Combining Fusion built-in tools with Twixtor

These tutorials are provided to help you get better use of Twixtor by combining them with Fusion's built in tools.

These tutorials show you how to successfully use Twixtor with Fusion's built-in tracking and stabilization tools.

For these tutorials you will need Fusion 5.1 or later and Twixtor 4.6 or later.

Project included in this tutorial
Twixtor1.comp, Twixtor2.comp, Twixtor3.comp
Note that these tutorials can be performed with the demo version of the software.

Source Footage
Test footage was provided by Alan Bell, HandMade Digital
All rights are theirs. It is provided here in lower res form for the purpose of this tutorial set. The original material is available as 2K cineon files at their site.

Purpose of Tutorials
These tutorials complement our documentation and the simpler feature by feature oriented tutorials/projects in the support section of our products on our website. The idea of these tutorials is to delve a bit deeper into Fusion with real-world situations that require different RE:Vision Effects and Fusion tools. These tutorials assume you already know Fusion so we have eliminated screen snapshots and the discussions of of what Fusion Point Publishing is, how Tracking works…

Power User Assistance
We would also like to thank Sander de Regt - ShadowMaker SdR who has made great contributions to our understanding of Fusion with his practical in-depth knowledge of Fusion.

LogLin conversion:
Of course the person who did the resizing and resaving of the image files to another file format (jpeg) did a poor job, so these projects include a LogLin conversion tool. Although it looks better after the LogLin conversion (looks probably more as expected by the director), please note that it sometimes works better for our tools to use as a tracking sequence (what is used to motion estimate) the footage *before* the footage is linearized Although the LogLin conversion does enhance the global contrast, it also potentially greatly squashes the darks further reducing relative local differences in dark areas which can affect the precision of the estimated motion. This is particularly critical in low lighting shot situations.

Now let's read the script: Our original shot needs to be slowed to 40% of the original speed. That should be easy, right? Well, yes and no. The tutorial is broken into 3 increments (as separate comps) so it's easier to explain..

Twixtor Comp 1

Often it's a good idea to prestabilize a shot, if you are retiming a shot with camera shakes and you don't want to slowmo the camera. . In addition, if you remove much, or all, of the dominant motion in the scene, the pixel tracking of Twixtor might work better in that it won't have to travel as far to find a match. This is particularly of interest to a set of problematic shots such as pans over repetitive textures (such as a sand beach, short grass fields or some carpets…). We may have been able to retime this particular shot without stabilization, but we will use this material to show how to handle stabilization data in the context of footage being retimed with Twixtor.
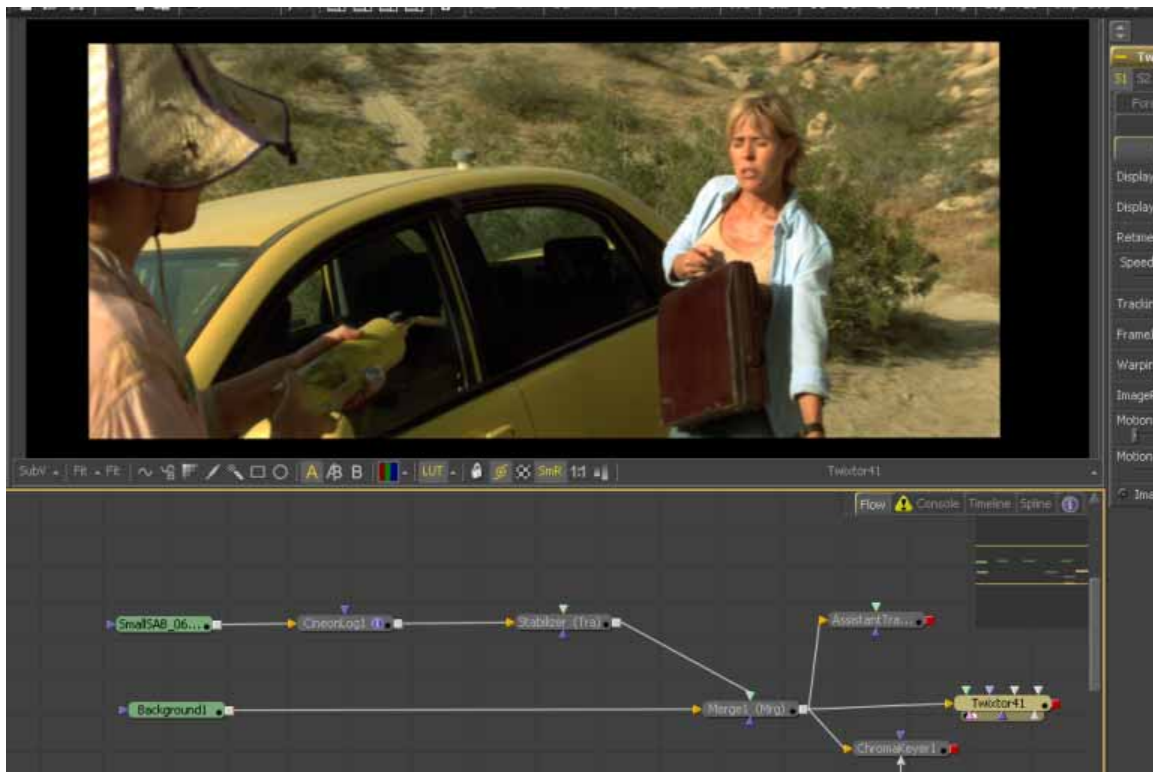
In this case since the camera motion is not too great, or too jittery, it will work to simply figure out a proper larger frame that covers all pixels of the sequence after stabilization, and stabilizing each frame to match the first frame as much as possible (which, in essence, takes the camera motion out)..

