

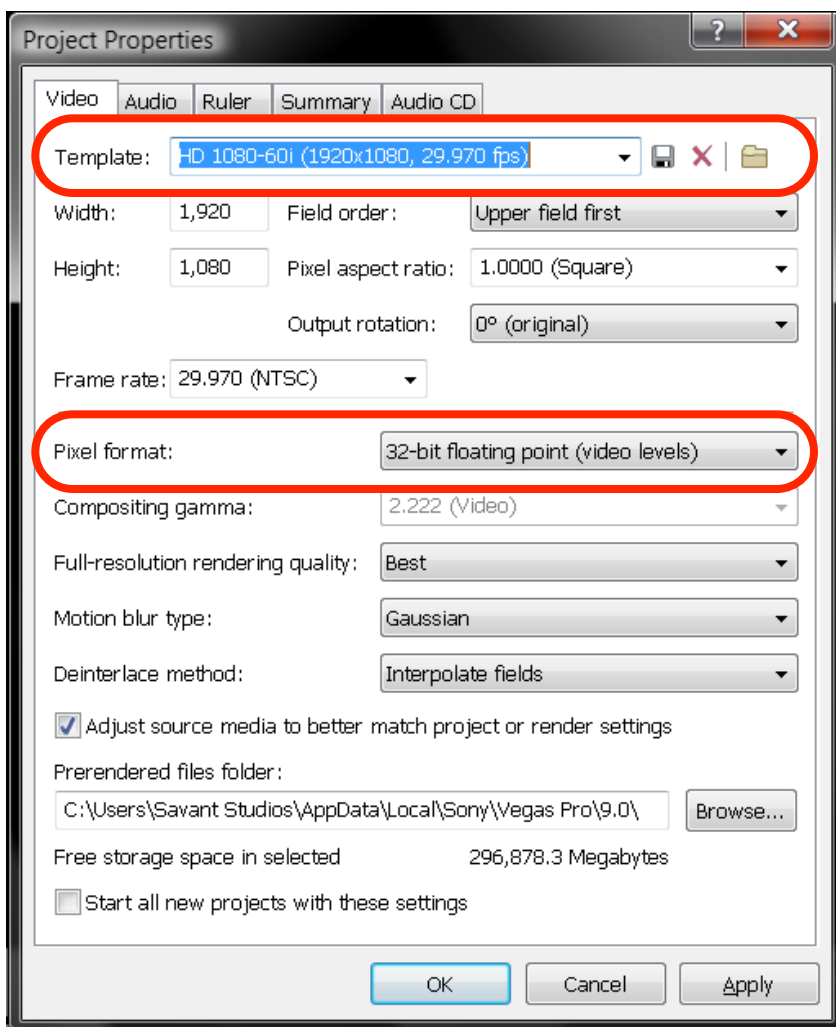
## I'VE SHOT MY FIRST STEREO 3D PROJECT... NOW WHAT?!

So, where to begin? Well, you *begin* by shooting the footage perfectly in the first place. The old saying, 'An ounce of prevention is worth a pound of cure' applies perfectly here. But if you haven't shot it perfectly, [Make3D](#) has plenty of widgets to help you adjust it until it looks perfect for your final output, and Sony Vegas Pro has all the horsepower to make things run smoothly while you edit and composite simultaneously!

Be sure to have installed the latest version of Vegas Pro Non-Linear Editing software from [Sony Creative Software](#), and then download and install the latest version of [Medtron Make3D](#), made exclusively for Sony Vegas Pro.

Medtron uses image analysis to help you roughly line up horizon and zoom levels, and was designed to use the ample resolution of HDV or Full HD frame sources, so you must be shooting High Definition video, but who isn't these days? Capture/Import your HD footage into separate folders on any hard drive you have connected to your system. (Separate them according to whether they are left eye or right eye camera files) Be sure that each video stream has the same number (and approximate location) of scene breaks, if any, or there will be no way for Make3D to create a match.

Create an empty project folder on your working drive (the fastest non-system drive you have available, or a RAID volume). Put nothing in this project folder; Make3D will put everything there for you.

