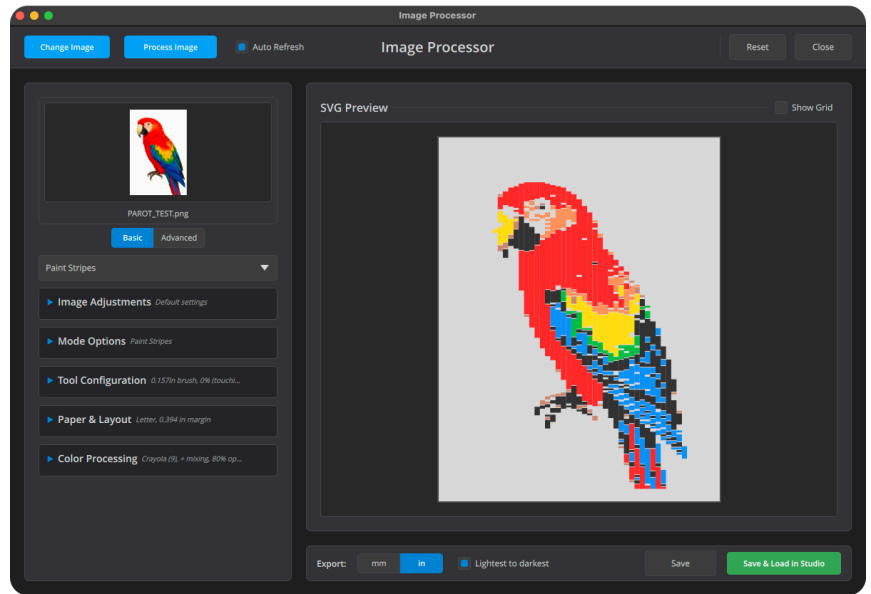


Bantam Tools Image Processor™

Bantam Tools Image Processor™ makes it possible to start from an image instead of an SVG, translating pixel based artwork into vector structure that machines can understand.

Its role is to take visual input and translate it into a structured form that can be painted by a machine. It prepares images so they can participate in a physical painting workflow that involves brushes, water, pigment, motion, and material behavior.

Bantam Tools Image Processor™ sits at the very beginning of the painting process. Image Processor generates an SVG from an image. After that, the workflow proceeds like any other SVG based job in Bantam Tools Studio™, where you select a toolset and palette (for painting), then run the job.



1. Launching Bantam Tools Image Processor™

To launch Bantam Tools Image Processor™, open the **Prepare** tab in Bantam Tools Studio™. Instead of opening an SVG file, select **Image to SVG Utility**.

This opens Image Processor, where you can begin working from a raster image rather than a pre-existing SVG.

2. the Generative Nature of Image Processor - Process Image & Auto Refresh

The **Process Image** button and **Auto Refresh** setting control when Image Processor recalculates the SVG preview.

Each time you press **Process Image**, the image is regenerated based on the current settings. Some parts of Image Processor rely on percentage based and probabilistic calculations, so pressing **Process Image** multiple times without changing any settings can still produce slightly different results. This variability is intentional and supports more organic, less mechanical outcomes.

When **Auto Refresh** is enabled, changing any setting immediately triggers a full recalculation. This is useful for quick exploration and small adjustments, but with larger images or more complex settings it can result in longer processing times. In those cases, turning Auto Refresh off allows you to adjust multiple values first, then manually trigger a recalculation using **Process Image**.

Because of the generative nature of Image Processor, results are not guaranteed to be repeatable. If you see an output you like, save it. Reprocessing later, even with the same settings, may not return you to the same result. Treat each successful preview as a moment worth capturing.

