# PART 11

## Deliver

# Chapter 136

# Using the Deliver Page

Once you've finished grading your project, you need to either render it, or output it to tape to deliver it to your client. This is where the Deliver page comes in. This chapter describes the overall interface of this page, as well as providing some general information about how effects are output from DaVinci Resolve in different situations.

# Contents

# The Deliver Page

The Deliver page is divided into five areas of functionality, each of which lets you set up a different part of a render or output to tape.



Deliver page

# The Interface Toolbar

At the very top of the Deliver page is a toolbar with buttons that let you show and hide different parts of the user interface. These buttons are as follows, from left to right:
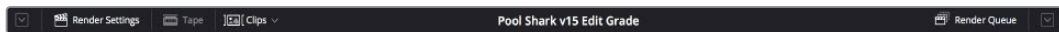


The Interface toolbar

- **Delivery full/half height button:** Lets you set the Render Settings panel to take up the full height of your display, if you need more area for browsing the various render settings, at the expense of a narrower Timeline.

- **Render Settings:** This panel lists all of the render settings that are available for configuring rendering jobs in DaVinci Resolve. By default, you're presented with a short list, but more options are available by clicking "Advanced Settings."

- **Tape:** Puts the Deliver page into Tape Output mode.

- **Clips:** Hides or shows the Thumbnail timeline above the Deliver page timeline

  – **Render Queue:** A list of all jobs that you've set up to render in the current project. Previously rendered jobs remain in the queue, for your reference or for you to reuse to re-render those jobs, unless you manually delete them from the queue.

  – **Render Queue full/half height button:** Lets you set the Render Queue to take up the full height of your display, if you need more area for listing render jobs at the expense of a narrower Timeline.

# Rendering Files vs. Outputting to Tape

Because the Deliver page does double duty, you control whether you're rendering files or outputting to tape using the Tape button in the Interface toolbar. Doing so replaces the controls in the Viewer with tape controls.
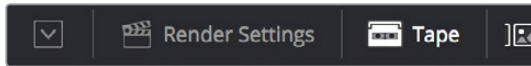

Render or Edit to Tape modes

# The Render Settings

The Render Settings contains the customizable settings that determine how media is rendered out of DaVinci Resolve. If you're using the Tape option, these settings are disabled.
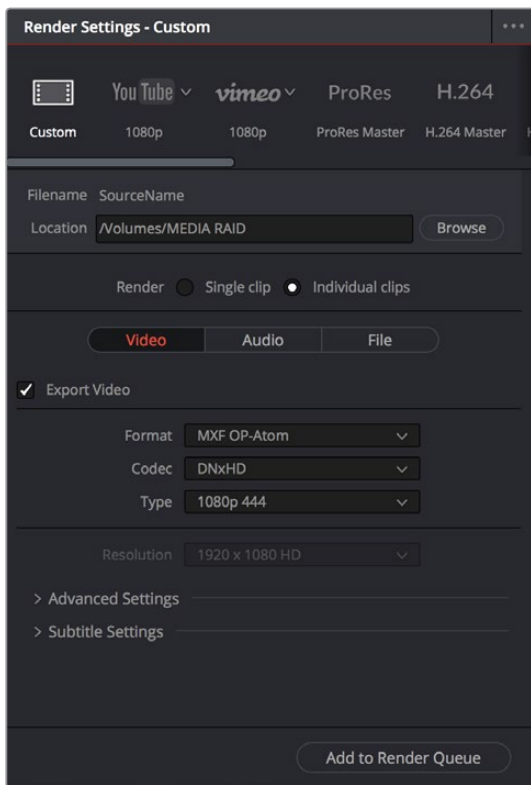

Render Settings

The Render Settings are divided into four general sections:

- **Render Presets:** At the very top, a scrollable row of icons lets you choose one of a series of presets to quickly set up the type of render you want. The Custom option exposes all render settings so you can set up a render manually.

- **Render Location:** A Browse button opens a dialog that lets you choose a volume and directory to render to.

- **Render:** Two options let you either render the entire selected area of the Timeline as a single clip suitable for reviewing or mastering, or as a series of individual clips more suited to round-trip workflows. The option you choose here changes which render settings are available below.
- **Video, Audio, and File Render Settings Panels:** All other render settings are divided among three panels.

For more information on all of these settings, see Chapter 138, "Rendering Media."
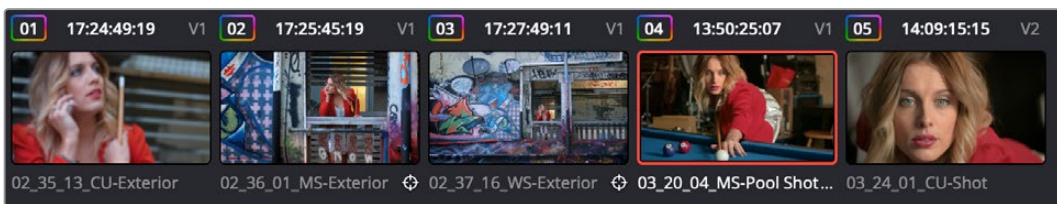
# The Deliver Page Timeline

You'll use the Timeline in the Deliver page to define the range of clips you want to render or output to tape, and to choose which versions for each clip you want to output. The Deliver page Timeline consists of a Thumbnail timeline at top (that can be shown or hidden via the Clips button) that makes it easy to select individual clips for rendering, and a more ordinary timeline below with controls for enabling and disabling specific tracks. A Timeline toolbar lets you choose the range of the Timeline you want to render, and has controls for zooming in and out.
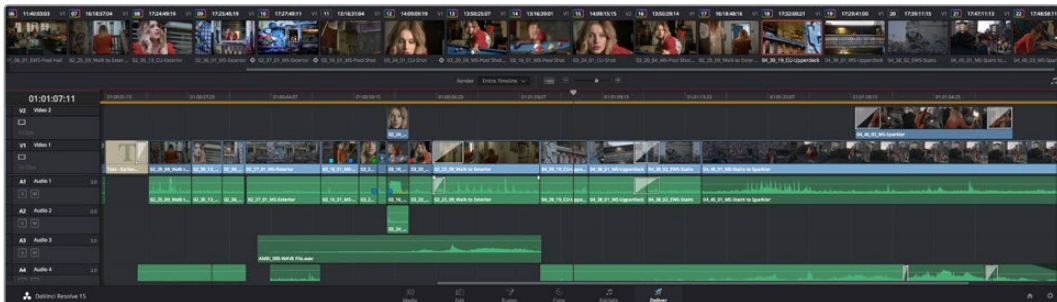


The Deliver page's Timeline and Thumbnail timeline

## Filtering the Thumbnail Timeline

The Deliver page Thumbnail timeline also has the Timeline Filter pop-up, available to the right of the Clips button in the Interface toolbar.



The Deliver page's Thumbnail timeline matches the Color page

Using this pop-up to filter the contents of the Timeline lets you restrict the range of media you want to output in different ways. For example, if you've already rendered a timeline, but you've since made some changes, you can use one of the "Modified Clips" options to display only the clips that have changed within a particular timeframe. Another commonly used option is to choose "Show Unrendered Clips" to isolate all clips that have not yet been rendered in workflows where you're only rendering a part of the Timeline at a time.

When you filter the Thumbnail timeline, you can only set up jobs to render in Individual Clips mode. You can tell if Thumbnail filtering is enabled by an orange underline under the Clips button in the UI toolbar.
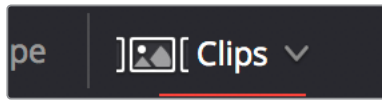


An orange line under the Clips button shows that filtering is enabled

# The Viewer

When rendering file-based media, the Viewer shows you exactly how the media being output will look using the current settings, and the transport controls move the playhead throughout the current Timeline.



Deliver page Viewer

When outputting to tape, the Viewer shows you the tape output so you can set up insert or assembly edit points, and the transport controls move the tape in the deck if device control is enabled. You can also put the Viewer into Cinema Viewer mode by choosing Workspace > Viewer Mode > Cinema Viewer (Command-F), so that it fills the entire screen. This command toggles Cinema Viewer mode on and off.

# The Render Queue

The Render Queue is a list of all the jobs you've queued up for delivery. Each job can have an individualized range of clips and render settings, which you can use to render multiple sections or clips of a timeline, the same timeline output to multiple formats, or multiple timelines.
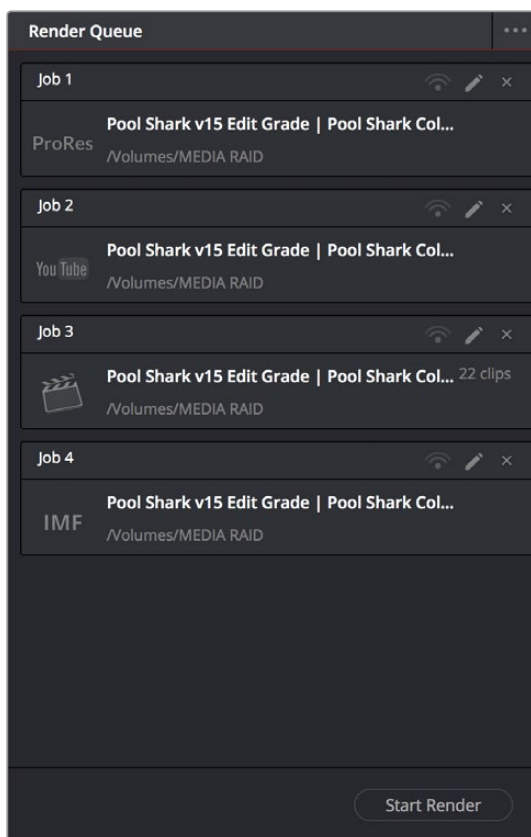


The Render Queue displays all jobs

The Render Queue also has the option to show either just the jobs within the current project, or jobs queued up and saved within all projects in the currently open SQL database (for the current user) or disk database (at the currently selected disk location). This can be exceptionally useful in situations where you've broken a program into multiple reels, with each reel being a different project. This can be turned on and off via the "Show All Projects" option of the Render Queue Option menu.

Jobs in the Render Queue can be edited (by clicking the pencil button), they can be assigned to remote rendering workstations, and they can be deleted. Jobs that have already been rendered can be kept in the Render Queue and re-rendered at a later time.

# Chapter 137

# Delivery Effects Processing

# Contents

# Delivery Effects Processing

When you're outputting to tape, how effects are rendered depends on whether you're rendering individual source clips or as a single clip.

## When Rendering a Single Clip or When Outputting to Tape

Whether you're rendering a QuickTime or MXF master of your project as a single clip, rendering a DPX image sequence for film output, or outputting directly to tape, all supported compositing, speed, and transform effects are rendered by DaVinci Resolve and "baked" into the output media. Unsupported effects are completely ignored, cannot be seen, and have no effect on media that's rendered and output.

## When Rendering Individual Source Clips for Round-Trip Workflows

In workflows where you're rendering individual media files to send a project back to an NLE or finishing application for final finishing (adding titles and other effects before final delivery), DaVinci Resolve handles different types of effects in different ways.

Unsupported effects do not appear in DaVinci Resolve. However, this effects data is internally preserved, and when you export an XML or AAF file to send back to your NLE of choice, these effects reappear, applied to the color corrected media that you rendered out of DaVinci Resolve and sent back.

Effects that DaVinci Resolve does support such as composite modes, opacity settings, speed effects, and transitions are handled differently. Even though these effects are visible in DaVinci Resolve while you work, they're not "baked" into the final media that you render in preparation for sending back to your NLE or finishing application. Instead, the portion of each media clip that's used in your project is rendered as an individual file, and the XML file that you export from DaVinci Resolve contains all of the effects information necessary to reassemble the rendered media into a timeline that uses Final Cut Pro effects applied to DaVinci Resolve-graded media.

| | EDL | FCP 7 | FCP X | Premiere Pro | Media Composer* |
|---|---|---|---|---|---|
| Color Corrections | N/A | N/A | Rendered | N/A | N/A |
| Composite Modes | N/A | Sent Back | Sent Back | Sent Back | Rendered |
| Alpha Channels | N/A | Optionally Rendered | Optionally Rendered | Optionally Rendered | Optionally Rendered |
| Transitions | Sent Back | Sent Back | Sent Back | Sent Back | Sent Back |
| Opacity Settings | N/A | Sent Back | Sent Back | Sent Back | Sent Back |
| Position, Scale, Rotation | N/A | Conditional | Conditional | Conditional | Conditional |
| Linear Speed Effects | Sent Back | Sent Back | Sent Back | Sent Back | Sent Back |
| Variable Speed Effects | N/A | Sent Back | Sent Back | Sent Back | Sent Back |
| Long Duration Still Images | N/A | N/A | N/A | N/A | N/A |
| Freeze Frames | N/A | N/A | N/A | N/A | Rendered |

The chart shows which effects are rendered by DaVinci Resolve, and which effects are passed back in different round trip workflows.

\* These effects are only sent back in AAF round trips when you're updating an existing AAF file, rather then generating a new AAF file.

After you've reimported your project back into your NLE or finishing application, you're free to readjust these effects while completing your program, without the need to re-render individual clips in DaVinci Resolve.

> **IMPORTANT** One exception to the preservation of media and effects in round-trip workflows is that nested sequences from Final Cut Pro 7 and Media Composer are not compatible with DaVinci Resolve; XML and AAF files containing nested sequences cannot be imported. On the other hand, Final Cut Pro X projects containing compound clips can be imported.

## More About Rendering Speed Effects

If you're rendering a project with speed effects, you should be aware that DaVInci Resolve can optionally render speed effects using Optical Flow processing, resulting in high-quality slow motion and fast motion effects delivered straight out of DaVinci Resolve. If you're satisfied with Optical Flow processing in DaVinci Resolve, there may be no need for you to do a round-trip export if the main reason you were doing so was to send the processing of slow motion clips to another application for rendering, and rendering the Timeline in Single clip mode will "bake" the speed effects in using whatever settings you've selected for the project, or for each clip if you've selected individual Retime Process settings for different clips.

However, if you want to send unrendered speed effects to another application, rendering your project in Individual source clips mode guarantees that the full range of each original clip of media will be rendered, with the speed effect itself exported within the XML, AAF, or EDL file that's exported.

> **NOTE:** DaVinci Resolve adds three frame handles to clips with speed changes applied to them, and to rendered clips that don't match the project's frame rate. This is done to facilitate reconform in NLEs that require handles beyond the actual length of each of these clips.

## Determining the Rendered Output Resolution of Clips in Mixed Timelines

Ordinarily, rendering individual source clips results in each clip being rendered at either the project resolution or the Resolution pop-up in the Render Settings (which overrides the project resolution), with clips that don't match the project resolution being resized or not according to the settings you've chosen in the Image Scaling panel of the Project Settings.

However, if you're rendering dailies for projects containing clips with mixed resolutions, you can choose to render each clip at its original resolution by turning on the "Render at source resolution" checkbox in the Video group of controls. This option is only available in the Intermediate and Advanced groups of Render Settings.

## Rendering Edit and Input Sizing Adjustments

Whether or not sizing is rendered into your final media depends on the "Disable edit and input sizing" checkbox in the File options of the Deliver page.

- **If "Disable edit and input sizing" is turned off:** Input Sizing and Edit page transform Pan/Tilt/Zoom/Rotate adjustments are "baked" into the final rendered media using the optical-quality sizing algorithms available to DaVinci Resolve. This is best if your sizing adjustments are approved and final, and you want to "bake" sizing adjustments into the final media your delivering.

- **If "Disable edit and input sizing" is turned on:** Input Sizing and Edit page Pan/Tilt/Zoom/Rotate adjustments are not rendered, and each clip will be rendered at its original resolution. However, the Input and Edit sizing adjustments you've made will be exported as part of the XML or AAF file that you're exporting. This is best for workflows where the editor wants to continue adjusting sizing after you've handed off the graded project relative to the original size of the clips.

Keep in mind that if you want to render Input Sizing adjustments into the media you're outputting, the "Force sizing to highest quality" checkbox guarantees that DaVinci Resolve will use the highest-quality sizing setting, even if you've temporarily chosen a faster-processing option for a slower computer.

