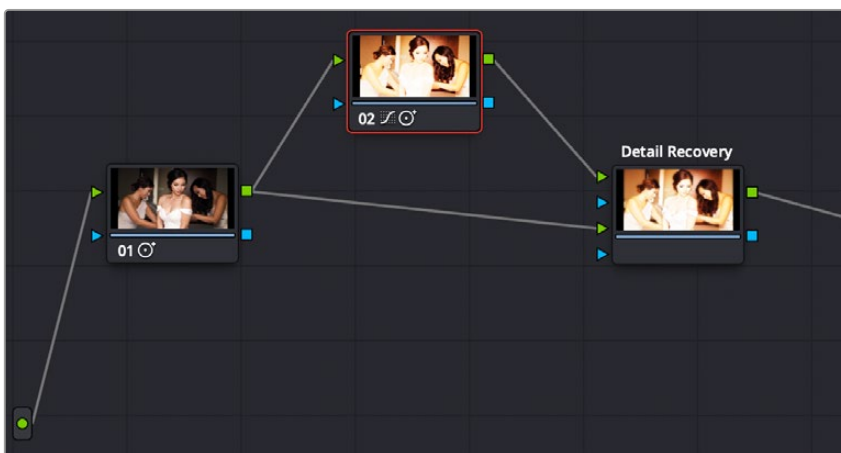
Setting up the Detail Recovery effect to add image
detail from Node 1 to the image coming from Node 2

The result, compared with the image in Node 2, is an image that's still harshly exposed, but that has traces of fine image detail so it doesn't look so clipped.
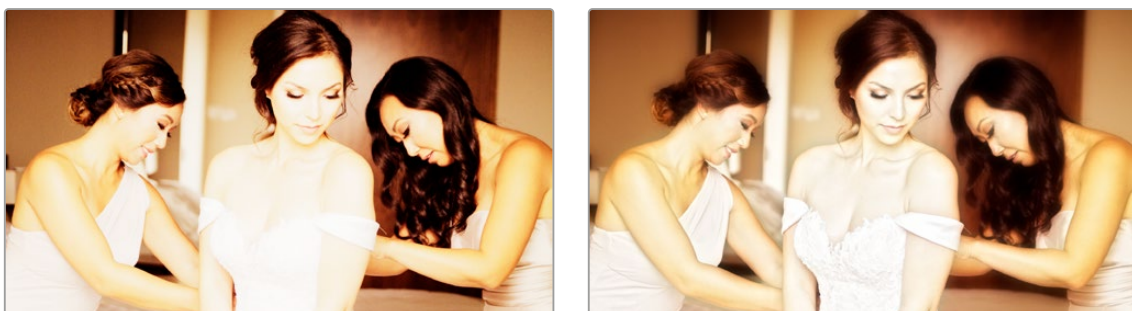
(Left) The image with highlights compressed harshly, (Right) The
image with high-frequency detail added back

Detail Recovery has the following parameters.

Detail Recovery

— **Transfer Direction:** This drop-down menu lets you choose which input provides the detail and which input the detail is combined with.

Details Extraction

— **Frequency Cutoff:** A slider that lets you choose how much detail you want to extract for recovery. Lower values isolate finer details; higher values include progressively larger details.
— **Strength:** This slider lets you exaggerate or attenuate the detail that's extracted for recovery.
— **Detail Mix:** At a value of 1.000, this slider blends the extracted detail with the image you're adding it to so that both layers blend together. At a value of 0.000, the extracted detail replaces whatever overlapping pixels are in the image you're adding it to. Using this slider, you can choose the best blend for your purposes.
— **Preview Detail checkbox:** Turning this checkbox on lets you see the detail that's being extracted using the Frequency Cutoff and Strength sliders.

Fast Noise

Fast Noise creates computer-generated noise patterns that can be composited on, or used to warp a video clip for a variety of special effects, such as smoke, haze, or water ripples.
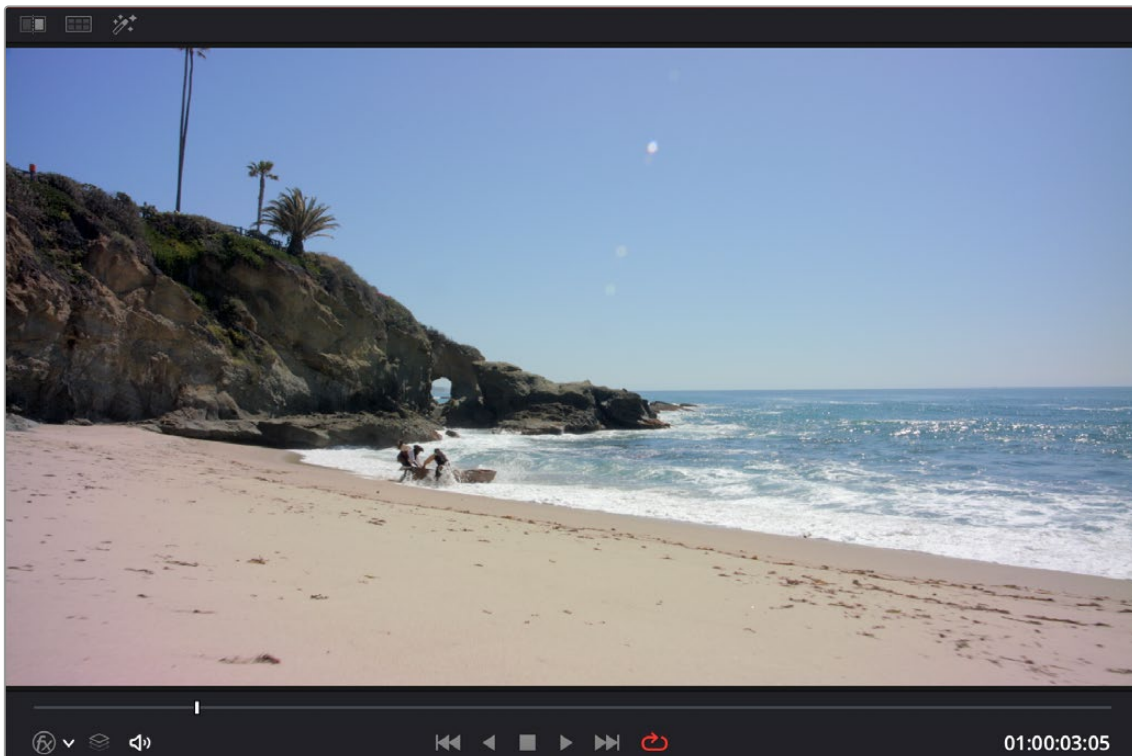
Original image

The image with Fast Noise's Smoke preset applied.
The onscreen controls for position and rotation are visible.

Appearance

Controls for what noise pattern is generated. All parameters are keyframeable for changing the noise pattern over time.

— **Preset:** Select from some common noise pattern use cases: Mist, Smoke, Water Surface, River, and Heat Haze. Default is the standard noise pattern, and Custom is auto-selected if you change any of the parameters below.

— **Scale:** The size of the noise pattern.

— **H/V Ratio:** Controls the horizontal/vertical spread ratio.

— **Detail Level:** How many levels of fine detail to generate.

— **Detail Balance:** Applies weighting to the different scales of detail. The slider lets you choose between stronger large detail or stronger fine detail. A value of 0.000 removes fine detail entirely.

— **Evolution:** Changes the noise pattern gradually. This slider controls the "progress" of the noise pattern over time, rather than just modifying its current state.

Adjustment

Controls for adjusting the parameters of the noise pattern once it's been generated. Especially useful for modifying the noise pattern's Alpha channel for compositing. All parameters are keyframeable for changing the noise pattern over time.

— **Brightness:** Increases or decreases the gain of the noise pattern.

— **Contrast:** Moving this slider to the right makes the light areas lighter and dark areas darker in the noise pattern, increasing the contrast. Moving it to the left reduces the contrast.

— **Saturation:** This slider controls the scale between a grayscale and color noise pattern. A value of 0.000 is completely grayscale, and a value of 1.000 is fully color.

— **Color Tint:** Sets the overall color of the effect.

Position

Controls that adjust the center and direction of the noise pattern.

— **Position X/Y:** Location of the center of the noise pattern.

— **Rotation:** Rotates the noise pattern around its center.

— **Position Reference:** Controls how to position the effect when a clip is re-sized or moved in the Timeline.

    — **Sizing and FX Tracker:** The noise pattern follows Sizing and FX Tracker adjustments in the Color page. For example, if you used the FX Tracker to track a camera pan, the noise pattern would move with the pan, rather than stay in one place as the shot panned underneath it.

    — **Keyframed Positions:** The noise pattern position can be adjusted as normal using keyframes.

The position and rotation controls can also be adjusted directly in the Viewer when the Open FX Overlay mode is selected from the drop-down menu in the bottom left of the Viewer. Dragging the star in the Viewer adjusts the X/Y position. Dragging the circle clockwise or counterclockwise sets the rotation.

Auto-Animation

These controls allow you to adjust the animation of the noise pattern.

— **Velocity X/Y:** How far to automatically advance each frame from the start position. You can keyframe these controls to change the noise pattern's direction, without adjusting its actual X/Y position. This lets you mimic motions like smoke changing direction in the wind.

— **Seethe:** Controls how far to automatically evolve each frame from the starting Evolution value.

— **Randomize Start Frame:** Aligns the skipping cycle to the current frame. This allows you to re-use a favorite effect in multiple clips without it looking exactly identical in each instance.

— **Start Frame:** Lets you set the reference frame for the skip pattern. This allows you to control the sequence of noise you get, just in case you need to match it to the same noise pattern on another clip. This frame will be repeated.

Output

These controls allow you to choose how to adjust the output of the noise pattern.

— **Preview Noise:** Checking this box shows the noise pattern alone.

— **Output:** Choose how to use the noise pattern.

    — **Composite Onto Clip:** The noise pattern is placed on top of or mixed into the video clip.

    — **Composite Type:** Selects composite mode for the noise pattern.

— **Put Into Alpha Channel:** The noise is inserted into the node's Alpha channel, allowing you to use the noise pattern for compositing purposes. Please note, you will also need to right click on the node and select "Use OFX Alpha" to activate this setting. Alternatively, you can drag the Fast Noise effect directly into the Node Graph as an FX Node instead of applying it to a corrector node, and you can use the Alpha without additional settings.

— **Use to Warp Image:** The noise pattern is used to distort the image.

— **Input Alpha:** Controls what to do with the input Alpha channel.

  — **Limits Warping Effect:** Limits the warp to certain areas as defined by the Alpha channel. For example, when you want to have a water ripple or heat shimmer on only certain part of the clip.

  — **Gets Warped as Well:** The warp affects the Alpha channel in addition to the RGB channels. For example, when warping a logo with a transparent background.

Film Damage

Found in the ResolveFX Texture category. After you've used the new ResolveFX Revival plugins to fix damage in archival footage, you can turn around and use the Film Damage plugin to make brand new digital clips look worn, dirty, and scratched instead. When used in conjunction with the Film Grain and Flicker Addition plugins, 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 plugin.

— **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 plugin, 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 plugin, 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. When the Optimized Mode checkbox is turned on (the default), performance should improve substantially. Turning on the Animate on Every Refresh checkbox will animate the grain as you adjust the sliders, allowing you a better idea of how the grain pattern will look in motion.

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.

Texture Pop (Studio Version Only)

Texture Pop is a more sophisticated and flexible version of the Midtone Detail control found in the Primaries and HDR palette. Using the controls of this effect, you can either remove texture or exaggerate it. There are two modes of operation that determine how specific a result you can achieve.

— In Simple mode, you can apply more extreme versions of the Midtone Detail effect found in the Primaries and HDR palette. A single Details slider lets you soften or sharpen midtone detail in the image with a greater range of operation, while a Strength slider lets you exaggerate the effect further or attenuate the effect to back it off.

— In Advanced mode, you can fine-tune the softness or sharpness of high, medium, and low-frequency image detail with great specificity via seven individual "details" sliders, labeled Rough, Coarse, Medium, Small, Fine, and Tiny. This lets you adjust the textural characteristics of multiple frequencies of image detail in different ways, for example softening Fine detail while intensifying Medium detail. The Strength slider lets you exaggerate or attenuate the overall effect caused by all sliders.

In either mode, the Details/Range sliders default to 0.000, which causes no change to the image. This is the level to choose to preserve the original quality of detail in the image. They range from -1.000 (maximum softening) to +1.000 (maximum sharpening). Additionally, a set of Tonal Range controls (described later) lets you choose how much of this effect is applied to the Shadows, Midtones, and Highlights of the image, giving you even more specific control over which parts of the image are softened and/or sharpened.

Understanding Advanced Mode

Advanced mode is the most exciting way to use this effect. The best way to learn what Advanced mode does is to set all of the Details sliders to -1.000, and then raise each one individually to see what kind of image detail get reintroduced, and ultimately enhanced, if you raise each slider above 0.000. In the following image, each of the Details sliders has been set to -1, which is the maximum smoothing for each setting. The result is an image with minimal detail.

In the following example, a person and the mechanical details of a helicopter shot are smoothed by setting each detail slider to -1.000. You can see that the resulting images both retain the broad strokes of color and contrast that define each region of color, but outside of high-contrast edges, all textural detail has been smoothed to a clean gradient.

(Left) An image of a person with all detail smoothed,
(Right) An image of mechanical detail with all detail smoothed

Then, by raising each of the Details sliders back to 0 or even +1 one at a time, you can see exactly what kind of detail that slider is affecting. As you can see in the example of the person, the Tiny and Fine sliders are affecting only the smallest details, hairs, lines, and pores of the skin. In the helicopter detail, you can see the kind of small textures, tiny lines, and rivet details that come back.
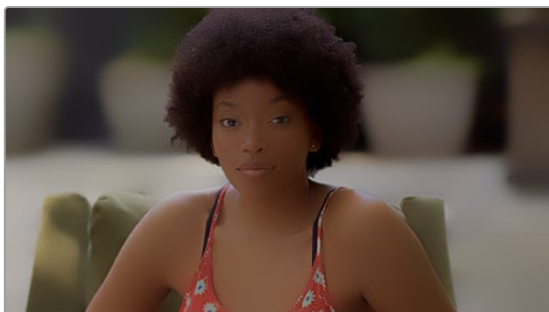
(Left) The same image of the person with the Tiny and Fine sliders raised to add subtle detail back to the image, (Right) The helicopter detail with Tiny and Fine detail added back to the image

Here are two sets of generalizations that hold true if you're thinking about the detail of a human face.