Quick Tips & Tricks:

1. **Start with Paint Shapes** for most images - it provides the best balance of detail and paintability.
2. **Lower the minimum area** in Paint Shapes mode if you want more detail, but be aware this creates more regions to paint.
3. **Enable dithering** in Paint Stripes mode when your image has gradients to avoid harsh color banding.
4. **Use Detail Trace** (Advanced mode) when you want crisp pen outlines after the watercolors dry.
5. **Adjust stroke overlap** based on your painting style:
 - Watercolors: Try negative overlap (gaps) for wet-on-wet blending
 - Markers: Use 0% (touching) for clean coverage
 - Heavy coverage: Use positive overlap
6. **Enable Virtual Palette Mixing** if your selected palette doesn't have the exact colors you need - the system will approximate by layering.
7. **Water blending** in Paint Shapes/Shades modes can create softer edges between color regions.

2 - Selecting an Image

Before selecting a file on your computer, it is worth thinking about what makes an image well suited for processing. The choices you make at this stage have a large impact on how successful and controllable the resulting SVG will be. **Taking time to choose the right image upfront leads to cleaner SVG output and a smoother transition into painting.**

When you open Bantam Tools Image Processor™, an example image is preloaded: a colorful parrot on a white background. This image demonstrates several qualities that tend to work especially well.

Strong, Clear Subject: Images with a clear, readable subject are easier to translate into vector structure. A well defined silhouette helps establish clean boundaries and reduces ambiguity during conversion. Subjects that are heavily obscured, cropped, or tangled with other elements can lead to fragmented or overly complex SVG output.

Color Separation: Vibrant colors that are clearly separated into distinct regions translate well into machine friendly structure. Large, continuous color areas tend to produce SVGs that are easier to paint than images made up of many small, subtle variations. Images with low contrast or heavily blended colors can still work, but often require more iteration.

Simple or Isolated Backgrounds: Whenever possible, start with an image that has a clean or simplified background. Isolating the subject in a photo editor before processing gives you greater control and helps ensure that the Image Processor focuses on the parts of the image you actually want to paint. Busy backgrounds often introduce unnecessary structure into the resulting SVG.

Manageable Detail: Images with a moderate level of detail tend to work best. There should be enough visual information to remain interesting, but not so much that the image relies on fine texture or subtle gradients. Physical painting favors clarity over precision, and overly fine detail is often lost once brushes, water, and pigment are involved.

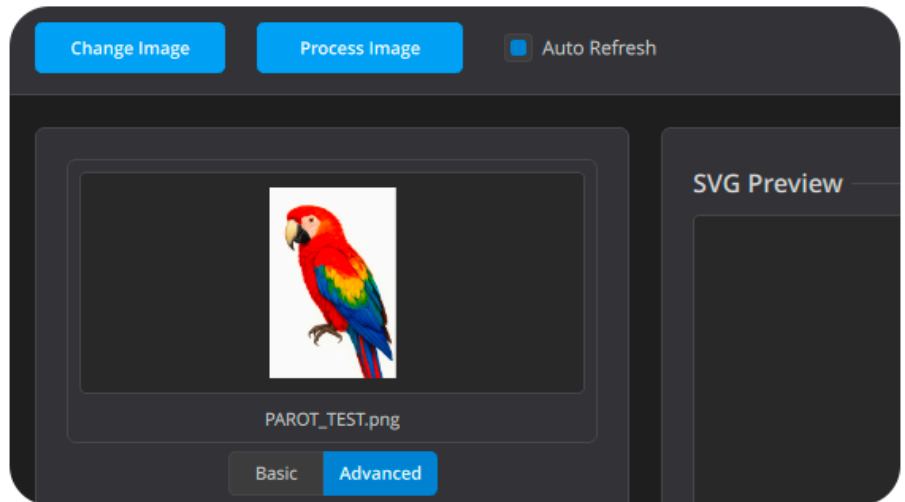
Even Lighting: Images with consistent lighting generally produce more predictable results. Strong shadows, glare, or extreme highlights can be interpreted as structure, even when they are just lighting artifacts. Soft, even lighting helps the Image Processor focus on the subject itself rather than accidental contrast.

Thoughtful Framing: Centered subjects with comfortable margins are easier to scale and place later in the workflow. Avoid images that are tightly cropped or cut off in ways that feel unintentional.

