The Deliver Page Interface

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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.
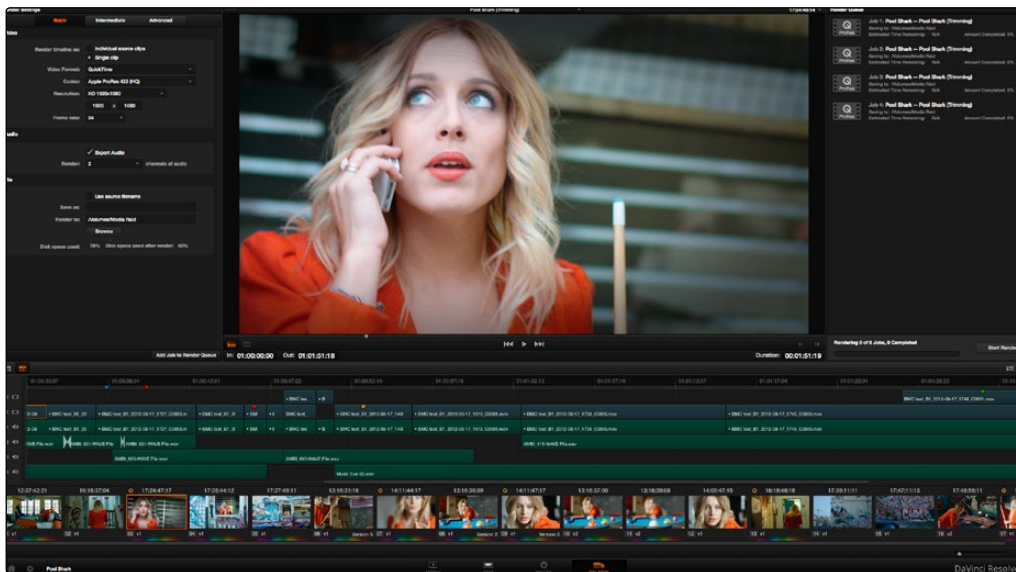
Deliver page

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 toggle buttons to the left of the Transport controls, underneath the Viewer.
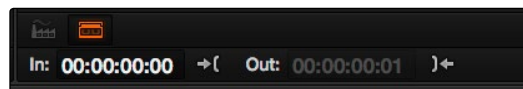
Render or Edit to Tape modes

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.

The Render Settings list contains the customizable settings that affect how media is rendered out of Resolve. These settings are covered in more detail later in "File-based Output." If you're using the Edit To Tape option, these settings are all disabled.
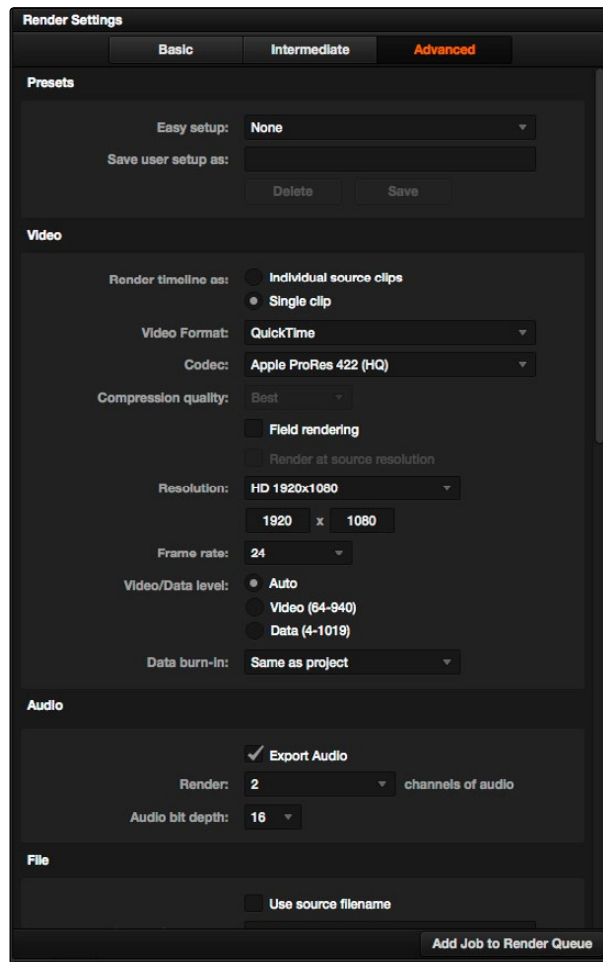
Render settings

