
FURNACE
BY THE FOUNDRY

Furnace User Guide

Images illustrating video interlacing courtesy of Ron Brinkmann (http://www.digitalcompositing.com).

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Rev: 3 November 2009

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Introduction

Welcome to this User Guide for Furnace on Avid DS.

Furnace is a rich collection of image processing tools to help compositors tackle common problems when working on films. We have spent two years working closely with post production houses in London developing tools that will save you time.

About this User Guide

This User Guide will tell you how to install, license, and use the Furnace plug-ins. Each plug-in is described in detail in later chapters.

This guide assumes you are familiar with Avid DS and the machine it is running on.

Example Images

Example images are provided for use with each of the plug-ins. You can download these images from our web site and try Furnace out on them.

Installing Furnace

Furnace is available as a download from our web site http://www.thefoundry.co.uk. The downloads are in zip format. You should install Furnace on your main Avid DS Workstation and your remote processing machines.

1. Download the file from our web site (http://www.thefoundry.co.uk)

2. Unzip file the archive and extract the files to a temporary directory.
3. Double click on setup.exe and follow the on-screen instructions to install Furnace.

Furnace will be installed but not licensed.

Licensing

If you don't have a valid license key, a warning will be displayed and the finished render will have coloured dots scattered over it.

The license key is a sequence of numbers and letters, stored in a plain text file, that unlocks Furnace. License keys can be created for a particular computer enabling those plug-ins to run only on that computer. These are called node locked licenses. We also supply floating licenses that will unlock Furnace on any networked computer connected to a machine running the Foundry license server.

Tools to install license keys, manage floating licenses, and diagnose license problems can be downloaded from our web site, http://www.thefoundry.co.uk/licensing.

About Furnace Plug-ins

All Furnace plug-ins integrate seamlessly into Avid DS. They are applied to your clips as you would any other plug-in and they can all be animated using the standard animation tools.

Other Foundry Products

The Foundry is a leading developer of plug-in visual effects for film and video post production. Its products include

Nuke, a high-end compositing application, and plug-ins, such as Furnace, Tinder, Tinderbox, Keylight, Ocula, and RollingShutter. The plug-ins run on a variety of compositing platforms, including After Effects, Autodesk® Media and Entertainment Systems, Avid DS, Nuke, Shake, After Effects, and Final Cut Pro. For the full list of products and supported platforms, see our web site at www.thefoundry.co.uk.

Nuke is an Academy Award® winning compositor. It has been used to create extraordinary images on scores of feature films, including *Australia*, *The Dark Knight*, *Quantum of Solace*, *The Curious Case of Benjamin Button*, *The Golden Compass*, *Iron Man*, *Transformers*, *King Kong*, and *Pirates of the Caribbean: At World's End*.

Furnace is a collection of film tools. Many of the algorithms utilise motion estimation technology to speed up common compositing tasks. Plug-ins include wire removal, rig removal, steadiness, deflicker, degrain and regrain, retiming, and texture tools.

Tinder and Tinderbox are collections of image processing effects including blurs, distortion effects, background generators, colour tools, wipes, matte tools, painterly effects, lens flares, and much more.

Keylight is an industry-proven blue/green screen keyer, giving results that look photographed, not composited. The Keylight algorithm was developed by the Computer Film Company who were honoured with a technical achievement award for digital compositing from the Academy of Motion Picture Arts and Sciences.

Ocula is a collection of tools that solve common problems with stereoscopic imagery, improve productivity in post

production, and ultimately help to deliver a more rewarding 3D-stereo viewing experience.

RollingShutter is a plug-in that tackles image-distortion problems often experienced by users of CMOS cameras. The plug-in will often vastly improve the look of distorted footage, by either minimising or eradicating image distortions. Unlike solutions tied to camera stabilisation, that stretch the image as a whole, the RollingShutter plug-in compensates for local skewing and distortion in the scene, by correcting each object individually.

Visit The Foundry's web site at http://www.thefoundry.co.uk for further details.

Common Property Pages

There are several property pages that are common to most Furnace plug-ins. This chapter describes the parameters on those pages.

- Help. The Furnace User Guide and the display of on-screen tools can be accessed from this property page.
- Cropping. This page controls how the Furnace effect behaves at the edges of your image.
- Masking. This page controls which components of the image are processed.
- Options. This page is used to select frame or field rendering.

Help Property Page

The Help property page gives a brief description of the plug-in and access to this Furnace User Guide by pressing the Online Help button. It is also used to display the version number of the plug-ins and to show or hide Furnace's on-screen interface tools.

Figure 1. Help Property Page.

Cropping Property Page

Furnace plug-ins may require access to source pixels that lie off the edge of the source image. The Cropping property page gives access to all the controls required for specifying how pixels are treated at these edges and where they appear.

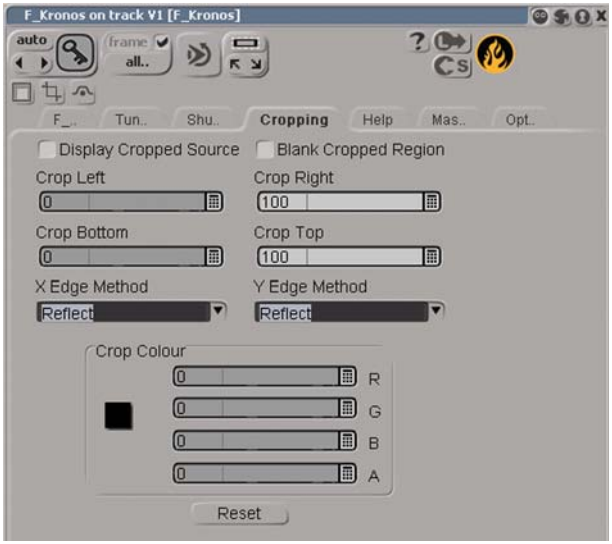

Figure 2. Cropping Property Page.

Display Cropped Source - switch this on to show the cropped source image with the effect bypassed. This can be useful if precise positioning of the crop lines is required when the Furnace effect is getting in the way.

Crop Left - controls the position of the horizontal crop line.

Crop Right - controls the position of the horizontal crop line.

Crop Bottom - controls the position of the horizontal crop line.

Crop Top – controls the position of the horizontal crop line.

Note *The position of the crop lines can be changed by clicking and dragging them directly on the screen. The image below shows the crop lines.*

Figure 3. Crop Lines reflecting left and repeating top.

X Edge Method – determines the behaviour of the image at the left and right crop boundaries. Four edge methods are supplied.

- **Colour** – fills the area between the crop line and the edge with the Crop Colour (Figure 4 on page 13).
- **Repeat** – copies pixels on the crop boundary to the screen edge (Figure 6 on page 13).
- **Wrap** – copies pixels from the area between the opposite crop line and its screen edge into the area between the current crop line and its screen edge (Figure 7).
- **Reflect** – reflects pixels about the current crop line. In other words it copies pixels from the other side of the

current crop line into the area between the current crop line and the screen edge (Figure 5).

Figure 4. Colour

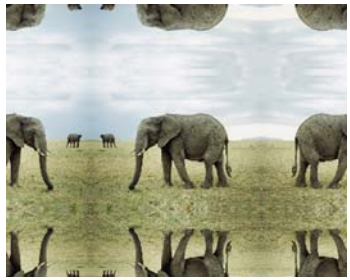

Figure 5. Reflect

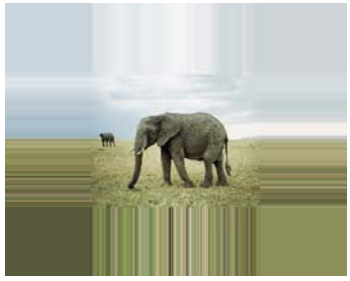

Figure 6. Repeat

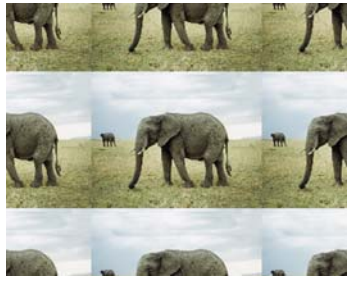

Figure 7. Wrap

Note: *Horizontal and vertical crop boundaries can have different edge methods. Cropping is often used to remove unwanted pixels at the edge of an image. If a video clip is digitised badly you may get black edges left and right. These can easily be removed by moving in the vertical crops and setting the edge method to Reflect.*

Y Edge Method - determines the behaviour of the image at the top and bottom crop boundaries. See X Edge Method on page 12.