## Rendering Mixed Frame Rate Timelines

Mixed frame rates are supported by DaVinci Resolve when any option other then none is selected in the "Mixed Frame Rate format" pop-up menu, either in the Conform Options section of the General Options panel of the Project Settings, or in the Import AAF or XML dialog. When you choose the appropriate option that corresponds to the application you're exchanging projects with (or DaVinci Resolve if you're working entirely within DaVinci Resolve), then DaVinci Resolve conforms and processes all clips in the Timeline to play at whichever frame rate is selected in the "Timeline frame rate" pop-up menu. For example, 23.98, 29.97, 30, 50, 59.94, and 60 fps clips will all play at 24 fps if that's what "Timeline frame rate" is set to in the Master Settings panel of the Project Settings.

How clips in mixed frame rate timelines are rendered out depends on whether the Render Settings are set to render Individual source clips or a Single clip.

- **Individual source clips:** All clips are rendered individually at their original frame rate.

- **Single clip:** All clips are converted to the "Timecode calculated at" frame rate and rendered as a single media file. Clips are converted using whatever method is selected in the Retime process pop-up of the Master Settings panel of the Project Settings, or in the individual Retime process setting found in the Video inspector of each clip that overrides the project-wide setting. You can choose Optical Flow processing for the highest quality conversion that's available in DaVinci Resolve.

## Export Alpha Channels

Starting in version 12.5, you have the option to turn on the Export Alpha checkbox in the Video panel of the render settings whenever you render individual source clips. When you do so, DaVinci Resolve renders clips with alpha channels in either of two cases:

- Whenever there is an alpha channel embedded in the source media for that clip, the embedded alpha channel will be copied to the rendered version of that clip.

- Whenever a clip's grade has a key connected to an alpha output, the alpha output will be rendered as an alpha channel for that clip.

In either case, you may only render alpha channels out when you render individual source clips to an RGBA format such as TIFF, OpenEXR, ProRes 4444, ProRes 4444 XQ, or DNxHR 444.

# Chapter 138

# Rendering Media

This section describes the options that are available for file-based delivery. The workflow is simple; you define the format and other settings that dictate how the media is to be rendered, define a range of clips in the currently selected session, and then add a job containing these settings to the Render Queue.

You can queue up as many different render jobs as you like, each with different formats, output options, and ranges of clips, depending on what you're trying to accomplish. When you're ready to render, simply click the Start Render button.

# Contents

# Using Presets for Fast Rendering

The very top of the Render Settings list has a set of presets for many of the most common rendering workflows you'll need to accomplish. If you want to create your very own settings, then choose custom. Each preset automatically sets up what you need, and locks you out of settings that are not necessary for rendering that type of media.
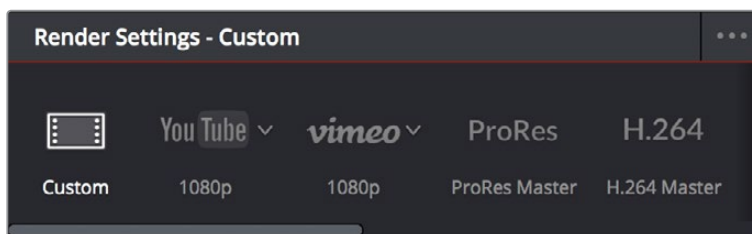


Render presets selection

## Custom

When custom is selected, nothing is automatically set, and all options are available. You must manually choose the settings and options you need. All Render settings are saved on a per-project basis.

## YouTube 720p/1080p/2160p

A pop-up menu lets you choose three different resolutions to render to. Selects the appropriate settings for exporting your program as a QuickTime H.264-encoded file suitable for uploading to Vimeo, YouTube, and many other video file sharing services. Renders a single clip, and sets the Video Format to QuickTime, the Codec to H.264, sets the video data rate to 10,000 Kb/s, the Audio Codec to AAC, and the audio data rate to 320 Kb/s.

## Vimeo 720p/1080p/2160p

A pop-up menu lets you choose three different resolutions to render to. Selects the appropriate settings for exporting your program as a QuickTime H.264-encoded file suitable for uploading to Vimeo, YouTube, and many other video file sharing services. Renders a single clip, and sets the Video Format to QuickTime, the Codec to H.264, sets the video data rate to 10,000 Kb/s, the Audio Codec to AAC, and the audio data rate to 320 Kb/s.

## ProRes Master

For quickly outputting ProRes Master files of a whole program. When selected, defaults to rendering in single clip mode, with the Format set to QuickTime, the Codec set to Apple ProRes, and the Type set to Apple ProRes 422 HQ. Audio defaults to the Codec being Linear PCM and the Bit Depth being 16.

## H.264 Master

For quickly outputting H.264 files of a whole program. When selected, defaults to rendering in single clip mode, with the Format set to QuickTime, and the Codec set to H.264. Quality is set to Automatic, Encoding Profile is also set to Auto, Passes defaults to Single, and Key Frames default to Automatic with Frame reordering turned on. Audio defaults to the Codec being Linear PCM and the Bit Depth being 16.

## IMF

(Available in DaVinci Resolve Studio Only)

A pop-up menu to the right of this preset provides options for Generic and Netflix-qualified presets. This preset is for facilities that deliver IMF files as digital-only deliverables. Format is set to IMF, the Codec pop-up menu is set to Kakadu JPEG2000 (although easyDCP encoding is also available), and pop-ups for Type and Profile Level appear, as well as settings for Maximum bit rate, Lossless compression, the Composition name, a Content pop-up, and the Package Type (current options include App2e and App2e Netflix).

## Final Cut Pro 7 or X XML

A pop-up menu attached to this preset lets you choose from two different XML formats to be exported along with the media you're rendering:

- Selects the appropriate settings for projects that were sent from Final Cut Pro 7 to DaVinci Resolve using XML. This is meant for situations when you're rendering media intended for a return trip to Final Cut Pro (by exporting an XML file from the Edit page). Renders Individual Clips, the "Render to" setting on Mac OS X, defaults to Apple ProRes 422 (HQ), Output Size defaults to the current Timeline Resolution (as set in the Master Settings panel of the Project Settings), and Use Unique Filenames is turned on. When you choose this preset, an XML of the rendered timeline is automatically exported along with the media.

- Selects the appropriate settings for projects that were sent from Final Cut Pro X to DaVinci Resolve using XML. This is meant for situations when you're rendering media intended for a return trip to Final Cut Pro (by exporting an XML file from the Edit page). Renders Individual Clips, the "Render to" setting on Mac OS X, defaults to Apple ProRes 422 (HQ), Output Size defaults to the current Timeline Resolution (as set in the Master Settings panel of the Project Settings), and Use Unique Filenames is turned on. When you choose this preset, an XML of the rendered timeline is automatically exported along with the media.

## Premiere XML

Selects the appropriate settings for projects that were sent from Premiere Pro to DaVinci Resolve using XML. This is meant for situations when you're rendering media intended for a return trip to Premiere Pro. Renders Individual Clips, the "Render to" setting on Mac OS X, defaults to Apple ProRes 422 (HQ), Output Size defaults to the current Timeline Resolution (as set in the Master Settings panel of the Project Settings), and Use Unique Filenames is turned on. When you choose this preset, an XML of the rendered timeline is automatically exported along with the media.

## Avid AAF

Selects the appropriate settings for projects that were sent from Avid Media Composer or Symphony to DaVinci Resolve using AAF. This is meant for situations when you're rendering media intended for a return trip to Media Composer or Symphony (by exporting an AAF file from the Edit page). "Rendering clips in" is set to Source, the "Render to" setting defaults to DNxHR 1080p 12 bit, Output Size defaults to the current Timeline Resolution (as set in the Master Settings panel of the Project Settings), and Render Clip with Unique Filename is turned on. When you choose this preset, an AAF of the rendered timeline is automatically exported along with the media.

## Pro Tools

Selects the appropriate settings for exporting (a) a flattened MXF Op-atom reference movie, (b) each of the individual audio clips used in that timeline along with all audio channels in every clip (regardless of which channels may be muted in DaVinci Resolve), and (c) an AAF of the audio portion of the current timeline that's formatted for import into Pro Tools, or any other digital audio workstation (DAW) software that's compatible with AAF import. Additionally, each audio track exports whatever custom name you may have given it, for use by Pro Tools.

## Audio Only

Disables video rendering, and defaults to QuickTime using Linear PCM, with a single channel, 16-bit output, and a single track of audio on output.

## Creating and Using Your Own Presets

If there is a particular group of settings that you find yourself using repeatedly, you can turn it into a custom Easy Setup, for easy recall.

**To create a new Easy Setup:**

1   If you want to start from scratch, make sure to choose Custom from the preset panel to unlock every setting in the Render Settings pane.

2   Choose the particular settings you require in the Video, Audio, and File panels for your new preset.

3   Open the Render Settings Options menu, and choose Save as New Preset.

4   Type a name into the "Render Preset" dialog, and click Save. The new preset now appears in the Preset panel.

**To load a preset:**

Click any preset. Every setting in the Render Settings pane updates to reflect the preset you selected.

**To change a custom preset that you've created**

Click a preset you want to change, make whatever changes you need to in the Video, Audio, and File panels, then click the Render Settings Option menu, and choose Update Current Preset.

**To delete a custom preset that you've created:**

Click a preset you want to delete, then click the Render Settings Option menu, and choose Delete Current Preset.

# Choosing a Location to Render

The first decision you have to make when rendering your output is where it's going to be rendered. Accordingly, this is the first set of controls appearing at the top of the Render Settings parameters.

- **Filename:** A preview of what the file name will be based on the settings found in the File panel described later. The Custom/Timeline name and File suffix fields, as well as the "Use x digits in the filename" settings all determine what name appears here. The editable portions of this filename preview can also be edited here.

- **Location:** Click the Browse button to choose a directory in which to write the media being output by DaVinci Resolve. After you've selected a directory, the path name appears in the "Render job to" field.

# Single Clip vs. Individual Clips

While there are numerous options available in the Render Settings of the Deliver page, there are basically two overarching ways you can render your project, depending on which of the "Render" radio buttons you click in the Output group.
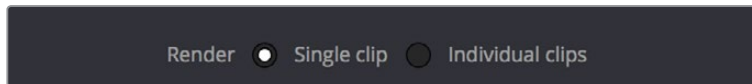


Render a single clip or individual clips

## Single Clip

When you select the Single clip option, you're setting up a render wherein all clips in the session are output together, as a single media file in whatever format you choose. This means you'll be rendering the selected range of the session to a single MXF or QuickTime file, or as a single collection of image sequences.

- **Timecode:** The timecode that's written out is dictated by the "Start timeline timecode at" setting of the timeline being rendered. Media files contain a continuous timecode track, while image sequences have timecode written into each frame's data header, and integrated into the file name (as a frame count).
- **Frame Rate:** If you're rendering a project that uses mixed frame rates, rendering to a single clip converts every clip in the entire session to the project frame rate, using either the project-wide or clip specific "Retime process" setting.
- **Effects:** Most effects are "baked into" the rendered output when you render a single clip.

> **IMPORTANT** Whenever clip filtering is enabled (via the pop-up menu to the right of the Clips button), Single Clip rendering cannot be selected. You can see if clip filtering is enabled by an orange line underneath the Clips button in the UI toolbar.

## Individual Clips

Selecting the Individual clips option sets up a render where each clip is rendered as an individual media file in whichever format you choose. The result will be a collection of as many media files as there are clips in the range you've selected to render.

- **Timecode:** The timecode written to each clip is cloned from the original source media, making it easy to reconform media for projects being passed between DaVinci Resolve and NLEs.
- **Frame Rate:** If you're rendering a project that uses mixed frame rates, rendering to source renders each clip at its own individual frame rate, to accommodate round-trip workflows.

# All Other Render Settings for Output

This section covers the different render settings that are available for customizing your output. Depending on which Render Setting mode you chose, some of these may be hidden, but this section covers the full list found in the Advanced panel of controls.

If you choose one of the Easy Setups, then some of these settings will be locked, and others will be editable, depending on the requirements of that setup. If none of the Easy Setups is suitable for the task at hand, you can leave the Easy Setup pop-up menu set to none, and manually choose the necessary settings for the task at hand.

## Video Panel

This panel contains all video-oriented parameters.

- **Export Video:** Turn this checkbox on to render the source video. Turn this checkbox off if you want to render the source audio all by itself; this disables all video controls, and shows an Audio Format pop-up menu in the audio section of settings.

- **Format:** A pop-up menu that gives access to the container formats that are currently available on your system. The available options depend on whether you have Final Cut Pro and QuickTime installed, and on the operating system you're using. This list is constantly growing, as new file formats are added over time, so be sure to check each new version for the latest supported formats.

  – **AVI:** A now-deprecated file-based media format that, despite its age, remains popular with Windows applications. Supports delivery using the Cineform, Grass Valley HQ and HQX, and Uncompressed RGB and YUV codecs.

  – **Cineon:** An older uncompressed image sequence format developed by Kodak, designed for film scanning and digital mastering, which delivers RGB 10-bit.

  – **DPX:** An uncompressed image sequence format favored by the film industry for mastering and delivery for DCDM mastering, which can be delivered as RGB 10-, 12-, 16-bit integer and half float, or RGBA 8-bit.

  – **EXR:** The OpenEXR format is a high-dynamic-range image sequence format developed by ILM for applications requiring high quality and multiple channels. Used for outputting ACES and HDR deliverables. You can deliver to a variety of RGB Half and RGB Float settings. When choosing the RGB half (DWAA) or (DWAB) compression codecs, an additional "Compression level" setting appears that lets you choose how much compression to apply.

  – **DCP:** Native DCP encoding and decoding for creating unencoded DCP files only. If you have a license for Frauenhofer's EasyDCP, a setting in the Configuration panel of the System Preferences enables you to choose whether to use EasyDCP (for creating encrypted DCP output), or the native DaVinci Resolve encoding.

  – **easyDCP:** An option that allows you to master a DCP or IMF directly from DaVinci Resolve in conjunction when you have an installed license of Fraunhofer's EasyDCP software.

  – **MJ2:** The Motion JPEG 2000 format. DaVinci Resolve 15 introduced support for the encoding and decoding of JPEG2000 using a library licensed from Kakadu software. This includes a complete implementation of the JPEG2000 Part 1 standard, as well as much of Parts 2 and 3. JPEG2000 is commonly used for IMF and DCP workflows.

  – **IMF:** A native IMF encoding option that lets you export to the SMPTE ST.2067 Interoperable Master Format (IMF) for tapeless deliverables to networks and distributors, with support for encoding of JPEG2000 using a library licensed from Kakadu software. No additional licenses or plug-ins are required to output to IMF. The

IMF format supports multiple tracks of video, multiple tracks of audio, and multiple subtitle and closed caption tracks, all of which are meant to accommodate multiple output formats and languages from a single deliverable. This is done by wrapping a timeline's different video and audio tracks (media essences) and subtitle tracks (data essences) into a "composition" within the Material eXchange Format (MXF).

– **JPEG 2000:** DaVinci Resolve 15 introduced support for the encoding and decoding of JPEG2000 using a library licensed from Kakadu software. This includes a complete implementation of the JPEG2000 Part 1 standard, as well as much of Parts 2 and 3. JPEG2000 is commonly used for IMF and DCP workflows.

– **MXF OP–Atom:** A simple standard for the Material eXchange Format, a file-based media format, that's often used when delivering DNxHD. This version conforms to the SMPTE 390M standard, and can deliver using the DNxHD, DNxHR, Kakadu JPEG 2000, NTSC and PAL Avid, RGB Avid 10-bit, and XDCAM MPEG2 codec options.

– **MXF OP1A:** A version of the Material eXchange Format that conforms to the SMPTE 378M standard, and can deliver using the 1080i Avid 8-bit, DNxHD, DNxHR, Kakadu JPEG 2000, NTSC and PAL Avid, RGB Avid 10-bit, Sony MPEG4 422 and 444, and Sony XAVC Intra CBG and VBR, and XDCAM MPEG2 codec options.

– **QuickTime:** Apple's file-based media format, used when delivering Apple ProRes, DNxHD or DNxHR wrapped in QuickTime, GoPro Cineform RGB 16-bit and YUV 10-bit, Grass Valley HQ and HQX, Kakadu JPEG 2000, H.264, HEVC, H.264 (single or multi-pass), Photo JPEG, Kakadu JPEG 2000, Uncompressed 8- and 10-bit formats with ARGB/BGRA/RGB/YUV channel orders, and VP9 at 8-, 10-, and 12-bits.

– **MP4:** Dedicated MP4 encoding lets you export H.264-encoded movies.