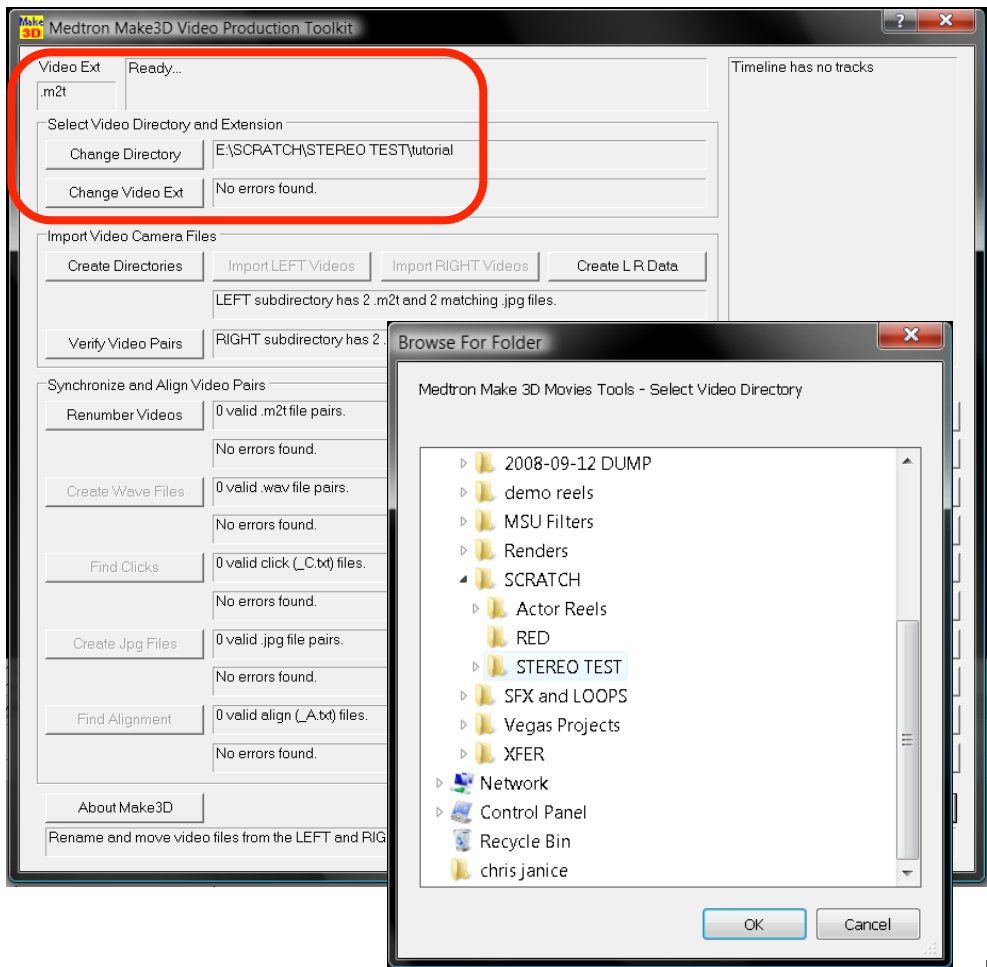


Create a new project within Sony Vegas Pro and adjust your project properties by selecting the Full HD preset which most closely resembles the media you're using (1080 60i/24p). While it's not absolutely necessary to process your 3D video with 32 bit floating point color handling, it is certainly recommended, especially if you know that you'll need to make color correction/grading adjustments later on.

(On the audio tab I prefer 5.1 surround as it creates a more immersive experience overall, but Make3D is designed to work with two stereo tracks.)

Ok, you're ready to invoke Make3D from the drop-down menu by going to Tools -> Extensions -> Make3D.

Ok, take a deep breath; there are a lot of fields on the first Make3D dialog box and you may feel a little overwhelmed, but latter steps are not clickable until you have completed the first basic tasks, so you'll be just fine :)



The first area of the dialog box is named 'Select Video Directory and Extensions'.

Straightforward enough; (this is the part where having a very fast RAID comes in handy) the ancillary .txt files that Make3D uses to store your evolving scripts are stored in this directory right alongside temporary media and render files. It may seem like a mess, but do not touch/ rearrange anything inside of this folder; if you just follow the steps as outlined Make3D will clean it all up for you when you are all done.

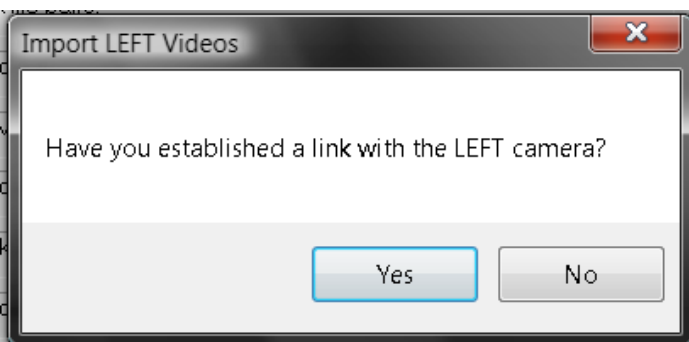
You'll notice that you can also change the video extension. Despite Vegas' well-documented ability to edit everything and the kitchen sink, Make3D does NOT like using mixed media formats in the same project. Besides, you would never be shooting stereo 3D with two different types of

cameras anyway.

Next is the Import Video area. Make3D needs to make some folders inside of your working directory, and (for some reason I don't fully understand) requires you to press the 'Create Directories' button. It seems to me that this could be automated in the future, but whatever; it just works!

Now you will import your media into the project. You are required to transfer the video one subdirectory at a time. After pressing the import LEFT videos button, Make3D will ask you if you've established a link with the LEFT camera; we as an industry are moving towards IT based workflows, so the idea is that you will have

just come back from a shoot and not transferred any media to your hard drive yet. Of course, if you are shooting HDV, you will need to capture to a LEFT and RIGHT scratch folder. Once you've established a link with the camera (or scratch folder) and browsed to the location of your media there will be a long pause. Make3D will appear unresponsive during this time. Don't freak out, and don't do anything while this is taking place. Just get a drink of water, get a snack or use the restroom, and wash your hands. By the time you get back, Make3D will be ready for you to import RIGHT videos. Repeat restroom/

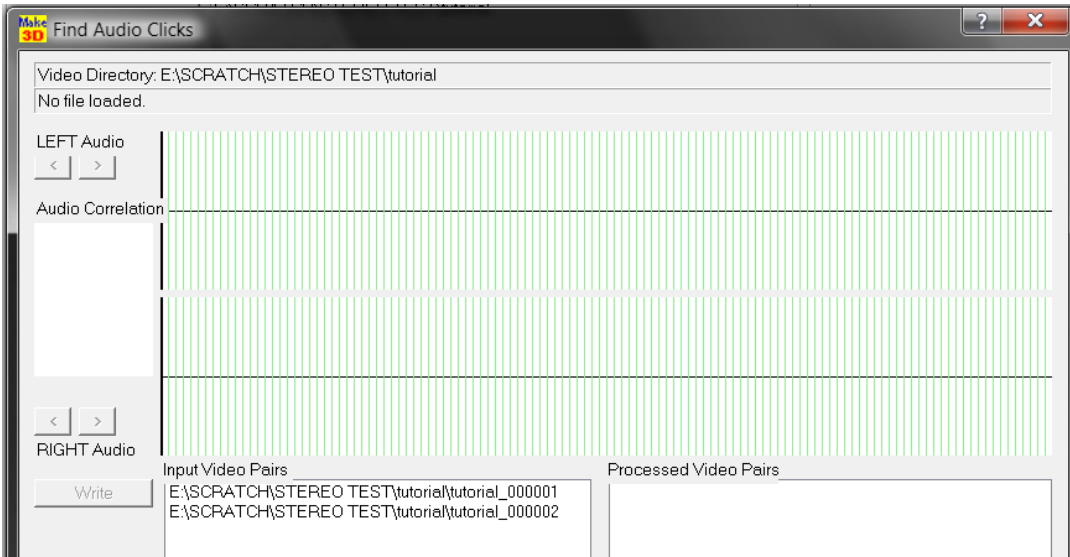


snack break.