Crop Colour - sets the fill colour used when the edge method is set to Colour. If you are keying blue screen you can

garbage mask unwanted rigs using the crop control and set the Crop Colour to blue.

Masking Property Page

This controls which colour channels are processed. Most commonly this will be all three. It also controls how the alpha channel will affect the result. See your Avid DS User Guide for more information.

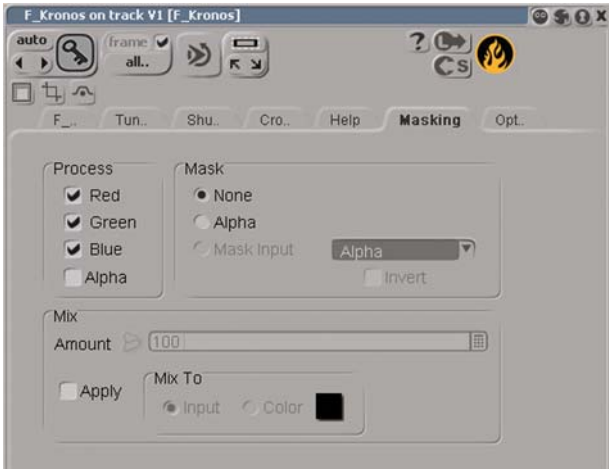

Figure 8. Masking Property Page.

Options Property Page

For general information about the options property page, see your Avid DS User Guide.

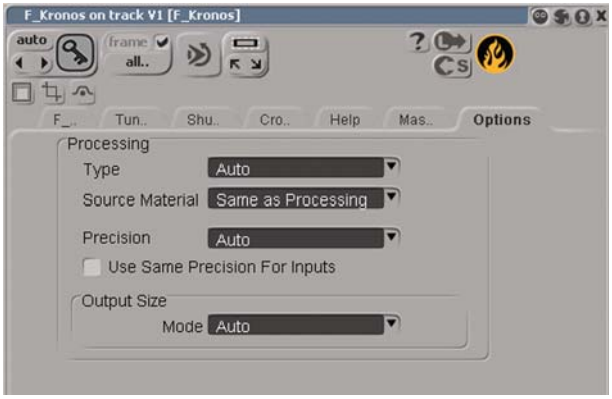

Figure 9. Options Property Page.

Furnace plug-ins will be rendered either as fields or frames depending on a decision process that Avid DS carries out.

The effect will be rendered on fields ONLY when you are 'processing all' and you have the 'Granularity' parameter set to 'fields' AND there is animation on any parameter OR the 'options' property page is present and 'source material' is set to 'same as processing'.

The effects that should be rendered in fields to get the best results will have the 'options' page present.

Kronos

Introduction

Kronos is Furnace's retimer and is designed to slow down or speed up footage. It works by calculating the motion in the sequence in order to generate motion vectors. These motion vectors describe how each pixel moves from frame to frame. With accurate motion vectors it is possible to generate an output image at any point in time throughout the sequence by interpolating along the direction of the motion.

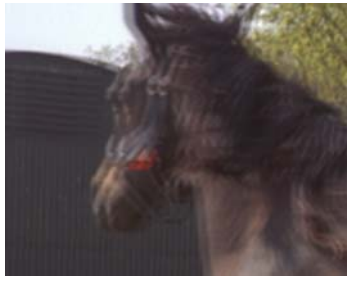

Figure 10. Simple mix of two frames to achieve an inbetween frame.

Figure 11. Kronos vector interpolation of the same two frames.

Kronos contains a number of controls to allow you to trade off render time verses accuracy of vectors.

A motion vector is the estimated direction a pixel will move between two frames, say frame 1 and frame 2. Motion vectors are then used to build frames between frame 1 and 2. We calculate two sets of motion vectors - forwards and backwards. A forward motion vector is the estimated direction a pixel moves when going from frame 1 to frame 2, whereas a backwards vector estimates the direction from frame 2 to frame 1. An average of these two sets give us the

motion vectors we use.

Note *Kronos tends not to use original frames in the output clip as this can show a regular, if subtle, pulsing or beating. For example, on a half speed slowdown you might expect the output clip to be composed of the original frame 1, a generated frame 1.5, original frame 2, etc. This is not the case. Kronos will generate frame 0.25, 0.75, 1.25, etc.*

Quick Start

Kronos *can* be applied as a Clip Effect but this is **not** recommended because trimming the start of the clip will not output the correct result.

The best way to use Kronos is as a Timewarp Container. We'll describe how to set this up and then how to use it to retime clips.

Timewarp Container

DS will not allow Kronos to be applied as a Timewarp Container from a saved preset, so it's important to follow the following steps.

1. Start DS.
2. Select **Customize Toolbars** from the Layout drop-down menu. Select **Editing** on the left hand side and, scrolling

down, select **Time Effect** on the right. (Do not select Timeline Effect).

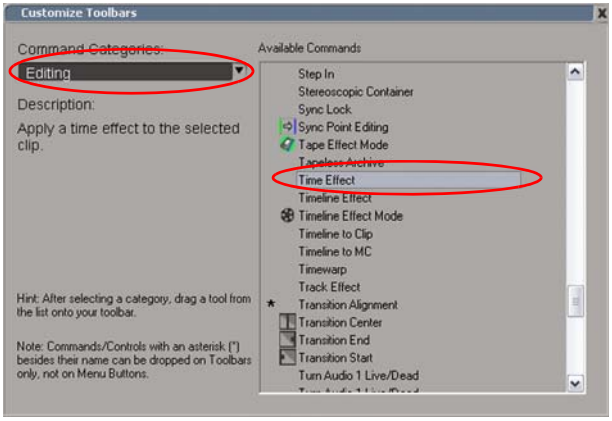

Figure 12. Customize Toolbar.

3. Drag Time Effect either onto a toolbar of your choice (the User toolbar is a good choice, Figure 13 red arrow) or

onto the Time Effects button on the NLE Tools toolbar, Figure 13 green arrow.

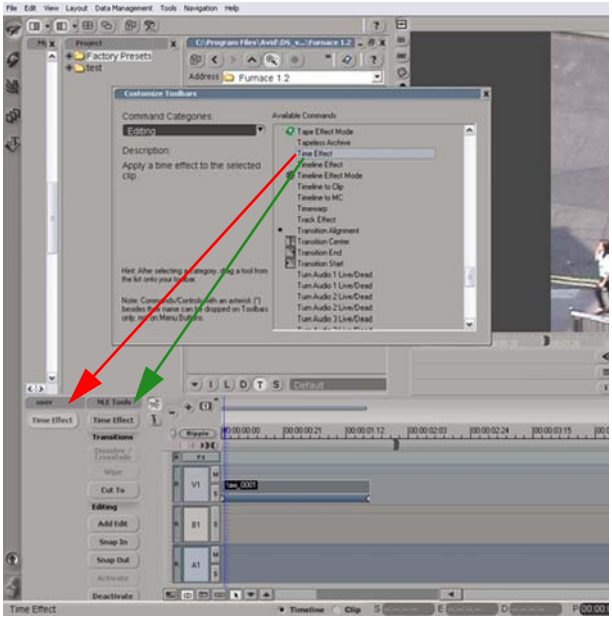

Figure 13. Create a Time Effect button.

Applying Kronos

To change the speed of a clip, do the following.

