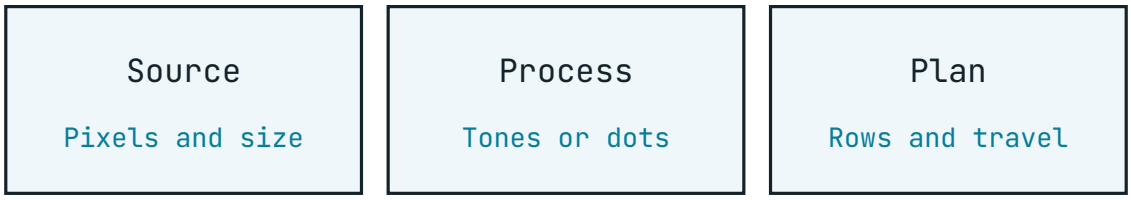
SOURCE, PROCESSING AND PLANNED PATHS

Preparing images and fills for engraving

Prepare a supplied illustration, compare its processing and scan settings, then practise cropping, masking, fills and tracing without a connected laser.

Start here

Keep Beam Bench disconnected with No Machine. Start with the main image-controls task, then choose the optional exercises you need. All values are software examples. They do not establish engraving quality or settings for your material.



Source pixels, processing settings and generated paths describe different parts of image preparation.

Source detail
The supplied tonal-owl.png is a 1536 x 1024 illustration. Physical size and source pixels limit detail. Increasing DPI cannot recreate missing detail.

Processing modes
Grayscale varies commanded power. Threshold keeps black and white. Floyd-Steinberg and Stucki represent shades with different dot patterns. Compare at the same size and interval.

Three inversion controls
Adjust Image > Invert changes one image. Negative Image changes layer processing. Use one for an output inversion; two can cancel. Invert Display changes only the preview.

Interval and DPI
Line Interval is planned row spacing. At 0.20 mm the DPI readout is 127; at 0.10 mm it is 254. The displayed DPI is rounded.

Inspect the right view
Compare Original and Processed in Adjust Image. Use Processed 1:1 for a planned-pixel sample. Fitted preview dimensions can be capped; they do not describe full output resolution.

The illustration and logo are supplied for these exercises. Preserve the starters and save each attempt under a new name. Use the answer projects after making your own edits.

MAIN TASK: PREPARE THE OWL IMAGE

Main task: prepare the owl image

image-start.lzrproj
In image-controls. Start here, or import image-controls/tonal-owl.png into a new project.

image-settings-answer.lzrproj
In image-controls. Open after your attempt to compare the independent target.

1. Select the image. In Properties keep the aspect lock on and set W to 90 mm. Check H is 60 mm.

2. Click Adjust Image. Set Contrast to 0.10, Brightness to 0.02 and Gamma to 1. Keep Invert and Negative Image off.

3. In Layer Settings choose Image Mode Stucki. Set Line Interval to 0.16 mm. Check that the rounded DPI readout is 159.

4. Keep one pass, Scan Angle 0, Overscan 2.5 mm and Bidirectional on. Leave the supplied 3000 mm/min and 30% example values unchanged.

5. Compare the light face and dark feathers in Fit and Processed 1:1. Click OK to keep the settings. Save your own project with both layer and entry Output off.

Which detail becomes easier or harder to see in the processed sample?

Record your size, interval and DPI before opening the answer:

If you import from blank

A new Image entry can appear beside the empty default Line layer. Name the image layer clearly. The prepared starter omits that unused empty layer.

OPTIONAL TASKS: CROP OR MASK

Optional tasks: crop or mask

Crop a new rectangle

1. Open crop-and-mask/crop-start.lzrproj. Select only Crop guide. Leave its aspect lock off and set W 70 mm, H 55 mm, X 65 mm and Y 50 mm in Properties.

2. Choose Select, then Command+A on Mac or Control+A on Windows/Linux to select both objects. Choose Tools > Image Options > Crop Image.

