



# STEP BY STEP GUIDE TO Stereoscopic 3D Editing & Finishing



"The new stereoscopic features in Media Composer have improved our dailies workflow. In the past, we had to export an EDL, run it through stereoscopic conform software and then compare that output with the cut in the Avid [system]. We have been able to streamline that process and, instead, just press play."

Trevor Cable  
Lead Media Engineer – *Coraline*  
Laika, Portland, Oregon

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## INTRODUCTION

It's "back to the future" for Stereoscopic 3D editing (or Stereo 3D, as it's known). The difference now is that digital technologies have made many of the issues associated with the 3D format of the 50's go away. For instance, film weave on each eye and anaglyph viewing have been supplanted by high resolution, rock-steady images, courtesy of higher-quality viewing technology that allows color values to remain unaffected.

These latter-day advancements have rekindled interest in stereo 3D storytelling for both theatrical and broadcast television applications. Recent announcements by several television manufacturers have promised 3D in their upcoming model lineups and certain broadcasters have pledged to start providing programming in 3D.

The question is, with the growing popularity of 3D viewing technology in films and games, how can content be created easily and affordably? The introduction of Avid® Media Composer® 4 provides the answer.

### ONE AVID

Avid is uniquely positioned to vault our customers into the future with its mastery of media technology and industry innovations. Listening to them, we know what they want and how to provide the tools they need to create the world's most-watched programming on any-sized screen. So, it's no accident that we are the first to bring Stereoscopic 3D editing to their workflows – and customers.

"In the past we've managed to edit a number of 3D projects within Avid's Media Composer/Symphony™ but the new tools will just make it so much easier. With the new 3D features I am really genuinely looking forward to getting into post on our next 3D project. To be able to view 3D footage properly in real time while making those very important editorial decisions is a game changing difference."

**Michael Lindsay**  
**Creative Director, 16oz**  
**London**

## BASIC OVERVIEW

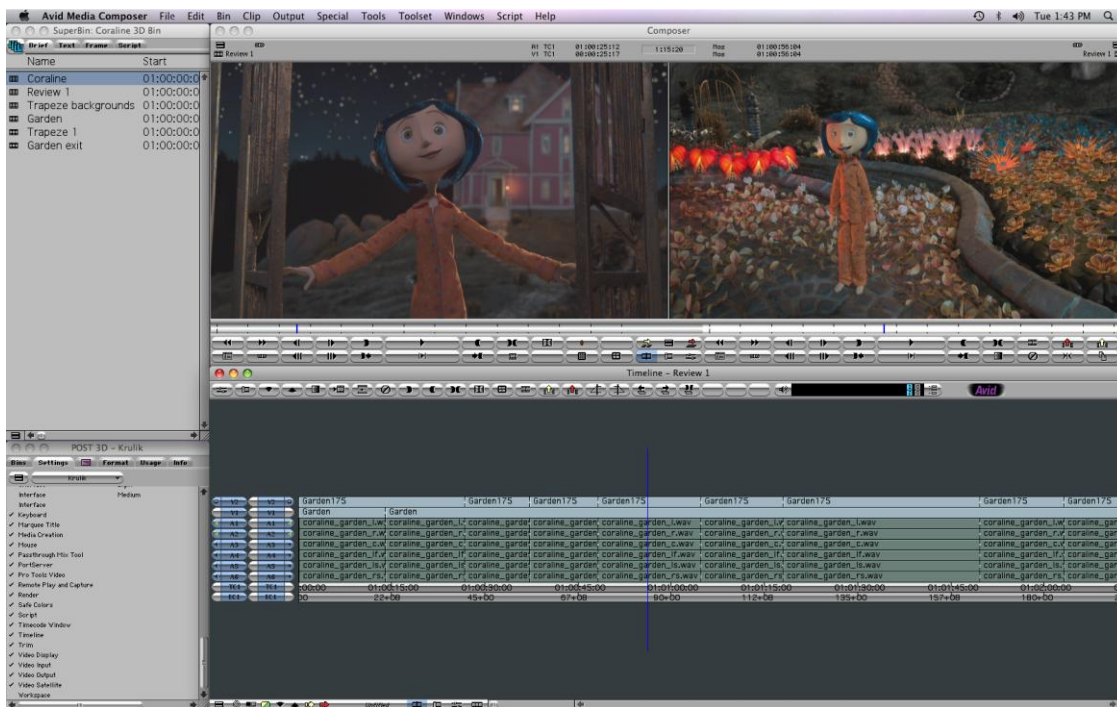
Initially introducing stereo 3D editing with Media Composer 3.5, Avid continues to lead the industry by enhancing film, video and television workflows with even greater 3D functionality.

The release of Media Composer 4 offers customers a hybrid environment that brings together the existing 2D editing world with 3D viewing.

Superior to editing exclusively in 3D, editing work can now be done in 2D within the main editing interface, while the client monitor plays back in stereo 3D when viewed with either passive or active glasses. Obviously, it would be very tiring for an editor wearing glasses to sit in front of a system for 8-10 hours a day editing; the eyes would be constantly struggling to focus on stereo 3D content inside a 2D graphical user interface.

Ergonomics aside, Avid's editor cuts costs by eliminating the time required for left and right eyes to conform for screening. All that's really required is the ability to check a sequence for pace and rhythm. By creating a hybrid workflow within the editor, Avid editing systems solve *both* issues.

This Stereoscopic 3D workflow guide explains the editorial process for not only using Media Composer 4 for offline editing, but preparing the project for finishing on another system.



## Format

Media Composer displays stereoscopic content in a proxy resolution that uses one-half of the pixels available in the source material (i.e., two sources, half resolution each to fill a single frame). Media Composer 4 supports a choice of stereo display formats that includes, in addition to over/under, a side-by-side view and interlaced frames. The projects you work on, as well as the monitoring system you prefer, will determine which format you choose; Media Composer is equally compatible with all three formats.

