

## BCC Optical Stabilizer Filter

The Optical Stabilizer filter allows you to stabilize shaky video footage. The Optical Stabilizer uses optical flow technology to analyze a specified region and then adjusts the track's position to compensate. Unlike many stabilizing tools, the BCC Optical Stabilizer does not require you to set user-defined tracking points. This is useful for images where tracking data is unreliable.

During playback, the motion appears smooth because the track moves incrementally to offset the unwanted motion. You can also stabilize just a portion of a track to correct isolated camera bumps.



The BCC Optical Stabilizer allows you to take motion, rotation and scaling into account when stabilizing. However, because it uses optical flow technology, the BCC Optical Stabilizer is render intensive and may not be appropriate for all clips.

The **Mode menu** is a preview control with the following options.

- Choose **Stabilize** to stabilize the clip. Choose Stabilize when you want to lock all the frames to the reference frame, eliminating all motion.
- Choose **Smooth** to produce an image that averages the motion over the smoothing range. This option may be less render intensive than Stabilize because there may be fewer frames within the smoothing range than from the current frame to the reference frame. Choose Smooth when you want to smooth, but not eliminate motion, such as when panning a hand-held camera.
- Choose **Setup Region** to setup the target area. This region should be as large as possible while excluding large untrackable areas of uniform texture such as sky or water.
- Choose **Show Vectors** to display onscreen motion vectors. The array of vector lines indicate the direction of motion of the pixels in the image in the current frame. This can be helpful for finetuning. Be sure to return the menu to Smooth or Stabilize before rendering.

**Reference Frame** sets the frame that is used as a reference for the filter. When stabilizing, the other frames are transformed to match the reference frame. The Reference Frame is not used when the Mode menu is set to Smooth.

**Smoothing Range** sets the number of frames that are used to calculate the average position.

**Corner 1** and **Corner 2 position controls** determine the target region. The target region indicates the area in the media to track. The points set the location of the upper left and lower right corners of a rectangular target region. However, in general it is easier to use the onscreen point controls to set this up. Then use the position controls for finetuning. Before adjusting these controls, set the Mode menu to Setup Region.

A good target region contains a high-contrast object with good vertical and horizontal edge definition as well as large areas of non-uniform detail, especially edges in various directions. Ideally, you should find a pattern that is visible in every frame. The area you define should contain an object that should be stationary in every frame.

For example, you want to stabilize some footage shot off the railing of a moving boat. The pier is visible from the boat. A high contrast mooring on the pier would make a good target.



Not all imagery is appropriate for optical stabilization. For example, images with large uniform textures, like fields of grain, sky, water, or blank walls will not work well with this filter. Images with lots of motion blur or low contrast images may also cause problems. In addition, perspective shifts (for example, a forward dolly shot) or moving foreground objects that dominate the image will not generate optimum results. For best results, your target region should include a fair amount of contrast with good vertical and horizontal edge definition as well as large areas of non-uniform detail, especially edges in various directions. The motion of the clip should only include panning, zooming and rotation. Large background areas with objects moving independent of the background are also suitable.

The **Stabilize menu** lets you choose how to calculate the tracker data.

- **Translation** tracks the motion on the X and Y axis only.
- **+Rotation** allows you to take motion and rotation into account when stabilizing.
- **+Zoom** allows you to take motion, rotation and scaling into account when stabilizing.

The **Clip Top**, **Clip Left**, **Clip Bottom** and **Clip Right** allow you to crop the edges of the clip after it has been stabilized. This allows you to finetune how the edges are handled. For example, if you set the Edge Handling menu to Repeat, you may want to adjust where the edge begins to repeat.

The **Edge Handling menu** determines how the filter produces new edges as the image is offset. For example, suppose the image shakes vertically. As the image moves up to offset the unwanted motion, the bottom of the image is raised above the bottom of the frame. This setting determines how the filter creates pixels to fill the this space.

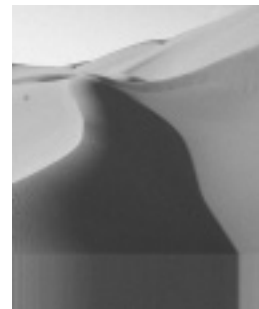
- **Color** produces a solid color on the edge of the image. The **Edge Color** parameter determines the color that is used.
- **Transparent** leaves the space transparent, revealing any tracks that are lower in the timeline.
- **Repeat** repeats the pixels on the edge of the image, producing a smeared effect.
- **Reflect** produces a mirror image copy of the pixels adjacent to the edge.
- **Tile** produces an image copy of the pixels adjacent to the opposite edge of the image.



Edge Handling=Mirror



Edge Handling=Black



Edge Handling=Smear

**X Translation** and **Y Translation** position point controls allow you to move the center point of the clip on the X and Y axis respectively.

**Rotation** allows you to rotate the clip on the Z axis.

**Scaling** changes the size of the image along the X and Y axis. This parameters scales as a percentage of the image's original width and height. Thus, a Scaling value of 200 produces an image twice as large as the original.

