



# ACO Converter App USER GUIDE

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## 1. Quick Start: Your First Look in 60 Seconds

The ACO Converter User Guide is designed to remove technical barriers, allowing users to move from a raw idea to a finished professional asset in under a minute. As a web-standard, stand-alone tool, it offers universal accessibility, functioning seamlessly on any device with a browser, including Chromebook Plus. By focusing on a clean, visual interface, the tool ensures that the complex math of color science stays behind the scenes, letting the creative process take centre stage.

### The Five-Step "Fast Track" Guide:

1. **Drop the reference image:** Drag any photo into the designated "Drop Image" area to set your visual baseline.
2. **Drop the .aco file:** Drag your Adobe Swatch file into the "Drop .aco Swatches" area to load your color palette.
3. **Selecting a swatch name:** Click on a specific color name (e.g., "Vintage Teal") from the populated library list.
4. **Moving the sliders:** Adjust the sliders to fine-tune how the color interacts with your image.
5. **Clicking "Bake":** Select the "Bake" button to generate your final professional color file.

This streamlined approach provides immediate visual feedback, transforming the way designers think about their static color assets and serving as the first step in a deeper color-grading journey.



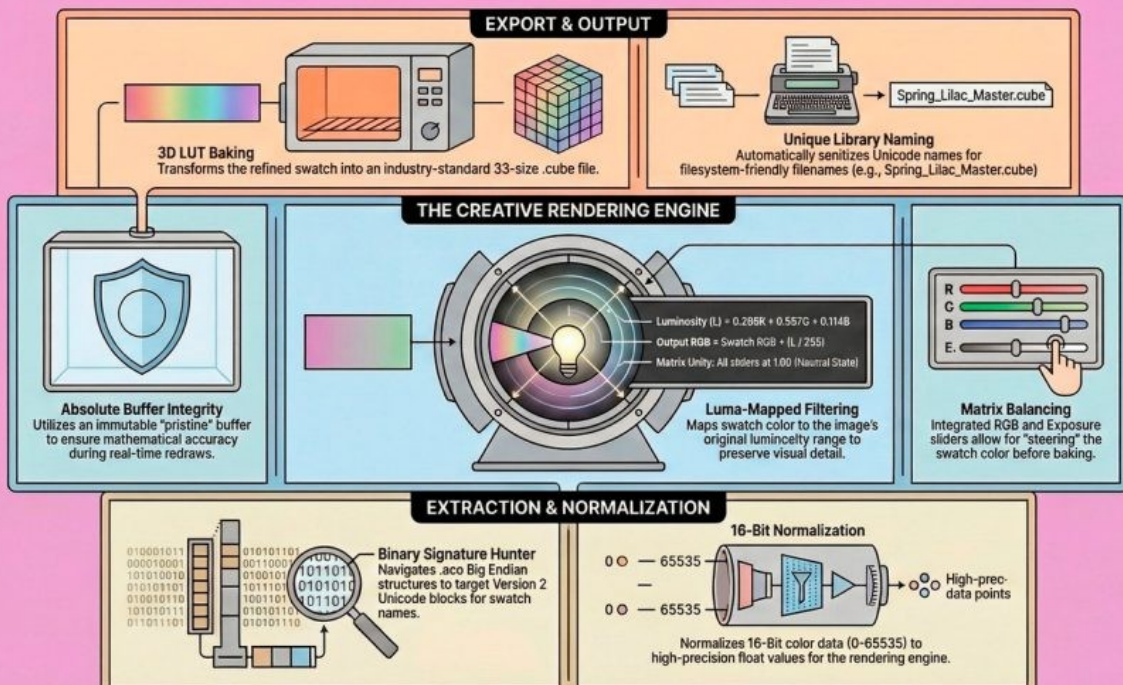
## 2. The Mission: Transforming Palettes into Looks

In professional design and video production, there is often a disconnect between the brand colors defined in a style guide and the final "look" of a video or photo campaign. Historically, applying a specific brand swatch to a moving image resulted in a flat, muddy overlay that obscured detail. The ACO Converter bridges this gap by acting as a specialized **Monochrome Grading Engine**, treating a single swatch as a "Target Primary" for a sophisticated luminosity map.

**Primary Function** The ACO Converter extracts high-precision color data from Adobe Color Swatch (.aco) files and transforms them into industry-standard 3D Lookup Tables (LUTs). This allows users to apply brand-accurate colors to any major video or photo editor with cinematic results, moving beyond simple overlays to true color-mapped filtering.

