ILLUSION2BEAM

Laser Engraving Starter Guide

How to turn your downloaded 3D illusion design into a great engraving: the best materials, starting settings for your laser, and how to fix common problems.

Important: every laser, lens, wood board and even room humidity is different. The settings in this guide are **starting points**, not guaranteed results. Always run a small test on scrap from the same board before engraving the full design.

1. Which file to use

File	When to use it
Laser PNG	Best choice for most software (LightBurn, xTool Creative Space, LaserGRBL, RDWorks). Grayscale image, 2x resolution.
Laser BMP	For older or simpler software that prefers BMP.
Cut-out ZIP	Contains the laser PNG plus a matching SVG cut line. Engrave the PNG first, then cut the SVG line without moving the board. For designs with openings inside the outline, trace the PNG in LightBurn instead (section 7).
Artwork PNG	The colored preview. For showing customers or listing the design, not for engraving.

In the laser grayscale, **white = no burn** and **black = deepest burn**. Don't invert the image for wood.

The three dials: which setting to change

There are three places to adjust: the design in the app, the image settings in LightBurn, and the laser power. Give each one its own job, lock two of them, and change only one at a time.

Dial	Its job	How to use it
1. The app (Auto-tune)	The look of the art	Leave Auto-tune on. Only adjust a design's sliders if that one design looks flat or muddy while others look right.
2. LightBurn image settings	Turning the image into dots	Set once with the tested preset in section 3 and save it. Don't change it per design.
3. Laser power	How dark it burns on this wood	The main dial. Calibrate once per material and write the number down.

Calibrate a new wood: engrave a small patch of a design at 42, 46, 50 and 54% power (same speed). Pick the one with dark shadows where the knuckles, teeth and moon still stay pale. That power is your setting for that wood from then on.

If something looks off: whole piece too light or too dark: change laser power. One design flat or muddy: adjust its sliders in the app. Grainy or speckled: lower Enhance in LightBurn or check the DPI.

Making your design

A few choices on the Idea screen make the biggest difference.

Step	What to do
1 · Idea	Describe your scene in two short lines: the main subject first, then the setting. Tap **Suggest 4 details** (free) for ideas. Pick a Style, 3D pop-out, Look and Shape.
2 · Concept	You get four free concepts. The tag on each card shows its style, camera view and **Extreme** if it has an extreme pop-out. Tap one, then **Create preview**.
3 · Preview	Click **Zoom** and check paws, claws, fingers, wings and faces. Not right? Type a fix in **Change something** (or tap a suggestion) and **Try again**. Happy? Tap **Use this preview**, or **Make HD final** to keep the exact design and sharpen it.
4 · Files	Auto-tune runs for you. Download the Laser PNG/BMP, the cut-out ZIP or the artwork. Your last 8 designs stay in the strip under the preview.

Pick a style

Style	What you get	Best for
Mixed	Four different takes: 2 breakouts, 1 framed, 1 open scene	Not sure yet
Breakout	The subject bursts out of a broken frame toward you	Action: eagles, bears, dragons, trucks
Framed	The scene sits inside a carved frame (ring, shield, cave, wall)	Wall plaques, gifts, calm scenes
Open scene	No frame: the subject in front of deep layered scenery	Landscapes, wildlife, lighthouses
Diorama	A miniature room set — floor and walls packed with props, the subject up front breaking out of the room	Shops, workshops, kitchens, saloons; easiest to cut out

Setting	Tip
3D pop-out	**Automatic** gives one concept an extreme pop-out when the subject suits it. **Standard** for calm gift pieces. **Extreme** aims one part (claw, horn, hand) straight at you.
Shape	**Wide** for wide subjects (spread wings, running horses, long rooms) so nothing gets cropped. **Tall** for towers, lighthouses and standing figures. **Square** for head-on subjects.
Look	Choose the wood look here. Don't put wood types or colors in your prompt.

Prompt tips

• **Name the main subject first.** The first subject you name is the star of every concept: "a mechanic working on a pickup truck" makes the mechanic the star.

• **Keep it short:** a scene line and a few details. No color words or wood types.

• **Diorama:** standing or working poses work best, and doors belong in the back wall: write "a cowboy in an old west saloon", not "pushing through the doors".

• **Planning to cut it out?** Avoid thin things that stick out past the design, like fishing lines, ropes or reins. Keep them inside the scene.

Credits and refunds: concepts are free, a preview is 3 credits and an HD final is 6, and you get 16 free credits when you verify your email. **Not every generation will be perfect.** Each image is newly made by AI and may have flaws like an extra finger or jumbled text, so check your preview before making the HD. **Credits used on generations are non-refundable.**

2. Best materials

These designs rely on many shades of gray, so a light, even-colored wood with tight grain gives the best 3D effect.

