Copying Grades Between Timelines Using ColorTrace

32

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ColorTrace is a key feature of DaVinci Resolve, which lets you copy grades quickly and easily from the clips of one timeline to those within another, based on the source timecode of each clip (or using clip names when in Automatic mode). You can even use ColorTrace to copy grades between timelines within the same project, and ColorTrace one stereo timeline to another.

This chapter covers the following topics:

Copying Grades Using ColorTrace

Users familiar with previous versions of Resolve will be happy to know that as of Resolve version 11, ColorTrace copies whichever version of a clip's grade was applied in the Source timeline you're copying from, either local or remote, depending on which grades each clip in the Source timeline is set to use. Furthermore, in Resolve version 11.1, ColorTrace gained support for copying Group Pre-Clip and Group Post-Clip grades. These improvements make this an extremely reliable tool for copying grades from one timeline to another in a wide variety of situations.

To use ColorTrace:

1   Open the Edit page and select the Timeline you want to use ColorTrace with from the Media Pool, then open it and choose Timelines > ColorTrace > ColorTrace From Timeline.
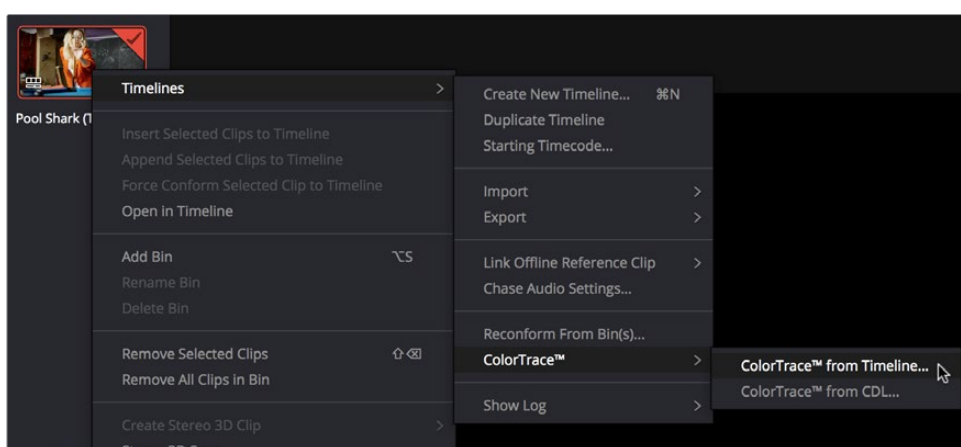

Choosing ColorTrace for a selected Timeline

The ColorTrace Setup window appears, which shows every database, user, project, and timeline within a single hierarchical list.

