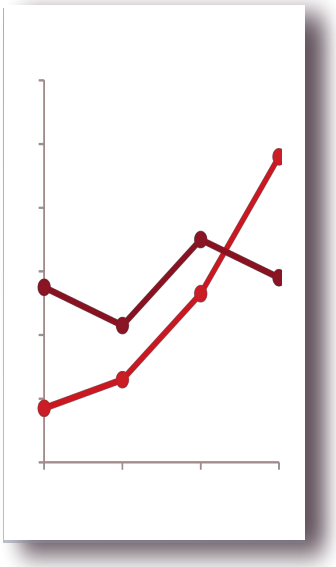

HOW TO
SPEED UP JOBS
By Billie Ruben - LightBurn Software

- Many ways to speed up production, what applies depends on goals.
- We will start with some simpler ones, you may know these already, and get more complex.
- Whenever you see the book symbol, I have included links to relevant documentation, in show notes of the presentation.

- We will be moving quickly, so it may be tricky to follow along in the software,
- I have uploaded this slide deck so you can reference it at your own pace.
- Show how to find on Forum

WHY OPTIMIZE?

- Costs are rising
- But the odds are in your favor



- Material getting more expensive but congrats!
- Laser remains one of the best ways to make money as a maker/ small to medium business.
- How do I know? Australia has highest minimum wage on earth & extremely high shipping - unavoidable costs, yet every 3rd stall at craft markets is a laser business.
-
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- We will start with some simpler ones, you may know these already, and get more complex.
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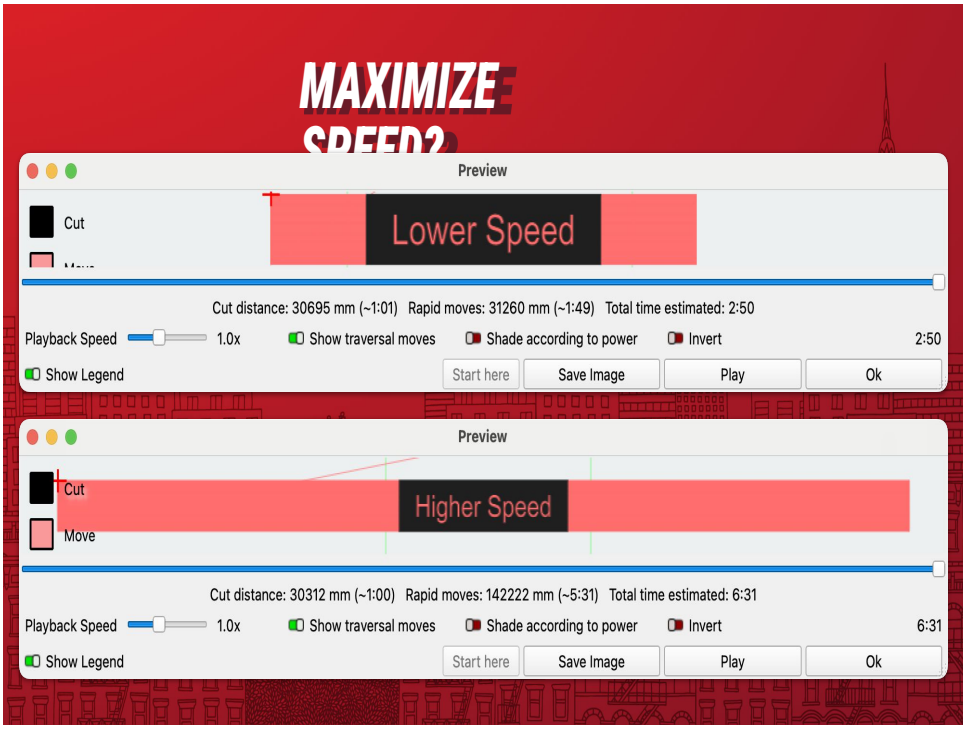


- Many folk think to make my jobs quicker, I just need to speed up.
- It's intuitive, like driving in a car - minimize travel distance, and go as fast as you can, right?
- But is it always faster? No. Because a laser needs to turn back to make the next line it has to slow to a stop, then accelerate again as it moves along the next line. As you increase the speed, this distance gets longer, and this can add time.
- Depends on your settings. Always check preview.

PREVIEW JOBS

- Always Preview Job.
- Black = Cutting/Engraving = Laser ON
- Red = Travel/Rapid Moves = Laser OFF
  (Preview > Show traversal moves)
- Note the time estimates

- Always Preview your jobs, both for seeing how long it will take, but also to spot any accidents before you cut into your material.
- Rapid and Cut move distances are listed below preview.
- If you don’t see red, click on “Show Traversal Moves”

More Info:

- Preview Window (includes videos):
  https://docs.lightburnsoftware.com/latest/Reference/Preview/#

PREVIEW ACCURACY

If Preview times inaccurate:

- Edit>Device Settings> Additional Settings
  - “Read from Controller” or:
  - manually adjust “Simulation Settings”

- “Find my laser” when adding a machine pulls device settings from machine.
- If you find the preview estimates are very different to your real-life job time, you can adjust them.
- Change Simulation Settings via Edit>Device Settings> Additional Settings
- Changing Sim Settings does NOT change anything on your controller or your job settings. Just the preview.