3. Save a separate copy. Check that the guide object disappears and the bitmap becomes about 70.05 mm x 55.01 mm. Compare crop-practice-answer.lzrproj in the same folder.

Keep a circular mask

1. Open crop-and-mask/mask-start.lzrproj. Select Mask guide and set W/H 50 mm, X 78 mm and Y 50 mm.

2. Select both objects and choose Tools > Image Options > Apply Mask to Image. Keep the guide because the image refers to it.

3. Leave both guide Output controls off. The bitmap remains 1536 x 1024 and 100 x 66.67 mm overall. Compare mask-practice-answer.lzrproj after saving a separate copy.

Check the difference

Crop changes the bitmap and removes the guide object. Mask keeps the full bitmap and guide reference. For optional disconnected Preview, enable both Output controls on Owl image only, inspect the circle, then return both off before saving.

Which approach lets you retain the full bitmap and the guide?

OPTIONAL TASKS: INVERSION AND SCANNING

Optional tasks: inversion and scanning

Compare one output inversion

Open image-controls/image-adjustment-answer.lzrproj. Turn Invert on in Adjust Image while Negative Image stays off. Save a separate copy and compare image-invert-answer.lzrproj. This case starts at 100 mm wide with Grayscale, 0.20 mm interval, Contrast 0.10 and Brightness 0.02. Invert Display is a separate viewing aid.

Change the planned scan

1. Open scanning/scan-settings-start.lzrproj. Its 40 x 26.67 mm image and coarse 0.5 mm interval make the paths easier to inspect.

2. Set Scan Angle to 30 degrees, Overscan to 4 mm and Bidirectional on. Keep geometry and other settings unchanged. Save a separate copy and compare scan-settings-answer.lzrproj.

3. For optional Preview, temporarily enable both Output controls on the image. Inspect the entire footprint. Return both off before saving; keep No Machine and disconnected.

Bidirectional
With zero degrees and 2.5 mm overscan, the demonstration plans 54 rows and about 0:51. Turning Bidirectional off keeps similar burn distance but raises return travel, giving about 1:38.

Overscan
Extra laser-off travel around a row allows acceleration. It does not add engraved width. The needed distance depends on machine, speed and acceleration.

Why can return travel change while burn distance stays similar?

What must be checked outside the artwork boundary?

OPTIONAL TASKS: GROUPED FILLS AND TWO ANGLES

Optional tasks: grouped fills and two angles

Compare Offset Fill grouping

1. Open offset-fill/offset-grouping-start.lzrproj. Expand Group A and Group B in Outliner. Each contains three rectangles; keep all geometry unchanged.

2. Select C00 in Layers. Choose Offset Fill, set Line Interval to 1 mm and enable the entry Output for disconnected Preview.

3. Compare Fill all shapes at once, Fill groups together and Fill shapes individually. Use Go to start and Next segment to inspect contour order. Compare burn, travel and duration.

4. Choose Fill groups together for your answer. Turn entry Output off, save a separate copy and compare offset-grouping-answer.lzrproj.

Fill at zero and ninety degrees

1. Open two-angle-fill/two-angle-start.lzrproj. Enable the first Fill entry for Preview. Keep Scan Angle 0, one pass and 1 mm interval.

2. Add + Sub-layer, open the second Fill entry and set Scan Angle to 90. Match speed, power, interval, overscan and one pass. Enable its Output for Preview.

3. Use Go to start and Next segment to inspect the first direction followed by the second. Preserve the tag and hole. Restore both entry Outputs off and compare two-angle-answer.lzrproj.

Read the plan

These are two ordinary Fill entries. The example adds 20 raster lines and takes about 33 seconds. Burn distance doubles here; material quality still needs a real sample.

OPTIONAL TASK: TRACE THE SUPPLIED LOGO

Optional task: trace the supplied logo

trace-image-start.lzrproj
In tracing. Portable starter with the image embedded.

trace-image-answer.lzrproj
In tracing. Editable answer with fourteen closed vector objects.

beam-bench-icon.png
In tracing. Original color icon for an optional import attempt.