The Deliver Page Timeline
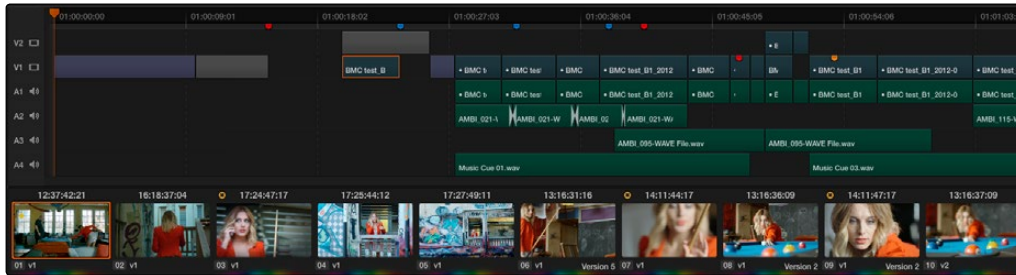
The Deliver page's Thumbnail and Mini-Timeline match the Color page

The Deliver page Timeline also has the Timeline Filter pop-up at the right-hand side of the toolbar. 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 the "Show Modified Clips" option 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.

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.
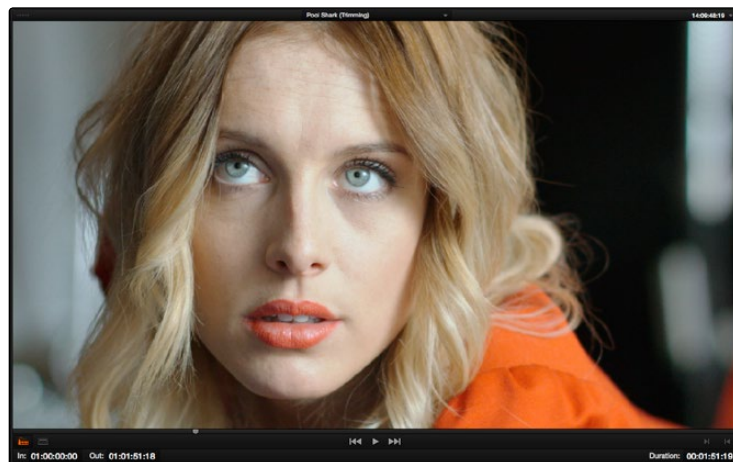
Deliver Viewer

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.

The Render Queue

The Render Queue is a list of all the jobs you've queued up for file-based rendering. 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.
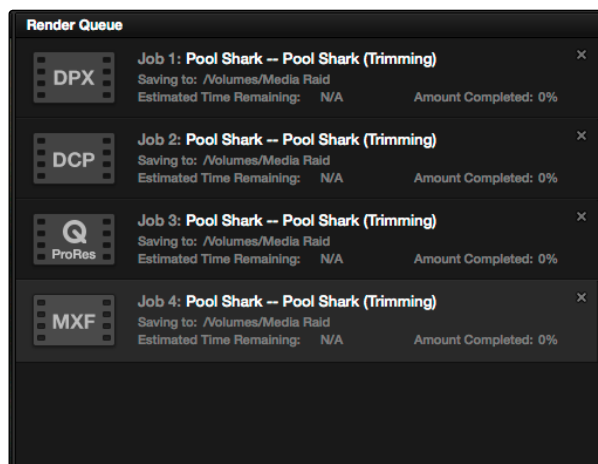
The Render Queue displays all jobs

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.

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 DNxHD 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 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), Resolve handles different types of effects in different ways.