– **TIFF:** "Tagged Image File Format," an image sequence format compatible with many desktop video applications on many platforms and is also used when delivering for DCDM mastering.

- **Codec:** A pop-up menu that lets you choose from a selection of codecs that are available to the format you've selected above.

- **Type:** Different codec options may also present different bit depth and color space combinations, as well, which are available from this menu.

- **Maximum Bit Rate:** (Does not appear for all codecs) Codecs such as Kakadu JPEG 2000 let you specify a maximum bit rate, in Mbits per second, with which to encode the delivered video.

If you choose MP4 as the Video Format, or QuickTime with H.264 or VP9 as the codec, additional options appear, described below.

– **Network Optimization:** Optimizes the resulting rendered media file so when it's downloaded over a network, the portion of the file that's been downloaded so far can be played before the entire file is finished downloading.

– **Quality:** If the currently selected option in the Render to pop-up menu has options for changing the compression quality, this pop-up menu lets you choose the quality you want to use. Otherwise, it's disabled.

– **Restrict to X Kb/s:** (Available for QuickTime H.264) You can choose automatic, or select a maximum data rate with which to export H.264.

– **Passes:** (Available for QuickTime H.264) You can choose between Single and Multiple pass encoding. If you choose Multiple pass, the number of passes performed is automatic.

– **Key Frames:** (Available for QuickTime H.264) You can choose automatic, or select a duration for manual keyframe insertion.

– **Frame Reordering:** (Available for QuickTime H.264) On by default, Frame Reordering enables the encoding of B frames to improve the quality of the resulting compressed movie file. Turning off Frame Reordering will speed encoding performance at the expense of visual quality.

If you choose DCP or IMF as the Video Format, additional options appear, described below.

– **Profile Level:** (IMF) More information will be forthcoming about this in subsequent versions.

– **Maximum bit rate:** (IMF) Lets you choose how much to compress the result.

– **Compression:** (IMF) A checkbox lets you specify lossless compression.

– **Composition name:** (DCP, IMF) Lets you choose a name for the timeline being encoded.

– **Use interop packaging:** (DCP only) Lets you create an Interop DCP package, based on an earlier standard of DCP delivery that is not forward compatible with SMPTE DCP packages.

– **Content:** (IMF) Lets you specify the type of content you're encoding.

– **Package Type:** (IMF) Defaults to App2 Extended (App2e), for encoding JPEG 2000 up to 4K.

- **Field rendering:** If you're processing interlaced source material, this checkbox sets DaVinci Resolve to render each field individually before reintegrating them back into a single frame, in order to process clips most accurately with filtering operations that would otherwise violate field boundaries and cause problems. If you're not rendering interlaced media, you should leave this checkbox turned off, as it is more processing intensive.

- **Export HDR10 Metadata:** (Available in Single clip mode if HDR10+ is enabled in Project Settings) Exports HDR10 metadata to the rendered file when you're doing an HDR workflow.

- **Render at Source Resolution:** (When rendering Individual Clips) This checkbox lets you render each clip at the same resolution as its source media file, letting you preserve mixed frame sizes for final delivery.

- **Resolution:** The output resolution for rendering. This setting defaults to the current resolution of the project as set in the Master Settings panel of the Project Settings, modified by whatever transforms are applied in the Sizing palette in Output mode. However you can change the resolution here if you need to output at a different resolution. Using this setting, you can queue up different render jobs at different resolutions, in order to output both HD and SD resolution media in the same render session, for example. Some file formats require specific resolutions, in which case the Output Size settings will be automatically set to the necessary resolution.

- **Frame rate:** (When rendering Single Clip) This setting is typically identical to the "Timecode calculated at" frame rate in the Master Settings panel of the Project Settings. However, you may wish to set this to a variation of the current conformed rate, for example choosing from between 23.98 or 24 fps. Doing so will adjust the metadata written within the file, which is used to aid playback for the range of systems available worldwide.

– **3:2 Pulldown Insertion Options:** Starting with DaVinci Resolve Studio 12.5, you have the option of outputting either 29.97 or 30 fps media with 3:2 pulldown insertion if your project's playback frame rate is either 23.98 or 24 fps. To output 29.97 media, the project must be 23.98 fps; simply choose (23.976 3:2) from the Frame rate pop-up. Projects with 24 fps frame rates can only be output at 30 fps.

- **Export Alpha:** (When rendering Individual Clips) Turning this checkbox on results in alpha channels found in each clip's source media file being output to each delivered clip, as well as alpha information that you're creating in DaVinci Resolve and inserting into that clip via the Alpha output of the Color page Node Editor being output to each delivered clip.

- **Alpha Mode:** (When rendering Individual Clips) Lets you choose how to export alpha channels when Export Alpha is enabled. You can choose Straight or Premultiplied.

- **Render Stereoscopic 3D:** (Only appears if there are stereo clips in a timeline) Three options let you choose how to render stereoscopic timelines, rendering just one eye's worth of media at a time, or rendering a single set of stereo media in one of four ways, depending on the option you choose from the "Both eyes as" pop-up menu.

  - **Left eye:** Lets you render only the left-eye media from a stereo timeline.

  - **Right eye:** Lets you render only the right-eye media from a stereo timeline.

  - **Both eyes as:** Lets you select from four ways of rendering the left and right eyes of stereo media as a single set of media files. "Separate files" lets you output both the left-eye and right-eye media as individual media files, all at once. Side-by-side, Line-by-Line, and Top-Bottom let you output frame-compatible media that can be output to stereo-capable displays. Anaglyph lets you output a traditional anaglyph red/cyan stereo image for viewing on any display using red/cyan glasses.

An advanced settings disclosure button hides the following additional controls, by default.

- **Pixel aspect ratio:** Lets you override the Project Settings and change the PAR of the rendered output to either Square or Cinemascope.

- **Data levels:** Defaults to "Auto," which simply renders all clips with the data level appropriate to the currently selected codec in the "Render to" pop-up menu, which is usually the preferred behavior. Choosing one of the other options ("Video" or "Full") outputs all clips using the selected data range. For more information, see Chapter 7, "Data Levels, Color Management, and ACES."

  - **Retain sub-black and super-white data:** Turning this checkbox on lets you choose to output media files that preserve overshoots and undershoots, data that's above the maximum and minimum data levels of the data level you've selected, assuming this is supported by the video format and codec you're exporting to. Otherwise, DaVinci Resolve clips these "out-of-bounds" parts of the signal in an effort to keep your deliverables from violating whatever QC standards you're adhering to in your grade.

- **Data burn-in:** A pop-up menu that defaults to "Same as Project," which leaves the current Data Burn In palette settings enabled while rendering, inserting a window burn into the media being output. Choosing "None" disables window burns while rendering. Note that when rendering as Individual Source Clips, individual clip burn in presets can be assigned if they've been created in the Data Burn In palette.

- **Use optimized media:** When this checkbox is turned on, DaVinci Resolve will use optimized media, when available, to do the final render, to save time. If your media has been optimized to the same format as the one you're outputting to (or better), this is convenient. However, if you've optimized to a lower quality format than what you're outputting to, you should turn this checkbox off to force DaVinci Resolve to process all clips using the original media, guaranteeing the best quality available.

- **Use render cached images:** When this checkbox is turned on, DaVinci Resolve will write media from the cache to the files being output to save time. If you're caching using the same media format you're outputting to (or better), this can be convenient. However, if you're caching in a lower-quality format than the one you're outputting to, you'll want to turn this checkbox off to force DaVinci Resolve to process all media as it's being rendered, writing at the maximum quality you're outputting to.

- **Enable flat pass:** Three options let you choose whether or not to render each clip with its grade applied.

    - **Off:** DaVinci Resolve always applies each clip's grade when rendering.

    - **With clip settings:** For each version of a clip, the system will check that version's pass flat flag. If it's turned on, the system disables color correction for that version of the clip. Otherwise, that version will be rendered with its grade intact. Versions can be individually flagged by right-clicking a clip's thumbnail in the Timeline, choosing the submenu of the version you want to flag, and choosing Enable Flat Pass.

    - **Always On:** When checked, DaVinci Resolve disables the grade of every clip being rendered.

- **Disable edit and input sizing:** When turned off, Input Sizing Pan, Tilt, Zoom, and Rotate adjustments are "baked" into the output. When turned on, all Input Sizing adjustments are disabled, except output to XML or AAF files that are round-tripped back to an NLE.

- **Force sizing to highest quality:** If you've been working with the "When resizing and scaling:" option set to Bilinear to improve performance when working on slower workstations, turning this checkbox on automatically renders all clips using the "Uses Sharper filter" setting of the Image Scaling panel in the Project Settings. For more information, see Chapter 3, "System and User Preferences."

- **Force debayer res to highest quality:** When rendering camera raw media formats that allow variable quality debayering, it's common to lower the debayering quality to improve real time performance while grading. Turning this checkbox on guarantees that media will always be rendered at the highest available quality, saving you from forgetting to manually change the debayer setting back when setting up a render at 3am.

- **Add X frame handles:** (When rendering Individual Clips) Lets you specify front and rear handles to be output in frames. This is particularly useful in round trips, when the finishing editor might want additional handles with which to roll edit points or add transitions while fine-tuning the graded edit.

- **Tone Mapping:** (Available in Single clip mode if Dolby Vision or HDR10+ is enabled in Project Settings) When set to None, the timeline is output using the current color management settings. When set to either Dolby Vision or HDR10+, you can choose to output the timeline at a specific peak nit level, color space, gamma, and Data Level using either the Dolby Vision or HDR10+ metadata available to guide the tone mapping operation you've selected. This makes it easy to set up multiple jobs to output HDR outputs at varying levels, as necessary.

## Audio Panel

This panel contains all audio-oriented parameters.

- **Export audio:** Turn this checkbox on to render the source audio, or audio that you've synchronized in DaVinci Resolve, along with the media being output by DaVinci Resolve.

- **Format:** You can choose which format of audio you want to render. Depending on which format you choose, different audio codec options will appear below.

  - **MXF OP-Atom:** Generates media files that conform to the SMPTE 390M format of MXF media for file exchange.

  - **QuickTime:** Exposes all available formats of audio compatible with QuickTime.

  - **WAVE:** Generates media in the WAVE format.

  - **MP4:** Generates media in the MPEG-4 file format.

- **Codec:** Lets you choose between Linear PCM (the default), AAC audio, and IEEE Float (Wave only). AAC audio encoding is only available on Mac OS X.

- **Quality:** (Available for AAC encoding) Five settings you trade between speed and quality when encoding AAC audio.

- **Data Rate:** (Available for AAC encoding) Lets you choose the maximum data rate for AAC encoding.

- **Bit Depth:** Lets you specify the bit depth at which to output the source audio.

- **Render one track per channel checkbox:** If you're exporting a single track, this checkbox lets you specify whether you want to export each channel as an individual track in the structure of the exported file.

- **Output Track #:** This pop-up menu lets you choose which Main or Submix you want to output. A Plus button to the right lets you add additional tracks you want to export in this job, so if you want to export multiple Mains or multiple Subs, you can add more Track pop-ups.

  - When you choose a track with multiple channels of audio, a field appears showing how many channels will be output; you have the option of using a virtual slider to change how many channels are output.

- **Language:** (Only available when outputting to the IMF format) This pop-up menu lets you choose the language of a particular output track when you're outputting to IMF. Since IMF files can accommodate multiple audio tracks containing different mixes for different regions, it's important to identify each output track you're outputting by language.

- **Content:** (Only available when outputting to the IMF format) This pop-up menu lets you choose the content of a particular output track when you're outputting to IMF. Since IMF files can accommodate multiple audio tracks containing different mixes and content, it's important to identify each output track you're outputting by content.

## File

This panel contains all other parameters.

- **Filename Uses:** Three options let you automatically name the media file(s) that are output automatically.

  - **Use Custom Filename:** Lets you enter your own name in the Custom name/File prefix field.

  - **Use Timeline Name:** (When rendering a Single Clip) When this option is selected, the name of the Timeline is used.

  - **Use Source Filename:** (When rendering Individual Clips) When this option is selected, the filename of each clip's corresponding source media file is cloned, and used as the filename of media being output by DaVinci Resolve. This is preferred when you're generating offline media for use by an editor that you later want to reconform to the originating DaVinci Resolve project. When this checkbox is turned off, you can customize filenames using the other options in this section of settings.

- **Custom name:** Lets you use custom text to name all rendered files. If you're not using the source filename, and not rendering to a file format that uses timecode, you can enter a filename here. When editing the Custom Name or File Prefix (or File Suffix), you can use "metadata variables" that you can add as graphical tags that let you display clip metadata. This is especially useful when rendering Individual Source Clips. For example, you could add the corresponding metadata variable tags %scene_%shot_%take and the File Prefix would be written as "12_A_3" if "scene 12," "shot A," "take 3" were in the source clip's metadata. For more information on the use of variables, as well as a list of all variables that are available in DaVinci Resolve, see Chapter 144, "Using Variables and Keywords."

- **File suffix:** Lets you add custom text and/or metadata variables (described previously) to the end of all rendered files.

- **Use unique filenames:** (When rendering Individual Clips, and only when Filename uses is set to Custom name) When enabled, additional characters are added to every rendered media file to guarantee that each rendered media file has a completely independent name. This prevents multiple rendered clips from the same source media file from overwriting one another when saved to the same directory. "Uniquely" named clips append the clip name with the track and clip number identifying a clip's position in the currently selected session. For example, a clip that's linked to a media file named "DropThatThingCU.mov," and edited as the twenty-fifth clip on track V2, will be named "DropThatThingCU_V2-0025.mov" when rendered. When enabled, two other options are revealed.

  - **Use unique filename prefix/Use unique filename suffix:** (When Use Unique Filenames is on) Radio buttons let you choose whether to add the unique identifier at the beginning or end of a clip. Choosing Prefix would result in "V2-0025 _ DropThatThingCU.mov," whereas choosing Suffix would result in "DropThatThingCU_ V2-0025.mov" when rendered.

  - **Add source frame count to filename:** (When Use Unique Filenames is on) Adds the number of frames in the source to the unique filename being created.

- **Add source frame count to filename:** (When rendering Individual Clips, and only when Filename uses is set to Custom name) When enabled, a number equal to the number of frames in each clip is appended to the end of the rendered file name. This is another way to make sure that multiple rendered clips with custom names don't overwrite one another.

- **Use filename digits:** Lets you specify how many digits to use when rendering an image sequence, although the specified digits will also be used for any media format. This is particularly useful if you're outputting media to be used by an application that has strict requirements for image sequence numbering. Defaults to eight digits.

- **Each clips starts at frame:** (When rendering Individual Clips) This permits timecode to be written to the header, and frame count to be written to the filename of the image sequences, which is ideal for VFX workflows.

- **Start timeline timecode at:** (When rendering Single Clip) This option is only available when rendering clips in Single clip order. Specifies the timecode that will be written to the media being output by DaVinci Resolve. For DPX files, timecode is written into the header data, and is simultaneously converted to a frame count that's inserted into the filename of each frame file, which provides a logical count of the frame numbers. For other media formats, timecode is written to the appropriate metadata container. You may find it useful to use custom start times, for example starting each reel of a project at a particular value, depending on the standards employed at your shop.

- **Place clips in separate folders:** (When rendering Individual Clips) Useful if you need to preserve the filenames of files you're outputting when the filenames of clips coming from the same source media file may cause them to overwrite one another. This option is also commonly used when rendering VFX shots for additional post-production work, allowing the VFX department to identify clips quickly and distribute the work accordingly.

- **Preserve Source directory levels:** (When rendering Individual Clips) Retains a user-specified depth of the original directory structure used by a clip's corresponding source media file, recreating it when rendering new files for output. The number you select determines how many levels of subdirectories DaVinci Resolve will automatically create within the currently specified "Render job to" directory to match the path used by the source files. Defaults to 0, which creates no matching subdirectories.

  - **After Head/From Tail:** When setting how many directory levels of each clip's file path to preserve (using the "Preserve x levels" parameter), click one of these buttons to specify whether that number of path levels is defined relative to the head or the tail of each media file path.

  - **Preserved Path:** Shows you a preview of the preserved path you've set up so you know you've gotten it right.

- **File Subfolder:** (Only appears in Additional Output panels) Lets you specify a subdirectory into which to render the media files being output. If the specified subdirectory doesn't exist, a new one with that name will be created within the currently specified "Render job to" directory.