1. Select your clip on the Timeline.
2. Select your new Time Effect button from the User toolbar (or Time Effects - Time Effect from the NLE toolbar) as described in "Timewarp Container" on page 18.

3. DS will open a browser window in the Time Effects folder. Navigate to the Furnace preset directory and double click on F_Kronos to create a Timewarp container for the clip.

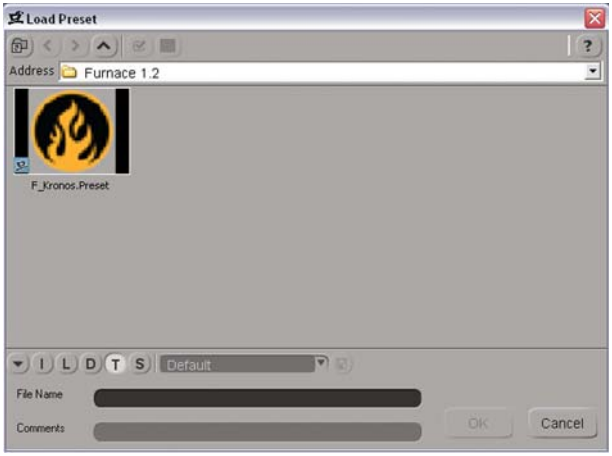

Figure 14. Browser.

4. To edit the Kronos parameter, right click on the F_KronosContainer on the Timeline and select F_Kronos Properties from the menu to display the property pages.

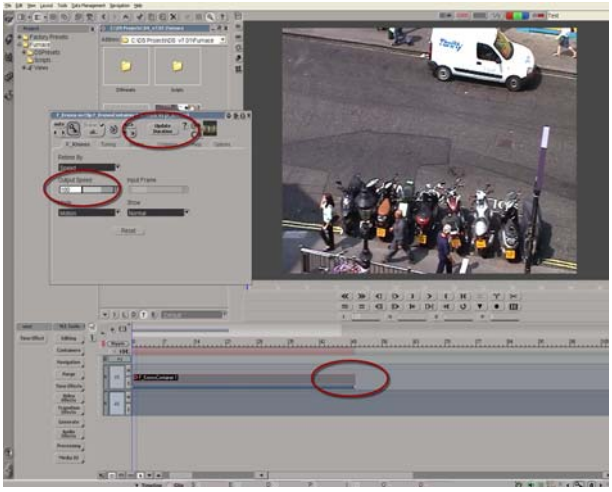

Figure 15. Kronos Property Page.

5. To slow down a clip, change the speed to, say, 50 and click on the Update Duration button at the top of the page. Note the clip doubles in length. Figure 15 on page 22.
6. Render.

Occlusions

One of the harder areas of motion estimation is handling occlusions and reveals. These are areas of an image where part of an object is being revealed or obscured by another. In these cases motion estimation often drags part of the background along with the foreground motion. This is because we can't yet get accurate enough motion vectors. This is frustrating because it's easy for people to separate

background and foreground, but very hard for algorithms that don't recognise everyday objects to do the same.

If you want the best possible result and you have lots of time and patience you can do it with Kronos by telling it accurately what is foreground and background with a matte. This will remove all dragging around the edges of the foreground objects and give a very high quality result. See the worked example "Taxi Matte" on page 36.

Motion Blur without Retiming

You can add motion blur without retiming. To do this:

1. Set Speed to 100%.
2. Set Shutter Control to Manual.
3. Set Shutter Time to 90.
4. Set Shutter Samples to 10.
5. Render.

This will add motion blur along the direction of motion without speeding up or slowing down.

Effect Type

Clip Effect, Multi-input Effect.

Property Pages

The parameters on each of the property pages are described below.

F_Kronos

This property page has the main controls to alter the speed of the retimed clip.

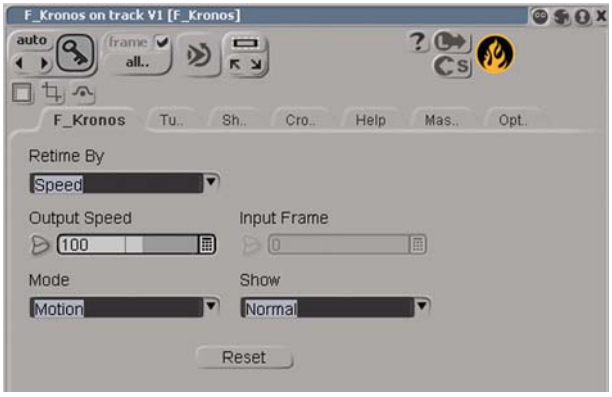

Figure 16. F_Kronos Property Page.

Retime By - sets how to control the new timing of the clip.

- **Speed** - select this if you wish to describe the retiming in terms of "double speed" or "half speed".
- **Frame** - select this if you wish to describe the retiming in terms of "at frame 100 in the output clip I want to see frame 50 of the input clip". You'll need to set at least 2 keyframes for the parameter Source Frame to retime the clip.

Output Speed - sets the speed of the output clip. This parameter is visible only if Retime By is set to Speed and is calibrated as a percentage of the original speed. Values below 100 slow down the clip. Values above 100 speed up movement. For example, to slow down the clip by a factor of two (half speed) set this value to 50. Quarter speed would be 25. This value can be animated.

Input Frame - this parameter is visible only if Retime By is set to Frame. Use this to specify the input frame (source frame) at the current frame in the timeline. For example, to slow down a 50 frame clip by half, set the timeline frame range from 1 to 100 using Enable Time Remapping (see your After Effects User Guide), then keyframe this parameter so that at the start of the timeline Source Frame = 0 and at the end of the timeline Source Frame = 50. This would be the same as setting the Speed to 50.

Mode - sets the interpolation algorithm. By default this is Motion. Frame and Blend are very quick and will give you a quick preview of the retimed clip.

- **Frame** - the nearest original frame is displayed.
- **Blend** - a mix between two frames is used for the inbetween frame.
- **Motion** - vector interpolation is used to calculate the in-between frame.

Show - sets the clip to be retimed.

- **Normal** - the standard retimed output of the Source clip.
- **Mask** - the retimed Matte input. (Only available when a Matte is applied).
- **Foreground** - the retimed foreground, ignoring motion in the background. (Only available when a Matte is applied).
- **Background** - the retimed background, ignoring motion in the foreground. (Only available when a Matte is applied).

Tuning

All parameters in the Tuning folder manipulate the motion vectors. These parameters are only visible when Mode is set to Motion.

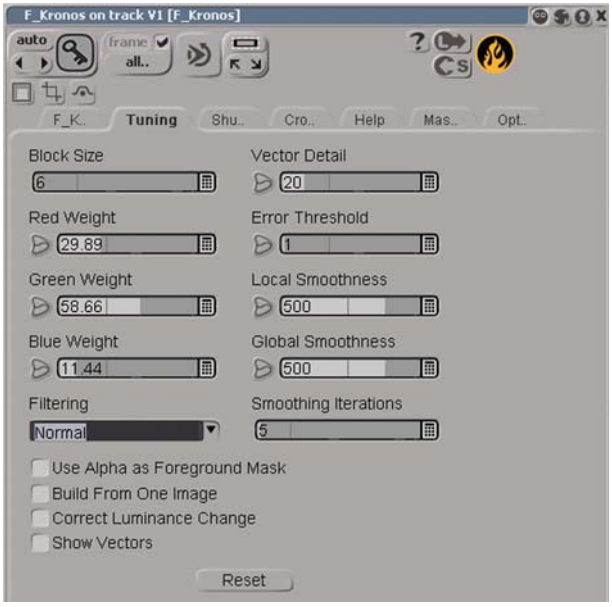

Figure 17. Tuning Property Page.

Block Size – adjusts the size of the coarse blocks used to calculate the vectors. Varying the block size will cause the motion estimation to lock on to different parts of the image. You won't need to adjust this very often.