2   Using the Project List browser, select the specific Timeline you want to copy grades from.

You'll need to click the disclosure triangle to the left of the database, user name, and project that contains that Timeline in order to select it.
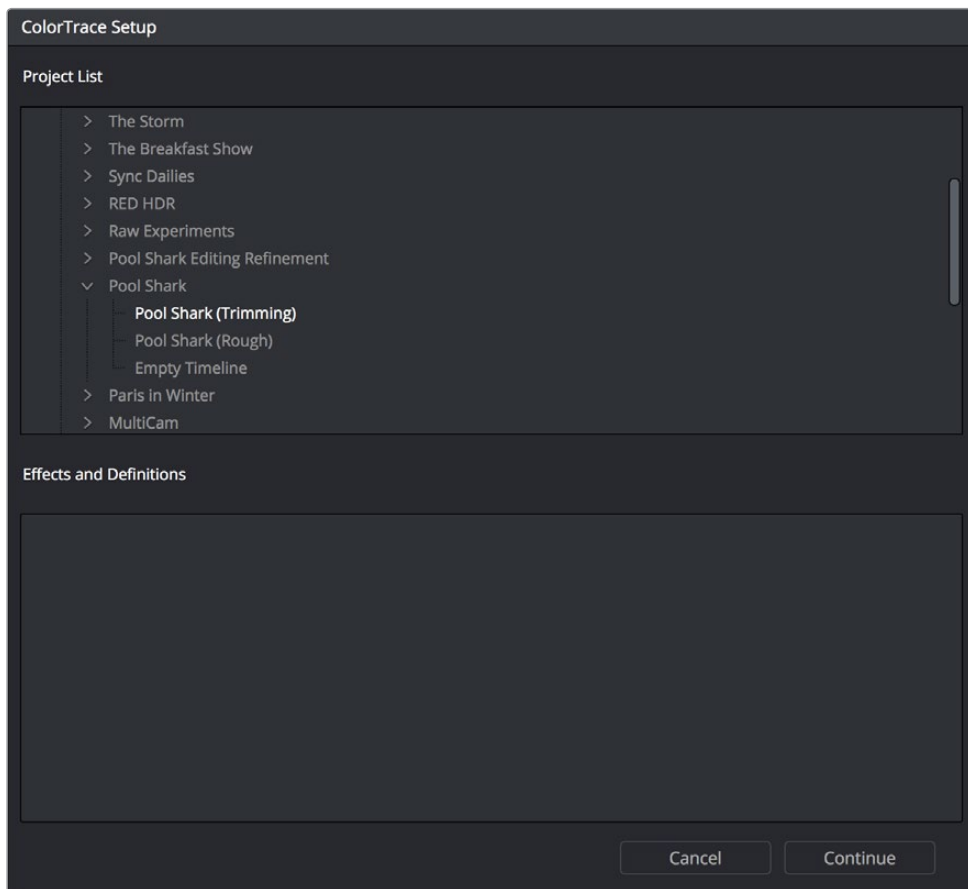
ColorTrace project and Timeline selection window

3 (Optional) If you're using ColorTrace with a project that has numerous VFX clips in a workflow where all VFX clips have specific reel names that identify them, you can enter these names (with asterisks (*) used as wildcards that indicate text in each Reel Name that can vary) in the "Effects Shot Definitions" field. This speeds automatic ColorTrace operations by enabling Resolve to use fuzzy string matching when a clip's reel number qualifies it as a VFX shot so that the best match is displayed first on the list. You can enter multiple VFX reel names with wildcards, one per line, for simultaneous string matching. You can use whatever Reel Name text makes sense for your workflow, some examples of VFX reel names are as follows:

- `*_COMP_*`
- `VFX*`
- `EFFECTS*`

4 Click Continue.

The ColorTrace window appears with two tabs that let you choose how to work.

5 Choose which mode to work in by clicking the Automatic or Manual tab:

In Automatic mode, ColorTrace automatically searches for matching clips between the selected Timeline and the current Timeline. Each clip is color coded depending on the correspondence that's been identified.

In Manual mode, you copy grades yourself, using the Copy and Paste procedures, or by dragging and dropping using your mouse.

The ColorTrace window is complex; details about the operation of each mode are covered separately in the following sections.

6 When you're finished using ColorTrace, click Close.
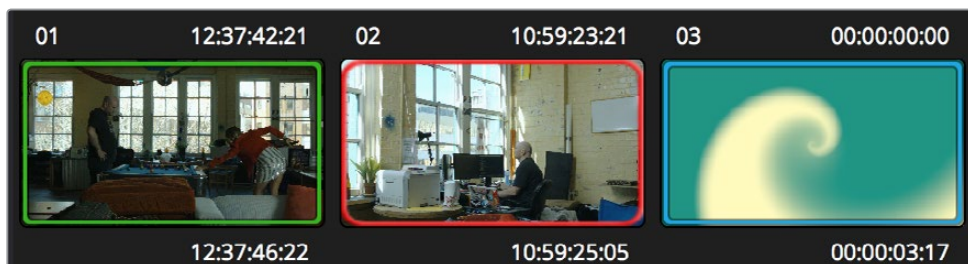
Using ColorTrace in Automatic Mode