- **Use commercial workflow:** (When rendering Individual Clips) Automatically renders every version that's applied to each clip in the session, except for versions that have been flagged using the "Render Disabled" flag, found in the Version submenu for each clip in the Timeline. This option is typically used when you've graded multiple versions of a clip to be used for VFX work, and you want to deliver each grade as a separate media file. This is also used when rendering programs for commercial broadcast where you have two or more versions of a grade for each scene. When using this option, alternate methods of outputting each rendered media file are used, and four additional settings are revealed.

  - **Alternative pass offset:** Lets you separate the timecode values written into each version of a clip with an offset. For example, if the default version timecode is 01:00:20:00, and you select a 10 minute offset in the Alternative Pass Offset timecode entry, then the second graded version of that clip will start at 01:10:20:00, the third version will start at 01:20:20:00, and so on until every version is rendered. You can offset the clips by whatever value you like, but the idea is to make it easy for editors and VFX artists to find the versions of each grade. If the clips are shared with a finishing artist, and they know that each alternate pass is 10 minutes apart, then it's easy for the finisher to change the clip version just by adding 10 minutes to the referenced timecode. To simplify the workflow further, you can put separate source reels in separate folders using the next three options.

  - **Place reels in separate folders:** Automatically places all media that's output using a particular reel name into corresponding folders.

  - **Place clips in separate folders:** Automatically places alternate grades of clips into separate folders.

  - **Use version name for folders:** Labels each folder with the name of the version when using the Commercial Workflow option.

- **Render speed:** A pop-up menu lets you throttle the speed at which media is rendered. Ordinarily you'll leave this set to the default of Maximum. However, some storage systems that are shared by multiple rooms in a facility use storage area networks (SANs) with insufficient bandwidth for multiple real-time image streams. DaVinci Resolve's incredibly fast rendering speeds can cause playback problems with other users accessing the SAN if available bandwidth is insufficient. In this case, you can throttle the render speed to limit SAN bandwidth usage to between 1 to 50 percent of full rendering speed.

- **Disk space currently used:** Shows the amount of disk space available on the target volume.

- **Disk space used after render:** Shows the new disk usage based on the specified range of the current session that you're rendering.
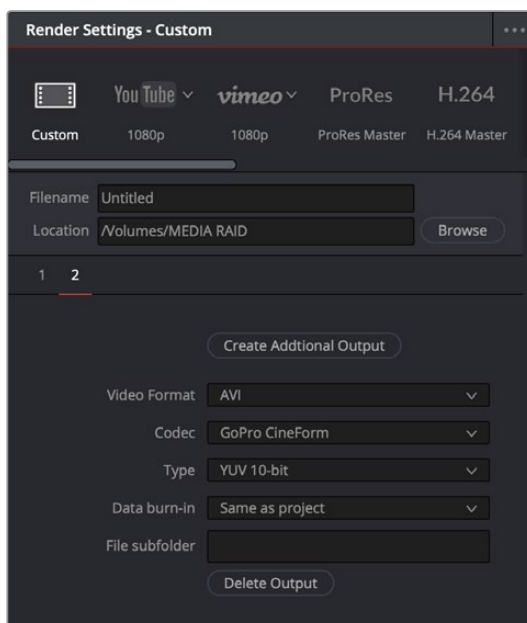
# Additional Outputs

Each job you create in the Render Settings defaults to a single output. However, you can create multiple outputs when you need to deliver multiple versions of media, with individual video formats and codecs and different data burn-in settings, to be rendered into individually named subfolders (optional).

This can be useful for setting up multiple rendered passes when your client requires two sets of media, for example QuickTime ProRes 422 (HQ) media along with MXF DNxHD media. This is also useful when you need to output two sets of media where one has window burns, and the other is clean.

**To add additional outputs in the Render Settings:**

Choose Create Additional Output from the Render Settings Option menu. A row of numbers below the Filename and Location controls let you open each output you create and adjust its settings. You can have as many outputs as you require.



The menu command for creating an additional output, shown next to an existing additional output in panel 2

**To remove an additional output:**

> Open the additional output panel you want to remove, and click the Delete button at the bottom.

# How to Avoid Overwriting Clips When Rendering Output Media

Three of the options described previously, "Use unique filenames," "Place clips in separate folders," and "Use commercial workflow," are all ways of organizing your rendered media to avoid overwriting rendered clips that happen to share the same file name. These options are necessary because each clip has one logical range of timecode, and because multiple clips often refer to a single source media file with one name.

When rendering a clip, DaVinci Resolve automatically overwrites any other media files that have the same name. So, in instances where you're trying to preserve the previous filename of the source media file, or where you're rendering out multiple versions of the same clip, it's entirely likely that the clips you're trying to output will overwrite one another, leaving you with the last clip you rendered. The three options mentioned previously prevent this in different ways.

# Defining a Range of Clips and Versions to Render

Once you've defined the Render Settings, now you need to decide how much of the Timeline you need to render. A Mini-Timeline and Thumbnail timeline are available to help you navigate your project's clips in order to choose which ones you want to render. Track controls let you enable and disable whole tracks from being output; for example if you need to render a textless version of a timeline in which all the title clips are on track V4, you can disable track V4. Furthermore, you can also use these controls to choose which clip versions you want to render.

**To render the entire Timeline:**

> Choose Entire Timeline from the Render pop-up in the Deliver page timeline. This option only appears if clips are not filtered.

**To disable a video or audio track to exclude those clips from being rendered:**

> Click the Video or Audio Disable Track button for the tracks you want to exclude.

**To render a filtered subset of clips in the Timeline:**

1   Open the Color timeline, if it's not already shown, and choose an option from the Timeline Filter pop-up to the right of the Clips button in the Interface toolbar.

> The contents of the Thumbnail timeline are restricted to show only the clips matching the selected criteria. For example, if you've already rendered a session, but you've since made some changes, you can use one of the "Show Modified Clips" options to display only the clips that have changed within a particular timeframe. Another possibility is to choose the "Show Unrendered Clips" option to show all clips that have not yet been rendered.

2   Choose "All Filtered Clips" from the Render pop-up in the Timeline toolbar.

**To clear clip filtering:**
> Choose All Clips from the Timeline Filter pop-up to the right of the Clips button in the Interface toolbar.

**To define a continuous range of clips to render:**

1   To define the first clip in the range you want to render, do one of the following:
    - Right-click a clip thumbnail in the Thumbnail timeline and choose Mark In.
    - Position the playhead in the Timeline or the Viewer, and press the I key, or right-click the Timeline ruler and choose Mark In.

2   To define the last clip in the range you want to render, do one of the following:
    - Right-click a clip thumbnail (in the Color timeline) or a clip (in the Edit timeline) in the Thumbnail timeline and choose Mark Out.
    - Position the playhead in the Timeline or the Viewer, and press the O key, or right-click the Timeline ruler and choose Mark Out.

    In and Out points appear within the Timeline ruler, and an orange bar shows the range you've selected to render. The In and Out fields update with the first and last frame numbers, in timecode and frame count, and the Duration field updates with the total number of frames you'll be rendering.

> **IMPORTANT** If you're in Individual Clips mode, In and Out points automatically snap to the nearest clip In or Out point in the Timeline. You cannot render partial clips in Individual Clips mode, but you may do so in Single Clip mode.

**To render a single clip:**
- Open the Thumbnail timeline if it's not open already, Right-click any clip thumbnail, and choose Render This Clip.
- An orange bar in the Timeline ruler shows that clip is selected for rendering. If you need to render several clips individually, you can select each clip one at a time to add as individual jobs to the Render Queue.

## Choosing Which Versions to Render for Each Clip

By default, the currently selected version that was set in the Color page is rendered for each clip. If you want to render a different version, the easiest thing to do is to make sure they're selected on the Color page Timeline before you open the Deliver page.

However, a Versions submenu, within the Thumbnail timeline's contextual menu for each thumbnail, also provides options to manage grade versions. These commands are duplicates of options that are available from the Thumbnail timeline of the Color page.

**To choose which version to render:**
> Right-click any clip thumbnail in the Thumbnail timeline, and choose a version from the Versions submenu.

> **TIP:** You can right-click a clip in the Thumbnail timeline of the Color or Render screen and rename any version of a grade. This can assist a facility's workflow when sharing material between suites and applications.
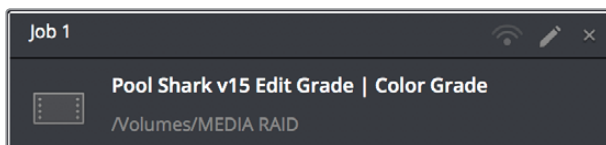
# Using the Render Queue

Once you've defined the settings necessary to render the type of media you require, and the range of the current session you want to render, you need to add all that information as a job to the Render Queue. You can add as many jobs to the Render Queue as you need, depending on what files you need to output.

Each job can have individually specified ranges of clips and individual clip settings, which can include different render directories, different formats, resolutions, data levels, burn-in settings, and so on. As a result, you can use the Render Queue to queue up the render of multiple sections of the current session, or multiple versions of the same media. Furthermore, you can queue up multiple sessions, if you have several differently graded sessions.

**To add a job to the Render Queue:**

1 Select a timeline.

2 Choose the settings you require in the Render Settings, using one of the Presets, or by choosing your own custom settings.

3 Choose a range of clips to render using the Deliver page Timeline using the procedures described in the previous section.

4 Click the Add to Render Queue button at the bottom of the Render Settings.

5 If you haven't chosen a location for the render yet, you'll be prompted to do so now via a File Destination dialog, so choose a location and click Ok. If there's already media in the render location you've specified, you may also see a dialog telling you "This render may overwrite existing clips in this folder." If you want to continue, click Yes, otherwise click No.

That render setup is now added as a job to the Render Queue, showing the project and timeline name, and location path where the render will be written to.



A selected job in the Render Queue

**To show more details about jobs in the Render Queue:**

Click the Render Queue Option menu (at the upper right-hand corner) and choose Show Job Details. Each job now lists the frame size, format, frame rate, audio channels and sample rate, and duration below the name and location path.
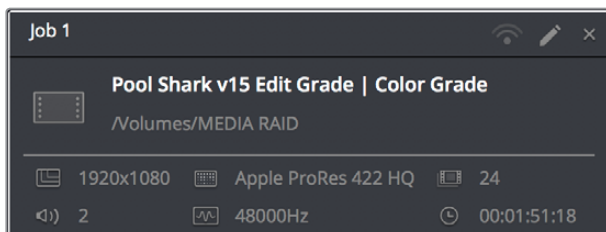


A selected job in the Render Queue with job details shown

**To rename a job:**

> Jobs can be given custom names simply by clicking on the default job name (Job 1, Job 2, and so on) and typing a new name of your own. This can be useful for setting up jobs that you may be re-rendering over and over as you work on a project.

**To start rendering:**

1   If you want to restrict rendering to only selected jobs in the Render Queue, then select one or more jobs by clicking on one, and then Command-clicking on others to choose discontinuous jobs, or Shift-clicking on another to select an entire range of jobs. When you select one or more jobs, only the selected jobs will be rendered. If no jobs are selected, then all jobs in the queue will be rendered.

2   Click the Start Render button, underneath the Viewer to the right of the interface.

3   If there are jobs in the Render Queue that have already been rendered, a dialog will appear asking "Selected items contain already rendered items. Do you want to re-render them?" Clicking Yes will re-render all jobs in the Render Queue. Clicking No only renders the jobs that have not yet been rendered. Clicking Cancel cancels the entire rendering operation.

> Rendering begins, starting with the highest job in the list. The Overall Progress bar starts to fill up, from right to left, indicating how much of what's been queued up has been rendered so far. While rendering is in progress, the Start Render button changes to the Stop Render button, which can be clicked at any time to halt rendering.

> **TIP:** While rendering is in progress, a small progress bar will appear on the DaVinci Resolve icon in the dock of Mac OS X, or on the taskbar of Windows.

**To remove jobs from the Render Queue, do one of the following:**

- **To clear a specific job:** Click the X at the upper right-hand corner of a job's entry in the Render Queue.

- **To clear all previously rendered jobs:** Click the Render Queue Option menu (at the upper right-hand corner) and choose Clear Rendered.

- **To clear all jobs:** Click the Render Queue Option menu (at the upper right-hand corner) and choose Clear All.

**To change a job that has been rendered to appear unrendered again:**

> Right-click any rendered job, and choose Clear Render Status. You can also select multiple jobs to change their rendered status all at once. This makes it easy to re-render the exact same job.

**To edit a job that has or has not been rendered:**

1   Click the Pencil button in the Render Queue to select it.



Clicking the pencil icon to edit a job in the Render Queue

> The selected Render Queue's settings repopulate the Render Settings list, and resets the selected range of the Timeline corresponding to that job.

**2** Change whichever settings you need to.

**3** When you're finished editing the job, click the Update Job button that appears at the bottom of the Render Settings, or you can click Add New Job to create a new job with the changes you've made, leaving the previous job untouched.

> **NOTE:** If you click the Pencil button again without clicking Update Job, you'll be prompted to Save, Cancel, or Don't Save.

**To review clips that correspond to rendered jobs:**
- **To show a rendered clip in the Media Storage browser:** Right-click any rendered job, and choose Reveal in Media Storage.
- **To show a rendered clip in your computer's file system (Mac OS only):** Right-click any rendered job, and choose Reveal in Finder.

# Rendering Jobs from Multiple Projects at Once

You can also add multiple projects from the currently open PostgreSQL or Disk database to the render queue all at once. This can be exceptionally useful in situations where you've broken a program into multiple reels, with each reel being a different project.

**To render output from multiple projects at once:**

**1** Open each project, set up whatever jobs you want to render in the Render Queue, and save that project without rendering.

**2** When you've set up the last project, click the Render Queue Option menu (at the upper right-hand corner) and choose Show All Projects.

All queued items in projects belonging to the currently selected user (if using a PostgreSQL database) or in the currently specified disk location (if using a disk database) now appear in the Render Queue.

**3** Click Start Render to begin rendering every job from every project in the queue.

**4** When you're finished, turn Show All Projects off to go back to displaying only the current project's render queue items.

# Remote Rendering

If you have multiple DaVinci Resolve 12.1 (or higher) workstations on the same network, you can send a job in the Render Queue from the workstation you're using (referred to as the "artist workstation") to one of the "remote workstations" on the network using remote rendering. This lets you use any one of your currently unused secondary workstations to render your jobs, while you continue working on your main workstation.

In order to use remote rendering, you must adhere to the following three criteria:

- Both the artist workstation and the remote workstation must have DaVinci Resolve Studio installed. Remote rendering does not work with the free version of DaVinci Resolve.

- Both the artist workstation and the remote workstation must be using the same Postgres shared database, either on one of the machines, or on a dedicated Remote Database Server. For more information on setting up and using a shared databases, see Chapter 147, "Managing Databases and Project Servers."

- Both the artist workstation and the remote workstation must have access to the same media files on either the same storage volumes, or identically named storage volumes.

## Sharing Storage

It's important that both the artist and remote workstations have access to the same media on the same named storage volume for remote rendering to work properly. This can be done via some manner of shared storage, such as a SAN. However, it can also be done by mounting the same volume over your network. This will be slower, but it will work.

If you're mixing Mac OS X, Windows, and Linux workstations for remote rendering, you'll need to use the Mapped Mount column of the Media Storage Locations list in the Media Storage panel of the System Preferences to add each volume's path as it's understood on the workstation it's attached to. For example, on a Windows workstation that's accessing volumes from a Linux workstation, type in the Linux-style file paths in the Mapped Mount column for each scratch disk that's listed.

## Setting Up and Using Remote Rendering

Using remote rendering is easy, but it does require a bit of preparation.

1   Make sure the storage volume containing the media being referenced by the project you want to render is mounted on both the artist and remote workstations.

2   Open DaVinci Resolve on the remote workstation, and do one of the following:

    – When the Project Browser opens, right-click anywhere and choose Remote Rendering.

    – If you've already opened a project in DaVinci Resolve, you can also choose Workspace > Remote Rendering.

    DaVinci Resolve will automatically open to the Deliver page, awaiting jobs to be assigned for automatic rendering.

3   On the artist workstation, add a job to the render queue as you normally would.

4   Click the Remote Rendering button for that job in the Render Queue and one of the options from the list that appears:

- **Any:** Automatically assigns that job to the next workstation that isn't currently rendering anything. If all remote rendering workstations are rendering, assigns it as the next job in line.