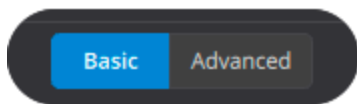
3 - Change Image

To load a new image, select **Change Image** in the top right corner of the Image Processor. This opens a file browser where you can choose the image you want to process.

Tip: It can be helpful to treat this step as part of your creative exploration. As you consider different images, try loading them into the Image Processor to see how they translate. Quickly previewing how an image reacts can help you decide which ones are worth developing further before committing to a full painting workflow.



4. Basic vs Advanced Mode



When you first open Bantam Tools Image Processor™, the focus is speed and clarity. Basic Mode is where almost all painting workflows begin and end. It presents a small, carefully chosen set of controls that produce reliable, paintable results without requiring technical tuning. For most users and most images, Basic Mode is all that is needed to generate successful watercolor-ready SVGs.

Advanced Mode is intentionally separated and optional. It exposes deeper and sometimes experimental controls that are not required for standard painting workflows. These tools exist for users who want to push beyond default behavior, explore non-painting outputs, or experiment with how images are interpreted at a structural level.


Advanced Mode is best thought of as a sandbox rather than a next step. If you are getting good results in Basic Mode, there is no expectation or advantage to switching. The Image Processor is designed so that effective painting workflows remain simple, predictable, and accessible without requiring advanced controls.

At the top of the left panel, you'll find a **Basic/Advanced** toggle:

- **Basic Mode:** Shows only essential controls for quick results
- **Advanced Mode:** Reveals additional HSL (Hue, Saturation, Lightness) adjustments and Detail Trace options

5. Render Mode

The dropdown at the top selects how your image will be converted to paintable strokes.



Paint Stripes

Render Mode defines the overall painting philosophy used to interpret your image. Rather than focusing on color correction or fine adjustments, Render Mode answers a more fundamental question: how should this image be broken down into marks that a physical brush can paint?

5.1 Paint Stripes

Converts the image into horizontal or vertical stripe patterns, similar to hatching. Each stripe is painted with a single color.

Best for: Simple images, quick conversions, when you want a woodcut/linocut aesthetic.

5.2 Paint Shapes

Creates paint-by-numbers style regions. The image is segmented into discrete color regions that can be filled with paint.

Best for: Most images - provides good balance of detail and paintability.

5.3 Paint Shades

Uses weighted Voronoi stippling to place painterly strokes that follow the image structure. Creates more organic, impressionist-style output.

Best for: Portraits, landscapes, when you want a more artistic/loose interpretation.

6. Image Adjustments

Image Adjustments exist to help the Image Processor see your image the way you intend it to be painted. These controls do not change the original file on disk, and they are not meant to replace full image editing software. Instead, they provide lightweight, purpose-built adjustments that influence how structure, color, and boundaries are interpreted during conversion.

You will notice that the sample image used in this guide has been edited in a photo editor outside of Image Processor to isolate the subject against a completely white background. This kind of pre-production work is often important when you plan to incorporate Image Processor into a longer term, more intentional artistic workflow.

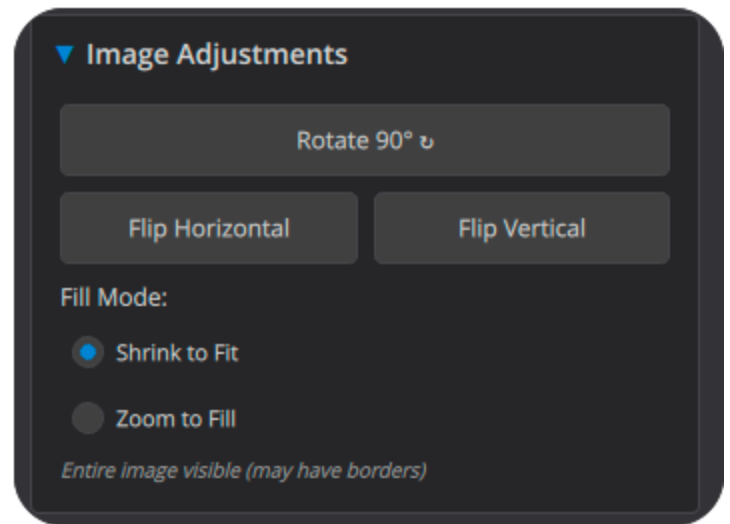


Image Processor works best when the subject is clearly separated from its background. Preparing images ahead of time by cleaning up edges, simplifying backgrounds, or isolating key elements can dramatically improve the clarity and predictability of the generated strokes.