- *Side-by-side* is a format that stores the left and right eye images, one beside the other in a vertical split frame. A full-frame 1920 x 1080 image displays the left eye in the left half of the image, using half of the horizontal resolution. The right eye occupies the right half – or 960 x 1080 each.



- *Interlaced* takes half the resolution from each source by alternating lines of horizontal pixels from each eye, from top to bottom, to make up a full frame comprised of both images.



- *Over/under* is a single master clip and media file that encompasses both the left eye view and the right eye view together, storing the left and right eye images, one above the other, in a horizontal split frame. The left eye occupies the upper half while the right eye fills the lower half. In a 1920 x 1080 frame size, for example, each eye is a 1920 x 540 proxy; when viewed together, they fill the entire frame.

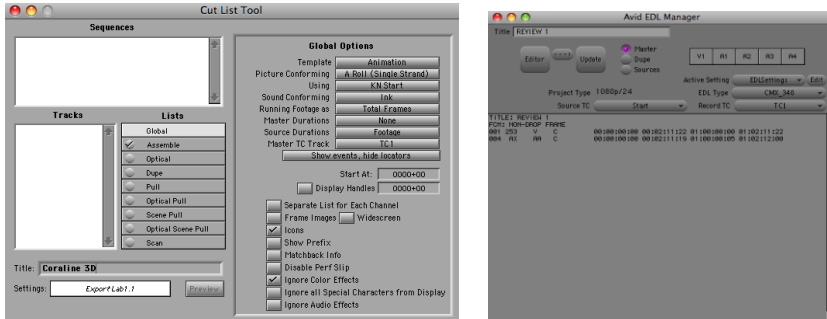


You can either view the stereo frames full frame (both eyes), or the left or right eye image independently. For output monitoring, you can also view the material in stereo as either checkerboard or interlaced, when you have appropriate stereo monitoring or projection equipment connected to your system.

## Utilities

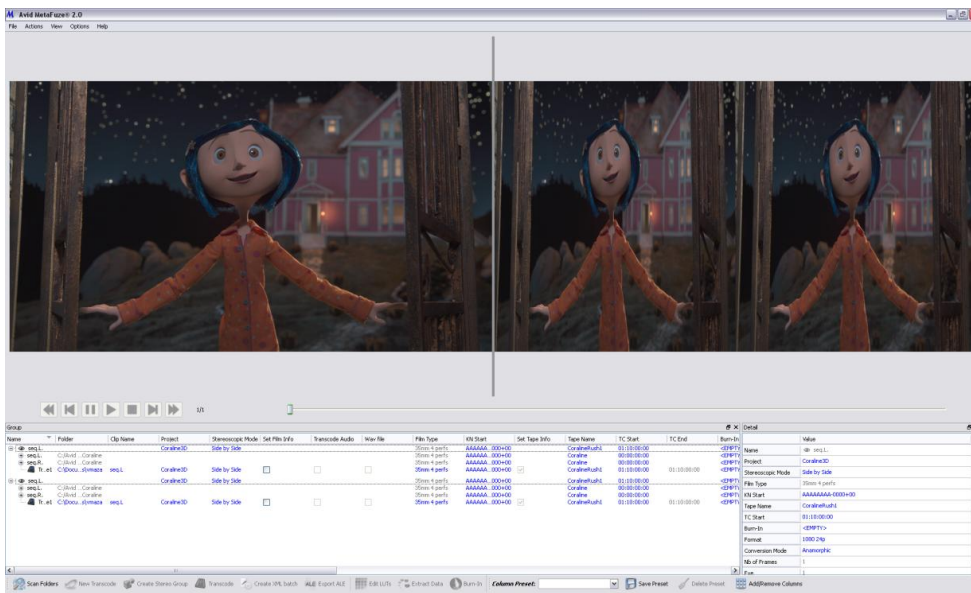
### EDLs and XML

Tracking left and right eye sources can be done very easily since Media Composer handles metadata better than any other video editing system. Tracking is managed in separate metadata columns. For video-tape-based acquired productions, the timecode will be the same, although there may be two tape sources, depending on shooting format. In file-based workflows, the filenames themselves will be different and can be tracked as such via custom columns based on the needs of the production. All of this metadata can be exported as EDLs via Avid EDL Manager and XML via Avid FilmScribe™. The XML XSD files can be found at [www.avid.com/filmscribe](http://www.avid.com/filmscribe).



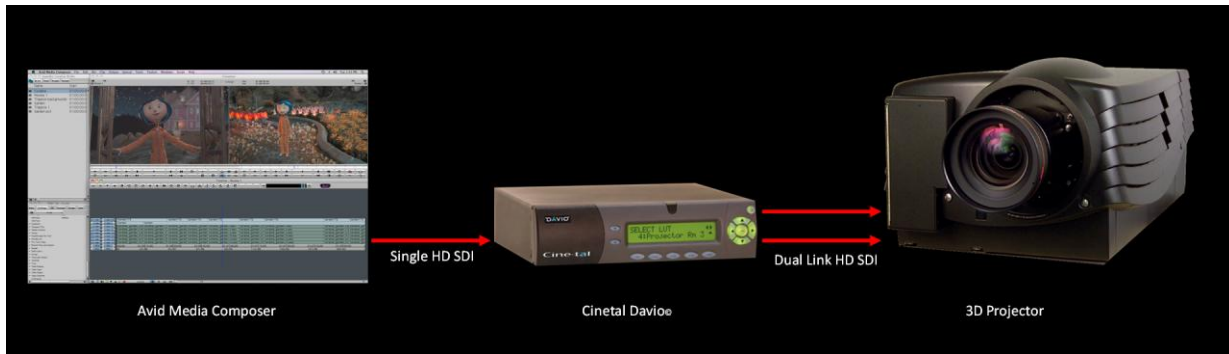
### Metadata

For file-based formats, the left and right eye sources can be prepared for editorial using Avid MetaFuze®. (see *Scan, Add Metadata, and Transcode, below*). This free application is available from [www.avid.com/metafuze](http://www.avid.com/metafuze). It will take directories of left and right eye files and create interlaced, over/under or side-by-side files in the MXF-wrapped Avid DNxHD® format in the stereo 3D proxy data rate of choice.