- **YourComputer.local:** The artist workstation with the name "YourComputer." Choose this if you want to render the job locally, and not remotely.

- **Other Workstations on Network:** All other remote rendering workstations are listed below, so you can choose which specific workstation you want to assign a job to.
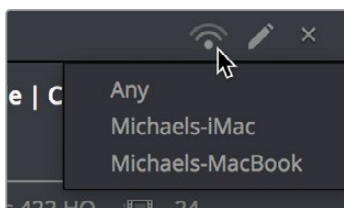


Clicking the Remote Render button to remotely render a job

**5**  Click Start Render. The job is sent to the remote workstation you selected and is rendered, while you're free to continue working on your artist workstation.

## When You're Finished Remote Rendering

Once you're done using a particular DaVinci Resolve workstation in Remote Rendering mode and you want to go back to using it as an artist workstation, choose Workspace > Remote Rendering to exit remote rendering and return to the Project Manager.

## Setting Up a "Headless" Remote Rendering Workstation

DaVinci Resolve allows remote rendering clients to operate in a so-called "headless" mode, with no GUI. This can be accomplished from the command line, by opening the directory where the app is located and then running DaVinci Resolve in Remote Rendering (–rr) mode using the correct command line syntax for your operating system. Once run in this way, DaVinci Resolve silently and invisibly waits on that system for remote rendering jobs to be sent to that workstation.

**On macOS**

- Open Terminal.
- Change the directory to:

  `cd /Applications//DaVinci\ Resolve/DaVinci\ Resolve.app/Contents/MacOS/`

- Run the following command:

  `./Resolve -rr`

**On Windows**

- Open the Command Prompt.
- Change the directory to:

  `C:\Program Files\Blackmagic Design\DaVinci Resolve\`

- Run the following command:

  `Resolve.exe -rr`

**On a Linux CentOS 6.8 system**

- Open Terminal.
- Change the directory to:

  `cd /home/resolve/Cyclone/`

- Run the following command:

  `./script.start -rr`

**On a Linux CentOS 7.x system**

- Open Terminal.
- Change the directory to:

  `cd /opt/resolve/bin`

- Run the following command:

  `./resolve -rr`

# Chapter 139

# Delivering DCP and IMF

For projects requiring Digital Cinema Package (DCP) or Interoperable Master Format (IMF) mastering for digital cinema or broadcast distribution, DaVinci Resolve allows native DCP and IMF encoding and decoding for the creation and playback of unencrypted DCP and IMF deliverables, or it can be integrated with Fraunhofer's easyDCP application in order to master fully encrypted DCP files, play them back for testing, and generate Key Delivery Messages (KDMs) for theatrical distribution, all directly within DaVinci Resolve.

This means you can encode a DCP or IMF master straight from your program's source media, all within the 32-bit floating point image processing pipeline of DaVinci Resolve, for the highest possible quality result.

# Contents

# Native IMF Encoding and Decoding

(Available in DaVinci Resolve Studio Only)

The Format pop-up in the Video panel of the Render Settings now has a native IMF option that lets you export to the SMPTE ST.2067 Interoperable Master Format (IMF) for tapeless deliverables to networks and distributors. No additional licenses or plug-ins are required to output to IMF.

The IMF format supports multiple tracks of video, multiple tracks of audio, and multiple subtitle and closed caption tracks, all of which are meant to accommodate multiple output formats and languages from a single deliverable. This is done by wrapping a timeline's different video and audio tracks (media essences) and subtitle tracks (data essences) into a "composition" within the Material eXchange Format (MXF).

Additionally, there's a new preset for facilities that export to Netflix using this format. A pop-up menu to the right of this preset provides options for Generic and Netflix versions of this preset.
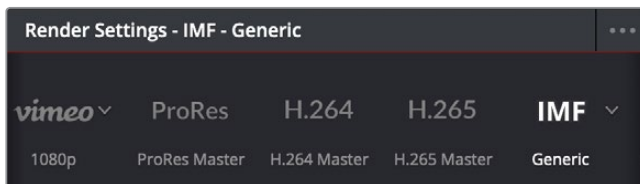


The IMF Generic preset in the Render Settings has options for different resolutions of output

When IMF is selected from the Format pop-up, the Codec pop-up menu presents options for Kakadu or EasyDCP encoding, with Kakadu being the method that's included with DaVinci Resolve Studio. A Type pop-up lets you choose what kind of JPEG2000 output you want, with options including RGB, YUV, and Dolby Vision. A Profile Level pop-up lets you choose more options. Additional controls appear for Maximum bit rate, Lossless compression, the Composition name, the Content (with numerous options specifying what type of program this is), and the Package Type (current options include App2e and App2e Netflix).
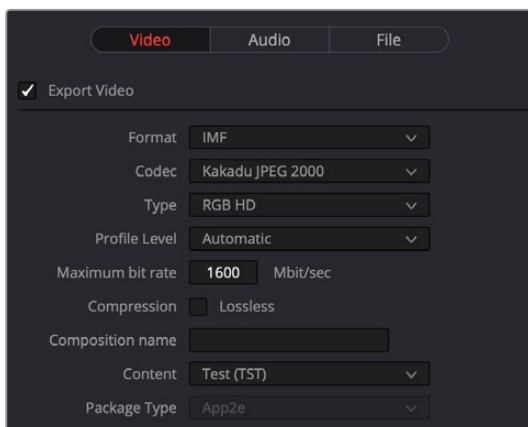


Render settings in the Export Video section for the IMF format

# Native Unencoded DCP Encoding and Decoding

(Available in DaVinci Resolve Studio Only)

DaVinci Resolve 15 also has new native DCP encoding and decoding support built-in, for unencoded DCP files only. That means that you can output and import (for test playback) unencoded DCP files without needing to purchase a license of EasyDCP. If you have a license, a setting in the Configuration panel of the System Preferences enables you to choose whether to use EasyDCP (for creating encrypted DCP output), or the native DaVinci Resolve encoding.
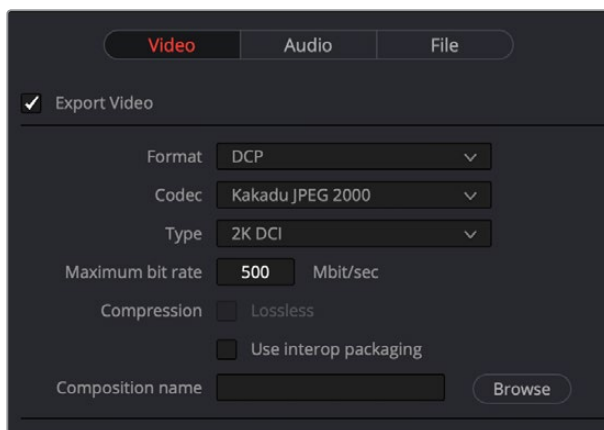


Native DCP settings in DaVinci Resolve

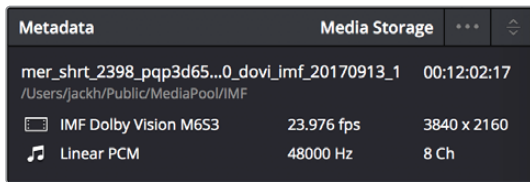# Creating DCP/IMF Supplemental Packages

Once created, DaVinci Resolve has the ability to reimport a DCP or IMF so that you can overwrite parts that need to be updated with new media, in order to export a "Supplemental Package," which is effectively a new version of the program that combines the new overwritten parts of the program with the old version, such that you can deliver just the changes.

> **NOTE:** Supplemental packages are only supported using the Kakadu encoder and decoder; this is not compatible with DCP or IMF packages created using EasyDCP. To avoid issues, disable "Use easyDCP decoder" in the Decode Options panel of the DaVinci Resolve System Preferences.

## Importing a DCP or IMF Into a Timeline

1   Using the Media Storage browser in the Media page, find and select the DCP or IMF, and check the header of the Metadata Editor to verify that your media is suitable for creating a supplemental package. Supported IMF profiles will be displayed in the Metadata Viewer.

The header in the Metadata Editor showing an IMF that's compatible with the creation of a supplemental package

**2**  Create a new project and add the DCP/IMF package you need to modify to the Media Pool. If a dialog appears asking if you want to change your timeline frame rate to match the incoming media, click Change to make your project match the media.

**3**  Create a timeline from the composition playlist (XML) within the imported DCP or IMF by right clicking the imported package in the media pool and choosing "Create New Timeline Using Composition Playlist" from the contextual menu.
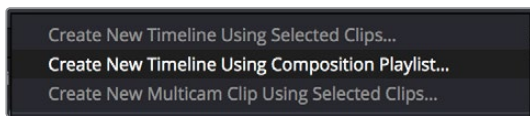


Right-clicking an imported IMF or DCP clip in the Media Pool reveals a command to make a new timeline using the composition playlist in the contextual menu

**4**  The New Timeline dialog has an "Import Dolby Vision Project Settings" checkbox. When it's turned on, clicking Create will do the following:

**a.**  Dolby Vision will be enabled in the Color Management panel of the Project Settings, and the Mastering Display menu will be set to match that of the IMF package.

**b.**  If Resolve Color Management (RCM) is not active, the Timeline Color Space will be set to match the Dolby Vision metadata. However, if RCM is already enabled, the user must manually set this by turning on "Use Separate Color Space and Gamma," and changing the Timeline settings to P3-D65" and "ST.2084" respectively.

**5**  Creating the Timeline will import Dolby Vision metadata (if applicable). This will allow a Tone Mapping preview to be seen on the Color page that uses the original metadata.
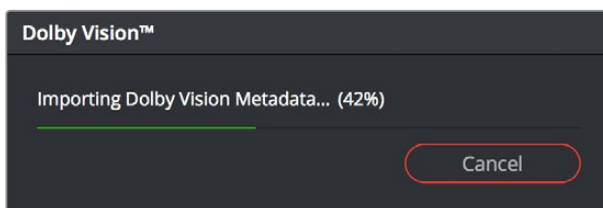


Dolby Vision metadata will be imported if present when importing an IMF

Once import is complete, all video and audio clips from the DCP or IMF appear within a new bin with the name of the package. The resulting timeline will be identified via its icon as a DCP/IMF timeline.
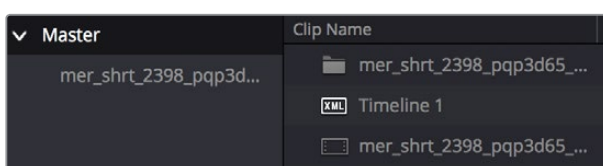


The imported media and timeline when you import an IMF

## Editing the Resulting Timeline

At this point, you can edit the program in the Timeline as necessary.

- You can overwrite sections of the Timeline with new clips. All modifications will be automatically included into the supplemental package.
- You can use the Blade tool or Insert Edit command to cut sections of the existing program to which you want to add Fusion effects, audio grading, or color correction. When you do this, you must right click that section and choose "Include in Supplemental Package" to make sure it exports correctly.
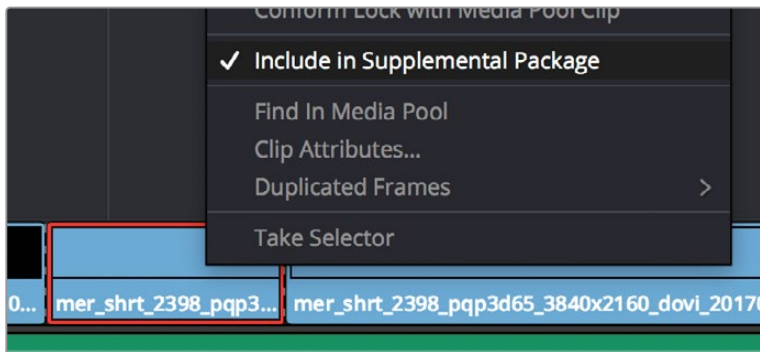


Right-clicking a section of the program and choosing Include In Supplemental Package

For IMF Dolby Vision packages, please ensure all modifications are on the first video track (V1).

> **NOTE:** If RCM is being used, please ensure the input color space and gamma of the inserts are correct.

## Dolby Vision Metadata

The Dolby Vision metadata from the imported DCP/IMF file can be reused by selecting "Original Metadata" from the Tone Map Using pop-up menu of the Dolby Vision palette in the Color Page.
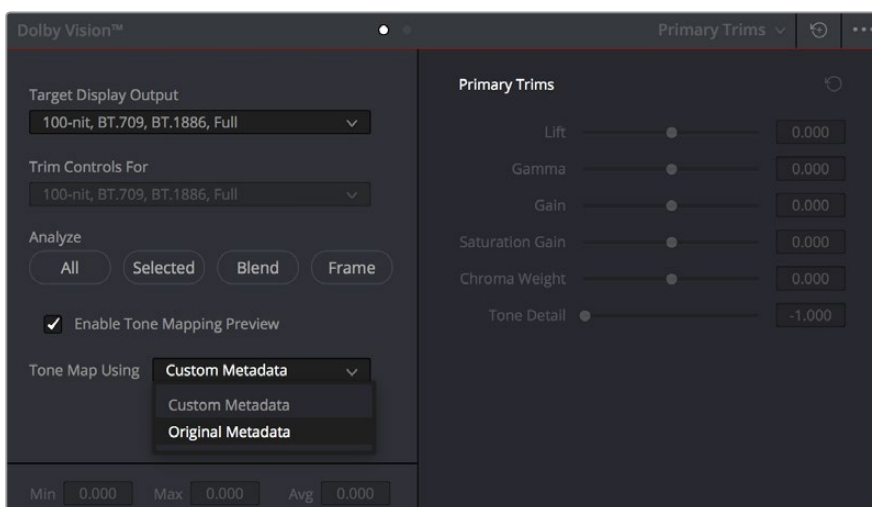


Setting a clip to Original Metadata in the Color Page

Alternatively, this metadata can be imported separately from an existing XML via the "Import Metadata from XML" command in the option menu of the Dolby Vision palette in the Color page. When successful, "Imported Metadata" will be enabled.

## Exporting

You can export a supplemental package by turning on "Supplemental Package" in the the video panel of the Deliver page Render Settings list.



Setting an export to be a Supplemental Package

The codec type and profile will be automatically selected to match the original version of the DCP/IMF package, and the audio tracks are set to match the Timeline tracks. Please ensure the rest of these audio settings are matched to the original version, since they start out set to the default values.
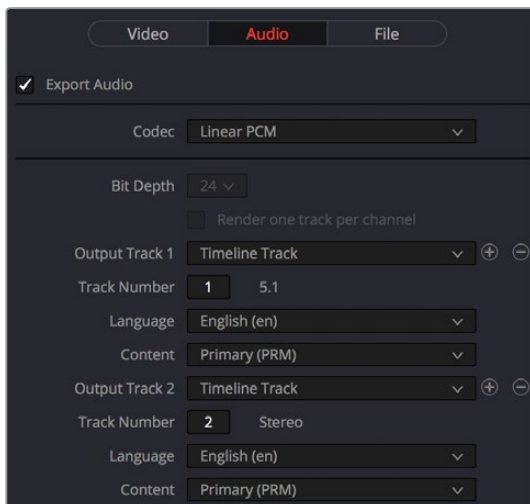


Setting the audio settings of a Supplemental Package export

# Photon Validation of IMF Packages

Photon is Netflix's validation software for IMF App2/App2e packages. The option for using Photon validation will only be shown on Resolve Studio with JDK/JRE version 1.8 and above installed, which is available at https://github.com/Netflix/photon.

**NOTE:** Please disable "Use easyDCP decoder" from "Preference" as there can be issues decoding IMF packages without an easyDCP license.