Advanced Mode includes controls for adjusting saturation, brightness, contrast, and hue. These settings affect how colors and light separate from one another, which in turn changes how Image Processor interprets structure and boundaries. Rather than making an image look better on screen, these adjustments help Image Processor see the image differently, often revealing separations that are subtle or ambiguous in the original file.

6.1 Transform Controls

- **Rotate 90°:** Rotates the image clockwise by 90 degrees
- **Flip Horizontal:** Mirrors the image left-to-right
- **Flip Vertical:** Mirrors the image top-to-bottom

6.2 Fill Mode

- **Shrink to Fit:** Entire image is visible within the paper bounds (may leave borders)
- **Zoom to Fill:** Image fills the entire paper area (may crop edges)

6.3 HSL (Hue, Saturation, Lightness) Adjustments (Advanced Mode)

Fine-tune the image before processing:

Control	Range	Default	Description
Saturation	0.0 - 2.0x	1.0x	Color intensity. Values >1 boost colors, <1 desaturate
Brightness	-0.5 to +0.5	0.0	Overall lightness. Positive = brighter, negative = darker
Contrast	-100 to +100	0	Difference between light and dark areas
Hue	-180° to +180°	0°	Shifts all colors around the color wheel

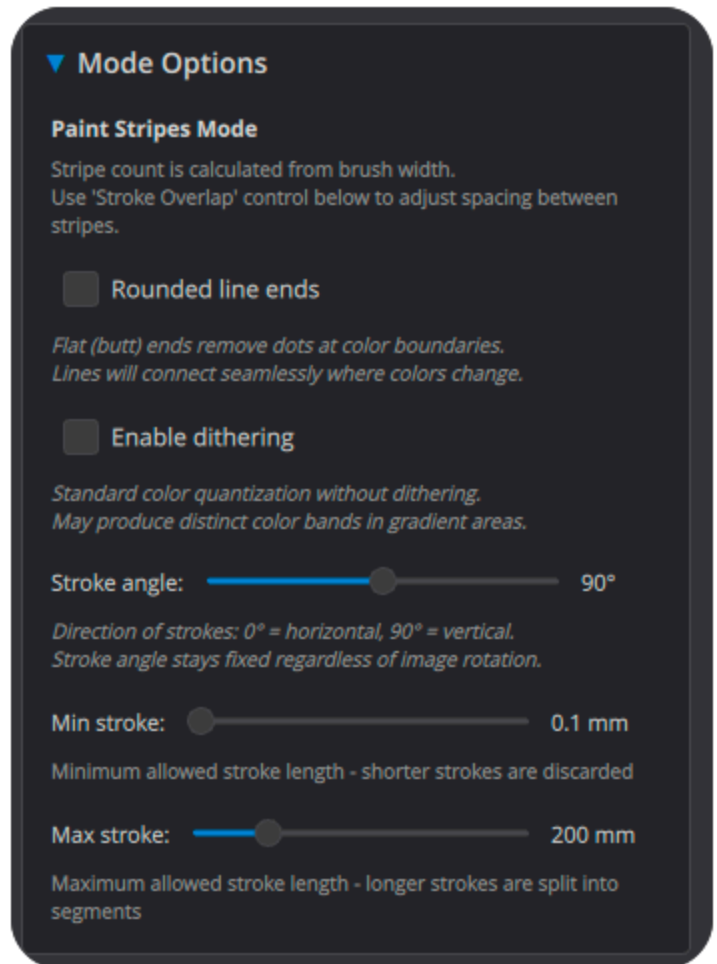
7. Mode Options

Options change based on the selected render mode.