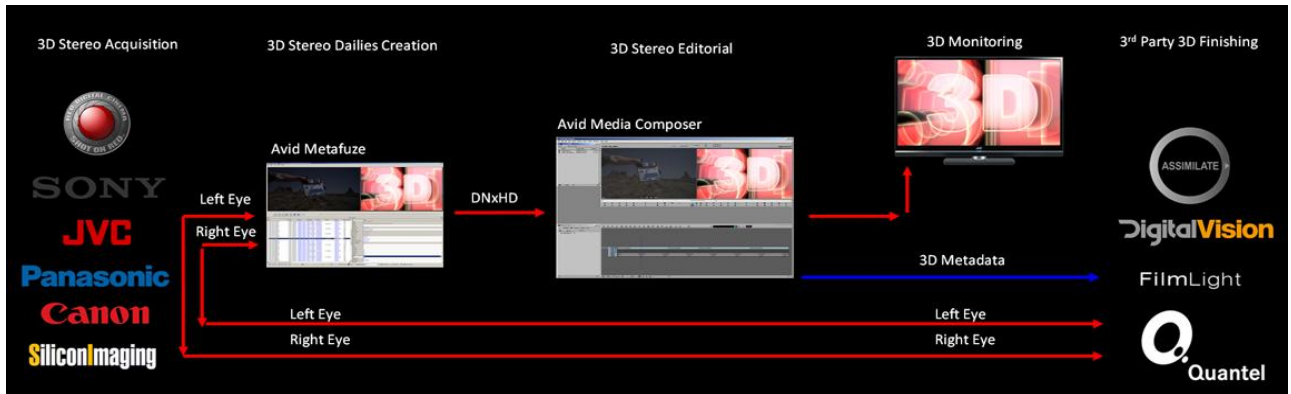


## Projection

For productions wishing to project the timeline in a theater, 3D-capable projectors are configured with two full 1920 x 1080 HD-SDI inputs, one representing each eye. There are third-party devices on the market such as the Davio display processor from Cine-tal that support any of the stereo 3D formats available within Media Composer and can split the signal into two scaled 1920 x 1080 signals.



# STEREO 3D WORKFLOW



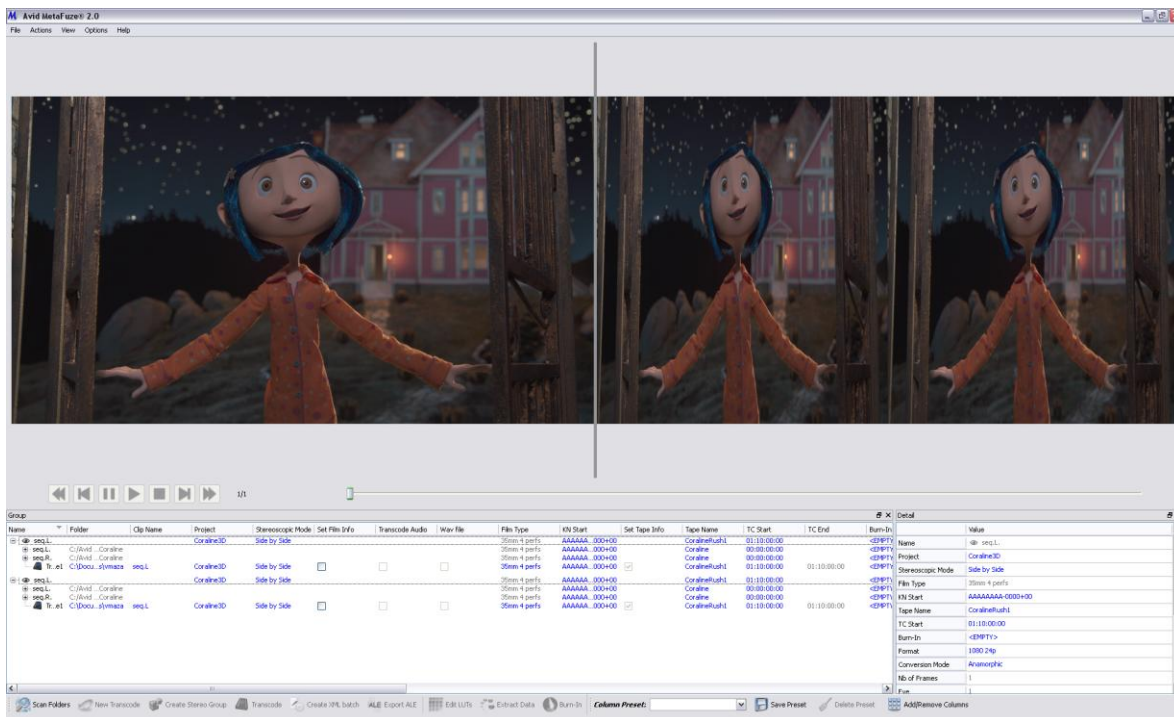
## File-based Material



Avid Media Composer allows you to streamline and enhance your workflow no matter which material you use. With the free Avid MetaFuze workflow tool, Media Composer supports both video and file-based stereoscopic 3D material, including RED camera (R3D) files, sequential files such as animation outputs, TIFFs, DPX and QuickTime files. With this kind of flexibility, any kind of project that you can edit in 2D, including drama or multi-camera type programming, can be edited for 3D. Your project, workflow and equipment – along with your preferences for price/performance, quality, and manufacturer support – will determine which formats you use for capture, 3D editing, and output.

Once your files or file sequences are captured, the media can be input into Media Composer using Avid MetaFuze (see below).