In Automatic mode, ColorTrace automatically finds the correspondences between clips in the selected Timeline that you want to copy grades from (the Source timeline), and those in the current Timeline that you want to copy grades to (the Target timeline).
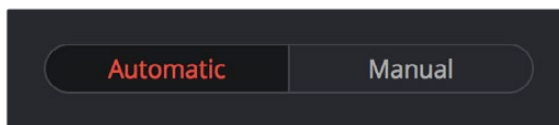
Selecting the Automatic or Manual ColorTrace

Each clip in the Target Timeline Thumbnail timeline is outlined with a color that indicates its status.

- Red: No match was found at all. Generally true for clips in the current Timeline that weren't used in the Timeline you're ColorTrace matching to.
- Blue: Due to overlapping timecode and reel names, multiple correspondences have been found (similar to a reel conflict), and you must select the correct one for each clip. This often happens with VFX and motion graphics clips that you've imported with timecode starting at 00:00:00:00.
- Green: A match has been found.

ColorTrace Thumbnail outlines indicate matching, overlapping and non matching clips

In Automatic mode the correspondence between each clip in the Source timeline and each clip in the Target timeline should be automatically made. However, overlapping timecode and reel names can cause problems. The other controls in the ColorTrace window help you deal with the subset of clips that can't be automatically matched, or are matched in error. These controls are:
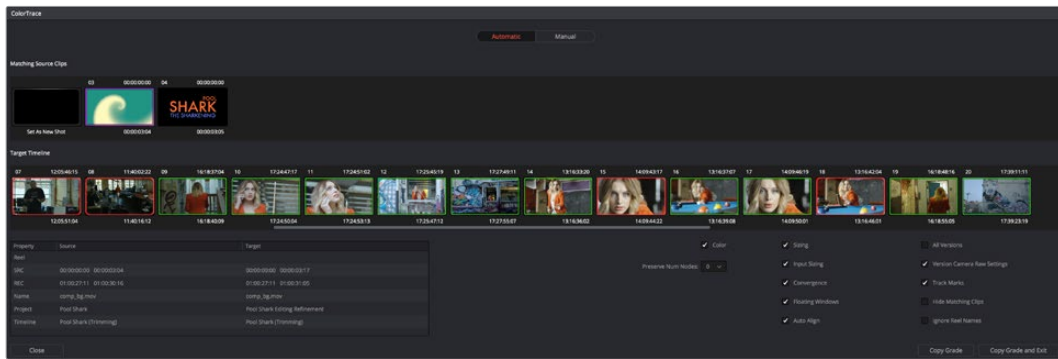
The ColorTrace window shown in Automatic mode

- Matching Source Clips list: Shows a scrollable collection of thumbnails that might correspond to the selected clip in the Target timeline.
- Target Timeline: Shows each clip in the Timeline you want to copy grades to, color coded according to how good a match it is.
- Clip Info pane: Displays two columns of properties for the source clip and the target clips that you've selected. These properties include the reel, source timecode, record timecode, clip name, project names, and timeline names of each clip, for easy comparison.
- Attributes and options checkboxes: A series of checkboxes lets you specify which clip attributes are copied as part of the ColorTrace operation.
  - Color: Enables the copying of grades.
  - Preserve Num Nodes: When copying grades, lets you prevent the first X nodes of the target clip grades from being overwritten by the first X nodes of the source clip grades.
  - Sizing: Enables the copying of Edit sizing attributes.
  - Input Sizing: Enables the copying of Input Sizing attributes.
  - Convergence: Enables the copying of Convergence for Stereo 3D projects.
  - Floating Windows: Enables the copying of Floating Windows for Stereo 3D projects.
  - Auto Align: Enables the copying of Auto Align settings for Stereo 3D projects.
  - All Versions: Copies all versions, rather then just the current version, from the source to the target clips. The currently selected version of each source clip is always correctly copied.
  - Version Camera Raw Settings: Enables the copying of versioned Raw settings, rather than just the current Raw setting.
  - Track Marks: Enables the copying of keyframes.
  - Flags and Markers: Enables copying of all flags and markers.
  - Hide Matching Clips: Hides all clips which have been successfully matched, and only show the clips with multiple or no matches. This lets you focus on the subset of problem clips within a potentially long timeline.
  - Ignore Reel Names: If you believe the reel names are in error, you can turn this checkbox on to ignore them, matching all source and target clips by timecode alone.
- Copy Grades: Copies the matched source grades to each green and purple target clip.
- Copy Grades & Exit: Once you've finished making all the grade matches you can, click this button to copy the matched source grades to each green and purple target clip, and close the ColorTrace window.