— Tiny, Fine, and Small controls affect the smallest details in an image, including the pores (tiny), blemishes (fine), and wrinkles (small) of average closeup shots. Other features affected would include high-frequency edge detail of strands of hair, leaves on a tree, or text on a page of paper or screen.

— Rough, Coarse, and Medium tend to affect progressively smaller shadow contouring of faces, bodies, and objects.

Of course, the granularity of a particular type of image detail depends on how much of a closeup or long shot the clip is. When the camera is closer to the subject being adjusted, you'll be able to adjust much finer details. When the camera is distant, then even large details on the subject are affected by the Tiny, Fine, and Small controls. This means when you create an adjustment for a subject in a closeup, you'll need to make changes to the adjustment if you try and apply it to a long shot.

Mode Controls

— **Operating Mode:** Lets you choose between the Simple and Advanced modes of this plugin.

— **Color Mode:** Lets you choose between working in RGB and Luma/Chroma mode. In RGB, a single set of parameters affect all three color channels at once. In Luma/Chroma mode, two sets of controls let you fine-tune the luma and the chroma separately.

— **Output Mode:** Lets you choose between outputting the Final Result, Differences mode, which lets you see the effect differenced against the original image, and Difference Magnitude, which shows a high-contrast differencing comparison.

Details Controls

— **Strength:** Lets you exaggerate the effect of the other Details sliders further, or attenuate the effect to back it off.

— **Details:** (Simple mode only) Lets you soften or sharpen midtone detail in the image with a greater range of operation.

— **Rough/Coarse/Medium:** (Advanced mode only) These three sliders affect progressively larger contours of the image, appearing to affect the shadows and structure of the image.

— **Small/Fine/Tiny:** (Advanced mode only) These three sliders affect progressively smaller details and texture of the image, adjusting medium to tiny details, lines, and specks.

Tonal Range Controls

— **Shadows:** Lets you reduce the effect you've created in the shadows of the image, as defined by the Low Range parameter.

— **Midtones:** Lets you reduce the effect you've created in the midtones of the image, as defined by the Low and High Range parameters.

— **Highlights:** Lets you reduce the effect you've created in the highlights of the image, as defined by the High Range parameter.

— **Low Range:** Lets you define the image value that defines the transition from Shadows to Midtones.

— **High Range:** Lets you define the image value that defines the transition from Midtones to Highlights.

Resolve FX Transform

The plugins 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 plugin 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.

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 plugin 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 plugin directly onto the connection from the last node in the tree to the Output, to add it as a stand-alone FX node.
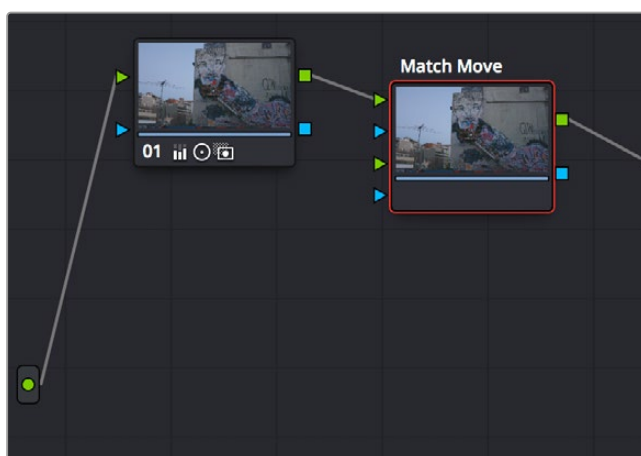

Adding the Match Move filter as a stand-alone FX node

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.
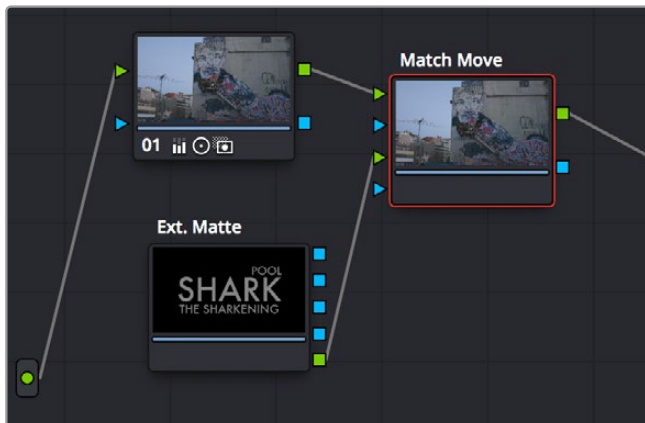

Connecting the foreground image to the second input of the FX node

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.
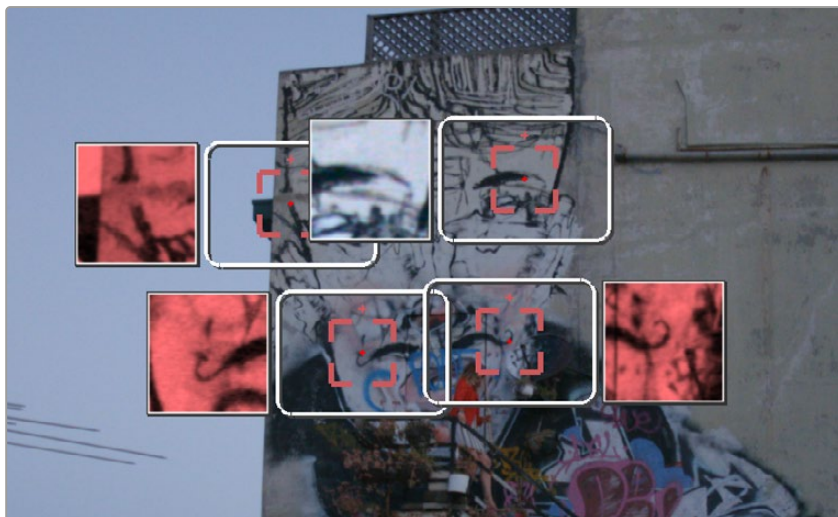

Adding tracker controls to the feature you need to Match Move to

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.
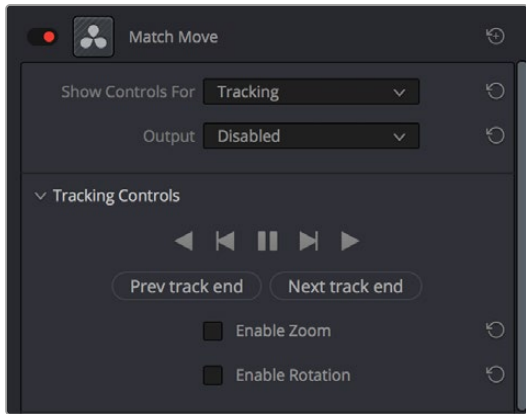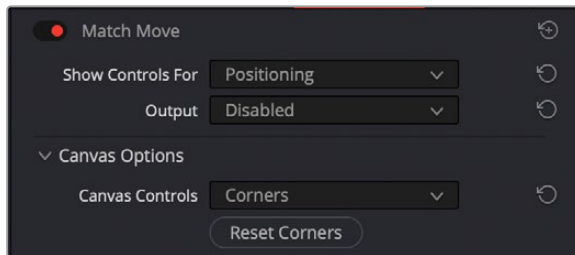
Using the Tracking controls

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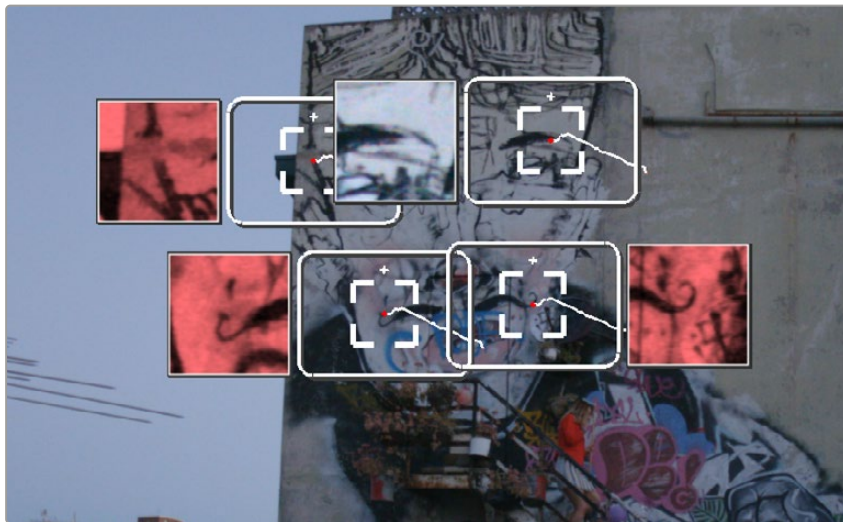
Placing more tracking controls to cover for tracking controls that turn themselves
off when going offscreen or being occluded by other moving features in the image

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.
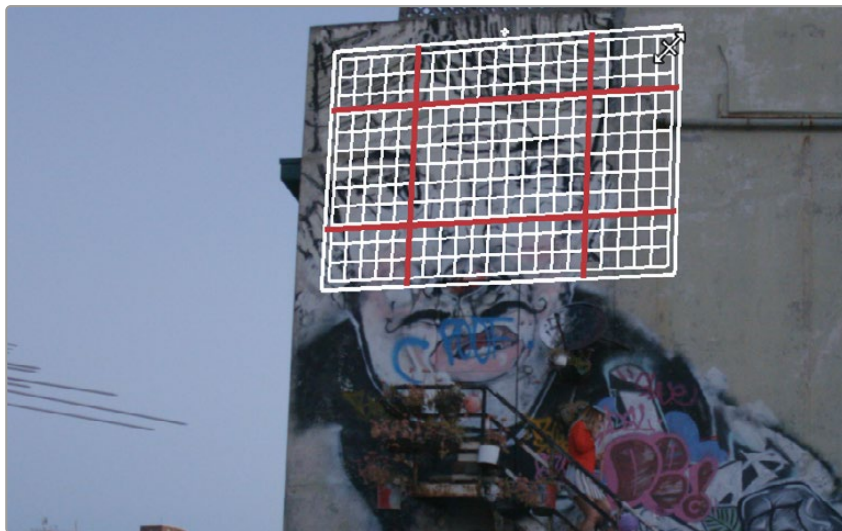
Resizing the canvas to fit the foreground image into the background

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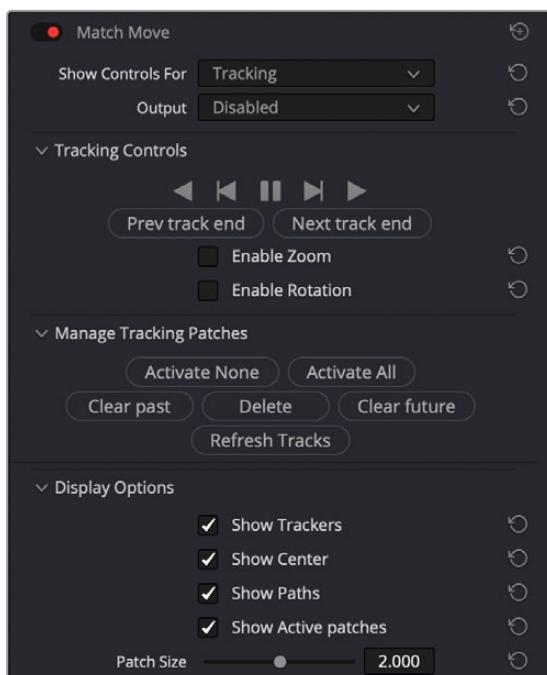
The controls that are exposed when
Main Controls is set to Tracking Controls

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.
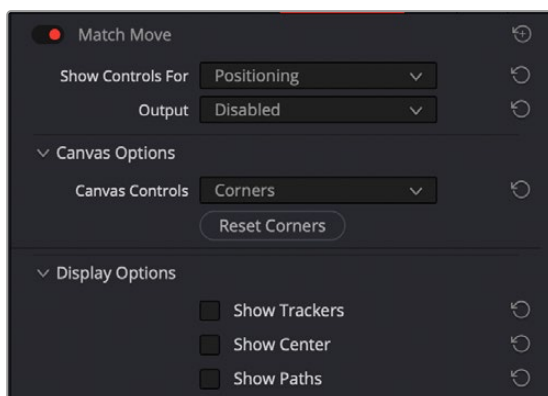
The Display Options group

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.
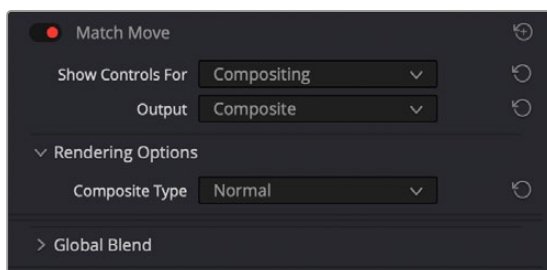
The controls that are exposed when Main Controls is set to Compositing

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 Resolve FX plugin 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.
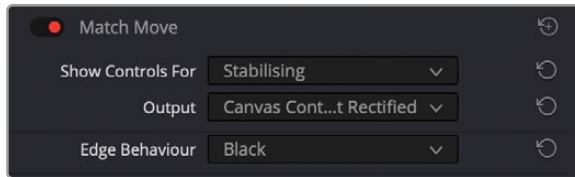
The controls that are exposed when Main Controls is set to Stabilizing

Surface Tracker (Studio Version Only)

The Surface Tracker is used for applying textures and effects to flexible or deformable moving surfaces, like cloth and skin. The Surface Tracker ensures that the folding and deforming of the texture or effect is realistically matched to the folding and deforming of the surface that it is attached to in the image.