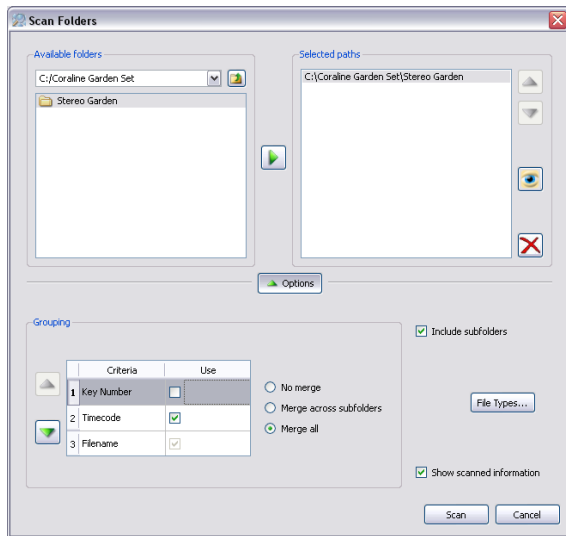
## Input Media: Scan, Add Metadata, Transcode Dailies



### Scan Footage

The Avid MetaFuze workflow tool allows you to prep stereo 3D dailies footage, whether it's in the form of movie files like AVI and QuickTime or file-based sequential formats such as DPX and TIFF. Use MetaFuze to transcode your footage to Avid DNxHD media files for stereoscopic 3D editing while preserving or correcting the metadata from the source and allowing new metadata to be applied. MetaFuze is native Windows XP-compatible, and can run on Linux systems under WINE.

1. Download the free, standalone MetaFuze application from [www.avid.com/metafuze](http://www.avid.com/metafuze) (or locate it on your Avid editing system) and launch.
2. Choose "Scan Folders" from the commonly used functions located at the bottom of the UI.



3. In the Scan Folders dialog box, navigate to and choose the drive or directories that contain the left eye and right eye source files that need to be transcoded to Avid MXF. Ensure that you select the directory that contains the files – *do not select the files themselves*. Subfolders will be included as part of the scan process. Typically left and right eye sources are kept in different folders or directories for easier management.
4. If your footage is sequential files, using Scan Preferences, determine what criteria will be used to create different shots from the groups of individual files into the scan – such as, a break in timecode, key number, or filename – and the order of those criteria.
5. After clicking “scan,” the file groups are presented in the main MetaFuze interface, their source metadata intact.

## Add Metadata

Your source files could be in a variety of formats, but if you want to edit in stereo 3D, the left and right sources need to be perfectly synced. This assumes that the first frame of picture in each eye is in sync. MetaFuze allows the ability to add vital metadata to sources that don’t have it, such as assigning timecodes to sequential TIFF files.

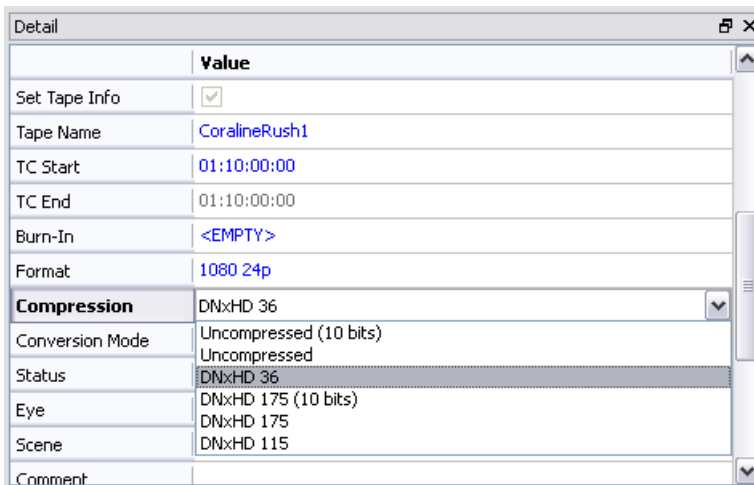
1. In the main interface window, simply select a scanned file to view its metadata. The Detail panel of the selected transcode shows the metadata extracted from the file or group: timecode, KeyCode, all other metadata you require. Clicking in these fields permits you to edit the file’s metadata.
2. If you’re tracking two different tapes of the same scene, put the left and right source names into two different metadata columns. MetaFuze is flexible enough that you can use your desired naming conventions (for instance, L001, R001). If you had difficulty during recording such as incorrect syncing or a genlock problem, add your own AUXTC field (in Media Composer) to handle offsets and correct timing mistakes.
3. If your source files are sequential files, you may want to track sources as frame counts in addition to timecode. Media Composer has two metadata fields, DPX and VFX, formatted in what’s called 64-7: up to 64 alphanumeric characters in the prefix and 7 characters of actual absolute frame count (because 24 hours of frames can be contained in 7 characters). For working with sequential files that will be edited in Media Composer as stereoscopic 3D media, these two fields should be used for the left eye (DPX) and corresponding right eye (VFX) tracking.

4. You can also add custom metadata that will be carried through the entire Avid editorial process when exported as an ALE in addition to the .MXF standard metadata set.
5. Choosing to display metadata fields as a burn-in on the media files is not advised, as the overlay text is 2D and the media created will be viewed as stereoscopic 3D.

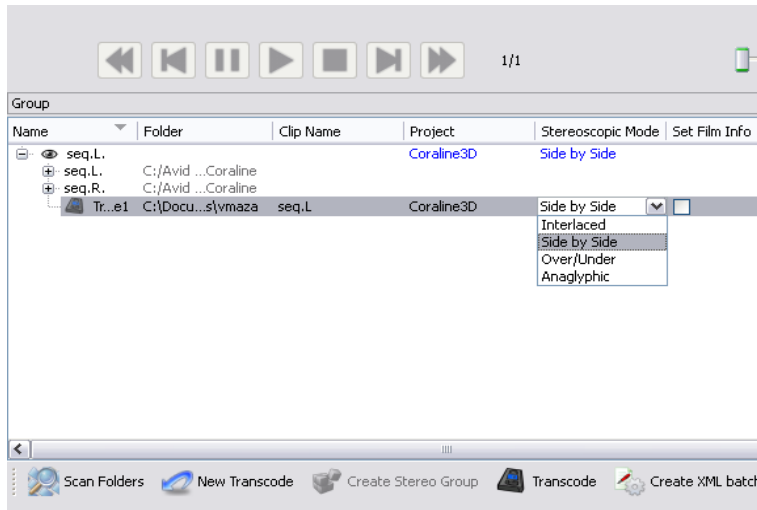
Once you've scanned the directories of your media and added or enhanced the metadata, you are ready to prep the files in the proper 16:9 format for transcoding into Avid DNxHD 36 (or any Avid DNxHD resolution) for editing.