Mode Options refine how a selected Render Mode behaves. While Render Mode defines the overall interpretation of the image, Mode Options control the character, density, and continuity of the resulting strokes. These settings are where you decide how literal or expressive the translation should be, and how much small scale structure is allowed to survive into the final output.

Not every option needs to be adjusted for every job. In many cases, the default values are chosen to favor paintability and visual clarity over raw detail. Changes here should be made with intention, especially when working with physical brushes, water, and paper.

As discussed in the Quick Start guide, settings like **Min Stroke** should generally be kept above **2 mm** so the brush is able to be physically pulled across the paper. Lower values intentionally introduce very short marks that behave more like stippling, which may or may not visually blend with longer strokes depending on the materials and technique used.



See a detailed breakdown of each option on the following pages

7.1 Paint Stripes Options

Control	Range	Default	Description
Rounded line ends	On/Off	Off	When off, removes dots at color boundaries. Use "off" for Pilot Parallel Pens or seamless color transitions
Enable dithering	On/Off	Off	Applies diffusion dithering for smoother gradients
Dithering Algorithm	Dropdown	Floyd-Steinberg	Choose: Floyd-Steinberg (best gradients), Ordered/Bayer (pattern-based), Atkinson (less noise)
Stroke angle	0° - 180°	90°	Direction of strokes: 0° = horizontal, 90° = vertical
Min stroke	0.1 - 100 mm	1.0 mm	Strokes shorter than this are discarded
Max stroke	1 - 1000 mm	200 mm	Longer strokes are split into segments

7.2 Paint Shapes Options

Control	Range	Default	Description
Min area	4 - 500 mm ²	4 mm ²	Minimum region size. Smaller = more detail, more regions to paint
Generate infill patterns	On/Off	On	Creates concentric fill lines as painting guides
Enable detail lines	On/Off	Off	Adds thin black outlines (experimental)
Complexity	Max to Min	Max (0.0)	Max = detailed complex shapes, Min = smooth simple shapes
Water wash blending	On/Off	Off	Adds water strokes at boundaries for softer transitions
Water wash before color	On/Off	On	When enabled, water is applied first (wet-on-wet technique)

7.3 Paint Shades Options

Uses Weighted Voronoi Stippling (Secord 2002 algorithm) for painterly strokes.

Control	Range	Default	Description
Voronoi iterations	0 - 20	3	Lloyd relaxation for blue-noise distribution. More = better distribution, slower
Flow coherence	0 - 100	30	Edge Tangent Field smoothing. Higher = smoother, more coherent strokes
Seed density	100 - 10000	1000	Base seeds per pigment. More seeds = denser strokes
Fidelity	0.0 - 10.0	1.0	Color matching priority. Higher = more accurate colors
Fill passes	1 - 5	3	Iterative refinement. More passes = better coverage, slower
Water blending	On/Off	On	Adds water strokes at color boundaries
Water opacity	0.1 - 0.5	0.3	How transparent the water strokes appear (when water blending enabled)

8. Detail Trace (Advanced Mode)

Creates a black outline layer for pen/marker tracing after watercolors dry. The trace layer renders last (topmost) in the SVG output.

8.1 Main Controls

Control	Description
Enable detail trace	Turns the feature on/off
Strategy	Organic for art/photos (DoG edge detection), Geometric for architecture/technical drawings (Line Segment Detector)
Stroke width	Width of trace lines (default 0.7mm for fine pen)

8.2 Advanced Parameters (Organic Strategy)

Control	Range	Default	Description
Min path length	0.5 - 20 mm	2.0 mm	Filters out short paths (noise)
DoG Sigma 1	0.5 - 3.0	1.0	Inner Gaussian blur - smaller = finer edges
DoG Sigma 2	1.0 - 6.0	3.0	Outer Gaussian blur - larger = broader edges
Block size	3 - 51 (odd)	11	Adaptive threshold block size
Threshold C	-10 to +10	2.0	Threshold constant - negative = more edges
Smoothing	0.5 - 3.0	1.0	Douglas-Peucker simplification - lower = more detail
Smooth passes	0 - 5	2	Chaikin smoothing passes - lower = more detail
White thresh	240 - 255	254	Pixels brighter than this are filtered as background
Expand white filter	On/Off	Off	Dilate white mask to catch edges near white boundaries
Min contrast	0 - 100	10	Filters edges in low-contrast areas