When the video is all done transferring, you will see the option to 'Create L R Data' click this button, and wait a moment while Make3D begins to write .txt files describing the relationship between the different streams. Last in this area is 'Verify video pairs.' Click it to be sure that file size and length match up properly.

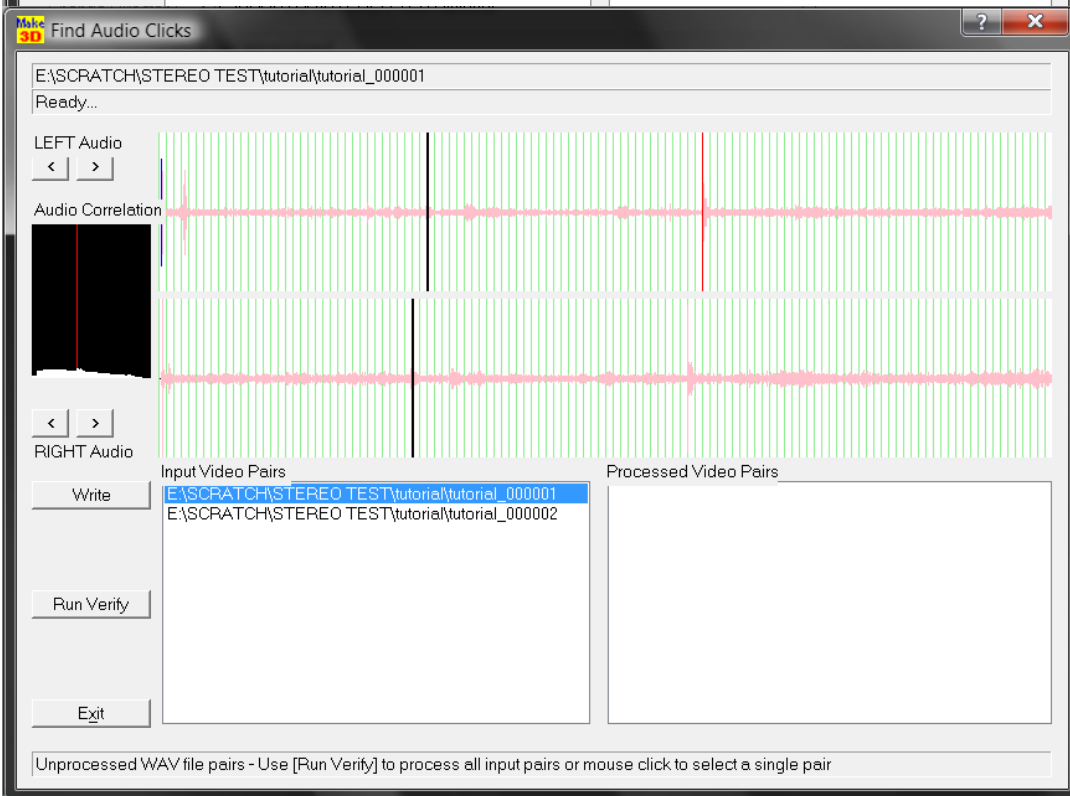
Ok, so this last section is where the process actually starts to get fun! Synchronize and Align Video Pairs!!! The magic of 3D all happens in this delicate process, so pay close attention. The first button will renumber the videos so that Make3D can more easily write scripts in the background. Same with wave file creation (the following button). The 'Find Clicks' button will open an interesting looking dialog like this:

You'll notice the green vertical bars and two audio channels. Nothing will populate those spaces until you click on a video pair from below.



click on a video pair from below.

Once you've selected a video pair, you'll see the dialog change:



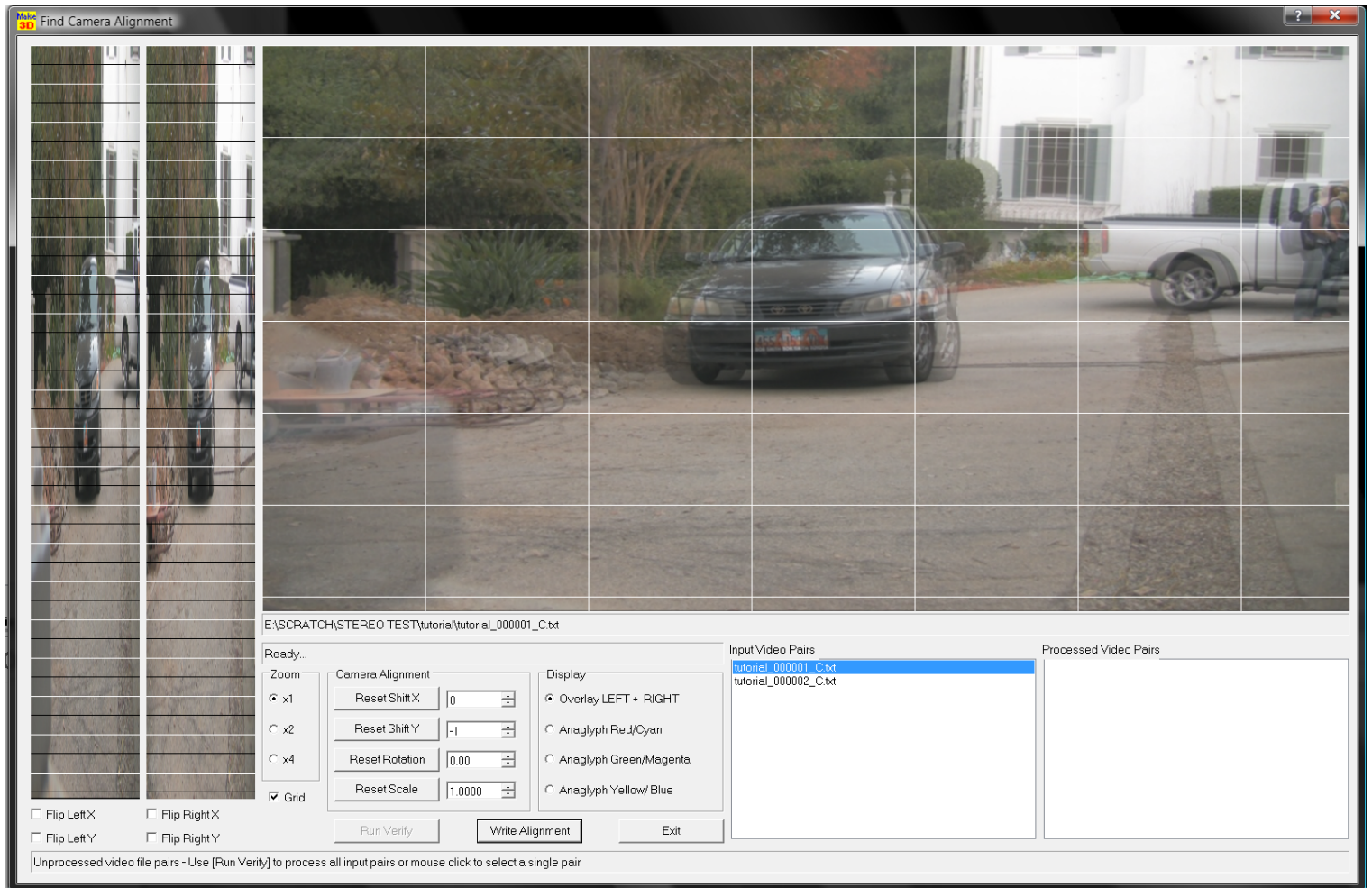
Make3D is basically looking for the sound of a clapper board or clicker in each audio stream, but you can help it by manually placing the audio sync point.

Once you've found sync, press 'Write', and select any other clips in the 'Input Video Pairs' bin. Repeat as needed.

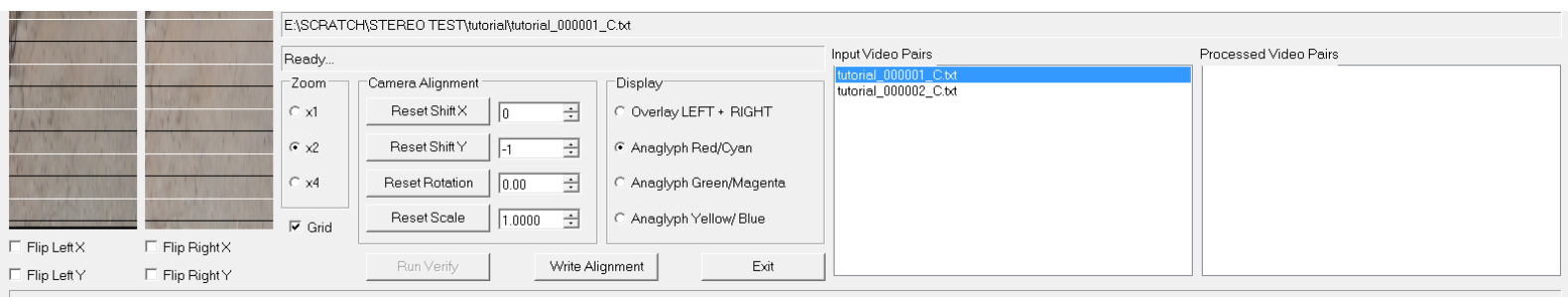
Next you'll create jpg pairs. Why? To help you achieve proper visual alignment. Click 'Create JPG Files', wait a moment as they're generated, and then click 'Find Alignment'. This will pop up: Didn't I tell you? This is the fun part! There are all sorts of controls to ensure a proper

visual alignment between your two video streams here, though will use two jpegs as proxies for now. As for me, I prefer to zoom in and use RED/CYAN anaglyph preview like this: And sometimes it just helps to shift back and forth between multiple views and zoom levels.

Now to the left of this dialog you'll see two very squozen images side by side, this is to emphasize vertical alignment. Vertical alignment is a deal-breaker in stereo 3D; most viewers' eyes will adjust to an incorrect

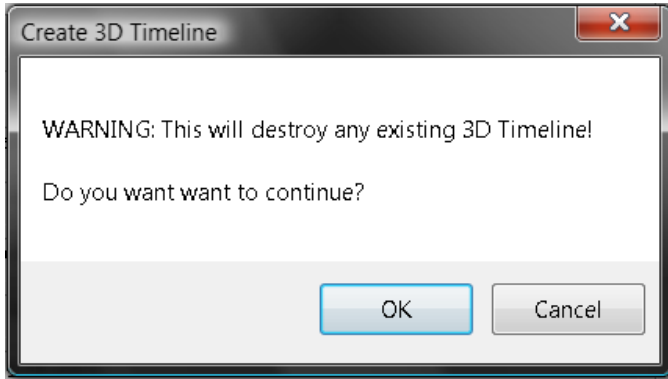


horizontal shift, but not a vertical shift. It causes nausea faster than anything else you could do here, so use this sidebar to full advantage. When you're done, click 'Write Alignment' and you'll see the video pair you just worked on move over to the 'Processed Video Pairs' bin. When you're done click 'Exit'