Weighting

By default we analyse motion based on the brightness of the image. Specifically this is the mean of the red, green and blue channels. However, we can bias this using the red, green and blue weighting parameters. For example, if we set the red

and green weight parameters to zero, we will only look for motion in the blue channel.

Red Weight - sets the contribution the red channel will make in the calculation of the motion vectors.

Green Weight - sets the contribution the green channel will make in the calculation of the motion vectors.

Blue Weight - sets the contribution the blue channel will make in the calculation of the motion vectors.

Filtering – controls the quality of the filtering used to build the interpolated image. As this only affects the sharpness of the final image, it's worth leaving it on Medium until you're ready for the final render.

- **Normal** - uses a bilinear interpolation suitable for most purposes.
- **Extreme** - use a sinc interpolation filter which will produce sharper results but will also dramatically increase the render times. You are warned!

Vector Detail – controls the number of motion vectors calculated. For example, setting this to 100 will generate a vector for each pixel in the frame. Don't automatically max this parameter as it may not improve the output and will certainly take longer to render. If you're retiming a fast moving sequence where there is an overwhelming global motion (most objects are moving in the same direction) and you are getting edge tearing you should probably reduce the vector detail to give a smoother result. This effectively says ignore the fine motion in the scene and just use the dominant motion. There may be other times where you can clearly see background pixels being dragged along by

foreground objects. Increasing vector detail should improve the result here.

Note *If you are working on HD sequences at half resolution, for example, and adjust the parameters in Kronos until you're happy and then switch to the full resolution, if you want approx the same result as in the half res you should half the vector detail.*

Error Threshold – In calculating the motion vectors we try to see where pixels have moved from one frame to another. The error threshold determines how hard we try and find matches before giving up. A high value will give up quickly and blend the pixels. A low value will try harder and use it's best guess for a motion vector. If you are seeing edge tearing these vectors are probably wrong and you could increase this threshold to get a blend instead. This may be less distracting when the clip is played.

It's also useful if you have heavy grain on the images and you don't want that to affect the motion estimation. Increasing the error threshold will cause Kronos to ignore more low level detail and so ignore the random motion of the grain.

Smoothing

Kronos estimates the motion between frames by first considering the coarse motion over the while image and then refining it over progressively smaller scales. Two smoothing parameters have been provided to give some control here. The image is split into coarse blocks and a single motion vector is attributed to each of these blocks.

Global Smoothness - massages these coarse vectors so they line up more with each other. This effectively smooths out global motion.

Local Smoothness - lines up the motion vectors that are calculated for each pixel within the coarse blocks. This effectively smooths out local motion.

Smoothing Iterations has a similar effect to combing the vectors to remove stragglers. In other words, if there are one or two vectors pointing in a different direction to the majority surrounding it, this parameter will force these stray vectors to line up with the others. Increasing this parameter will do more combing passes and so produce smoother results but at the expense of longer render times.

Use Alpha as Foreground Mask - switch this on to use the Foreground Mask input (seen in the effects tree) to improve the motion vectors and reduce edge dragging. The foreground mask is an optional input which can be used to define the foreground and background areas of the image so that dragging of pixels between overlapping objects can be reduced. See "Occlusions" on page 22. White areas in the mask are considered to be foreground and black areas background. Grey areas are used to attenuate between foreground and background.

Build From One Image – switch this on to build the final output from the closest single frame as opposed to the closest two frames. This will result in a sharper image but more jerky motion.

Correct Luminance Change – motion estimation algorithms are particularly sensitive to luminance changes. Switching this on will attempt to equalize the luminance between the frames before calculating the motion. The original images are used to build the final result and so the luminance changes will still be present in the final output but the vectors should be more accurate.

Show Vectors – switch this on to display the motion vectors over the image. Blue are backward motion vectors and red are forward motion vectors. The length of the lines corresponds to the speed of the object. Figure 18 shows that only the taxi is moving on this frame.

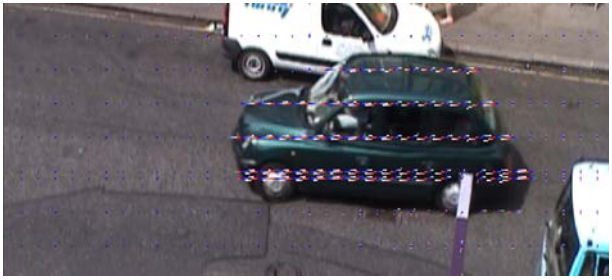

Figure 18. Motion Vectors.

Shutter

The shutter parameters mimics some of the features of a real camera shutter essentially giving control over how long the camera aperture is open exposing the film to light through the camera lens. The longer the shutter is open the more motion blur is seen on the film.

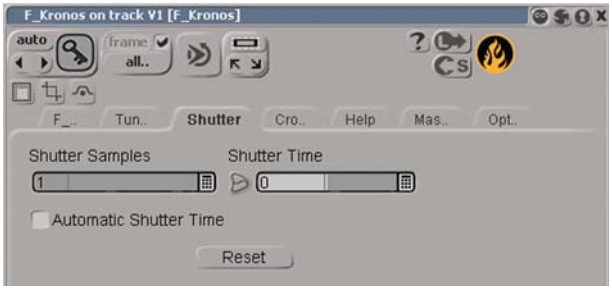

Figure 19. Shutter Property Page.

Shutter Samples – this is a quality setting. It sets the number of in-between images used to create an output image during the shutter time. Increase this value for smoother motion blur.

Figure 20. Shutter Samples 2

Figure 21. Shutter Samples 20

Shutter Time – effectively controls how long the virtual camera aperture is open. Long shutter times will produce motion blur on moving objects. A shutter time of 100, Figure 22, is equivalent to averaging over plus and minus half an input frame which is equivalent to a shutter angle of 360 degrees. A shutter time of 50, Figure 23, is equivalent to a shutter angle of 180 degrees. To switch off motion blur,

Figure 22. Shutter Time 100

Figure 23. Shutter Time 50

set the shutter time to 0.

Automatic Shutter Time - switch this on to vary the shutter time throughout the sequence according to the rate of the retime. Switch this off to set the shutter time manually.

Cropping

Cropping is often used to get rid of unwanted pixels which can occur at the edges of images. After retiming these unwanted edge pixels can get worse. Kronos's built-in cropping tools can reduce these artifacts by repeating the pixels at the crop boundary See "Cropping Property Page" on page 11.

Figure 24. Showing unwanted black pixels on right edge.

Figure 25. Right crop set to 98 to reduce the problem.

Help

See "Help Property Page" on page 10.

Masking

See "Masking Property Page" on page 15.

Options

See "Options Property Page" on page 16.

Examples

All the images for the following example can be downloaded from our web site.

Taxi

This example shows a taxi, Figure 26, driving past our offices in Soho. We'll retime this 50 frame sequence to half

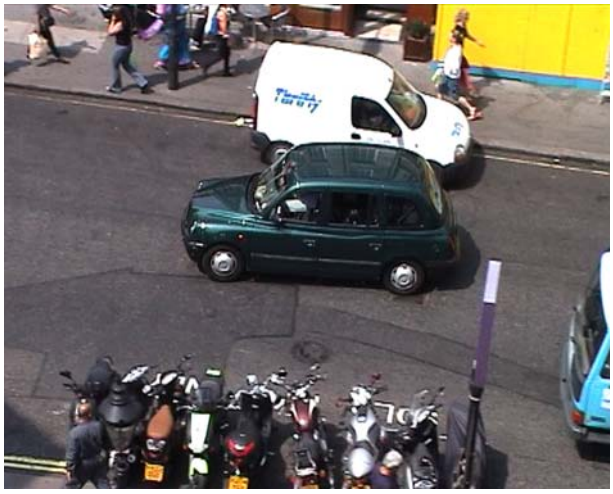

Figure 26. London Taxi.

speed.

Download File kronos-taxi.tar.gz

Step by Step

1. Start Avid DS.
2. Make sure you have set up Kronos as a Timewarp Container as described in "Timewarp Container" on page 18.
3. Import the taxi clip.