Unsupported effects do not appear in 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 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 Resolve contains all of the effects information necessary to reassemble the rendered media into a timeline that uses Final Cut Pro effects applied to 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	N/A	N/A	N/A	N/A
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	Sent Back	Sent Back	Sent Back	Sent Back
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 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 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 Resolve can optionally render speed effects using Optical Flow processing, resulting in high-quality slow motion and fast motion effects delivered straight out of Resolve. If you're satisfied with Optical Flow processing in 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: 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 V

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 Output options of the Deliver page.

→ If this checkbox 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 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 this checkbox 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 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 of the Master Project Settings panel, 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 Resolve if you're working entirely within DaVinci Resolve), then 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 Project Settings.

How clips in mixed framerate 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 Editing panel in 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 Resolve.

Rendering Your Final Output

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.

Choosing Which Set of Output Controls to Use

The Render Settings you can choose from for outputting from Resolve appear in three different sets of controls, labeled Basic, Intermediate and Advanced. You can choose the set of controls that meets your needs, based on the following description.

→ Basic contains only the most essential controls needed for defining whether to render a single clip or multiple clips, the render format, audio settings, and the file name and destination for the media you're delivering, along with Presets controls for using and saving Easy Setups for commonly performed delivery tasks. This setting is appropriate for most situations where your output is fairly straightforward.

→ Intermediate adds additional parameters for adjusting more specific aspects of your render, such as data rate limiting for H.264 and AAC encoding, manual video/data level adjustment, data burn-in presets, and options for controlling how sizing, debayer quality, and flat pass are output. Intermediate also lets you create additional output passes, to output the same job with different format, codec, and data burn-in settings.

→ Advanced provides all of the outputting options of DaVinci Resolve, including file name prefix and suffix editing, subfolder organization, render speed controls for limiting LAN bandwidth usage, commercial workflow options for rendering multiple versions and organizing media in different ways, and stereoscopic rendering control.

Using Easy Setups for Fast Rendering

The Intermediate and Advanced sets of controls provide an Easy Setup pop-up menu. This pop-up lets you quickly choose a preset that automatically populates all the settings appropriate to rendering media for your particular workflow. DaVinci Resolve ships with four options.
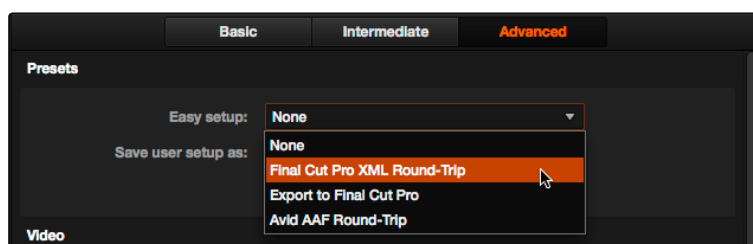
Easy Render setup selection

None

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

Final Cut Pro XML Round-Trip

Selects the appropriate settings for projects that were sent from Final Cut Pro 7 or Final Cut Pro X to 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). "Render clips in" is set to Source, 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 Project Settings of the Project Settings), and Render Clip with Unique Filename is turned on.

Export to Final Cut Pro

Selects the appropriate settings for projects where media is being initially ingested into DaVinci Resolve, graded, and output for offline editing in Final Cut Pro. The Render Properties settings are similar to Final Cut Pro XML Round-Trip, except that Render Clip with Unique Filename is turned off, so that the File Name, Reel Name, and timecode of the rendered media are identical to the originally ingested clips in Resolve. This makes it easy to reconform the finished Final Cut Pro offline edit to the original clips in your Resolve project, using either XML or EDL workflows (to reconform to the original media via XML, you'll need to turn "Automatically import source clips into media pool" off).

Avid AAF Round-Trip

Selects the appropriate settings for projects that were sent from Avid Media Composer or Symphony to 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 DNxHD 1080p 220/185/175 10 bit, Output Size defaults to the current Timeline Resolution (as set in the Master Project Settings of the Project Settings), and Render Clip with Unique Filename is turned on.