## Transcode

1. To make aspect-ratio decisions that best fit your 16:9 dimension target, in the main interface window, simply highlight the line of the target transcode job to enable the options for aspect ratio conversion mode (including anamorphic, letterbox top, center and bottom) and select the Avid DNxHD data rate desired for creative editorial.



2. Highlight the left-eye and right-eye scanned media groups in the main interface Groups pane and choose "Make Stereo Group" from the right-click contextual menu.
3. NOTE: select only Over/Under, Side by Side or interlace in the options dialog box to ensure compatibility with Media Composer.



4. Set the target directory for file creation using the Folder field in the Details pane.
5. When satisfied with the parameters select Actions->Transcode from the main interface window to start the transcode, or use the right-click contextual menu for the transcode batch highlighted in the main interface window.
6. The newly transcoded files will be rendered to the directory you targeted in your local or shared storage, and will show up as .mxf files in the Media Tool, from which you can simply drag the files directly into your Media Composer bin. Any metadata extracted during the transcode is also now available in your Avid bin. You can also export an ALE, import into your dailies bin and choose "Clip/Relink" from the Media Composer window.

## Tape-based Material

### Tape Setup from Sony's HDCAM-SR

#### Single link HD-SDI

For tape based stereoscopic production acquisition, the Sony HDCAM SR is a high-end tape deck that can record both a left-camera feed and a right-camera feed over SDI with dual-link as two separate 4:2:2 signals. When working with this method, the same deck can output left and right as a single 4:2:2 signal in the interlace format (monitoring output) currently compatible with Avid Media Composer 4 editing systems running the Avid Mojo® DX or Nitris® DX breakout box.

This will result in creating a real-time or interlace clips that can then be captured along with its metadata and used as precisely as having created the media in MetaFuze.

#### Dual link HD-SDI

1. Feed your source tapes through a linear DVE with the tape's left and right camera feeds simultaneously:
  - For over-under:
    - left camera image scaled to 1920 x 540 on the top half of a 1920 x 1080 frame
    - right camera image on the bottom scaled to 1920 x 540
  - For side-by-side:
    - left camera image scaled to 960 x 1080 on the left half of a 1920 x 1080 frame
    - right camera image on the right scaled to 960 x 1080
2. Manipulate both inside the DVE so their dimensions and alignment are correct

This will result in creating a real-time over-under or side-by-side submaster that can then be captured along with its metadata and used as precisely as though it were created in MetaFuze.

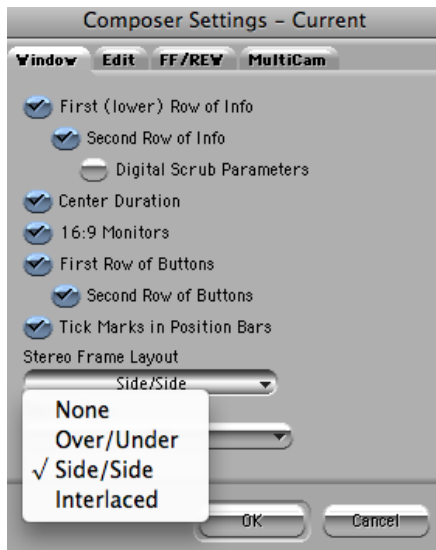
## Monitor Setup

Create a left-eye test slide and a right-eye test slide to confirm setup; always have these slides in your bin when preparing to edit 3D material. Make an over-under, side-by-side or interleaved preview with the slides to use for reference when displayed on the monitor.

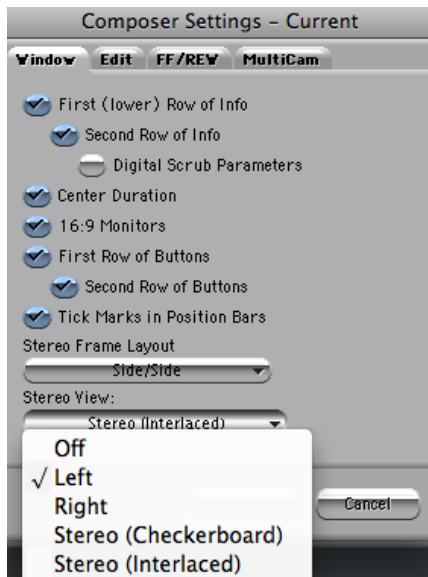
Example of test slides are provided under the Resources tab at: [www.avid.com/3D](http://www.avid.com/3D).



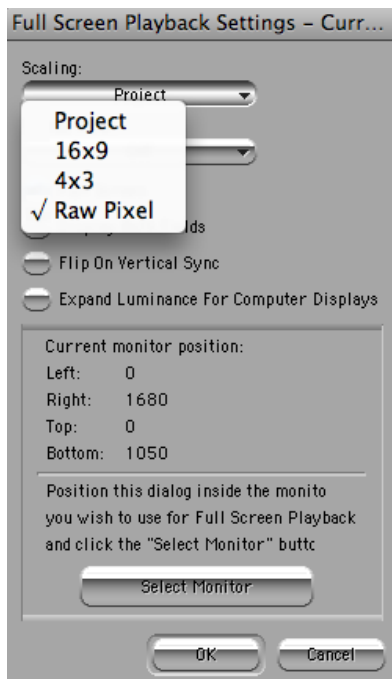
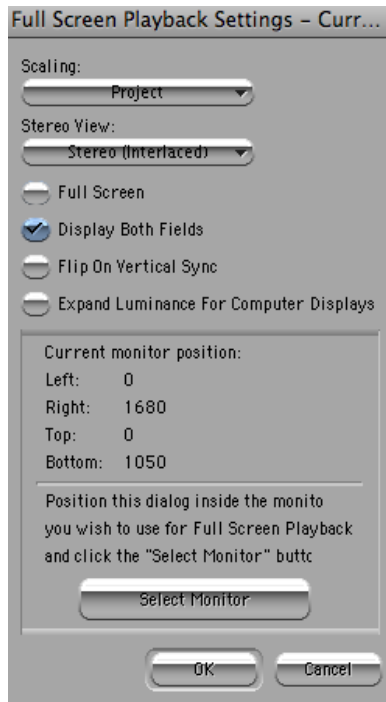
1. Import the slide for the stereo layout you are using into a 1080 progressive project
2. Set the Quality mode in the timeline to Green/Green.
3. Set the stereo layout setting in Composer settings to match the slide.