Here's how to use these controls to sort out which source clips to copy from for each blue and

red target clip in the Target timeline.

To manually choose which source grades should be copied to which target clips:

1	Click any blue clip thumbnail in the Target timeline.
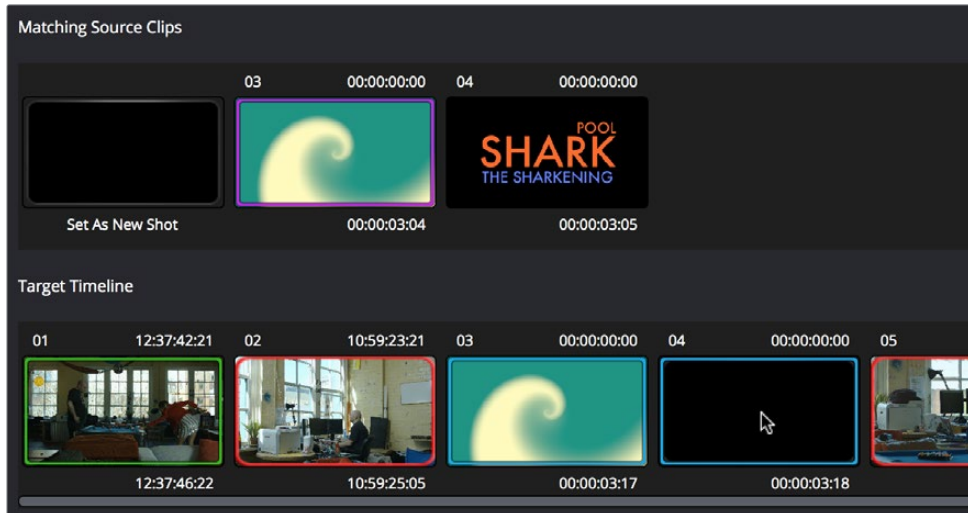
Revealing a number of different possible correspondences in the Matching Source Clips timeline

A collection of clips with overlapping timecode and reel names appears. If you want to ignore the reel names because you believe they might be in error, turn on the Ignore Reel Names checkbox.

2	If a comparison of the Source and Target thumbnails doesn't make the choice obvious, then click any of the clips in the Matching Source Clips timeline to view its metadata for comparison in the source/target columns below.

Source and Target clip metadata for comparison

3	Once you've decided on a clip correspondence, double-click the Matching Source Clip thumbnail you want to copy from. If no clip in the Matching Source Clip pane is a good match, double-click the "Set As New Shot" box.