Note as well that we set the sequence end frame to be further in time than the duration of the original footage, because we will be retiming it with Twixtor later

Stabilization: we stabilize the plate to essentially remove the background "camera" motion.
First thing to do: stabilize the shot
1 – we track the gasoline cap on top of the car
2 – we track the defocused rock bottom right of the frame - make sure you don't lose the

track when the shirt covers the rock
If you've tracked that correctly, you should have a very stable shot.
Go to Tracker1-->operation-->Match Move and select
BG Only and tick all of Position,Rotation and Scaling.
This should effectively eliminate all camera movement out of this shot.

Creating a Large Background Plate:
Twixtor does not deal properly with plates that vary of effective size per frame (for example, if you animated a crop of the image sequence). Also there is a known issue with Fusion if you crop a stabilized node and try to recover the tracking data further down the flow as the stabilized coordinates are in another spatial reference domain. So in this comp, what we did was simply made a transparent Background Generator and merged over it the stabilized plate, making sure that the edges around the frame have zero alpha. Then Twixtor uses that large frame as source and there is no loss of any image information. Of course by doing so Twixtor will take a lot more time to process so it's not always what we want to do.

Step 2: Try it
We tried Twixtor on this larger background plate and we were not satisfied with the result. (The comp for this propsed "step 2" is not included). Because the default settings for Twixtor resulted in some 'wobbling' on the right shoulder of the woman holding the briefcase when the bushes come from behind the girls arm. We have different options for dealing with that problem. Right now we are still not clear what we will do so we start two branches. (Later we decided to use shape guidance within Twixtor, with tracker help).

Tracker:
We branched off a tracker tool from the merge to help create trackers that can be useful in helping us create better slomos.

Mattes and Twixtor:
We also branched out a chroma key tool that we think we might be want to use to separate the jacket from the bushes. Be careful, if you intend to use this as a Twixtor/MV Create/RSMB… FG-BG layer separation matte, these mattes should be full on in the areas that are being keyed. These mattes are meant as coverage for Twixtor with only ON and OFF values, so be aware that semi-transparent values are simply discarded within the use of these mattes within Twixtor.

Also, it often happens in real life that you need mattes for different reasons, for example you might need to color correct her shirt anyway. In that case, since the color correction would probably want a nice soft matte and Twixtor wants an hard edge full on or off matte. So we suggest creating a key and then using the soft edge version for color correction, and then feeding the keyed matted into another Brighntess/Contrast or perhaps a Matte Control tool (or other level correction tool), to make a hard edged, full-on and full-off pixel matte for use within Twixtor as one if its FG separation matte inputs. Please note with Twixtor you can choose to render only the FG1, and the other Warp

modes (not the default) implement SmartBlending, which can help deal with frame edges (which in our cases are now a window into a larger empty frame).