The Surface tracker is a complex effect, with many different options and controls to create the most realistic composites possible. But in all cases you simply move from left to right, using the buttons in the effect's settings.

1   Click the Bounds button, and click on the screen to define the area on the surface where you wish to apply the new texture. The bounds should select one surface at a time and not go over/on object edges.

2   Click on the Mesh button to define the control points along the natural folds and curves of the surface within the bounds.

3   Click on the Track button to analyze the motion of the surface over time, using the Mesh you just set.

4   Click on the Result button to composite the texture on top of the moving Mesh.

It is recommended that you use the Surface Tracker as a separate FX Node (dragged from the effects library directly into the node tree), rather than applied to a normal corrector node. This allows you to have access to an additional Alpha input for applying textures that have some transparency built in to them.

Across all the tabs in the Surface Tracker, the Tracked Range shows the start and end frame numbers of your clip that contain tracking data. Any existing tracking data will be reset if you modify the bounds, or mesh layout, and you will need to re-track it.

The Surface Tracker in action, overlaying the logo (left), and warping and conforming it realistically to the folds of the shirt (right).

Bounds

This is where you are prompted to draw an area on the image that you want to apply the texture to. Ideally, you want to choose a frame in the clip that has the surface you want to track as close and as flat-on to the camera as possible. This frame becomes the default reference frame for the effect. Make sure that the Open FX Overlay controls are active in the Viewer to use the tool. Simply click on the image to make multiple points around the area you want to define (a minimum of three points are required), and the effect will connect them automatically as a polygon. Boundary points should be **on** the surface for tracking, not around it. If points are accidentally placed on object edges or the background instead, it will cause errors in the tracking.

You may add multiple boundaries and multiple holes to the same image, and all boundaries will join together into one shape before subtracting the holes. The purpose of multiple boundaries and holes are to allow you to mask out complex surfaces with regions not for tracking. For example, you can make a boundary around someone's face, but use multiple holes to exclude the eyes and mouth as those change appearance quickly as the subject blinks and talks, making them exceptionally difficult to track.

Multiple boundaries are designed to work on the same surface; using multiple boundaries on different surfaces within the image will cause poor results. Separate surfaces are best tracked by using multiple instances of the Surface Tracker instead.

The boundary is not useful for rotoscoping objects, only for analyzing the motion of a surface. Rotoscoping of foreground objects can be done as described in the Tracking Using a Mask section below.

— **Click to Add Points:** These are the controls used to make boundary areas on the image.
  — **Boundary:** The currently selected boundary area on the image. You can change the current boundary or hole by using the drop-down menu. If there are issues with the boundary (i.e., crossed edges, too few points, etc.), an error message will appear next to the boundary name.
  — **+ Bound:** Adds a boundary polygon to the image. You can have multiple boundaries defined for the same surface, and they will be joined together into one shape.
  — **+ Hole:** Adds an area to exclude tracking from the surface. Used to remove overly complex and changing parts of a surface from the effect's calculations.
  — **Delete:** Lets you delete the boundary or hole selected in the Boundary field. Currently, this operation is not undo-able, so be careful around this button.
  — **Clear All:** Lets you delete all boundaries and holes in the effect.

Mesh

With the boundaries now defined, you can establish the mesh over the surface to be tracked. The initial mesh serves as the starting point for tracking, so for best results the mesh should be placed when your surface is as flat-on and closest to the camera as possible.

The mesh can be manually adjusted by dragging current points (multiple points can be moved by holding command and dragging an area around the points) or clicking on an area to place new ones. Option-clicking a point will remove it from the mesh. Manually adding mesh points can be useful if there are flexible portions of the surface known to be a point where the texture should fold but which is not initially identified when placing the mesh. For example, an extended arm may not have a mesh point active at the elbow, but with a mouse click (and a basic knowledge of human anatomy), you can manually add one there. Another use case would be to add points to an area with little detail, but you know will develop detail as it rotates into view. Placing mesh points in blank areas that show little detail will not improve results and may actually degrade them, so very few points on smooth areas is desirable. A good rule of thumb is that if more than five points are created inside the boundaries, the mesh may be good enough for tracking. Points cannot be added or deleted after tracking.

A good mesh is a sign of good tracking as they go hand in hand. If your mesh has few points detected and the results don't track tightly, you can artificially improve your results. For example, make sure that the content is clearly visible. Tracking and point detection can fail if the surface is too bright (HDR), too dark, or low contrast due to working in log. To improve results, you can add a corrector node before the Surface Tracker to adjust contrast and levels manually, then run the Surface Tracker. You could also use a corrector node with the Contrast Pop effect before the Surface Tracker to help track surfaces that are too smooth. In both cases simply disable the corrector node again after the tracking has finished.

— **Regenerate Mesh:** This button recreates the mesh at the current frame and settings and discards any manual changes that have been made.

— **Point Locations:** These controls determine which mode is used to generate the mesh points.

— **Automatic:** The Surface Tracker automatically locates the best details for tracking, and places mesh points on those details. In most cases Automatic will give you the best results.

— **Point Number Limit:** Lets you set the maximum amount of mesh points to place. The number of mesh points affects how the overlay will flex and fold, and should be set by the expected flexibility of the surface. They do not directly affect tracking speed.

— **Minimum Point Spacing:** Lets you set the minimum distance between mesh points. This prevents mesh points from bunching together too tightly in highly detailed areas and interfering with each other.

— **Uniform Grid:** Creates a regular grid of points in the boundary and relies on internal shape models to deform the grid during tracking. This may give better results than Automatic mode if your surface is highly detailed.

— **Horizontal Spacing:** Adjusts the horizontal distance between adjacent points in the uniform mesh.

— **Vertical Spacing:** Adjusts the vertical distance between adjacent points in the uniform mesh.

Track

This section of the effect tracks the motion of the mesh points over time. Use the Tracking Direction controls to complete the tracking procedure across the clip. After the tracking is complete, the effect does no more analysis, and any additional contrast assistance from previous nodes can be discarded after this step. For simple cases, the tracking may run completely without user intervention, but for more complex cases, a number of additional controls are used to refine the track.

Fixing a broken track will require some manual adjustments to both the mesh and the tracking data. At any time while tracking, mesh points can be adjusted either one by one, or with the lasso selection tool (Command - Drag) around the entire mesh or just parts of it. The lasso selection tool also has the ability to stretch, scale, and rotate the mesh points, making it easier to manually deform and place the mesh exactly where you want it to be, if for some reason the automatic tracking fails. However, additional mesh points cannot be added or deleted at this stage, without first resetting the tracking.

Command-Drag will allow you to lasso multiple mesh points,
and scale, rotate, and stretch them, as needed.

Manually editing the mesh points at a frame only affects that frame directly; it does not affect neighboring tracking data. However, it does affect neighboring interpolated positions, which makes it good for tracking from that point onwards. For example:

— Tracking is good until frame 150 when a few points separate from the rest, disturbed by a lighting change. At frame 150 they can be manually moved back into place, then if tracking is resumed they will continue with their corrected positions.

— Tracking exists until frame 150, after which there is no data for a few frames until it resumes at 160. Editing the points at either frames 150 or 160 will cause the intermediate frames to be interpolated with these changes applied.

— Tracking exists up to frame 150 and at frame 160 onwards, frames 151-159 are interpolated. At frame 155 some points are adjusted. This creates tracking data at this frame, and now frames 151-154 interpolate from the last tracked frame to this current one, and then frames 156-159 from the current to the next tracked frame.

If an object in the frame occludes the tracked surface, for example tracking a mesh on a shirt, and the person's arm moves down through the mesh, breaking the track. You may be able to fix this issue by using an Alpha channel, as described in the Tracking Using a Mask section below.

Tracking data is also visible as keyframes in the Keyframe Editor in the FX node's Surface Tracker keyframing data, and it is also accessible as the last control at the bottom of the Track section where the data at a frame can be created or deleted directly.

— **Go to Start:** This button will snap the playhead to the first frame that has been tracked, or the frame where the boundary was created.

— **Go To End:** This button will snap the playhead to the last frame that has been tracked.

— **Tracking Direction Controls:** These controls perform the tracking analysis in the direction indicated. They are from left to right: Track Backwards, Track Backward One Frame, Pause Tracking, Track Forwards Then Reverse, Track Forwards One Frame, Track Forwards. Using these controls, you can set the track across the whole clip or limit the tracking to just a section of it.

— **Tracking Data Controls:** These controls allow you to manipulate the track data after it's been run.

    — **Remove Tracking Data Before This Frame:** Clears all the tracking data before the current frame.

    — **Track From Last Known Match:** This button will match the tracking data to the current frame and connect it to the last frame where tracking data exists. If there has been too much motion between those times, you can move the points approximately into place and try matching again. For example, the tracking occurs without issue until frame 150, but something moving across the scene causes an error in the track for six frames (151-157). The tracking data can be paused before it hits these frames, or these frame's tracking data can be deleted after the fact. Then at frame 158 you can press this button to continue the track from the last known good track at frame 150.

    — **Remove Tracking Data At This Frame:** Clears the tracking data at the current frame.

    — **Remove Tracking Data After This Frame:** Clears all the tracking data after the current frame.

— **Interaction Overlays:** These buttons control the visibility of the mesh overlays on the Viewer.

    — **Show:** Shows the mesh at all times.

    — **Hide on Drag:** Shows the mesh until a point is dragged, then it is hidden, allowing you to see the surface underneath for fine adjustments.

    — **Hide:** Hides the mesh at all times.

— **Tracking Behavior:** These options allow you adjust the way the tracking operates.

    — **Motion Range:** Controls how far to search for matches. Increase this slider if the surface is moving too quickly and the tracking fails to find it.

    — **Mesh Rigidity:** Controls how flexible the mesh is. Reduce this slider to make the mesh points more flexible. This gives you best results if the clip is noise-free and warping smoothly. Increase this slider to get a "stiffer" tracked surface with less internal warping.

    — **Quality:** The tracker can be very computationally intensive; it is recommended to use the Faster setting while making adjustments to the mesh, then use Better for the final track once all the parameters have been set correctly.

    — **Tracking Keyframes:** Controls the Surface Tracker in the standard Keyframe Editor. You can insert, delete, and navigate different keyframes from this option.

> **NOTE:** The Surface Tracker creates data at each frame of the source clip. If the source clip is not at the same frame rate as the timeline, tracking may seem to stutter or skip frames. You can "bake" retiming into a clip by right-clicking on it on the Edit page and choosing "Render In Place" to create a result with exactly one frame for every timeline frame.

Result

Once the tracking data is complete, the Result section lets you determine what and how to composite a video layer on top of the moving surface.

— **Output:** There are six options for what to do with the resulting tracking data.

 — **Warp Input 2 Onto 1:** Warps the Surface Tracker's second RGB input to the shape and position of the tracked mesh and composites it onto the clip.

 — **Warp Input 2 Onto Blank:** Warps the Surface Tracker's second RGB input to the shape and position of the tracked mesh and passes the Alpha channel information, allowing you to perform the actual composite in another node or effect.

 — **Warp Input 1's Alpha:** Applies the results of the Surface Tracker to the first Key input (the second RGB and Key inputs are ignored). If the first Key input receives an Alpha channel from another node with, say, a drawn shape, or a key, or other Alpha data, it can be warped from the first frame to others.

 — **Create Mesh Alpha Mask:** Produces an Alpha mask, which follows the position and shape of the outline of the mesh. All inputs and alphas are ignored.

 — **Stabilize-Warp Input 1:** Performs an inverse warp to the Reference Frame (again, this should be a frame that ideally is as close to and flat-on to the camera as possible). The result is a stationary image within the boundary with all the lighting changes and details of the surface's motion shown on it. This now stabilized image can be modified with any of DaVinci Resolve's existing tools, bypassing any issues caused by this area's motion in the original video clip. Once modified, you warp the result back onto the original footage by using a copy of the original Surface Tracker node but with the Rewarp Stabilized Clip setting here instead.

 — **Rewarp Stabilized Clip:** Composites the output of the Stabilize-Warp Input 1 selection back onto the original video clip, after it's been modified. This option is designed to be used in conjunction with a copy of a Surface node using Stabilize-Warp Input 1. It seamlessly blends whatever additional modifications that were made between the two Surface Trackers back together.

— **Overlay / Alpha Source:** Allows you to select which frames of the overlay or alpha are used to create the result.

 — **First Frame:** Useful for freezing content from an overlay clip to use a still frame as a static texture. In DaVinci Resolve's External Matte controls the offset can be chosen, but also you can use the same frame as the texture reference with Reference Frame.

 — **Reference Frame:** Starts at the currently defined reference frame (see below), instead of at frame 0. The reference frame is the frame which the mesh overlay is initially positioned in its "un-warped" state, and the positioning controls are active.

 — **Each Frame:** Treats the overlay or alpha as a clip, warping each frame in turn. This is necessary for animated overlays or re-warping stabilized content. It should be noted that in the Key controls on the Color page, when an External Matte is selected, options appear to control the lifetime of the external clip.

— **Expand / Contract:** Allows you to add or remove pixels from the edges of the overlay or alpha. It is important to note that the expanded area is not tracked and will not be stabilized to the content.

— **Softness:** Blurs the edge of the Expand/Contract tool to blend more realistically into the scene.

— **Motion Blur:** This slider lets you add motion blur to the overlay to preserve the illusion that it was actually captured with the scene.

— **Overlay Placement:** These controls let you set the initial transform options for the image you want to overlay on the mesh.

  — **Go To Reference:** Moves the playhead to the selected reference frame.

  — **Set to Current:** Sets the current frame under the playhead as the reference frame.

  — **Reference Frame:** Shows the frame number at which the overlay is originally positioned and un-warped (the point from which the warp to every other frame is calculated). The positioning controls appear on screen when the clip is at the reference frame. A frame where the surface's view is largest and least warped is the best starting point for rendering onto other frames.

  — **Positioning:** Lets you choose how to adjust the overlay position.