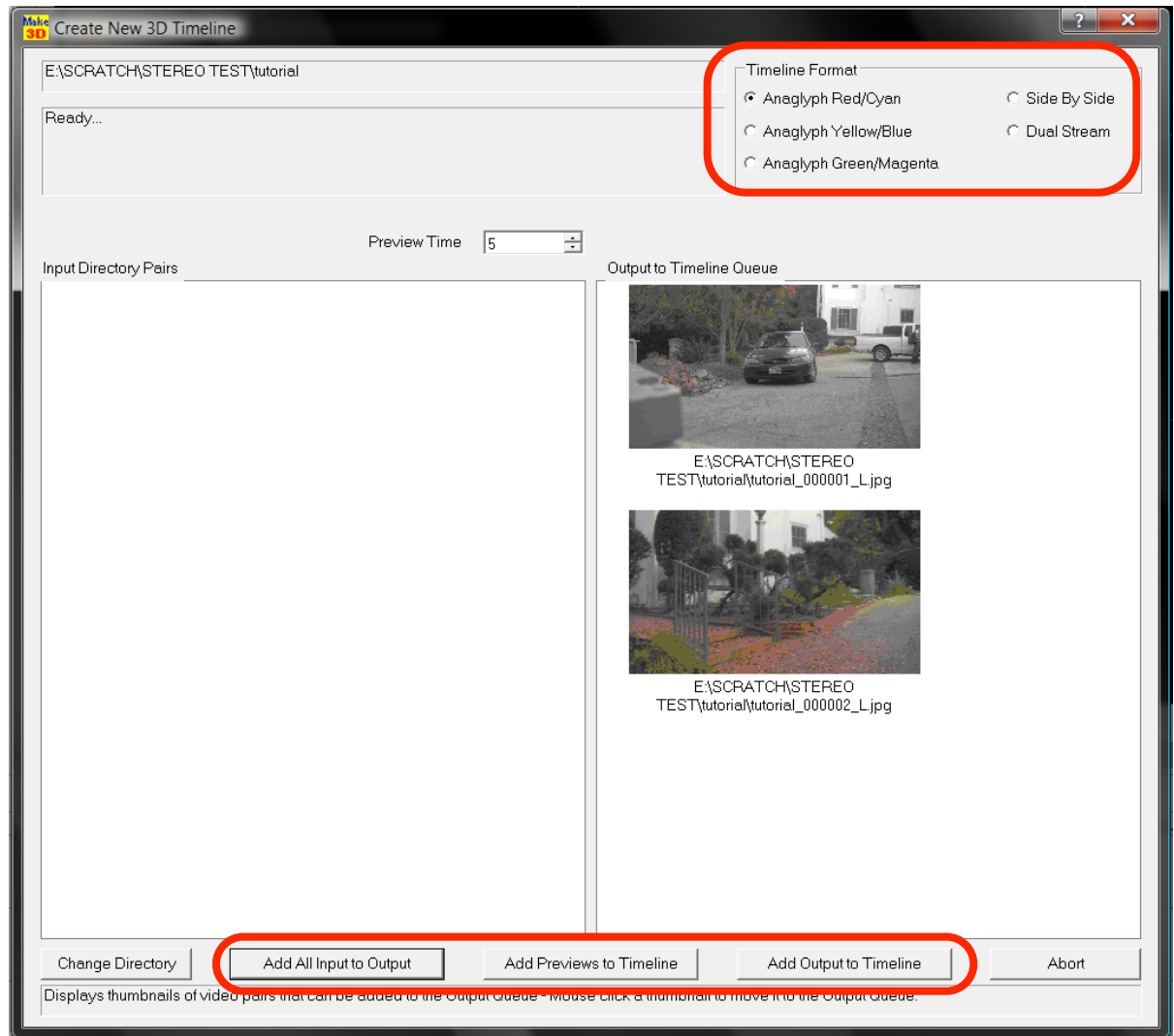
You will be brought back to the main Make3D window. Click 'Create New 3D Timeline' and you will see the following warning:

Well, unless you already have a project on the timeline, OF COURSE you want to continue! Click 'OK' and you'll be greeted by the following options:



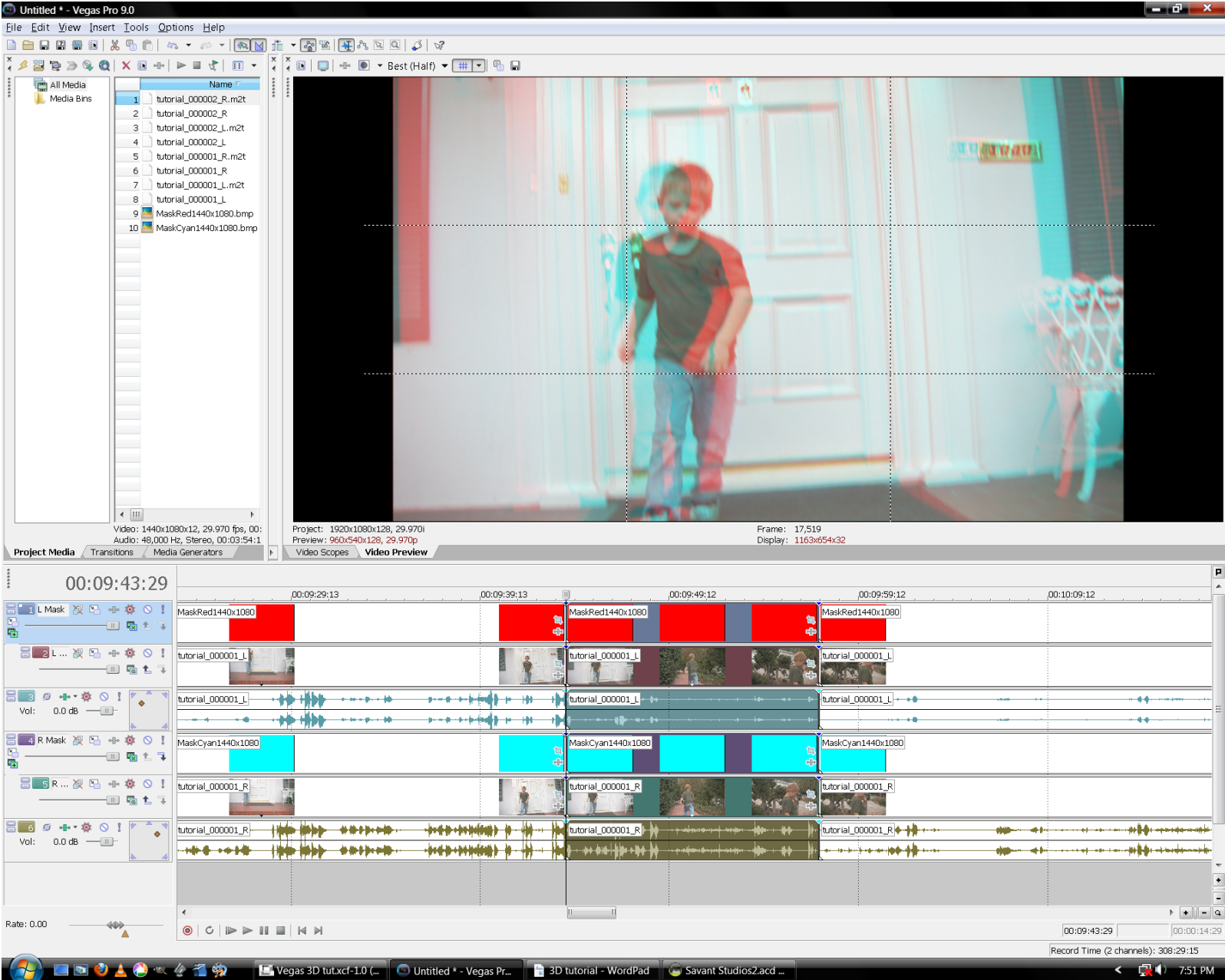
Click on the individual video pairs you want to add to your new 3D timeline, or alternately you may click 'Add All Input to Output' to simply dump everything onto your timeline. And select the 3D format you wish to *work* in. This setting can be changed later for final output, so you should choose whatever option is best for you and your hardware.