Material	Rating	Notes
Basswood / limewood	Best	Pale, even, tight grain. Shows every shade. First choice for 3D illusion designs.
Alder	Excellent	Light and smooth, slightly warmer tone than basswood.
Hard maple	Very good	Very light, needs a little more power. Crisp detail.
Birch plywood (laser grade)	Good	Affordable and light. Watch for glue pockets that burn darker. Our tested settings are on ¼ in birch.
Maple-veneer MDF core	Good	Pale, even face and void-free cuts. Thin veneer: keep it a surface engrave. Cut edges come out dark and it smokes more.
Cherry	Good	Warm, rich result. Darkens with age, lower contrast than basswood.
Pine / poplar	Fair	Grain bands burn unevenly and can fight the image. Choose clear, even boards.
Slate / black anodized aluminum	Special	Engraves light on dark: the image must be inverted and settings differ. Test first.
Walnut, mahogany, plain MDF	Avoid	Too dark for contrast (walnut, mahogany) or burns unevenly with heavy smoke (plain MDF).

Thickness for cut-outs: use ¼ in (6 mm) for pieces 8 in and larger so they stay flat and thin parts don't break. 1/8 in (3 mm) is fine for ornaments, coasters or pieces glued to a backer.

Tip: sand to 220 grit and wipe clean. For the cleanest result, seal the wood with a light coat of clear shellac or lacquer *before* engraving. It reduces smoke staining and makes cleanup easy.

3. Starting settings (dithered image on light wood)

Use these as your first test. Settings are shown as a range: start in the middle, then adjust after your test.

Laser type	Power	Speed	DPI	Line interval	Image mode
Diode 5–10 W	60–80%	1,500–3,000 mm/min	254	0.1 mm	Jarvis
Diode 20–40 W	30–50%	4,000–6,000 mm/min	254–300	0.1–0.085 mm	Jarvis
CO_2 40–60 W (glass tube)	45–60%	300 mm/s	254	0.1 mm	Stucki
CO_2 80–100 W **(tested)**	48 / 44% (80 W) 40–42% (100 W)	400 mm/s	300	0.085 mm	Stucki
Galvo CO_2	30–40%	2,000–3,000 mm/s	254–300	0.1–0.085 mm	Stucki
Fiber (1064 nm)	Not for wood	—	—	—	Use on metal or anodized aluminum only

Tested: the 80 W CO_2 row was proven on ¼ in birch plywood at 400 mm/s, 48% max / 44% min, 300 DPI, Stucki, scan angle 0°, with the lens raised 1 mm above focus (see below), together with the LightBurn image settings below. Result: deep, dark background shadows with the hands, face and teeth still standing out in light relief. The other rows are scaled from it; run a quick test to confirm on your machine. On CO_2 (Ruida controllers) set min power a few % below max.

Use dithering, not Grayscale mode. Dithering (Jarvis or Stucki) turns the shades into fine dots of full-power burns, and your eye blends them back into smooth tones. It gives the cleanest, most detailed 3D look on wood and works on every laser. Grayscale mode tries to burn each shade at a different power, but wood doesn't darken evenly and most lasers can't change power fast enough while scanning, so it usually comes out muddy, blotchy and flat.

LightBurn image settings (tested preset)

Open the image layer's **Adjust Image** window and enter these once, then save them as a preset (for example "Illusion2Beam") and reuse it for every design:

Setting	Value	What it does
Image mode	Stucki	Fine dot pattern, crisp on CO_2
DPI / Line interval	300 / 0.085 mm	Fine detail without overlapping burns
Contrast	15	Deeper shadows while highlights stay light
Brightness	-5 to -10	Darkens the whole image slightly. Use -5 for darker designs, -10 for lighter ones. -15 is usually too dark.
Gamma	0.925	Leave as is
Enhance Radius / Amount	4 / 100	Light edge sharpening. Higher amounts add grain and white halos.
Negative Image	Off	Leave off for wood

LightBurn setup and sizing

Set the image size yourself in LightBurn. File detail depends on the size you engrave.

File	Long side	Recommended use
Preview	about 2,000 px	Under 7 in; engrave directly
HD final	about 3,000+ px	Especially 7–10 in; optional

Above 10 inches, fine detail may soften. Test at full size before engraving a larger piece.

Step by step in LightBurn

• **Import** the Laser PNG (File > Import, or drag it in).

• **Resize** it to your board with the lock on, for example 10 in wide. The app's files carry no DPI of their own, so always set the size yourself.

• **Open the image layer** (double-click it in Cuts / Layers) and set **DPI** from the table in section 3. The line interval updates to match (254 DPI = 0.1 mm, 300 DPI = 0.085 mm).