Twixtor Comp2

Cropping: Note this time we used a negative crop to extend the frame size (instead of a Background and a merge).

Shape Guidance:
To help with the little defect we previously noticed, we decide to use a polyline around her arm, first we tracked her arm (in the assistant tracker node) to help with the positioning of the polyline - We renamed the path to make it easier to recognize when we start connecting to it.

In Twixtor - with Display set to 'Source' we add a Shape - then we Right-Click on the Shape1 center and select 'connect to' the path we just tracked:
'Handwithbriefcasepath'-->position
Then we draw the polyline that will cover the outside of the woman's right arm - because we have just connected the center of the path to a tracker we will need less keyframes on the spline to make it follow the woman's arm

Voila, perfect retiming now!

Twixtor Comp3

Now we need to unstabilize the shot (that is, putting back the "dominant" motion we removed but as per the retiming, this time in a different time domain).

If we weren't using a timewarping process this would be a matter of adding another transform tool, connecting all items to their stable counterparts and then select 'invert transform' (basically what the tool script that comes with Fusion does) but since we've altered the timing of the shot, all other items like size and shake etc. should have changed as well. One way of dealing with this would be by copy/pasting the tracker and then timescaling all keyframes in the spline editor to match with the timechange we've done in Twixtor.

The downside to this method is that it's not that flexible. If you decide you want to slow things down three times instead of 2.5 times, you'd have to go back into the spline editor and re-scale those keyframes. We are going to try a more automated way. There are quite some steps we need to do to achieve this, but the flexibility we gain, will make it worth the effort. It's not that complicated but it requires a lot of words to explain.

A) We publish the value of the Speed Slider in Twixtor. It's set at 40%. We renamed it 'TwixtorSpeedslider' for easy reference.

B) Now we add a transform tool and modify Center, Pivot with an 'offset position' and the Size and Angle with a calculation. Check the 'invert transform' button now - you'll need it later.

C) Now in the offset for the center connect the position to the steady position of the stabilizer. Set the mode to "Use position only". And to make sure that everything moves correctly set the image aspect to 1400/576 (the size of our image). Repeat this for the Offset on the Pivot, but connect to Steady Axis. Connect in the calculation for Size the first operand to the stabilizer's steady size and as operator 'first only'

Do the same in the calculation for Angle, but connect to steady angle.

D) Now here comes the automated part: All the modifiers we've just added have a timescale option. Now all we have to do is create a small calculation that will make the timescale correspond with the amount of timestretching we've done. In this version of the shot we simply made everything 2.5 times as long (the shot plays back at 40% - what a coincidence, the amount of the Twixtorspeedslider).

E) Now go into one of the modifiers (e.g.. the Center Offset) and modify it's timescale with a calculation. (We renamed it 'TimeScaleCalculation')

Connect the first operand to the published speedslider and make the second operand 100.

F) Now select divide (First/Second) as the Operator. And if you go into the time tab of the offset you'll find that it says 0.4 in theTime Scale Slider. This is the result of this calculation. We want this in the timescale tab of all the other modifiers as well, but to make it quick, we won't create 3 more calculations. We will just connect those to the result of TimeScaleCalculation.

G) Now if you watch the result of all this hard work, you'll notice that the orginal frame is completely still and centered in the transform tool. Effectively restoring the original motion but 2.5 times slower.

The great thing about the calculations we've added is that if you change the speedslider in Twixtor, all the other values will move with it. So slowing everything down to 10% of it's original speed will automatically change the timescale of all modifiers in the transform tool to 0.1 as well.

Now all that is left to do is to crop to the footage's original dimensions (remember we initially expanded the size of the plate). All you have to do is add a crop tool behind the transform and set it to your original size (we actually used an height of 518 instead of 519, because of the interpolation you otherwise get a slight flickering black edge if you set the crop to 519 - Fusion likes even heights a little better than odd ones).

That's it folks, get the VFX supervisor for approval…