4. Set the stereo view setting in Composer settings to “Left” (You should see just the left side)



- Bring up the Full screen play settings. Set "Raw Pixel", "Both fields", and set it for the stereo monitor type you have.



6. Bring up Full Screen Play. With the stereo glasses on, you should see “Left” in the left eye, and “right” in the right eye.

Note:

- On the “Interlaced” slide, when shown on an interlaced capable stereo 3D monitor, the word “Interlaced” should look right without the glasses.
- There are crop marks at each corner of the frame; these should help with the alignment of your monitor or projector:

### ***Rear-projection using checkerboard***



These monitors are rear projection DLP that use the “3D Ready” tag as the indication that they support the checkerboard format. Active shutter glasses can then be used with the monitor for stereo 3D viewing. The checkerboard can be turned off and either a LEFT or RIGHT eye view can be selected to output a full screen 2D version. This setting gives the flexibility to output as needed for the desired viewing environment and monitoring available.

### ***3D-Ready LCD using auto-wide***



Once its Picture Size option has been set for Auto-Wide, this LCD monitor can be viewed using 3D circular-polarization filtered glasses (passive) with no further adjustments.

## System Prep

Finally, have all the companion applications plug-ins for metadata, EDL and XML export and the test slides loaded on your system before you begin. Most of these downloads are available from Avid.com and include system requirements as well as installation and usage instructions.

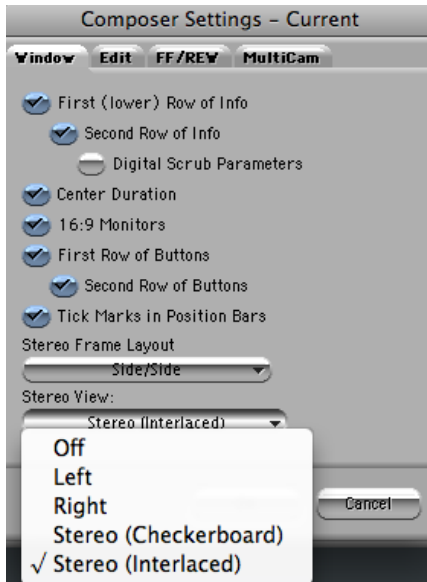
- XML data export: FilmScribe ([www.avid.com/filmscribe](http://www.avid.com/filmscribe))
- Media creation and Metadata management: MetaFuze (<http://www.avid.com/metafuze>)

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## Offline 3D Editorial Editing UI

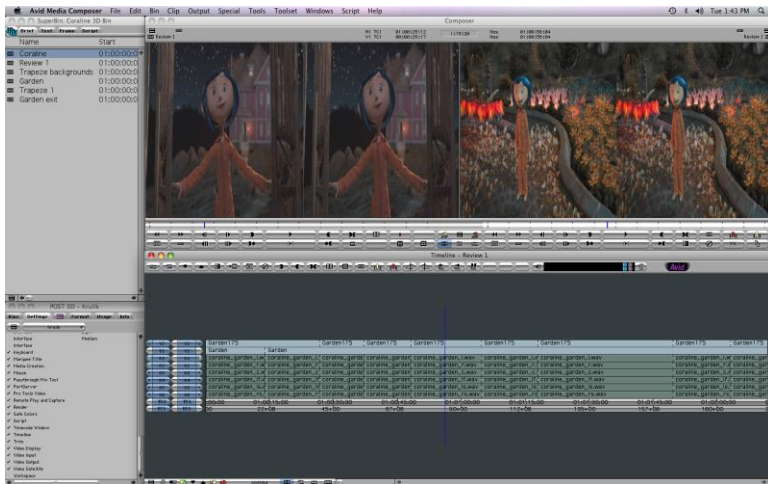
Editing stereo 3D in Media Composer is as straightforward as the conventional 2D editorial workflow. Configuring only a few settings will prepare the system for 3D offline editing:

1. Once the media is in Avid Media Composer using the steps for Inputting Media (above), the editor then chooses which eye should be the leading eye during editorial for the 2D view. This is done via the “Composer” settings. The choices are:

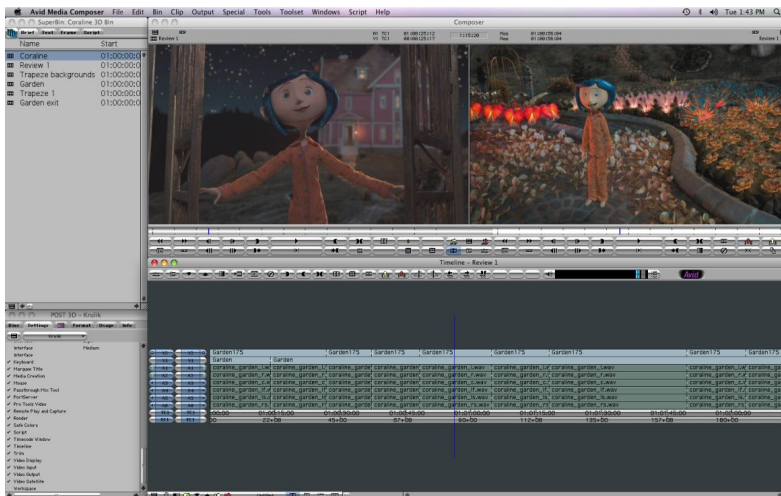


- For over/under display:
  - OFF (over/under)
  - LEFT (top half only, as full 1920 x 1080)
  - RIGHT (bottom half only, as full 1920 x 1080)
- For side-by-side display:
  - OFF (side by side)
  - LEFT (left half only, as full 1920 x 1080)
  - RIGHT (right half only, as full 1920 x 1080)
- For interleaved display:
  - OFF (interleaved)
  - LEFT (left half only, as full 1920 x 1080)
  - RIGHT (right half only, as full 1920 x 1080)