Advanced Parameters (Geometric Strategy)

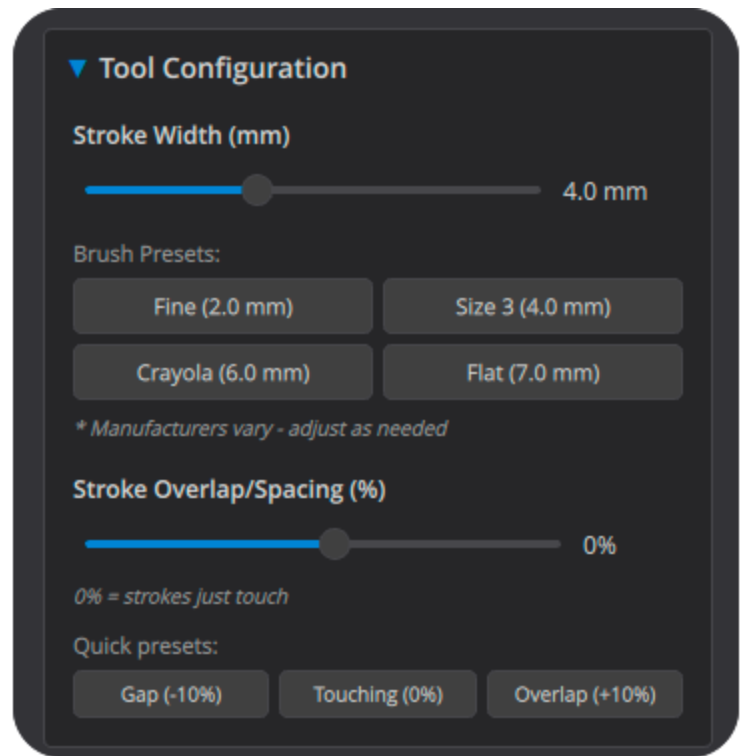
Control	Range	Default	Description
Min line length	5 - 100 px	10 px	Minimum line segment length to detect

9. Tool Configuration

Tool Configuration defines how the Image Processor generates strokes, not how the WaterColorBot is physically configured.

Tool Configuration does not configure tools, brushes, or behavior on the WaterColorBot itself. Instead, it tells the Image Processor how to construct SVG paths, including assumptions about stroke width, spacing, and mark structure, so those paths are appropriate for a given painting tool.

Think of Tool Configuration as a translation step. It sets expectations about the physical tool that will eventually be used, ensuring the generated SVG is compatible with the brush size and painting style you plan to apply later. The actual painting behavior, including brush loading, refilling, and motion, is defined later when the SVG is prepared and assigned to a toolset inside Bantam Tools Studio.



9.1 Stroke Width

Sets the brush/marker width used for painting.

Range: 0.1 - 10.0 mm (or inches depending on unit setting)

Brush Presets: Set the effective brush width used to generate strokes, approximating different physical brush sizes.

Note: Actual brush sizes vary by manufacturer - adjust as needed.

9.2 Stroke Overlap/Spacing

Controls how strokes relate to each other:

Value	Meaning
Negative (e.g., -10%)	Gap between strokes
0%	Strokes just touch edge-to-edge
Positive (e.g., +10%)	Strokes overlap

Quick Presets:

- **Gap (-10%):** Slight space between strokes
- **Touching (0%):** Strokes just touch
- **Overlap (+10%):** Strokes overlap slightly