4. Drag it into the timeline and play the clip to get a sense of the motion (Figure 27).

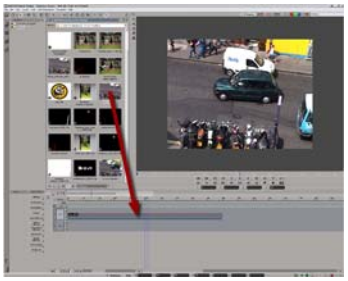

Figure 27. Drag taxi into timeline.

5. Create a Kronos Timewarp Container on the clip as described in steps 1-3 of "Applying Kronos" on page 20 and edit the property pages.
6. Set Retime By to Frame.
7. Drag the Kronos container to double its length.
8. Move the Timeslider to the start of the Kronos container and set Input Frame to 1. Set a key.
9. Move the Timeslider to the end of the Kronos container (frame 100) and set Input Frame to 50. Set a key.
10. Render.

Tips Edit the animation curve for Input Frame (Figure 28) to get the motion you want.

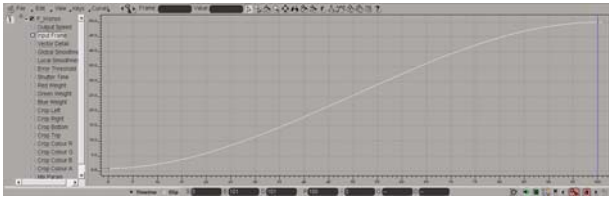

Figure 28. Animation curve for Input Frame.

To get a sense of the motion, you can set the Mode to Blend, render, and adjust your timing curve from there. It's quicker to process if Mode is set to Blend. When you're happy, set the Mode to Motion.

With the Vector Detail set to the default 20 you will see part of the road under the taxi being dragged along. To reduce this increase this value to 100. See also "Taxi Matte" on page 36 for further improvements that can be made.

To add motion blur to the taxi, switch Shutter Control to Automatic and Shutter Samples to 10.

Taxi Matte

This example demonstrates how to use mattes to remove edge dragging.

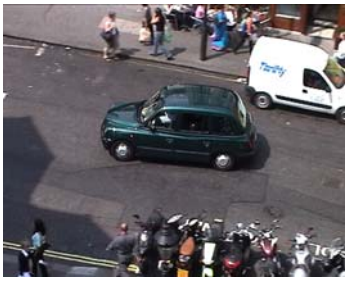

Figure 29. Taxi.

Figure 30. Matte.

Download File kronos-taxi.tar.gz

Step by Step

1. Import the taxi clip and taxi matte. Drag the taxi clip into the timeline as shown in Figure 31.

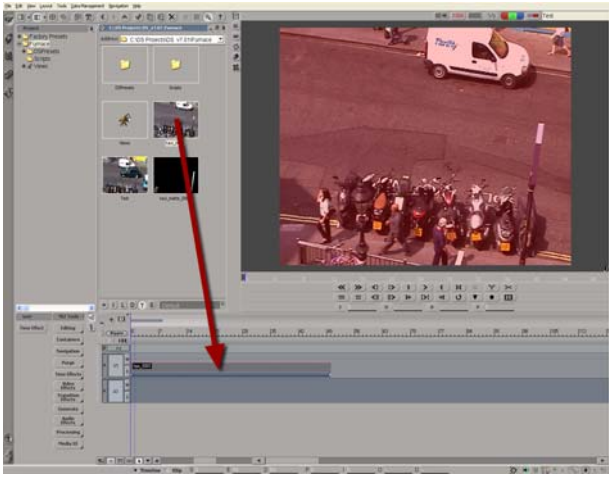

Figure 31. Drag the taxi into the timeline.

2. Create a matte container from the taxi and add the taxi matte.

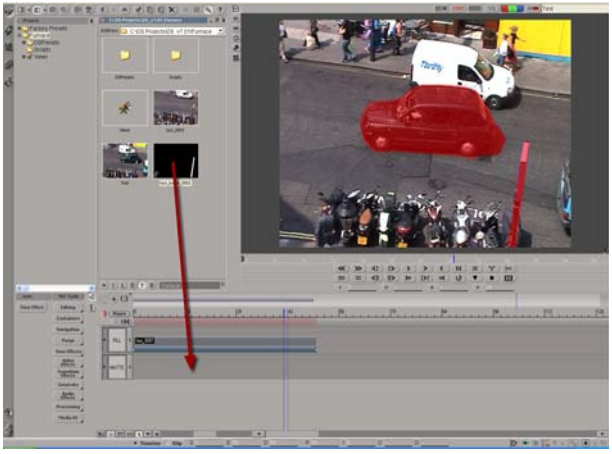

Figure 32. Drag taxi matte into matte layer.

3. Go back to the top timeline, select the taxi matte container and click on the Time Effect button. Select F_Kronos from the browser as shown in Figure 33.

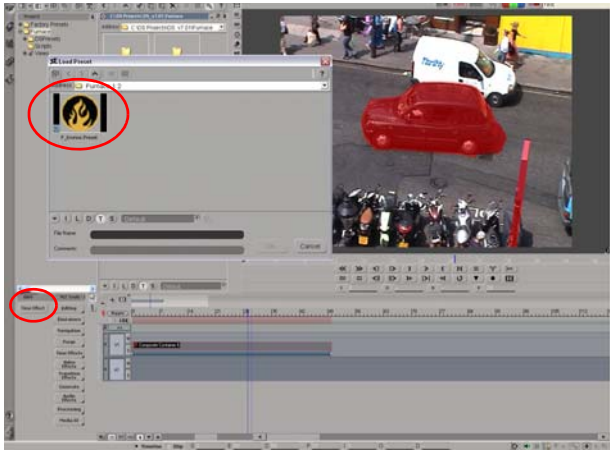

Figure 33. Apply Kronos as a Time Effect.

4. Edit the Kronos Effect Properties as required and click on the Update Duration button to extend the clip.

5. Now switch on the Use Alpha as Foreground Mask on the Tuning PPG to improve edge dragging around the taxi.

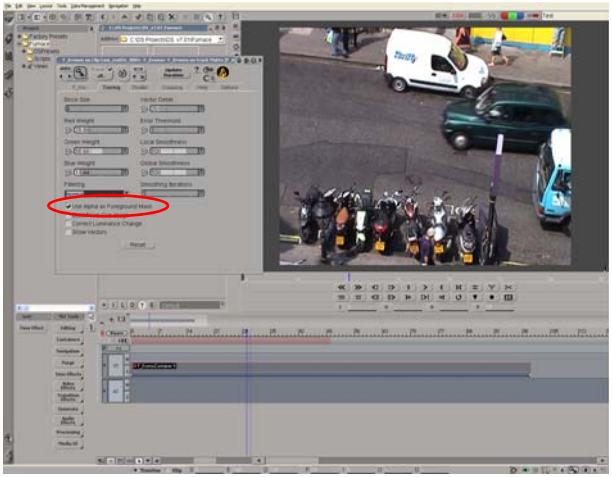

Figure 34. Switch on Use Alpha as Foreground Mask.

6. Finally render the sequence.

Steadiness

This chapter looks into removing camera shake from clips without tracking.

Introduction

F_Steadiness analyses a clip and applies a global transformation to reduce translation, rotation, scale, and perspective changes to smooth out camera shake or lock to a particular frame.

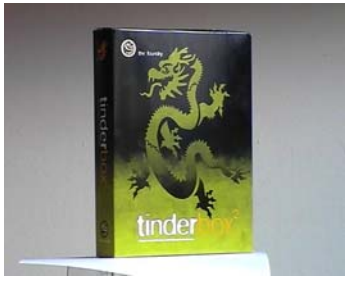

Figure 35. Hand held camera shot of a box used in the examples.