The Source and Target thumbnails both turn purple, to show that you've created a correspondence.
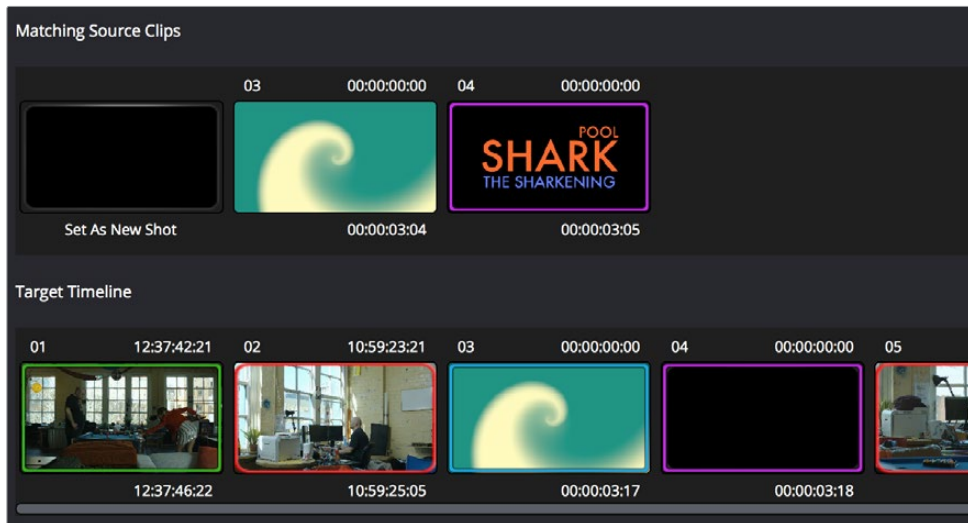
The matching Source and Target clips now both marked with purple outline

Continue working your way through every thumbnail with Blue and Red Xs until you've found matches for every clip in the Timeline for which it's possible.

4   When you're finished, click Copy Grades & Exit.

Using ColorTrace in Manual Mode

Manual mode is ideal for situations where you want to copy grades between programs with clips that have no timecode or reel name correspondence at all. The Manual ColorTrace interface is designed to let you move through two different timelines, either a clip at a time, or in matching multiples of clips, copying grades from the Source timeline to the Target timeline.

For example, if you're trying to copy grades from a timeline that was conformed from individual media files, to another timeline that was conformed from a flattened master media file, you can use the ColorTrace Manual mode to accomplish this.

The manual interface consists of two sets of controls that correspond to the Source timeline (labeled "Timeline to copy from"), and the Target timeline (labeled "Timeline to paste to"). The general idea is that you move through both sets of timelines one clip at a time, or in matching multiples of clips at a time, and copy grades from the "Copy from" timeline to the "Paste to" timeline.
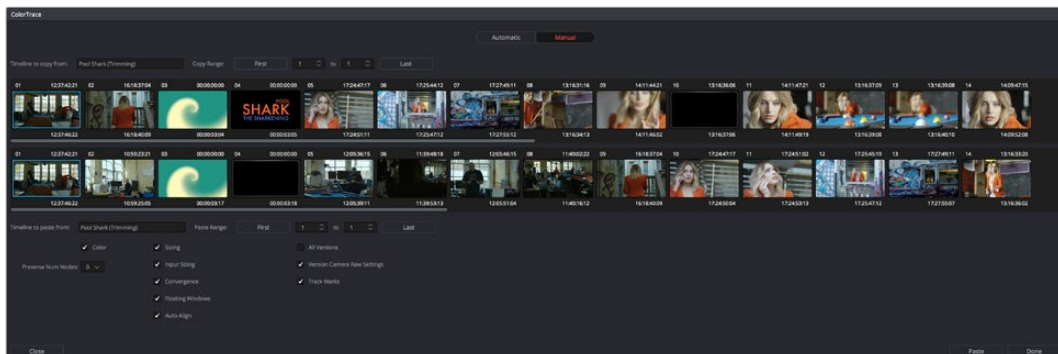
ColorTrace Manual window

Manual mode has the following controls:

- **Source timeline:** Shows all clips in the Source timeline you selected; the clips you're copying grades from. Click any one clip thumbnail to select it, or click a thumbnail, and then shift-click another thumbnail to select a contiguous range of clips. You cannot select a noncontiguous range of clips.