9.3 Multiple Brush Widths (Paint Shades Only)

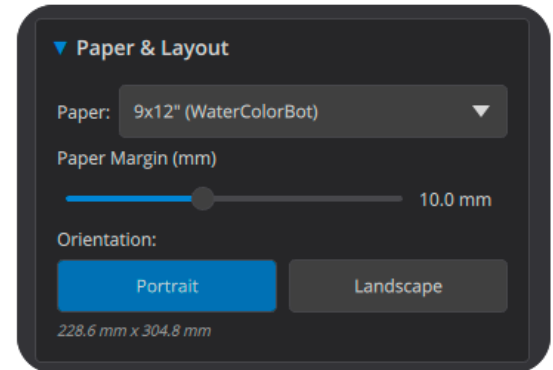
When using Paint Shades mode, you can enable multi-brush support:

- **Multiple Brush Widths:** Enable to use multiple brush sizes
- **Brush Widths:** Comma-separated list (e.g., "10, 5, 2")
 - Large brushes fill bulk areas
 - Small brushes add detail
 - Range: 0.1 - 100mm, up to 10 values

10. Paper & Layout

Paper & Layout defines the size, orientation, and usable area of the SVG generated by the Image Processor. These settings do not configure the WaterColorBot hardware or physically move the paper. Instead, they establish the coordinate space and boundaries that the generated paths will occupy.

Think of Paper & Layout as setting the canvas for the translation process. By choosing a paper size, margins, and orientation here, you are telling the Image Processor how the image should be framed and scaled when converted into SVG paths. This ensures the output fits your intended paper size and composition before it is later prepared and painted using a toolset in Bantam Tools Studio.



Setting up **Paper & Layout** at this stage allows Image Processor to accurately scale brush strokes relative to the paper size and margins you intend to use. Stroke width, spacing, and overlap are all generated based on these dimensions.

10.1 Paper Size

Choose from 17 preset sizes plus custom:

Custom: Enter your own width and height (10 - 1000 mm)

10.2 Paper Margin

Range: 0 - 25 mm

The margin around the paper edge where no strokes will be placed.

10.3 Orientation

- **Portrait:** Taller than wide
- **Landscape:** Wider than tall

11. Color Processing

Color Processing determines how Image Processor reduces your image into a working set of paintable colors. Rather than attempting to reproduce every subtle variation in the source image, this stage defines the palette the system is allowed to see and use when generating strokes.

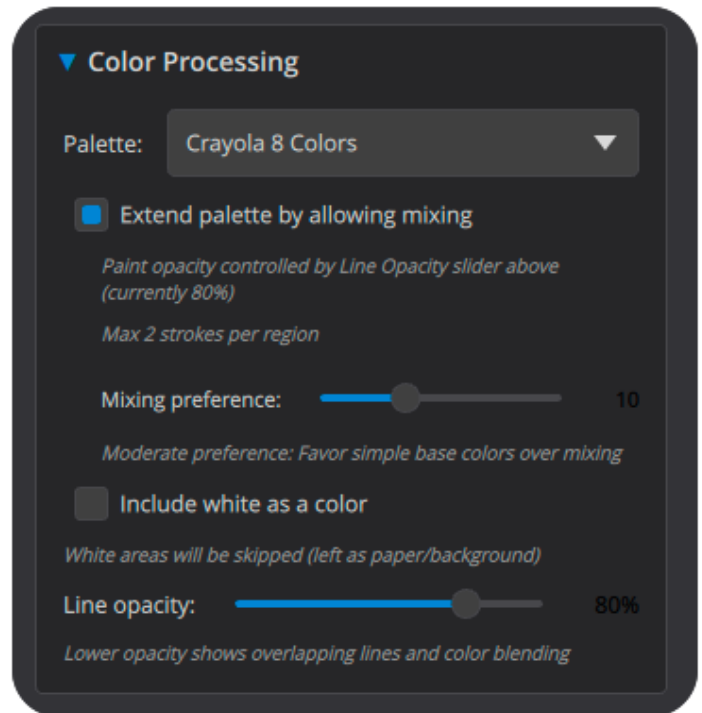
By default, white is not included as a paintable color. Image Processor assumes you are painting on white watercolor paper and treats white areas in the image as unpainted paper rather than something to fill. This preserves highlights, negative space, and the natural brightness of the paper. If your workflow requires painting light areas explicitly, or substituting white with another color, you can enable the **Include White** toggle to treat white regions as a paintable color instead.