    — **Sliders:** Choosing this option exposes a set of transform sliders (X/Y position, zoom, rotate, etc.) that let you manipulate the overlay's initial position.

    — **Interactive Canvas:** Choosing this option exposes draggable frame controls in the Viewer, allowing you to transform the overlay using mouse controls. The Viewers shows a large grid with 9 regions; you can drag in any of them to move, skew, or warp the overlay.

    — **Interactive Pins:** Adjusting the image in this mode is done by manually placing control points, called pins, in the Timeline Viewer. Adding one pin only gives you position control. At least two points are required for scaling and rotation. Dragging on one of the pins scales or rotates the image around the other pin. Using three pins, you can create perspective distortions by dragging any one of the pins. You can add up to four pins for unique corner pinning distortions.

  — **Reset Position:** Resets the on-screen overlay back to its default state.

— **Interaction Overlays:** These buttons control the visibility of the mesh overlays on the Viewer.

  — **Show:** Shows the mesh at all times.

  — **Hide on Drag:** Shows the mesh until a point is dragged, then it is hidden, allowing you to see the surface underneath for fine adjustments.

  — **Hide:** Hides the mesh at all times.

— **Compositing:** Lets you set the composite blend mode for the overlay operation. For more detailed information on each blend mode, *see Chapter 50, "Compositing and Transforms in the Timeline."*

  — **Composite Type:** A drop-down menu of all the possible composite operations.

  — **Opacity:** This slider controls the transparency of the overlay.

Using the Surface Tracker

The Surface Tracker is a deep and versatile tool that can be used to realistically isolate a moving surface for a variety of effects. The examples below can get you started on discovering its uses.

Using the Surface Tracker to Composite a Logo onto a Fabric Surface

One of the more common use cases of the Surface Tracker is to overlay a still graphic on top of a moving surface and have the graphic behave realistically as the surface deforms and warps. In this example, we will add a simple logo to the back of a jacket.

The first step is to define the boundary of where we want the surface analyzed. For best results, you need to place the boundary on the surface to be tracked, not around it, and try to find a frame where the surface is flat on to the camera and as large in the frame as possible.

The next step is to define the Mesh within the surface to be warped. In this case, we will leave the Point Locations setting at Automatic to have the effect apply the mesh points. Ideally, there will be more than five mesh points for a good track. Unfortunately, this surface doesn't have enough detail to make a good mesh, so we will temporarily add a Contrast Pop node before the Surface Tracker in order to artificially enhance its details.

Creating the initial boundary to isolate the surface of the jacket where the logo will be applied
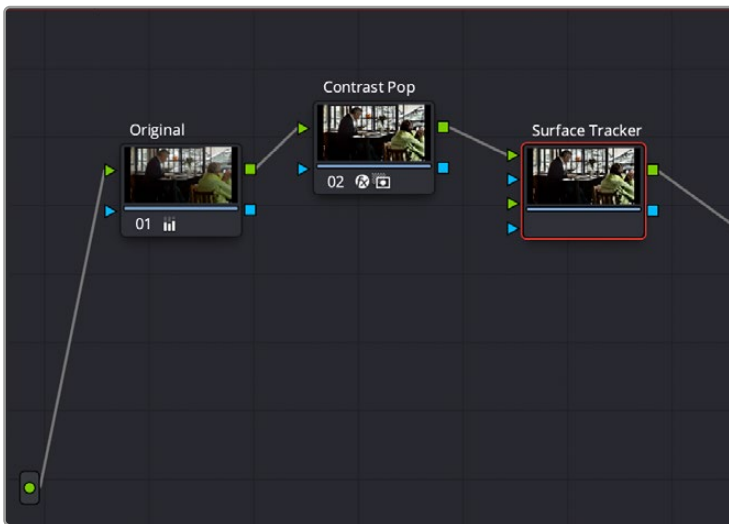
By adding the Contrast Pop FX before the Surface Tracker input, we can artificially increase the detail inside the boundary, giving it a better surface to form the mesh.
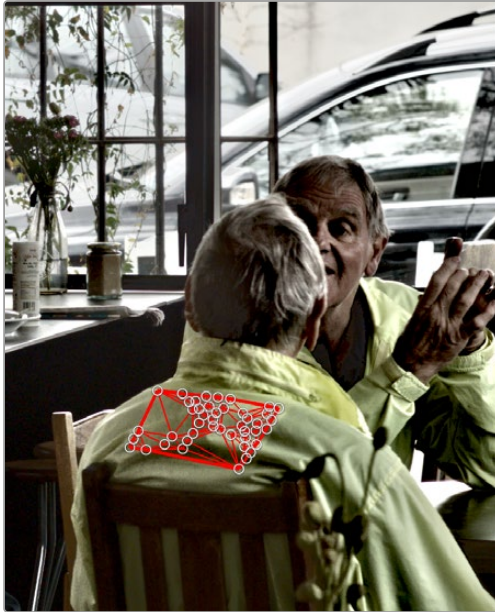
The Tracker analyzes the Mesh movement throughout the rest of the video clip.

Next, we will track the Mesh's motion using the Track Forward button and leave the rest of the controls at their defaults. Note that the track continues to warp and fold correctly, even when the subject leans back in his chair.

With the surface now correctly analyzed, we no longer need the Contrast Pop node, so we can disconnect it at this point. Next, we will drag the logo (a .png file with transparency) from the Media Pool, over into the node tree, where it comes in as a matte. We then add a corrector node after the matte, so we can adjust the color/saturation/brightness, etc. of the logo. Next, we set the RGB and Key connections of the nodes through the matte and corrector nodes, and into the second RGB and Key inputs of the Surface Tracker. This is shown on the node tree below:
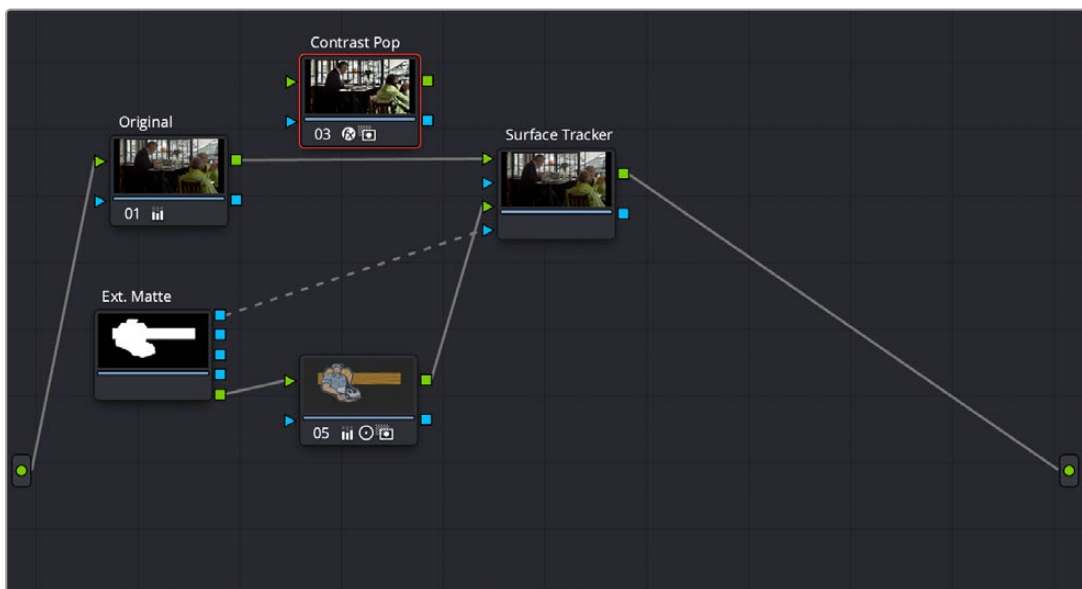
The node tree, showing the layout of the RGB and Key inputs to composite the logo over the jacket

Now, moving to the Result section, we set the following parameter:

— **Output: Warp Input 2 onto 1** - This will take the second RGB and Key input (logo) and deform it over the original image coming in to RGB input 1.

Then we will click on the Go To Reference button to take the clip to its reference frame, and in Positioning, use the Interactive - Canvas tool to reframe the logo to look like it's on the same plane as the jacket.
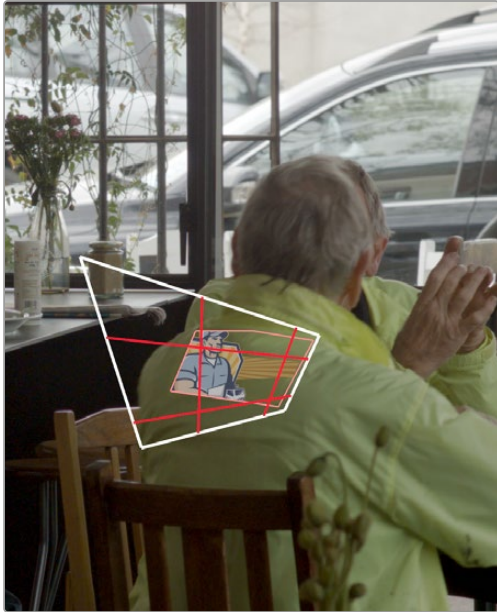
For the last step, we change the Composite Type from Normal to Overlay to make the logo blend in better to the surface of the jacket. Notice how the logo is deformed by the mesh to wrap around the curves and folds of the jacket, and it tracks along with the man as he leans back in his chair.

Adjusting the logo in the Interactive Canvas mode to transform it to make it appear it's in the same plane as the jacket


The finished Surface Tracker composite; the logo now adheres to the curves and folds of the jacket and tracks along with the man as he shifts positions in his chair.

Tracking Using a Mask in the Surface Tracker

If there is an object occluding the surface to be tracked, then an input key can be used as a tracking mask to exclude the blocking object from the track. Areas of full alpha (completely white) in the Alpha channel are analyzed for tracking, while other areas are excluded. Any appropriate effect, window, or qualifier can be used as the Alpha channel generator. For example, in the shot below, the path has the surface mesh applied to it, however the woman walking over the path breaks the mesh tracking. By connecting a node's key output with a Magic Mask applied to it that picks out the shape of the walking woman, then inverting that mask (so the woman is black, while her surroundings are white), the mesh ignores her legs and feet as they pass through it and only tracks points in the white areas (everything other than the woman).
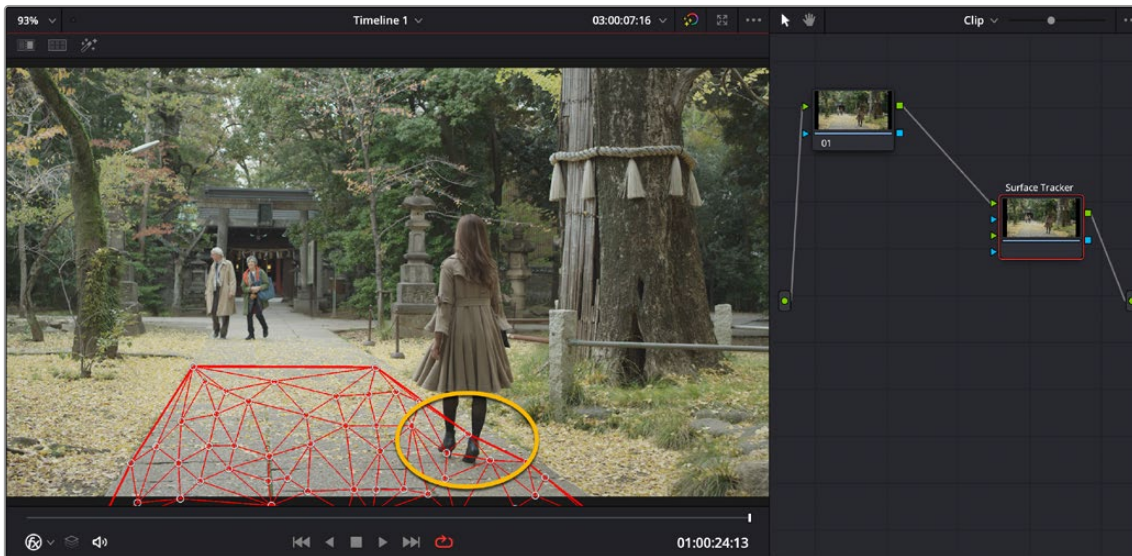
A problem trying to track the path's surface; as the woman walks through the mesh, the points attach themselves to her feet instead of the path, breaking the tracking on the right side of the path.
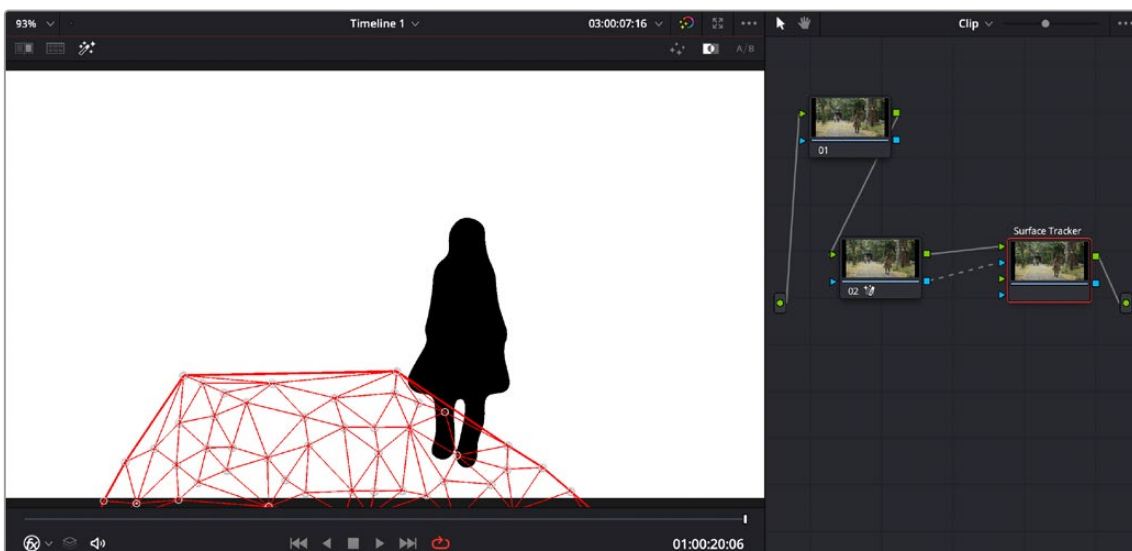
By connecting an inverted key from a Magic Mask node of just the woman, the tracking ignores the woman walking through the mesh (anything black), and only tracks points in the white part of the Alpha channel.
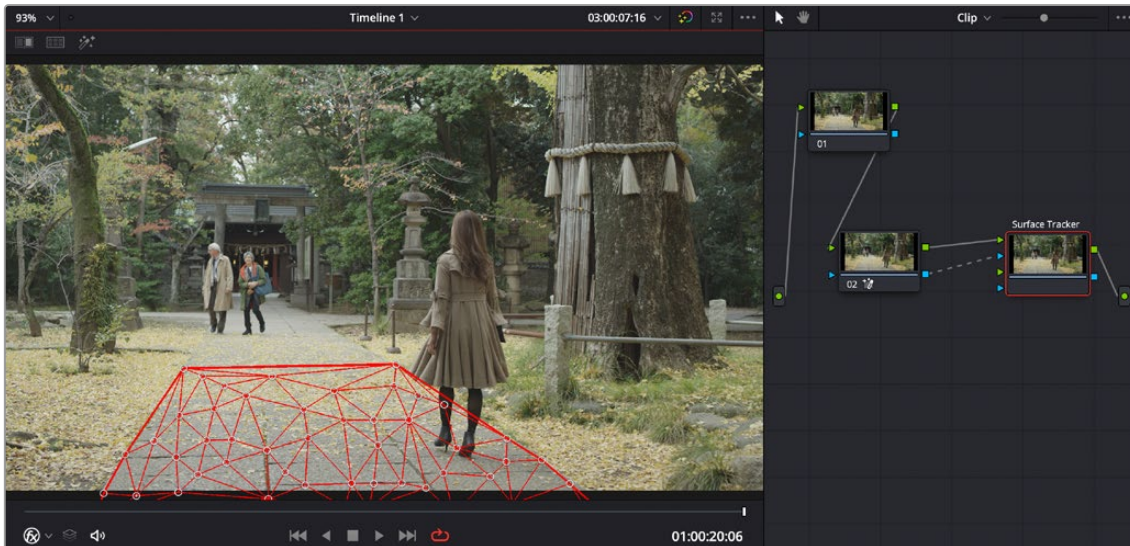
The resulting mesh is now properly attached to the path's right side and tracks correctly as she walks through it.