• **Image mode:** Jarvis (diode) or Stucki (CO_2). Not Grayscale — see the image modes table below.

• **Adjust Image:** apply your saved preset (Contrast 15, Brightness -5 to -10, Enhance 100 — see section 3).

• **Power:** set max power and speed from the table. With dithering only max power is used; min power doesn't matter.

• **Turn on** bidirectional scanning and overscan (about 2.5%). Leave **Negative image off** for wood.

• **Frame** the job to check placement, run a small test crop, then engrave the full design.

Why not a higher DPI?

A laser dot on wood is about 0.08–0.1 mm wide. Above about 300 DPI (0.085 mm) the lines overlap, so the wood is burned twice. The result gets darker and muddier, not sharper, and takes longer. For diode lasers 254 DPI is usually the sweet spot.

1 mm defocus (smoother shading): focus as usual, then raise the lens (or lower the bed) by 1 mm. The slightly wider dot blends neighbouring scan rows, so dark areas look smoother, with fewer fine horizontal lines. Use it together with the tested 48/44% power. Keep the scan angle at 0°: at 45° a gantry laser moves much slower than the set speed and badly over-burns.

Which image mode to use

Mode	Use it for
Jarvis	**Recommended for diode lasers.** Fine, soft dot pattern that keeps the depth and detail of our laser PNG.
Stucki	**Recommended for CO_2 and galvo lasers.** Slightly crisper dots, great at 300+ DPI.
Grayscale	Not recommended for these designs on wood. It varies power per shade, which usually comes out muddy and flat. Best kept for true 3D depth carving on CO_2 with many passes.
Pass-Through	Only for images already dithered in another program (pure black-and-white dots). It sends the pixels 1:1, so set the DPI to the image's own resolution and don't resize it. **Don't use it for our grayscale laser PNG.**
Threshold	Not for these designs: it throws away all the shading.

4. Always do a test first

• **Test crop:** in your software, crop a 2 in (50 mm) square from the busiest part of the design (the hero's face or claws) and engrave it on scrap from the same board.

• **Or a test grid:** engrave a small power/speed grid (most software has a "material test" tool) and pick the square with the richest dark tones that still keeps detail.

• **Judge it:** the darkest areas should be deep brown, not charred black; the lightest areas should barely be marked; fine details like fur and feathers should be visible.

• **Adjust, then run the full design.**

5. Machine setup checklist

– Focus the laser on the surface of the wood, then raise it 1 mm for image engraving (see section 3). For cutting, use normal focus.

– Turn on air assist. Moderate air for wood keeps smoke off the surface and the lens clean.

– Clean the lens and mirrors if the laser has run a lot. Dirty optics cause faint, uneven engravings.

– Set the engraving size first (for example 8 × 10 in) and keep the design's proportions locked.

– Engrave **bottom to top** if your software offers it, so smoke rises away from finished areas.

– Use overscan (2–5%) so edges don't come out darker than the middle.

– CO_2 lasers: keep the chiller water at about 18–22 °C. Colder water can form condensation on the tube and damage it.

– Put a scrap board or honeycomb under the work and never leave the laser unattended.

6. Fine-tuning a design

Every design is different. **Auto-tune for engraving** gives a good starting point, but a busy or very dark design may need a small adjustment. Fix the **image** in the app — keep your laser power fixed for the wood you are using.

If the preview or test burn shows…	Change in the app
Dark areas fill in solid and detail is lost (harness, fur, folds)	Shadow depth down (to 0), Brightness up 5–10, Hero cast shadow down 10–20
Whole design too pale or flat	Brightness down 5–10, Contrast up
Too dark or charred overall	Brightness up 5–15
Hero blends into the background	Background fade up (60–100), Hero cast shadow up
A held object (nozzle, sword, rifle) fades with the background	Background fade down a little
Busy background competes with the hero	Background fade up, Depth pop down a little
Flat, not enough 3D	Depth pop up, Hero cast shadow up
Grainy or speckled	Extra crisp down, Detail down

Three habits that save wood:

• **Judge on white.** Click the white background circle above the preview — it is closest to how the design looks on light wood. The dark background makes everything look brighter than it will burn.

• **Test the darkest part first.** Mask a small patch of the busiest, darkest area (LightBurn: draw a rectangle over it, select both, Tools > Apply Mask to Image) and burn it before the full piece.

• **Change one thing at a time**, and clean the test with alcohol before judging it — soot makes everything look darker and grayer.

7. Cutting out the design

Before you cut, check the line under **Show the cut line** in the app: **Cut-ready** means the design is one connected piece. If it warns about loose pieces, engrave it on a blank instead or make another preview. **Diorama** designs have a solid room-box outline and are the easiest style to cut out and stand up.