For example: Anaglyphs require two additional video tracks to do an additive composite of each color, and so will require faster hard drives and processor speed. Dual stream uses two additional video tracks but only composites white to each track, and is less processor intensive. Side by Side of course requires only the two video tracks for your video pairs, and is very speedy on most systems, but requires that you edit cross-eyed. So choose accordingly, but know that it can be changed at any point during your edit, without posing any threat to the various 3D adjustments you've made. Click on 'Add Output to Timeline' and you will finally get to see this familiar sight:



The Vegas Pro timeline! And pre-configured for your desired 3D options no less. Now all we have to do is fix any problems -too easy!

You'll notice in the above picture that my subject is behind the zero point on the z-plane. Let's just say, for a moment, that I meant to shoot the footage with my subject at zero depth, so that when ever he moves his arms towards the camera, they 'pop out', giving the classic 3D illusion of depth protruding from the screen.

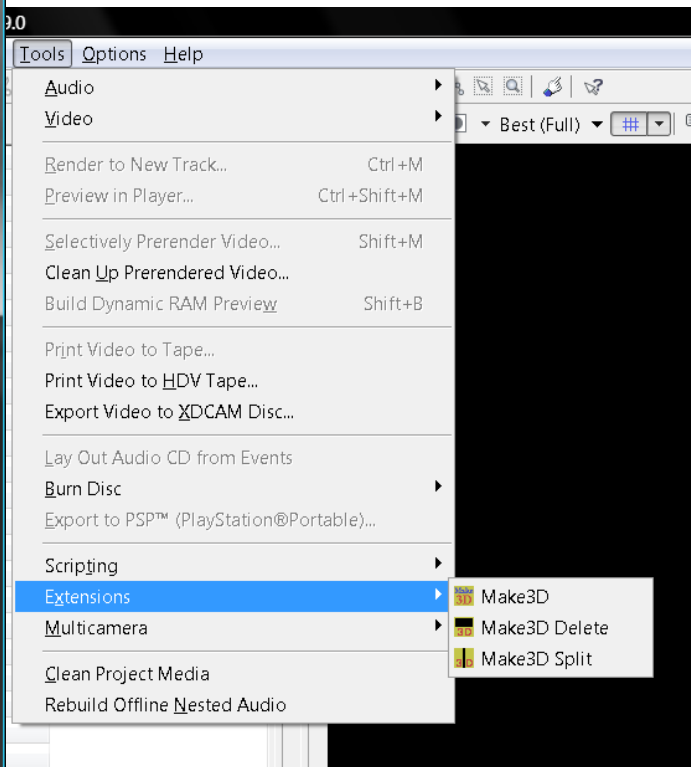
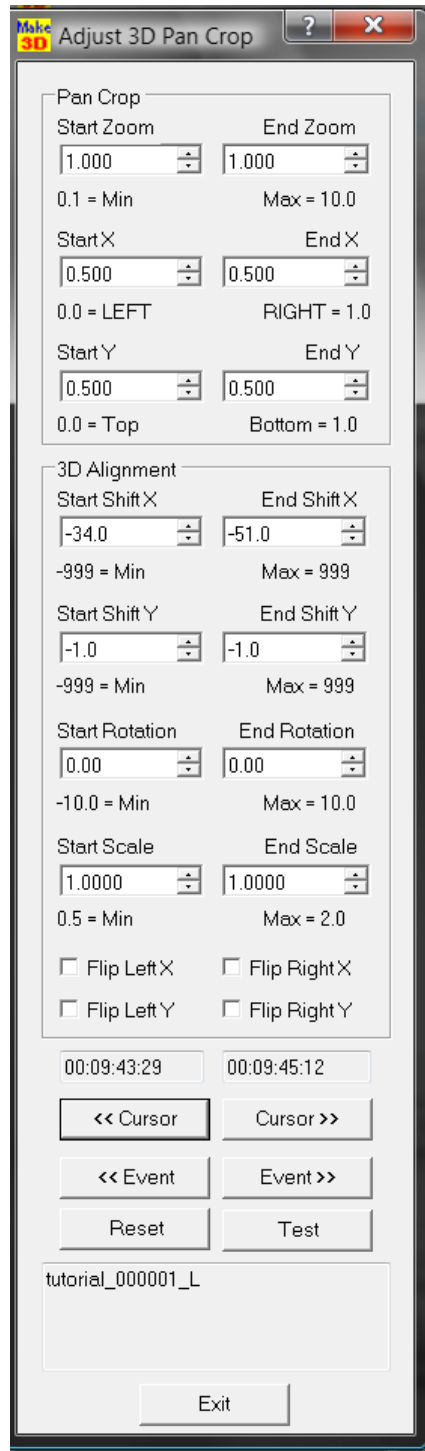