In the final step of the Surface Tracker, the overlay with alpha is composited over the original clip with alpha, so if using a tracking mask, it is recommended to disconnect it from the Surface Tracker's key input after the tracking is complete.

Using the Surface Tracker's Stabilize Warp

The Surface Tracker's Stabilize Warp operation allows you to use the mesh to freeze a section of video in place to make it easier to use with certain other operations. This is useful when the surface you are modifying is difficult to isolate with other tools due to its movement. Using the Surface Tracker to stabilize areas is a bit different to set up.

— Initially you want to set the Surface Tracker's mesh tracking on a surface you want to work on, as explained earlier in this chapter.

— Once complete, in the Result section you use the Output mode called Stabilize-Warp Input 1, and then feed that RGB output to a new corrector or FX node.

— This will isolate just the mesh surface and freeze it in place, allowing you to make any adjustments needed. This method is different than, say, a window qualifier, which sticks to the video and moves with it. In Stabilize Warp, the "window" (actually the mesh defined boundary) is frozen in place instead, and the video moves and warps within it.

— Once your adjustments are finished, you then feed the RGB output of the corrector node back into an exact copy of the first Surface Tracker node. The copied Surface Tracker node's Output then needs to be set to Rewarp Stabilized Clip instead. This re-lays the adjusted mesh back on to the original video clip. Directly copying an FX node like the Surface Tracker is not currently supported. To copy the Surface Tracker, you must grab a still into your Gallery, then right-click on it and append the still's node graph back into your same clip, deleting the excess duplicate nodes other than the Surface Tracker.

For example, in the clip below we will use the Surface Tracker to remove a small mole from the woman's chin. Normally, we could use a Patch Replacer FX to put a smooth area of skin nearby over the mole. This shot is tricky to use effectively in the Patch Replacer because the subject cocks her head while she's talking, as the camera trucks around her.

This movement on all axes means that the area of skin underneath the source patch is changing angle and lighting all the time, ruining the effect. While the patch replacer does support tracking, the mole is on her chin and her talking also causes the skin around her cheek to deform, making it unsuitable for a simple track.

In this case, we can use the Surface Tracker's Stabilize Warp function to "hold" those face area pixels in place under the source and target patches, patch them, and then make a Rewarp Stabilized Clip version of the Surface Tracker to lay those corrected pixels back onto the original image.

We want to remove this mole from the woman's chin. Because of camera movement, combined with her chin and cheek deforming as she talks, this is difficult to achieve with the Patch Replacer alone.

First we will create a mesh on her face and track it as described above. Making holes for the eyes and mouth so their rapid movement does not disturb the mesh on her face.
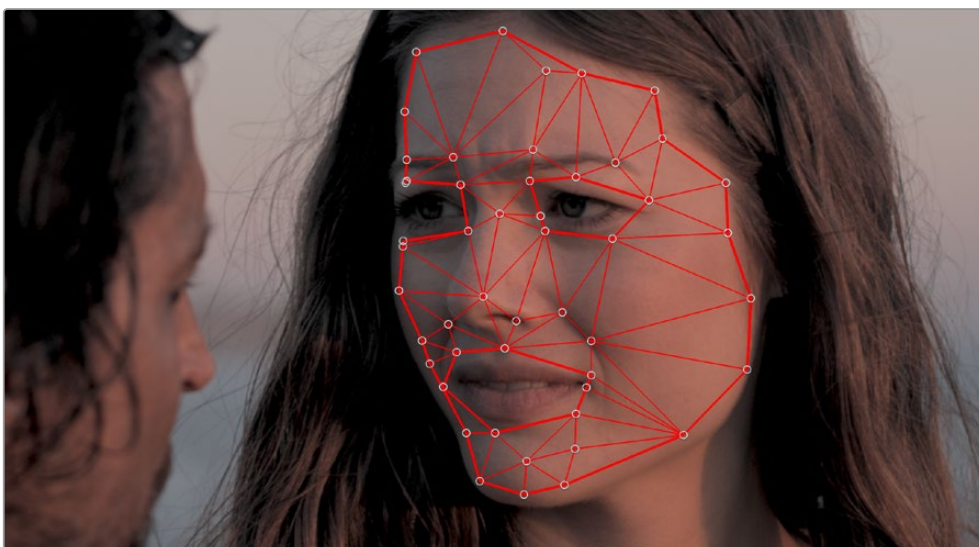

We apply the mesh to her face and track it, leaving holes in the mesh for her eyes and mouth.

Once the tracking is complete, in Result we will choose the Output mode Stabilize-Warp Input 1. This will freeze the mesh in place and give us the resulting output, which we will feed into a Patch Replacer node. Now we can simply use the Patch replacer statically to hide the mole using another area of skin. No tracking is required. Because the mesh is static, and the video warps within it, this area now perfectly matches the angles, lighting changes, and skin stretching of the area as she talks.
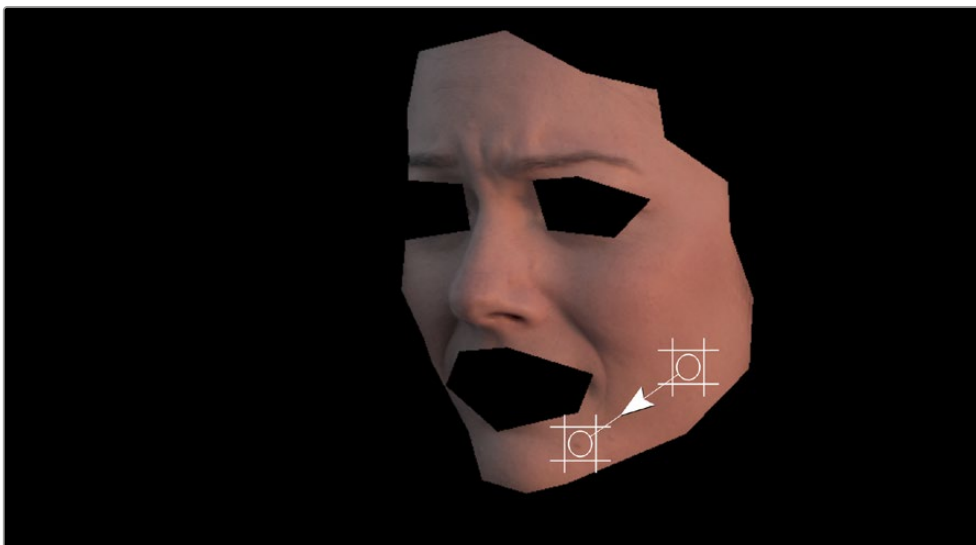
The frozen mesh stays in place (the face) and the video warps inside it.
This allows us to use a static Patch Replacer to replace the mole area, with
a smooth area on her cheek. No additional tracking is required.

At this point, we will then make an exact copy the Surface Tracker node, and place it after the Patch Replacer. To copy the Surface Tracker node, we must grab a still of the current clip, and then right-click on the still in the Gallery and select Append Node Graph to duplicate it back into our node tree. We want to delete any excess nodes added, and keep only the copy of the Surface Tracker. Then in the copied Surface Tracker, we need to select "Rewarp Stabilized Clip" from the Result tab's Output mode. Then connect the original clip to RGB input 1, and the output from the Patch Replacer to RGB input 2, as shown in the node graph below:
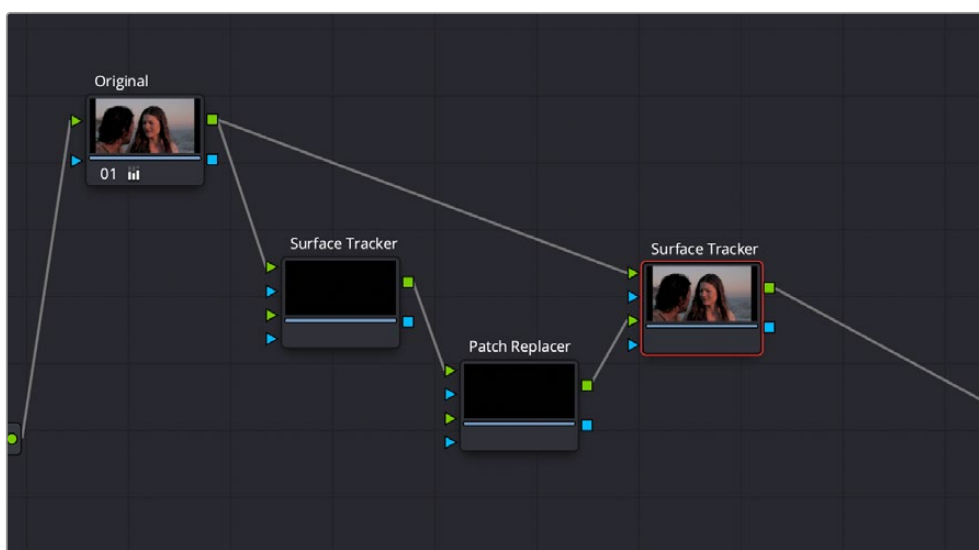
The node tree showing the correct setup for Warp Stabilizing the mesh. The first
Surface Tracker node has its Result Output set to "Stabilize-Warp Input 1." The second
copy of the Surface Tracker node has its Result Output set to "Rewarp Stabilized Clip."
The actual mole removal will take place in the Patch Replacer FX node.

Our finished effect now shows that the mole has been replaced, and regardless of her jaw movement or the camera position, the source patch always matches perfectly to the lighting and position changes over time. This makes for a much more seamless and convincing effect.

The resulting shot perfectly hides the mole (above), no matter her facial position or camera movement.
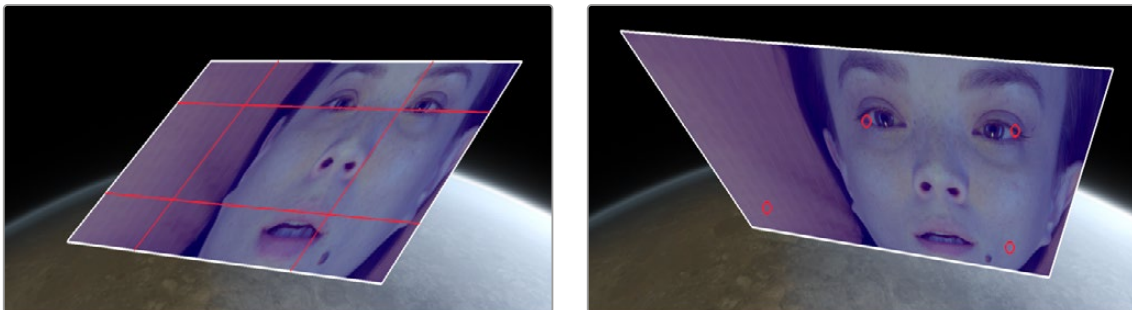
Transform

The Transform Resolve FX adds considerable control over the standard transforms in the Inspector's Sizing or the Color page Sizing palette. This effect includes all the standard Position, Tilt, Zoom, and Rotate controls but adds corner pinning, two kinds of on-screen controls, motion blur, and Edge behavior controls.

General

— **Control Mode:** This drop-down menu includes three methods for controlling the transforms. One is based on sliders in the Inspector, while the other two are based on manipulating the Viewer's image.

  — **Sliders:** Uses sliders and checkboxes in the Inspector to control the transforms. This method has no Viewer overlays with which to control the position, scale, or rotation but provides exact control using numeric values.