This is an example of NONE (or OFF) and shows the media as it comes into the system:

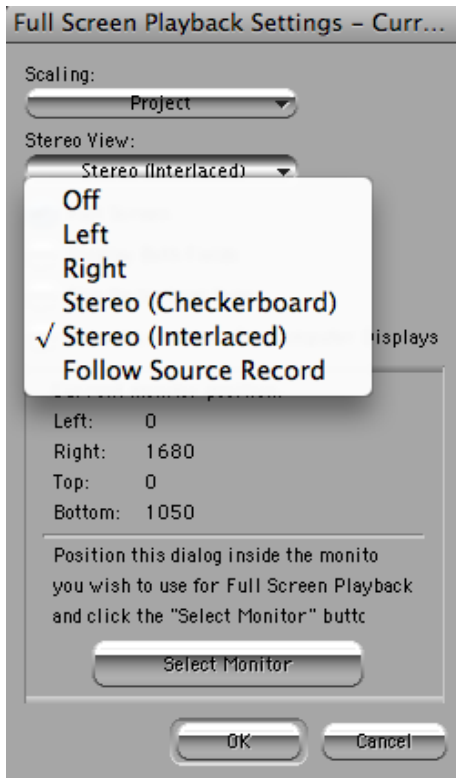


This is showing the result of selecting LEFT:



2. To avoid eye strain when reading text in the editing interface with the Media Composer UI displayed on the monitor, set the font per bin to a size and style readable on the 3D monitor.
  - Edit – Set font – TWcenMT condensed – size 20
3. Because the images being edited are always a single frame incorporating both left and right eyes at half-resolution, you can perform blend effects such as dissolves, fades, and supers. However, transform effects such as wipes, resize, and compositing that require the image to carry both eyes in the same frame, will lose the stereo effect and the entire image will no longer appear in 3D.
4. As an editorial system, Media Composer does not at this time offer depth grading tools. It is expected that corrections are made before the dailies are created for offline editorial. For projects in which these are needed for 3D finishing, follow the “Export Sequence for Finishing” steps (below) to make the sequence available for finishing solutions that incorporate convergence tools, sync alterations and other specific tools for stereoscopic 3D finishing.

## Full-screen Playback (Client Monitor)



1. Configure the full-screen playback signal that goes to the client monitor. This is done via the DVI output of the supported graphics card. Set your view options under 'Full Screen Playback' depending upon client monitor used, such as the following examples:
  - For LCD Monitor: Full screen, display both fields, flip on vertical sync
  - For Rear Projection DLP Monitor: Checkerboard
2. Select Follow Source Record if you want to manage same settings as found in Composer settings.

## Export Sequence for finishing

The final Stereo 3D sequence can be exported from Media Composer for finishing on an online finishing system. Either an EDL or XML report can be output from the editorial session.

### 1. EDL export:

```
009 005 V C 05:03:22:04 05:03:23:15 00:01:43:16 00:01:45:02
010 004 V C 04:01:41:23 04:01:43:03 00:01:45:02 00:01:46:07
011 003 V C 03:03:34:08 03:03:37:09 00:01:46:07 00:01:49:08
012 001 V C 01:12:09:12 01:12:10:06 00:01:49:08 00:01:50:02
013 005 V C 05:05:07:12 05:05:08:23 00:01:50:02 00:01:51:13
014 001 V C 01:12:15:17 01:12:16:22 00:01:51:13 00:01:52:18
015 004 V C 04:05:45:17 04:05:46:22 00:01:52:18 00:01:53:23
016 002 V C 02:09:15:08 02:09:16:09 00:01:53:23 00:01:54:24
017 005 V C 06:02:04:00 06:02:05:04 00:01:54:24 00:01:56:03
018 005 V C 06:02:05:04 06:02:05:04 00:01:56:03 00:01:56:03
018 005 V D 025 06:08:41:18 06:08:45:15 00:01:56:03 00:02:00:00
* BLEND, DISSOLVE
019 BL V C 00:00:00:00 00:00:30:00 00:02:00:00 00:02:30:00
* ASDASDAD
020 004 V C 04:11:05:23 04:11:06:22 00:02:30:00 00:02:30:24
M2 004 040.1 04:11:05:23
021 003 V C 03:05:49:21 03:05:50:16 00:02:30:24 00:02:31:19
022 003 V C 03:09:21:13 03:09:22:17 00:02:31:19 00:02:32:23
M2 003 040.1 03:09:21:13
023 005 V C 05:06:25:01 05:06:26:00 00:02:32:23 00:02:33:22
024 002 V C 02:04:56:23 02:04:57:22 00:02:33:22 00:02:34:21
M2 002 039.9 02:04:56:23
```

- Using EDL Manager, make an EDL based on the fields used for capturing metadata and predicated upon either the standard metadata fields for your project or your own custom metadata fields.
- If the offline footage was captured from tape, the EDL will provide accurate re-capture instructions
- If the sequence used DPXs, the EDL will point to the correct directory of sequential files