We'll fix this in no time. first we'll select the clip we wish to re-adjust, then select Make3D from the Tools->Extensions menu. From the Make3D window, press 'Adjust 3D pan crop'. You will be treated to a whole new adjustment window, with even more adjustment parameters than the preliminary alignment tool (see below left).

This tool includes not only alignment but also zoom control so you can correct frame size/output aspect, as well as complete flip control so you can invert images you've obtained with a lens adapter or by mounting your L or R cam upside down (this is a fairly common practice when trying to achieve narrow inter-ocular distance with consumer HDV camcorders). Even more importantly, this tool allows for key-frameable adjustments, if only at the start and end of each 3D event. This can easily be worked around by using one of the other tools in the Tools->Extensions toolbox: Make3D Split.

This is similar to the standard Vegas Pro 'split at cursor' (S) command with one critical difference: it writes all the changes that you see in your timeline to the Make3D scripts being made behind the scenes (so that Make3D can in turn talk to Vegas Pro and handle all of the pan/crop/zoom keyframes on a per-event basis, instead of letting you chop your key-framed events willy-nilly).

If you use the Make3D Split tool in leu of using pan/crop/zoom keyframes, as opposed to a mere "create edit point here" tool, then the Make3D workflow becomes a lot more useable.

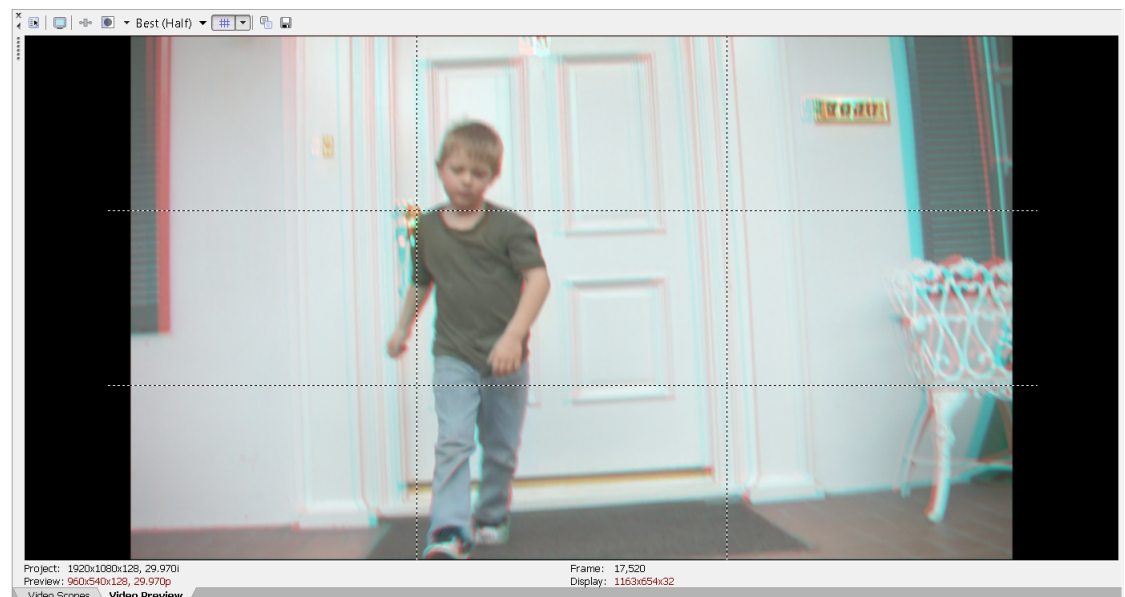


For example, as an exercise in 3D convergence adjustment, I decided to keep my subject at zero-depth for the duration of the sequence. However, the subject is a 5 year old boy, hardly able to keep still for very long, and so I was forced to make convergence adjustments every 3 seconds or so. (Perhaps in the near future someone will create an open-source stereo image analysis tool to automate this process so that we can do camera stabilization and convergence stabilization simultaneously) This effort required that I look to see when the subject was moving forward or backward, and create Make3D Split points where I would normally

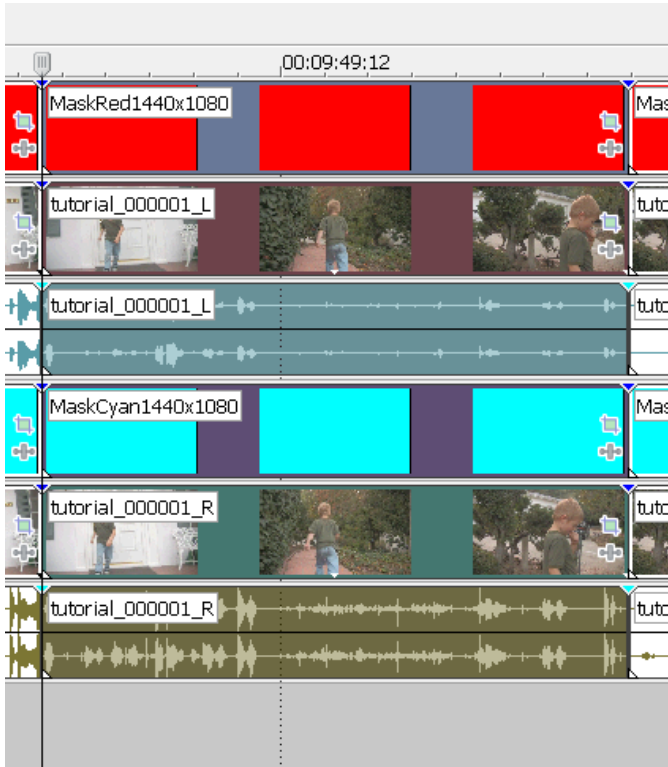
place keyframes, then open up the Adjust 3D Pan Crop tool and toggle between the 'Start' and 'End' points of each event by clicking '<<Cursor/Cursor>>' and '<<Event/Event>>'.