  — **Interactive-Canvas:** Choosing this mode moves the controls from the Inspector to the Timeline Viewer. The Viewer's controls are shown as a bold white outline and four vertices, one at each corner. You can drag on any part of the white outline for stretching, squeezing, and corning pinning. Dragging the center of the image repositions the frame. The red subdivision overlays make it easy to create shearing effects by dragging line segments to move two corners simultaneously.

  — **Interactive-Pins:** Adjusting the image in this mode is done by manually placing control points, called pins, in the Timeline Viewer. Adding one pin only gives you position control. At least two points are required for scaling and rotation. Dragging on one of the pins scales or rotates the image around the other pin. Using three pins, you can create perspective distortions by dragging any one of the pins. You can add up to four pins for unique corner pinning distortions.

> **TIP:** You can Option-Click on a pin to remove it or use the Reset Canvas button to remove all the pins.

Resolve FX Transform Interactive-Canvas mode (Left) and Interactive-Pins mode (Right)

Only one Control mode can be active at a time. For instance, you cannot make adjustments with the sliders and then switch to one of the interactive methods. The sliders will be reset once a different method is selected. However, can you apply two Transform effects to a clip, adjusting one with Sliders and the other using an interactive method.

Position Controls

— **Canvas Keyframe:** Only displayed when the Control mode is set to Interactive-Canvas or Interactive-Pins. The Canvas Keyframe has no control except for a keyframe button allowing you to keyframe the changes you make in the Viewer.

— **Reset Canvas:** Resets any interactive changes made in the Viewer and any keyframes created from those changes.

The following parameters are only displayed when the Control Mode is set to Sliders.

— **Position X and Y:** Moves the image within the frame, allowing pan and scan adjustments to be made. X moves the image left or right, and Y moves the image up or down.

— **Zoom:** Allows you to blow the image up or shrink it down.

— **Rotate:** Rotates the image around the center.

— **Width:** Stretches or squeezes the image in one direction only.

— **Height:** Stretches or squeezes the image in one direction only.

— **Pitch:** Rotates the image toward or away from the camera along an axis running through the center of the image, from left to right. Positive values push the top of the image away and bring the bottom of the image forward. Negative values bring the top of the image forward and push the bottom of the image away. Higher values stretch the image more extremely.

— **Yaw:** Rotates the image toward or away from the camera along an axis running through the center of the image from top to bottom. Positive values bring the left of the image forward and push the right of the image away. Negative values push the left of the image away and bring the right of the image forward. Higher values stretch the image more extremely.

— **Flip Horizontal/Vertical:** Two checkboxes let you flip the image in different dimensions.
  — **Flip Horizontal:** Reverses the image along the X-axis, left to right.
  — **Flip Vertical:** Reverses the clip along the Y-axis, turning it upside down.

Image Adjustment

— **Crop:** This checkbox exposes the crop tools, allowing you to selectively remove parts of the frame from each side.

— **Edge Softness:** This control sets the amount of feathering to the Alpha channel for compositing.

— **Edge Rounding:** This control rounds the corners of the Alpha channel for compositing.

Animation

— **Motion Blur:** Keyframing the transform so the frame moves rapidly will create a blurring effect. The amount of the blur is controlled using the Motion Blur slider.

Advanced Options

— **Edge Behavior:** This menu determines how edges of the frame are handled when the transforms are scaled smaller than the Timeline Resolution.
  — **Transparent:** The area outside the transformed image is set to be transparent, allowing the video on tracks underneath this one to be shown behind the image.
  — **Reflect:** The image is flipped and flopped to create a mirrored image, which extends to the Timeline Resolution frame boundary.
  — **Wrap-Around:** Duplicates the image to create a video wall effect, which is used to fill in the space to the Timeline Resolution frame boundary.
  — **Replicate:** Duplicates the outermost pixels along the edge of the image. The pixels are stretched out from each side to reach the Timeline Resolution boundary.

— **Composite Type:** Sets the Composite type for blending multiple video layers together.

For more information on what each Composite type does, *see Chapter 50, "Compositing and Transforms in the Timeline."*

Global Blend

— **Blend:** Lets you dissolve between the image with no Transform applied and one with the Transform fully applied.
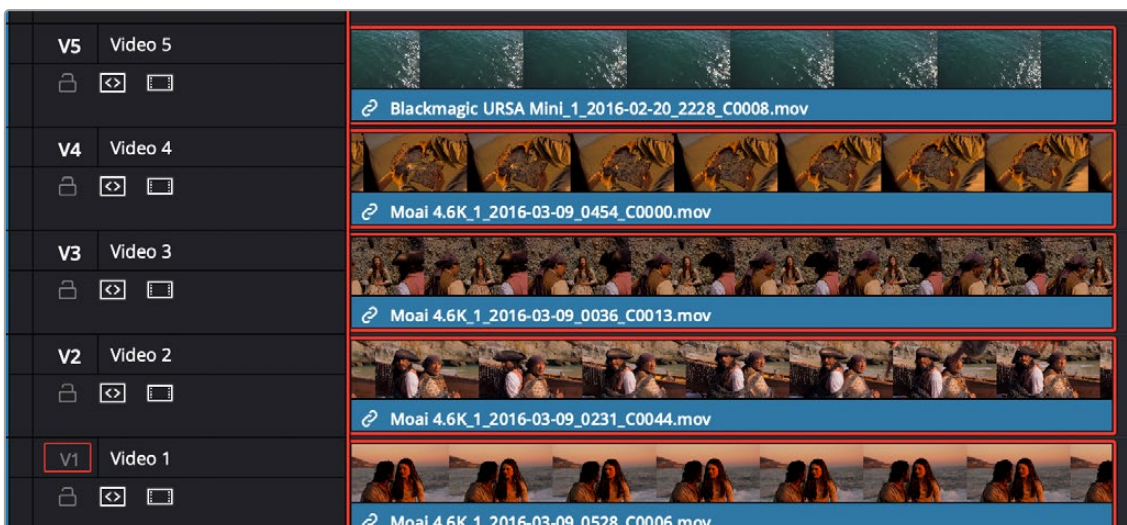
Video Collage

Video Collage is designed to make it easier to create grid-based layouts of multiple video layers to create different kinds of split-screen effects, where each video layer appears within a "tile" that can be styled in different ways. Layout controls let you choose how many rows and columns there are, which determine how many tiles are available to arrange tiles of video next to one another in different ways, with additional controls for creating offsets, changing the margins around and spacing between the tiles, and rounding the corners of each tile.

This effect is designed to be used in the Cut and Edit pages, and there are two ways that you can set this up, which are chosen using the Workflow drop-down menu.

Create Background

The Create Background option is perhaps the simplest way to create a split-screen using this effect. This mode creates a frame with holes in it, behind which you can position multiple layers of video. These clips are placed on tracks underneath the background clip in the Timeline, and use each clip's individual sizing controls in the Inspector (which can be used via on-screen Transform controls in the Viewer) to scale and position them correctly within the holes. The Video Collage effect is applied to the topmost superimposed video or still image clip in the Timeline, in order to use that clip as a background for the frame.

In the following example, the Video Collage effect is applied to the clip on track 5, which has four other clips underneath it in a stack, each of which has been positioned to fit in one of the holes of the frame.

A stack of clips to create a split-screen effect; the top-most clip is used as the background by the Video Collage effect in Create Background mode, while the stack of clips underneath are all positioned to fit into the holes created in the top clip.

Create Background mode makes it easy to create a split-screen layout of different clips without having to resize them with precision to align the edges and sizes of each clip. The width of the frame that's created gives some wiggle-room to reposition and animate each individual clip within the hole it shows through. You can see the resulting effect created in the previous example below.

The resulting split-screen effect, with four clips arranged to show through the holes created in the top "background" clip that's creating the frame; you can see the onscreen controls corresponding to the clip on track 4 that have been used to position and resize it to fit.

Create Tile

This mode of operation is a bit more work to set up, as it requires you to create a layout in one instance of this effect, but it gives you more options, automatically transforming each layer of video in your stack of clips in the Timeline to fit a layout you design. The best way to work in Create Tile mode is to edit a stack of superimposed clips in the Timeline, but this time if there's a clip you want to use as the background, it should go at the bottom of the stack.
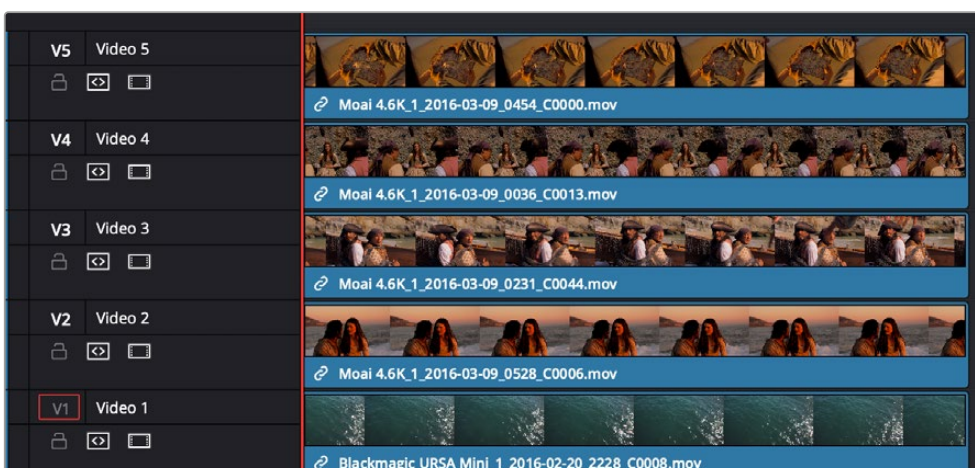
A stack of clips to create a split-screen effect in Tile mode; the
bottom clip is going to be used as the background.

Then, apply the Video Collage clip to the topmost clip, and set the Workflow drop-down menu to Create Tile. Immediately, you'll see that the current layer has been fit inside the first rounded tile

of the default layout of four tiles. For clarity, video tracks 4, 3, and 2 have been muted so you can see the current clip turned into a tile against the bottom clip that serves as the background for this arrangement.

The topmost clip set to create the first tile in a layout; video tracks 4, 3, and 2 are disabled to show the top clip against the bottom clip that's being used as the background.

Ultimately, you'll use Paste Attributes to apply a copy of this effect to each clip on the Timeline that's supposed to fit inside a tile, and once you choose which clip goes inside each tile, that's what will create the arrangement. Before you do that, however, you need to customize the layout.

To get a preview of the entire layout for further customization, turn on the Preview Layout checkbox in the Inspector. This draws a preview of how all the tiles will be placed using the current layout. Using this preview, you can make whatever changes you want to set things up, before you copy this plugin to all the other clips in the stack.


Turning on Preview Layout to customize the layout

With Preview Layout enabled, you can use the Layout controls below to choose how many columns and rows of tiles there are, to stagger the tiles horizontally or vertically, to round or square off each tile by a variable amount, and to alter the margins and spacing. In this way, you can create a wide variety of different symmetrical layouts really easily. In this example, we'll create a layout with one row, three columns, that's staggered vertically.
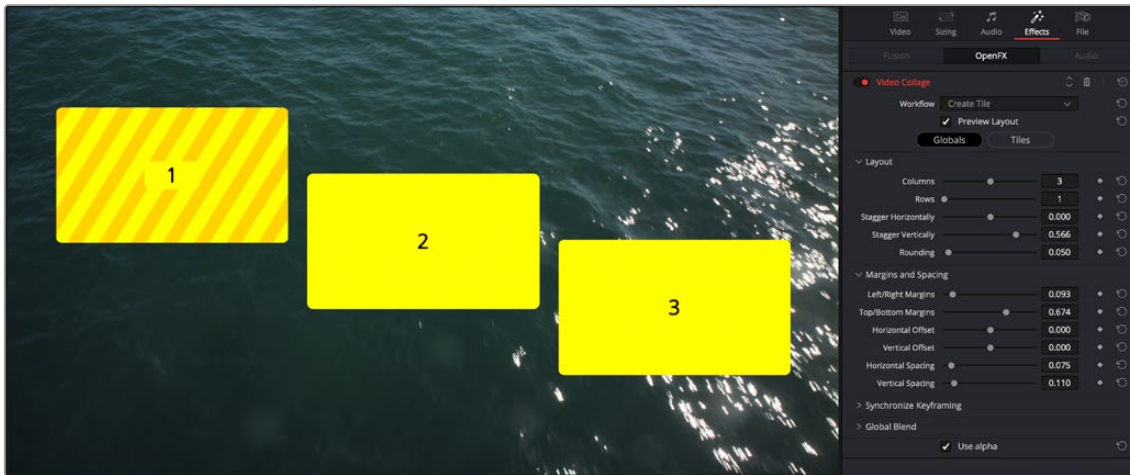
Our new customized layout, shown next to the Inspector controls for this effect

Now that this is done, we'll turn off Preview Layout to focus on the current clip's integration into our layout, and we can see that it doesn't quite fit into the box. Click the Tiles button in the Inspector. This reveals the Tile-specific controls, which include the Resize Content controls. Click the disclosure control to open these up, and use the Pan, Tilt, and Zoom controls to make this image fit into the tile full screen.
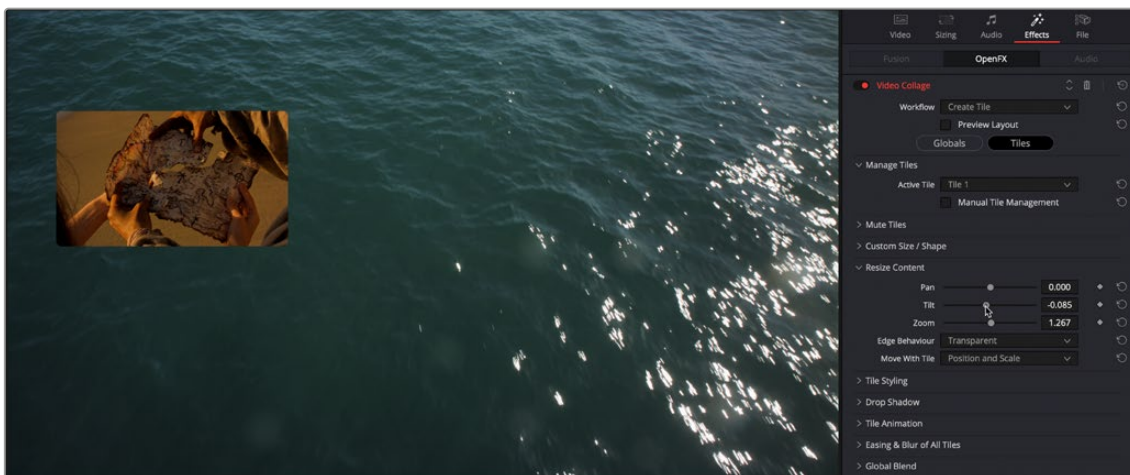
Tiles controls in the Inspector with Preview Layout disabled, so we can focus on customizing the current tile

You should also note the Active Tile drop-down menu. This menu serves two purposes. First, it defines which tile the current clip is displayed within. This becomes important later on when you apply this effect to multiple superimposed clips. However, it also determines which tile you further customize using the Tile-based controls of the Inspector. If needed, tiles can be individually styled.