- **Copy Range controls:** Two fields show the range of clips in the current selection that you'll be copying from, referred to by their numeric position in the Source timeline. You can change the range numerically by either entering new numbers in the fields, or by using the up/down arrow buttons to alter the value by one. The First button automatically adds all clips from the first one in the Timeline into the current selection. The Last button automatically adds every clip going to the last one in the Timeline to the current selection.

- **Target timeline:** Shows all clips in the Target timeline you selected; the clips you're pasting grades to. Selecting clips works identically as with the Source timeline.

- **Paste Range controls:** Two fields show the range of clips in the current selection that you'll be pasting to, referred to by their numeric position in the Source timeline. All controls work identically to the Copy Range controls.

- **Attributes and options checkboxes:** Turn off the checkboxes of any clip characteristics that you don't want to copy as part of the ColorTrace operation. A more complete description of these options appears in the section on the Automatic ColorTrace mode.

- **Paste button:** Once you've selected one or more source clips and a matching number of target clips, clicking Paste copies the grades, PTZR settings, and marks (depending on the corresponding checkboxes).

- **Undo Last:** Lets you undo the most recent paste action.

- **Undo All:** Lets you undo all paste actions in Manual mode.

- **Done:** Finishes the operation and closes the ColorTrace window.

If you're cherry picking individual grades from one timeline to paste into shots in another, you can copy grades one at a time.

**To copy one source grade to one target clip:**

- Click a thumbnail in the Source timeline (on top) to copy from, then click a thumbnail in the Target timeline (on the bottom), and click Paste.

You can also simultaneously copy the grades of entire scenes of clips from one timeline to another. For example, if you're copying grades from an originally graded timeline to a re-edited version of the same program, you can copy every grade from a 10-clip scene in the Source timeline to the same 10 clips in the Target timeline which have been pushed back later in the Timeline.

To copy a group of source grades to a group of target clips:

1   Choose a continuous range of source clips by doing one of the following:

- Click the first clip in the range, and then Shift-click the last clip in the range.
- Enter the clip number of the first clip in the left "Copy Range" field, and then enter the clip number of the last clip in the right field.
- Click a clip, and then click First to select every clip from that one to the first clip in the Timeline.
- Click a clip, and then click Last to select every clip from that one to the last clip in the Timeline.

2   Choose a continuous range of Target clips by using the same procedures as in the previous step, but using the "Paste Range" controls.

Important: You must select the same number of target clips as you did source clips for the Paste button to become enabled.
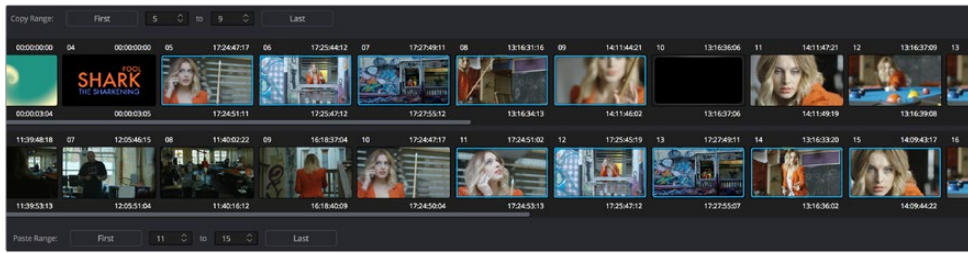
Group copy and paste of grades

3 When you've made your selections, click Paste.

The grade settings from the source clips are pasted to the destination clips, in order. In other words, if you copy from clips 5 through 9 to clips 11 through 15, then grade 5 is copied to shot 11, grade 6 is copied to shot 12, grade 7 is copied to shot 13, etcetera.

Importing CDL Data Using ColorTrace

The ColorTrace CDL command lets you import ASC CDL file formats from other applications into DaVinci Resolve. Resolve version 11.1 also added the ability to read DRX filenames from CDL files, allowing a CDL to load exported Resolve grades.