## Validating in the Media Pool

An existing IMF package can be validated with Photon by importing it into the Media Pool, then right-clicking it and choosing "Perform Photon Validation" from the context menu.
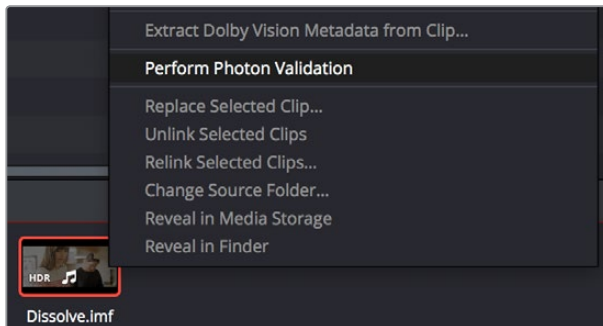


Validating an IMF in the Media Pool

A report dialog will be shown when the validation is completed.
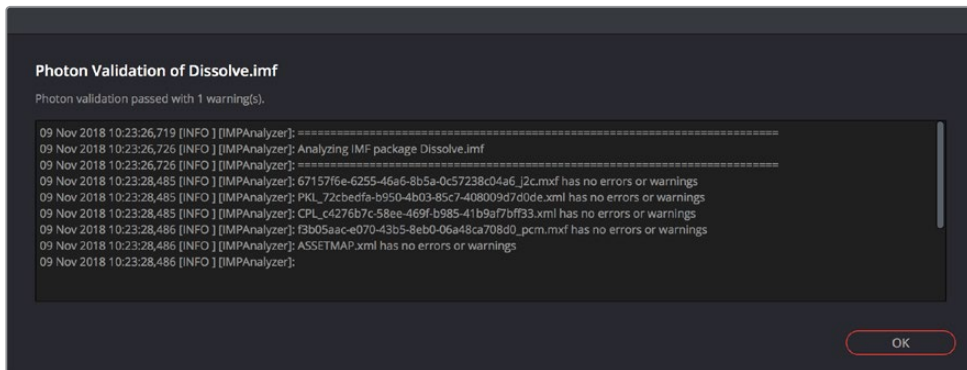


A validation report

## Validating on Export

Photon validation can be enabled in the File panel of the Deliver page Render Settings; choosing the "IMF Netflix" preset will also enable this option. When enabled, DaVinci Resolve will perform Photon validation after the IMF package is exported. The validation report will be saved to a text file in the IMF package folder, and a report dialog will be shown if there is any error.
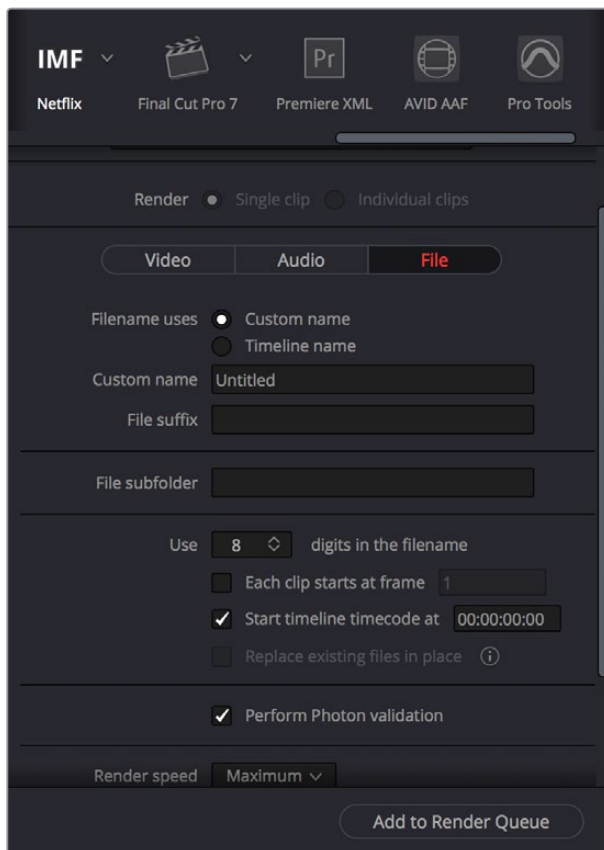
Enabling Photon validation on export

# Using and Licensing EasyDCP

Both DaVinci Resolve and DaVinci Resolve Studio include a demo version of easyDCP. Details of operation and restrictions of the demo version can be found later in this chapter. The fully functional version of easyDCP operates via licensing modules purchased from http://www.easyDCP.com (info@easyDCP.com) and every new DaVinci Resolve system (server) needs its own license and specific certificates for DCP and KDM generation and for playback of DCPs.

## Requesting Your Server Certificate Set

For your DaVinci Resolve system to generate DCPs and KDMs you need to request a specific set of configuration files called the Server Certificate Set. To begin, first purchase your encoding, encryption, decoding, and decryption modules from easyDCP. They will provide a password to access your easyDCP account.

Then, from the DaVinci Resolve File menu, select easyDCP > Request Server Certificate Set. Fill in the detail listed on the request form and save the form to your desktop or somewhere it can be easily found. This html file can be emailed to info@easyDCP.com. After sending the html, a customized Server Certificate Set for your installation will be generated and made available for download in your easyDCP Website User Account.

The Server Certificate Set generated for your DaVinci Resolve will contain files based on your purchased modules and your specific DaVinci Resolve server hardware. The table below shows the modules and the licenses and certificates generated, followed by a brief description of each item.

| | License | Server Certificate | Signer Certificate |
|---|---|---|---|
| DCP Encoder | X | | X |
| DCP Encoder with Encryption | X | X | X |
| DCP Player | X | | |
| DCP Player with Encryption | X | X | |

- **License:** The License is used to activate the purchased modules on a specific hardware server.
- **Server Certificate:** Each DCP render (referred in the industry as an "Instance") using encryption or decryption has an individual server certificate. This certificate is required to be able to receive Key Delivery Messages (KDMs), which unlock encrypted DCPs.
- **Signer Certificate:** A Signer Certificate is used to sign certain files within a DCP package and/or Key Delivery Message (KDM) to verify which authority generated the DCP instance.

## Importing Your Server Certificate Set

Once generated and downloaded to your DaVinci Resolve server, the Server Certificate Set needs to be imported into DaVinci Resolve.

**To import your server certificate:**

1 Choose File > easyDCP > Import License and Certificates.

2 Use the Import Server Certificate dialog to select the file, enter your Certificate Set password, then click Import.

3 To verify your easyDCP license and the Server Certificates, choose easyDCP > About easyDCP.

From this point onward, you can use the controls from within the Settings window, the Deliver page, and the File menu to master and play DCPs.

### Limitations of the Demo Version of easyDCP

The demo version of the DCP encoder embeds visible DaVinci Resolve and easyDCP logo watermarks in the rendered Digital Cinema Package (DCP) images. The demo version does not include encryption so these DCPs can be used for screening in a digital equipped cinema. The demo version of the DCP playback module will play 15 seconds in full quality. After that playback quality reduces drastically. Furthermore, audio won't be rendered after 15 seconds of playback.

# Switching Between Native DCP and EasyDCP Encoding

A checkbox in the Configuration panel of the System Preferences, "Use EasyDCP Encoder," lets you choose whether to use the native DCP/IMF encoding in DaVinci Resolve, or your licensed EasyDCP software. In either case, all set up happens from within the Deliver page of DaVinci Resolve.

# EasyDCP Color Management

The Color Management panel of the Project Settings has a Timeline Colorspace pop-up menu that is enabled for EasyDCP encoding regardless of whether or not DaVinci Resolve Color Management is used for the current project (the same setting is used for both color management tasks). You should set this to the color space used by your current DaVinci Resolve timeline. If, for example, you are grading using a Rec. 709 monitor for television deliverables but also wish to make a DCP, select Rec. 709 Gamma 2.4 and DaVinci Resolve will render the DCP with the correct Rec. 709 to XYZ matrix.

# EasyDCP Output in the Deliver Page

To master to a DCP in the Deliver page, use the following procedure, which walks you through all of the easyDCP settings that are available in the Render Settings list.

**To master a DCP or IMF:**

1   Set "Render timeline as" to Single clip.

2   Choose easyDCP from the Video Format pop-up.

3   Choose the appropriate option from the Codec pop-up that corresponds to the type (DCP or IMF) resolution (2K or 4K), and aspect ratio (native, scope, or flat) of your intended output.

4   Set the Composition Name. This field is intended to hold a standardized name for the DCP being encoded. You can either type a name into this field directly, or you can press the "…" button to open the easyDCP Composition Name Generator window. An editable Film Title field appears, along with a number of pop-up menus that let you select various DCP attributes such as content type, aspect ratio, language of audio and subtitles, and so forth. As you populate each attribute, the name being generated appears at the top of the window, and clicking OK copies the resulting Composition Name into the Composition Name field of the Render Settings.

5   If necessary, set the desired "Maximum DCP bit rate" by either typing or dragging within the field (the range is 50 to 250 Mbit/sec). If you're not sure what data rate to use, consult the client or distributor to whom you're delivering the DCP.

**6**　There are two DCP package types you can output, determined by the "Use Interop packaging" checkbox:

   –　The standard package conforms to the "Interop" specifications for DCPs, which is turned on by default. With "Use Interop packaging" turned on, however, the frame rate of your output is limited to either 24fps or 48fps, so you need to make sure that your timeline conforms to these frame rates.

   –　If you want to generate DCP packages with other frame rates to match your timeline, you need to turn "Use Interop packaging" off to generate a SMPTE-standard DCP. This supports additional frame rates including 25, 30, 50, and 60 fps. However, SMPTE-Standard-DCPs are not supported on all JPEG2000-based playback systems so it's generally recommended to use the Interop standard unless you know the player supports the SMPTE-Standard DCPs.

**7**　Turn on the "Encrypt package" checkbox to encode an encrypted DCP. This sets the encoder to generate a Digest containing the keys used during encryption. This Digest will allow you to play the resulting DCP on your system, and to generate KDMs to allow that DCP to be played on other servers.

> **NOTE:** If you do not encrypt the DCP it can be played on any DCP player/decoder without restriction.

**8**　Set the Subtitles Path. If you have a properly formatted subtitle file, click the Browse button to link to it.

**9**　If you're including an audio mix in the DCP, go to the Audio section, turn on the Render audio checkbox, and choose the number of channels in the "Render channels of audio" pop-up menu that corresponds to the number of Audio Mixer output channels defined in the Edit page.

**10**　Click the Browse button under the "Render to" field, and choose a location for the resulting DCP. Make sure you pick a drive with enough room for the estimated size of the final DCP.

**11**　Choose all necessary options from the Output Options to ensure the quality you need.

**12**　Click the Add Job to Render Queue button, and then click Start Render to create your DCP. A DCP will be created and placed at the location you chose, ready for playback or delivery.

## KDM Generation and Management

Key Delivery Messages (KDMs) are required to allow an encrypted DCP play on a designated projector at a particular theater at a specified time. DaVinci Resolve is capable of creating KDMs, which is convenient for exporting KDMs for select screenings, but commercial distributors may require thousands of KDMs. Fortunately, easyDCP allows you to use external Distribution KDM (DKDM) utilities to generate KDMs for your clients, so you don't have to tie up your DaVinci Resolve workstation with this task.

## Publishing Your Encrypted Digital Cinema Package

While you can play your encrypted DCP on the same DaVinci Resolve system that generated it, if you wish to publish the DCP so other players can decode and play you need to generate a KDM to send to the player.  The user of the other player, or players, will need to generate a Server Certificate for each of their players and send this to you so when you generate the KDM it will be just for those players.

Select the DCP in the Media page Library. Right-click and select Generate KDMs. From the pop-up select the location of the Server Certificate file if the KDM is for one player, or folder for multiple players. Set the start and end dates that the KDM will be valid for, an output folder to place the KDM, and then select Generate.

You can now send your DCP and the KDMs to the player you authorized. The user there will import the KDM and the DCP will play between the start and end dates.

## Playing Your Digital Cinema Package

To play a DCP you've output from DaVinci Resolve, use the Media page to add it to the Media Pool and edit it into a timeline like any other clip.

Decoding the JPEG2000 images embedded within the DCP in real time is computationally intensive. If your system is underpowered you can reduce the decoded resolution of the files by selecting Half or Quarter Resolution Decode from the File > easyDCP menu. A smaller, less bandwidth-intensive version of the JPEG2000 files will be decoded by discarding some levels of the wavelet stage inside the decoder, which will directly increase the playback performance.

## Playing Third-Party Digital Cinema Packages

To play a non-encrypted DCP simply select the DCP in the Media page like any other clip. To play an encrypted DCP from a third party you first must publish your Server Certificate. They use the certificate to generate KDMs for their DCP to play on your DaVinci Resolve system. From the File menu choose easyDCP > Export Server Certificate, and on the pop-up menu choose a location to save the file. Send this to the third party for KDM generation.

When you receive a KDM or a Digest for an encrypted DCP you must first import the file into your DaVinci Resolve system. Choose File > easyDCP menu > Import KDM/Digest, and then select the file. Then simply select the encrypted DCP in the Media Page Library to play.

# Chapter 140

# Delivering to Tape

This section covers how to use the Deliver page to output a timeline, either in whole or in part, to a device-controllable VTR connected to a compatible Blackmagic Design video interface. For whichever output interface you use, you need to make sure that the RS-422 interface is connected to that of the VTR, and that device control has been established.

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# The Tape Output Interface

Tape output is accomplished on the Deliver page, which has to be placed in the Tape mode before you can proceed.

**To switch to tape output in the Deliver page:**

> Click the Tape button, which is the third button from the left on the Interface toolbar at the top of DaVinci Resolve. The Deliver page updates to reflect the relevant controls for editing to tape.

While in Edit to Tape mode, the Deliver page is used to control the VTR, in order to establish In and Out points for insert or assemble editing of the selected portion of the current Timeline to tape.

- **Capture and Playout:** The Render Settings panel turns into the Capture and Playout panel, with controls and settings governing how DaVinci Resolve will output your program to tape.

- **Edit to Tape Queue:** The Render Queue turns into the Edit to Tape Queue, which lets you set up a batch of either previously rendered media files, or In and Out point-defined segments of the current Timeline for simultaneous output to tape.

- **Transport controls:** The transport controls, while similar in appearance to those used while in Render mode, now control the VTR. While in Edit to Tape mode, the transport controls of the DaVinci control panel also control the deck, rather than your program.

- **Shuttle control:** A shuttle control appears in what was formerly the jog or scrubber bar, which lets you shuttle through the range of reverse and forward speeds compatible with that deck.

- **In and Out controls:** In Edit to Tape mode, the In and Out buttons to the right of the transport controls define a range of the tape to Insert or Assemble edit to, within the current Timeline. While in Edit to Tape mode, you can still define In and Out points to define a specific range of the Timeline by right-clicking a clip in the Thumbnail or Mini-Timeline, and choosing Mark In or Mark Out. You can only add In or Out points to the beginning and end of clips.

- **Cue In and Cue Out controls:** Buttons next to the timecode In and Out fields cue the tape to those frames on tape.



Edit to Tape controls

## Gang Timecode to Tape

When the Deliver page is in Tape mode, you can right-click the ruler running along the top of the Timeline and choose "Gang Timecode to Tape," which puts DaVinci Resolve into a mode where every time you set an In point on the Deliver page Timeline, a corresponding In point is automatically set on the tape deck. Setting both In and Out points on the Deliver page Timeline results in the In and Out points on the tape deck being set at the same timecode, making it easy to set up insert edits to tape on top of a previously output program.
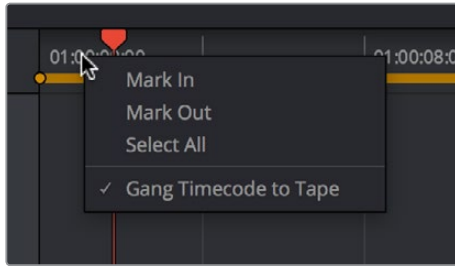
The Gang Timecode to Tape option

## Insert/Assemble Pop-Up Menu

A pop-up menu under the In and Out buttons lets you choose how to edit the selected part of the Timeline to tape. There are two options:

- **Insert:** Performs an insert edit to tape, in which selected tape tracks are seamlessly and frame-accurately overwritten without interrupting the timecode or control track. You must be outputting to either a blacked tape, or a prerecorded tape to make an insert edit.
- **Assemble:** Performs an assemble edit, in which every track of tape is overwritten, including the video, audio, timecode, and control tracks.
- **Crash:** (Only appears if "Output Source Timecode" has been enabled in the Playout section of the Capture and Playback panel of the Project Settings) Similar to an assemble edit, except there is no pre-roll period to let the VTR get up to speed. A crash edit also overwrites every track of the tape, including the video, audio, timecode, and control tracks, and may result in a more visible jump at the resulting edit point. However, in some instances crash edits may be the only option for a particular operation.

> **NOTE:** When DaVinci Resolve is performing a Batch Output operation, you can only output clips using assemble editing or crash recording.

## Start Record Button

Once you've set In and Out points to define how much of the tape to record to, the Start Record button initiates device-controlled tape output.