F_Steadiness analyses the motion in the scene without requiring the user to specify tracking points in the sequence. This is useful where tracking data is unreliable, or where good data is available but moves out of shot during the clip.

Quick Start

Two methods are discussed here – locking a clip to a frame and stabilizing a shot to reduce camera shake while retaining the overall camera motion.

Locking the Shot

Here we will learn how to lock a shot to a particular frame without adding tracking points and stabilizing.

1. Select a clip on the timeline and add a clip effect to it. (right mouse click on the clip and select from the pull down menu)
2. Select F_Steadiness from the Furnace 1.0 directory in DS Presets.
3. Set the **Specific Frame** to the frame you want to lock to.
4. Render.

See the tutorial example "Tinderbox 2" on page 49. You should note that this approach only works if the overall movement of the frames doesn't drift. If you try and lock to the first frame in a panning shot, the position will eventually be lost.

Removing Camera Shake

Here we will learn how to reduce the camera shake in a particular shot without adding tracking points and stabilizing.

1. Select a clip on the timeline and add a clip effect to it. (right mouse click on the clip and select from the pull down menu)
2. Select F_Steadiness from the Furnace 1.0 directory in DS Presets.
3. Set **stabilise To** to **Average Frames**.
4. Set **Motion Smoothing** to say **20**.
5. Set **Filtering** to **Medium**.
6. Render.

See "Tinderbox 2" on page 49.

The more of the primary options (Scale, Rotate, Transform and Perspective) which are checked, the more processing time increases as F_Steadiness computes more complex transforms to match the motion in the shot. Frames To Smooth Over can now be adjusted to set the amount of camera shake you want to remove (high values) verses the amount of camera motion you wish to keep (low values).

Replacing Camera Shake

Often it is necessary to remove camera shake to facilitate a composite or other effect processes, but once this is done it is necessary to reverse the process and to replace the camera shake. This can be done using the Invert Transform. For a worked example see "Logo Replacement" on page 52.

Effect Type

Clip Effect, Multi-input Effect.

Property Pages

The parameters on each of the property pages are described below.

F_Steadiness

This property page has all the controls to steady a clip.

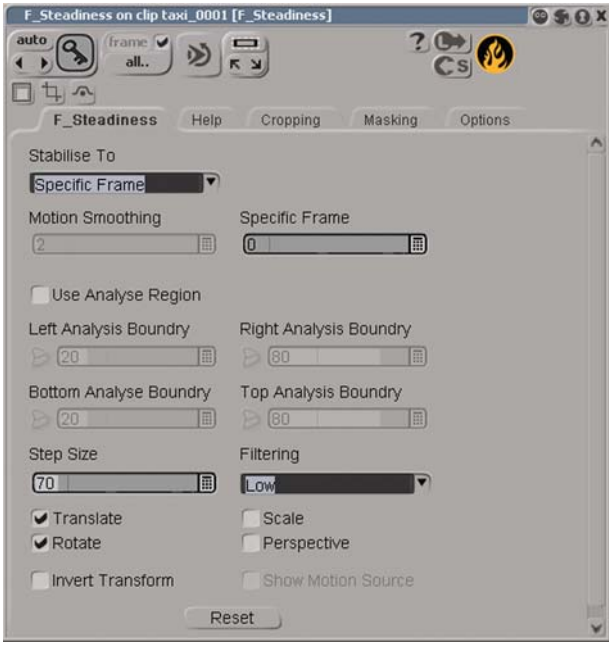

Figure 36. F_Steadiness Property Page.

Stabilise To – controls whether to lock the motion to a particular frame or to smooth out the motion in a clip.

- **Specific Frame** - select this to lock the motion in the clip to a particular frame. This should only be set if the shot is "locked off" (not a panning shot) but unsteady.
- **Average Frame** - select this to smooth out camera shake in a panning shot.

Motion Smoothing – controls the amount of camera motion kept versus the amount of wobble removed if stabilise is set to average frames. Increase this value for smoother motion.

Specific Frame - sets the frame to lock to if stabilise to is set to a specific frame.

Use Analyse Region – the region of the image used to calculate motion is automatically calculated by F_Steadiness. But in sequences with large amounts of object motion which is not related to the camera motion we need to be able to ignore this excess motion. To do this we can select an Analysis Region. The Analysis Region should be used to select a region of the image which has limited object motion and therefore has only the motion of the camera present.

Analysis Region

These parameters define the positions of edges in the analysis region rectangle.

Left Analysis Boundary - the left edge of the analysis region rectangle.

Right Analysis Boundary - the right edge of the analysis region rectangle.

Bottom Analysis Boundary - the bottom edge of the analysis region rectangle.

Top Analysis Boundary - the top edge of the analysis region rectangle.

Alternate Motion Source – If a layer is selected as an alternate motion source F_Steadiness will acquire the motion data from it, otherwise, if no layer is selected the calculation defaults to acquiring the motion data from the Source layer.

Step Size – it is rarely necessary to find the optimum transformation for all pixels and so, to speed up the process,

the image is sampled with frequency of Step Size, and only these pixels are used to find the transformation. Decreasing step size will increase both the processing time and the quality of result. A Step Size of 1 will analyse the motion of every pixel. A value of 10 will use every tenth pixel.

Filtering - is used to control the quality of your processed images by reducing the jagged lines characteristic of pixel devices. To render high quality images you should switch filtering on to High. With all image processing you have a trade off between quality and time. Filtering will increase the quality of your image but will also increase the time it takes to process the image.

- **Low** - point sampling can give poor results but is faster to process.
- **Medium** - bilinear filtering. This is a good compromise between quality and speed.
- **High** - sinc filtering gives excellent results but is much slower to render than the others.

Translate – switch this on to correct for translational changes in the transformation.

Rotate – switch this on to correct for rotational changes in the transformation.

Scale – switch this on to correct for scale changes in the transformation.

Perspective – switch this on to correct for small perspective changes in the transformation.

Invert Transform – normally a transform is applied to the clip to smooth the camera motion. When Invert Transform is

switched on, the opposite correction is applied. This is normally only useful when trying to restore motion to a previously steadied clip. See "Logo Replacement" on page 52.

Show Motion Source - If an Alternate Motion Source is selected this can be used to view this input clip.

Help

See "Help Property Page" on page 10.

Cropping

The crop tools allow you to specify how pixels are treated at the edge of the image. When F_Steadiness translates the image to reduce camera shake we can reflect pixels at the edge to fill in the gaps around the edge. Figure 37 shows

Figure 37. Colour.

Figure 38. Reflect.

that the image has been moved up and to the left leaving black pixels behind. Setting the Edge Methods to Reflect (Figure 38) will disguise the join.

See also "Cropping Property Page" on page 11.

Masking See "Masking Property Page" on page 15.

Options See "Options Property Page" on page 16.

Examples

The images for the following examples are available to download from our web site.

Tinderbox 2

This is a handheld wobbly shot of Tinderbox 2 - our boxed plug-ins for After Effects. To remove the camera shake

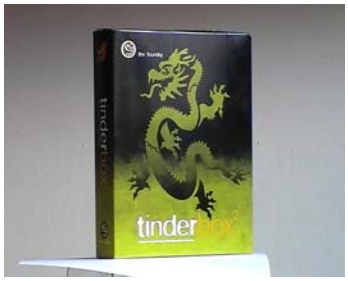

Figure 39. Hand held shot with camera shake.

without having to set tracking points and stabilise you can simply apply F_Steadiness. You should note that this plug-in really comes into its own on long panning shots where tracking points go off screen or where there's a lack of good tracking points due to the nature of the shot.

Download File steadiness-tb2.tar.gz

Step by Step

1. Start Avid DS and import the tinderbox2 clip.
2. Drag it into the timeline and play the clip to get a sense of the motion. Note the camera wobble.

3. Apply F_Steadiness (Figure 40) to the clip (use Add Clip Effect and select F_Steadiness from the Furnace 1.2 folder in DS Presets).