There are three supported file formats:

- **CMX EDL:** An EDL with comments referring to CCC/CDL XML files, or even Slope, Offset, and Power (SOP) data within the comment area.
- **CCC and CDL XML:** A file format that contains various color correction looks, and even references.

To import CDL data into DaVinci Resolve:

1 If you're importing CCC/CDL XML correction looks:

Open the Gallery page, right-click anywhere within the Stills tab, and choose "Import" from the contextual menu.

When the Import Stills dialog appears, open the CDL/CCC files. When these are finished importing into the Gallery, an ASC logo will appear along with them.

2 Open the Edit page and select the Timeline you want to use ColorTrace with in the Timeline list.

3 Right-click anywhere within the Timeline, and choose ColorTrace from CDL.

4 Select an EDL using the Select EDL dialog, and click Open.

5 Select its corresponding CDL and CCC files using the Select CDL Files dialog. If there are no CDL or CCC files (which is the case if there are inline SOP comments within the EDL), you should click cancel.

6 Using the ColorTrace With CDL window, copy the source grades from the CMX EDL/ CCC & CDL XML files to the Target timeline.

At this point, the ColorTrace window works identically as previously described.

For formatting reference, here are some examples of CMX, CCC and CDL files.

Example CMX EDL File

```
TITLE: Final EDL FCM: NON-DROP FRAME 010 001 V C 01:19:28:16
01:19:28:16 01:00:41:18 01:00:42:18 *ASC_CC_XML test_cc.102 011 001 V C
00:00:00:00 01:19:28:16 01:00:42:18 01:00:43:18 *ASC_SOP (0.9 1.2 0.5)(0.4
-0.5 0.6)(1.0 0.8 1.5)
```

Example CCC File

```
<ColorCorrectionCollection xmlns:"urn:ASC:CDL:v0.5" >

<InputDescription> test corrections for ref_input_image.1920

</InputDescription> <ViewingDescription>

for mathematical analysis only </ViewingDescription>

<ColorCorrection id="test_cc.100"> <SOPNode>

<Description> for ref_output_image.0100 </Description> <Slope> 1.0
1.0 1.0 </Slope> <Offset> 0.0 0.0 0.0 </Offset> <Power> 1.0 1.0
1.0 </Power>

</SOPNode> </ColorCorrection>

<ColorCorrection id="test_cc.101"> <SOPNode>

<Description> for ref_output_image.0101 </Description> <Slope> 1.0
1.5 0.6 </Slope> <Offset> 0.0 -0.1 0.01 </Offset> <Power> 1.0 1.5
0.5 </Power>

</SOPNode> </ColorCorrection>

</ColorCorrectionCollection>
```

Example CDL File

```
<ColorDecisionList xmlns=<94>urn:ASC:CDL:v0.5<94> >

<InputDescription> GeneralProducts M1 std thru GP M1 LUT4 </
InputDescription> <ViewingDescription> GP P1, DCI P3, Pathe color
emul </ViewingDescription> <ColorDecision>

<MediaRef ref=<94>/some/Project/frame%250900-0954%5B.dpx<94>/>
<ColorCorrection id="cc03340">

<SOPNode> <Description>change +1 red, contrast boost</Description>
<Slope>1.2 1.3 1.4</Slope> <Offset>0.3 0.0 0.0</Offset> <Power>1.0 1.0
1.0</Power>

</SOPNode> </ColorCorrection>

</ColorDecision> </ColorDecisionList>
```

Using CDL Adjustments

Once you've imported a CDL (Color Decision List), then the CDL adjustment for each clip is made available to you via a contextual menu command in the Thumbnail timeline of the Color page.

Calculating CDL Functions

To turn the SOP values into a primary correction, the following math is used by DaVinci Resolve:

```
Output = (Input * Slope + Offset)Power
```

Output refers to the final grade. Input is the value of each pixel within each color channel (on a scale from 0-1). The detente value for Slope is 1. The detente value for Offset is 0. The detente value for Power is 1.