The Manual Tile Management checkbox is off by default, which enables DaVinci Resolve to automatically update the number of tile entries in the Active Tile drop-down menu with items equal to the number of grid positions (or grid nodes) defined by the rows and columns you've set, without you needing to do anything. For simple symmetrical layouts, this is easiest. However, if you turn Manual Tile Management on, you gain the ability to add and delete tile positions manually, which enables other options. For now, we'll leave this turned off.
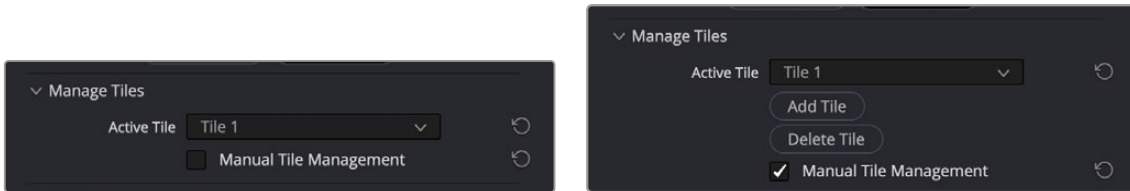
(Left) The Active Tile drop-down with Manual Tile Management turned off, (Right) The Active Tile controls with Manual Tile Management turned on, and additional controls for manual tile management displayed

So, now we've created a custom overall layout, and we've tailored the top clip in the stack to fit the first tile in the layout. Now it's time to apply this effect to the next two clips in the stack (remember the bottom clip will be used as a background, so it doesn't need this plugin applied to it). Select the top clip with the effect applied to it in the Timeline, and press Command-C to copy it. Then, select the next two clips, right-click one of them, and choose Paste Attributes (Option-V). When the Paste Attributes window appears, turn on the Plugins checkbox, in Video Attributes and click Apply. Those two clips disappear as they receive the Video Montage effect and fit themselves into Tile 1, just like the top clip.
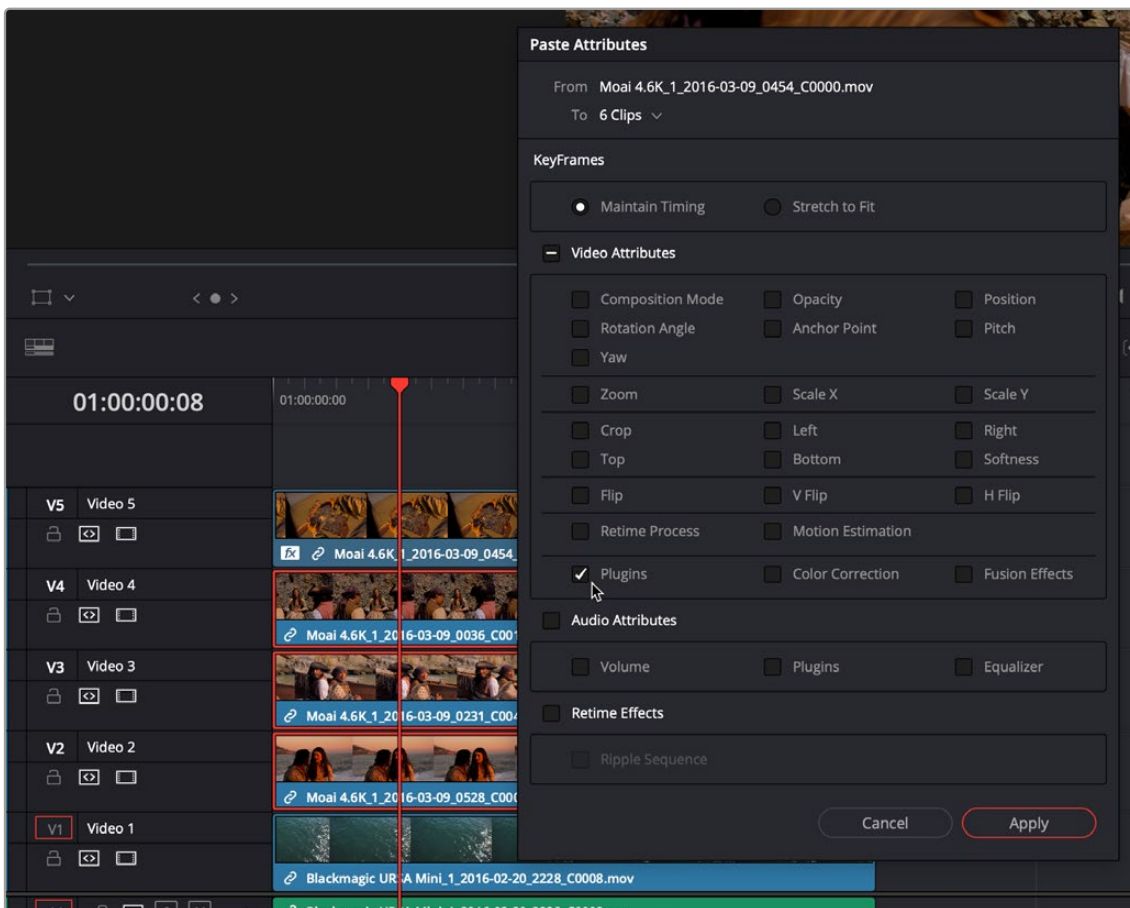
Using Paste Attributes to apply the copied effect from
the top clip to the other clips in this arrangement

To assign each clip to the correct tile in the layout, select each clip in the arrangement, one at a time, open the Effects panel of the Inspector, click the Tiles button in the Inspector (if necessary), and set each clip to be the next available tile in the Active Tile drop-down menu. In this example, the top clip was in Tile 1, the second clip down will be in Tile 2, and the third clip down will be in Tile 3.
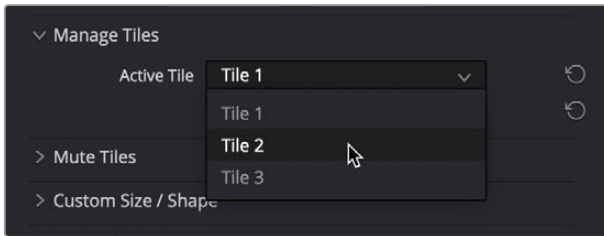
Assigning the Active Tile for each layer in the Timeline

> **TIP:** If you enable the Open FX Overlay of the Timeline Viewer, each tile has an overlay that lets you click a tile in the Viewer to make that the Active Tile.

If you like, you can rearrange which clips go into which tiles using this control, but for now we'll keep things simple. As you do this, each tile becomes populated, and the final layout is revealed, with the background clip showing behind everything. If necessary, you can use the Resize Content controls (in Tiles mode) to resize each tile's contents to fit the tile better.

The current layout, with each clip in the stack assigned to a different tile

> **NOTE:** If you've customized a layout, copied and pasted attributes to the other clips you want to use in that layout, and have assigned each clip to its position in the layout, and you then decide you need to make a change to the Globals layout controls, you'll need to go through the process of copying the updated effect, pasting attributes to the other clips, and reassigning each clip to the appropriate position in the layout to make that update to the other clips as well.

So, these are the overall workflows of the Video Collage effect. There is, of course, much more you can do, but this is the basis of how you create your initial layout.

Animating Tiles and Advanced Layouts

One of the more powerful aspects of the Video Collage effect is the ability to quickly and easily create animated intros and outros for each tile. These effects can be fully automated over a customizable duration, or their duration can be manually keyframed. All animations can be automatically eased, and you can also enable motion blur for the Fly, Shrink, and Rotate animations.

When you use these controls in Create Background mode, the transparent holes through which other clips in the background show through are animated to "open or close" to reveal the contents. When used in Create Tile mode, the actual tile and its contents are animated to fly, shrink, rotate, and/or fade to appear or disappear.
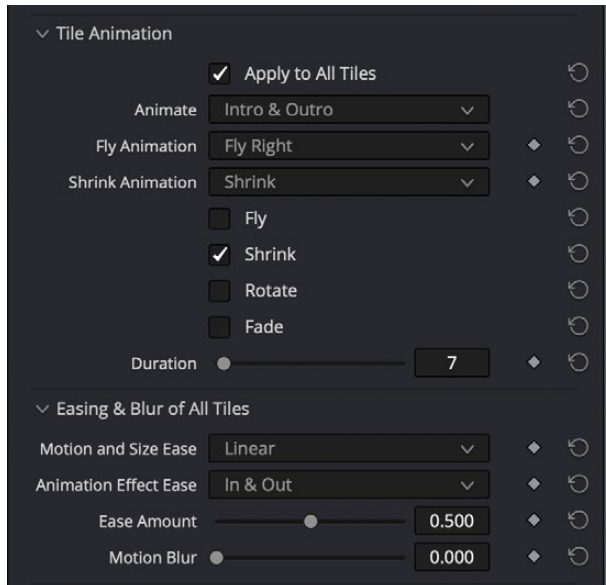
Tile Animation controls let you create automatic
Intro and/or Outro animations.

Additionally, you have the ability to keyframe the Mute, Start and End Column and Row parameters, Tile Styling and Drop Shadow parameters, and other aspects of tiles in Tiles mode, either individually or all together.

In particular, the Start and End Column and Row parameters let you create tiles that span multiple grid positions, and also move tiles from one grid position to another. Without keyframing, this lets you create more kinds of layouts with asymmetric arrangements of large and small tiles. With keyframing, you gain the ability to easily create sophisticated grid-based animations to move tiles from position to position, and to have tiles expand and contract to encompass neighboring tiles in the layout, all with a minimum of keyframing.

Tile Animation controls let you create automatic Intro and/or Outro animations.

Keep in mind that, when using multiple instances of the Video Collage effect on superimposed clips in the Timeline, once you've defined your overall layout and used Paste Attributes to copy a particular instance of this effect with your layout to the rest of the clips, you need only keyframe each instance of each tile within the clip it's applied to. Furthermore, since Intro and Outro animations are applied to the entire duration of the clip, you can easily offset each Intro and Outro animation by offsetting the clips in the Timeline.

> **TIP:** If you change the duration of clips in a stack that are creating a Video Collage effect, you can use the Synchronize Keyframing controls in Globals mode to offset all keyframes applied to that instance of the Video Collage effect by the same amount. You could do the same thing by opening the keyframe track or Curve Editor for all Video Collage parameters in the Timeline and offsetting them that way, but this provides a quick shortcut.

Video Collage Controls

Here's a detailed explanation of all the parameters found in the Video Collage effect.

— **Workflow:** Defines what the output of Video Collage is, depending on how you want to use it.
  — **Create Background:** Outputs a frame with holes, behind which you can position individual layers of video to show through.
  — **Create Tile:** Outputs a single tile, transformed and styled to be one element of a multi-tile layout

— **Preview Layout:** Turning on Preview Layout lets you see a graphical preview of the entire layout, and how each tile fits together. In Create Tile mode, this lets you configure how you want the layout to look before you copy the clip and use paste attributes to apply this effect to the rest of the video layers you want to arrange into a split-screen.

— **Globals/Tile buttons:** Choose between the Globals controls, which expose controls that let you adjust the overall layout, and the Tiles controls, which let you choose the currently active tile and style it.

Layout

These controls appear in Globals mode.

— **Columns:** Choose how many vertical columns worth of tiles there are.

— **Rows:** Choose how many horizontal rows worth of tiles there are.

— **Stagger Horizontally:** Lets you create an offset from one row to the next in a balanced way, so the rows are all staggered from one another.

— **Stagger Vertically:** Lets you create an offset from one column to the next in a balanced way, so the columns are all staggered from one another.

— **Rounding:** Rounds the edges of each tile in the layout. A value of 0.000 sets the edges to be square. Increasing rounding increasingly curves the corners of each tile, until a value of 1 sets the tile to be perfectly round.

Margins and Spacing

These controls appear in Globals mode.

— **Left/Right Margins:** Alters the spacing from the edge of the frame to the left and right edges of the group of all tiles. Increasing this parameter makes all tiles progressively more narrow, as they squeeze in towards the center of the frame.

— **Top/Bottom Margins:** Alters the spacing from the edge of the frame to the top and bottom edges of the group of all tiles. Increasing this parameter makes all tiles progressively shorter, as they squeeze in towards the center of the frame.

— **Horizontal and Vertical Offset:** These two sliders let you offset the group of all tiles from the center however you like.

— **Horizontal and Vertical Spacing:** These two sliders increase or decrease the spacing between each tile, making them narrower or wider as a result.

Synchronize Keyframing

These controls appear in Globals mode. They're basically a built-in utility that lets you offset all Globals and Tiles parameter keyframes that are applied to the current effect, to account for times when you've done elaborate keyframing to create animated split-screen effects, and you then need to change the duration of the clip this effect is applied to. Instead of forcing you to expose the keyframes of each parameter in the Timeline in order to move them, these controls let you move all keyframes for all parameters forward or backward by a particular number of frames, all at once.

— **Offset Frames:** Lets you specify how many frames you want to offset all keyframes applied to this effect forward. Negative values move keyframes to the left.

— **Apply Keyframing Offset:** Executes the offset.