Several preset palettes are provided for well known watercolor and marker sets. When working with **Crayola**, it is often useful to intentionally limit yourself to the colors that physically exist in the set. This constraint tends to produce clearer separations and more predictable results, while reinforcing the character of the medium itself.

If you are using the **12 Pan Palette Accessory**, selecting **Image Colors** can open up a more interpretive workflow. In this mode, Image Processor extracts colors from the image, and you as the artist decide how those colors map onto your twelve physical paint pans. You may choose to mix, approximate, or reinterpret the extracted colors however you see fit, then assign them intentionally to the palette layout.

There are also creative advantages to allowing Image Processor to see larger preset palettes, such as the full **Pentel 22** set. This allows the system to preview and select from a wider range of existing colors during processing, even if you later choose to consolidate or reinterpret those colors during painting. Used thoughtfully, this can reveal color relationships and possibilities that are not immediately obvious when working from a more limited palette.

Section 11 continues on the next page



11.1 Palette Selection

Choose which colors will be used for painting:

Palette	Colors	Description
Crayola 8	9 (8 + white)	Standard Crayola marker palette
Winsor & Newton	12	Professional artist watercolor palette
Pentel 22	23 (22 + white)	Pentel marker palette
Phoenix	35	Comprehensive watercolor palette
Grayscale	2 - 128	Grayscale shades (user-selected count)
Image Colors	2 - 128	K-means extraction from the image
Custom	Variable	User-defined color palette

11.2 Virtual Palette Mixing

Extend palette by allowing mixing: When enabled, the system can layer semi-transparent strokes to create mixed colors (e.g., Red + Blue = Purple). Uses Kubelka-Munk physics-based color mixing for realistic paint behavior.

Mixing preference (0 - 30): Controls how much the system prefers simple base colors vs. complex mixes:

- **0:** Always use best color match (may create complex mixes)
- **~10:** Favor base colors when reasonably close
- **~20:** Strongly prefer base colors, minimize mixing
- **30:** Maximum preference for single strokes

The maximum number of strokes per region is calculated from line opacity (e.g., at 80% opacity, max 2 strokes).

11.3 Include White

- **Off:** White areas are left as paper/background (not painted)
- **On:** White areas are rendered using a substitute color

When enabled, you can pick a **replacement color** to use instead of true white (default: light blue #E3F2FD).

11.4 Line Opacity

Range: 10% - 100% **Default:** 80%

Controls the transparency of paint strokes. Lower opacity:

- Shows overlapping strokes
- Enables more color mixing/blending
- Creates watercolor-like effects

12. Export Options

Export Options are located at the bottom of the SVG preview window and control how the generated SVG is saved or handed off into Bantam Tools Studio for painting.

Export Options define how the work you have done in Image Processor is preserved. Image Processor uses generative, percentage based calculations, which means that pressing **Process Image** again, even with identical settings, can produce a slightly different result. If you see an output you like, saving the SVG is critical. Reprocessing later may not return you to the same structure.

An exported SVG is not a finished painting. It is a paintable structure that represents one possible interpretation of the source image. That structure may or may not be immediately paintable without further adjustment, and the choices you make next inside Bantam Tools Studio will have a significant impact on the final outcome. Toolsets, palettes, refill behavior, stroke order, paper choice, and drying time all influence how the SVG translates into physical paint.

The **Save & Load in Studio** button provides a direct handoff into Bantam Tools Studio for immediate painting. This is useful when you are ready to continue straight into tool assignment and execution.

In many cases, saving the SVG separately is essential. A saved SVG allows you to experiment with different toolsets, painting techniques, or materials now or in the future without re-running Image Processor. Treat exported SVGs as snapshots of a generative process, not guaranteed recipes. Saving successful results ensures you can return to them, refine them, and repaint them under different conditions with intention.

12.1 Sort by Lightness

When enabled, colors in the output are ordered from lightest to darkest. This is useful for watercolor painting where lighter colors are typically applied first.

12.2 Unit Toggle (mm/in)

Switches the display between millimeters and inches throughout the interface.