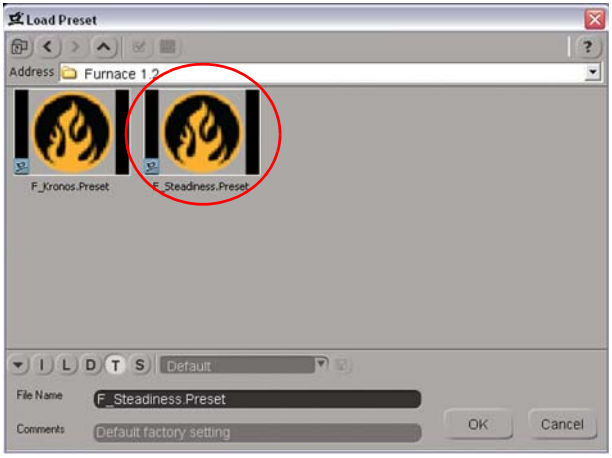

Figure 40. F_Steadiness.

4. Render.

Buoy

This is a shot of a buoy in the English Channel taken from a boat. Using Steadiness we can easily take out the camera shake while retaining the underlying camera motion.

Figure 41. Buoy.

Download File

steadiness-buoy.mov

Step by Step

1. Import steadiness-buoy.mov
2. Drag it into the timeline and play the clip to get a sense of the motion. Feeling seasick?
3. Apply F_Steadiness (Figure 40) to the clip (use Add Clip Effect and select F_Steadiness from the Furnace 1.0 folder in DS Presets).
4. Set **stabilise To** to **Average Frames**.
5. Set **Motion Smoothing** to **10**.
6. Switch off **Scale** so that we're just translating the image.
7. Now render the clip.

To disguise the edge artifacts as the image is moved you can scale the image to move these out of view.

Logo Replacement

We'll use Steadiness to stick a new logo to the wobbly box.

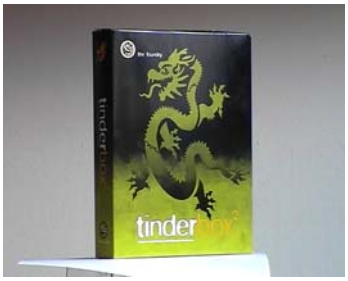

Figure 42. Original image with camera shake.

Figure 43. Steadiness used to replace logo.

Download File

steadiness-tb2.tar.gz

Step by Step

1. Download, extract and import the files. Drag the logo into the timeline and click on the composite menu as shown in Figure 44.

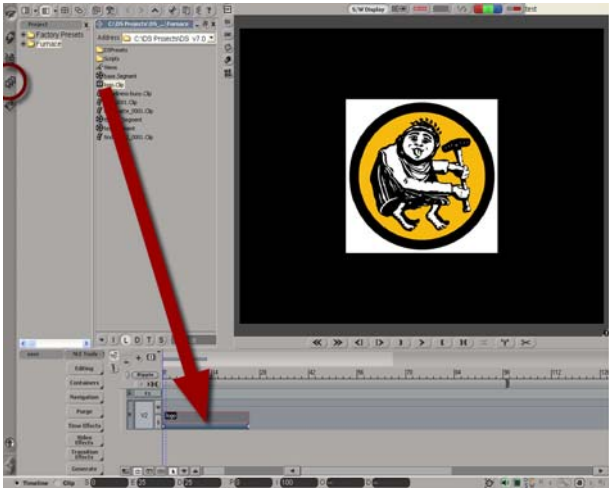

Figure 44. Drag logo into the timeline.

2. Add the tinderbox2 clip (Figure 45). Switch to composite

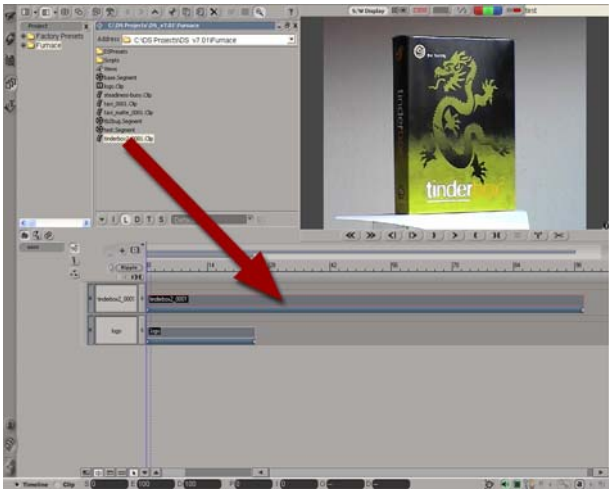

Figure 45. Add tinderbox 2.

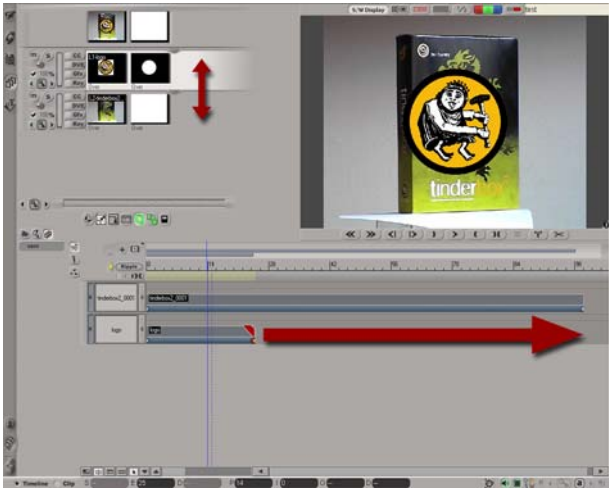

Figure 46. Reorder layers and extend logo.

view and reorder the layers so that the logo is composited over the tinderbox 2 clip. Set the alpha to "Not Premultiplied" (right click on the layer). Then stretch the logo to match the length of the tinderbox 2 clip (Figure 46).

3. Select the logo layer and switch to the tree view. Add the

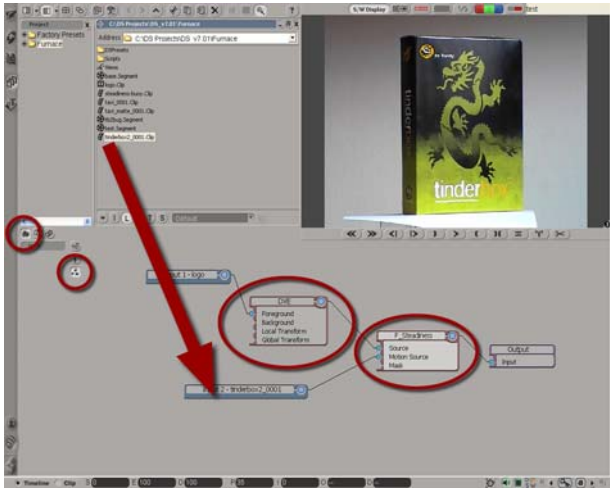

Figure 47. Build a tree with F_Steadiness.

Tinderbox 2 clip. Add two effects. First add a DVE so that we can scale and reposition the logo. Then add F_Steadiness from the DS Presets, Furnace 1.0 folder. Connect the nodes as shown in Figure 47. The logo is fed into the Foreground of the DVE and the output of that goes into the Source of the F_Steadiness node. The tinderbox 2 clip is connected to the Motion Source input of the F_Steadiness node which is connected to the output node. Using the tree we are taking the motion of the wobbly box and applying it to the logo so that the logo sticks to the box.