Manage Tiles

These controls appear in Tiles mode.

— **Active Tile:** This menu serves two purposes. First, it defines which tile the current clip is displayed within. This becomes important later on when you apply this effect to other superimposed clips you want to use together in a layout. However, this control also determines which tile you further customize using the Tile-based controls of the Inspector. If you enable the Open FX Overlay of the Timeline Viewer, each tile has its own overlay that lets you click a tile in the Viewer to make that the Active Tile.

— **Bring Tile Forward/Send Tile Back:** These two buttons let you rearrange the order of tiles in the Active Tile drop-down menu.

— **Manual Tile Management:** While this checkbox is turned off (the default), changing the Columns and Rows parameters automatically updates the Active Tile drop-down menu with one tile per node on the resulting grid arrangement. Turning this checkbox on lets you Add and Delete tiles manually, which lets you create more advanced layouts with overlapping tiles and asymmetric spacing between tiles.

Mute Tiles

These controls appear in Tiles mode. A single checkbox parameter, Mute Tile, lets you enable and disable the visibility of the active tile. This checkbox is keyframable, so you can animate the appearance and disappearance of different tiles to create different effects.

Custom Size/Shape

These controls appear in Tiles mode. They let you further customize layouts on a tile-by-tile basis and can also be used to quickly and easily animate a single tile to move and resize itself around the grid of the overall layout.

— **Start/End Column and Row:** These four controls serve two purposes, letting you change a tile's position by row and column number, or enlarge a tile to encompass multiple tile row or column positions ("spanning"). To use these parameters, you must first choose which tile you want to adjust from the Active Tile drop-down menu. With the tile you want to edit active, you can then drag the appropriate sliders to create either effect, as explained below.

— **To change Tile Position:** When adjusted together so that the Start and End values are identical, they let you manually adjust the position of each tile in the grid that's defined by the number of rows and columns you've set. This is particularly useful when you want to quickly keyframe animated changes to tile position, in order to jump a tile around the grid of the layout.

— **To make a tile span multiple positions:** Setting the Start and End Row and/or Column parameters to different values changes the currently active tile to span multiple grid positions in the layout, making that tile bigger in order to create asymmetric arrangements of larger and smaller tiles. You can also keyframe these values to easily animate the effect of a tile expanding to occupy more grid positions, or shrinking from occupying several grid positions to occupying a single position.

Choose how many rows/columns and in which directions you want that tile to span. Note that if you span multiple rows or columns that have been offset, the resulting tile is enlarged to encompass the entire rectangular region defined by the outer boundaries of both offset tiles.

— **Custom Size/Shape:** Turning this checkbox on enables the rest of the controls in this group, enabling you to set individual scale and rounding for the active tile that's selected.

— **Custom Scale:** Lets you adjust the size of the active tile independently of the other tiles.

— **Custom Rounding:** Lets you adjust the rounding of the active tile independently of the other tiles.

Resize Content

These controls appear in Tiles mode. They let you resize the image being fit within each tile to show exactly what you want shown.

— **Pan/Tilt/Zoom:** These three sliders let you move and resize the video layer shown inside of the active tile to fit however you need it to.

— **Edge Behavior:** These settings allow you to control how the edges of the video layer respond inside the tile.

   — **Transparent:** Any positioning that goes past the edge of the video is transparent, showing the Tile Color set in the Tile Styling options.

   — **Reflect:** Any positioning that goes past the edge of the video mirrors back on itself.

   — **Wrap:** Any positioning that goes past the edge of the video repeats itself.

   — **Replicate:** Any positioning that goes past the edge of the video shows a duplicate of the edge stretched to the boundary of the control, essentially filling in the remaining space with the pixels used at the extreme edges of the video clip.

— **Move With Tile:** Defines how the image is fit into the tile when the tile size changes due to other parameters of the Video Collage effect.

   — **Position Only:** The video content in the tile only is sized using Pan and Tilt; Zoom is ignored.

   — **Position and Scale:** The video content in the tile is sized using Pan, Tilt, and Zoom.

Tile Styling

These controls appear in Tiles mode. They let you add a colored border and adjust the opacity of all tiles or just the currently active tile. These parameters are animatable.

— **Apply to All Tiles:** When checked, this applies any changes made in the Tile Styling parameters to all tiles in the Video Collage, regardless of which tile is currently active.

— **Tile Border:** This slider controls the width of the tile's border. It has a possible range of values from -0.250 to 0.250, where negative numbers expand the size of the border inside the tile, and positive numbers expand it outside the tile.

— **Tile Color:** Allows you to chose the background and border color of the tile.

— **Tile Opacity:** This slider changes the transparency of the tile itself; it does not effect the video clip inside the tile. The possible ranges are 0.000 (fully transparent) to 1.000 (fully opaque).

Drop Shadow

These controls appear in Tiles mode. They let you add and customize a drop shadow, either to all tiles or just to the currently active tile. These parameters are animatable.

— **Apply to All Tiles:** When checked, this applies any changes made in the Drop Shadow parameters to all tiles in the Video Collage, regardless of which tile is currently active.

— **Strength:** This slider controls drop shadow transparency. The possible ranges are 0.000 (fully transparent) to 1.000 (fully opaque).

— **Color:** Allows you to choose the color of the Drop Shadow.

— **Drop Angle:** Lets you set the angle that the shadow is cast from. The slider represents 360 degrees of movement from -180.0 to 180.0.

— **Drop Distance:** Allows you to set the distance that the shadow appears from its source tile. The possible values are from 0.000 to 0.200.

— **Expand:** This slider controls how far the shadow expands from its origin. The possible values are from 0.900 to 1.250.

— **Blur:** Allows you to control the amount of diffusion of the Drop Shadow. The possible ranges are 0.000 (no blur) to 1.000.

Tile Animation

These controls appear in Tiles mode. They make it easy to create simple intro/outro animations to bring all or some tiles onscreen, and to push all or some tiles offscreen, in different ways. The Animate drop-down menu determines whether this animation will be automatic or manually created using keyframes.

— **Apply to All Tiles:** When enabled, any animation that's set up will be applied to all tiles in the layout simultaneously.

— **Animate:** This drop-down menu lets you choose between Manually Keyframing intro or outdo animations or automatically creating animations to introduce or conclude a tile. The options are:

  — **Manually Keyframe:** In this mode, you must manually keyframe the four progress sliders below to create animated Intro and Outro animations.

  — **Intro Only:** Animation is automatically created to bring each tile onscreen according to the types of animation you choose from four checkboxes below. Options include: Fly, Shrink, Rotate, and Fade, in any combination. A Duration slider appears that lets you choose how long the Intro will be.

  — **Outro Only:** Animation is automatically created to send each tile offscreen according to the types of animation you choose from four checkboxes below. Options include: Fly, Shrink, Rotate, and Fade, in any combination. A Duration slider appears that lets you choose how long the Outro will be.

  — **Intro & Outro:** Animation is automatically created to bring each tile onscreen and then send each tile offscreen, according to the types of animation you choose from four checkboxes below. Options include: Fly, Shrink, Rotate, and Fade, in any combination. A Duration slider appears that lets you choose how long the Intro and Outro will be.

  — **Fly Animation:** Lets you choose a direction for tiles to fly in from and fly out to.

  — **Shrink Animation:** Lets you choose a method of shrinking out or in when the Fly Progress slider is animated.

— **Fly Progress:** (manual key framing only) A slider that, when animated, lets you fly a tile into or out of the frame. A value of 0.000 positions the tile in its default grid position. A value of 1.000 positions the tile entirely off screen.

— **Shrink Progress:** (manual key framing only) A slider that, when animated, lets you shrink a tile down to nothing or up to the current size. A value of 0.000 sizes the tile at its largest state. A value of 1.000 shrinks the tile to nothing.

— **Rotate Progress:** (manual key framing only) A slider that, when animated, lets you fly a tile into or out of the frame. A value of 0.000 positions the tile in its default grid position. A value of 1.000 positions the tile entirely off screen.

— **Fade Progress:** (manual key framing only) A slider that, when animated, lets you fly a tile into or out of the frame. A value of 0.000 positions the tile in its default grid position. A value of 1.000 positions the tile entirely off screen.

Easing & Blur

These controls appear in Tiles mode. They let you adjust the easing of the tile animation created in the previous group of controls.

— **Motion and Size Ease:** These controls set the curve used for simulated momentum in animating the Tile Position and Size keyframes of the tiles.

— **None:** No curves are applied. The animation snaps immediately from keyframe to keyframe.

— **Linear:** No easing curves are applied; motion is neither accelerated or decelerated.

— **In:** The animation curve starts slower and ends faster.

— **Out:** The animation curve starts faster and ends slower.

— **In & Out:** The animation curve starts slower, accelerates in the middle, and slows down at the end.

— **Animation Effects Ease:** These controls set the curve used for simulated momentum in animating the Tile Animation keyframes of the tiles.

— **None:** No curves are applied. The animation snaps immediately from keyframe to keyframe.

— **In:** The animation curve starts slower and ends faster.

— **Out:** The animation curve starts faster and ends slower.

— **In & Out:** The animation curve starts slower, accelerates in the middle, and slows down again at the end.

— **Ease Amount:** The relative strength of the animation curve in speeding up and slowing down. The values range from 0.000 to 1.000.

— **Motion Blur:** This slider controls the amount of motion blur added to the animation, in order to make it smoother and more organic looking. The values range from 0.000 (no motion blur), to 1.000 (maximum motion blur).

Global Blend

— **Blend:** This slider controls the overall opacity of the entire Video Collage effect. The values range from 0.000 (completely transparent) to 1.000 (completely opaque).

Resolve FX 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 plugin 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 (Studio Version Only)

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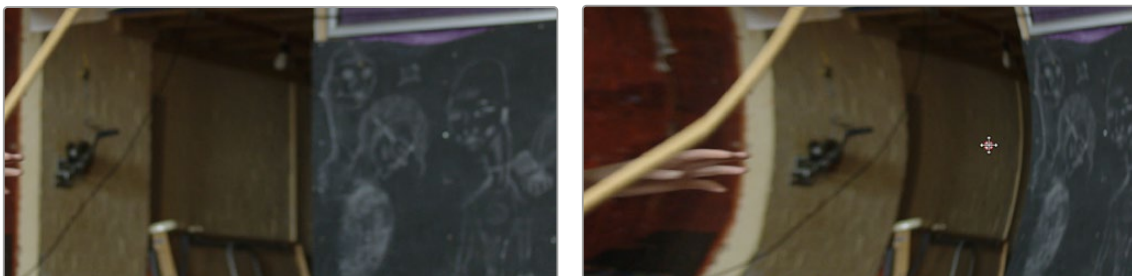
(Left) The original image (Right) The image warped with a single control point

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 plugin'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.
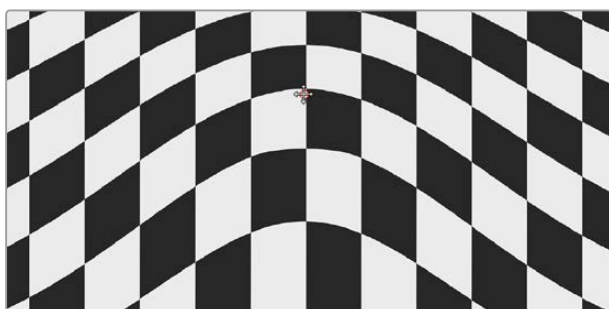
Effect Options

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.
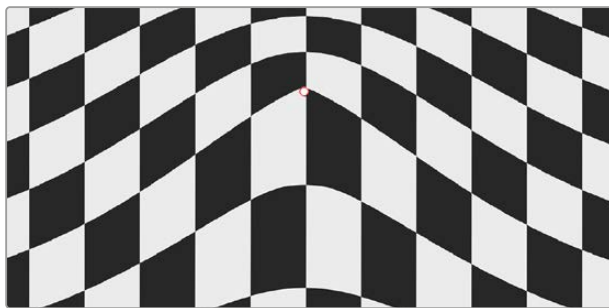

Sharp

Rubber-Sheet
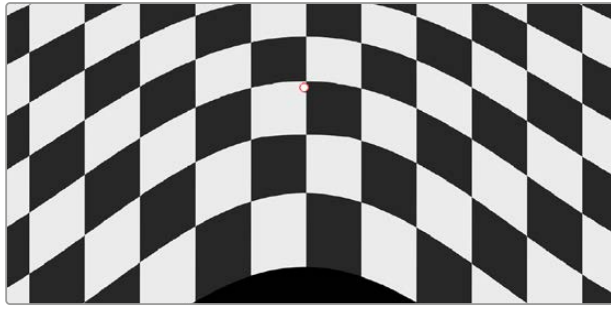
Rounded

— **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.
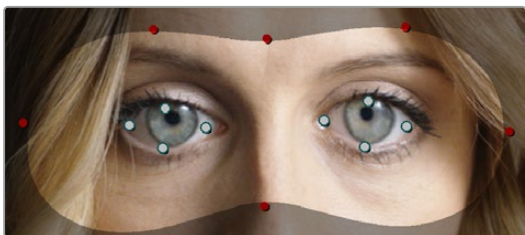

Show Warp Boundaries set to As Mask

— **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.
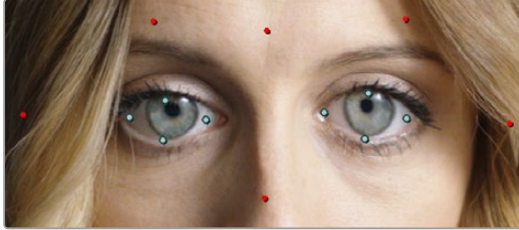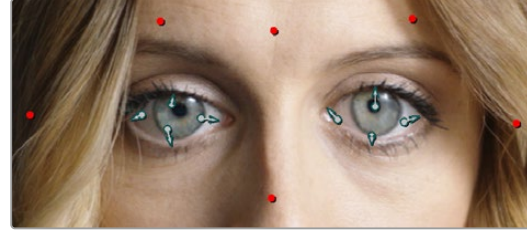
Warp points   Warp vectors

— **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.