Video Sharing Export

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. Sets "Render timeline as" to single clip, and sets the Video Format to QuickTime, the Codec to H.264, sets the video data rate to 10,000 Kb/s, on Mac OS X the Audio Codec to AAC, and the audio data rate to 320 Kb/s. The Resolution and Frame rate settings automatically match those of your project, but you can change the Resolution setting to something smaller (such as 1280 x 720) if you want to export a smaller size.

To create a new Easy Setup:

1. From the Intermediate or Advanced tab, choose None from the Easy Setup pop-up menu, to unlock every setting in the Render Settings pane.

2. Choose the particular settings you require for your new preset.

3. Type a name into the "Save user setup as" field, and click Save.

   The new preset now appears in the Easy Setup pop-up menu.

To load an Easy Setup:

→ Choose an option from the Easy Setup pop-up menu. Every setting in the Render Settings pane updates to reflect the preset you selected.

To delete an Easy setup:

→ From the Intermediate or Advanced tab, choose the option from the Easy Setup pop-up menu that you want to delete, and click Delete. That setup disappears from the menu.

The Two Basic Rendering Workflows

While there are numerous options available in the Render Settings List of the Deliver page, there are basically two ways you can render your project, depending on which of the "Render timeline as" radio buttons you click in the Output group.
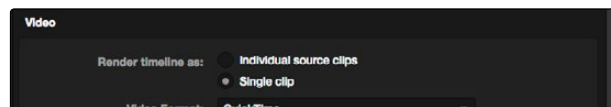
Render individual source clips or a single clip

To Individual Source clips

Selecting the individual source 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 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.

To a Single clip

When you select the Single clip option in the Output parameters, 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. 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.

All Available 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

The settings in the Format section relate to the file format or codec used, including the output resolution, frame rate, data level, and audio settings.

→ Render timeline as: Lets you choose which rendering mode to use. For more information about this setting, see the corresponding section earlier in this chapter. There are two options:

→ Individual source clips: Renders each clip as an individual media file.

→ Single clip: Renders every clip within the specified range of the current session as a single media file.

→ Video 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.

→ **DPX:** An uncompressed image sequence format favored by the film industry for mastering and delivery for DCDM mastering.

→ **Cineon:** An older uncompressed image sequence format developed by Kodak, designed for film scanning and digital mastering.

→ **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.

→ **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 media.

→ **JPEG 2000:** A high-quality compressed image sequence format used for DCP encoding.

→ **QuickTime:** Apple's file-based media format, used when delivering ProRes.

→ **MXF:** The Material eXchange Format is a file-based media format, used when delivering DNxHD.

→ **easyDCP:** An option that allows you to master a DCP or IMF directly from Resolve in conjunction when you have an installed license of Frauenhofer's EasyDCP software. More information about DCP mastering can be found at the end of this chapter.

→ **AVI:** A deprecated file-based media format that remains popular with Windows applications.

→ **MXF OP1A:** A version of the Material eXchange Format that conforms to the SMPTE 378M standard.

→ **Codec:** A pop-up menu that lets you choose the codec, bit depth, and color space, based on what's available to the container format you've selected above.

→ **H.264:** If you choose QuickTime as the Video Format, and H.264 as the codec, additional options appear underneath Compression Quality, below.

→ **Compression 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.

→ **Data Rate:** (Available for QuickTime H.264 encoding) You can choose automatic, or select a maximum data rate with which to export H.264 clips.

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

→ **Frame Reordering:** (Available for QuickTime H.264 encoding) 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.

→ **Field rendering:** If you're processing interlaced source material, this checkbox sets 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.

→ **Render at Source Resolution:** When Render Timeline As is set to "Individual source 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 Project 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:** Typically identical to the "Timecode calculated at" frame rate in the Master Project Settings panel of the Project Settings. However, you may wish to set this to a variation of the current conformed rate. This will adjust the metadata written within the file and is used to aid playback for the range of systems available worldwide. Use the pull-down to select from the available options.