**The "So What?" Factor** The strategic advantage of this tool lies in cross-media consistency. By converting a brand color into a 3D LUT, a company can ensure that the exact "soul" of their visual identity is maintained across different media, from a high-end commercial in Premiere to a social media campaign graded in Photoshop. It moves color from a "paint bucket" tool to a sophisticated grading engine, a process made possible by the app's intuitive physical layout.

### Lumatic LAB - ACO to LUT





### 3. Navigation: Interface Overview

A well-structured workspace is essential for reducing cognitive load, allowing the user to focus on aesthetic choices rather than searching for buttons. The ACO Converter interface is built on a precise grid (350px/1fr/300px) that follows the natural progression of a project.

**Master Ingest (Left Sidebar)** This 350px-wide sidebar is the starting point of every project. It features dedicated "drop zones" for images and .aco files. To assist the user, these zones provide tactile feedback by glowing with a fluorescent turquoise highlight when a file is hovered over them, signaling that the app is ready to receive data.

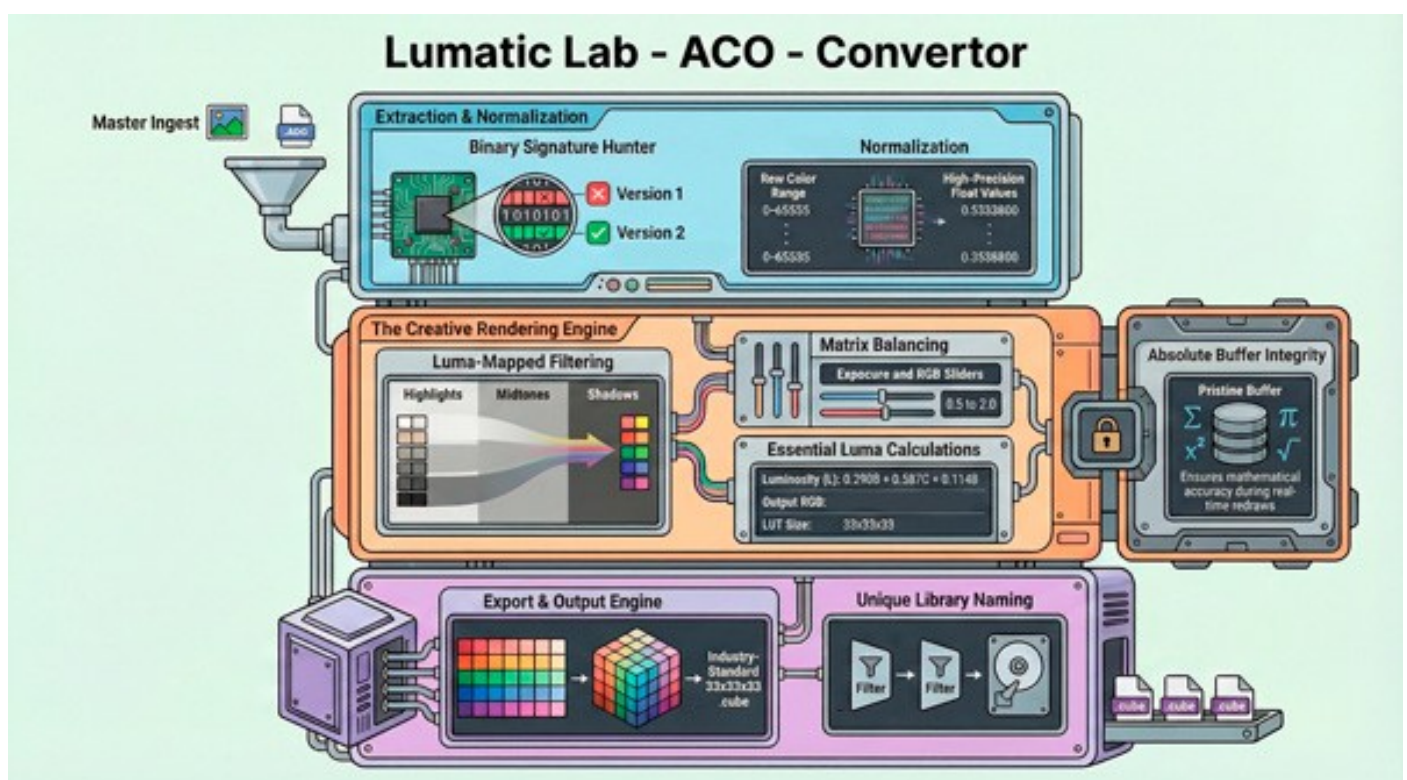
**The Viewport (Center)** The viewport is the heart of the application. It provides a real-time preview of how your chosen color swatch and slider adjustments affect your reference image. This area ensures that what you see is exactly what you get in the final export.