The cut-out ZIP's SVG follows the **outside** of the design only. When a design has openings inside it — gaps between antlers, between legs, or through a fence or window — LightBurn's **Trace Image** tool gives a better cut, because it also traces those interior openings.

Trace it in LightBurn

• **Import the Laser PNG** and size it to your board first (lock on). The trace follows the image, so size it before you trace.

• **Select the image** and choose **Tools > Trace Image** (Alt+T).

• **Tick Trace Transparency** so LightBurn traces the edge of the design, not the shading inside it.

• **Adjust** Ignore less than (about 10–20) to drop tiny specks, and raise Smoothness a little for clean curves. Check the preview: the outer outline plus the inner openings you want to cut out.

• **Click OK**, then delete any traced shapes you don't want cut (small islands or holes that would weaken the piece).

• **Put the traced lines on their own Line layer** with your cut settings, and keep the image on its image layer.

• **Engrave first, then cut** — in LightBurn, drag the Line layer below the image layer in the Cuts / Layers list so it runs last. Don't move the board between the two.

Cut setting (80 W CO_2, tested)	¼ in (6 mm) birch plywood
Speed / power	10 mm/s · 70% max / 60% min
Mode / air	Line · full air assist
Focus	Normal focus (no defocus for cutting)
Passes	1 — check it dropped out before moving the board

Tip: keep thin parts at least about 3 mm (1/8 in) wide at your final size, or they may snap or burn away. If a gap is very small, delete that inner shape and let it stay as engraved shading instead.

8. Common problems

Problem	Likely cause	Fix
Horizontal stripes / banding	Loose belts, speed too high, dirty lens	Tighten belts, slow down 10–20%, clean optics
Dark smoke haze around the image	Weak air assist, unsealed wood	Increase air, seal the wood first, clean with a damp cloth or alcohol
Engraving looks gray and ashy, not brown	Surface soot from the burn (normal)	Wipe or spray with isopropyl alcohol and a soft cloth. Don't lower the power to fix it
Uneven burn across the board	Board not flat or focus off	Weigh down or pin the board, refocus
Edges darker than center	Acceleration at line ends	Add overscan
Image blurry	Out of focus or DPI too high for the spot size	Refocus; try 254 DPI on diode
Cut line doesn't line up	Board moved or files imported at different sizes	Import PNG and SVG together at the same size, or trace the PNG after sizing it, and don't move the board

9. Finishing

• **Clean off the soot first.** A fresh engraving often looks ashy gray: that is surface soot, not bad settings. Spray or wipe it with isopropyl (rubbing) alcohol and a soft cloth or soft brush. The gray lifts off and the warm brown shading and full 3D depth appear. Let it dry completely (about 15–30 minutes) before finishing.

• Brush off any remaining loose char with a soft brush.

• Seal with clear matte or satin lacquer, shellac or wipe-on poly to protect the engraving. Satin or matte shows the 3D effect best; gloss can add glare.

• A clear coat darkens the bare wood and reduces contrast, so test it on the back first. If you always finish your pieces, engrave a little darker (about +2% power).

• Spray in light mist coats (2–3 thin coats, not one heavy coat) so finish doesn't pool in the engraved areas.

• Optional: a light coat of clear paste wax gives a soft sheen that makes the 3D effect pop under light.

• For a cut-out piece, lightly sand the cut edges and seal them too.

Safety: only engrave natural wood and laser-safe materials. Never laser PVC, vinyl or unknown plastics (toxic chlorine gas). Keep a fire extinguisher nearby, use ventilation or a fume extractor, wear the correct laser safety glasses for your laser, and never leave a running laser unattended.

These settings are general starting points. Always follow your laser manufacturer's safety instructions and test on scrap before engraving your final piece.

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Your preview is ready to use.

A clear path from a preview to an engraving - with an optional HD upgrade.

1

Create a preview

Your preview is a usable image. You can adjust its engraving controls, download its laser files and engrave it. For the best detail, keep preview engravings under 7 inches on the longest side.

2

Decide whether you want HD

An HD final uses additional credits. It provides a higher resolution export and can be used for any size. We especially recommend HD when engraving 7 to 10 inches on the longest side.

3

Keep the preview if you prefer

The HD purchase is optional. On the preview screen, click Skip to files →. Then continue adjusting the laser image and download the preview files for engraving.

A practical size limit

We recommend staying at or below 10 inches for crisp 3D detail. Larger engravings may still work, but small features can soften. If you need a larger piece, run a test at the intended size on the same material first.

Make your own designs: www.depth2beam.com/illusion2beam