Note *You cannot scale and translate the logo using the built-in DVE in the composite layers. You have to build the DVE into the tree to get the logo to follow the movement of the box.*

4. Edit the F_Steadiness node and switch on Invert Transform.

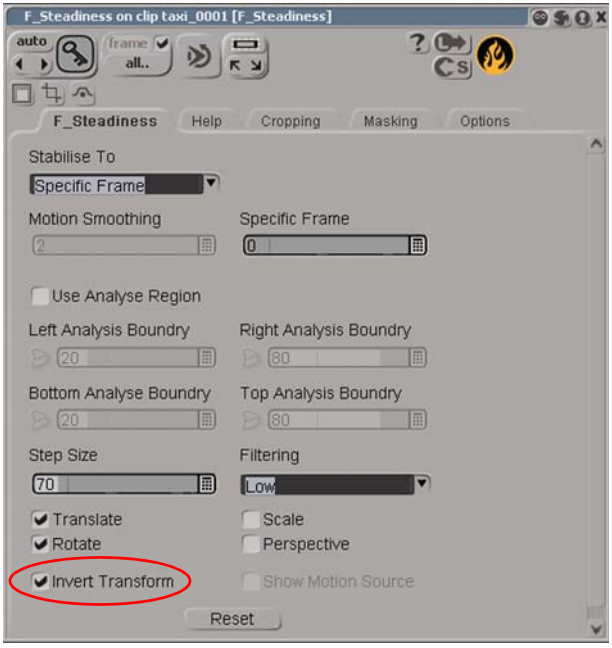

Figure 48. Switch on Invert Transform.

5. Edit the DVE node and position the logo as shown in Figure 49.

6. Return to the top timeline and extend the composite container to 100 frames and render. Note that the logo is stuck to the box.

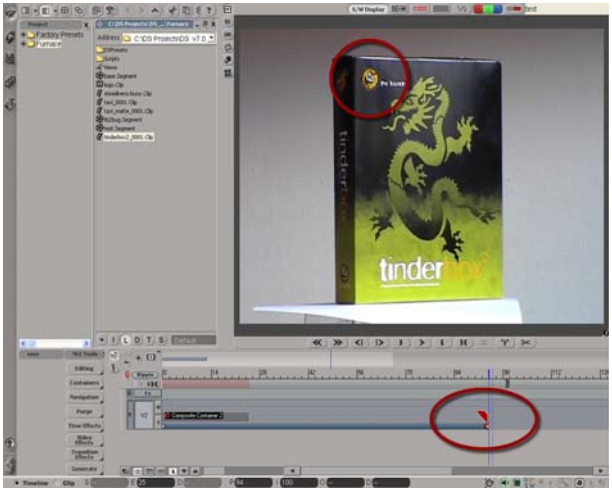

Figure 49. Extend composite container.

Leicester Square

This is a handheld shot walking around Leicester Square in London. Note that any tracking points you had set would go off screen.

Figure 50. Leicester Square.

F_Steadiness can be used to smooth out the camera shake while retaining the overall camera motion.

Download File

steadiness-lsw.tar.gz

Step by Step

1. Import the leicester square tiff files and play. Note the jerky camera motion.
2. Apply F_Steadiness (Figure 40) to the clip (use Add Clip Effect and select F_Steadiness from the Furnace 1.2 folder in DS Presets).
3. Set **stabilise To** to **Average Frames**.
4. Set **Motion Smoothing** to **20**.
5. Set **Filtering** to **Medium**.
6. Now render the clip to reduce the camera shake.

To remove more of the camera wobble you can increase the Motion Smoothing parameter.

APPENDIX A

Release Notes

This section describes the requirements, new features, improvements, fixed bugs, and known bugs & workarounds for each release of Furnace.

Furnace 1.2v3

This release introduces one improvement.

Release Date

4 November 2009

Requirements

1. Avid DS 10.2.x.
2. Foundry FLEXlm Tools (FFT) (5.0v1 or later) for floating license support.

New Features

There are no new features in this release.

Improvements

There are no improvements in this release.

Bug Fixes

- BUG ID 9423 – Wrong version number in Help page in Furnace 1.2v2. The correct version can be viewed in Windows by clicking **Start** > **Settings** > **Control Panel** and opening **Add/Remove Software**.

Known Bugs and Workarounds

There are no known bugs.

Furnace 1.2v2

This release introduces one improvement.

Release Date

9 October 2009

Requirements

1. Avid DS 10.2.x.
2. Foundry FLEXlm Tools (FFT) (5.0v1 or later) for floating license support.

New Features

There are no new features in this release.

Improvements

All of the plug-ins have been rebuilt with the release SDK for Avid DS 10.2.

Bug Fixes

- BUG ID 7290 - 64-bit installers are now default to DS 10.2 and not DS 10.0.
- BUG ID 8567 - Copyright dates are now correct.

Known Bugs and Workarounds

There are no known bugs.

Furnace 1.2v1

This is a maintenance release to support Avid DS v10.

Release Date

October 2008

Requirements

1. Avid DS v10
2. Foundry FLEXlm Tools (FFT) (4.0v8 or later) for floating license support.

New Features

There are no new features.

Improvements

There are no improvements to existing features.

Fixed Bugs

1. EULA - BUG ID 6053 - the end user license agreement has been updated in the installer.
2. Debug - BUG ID 6056 - option panel reported the plug-ins as debug, even though they were not. This has been fixed.
3. Icons - BUG ID 6055 - old product icons have been updated.
4. FLEXlm - BUG ID 5085 - the C:\Program Files\The Foundry\FLEXlm directory was not created on installation of the software. This has been fixed.
5. Spelling - BUG ID 1415 - the parameter Stabilise was spelled incorrectly. This has been fixed.
6. F_Steadiness - BUG ID 1865 - an intermittent crash has been fixed in F_Steadiness.

Known Bugs & Workarounds.

There are no known bugs.

Furnace 1.1v2

This is a maintenance release to fix a couple of bugs.

Release Date

January 2007

Requirements

1. Avid DS 8.0
2. Foundry FLEXlm Tools (FFT) (4.0v1 or later) for floating license support.

New Features

There are no new features.

Improvements

There are no improvements to existing features.

Fixed Bugs

1. Kronos and Steadiness - BUG ID 772 - processing at 16bit in 8 bit projects and in some other circumstances too, Kronos and Steadiness applied as a track effects would render corrupt frames or crash. This bug has been fixed.

Known Bugs & Workarounds.

There are no known bugs.

Furnace 1.1v1

This is a maintenance release to support 32 and 64 bit versions of Avid DS v8.0.

Release Date

November 2006

Requirements

1. Avid DS 8.0
2. Foundry FLEXlm Tools (FFT) (4.0v1 or later) for floating license support.

New Features

There are no new features.

Improvements

1. Support for 64 bit machines running Avid DS v8.0.
2. FLEXlm licensing.

Fixed Bugs

There are no fixed bugs.

Known Bugs & Workarounds.

There are no known bugs.

Furnace 1.0v1

This is the first release of Furnace on Avid DS.

Requirements

Avid DS 7.5 (or 7.0)

Release Date

9 September 2004

New Features

There are two plug-ins included in this release. Kronos, a vector based retimer and Steadiness, a plug-in to

automatically remove camera shake from a clip without adding tracking points.

Improvements

Not applicable.

Bug Fixes

There are no known bugs in Furnace.

Known Bugs & Workarounds.

1. There is a bug in Avid|DS 7.0 (not Kronos) that stops DS from recognising that there has been a change in the duration of a Kronos Timewarp clip, shown here in Figure 51. The pink unrendered bar does not stretch to the new duration. As a work-

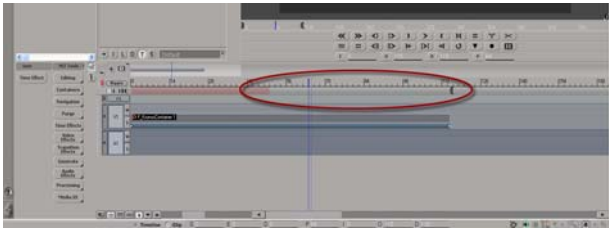

Figure 51. DS 7 bug.

around, either save, quit and restart or try to purge the caches. Avid has fixed this bug in DS 7.5.

2. Kronos - negative time remapping will crash Kronos when used in a composite container. As a workaround use Kronos as a filter effect in the timeline.

Appendix B

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