



## ACO Converter – Addendum (v1.4.0–v1.5.0)

### 1. The Luminosity Engine (New Core Foundation)

The application now includes a dedicated **Luminosity Engine**, acting as a tonal “sculptor” before any colour is applied.

#### What’s changed

- All images are first converted into a **perceived brightness map (Luma)**
- This map is structured using the **11-Zone tonal system** (black → white)

#### Why it matters

- Ensures consistent tonal structure before colour grading
- Prevents washed-out highlights and crushed shadows

#### Key Mechanisms

##### Luma Weighted Ingestion

- Converts RGB into a single brightness value using perceptual weighting
- Green contributes most, blue least → matches human vision

##### Linear Zone Interpolation (LERP)

- Smoothly blends between tonal zones instead of snapping
- Eliminates banding (posterisation)
- Produces photographic-grade gradients

### 2. The Filter Engine (Enhanced Colour Application)

The **Filter Engine** now operates as a secondary layer, applied *after* tonal sculpting.

#### What’s changed

- Replaces flat overlays with **multiplicative colour mapping**
- Colour is now tied directly to brightness values

#### Why it matters

- Shadows stay dark, highlights stay bright
- Colour feels “embedded” in the image, not painted on



## Key Mechanisms

### Chromatic Multiplication

- Swatch colour is multiplied by luminance
- Result: natural, film-like colour response

### Strength Matrix (Global Opacity)

- Controls blend between:
  - Clean tonal base
  - Colour-influenced result

### Practical effect

- Enables subtle tinting or strong stylisation without losing detail

## 3. Unified Rendering Pipeline (Major Workflow Shift)

The pipeline is now fully integrated:

### Old model

- Either tonal shaping *or* colour mapping

### New model (v1.4.0+)

- Tonal sculpt → Colour injection → Final blend

### Why it matters

- No compromise between structure and style
- Enables “colourised zone system” workflows

## 4. Unified Export (.CUBE Baking Upgrade)

The export engine now reflects the full pipeline:

- Generates a **33×33×33 3D LUT grid**
- Each point processed through:
  - Luma conversion
  - Zone interpolation
  - Filter application
  - Strength blending

### Result

- 100% match between preview and exported LUT
- Reliable cross-platform grading consistency



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## Key additions

- Parallel processing of luminosity + colour
- Simultaneous Zone + Swatch workflows

## New capability

- Example: Apply a red swatch to a fully structured B&W tonal base

## Impact

- Dramatically improved creative control
- True hybrid grading (monochrome + colour)

## v1.5.0 – “Ribbon Build”

### Key addition: Zone Audit Ribbon

A real-time visual strip showing:

- Zone 0 → Zone 10 (black → white)
- Colour influence across each tonal level

### Why it matters

- Instant feedback on:
  - Clipping
  - Colour density
  - Tonal balance

## 6. New UI & Feedback Systems

### Zone Audit Ribbon

- 11-segment tonal bar
- Updates live with slider changes

### Chromatic Magnitude Mapping

- Shows exactly how RGB adjustments affect each zone

### Optical Neutral Workspace

- Fixed neutral grey (#7F7F7F) background
- Prevents visual bias when judging colour



## 7. Operational Verification (What You Can Trust)

The system now guarantees:

- **Tonal integrity preserved** during colour grading
- **Real-time preview = final LUT output**
- **No flattening of highlights or shadows**
- **Consistent results across software platforms**

## Practical Impact (Quick View)

Feature	Before	Now
Tonal control	Limited	Full 11-zone structure
Colour application	Overlay-style	Luma-mapped
Workflow	Sequential	Unified
Preview accuracy	Approximate	Exact match
UI feedback	Histogram only	Zone Ribbon + mapping

## 8. Risk Assessment

### Pros

- Stronger tonal fidelity (high confidence)
- More cinematic, controllable results (high confidence)
- Better export reliability (high confidence)

### Cons

- Slight learning curve for Zone System (medium likelihood)
- More controls may overwhelm beginners (low–medium)

### Overall

- Clear upgrade with minimal downside once basics are understood



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