# Setting Up for Tape Output

Before you perform an edit to tape, the Capture and Playback panel of the Project Settings has a number of options that you should set to match the format and type of tape output you're doing.

## General Options

The Output LTC checkbox, when turned on, directs DaVinci Resolve to output LTC timecode.

## Capture and Playout Settings

These settings affect both capture and playback when using the Tape Ingest options of the Media page, or the Tape Output options of the Deliver page.

- **Video capture and playback:** You can choose the video format (frame size and frame rate) with which to output to tape from this pop-up menu. HD timelines can be downconverted to SD, and SD timelines can be upconverted to HD using the format conversion of your DeckLink card.

- **Use left and right eye SDI:** A checkbox that enables supported video interfaces to ingest and output muxed stereoscopic video when used with supported VTRs, such as HDCAM SR decks with 4:2:2 x 2 mode. (When muxed stereoscopic signals are ingested, each eye is separated into individual left-eye and right-eye image files.) This parameter only appears when your hardware is set up appropriately.

- **Video connection operates as:** Selects between the available signal options: Use 4:4:4 SDI, and enable Single Link. Which options are available depend on which video capture card you are using.

- **Data Levels:** Lets you specify the data range (normally scaled or full range) that's used when ingesting from or outputting to tape. This option switches the data range of the signal output by your video capture card, but only during capture from tape in the Media page, or output to tape in the Deliver page. When capture or output is not currently occurring, your video capture card goes back to using the identically named data range setting in the Master Settings panel of the Project Settings, which governs how you monitor the signal being output on an external broadcast display or projector.

- **Video bit depth:** Choose the bit depth that corresponds to the capability of your deck. You can choose between 8-bit and 10-bit. Outputting to 10-bit is more processor intensive, but higher quality for compatible devices, and is the default setting.

- **Use deck autoedit:** If supported by your video deck, this is the best method to record video to the deck, as it enables the deck to roll the edit using the specified preroll, and control the edits via serial device control. If this checkbox is turned off, a basic edit On/Off mode is used by the deck, with the potential for frame inaccuracies if the "Non auto edit timing" setting is not properly adjusted.

- **Non auto edit timing:** Adjusts the edit synchronization of the connected deck when auto edit is turned off.

- **Deck preroll:** Sets the number of seconds for preroll. How much is appropriate depends on the performance of your deck.

- **Video output sync source:** When using a DeckLink card this is set to Auto. Other capture cards may require you to set the sync source to "Reference" for playout and "Input" for ingest. This setting is only available if you have a DVS card installed on your system.

- **Add 3:2 pulldown:** Inserts or removes the 3:2 pulldown required to record or play 23.98 fps media to or from a 29.97 tape format.

# Capture

These settings are used when you use the Capture mode in the Media page to capture clips from tape into the Media Pool. Media is captured as DPX image sequences.

- **Capture:** Lets you choose whether to capture both Video and Audio, or Video Only.

- **Video Format:** The format that scanned film frames are saved as. When capturing from tape, the available options are DPX and QuickTime. When capturing from the Cintel film scanner, this is restricted to Cintel Raw Image (CRI), which is a raw data format that DaVinci Resolve automatically debayers as a Cineon log-encoded image for grading.

- **Codec:** The codec used to write captured media. When capturing from tape, these include the various type of Apple ProRes, 8- and 10-bit YUV 422, 10-bit RGB, and the various types of DNxHD. Cintel Raw Image files default to RGB.

- **Save clips to:** A field that displays the directory path to which media files captured from tape are written. You want to choose a volume that's fast enough to accommodate the data rate of the media format you're capturing.

- **Browse:** Click this button to choose a directory to write captured media to. The directory you choose appears in the field above.

- **Save in this folder path:** A series of checkboxes let you specify what other information to use to define the directory hierarchy that will hold the captured media. Every checkbox you turn on adds an additional directory with a name defined by that checkbox's metadata. You can choose any or all of the following: Program name, Clip number, Reel number, and Roll/Card.

- **Apply reel number to:** Lets you choose how to write the reel name. Two checkboxes let you write the reel number to the file's name, and/or to the Header data.

- **Use prefix:** A field lets you type in a prefix to be used in the media file's name. This lets you add text identification that will make the media more easily identifiable and searchable.

- **Apply prefix to:** Two checkboxes let you choose to use the prefix you typed in the file name, and/or in the folder name.

- **Use frame number with:** When capturing to image sequences, you can choose how many digits to use when writing the frame number into the name of each frame file.

- **Set batch ingest handles to:** When capturing to image sequences from a batch list, defines how many frames of additional handles to ingest along with each logged clip.

- **Enable audio input:** Turn this checkbox on to capture audio along with the video. If you're capturing QuickTime or MXF files, the audio will be written as additional tracks inside each file. If you're capturing to a DPX image sequence, then a broadcast .wav file is recorded separately.

- **Input:** Lets you choose how many tracks of audio to capture, from 2 to 16.

# Playout Settings

These settings only affect the video signal that's output when you use the Edit to Tape mode of the Deliver page.

- **Output:** Lets you choose whether to output both Video and Audio, Video Only, or Audio Only if you're doing an audio layback.

- **Output Source Timecode:** Turn this checkbox on to output each individual clip's source timecode. This option is only applicable when assemble editing to tape.

- **Output LTC:** With a Blackmagic Design DeckLink or UltraStudio device using HD-SDI, longitudinal timecode (LTC) is available on track 16 of the HD-SDI video signal, making it easy to use a Mini Converter de-embedder to extract this analog timecode audio signal and feed it directly to a recording device. This is particularly helpful if you have outboard video processing equipment such as a noise reducer or format converter that does not pass through the VITC timecode.
- **Delay LTC by x frames:** When outputting LTC to bypass outboard processing gear, such as a noise reducer or format converter, you can compensate for the processing delay by delaying the timecode by a matter of frames to ensure that the processed image and timecode reach the deck at the same time. With a DVS card there is a separate timecode output.
- **Enable audio output:** When this checkbox is enabled, DaVinci Resolve will play all available timeline audio along with the video being output, so both can be recorded to tape.
- **Offset audio by x frames:** Lets you specify an offset between the audio track and video to achieve proper A/V sync in cases where the video is being delayed by outboard processing hardware.
- **Output x channels of audio:** Choose the number of audio tracks to output to tape.
- **Set batch playout head handle to x seconds:** When batch outputting multiple clips, you can specify a number of frames before the In point of each clip to be output as well.
- **Set batch playout tail handle to x seconds:** When batch outputting multiple clips, you can specify a number of frames after the Out point of each clip to be output as well.
- **Apply gaps between clips:** This checkbox lets you add a black gap, of the specified duration in frames, between every two clips being output when outputting in batch mode.

# Edit to Tape Queue Option Menu Settings

The following settings and options are available in the Option menu found at the top right-hand corner of the Edit to Tape Queue.

- **Show Job Details:** Lets you see more information about each job listed in the Render Queue.
- **Clear Recorded:** Clears all queue items that have already been output to tape.
- **Clear All:** Clears every queue item.
- **Sort by Reel & Timecode:** Does a multi-criteria sort by reel and timecode, reel first, then timecode.
- **Sort by Timecode:** Sorts by timecode only.
- **Output Source Timecode:** Sets tape output to write source timecode to tape (each clip's individual timecode), rather than record timecode (from the Timeline).
- **Use Preview for Tape Output:** Enables Preview mode when outputting to tape. Preview mode lets you test how an edit to tape operation will work before actually recording it.

# Tape Output Procedures

There are a few different ways you can output media to tape, depending on what you need to accomplish, and on how intensive your grades are relative to the processing capabilities of your workstation.

## Power Mastering

Power Mastering allows you to select either a range of clips, or an entire timeline, to be output to tape in real time, without rendering. This can save you from a time-consuming render, and it also saves disk space. Power Mastering is a no-compromise procedure, since your program is still output at full quality.

If there are a handful of clips with grades that you know are too processor-intensive to be Power Mastered, you can use the Render Cache controls to cache the problem clips before output. For more information, see Chapter 6, "Improving Performance, Proxies, and the Render Cache."

## Outputting a Program From the Timeline

The simplest method of outputting to tape is to output a single Timeline, either in its entirety, or in part if you're insert editing a small section that has been revised.

**To Power Master to tape:**

1   Use the Render Cache, if necessary, to cache any clips that are too processor-intensive to output in real time.

2   Click the Edit to Tape mode button to the left of the transport controls to switch to tape output.

3   Define how much of the current Timeline to output by moving the playhead throughout the program, and then right-clicking clips that define the beginning and end of the range you need to output and using the Mark In and Mark Out commands.

4   Use the transport controls to find the In point on tape at which you want to start recording, and click the In button.

5   Choose Insert from the pop-up menu at the upper right-hand side of the Viewer, if you're either outputting to a striped and blacked tape, or inserting over an existing program on tape.

6   Click the Power Mastering (lightning bolt) button at the bottom of the tape settings to add the job you've just set up to the Edit to Tape Queue.

7   Click Start Record to begin the process of outputting to tape. Device control is used to record to the designated section of tape; a progress bar appears at the bottom of the Render Queue to show how long this will take.

If you don't want to Power Master, you can render the section of the Timeline you need to output as a single clip first, as a self-contained media file, and then add that clip directly to the Edit to Tape Queue. This might be an easier solution if you're outputting an extremely processor-intensive timeline.

**To output a pre-rendered media file to tape:**

1   Click the Add Clips button at the bottom of the tape settings, and use the VTR Record dialog to select the media file you rendered in step 1, and click Add Clip(s) to Queue.

The media file you selected is added to the Edit to Tape Queue as a Power Mastering job, and will be output in its entirety.

2   Use the transport controls to find the In point on the tape at which you want to start recording, and click the In button.

3   Choose Insert from the pop-up menu at the upper right-hand side of the Viewer, if you're either outputting to a striped and blacked tape, or inserting over an existing program on tape.

4   To preview what the edit will look like before actually writing it to tape, choose "Use Preview for Tape Output" from the Edit to Tape queue option-menu, and then click Start Record to watch DaVinci Resolve run through the edit using the deck. After previewing the edit, turn this setting off.

5   Click Start Record to begin the process of outputting to tape. Device control is used to record to the designated section of tape; a progress bar appears at the bottom of the Render Queue to show how long this will take.

## Batch Outputting Multiple Clips

You also have the option of outputting a number of clips to tape in a batch operation, as opposed to outputting from the Timeline. When you set up a batch of multiple clips in the Edit to Tape Queue, then DaVinci Resolve will automatically record them sequentially to tape.

How the timecode is generated during batch output depends on the "Output Source Timecode" setting in the Capture and Playback panel of the Project Settings. If this is turned off, then a continuous timecode track will be written to cover everything being output to tape. If this is turned on, then each clip's source timecode will be written to tape discontinuously.

When batch outputting to tape, you can add black handles to each of the clips to space them out, making later ingest easier, using the "Set batch playout head/tail handle" settings in the Capture and Playback panel of the Project Settings.

**To make a Batch Record multiple clips to tape:**

1   Use the transport controls to find the In point on tape at which you want to start recording, and click the In button.

2   Do one of the following to add items to output to the Edit to Tape Queue:

– Click the Add Clips button at the bottom of the tape settings, and choose one or more media files from the VTR Record browser, and click Add Clip(s) to Queue.

– Right-click any clip in the Timeline, choose Render This Clip, and then click the Power Mastering button at the bottom of the tape settings to add that clip to the Queue.

3   Choose either Assemble or Crash from the pop-up menu at the upper right-hand side of the Viewer. Because you're outputting clips with discontinuous timecode, you cannot insert edit when batch outputting.

4   Once you've added all the clips you want to output to the queue, click Start Record to begin outputting to tape. Device control is used to record to the designated section of tape; a progress bar appears at the bottom of the Render Queue to show how long this will take.

# Chapter 141

# Exporting Timelines and Metadata

Once you've completed editing and grading a program, you may need to export your final graded timeline as EDL, AAF, or XML files in order to send it to another application for further finishing, effects work, or to complete a round trip from an NLE.

To send a graded project to another application, you need to render the graded clips first using the controls on the Deliver page to render the Timeline as individual source clips. In this mode, the reel name and timecode metadata of each rendered clip is mirrored by the exported project file, to maintain the correlation between exported EDL, XML, or AAF data and the rendered media. For detailed information about rendering in the Deliver page, see Chapter 138, "Rendering Media."

If you render using the Easy Setups that correspond to Final Cut Pro XML or Avid AAF round trips, then an XML or AAF will be exported to the same directory you've rendered to. However, you can still export an XML, AAF, or EDL file separately should the need arise.

Alternately, if you've edited a project from scratch in DaVinci Resolve and need to move a timeline to another application, you can export any timeline to any format for purposes of project exchange, without the need to render new media (depending on your workflow).

Even in situations where you've imported a timeline from another application, the robust project compatibility of DaVinci Resolve makes it possible to import one type of project exchange file, such as XML, and then export a completely different kind, such as AAF or EDL. This lets you use DaVinci Resolve as a project exchange utility.

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# Exporting to AAF/XML

Whether you've edited your project from scratch inside of DaVinci Resolve, or you're doing a round trip with an application that uses AAF, Final Cut Pro 7 XML, or Final Cut X XML project exchange formats, you can export any DaVinci Resolve timeline in the Edit page to any project format DaVinci Resolve supports. Whatever your workflow, keep the following in mind:

- **Timelines are automatically exported when you render a timeline in the Deliver page:** When you use the "Final Cut Pro Round-Trip" or "Avid AAF Round-Trip" render setting presets, or a preset created from one of them, a corresponding XML or AAF file is automatically exported along with the media you render.

- **Even if you've imported a project from another application, you can re-edit imported projects before export:** If necessary, you can freely re-edit projects you're planning to export. When you export an AAF or XML file, the Timeline will be sent back to the originating NLE, or onward to the finishing application of choice.

- **Unsupported effects are sometimes preserved in Round Trip workflows:** If there were effects or clip constructs in the original sequence that were not compatible with DaVinci Resolve, how those effects will be handled depends on the project format you're exporting to, and whether or not you've edited the project. For XML projects, unsupported effects are saved internally by DaVinci Resolve, and are exported with the XML file that you output no matter what. Consequently, they should reappear when you reopen the exported file in the originating NLE. For AAF projects, you can export unsupported effects as long as you don't re-edit the project. However, if you do re-edit the project, then you can only export an AAF file that's been stripped of all unsupported effects.

- **Project formats can be converted to other formats:** Using DaVinci's Export commands, compatible project formats can be converted from one format to another. For example, an imported EDL can be output as Final Cut Pro X XML. For that matter, Final Cut Pro 7 XML can be imported and then exported as Final Cut X XML. Or, an AAF file from Media Composer can be imported and then exported as a Final Cut Pro XML file to be opened in any NLE or finishing application compatible with that format, such as Premiere Pro or Smoke.

**To export an AAF or XML file after you've rendered the graded clips:**

Do one of the following:

1 To export the current Timeline, choose File > Export AAF, XML, or press Shift-Command-O.

   – Open the Edit page, right-click the Timeline you want to export in the Media Pool, and choose Timelines > Export > AAF/XML.

   – When the Export XML dialog appears, type a name for the file and choose a location for the exported XML file, then click Save.

2 An XML version of that timeline is saved, complete with references to the graded media you rendered, and is ready for import into an NLE or finishing application.

# More About Exporting to AAF

When you export to AAF, there are actually two options that are available to you, depending on whether you made editorial changes to the Timeline in the Edit page:

- **If you didn't make any editing changes to the Timeline you imported:** You can choose File > Export AAF, XML, and choose "AAF Files" from the Format pop-up menu. This exports all audio and effects using data from the original AAF file that was exported from Media Composer, regardless of whether or not they're supported in DaVinci Resolve. When you export an unedited AAF, DaVinci Resolve uses the Avid AAF file that you originally imported to create an updated one; make sure it's still in the same location as it was when you first imported it into DaVinci Resolve.

- **If you made editing changes to the Timeline you imported, or you're exporting a project that wasn't AAF to begin with:** Then you need to right-click the Timeline you want to export in the Media Pool and choose Timelines > Export > Generate New AAF. This option creates a brand new AAF file, but audio and effects that are not supported in DaVinci Resolve in an AAF import are discarded.

# Exporting an EDL

DaVinci Resolve is also capable of exporting EDLs that can be reimported into other applications. For more information about EDL workflows, see Chapter 16, "Ingesting From Tape," Chapter 39, "Conforming and Relinking Clips," and Chapter 43, "Conforming EDL Files."