→ **Video/Data level:** 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 ("Normally scaled legal video" or "Unscaled full range data") outputs all clips using the selected data range. For more information on this setting, and on data range handling in general, see Chapter 4, "Before You Conform."

→ **Data burn in preset:** 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.

Audio

Settings in this section relate to audio output.

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

→ Audio codec: Lets you choose between Linear PCM (the default) and AAC audio. 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.

→ Render X channels of audio: This control's functionality depends on the "Render timeline as" setting. When "Render timeline as" is set to "Individual source clips," you can choose which of the audio tracks available in the source media will be output. There is also a "Same as source" option that automatically outputs however many audio channels are in the source media to the rendered media being created by Resolve, which lets you easily generate dailies with the correct audio from camera original media with varying numbers of audio tracks. When "Render timeline as" is set to "Single clip," then the Render pop-up lets you choose which of the currently mapped Audio Mixer Output channels will be output along with the video.

→ Audio bit depth to: Lets you specify the bit depth at which to output the source audio.

Note: While clip audio is rendered out, audio chase tracks that you've synced are not output, either when rendering media or outputting to tape.

File

The settings in this section relate to how media named and where it is written.

→ Save as: Three options let you automatically name the media file(s) that are output automatically.

  → Use Timeline Name: When this option is selected, the name of the Timeline is used.

  → Use Source Filename: 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 Resolve. This is preferred when you're generating offline media for use by an editor that you later want to reconform to the originating Resolve project. When this checkbox is turned off, you can customize filenames using the other options in this section of settings.

→ Custom name/File prefix: Lets you add custom text to the beginning of the name of 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.

→ File suffix: Lets you add custom text to the end of all rendered files.

→ When entering text to use for the Prefix or Suffix, you can also use variables to automatically add to the filename based on clip metadata (you can also use these variables in the "Render job to" file path field).

%L	Reel Name extracted by Resolve from source filename or clip name
%R	Resolution of the rendered file
%T	Tape number extracted from imported EDL
%E	Event number from imported EDL
%V	Version Name of the rendered file
%I	Resolve-generated index number of the clip in the timeline
%	For stereo 3D projects, the eye ("left" or "right")
%{scene}	Scene metadata
%{take}	Take metadata
%{shot}	Shot metadata
%S	Stereo session, "Left" or "Right"
%{eye}	Same as %S

→ **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 8 digits.

→ **Start timeline timecode at:** 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 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.

→ **Each clips starts at frame:** This option is only available when rendering clips in Single clip order. This permits timecode to the header, and frame count to be written to the filename of image sequences, which is ideal for VFX workflows.

→ **File Subfolder:** 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.

→ **Render unique filenames:** 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.

→ Add Prefix/Add Suffix: 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.

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

→ To add a directory within the File Browser dialog, Right-click a volume or directory and choose New Folder. Type a name into the dialog that appears, and click OK. A new directory with that name is created in the File System.

→ Render at: 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 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.

Options

→ Add frame handles: 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.

→ Disable 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, but 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 2, "Project Settings."

→ 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.

→ User render cached images: When this checkbox is turned on, 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, this can be convenient. However, if you're caching in a lower-quality format then the one you're outputting to, you'll want to turn this checkbox off to force 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: 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, Resolve disables the grade of every clip being rendered.

→ Place clips in separate folders: 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 postproduction work, allowing the VFX department to identify clips quickly and distribute the work accordingly.

   → Preserve X Source directory levels: 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 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.

   → From 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.

→ **Use commercial workflow:** 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 enabled.

→ **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 Stereoscopic 3D:** 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 and Line-by-Line let you output Frame Compatible media that can be output to a stereo-capable television. Anaglyph lets you output a traditional anaglyph red/cyan stereo image for viewing on any display using red/cyan glasses.

Additional Outputs

→ **Create Additional Output:** This button lets you specify additional sets of media to be rendered, with individual "Render to" format settings, into individually named subfolders (optional), and using individual "Data burn in preset" options. This is 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. When you click the Create Additional Output button, a new group of settings appears in the Render Settings list, named "Output x," where x is the total number of outputs you've added. If you want to eliminate an output, click the Delete button at the bottom of that output group.