**Matrix Balance & Export (Right Sidebar)** This 300px-wide section houses the precision controls. It includes the Matrix Balance sliders for fine-tuning the look and the final action buttons for saving your work.

#### Key UI Elements:

- **Reset to Center:** Instantly returns all sliders to their neutral starting positions.
- **Clear All:** Located within the **Swatch Library** sub-panel on the Left Sidebar, this wipes the current palette to allow for a fresh start.
- **Rename:** Allows you to customize the names of swatches within the library before they are exported.

Understanding this layout facilitates a seamless transition into the "Extraction and Baking" workflow.





## 4. The Workflow Pipeline: Extraction to Baking

The application operates on an "Extraction and Baking" philosophy. This professional-standard, non-destructive workflow ensures that your original reference image remains untouched while the engine calculates the mathematical "recipe" for your new look.

### Stage 1: Ingest

- **What to do:** Load your reference photo and your binary .aco swatch data.
- **Why it matters:** This establishes the visual context and the raw data the engine will use for the transformation.

### Stage 2: Selection

- **What to do:** Identify and click a specific color in the Swatch Library.
- **Why it matters:** As you select a color, the "Signature Hunter" works behind the scenes to extract the high-precision 16-bit color data and Unicode names. This selects the "Target Primary" that the engine will map across the image's brightness range.

### Stage 3: Refinement

- **What to do:** Use the Matrix Balance sliders to "steer" the color's response.
- **Why it matters:** With specific ranges (0.5 to 2.0 for Exposure; 0 to 2.0 for RGB), these sliders allow you to customize the density and tone, ensuring the color perfectly matches the mood of your reference image.

### Stage 4: Baking

- **What to do:** Finalize the 3D LUT by clicking the "Bake" button.
- **Why it matters:** "Baking" converts your real-time adjustments into a permanent, high-precision file that can be used in other professional software. This transition from real-time adjustment to finalized file is powered by the app's internal rendering engine.



## 5. Feature Deep-Dive: The Creative Rendering Engine

Most basic editors apply color as a "flat wash," which simply places a semi-transparent layer over an image, often washing out the shadows and highlights. The ACO Converter uses a sophisticated rendering engine that treats color as a dynamic filter, performing **16-bit normalization** to convert 0–65535 integer values into high-precision floating-point data points.

**Luma-Mapped Filtering** Rather than painting over pixels, this engine maps your chosen swatch to the specific highlights, midtones, and shadows of your image. It ensures that pure black remains black and pure white takes on the swatch color, preserving all the original detail and texture of the shot.

**Matrix Balance Sliders** These sliders allow you to customize the "Matrix" of the color:

- **Exposure:** Adjusts the overall density and brightness of the color effect (Range: 0.5 to 2.0).
- **Red, Green, and Blue Balance:** These sliders allow you to "steer" the swatch (Range: 0 to 2.0). For example, you can push a blue swatch toward teal or purple to match a specific cinematic atmosphere.

**Live Tonal Histogram** Located in the Matrix Balance panel, this **turquoise/accent blue** graph tracks color shifts in real-time. It acts as a safety monitor, helping you prevent "blown out" highlights or lost shadow detail as you push the color sliders to their limits. With these features understood, first-time users can better navigate the complexities of color grading.

## 6. Success Strategies: Beginner Tips

Experimenting with radical color shifts is part of the creative process, but it is important to maintain the integrity of your image. Here are six tips for achieving professional results:

1. **Trust the Absolute Buffer Integrity:** The app utilizes an immutable `Uint8ClampedArray` known as the "Pristine Buffer." You can test extreme looks with zero latency because the engine redraws from this clean source every frame, preventing "data ghosting" or image degradation.
2. **Use "Reset to Center" as a Safety Net:** If a look becomes too chaotic, use this link to instantly return to a neutral, mathematically accurate starting point (1.00 for all sliders).
3. **Monitor for Clipping:** Always keep an eye on the turquoise histogram; if the bars bunch up against the **right side**, your highlights are "clipping" into the swatch color and losing detail.
4. **Avoid Over-Adjusting Blue:** Because the human eye perceives blue differently, small shifts in the Blue Balance slider have a much more dramatic effect than Red or Green.
5. **Sanitize Your Names:** Use the "Rename" feature to give your colors descriptive names to make them easier to find in your editor later.
6. **Start Subtle:** The most cinematic looks often come from slight adjustments to the Exposure and Balance sliders rather than maxing them out.