**To export an EDL:**

1 Open the Edit page and select the Timeline you want to export an EDL from in the Media Pool.

2 Exported EDLs only have a single video track. For timelines with multiple tracks, only the events on the video track with the destination control assigned to it will be exported (the destination control is the first control at the left in the track header). If you want to export a track other than Video 1, you can assign the destination control to the specific track you need to export.

3 Right-click the Timeline in the Media Pool, and choose Timelines > Export > AAF/XML/ EDL from the contextual menu.

4 When the Export Timeline dialog appears, type a name, choose a location for the exported EDL, and choose EDL Files from the pop-up menu at the bottom, then click Save. An EDL is exported.

# Exporting a Missing Clips EDL

This command lets you export a quick report listing all clips that are offline in the currently selected track of the Timeline in the Edit page. This report is in EDL format, with one event for each clip that's offline, which describes the reel number and source timecode of the missing media, as well as the record timecode of the missing media's position on the Timeline.

Here's an example of an exported Missing Clips EDL:

```
TITLE: ( no title )

1   A001_C002_0820GA_001 V     C  10:28:27:03  10:28:28:00  01:00:00:00  01:00:00:21

2   A004_C012_0820MC_001 V     C  14:07:31:21  14:07:35:13  01:00:12:13  01:00:16:05

3   A017_C001_0820CV_001 V     C  21:16:14:22  21:16:15:00  01:00:16:05  01:00:16:07
```

Once you've exported this information, you can hand it off to whomever can help you track down the missing media.

**To export a Missing Clips EDL:**

1   Open the Edit page and open the Timeline you want to export a Missing Clips EDL for in the Timeline browser.

2   For timelines with multiple tracks, only the events on the video track with the destination control assigned to it will be examined for missing clips. If you want to examine a track other than Video 1, you can assign the destination control to the specific track you need to examine for missing clips.

3   Right-click the Timeline in the Media Pool, and choose Timelines > Export > Missing Clips EDL from the contextual menu.

4   When the Save Missing Clips EDL dialog appears, type a name and choose a location for the exported EDL, then click Save.

# Exporting Timeline Markers to EDL

If you keep notes about a project within the notes field of Timeline markers, found in the Timeline ruler, then it's possible to export those notes as an EDL.

**To export timeline markers as an EDL:**

1   Right-click that timeline in the Media Pool, and choose Timelines > Export > Timeline Markers to EDL.

2   Choose a location and export format from the Export Edit Index dialog, and click Save. Each Timeline marker is listed in the resulting EDL, with any notes included along with a duration, where applicable.

# Exporting to CDL

DaVinci Resolve can export and import basic grading data to and from other applications via a Color Decision List (CDL). CDLs are an industry-standard file format originally developed by the American Society of Cinematographers' technology committee. DaVinci Resolve supports the 1.2 CDL standard that defines the slope, offset, and power for each of the red, green, and blue channels, as well as the overall saturation of each clip in a program.

CDL files are formatted similarly to EDLs, with SOP (Slope/Offset/Power), and SAT (Saturation) values embedded as metadata in much the same way as comments are in a more typical EDL.

Here's an example of a single CDL event:

```
020  001  V  C  03:02:49:13  03:02:53:00  01:01:28:11  01:01:31:22

*ASC_SOP (1.109563 1.717648 0.866061)(-0.238880 -0.390357 0.353743)
 (0.672948 1.384022 0.889876)

*ASC_SAT 1.000000
```

Because the CDL definition of a grade is so narrow, projects you're planning to export to other applications via a CDL must be constrained to only those operations the CDL mathematically defines. Here are some things to keep in mind:

- Only primary corrections in the first node of each clip are exported.
- Restrict yourself to using the Lift/Gamma/Gain, Offset, and Saturation controls.
- Keyframes are never exported. If keyframes are present in a grade, only the parameter values at the first frame of the clip are used.
- The track grade and group grades are completely ignored.
- If there is an HSL Qualifier or a Power Window in the first node, it is ignored and the corrections in that node are exported as if it were a primary correction.
- Do not make Y' only adjustments; they're not compatible with CDLs. To ensure that your exported CDL is accurate, set the Lum Mix parameter in the Primary Controls palette for each grade to 0. For workflows involving frequent CDL export, you can turn on the "Luminance Mixer defaults to zero" option in the Color  section of the General Options panel of the Project Settings to guarantee this parameter is always set to 0.

If your timeline conforms to all of these restrictions, then you're ready to export a CDL.

**To export a CDL:**

1   Open the Edit page, right-click the Timeline you want to export in the Media Pool, and choose Timelines > Export > CDL from the contextual menu.

2   Enter a name for the CDL, choose a location to save it to, and click OK.

For more information on importing a CDL to add grades to your project, see Chapter 114, "Copying and Importing Grades Using ColorTrace."

# Exporting the Edit Index as a CSV or TXT File

You can export the current contents of the Edit Index, in the Edit page, as a self-contained file to use for reference in a variety of ways.

**To export the Edit Index:**

1  Open the Edit Index, and choose one of the Edit Index filters from the Edit Index option menu, if necessary. For example, you could filter the edit index by Offline Clips Only if you wanted to export a list of all offline clips in the current timeline.

2  Right-click that timeline in the Media Pool, and choose Timelines > Export > Edit Index, then choose a location and export format from the Export Edit Index dialog, and click Save.

# Exporting to ALE

DaVinci Resolve is also capable of exporting ALE (Avid Log Exchange) files. ALE is a tab-delimited, ASCII text-based clip logging list format that enables the exchange of clip metadata that can't be embedded inside MXF files. ALE files are designed to let you export a log of all clips that are used in a particular timeline with all of the metadata that's associated with those clips in DaVinci Resolve, so this metadata can be imported into and associated with clips inside Media Composer or Symphony.

ALE files are divided into three sections, labeled Heading, Column, and Data:

- The Heading provides information about the clips being logged, including the picture and audio format, and the frame rate.

- The Column line defines each of the columns of metadata being exported in the list. There's an automatic minimum of metadata columns that are automatically included, regardless of whether they're populated or not. However, additional metadata columns are automatically added to this list by DaVinci Resolve when any corresponding metadata field in the Metadata Editor is populated. For example, if you enter information into the Camera, Keyword, and Shot fields of the Metadata Editor, then those columns will be added to the exported ALE. There are no user settings that control this.

- The Data section contains multiple lines, one for each event being referenced in the list, that contain all the data corresponding to that clip.

If you're exporting stereoscopic clips from stereoscopic timelines, the following additional columns of metadata are automatically included in the two ALE files that are generated:

- Pan (relative to timeline resolution)
- Tilt (relative to timeline resolution)
- Zoom
- Rotate
- Convergence (relative to timeline resolution)
- HFlip (0 or 1)
- VFlip (0 or 1)

**To export an ALE file:**

1 Open the Edit page, right-click the Timeline you want to export in the Media Pool, and choose Timelines > Export > ALE from the contextual menu.

2 Enter a name for the ALE file, choose a location to save it to, and click OK.

The ALE file is saved, and a dialog appears reminding you of the file path to which it was saved (click OK to dismiss it).

**Here's an example of a short ALE export:**

**Heading**

FIELD_DELIM        TABS

VIDEO_FORMAT       1080

AUDIO_FORMAT       48khz

FPS                23.976

**Column**

Name, Tracks, Start, End, Take, Tape, UNC, FPS, Reel, Scene, Shoot, date, Manufacturer, Source Resolution, Source, Bit Depth, DESCRIPT, Comments, Audio SR, Audio Bit Depth, Auxiliary TC1, KN Start, Source File Path, Display Name

**Data**

A001_C002_V01.CBF6A4FD139AD.mxf, V, 10:28:27:03, 10:28:28:00,
A001_C002_V01.CBF6A4FD139AD
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A001_C002_V01.CBF6A4FD139AD.mxf
23.98, DaVinci Resolve, 1920x1080, 10
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A001_C002_V01.CBF6A4FD139AD.mxf
A001_C002_V01.CBF6A4FD139AD

A016_C008_V01.CBF6A4FD13ABD.mxf,V, 23:35:56:03, 23:36:00:11,
A016_C008_V01.CBF6A4FD13ABD
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A016_C008_V01.CBF6A4FD13ABD.mxf
23.98, DaVinci Resolve, 1920x1080, 10
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A016_C008_V01.CBF6A4FD13ABD.mxf
A016_C008_V01.CBF6A4FD13ABD

A004_C012_V01.CBF6A4FD1438E.mxf, V, 14:07:31:21, 14:07:35:15,
A004_C012_V01.CBF6A4FD1438E
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A004_C012_V01.CBF6A4FD1438E.mxf
23.98, DaVinci Resolve, 1920x1080, 10
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A004_C012_V01.CBF6A4FD1438E.mxf

> **NOTE:** The commas shown above are not normally in the ALE but shown here for field clarity

**To export an ALE file:**

**1** Open the Edit page, right-click the Timeline you want to export in the Media Pool, and choose Timelines > Export > ALE from the contextual menu.

**2** Enter a name for the ALE, choose a location to save it to, and click OK.

# Exporting to ALE with CDL

Avid Media Composer and Symphony also support the import of ALE files with additional CDL metadata columns with which to associate SOP (Slope/Offset/Power) and SAT (Saturation) adjustment metadata to each clip that's logged in the ALE.

When you import an ALE with CDL file into Media Composer, the SOP and SAT data populate metadata columns for preservation and export in various Avid workflows. Here's an example of the Heading, Column, and Data sections of a sample ALE with CDL, with one line of clip and CDL data.

**To export an ALE with CDL file:**

**1** Open the Edit page, right-click the Timeline you want to export in the Media Pool, and choose Timelines > Export > ALE and CDL from the contextual menu.

**2** Enter a name for the ALE file, choose a location to save it to, and click OK.

The ALE file is saved, and a dialog appears reminding you of the file path to which it was saved (click OK to dismiss it).

**Here's an example of a short ALE with CDL export:**

```
Heading
FIELD_DELIM      TABS
VIDEO_FORMAT     1080
AUDIO_FORMAT     —
FPS              23.976

Column
Name, Tracks, Start, End, Take, Tape, UNC, FPS, Reel, Scene, Shoot
date, Manufacturer, Source Resolution, Source Bit Depth, DESCRIPT,
Comments, Audio SR, Audio Bit Depth, Auxiliary TC1, KN Start, Source
File Path, Display Name KeyKode, ASC_SOP, ASC_SAT, RESOLVE_SIZING

Data
A001_C002_V01.CBF6A4FD139AD.mxf, V, 10:28:27:03, 10:28:28:00,
A001_C002_V01.CBF6A4FD139AD
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A001_C002_V01.CBF6A4FD139AD.mxf
23.98, DaVinci Resolve, 1920x1080, 10
/Volumes/Disk_1/Avid MediaFiles/MXF/1/A001_C002_V01.CBF6A4FD139AD.mxf
A001_C002_V01.CBF6A4FD139AD
(1.0260 1.0260 1.0260)(−0.0260 −0.0260 −0.0260)(0.8237 0.8237 0.8237) 0.8640
(0.0000 0.0000 1.0000 0.0000 0.0000 0 0)
```

**NOTE:** The commas shown above are not normally in the ALE but shown here for field clarity

# Exporting Timeline Markers to EDL

This command lets you export a quick report listing the text of all markers that have been added to the Timeline as notes in an EDL. Clip markers are ignored. This report is in EDL format, with one event for each Timeline marker, with a placeholder reel number (001 by default), and source and record timecodes that correspond to each marker's position in the Timeline (with a duration of one frame). An EDL note for each event lists the Marker note, if there is one. There is no note available for the color of the markers

**Here's an example of an exported Timeline Marker EDL:**

```
TITLE: ( no title )

001  001    V    C     01:00:09:09 01:00:09:10 01:00:09:09 01:00:09:10

Replace with another car door sound effect

002  001    V    C     01:00:20:12 01:00:20:13 01:00:20:12 01:00:20:13

Trim this clip shorter

003  001    V    C     01:00:30:12 01:00:30:13 01:00:30:12 01:00:30:13

Find another stock footage clip of the bridge

004  001    V    C     01:00:30:13 01:00:30:14 01:00:30:13 01:00:30:14

Trim this montage three seconds shorter
```

# Exporting and Importing Media Pool Metadata

DaVinci Resolve makes it possible to export metadata from the Media Pool of one project for import into the clips of another project, for instances where you need to move metadata around. This process exports all metadata from the Media Pool as a .csv file.

For example, a DIT might have entered a lot of metadata to the DaVinci Resolve project used for generating dailies, but then an impatient editor might have created a separate project to begin editing those dailies. Instead of requiring the editor to enter each clip's metadata all over again, you can export the metadata from the DIT's project and import it into the editor's new project, automatically matching the relevant metadata to each corresponding clip.

**To export Media Pool metadata:**

1   Open a project containing Media Pool metadata you want to export.

2   Optionally, select which clips in the Media Pool you want to export metadata for.

3   Choose File > Export Metadata From > Media Pool to export metadata from every clip in the Media Pool, or choose File > Export Metadata From > Selected Clips to only export metadata from clips you selected in step 2.

4   When the Export Metadata dialog appears, enter a name and choose a location for the file to be written, then click Save. All metadata is exported into a .csv file that can be viewed and/or edited in any spreadsheet application.

**To import Media Pool metadata:**

1  Open a project containing clips you want to populate with imported metadata.

2  Optionally, select which clips in the Media Pool you want to import metadata to.

3  Choose File > Import Metadata To > Media Pool to import metadata to potentially every clip in the Media Pool, or choose File > Import Metadata To > Selected Clips to only import metadata to clips you selected in step 2.

4  When the Import Metadata dialog appears, choose a metadata .csv file to import, and click Open.

5  When the Metadata Import dialog appears, choose the Import Options you want to use to match the .csv file's metadata to the correct clips in the currently open project. By default, DaVinci Resolve tries to use "Match using filename" and "Match using clip start and end Timecode" to match each line of metadata in the .csv file with a clip in the Media Pool, but there are other options you can use such as ignoring file extensions, using Reel Name, and using source file paths.

6  Next, choose which Merge Option you want to use in the Metadata Import dialog. There are three options:

   – **Only update metadata items with entries in the source file:** The default setting. Only updates a clip's metadata if there's a valid entry in the imported .csv file. Other clip metadata fields are left as they were before the import.

   – **Update all metadata fields available in the source file:** For each clip that corresponds to a line of metadata in the imported .csv file, every single metadata field referenced by the .csv file is overwritten, regardless of whether or not there's a valid entry for that field.

   – **Update all metadata fields available in the source file and clear others:** For each clip that corresponds to a line of metadata in the imported .csv file, every single metadata field referenced by the .csv file is overwritten, regardless of whether or not there's a valid entry for that field. Furthermore, metadata fields that aren't referenced by the imported .csv file are cleared of whatever metadata was there before.
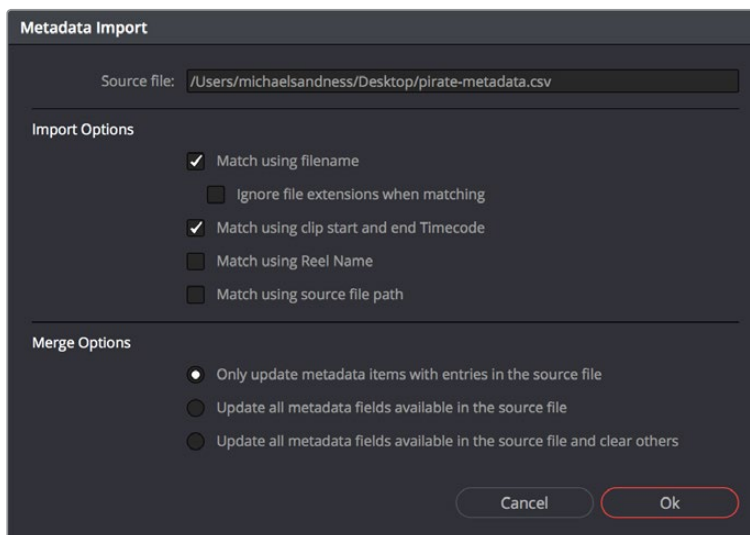


The Metadata Import dialog that lets you choose options for how to match and merge imported metadata

7  When you're finished choosing options, click Ok and all available metadata from the source .csv file will be imported.