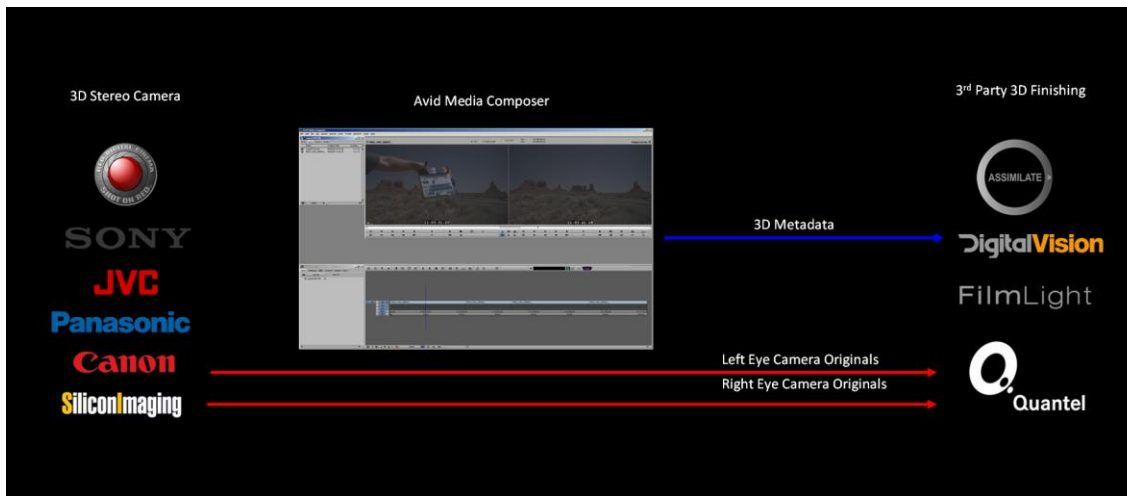
### 2. XML data:

```
- <MasterDuration>
  <FrameCount>2394</FrameCount>
  <Edgecode Type="35mm 4p">0149+10</Edgecode>
  <Timecode Type="TC1">00:01:39:21</Timecode>
</MasterDuration>
<SourceDuration />
<MediaFile />
<VideoConform>KN Start</VideoConform>
<AudioConform>Aux Ink</AudioConform>
- <LFOA>
  <Edgecode Type="35mm 4p">0149+10</Edgecode>
</LFOA>
<EditRate>24</EditRate>
<Resolution>24</Resolution>
</ListHead>
- <Events>
- <Event Num="1" Type="Cut" Length="75" SourceCount="1">
  - <Master>
    <Reel />
  - <Start>
    <Timecode Type="TC1">01:00:00:00</Timecode>
    <Pullin>A</Pullin>
    <Edgecode Type="35mm 4p">5010+08</Edgecode>
    <Frame>80168</Frame>
    <FrameImage />
  </Start>
  - <End>
    <Timecode Type="TC1">01:00:03:03</Timecode>
    <Pullin>C</Pullin>
    <Edgecode Type="35mm 4p">5015+02</Edgecode>
    <Frame>80242</Frame>
    <FrameImage />
```

- a. Use the FilmScribe Schema (the “dictionary”) downloaded from [www.avid.com/filmscribe](http://www.avid.com/filmscribe) if you wish to examine the metadata elements that will be parsed to create XML output of every clip, whether for symbol lists, pull lists or scan lists.
- b. All metadata, including every piece of custom metadata added during scan and transcode, will be preserved and exported, viewable in straight XML, formatted as HTML, or in a tab-delimited text file.
- c. End users can then parse the xml fields (data fields, tags) the way they need to in order to customize the sequence from Media Composer to map to the online project.

Downstream processes will take the EDL or XML to conform with all necessary data intact so you can accurately re-create your vision faster and more efficiently during final mastering.

## Stereoscopic 3D Finishing



Any stereoscopic project exported from an Avid editing system as an EDL or AAF file can easily be conformed on systems such as Quantel, Digital Vision, FilmLight or Scratch or other finishing system using either tape-based or file-based media. Commonly supported file formats include DPX sequences, QuickTime files, or, if using RED media, native .r3d files. In the case of file-based media, each eye would be conformed separately to make a resultant stereo clip in the mastering system.

Each finishing system will have its own method for handling stereo finishing and color grading. Using Quantel systems, for example, the sequence for each eye can be taken into Effects mode and graded individually. The settings of each eye can then easily be copied and transferred from one eye to the other.

## THE FUTURE (OR BACK TO IT)

3D storytelling has come a long way since the advent of stereo editing with MediaComposer 3.5. During that time, Avid has worked closely with content creators to enrich the stereo 3D post production process, producing enhancements like additional formats for viewing and editing that have afforded greater control than ever before.

Going forward, Avid will rely on these creative collaborations to pave the way for innovative film, game and broadcast creators the world over as they continue their successful stereo 3D journey “back to the future” – now and in the years to come.

## THIRD PARTY PARTNERS

### **3D Camera, Rigs, and Dailies Manufacturers:**

P+S Technik

<http://www.pstechnik.de/en/3d-rig.php>

RED Digital Cinema

<http://www.red.com/>

Sony CineAlta

<http://pro.sony.com/bbsccms/ext/cinealta/shoot/index.shtml>

Panasonic

[http://www.panasonic.com/business/provideo/cat\\_camcorders.asp](http://www.panasonic.com/business/provideo/cat_camcorders.asp)

Silicon Imaging

<http://www.siliconimaging.com/>

Codex Digital Digital

<http://www.codexdigital.com/>

Pace Camera Systems

<http://www.pacehd.com/>

### **3D Finishing Systems**

Assimilate

<http://www.assimilateinc.com/>

Digital Vision

<http://www.digitalvision.se/>

FilmLight

<http://www.filmLight.ltd.uk/>

Quantel

<http://www.quantel.com/>

### **3D Monitoring and Projection**

JVC

<http://pro.jvc.com/pro/microsite/3d/index.html>

Hyundai

<http://www.hyundaiit.com/>

RealD

<http://www.reald.com/>

Samsung

<http://pages.samsung.com/us/dlp3d/>

Barco

<http://www.barco.com/en/productcategory/15>

Cinetal

<http://www.cine-tal.com/>

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