## 7. Advanced Notes: The Science of the Engine (Technical)

For Power Users and those who wish to understand the "why" behind the app, a look at the engine's mathematical foundation is required. **ACO Converter** offers high-precision data handling that rivals desktop-grade grading suites. The engine's integrity is built on three core technical pillars.

**Binary Signature Hunter** The tool's parser is specifically engineered to navigate these structures, skipping the basic Version 1 data blocks to target the **Version 2 Unicode blocks** and ensure the extraction of all color data and the preservation of original, descriptive swatch names.

**Absolute Buffer Integrity** To prevent data degradation during real-time redraws, the engine utilises a pristine buffer. Every time a slider is moved, the engine refers back to this immutable source rather than the previous frame, ensuring 100% mathematical accuracy and zero "ghosting".

**Rosetta Stone Mathematics** The heart of the rendering engine is the Luma calculation formula. By applying the industry-standard formula:  $0.299R + 0.587G + 0.114B$ , the engine creates a linear ramp from black to your swatch color. This ensures that the swatch is applied proportionally to the brightness of the image, resulting in a professional, transparent tint. This precision translates directly into versatile real-world applications.

## 8. Practical Application: Use Case Scenarios

The versatility of the ACO Converter makes it an essential tool in various professional environments:

**Brand-Accurate Grading** A design team can take a specific set of Pantone colors from a brand's style guide and instantly convert them into LUTs. These can then be handed off to a video editor to ensure the commercial campaign matches the print assets perfectly.

**The Monochrome Darkroom** By using the RGB matrix sliders on a single swatch, users can simulate the effect of physical lens filters used in traditional black-and-white photography. For example, pushing the Red balance can darken blue skies in a landscape shot, creating powerful, professional B&W split-tones.

**Cinematic Look Creation** A photographer can find a single inspiring color and use the "Bake" engine to turn it into a complex **33x33x33 (33-point) 3D LUT**. This "recipe" can then be applied to thousands of images to create a consistent "look" for an entire gallery. Finalizing these looks requires a clear understanding of the export engine.



## 9. Mastering Output: Export & Compatibility

Ensuring your files are ready for use in other professional environments is the final step in the pipeline. The export engine is designed with "file hygiene" in mind, automatically cleaning up filenames for cross-platform compatibility.

### Export Options:

- **The .Cube File:** This is the primary output—an industry-standard 33x33x33 3D LUT. It is high-resolution enough for cinema-grade work while remaining performant in real-time editors.
- **The .JPG Preview:** The app triggers **two separate downloads** when saving previews: one high-resolution 1200px version and, following a brief delay, a 200px thumbnail version.
- **Unique Library Naming:** The app automatically "sanitizes" your filenames, replacing spaces and special characters with underscores to ensure they are safe for any filesystem. For example, a swatch named "Spring Lilac" will export as **Spring\_Lilac\_Master.cube**.

**Compatible Software:** The exported .cube files are ready for immediate use in **Adobe Premiere Pro**, **DaVinci Resolve**, and **Adobe Photoshop**. Should any issues arise during this final phase, the following troubleshooting guide provides immediate solutions.

## 10. Smooth Sailing: Troubleshooting & Trust

At Lumatic Lab, we prioritise your privacy and the security of your creative assets. The ACO Converter performs all processing locally in your browser. There are no logins, no data storage, and your images never leave your machine.

### Troubleshooting Guide

Issue	Simple Fix
<b>Buttons are disabled</b>	Ensure both a reference image and an .aco file are loaded.
<b>Colors look "muddy"</b>	Check your Exposure slider; the effect may be too dense.
<b>Swatch list is empty</b>	Ensure you are dropping a Version 2 .aco file. The tool skips Version 1.
<b>Highlights look "flat"</b>	Check the Live Tonal Histogram to ensure you aren't clipping to the right.
<b>Unexpected color shifts</b>	Click "Reset to Center" to return to the neutral baseline.

**Elevate your color science.** Start turning your static swatches into cinematic masterpieces today.