Needless to say, this took a minute or two, but I finished up with a result I can live with. (See right vs. previous page)

So that's basically how you use Make3D to work with media on the timeline (in a nutshell) except for the last tool: Make3D Delete. This should be apparent as far as it's function, but it's proper use probably not so much. Make3D Delete requires that you have the entire grouping of clips that form a 3D event selected, as you see below. Otherwise, it will not know



what part of the timeline you wish to delete. And you should use the Make3D Delete instead of the Vegas Pro selection edit tool or ripple delete to keep your scripts working properly. Simple.



Now comes the final render. The moment of truth. Ok, so which format? What frame size/resolution? What encoding settings? Patience, young grasshopper! First you must color correct and color grade. Click on Tools->Extensions->Make3D and press the Convert Timeline 3D Format. You will be presented with as many options as before, but the ideal way to color correct and color grade 3D, in my humble opinion, is side-by-side.

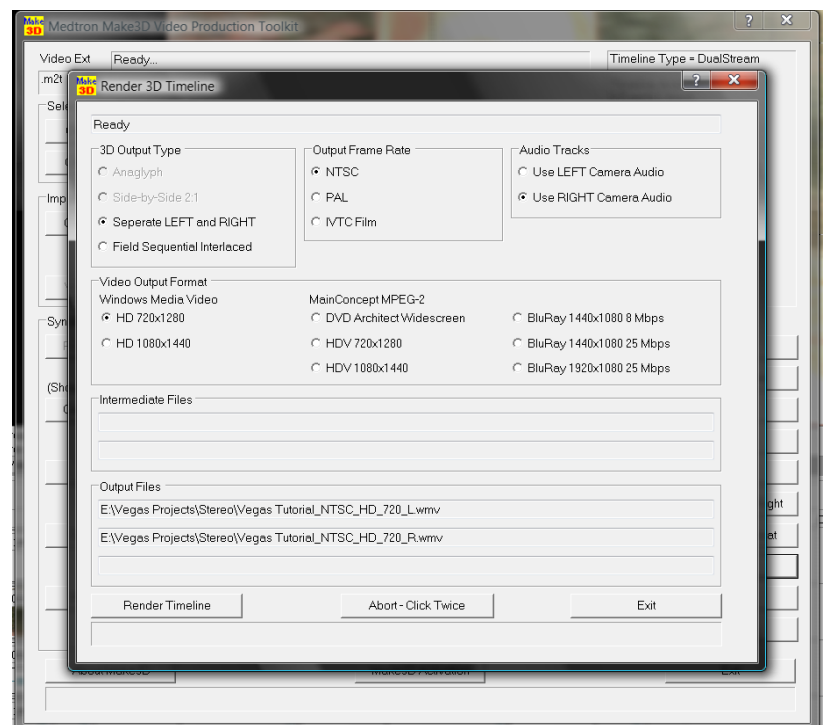
Make whatever adjustments necessary to your media, and be sure to copy and paste color adjustment/curves keyframes from one eye to the other (unless you have a horrific color imbalance between the two eyes). Do not, however, blindly copy and paste attributes by right clicking one event, selecting copy, and right clicking the other event to select 'paste attributes'; you will also paste pan/crop/zoom data and undo the many hours, days, weeks, or months of work you have put in to your project. Got it? It bears repeating:

**DO NOT COPY AND 'PASTE ATTRIBUTES', AS YOU WILL DESTROY ALL PAN/CROP/ZOOM DATA!**

Now, assuming your color adjustments are done, we will convert the timeline back to your desired output format and render your project. There are many options, and it is entirely up to you and your intended audience. (It is worth noting, however, that the Blu-ray Disc Association has not yet released official specs for delivering 3D content on the Blu-ray Disc platform as of this writing, but they will soon. So, be prepared for a follow up article on prepping your content for distribution on Blu-ray Disc using Sony Creative Software's excellent line of BD authoring tools.) Now you will render using Make3D as well, which is important because if you want to render two separate video streams for someone else (i.e.; your distribution partner) to re-format later, then this will be the fastest way to start a batch render process. Click on Tools->Extensions->Make3D then press the 'Render Timeline' button. You'll see this window:

Some of the options will be grayed out depending on which 3D format you're using. It's nice to have options; in this case, the major options are web formats, archive formats, and deliverable formats. DVD & Blu-ray templates are a mouse click away, as are HDV, should you choose to prep your project for rendering back to tape as an archive. At any rate, you know what you need, and this is the simplest way to get it.

If you've finished working with your project and you want to free up HDD space by getting rid of the copied files that Make3D has made for you, go to Tools->Extensions->Make3D, and click 'Cleanup Directory'. Your media, .txt files, and temp renders will all be permanently





deleted. Be sure not to click this button accidentally, as there's no going back.

The majority of the work in 3D is ensuring a *non-vomit-comet* ride by fixing alignment (pan/crop/zoom) So 'editing' for a 3D project when using the Make3D extension of Sony Vegas Pro consists of splits and deletions, directly on the timeline no less. "But what about my star wipes?!" you ask indignantly. Well, editing theory *for 3D* is a topic for a whole different tutorial altogether. The real work is, again, in maintaining a visually stimulating/pleasant convergence point to keep your audience engaged. Keep it to hard cuts only while you learn how to tell stories in the 3rd dimension and, who knows? Maybe you'll decide you didn't need all those star-wipes in the first place.

-Seth Estrada  
10-15-2009