### Optical Flow Parameter Group

The Optical Flow parameters estimate the motion between frames of video and use that information to calculate the motion of the image. Optical Flow analyzes the frames before and after the current frame to determine which pixels are moving.

**Vector View Spacing** and **Vector View Scale** control onscreen motion vectors which indicate the direction of motion of the pixels in the current frame. If an area in the effect doesn't look correct, turn on the vectors to view the estimation. For example, if an area in your image is not supposed to move, check the display for that area.



You must set the **Mode menu** to **Show Vectors** to display the onscreen motion vectors. Be sure to return this menu to Stabilize or Smooth before rendering your effect.

**Vector View Spacing** adjusts the number of onscreen motion vector lines. The array of vector lines indicate the direction of motion of the pixels in the image in the current frame. Higher values produce more vectors. At a value of 0, no vectors display.



*Display Density=2*



*Display Density=10*

**Vector View Scale** controls the length of the individual vector lines. The array of vector lines indicate the direction of motion of the pixels in the image in the current frame. Higher values produce longer lines. At a value of 0, no vectors display.



Drawing Scale=10



Drawing Scale=10

**Stabilization Samples** sets the number of vector field samples that the filter takes. Higher values produce more accurate analysis but increase rendering times.

**Span** sets the percentage of samples that are considered to be representative of the background. If the image is nearly all background, increasing Span can increase the accuracy of the stabilization.

**Edge Contrast** sets a threshold for the minimum amount of detail in a region. Regions containing less detail than the threshold are treated as having no detail. If your frame includes a lot of motion in areas that are very detailed or small objects, decrease this parameter. Min. Edge Contrast does not depend on the motion, only the texture and detail of the frames.

The **Resolution menu** adjusts the quality of the analysis. The choices are *Full, Half, Quarter, Eighth, Sixteenth, 32nd* or *64th*. The default Quarter resolution setting often produces good results. However some images may require Half or even Full to produce good results. Easily tracked images may be able to use lower resolutions. Higher resolutions take more time to process but can create more accurate results.

**Velocity Limit** constrains the magnitude of motion estimation. This value corresponds to a percentage of the size and resolution of the Source Layer. For example, when working with a D1 image, the value of 100 corresponds to approximately 100 pixels.



If the estimated motion is larger than the actual motion, the stabilization will be incorrect and the motion vector display will show long motion vectors. If this occurs, try decreasing Velocity Limit to approximately 50.

**Low Velocity Correction** sets a threshold for detecting motion in a region. If the Optical Flow shows vectors in an area that is not moving, adjust the **Low Velocity Correction** value.

## Overview of Using the Optical Stabilizer

The following steps provide an overview of the optical stabilizing process.

1. Apply the BCC Optical Stabilizer filter directly to a clip that you want to stabilize.



The **Video Quality** should be set to *Full Quality* when you use the Optical Stabilizer.

2. Set the **Mode Menu** to *Setup Region* and use the onscreen controls to set up the target region. This region should be as large as possible while excluding areas of uniform texture such as sky or water or other difficult to track areas such as motion blur or low contrast.

A good target region contains large areas of non-uniform detail with high-contrast edge definition aligned in a variety of directions.

3. If you are stabilizing, set the **Reference Frame** to assign the frame that is used as a reference for the filter. When stabilizing, the other frames are transformed to match the reference frame.
4. If you will be smoothing instead of stabilizing, adjust **Smoothing Range** to set the number of frames that are used to calculate the average position of the image.
5. Set the **Stabilize menu** to the appropriate choice.
6. Set the **Edge Handling menu** to the appropriate choice. This setting determines how the filter creates pixels to fill the this space created when the image is offset to compensate for movement.
7. Make sure you are on the first frame in the effect. Set the **Mode Menu** to *Stabilize* or *Smooth* and click **Play**. The filter will stabilize or smooth the clip.

Choose **Stabilize** when you want to lock all the frames to the reference frame, eliminating all motion. Choose **Smooth** when you want to smooth, but not eliminate all motion, such as when panning a hand-held camera.



If you are not on the first frame of the effect and choose Stabilize, the filter will calculate the stabilization of every frame up to the current frame before displaying the current frame. No onscreen displays indicate that the filter is calculating, so you could mistakenly believe that the BCC Optical Stabilizer filter is frozen. Conversely, if you are on the first frame and choose Smooth, the filter must calculate all frames in the Smoothing Range. This means that if the position indicator is on the first frame, Stabilize will be more interactive while if the position indicator were on frame 100, Smooth could be more interactive (depending on the Smoothing Range setting).

8. If necessary, correct any errors using the Optical Flow parameters.
9. If you want, you can adjust **X Translation** and **Y Translation, Rotation** and **Scaling** parameters to correct any mistakes made by the filter or to finetune the results.
10. Render the effect.



If you play through the entire effect before rendering the filter will calculate the stabilization of every frame. Otherwise, the filter will calculate during the render.