Preventing Clip Overlap When Rendering Output Media

Three of the options listed above, "Render each clip with a unique filename," "Render each clip to a separate directory," and "Use commercial workflow," are all ways of organizing your rendered media to avoid clip overlap. 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, do one of the following:

→ Click the Select All button.

→ Right-click any clip in the Mini-Timeline (above the Thumbnail Timeline), and choose Select All.

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

→ Click the video or speaker icon to the right of that track's name in the Timeline header.

To render a filtered subset of clips in the Timeline:

1. Choose an option from the Timeline Filter button to the right of the screen underneath the Timeline.

    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. Do one of the following:

    → Click the Select All button.

    → Right-click any clip in the Mini-Timeline (above the Thumbnail Timeline), and choose Select All.

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, and choose Mark In.

    → Click the first clip, and click the Mark In button at the bottom right-hand side of the Viewer.

2. To define the last clip in the range you want to render, do one of the following:

    → Right-click a clip thumbnail, and choose Mark out from the contextual menu.

    → Select the last clip, and click the Mark Out button at the bottom right-hand side of the Viewer.

    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.

To render a single clip:

→ 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-by-one, and add it as an individual job to the Render Queue.

To select an arbitrary range of clips to render:

1. Move the playhead to the first of the range of frames you want to render, and set an In point by doing one of the following:

    → Right-click the Timeline ruler and choose Mark In.

    → Click the Mark In button at the bottom of the Render Timeline.

2. Move the playhead to the last of the range of frames you want to render, and set an Out point by doing one of the following:

    → Right-click the Timeline ruler and choose Mark Out.

    → Click the Mark Out button at the bottom of the Render Timeline.

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

Choosing Which Versions to Render For Each Clip

By default, the currently selected version 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 Render Timeline's contextual menu, also provides options to manage grade versions, as well as access to the Stereo submenu for managing stereo grades, the Edit PAR (Pixel Aspect Ratio) command, and a command for updating the thumbnails in the Render Window timeline to reflect any changes you've made. Most of 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 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. Again, this is to 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 the 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, etcetera. 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 session.

2. Choose a range of clips to render using the Deliver page Timeline.

3. Choose the settings you require in the Render Settings list, either individually, or by using one of the Easy Setups.

4. Click the Add Job button at the bottom right of the Render Settings list.

5. If there's already media in the "Render job to:" directory, you may get 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.

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 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 start rendering:

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

2. 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.

   The Start Render button changes to the Stop Render button, which can be clicked at any time to stop rendering.

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

1. Click a job in the Render Queue to select it.

   The selected Render Queue's settings repopulate the Render Settings list, and resets the selected range of the Timeline.

2. Change whichever settings you need to.

3. Click Add Job to add the alterations as a new Job in the Render Queue. If necessary, remove the original job from the Render Queue.

Rendering Jobs from Multiple Projects at Once

You can also render queue items from multiple projects in the currently open SQL or Disk database, 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 an SQL 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 item 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.

EasyDCP Output

For projects requiring Digital Cinema Package (DCP) or Interoperable Master Format (IMF) mastering for digital cinema or broadcast distribution, DaVinci Resolve can be integrated with Fraunhofer's easyDCP application in order to master these files, play them back for testing, and generate Key Delivery Messages (KDMs) for theatrical distribution, all directly within Resolve. This means you can encode a DCP master straight from your program's source media, all within the 32-bit floating point image processing pipeline of Resolve, for the highest possible quality result.

Licensing EasyDCP

DaVinci Resolve and DaVinci Resolve Lite includes 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.com account.

Then, from the 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 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 Resolve.

To import your server certificate:

1. Choose File > easyDCP > Import Server Certificate Set.

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.

DaVinci Resolve includes a demo version of easyDCP

DaVinci Resolve and DaVinci Resolve Lite includes a 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.