1. Select the picture and click Trace Image in Properties. Compare Threshold 200 with 80 while watching the colored outlines. Use 80.

2. Set Ignore Less Than to 5, Smoothness to 1, Cutoff to 0 and Optimize to 0.2. Keep Trace Transparency and Sketch Trace off. Use Show Points to compare smoothing.

3. Leave Delete image after trace on and click OK. Inspect lettering, holes and small details.

4. Choose Edit > Select > Select Open Shapes. Nothing should be selected for this closed-path answer. Save a separate editable project with entry Output off.

What changed when Threshold moved from 200 to 80?

Did smoothing preserve the lettering and holes?

How many open shapes were selected after your trace?

Keep a way back

Deleting the image after tracing affects the working project. Keep the original starter and PNG to try another trace. The unsmoothed comparison in the pack is a separate example.

ANSWER CHECKS AND COMPARISON FILES

Answer checks and comparison files

Main image controls
90 x 60 mm; Contrast 0.10; Brightness 0.02; Gamma 1; Stucki; 0.16 mm; rounded DPI 159. Source remains 1536 x 1024. The saved processed PNG is 563 x 376; a fitted preview can instead show 500 x 333.

Independent crop
One raster object, 1076 x 845 pixels, about 70.05 mm x 55.01 mm. The small difference comes from source pixel boundaries. The demonstration square is 922 x 922, about 60.03 mm.

Independent mask
Original bitmap and bounds retained, with a keep-inside reference to the 50 mm circle. The guide remains excluded. At 0.20 mm the independent circle plans 250 rows, versus 300 in the demonstration.

Scan comparison
Independent answer: 30 degrees and 4 mm overscan. The 45-degree demonstration uses 2.5 mm overscan, 95 rows and about 0:56. Estimates do not establish a material result.

Fills and trace
Grouped answer: six rectangles in two groups. Two-angle answer: two Fill entries, 0 and 90 degrees, one pass each. Trace answer: fourteen closed vector objects with lettering and holes retained.

For saved demonstrations, compare image-adjusted-demo.lzrproj, crop-demo-answer.lzrproj, mask-demo-answer.lzrproj and scan-angle45-demo.lzrproj. The four mode-*-processed.png files are native processed exports with other settings held fixed.

What would you change for a second attempt, and why?

Which physical outcome still needs a small material test?

PRACTICE PACK DIRECTORY

Practice pack directory

Use starters first and answers afterwards. Comparison projects preserve the lesson examples. Image starters and answers have both layer and entry Output off. Existing vector examples may retain layer Output on with every operation entry off. Keep No Machine and disconnected.

image-controls: image-start.lzrproj, image-adjusted-demo.lzrproj, image-adjustment-answer.lzrproj, image-settings-answer.lzrproj, image-invert-answer.lzrproj.

crop-and-mask: crop-demo-answer.lzrproj, crop-practice-answer.lzrproj, crop-start.lzrproj, mask-demo-answer.lzrproj, mask-practice-answer.lzrproj, mask-start.lzrproj.

image-modes: mode-floyd-demo.lzrproj, mode-grayscale-demo.lzrproj, mode-stucki-demo.lzrproj, mode-threshold-demo.lzrproj.

scanning: scan-angle45-demo.lzrproj, scan-settings-answer.lzrproj, scan-settings-start.lzrproj.

offset-fill: offset-grouping-all.lzrproj, offset-grouping-answer.lzrproj, offset-grouping-individual.lzrproj, offset-grouping-start.lzrproj.

two-angle-fill: two-angle-answer.lzrproj, two-angle-start.lzrproj.

tracing: trace-image-answer.lzrproj, trace-image-start.lzrproj, trace-image-unsmoothed.lzrproj.

PNG files provide the source artwork, native processed samples and fill comparisons. scanning/scan-comparison.json is a readable settings reference, not an importable machine profile. The worksheets are printable; they contain no interactive PDF fields.