EasyDCP Color Management

The Look Up Tables panel of the Project Settings has an easyDCP Color Management section with a Timeline Colorspace pop-up menu. You should set this to the color space used in your current Resolve timeline. If, for example, you are grading using a Rec. 709 monitor for TV deliverables but also wish to make a DCP, select Rec. 709 and 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 Render to 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. Turn on the "Encrypt" 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.

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

11. 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 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 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 select easyDCP, then select 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. Using the File, easyDCP menu select Import KDM/Digest, and then select the file. Then simply select the encrypted DCP in the Media Page Library to play.

Tape Output

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.

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

→ Click the Edit to Tape button, located to the left of the transport controls underneath the Deliver page Viewer.

The Deliver page updates to reflect the relevant controls for editing to tape.

The Tape Output Interface

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.

→ **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 surface also control the deck, rather then your program.

→ **Shuttle Control:** A Shuttle Control appears in what was formerly the 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.
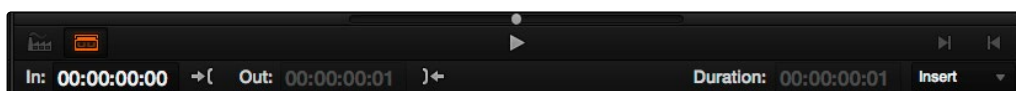
Edit to Tape controls

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: 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 Deck 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.

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.

→ Video connection: Selects between the available signal options: YUV 422 SDI, RGB 444 Dual Link, and 444 single link using 3 Gb/s. Which options are available depend on which video capture card you are using. All three are available when using the Blackmagic Design DeckLink HD Extreme 3+ card.

→ Colorspace: 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 Project Settings pane, which governs how you monitor the signal being output on an external broadcast display or projector.

→ Video bit depth: You have the option of switching between 8- and 10-bit output. Ordinarily this should be left at the default setting of 10-bit.

→ 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: Set 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 the 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.

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 Source Timecode: Turn this checkbox on to output each individual clip's source timecode, resulting in discontinuous timecode being written to tape. This is useful when backing up a project's media via videotape.

→ Output LTC: With a DeckLink HD Extreme 3 or 3D+, 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 timecode 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 whatever audio is currently edited into the Timeline, along with the video being output, so both can be recorded to tape. You'll need to set the channel mappings that determine which audio tracks are output to which channels using each track's channel pop-up menu in the Audio Mixer, and then you need to choose the appropriate settings for Offset and Channels. Use the "Offset (frames)" setting to sync the audio and video, if necessary. For the best results, set the "Output (channels of audio)" to match the Output setting of the Audio Mixer.

> → 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 channels as defined in the Audio Mixer to output to tape. For the best results, this setting should match however many audio channels are selected in the Output pop-up menu of the Audio Mixer. For more information on the Audio Mixer, see Chapter 7, "Working With Audio."

→ 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: Adds 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.

→ 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 then 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 in the Color page to cache the problem clips before output. For more information, see Chapter 6, "The Color Page Interface."

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.

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

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

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

4. Choose Insert from the pop-up menu, if you're either outputting to a striped and blacked tape, or inserting over an existing program on tape.

5. Click the Power Mastering (lightning bolt) button at the top-right of the Edit to Tape Queue to add the job you've just set up to the Edit to Tape Queue.

6. Click Start Record to begin the process of outputting to tape.

7. 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 Render mode button to the left of the transport controls to switch to File-rendering mode, and then render out a section of the Timeline that you need to output to tape as a single clip. Be sure you render it to a drive volume that has fast enough performance to play back in real time without dropping frames.

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

3. Click the Plus (+) button at the top-right of the Edit to Tape Queue, and then 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.

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

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

6. 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 Resolve run through the edit using the deck. After previewing the edit, turn this setting off.

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.

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 Playout 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 Playout 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 Plus (+) button, 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 (the lightning bolt) to add that clip to the Queue.

3. Choose either Assemble or Crash from the Output pop-up menu. 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.