More Info

- Video: Get Accurate Job Times in LightBurn: https://www.youtube.com/watch?v=s1jCqB233N0
- Device Settings: https://docs.lightburnsoftware.com/latest/Reference/DeviceSettings/AdditionalSettings/

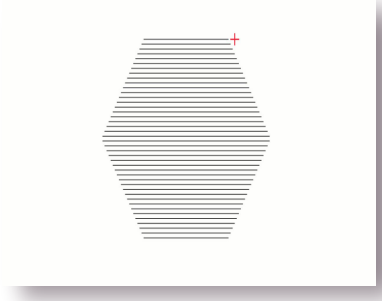
MINIMIZE DISTANCE

- Minimize how far the laser has to move
- Both of laser ON & OFF
- Lots of ways to do this

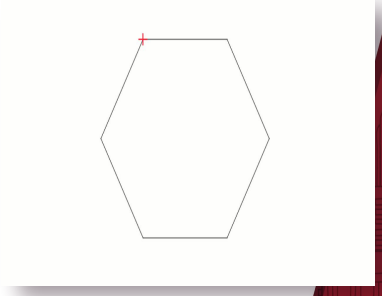
- Generally the less red and black we see in the preview the quicker the job will be.

AVOID RASTER ENGRAVINGS

Image, Fill, or Offset Layers use many lines to 'color in' area



Line Layers travel far less, follow the contour/perimeter



- Two types of ways a laser can move,
    - either by tracing along vector lines,
    - or by filling in an area by 'scanning' back and forth.
- Scanning is used for engraving images and filling closed vector shapes.
- Scanning takes far more time because it has to move much farther.

Further reading:

- Layer modes: https://docs.lightburnsoftware.com/latest/Explainers/LayerModes/
- Image vs Vector: https://docs.lightburnsoftware.com/latest/Explainers/ImagesVsVectors/
- Closed vs Open Shapes: https://docs.lightburnsoftware.com/latest/Explainers/OpenClosedShapes/

Engrave with lines, not fills:

- You can score a line. A Lot of folk think of line operations as a ‘cut’, but they don’t have to be. With lower power or higher speed, you can avoid cutting all the way through, and instead just score a line.

  If you design with this in mind you can DRASTICALLY reduce the time of your jobs.

  Depends on design. Sometimes you need a fill, e.g if you’re removing an area of material, but often you don’t. Often an outline will do.

Further reading:

- Layer modes:
  https://docs.lightburnsoftware.com/latest/Explainers/LayerModes/
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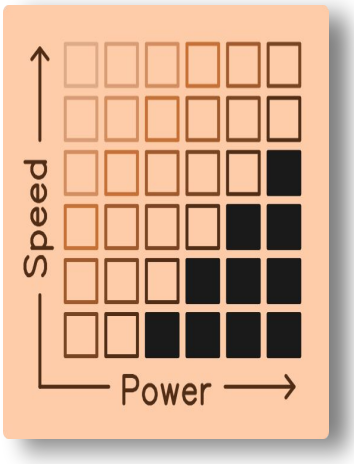
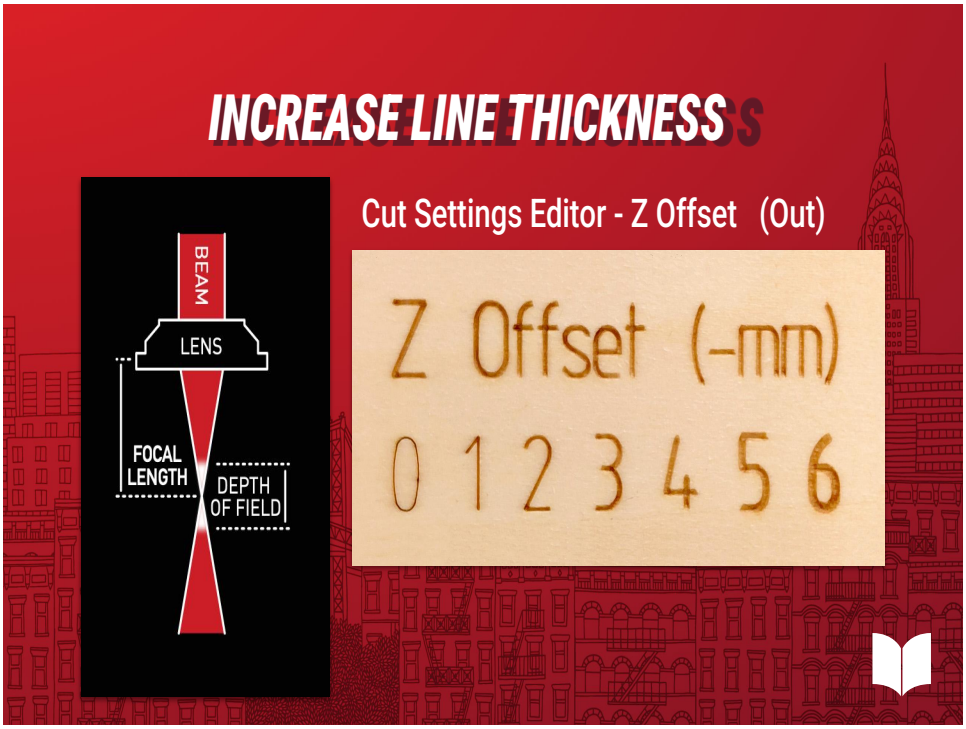
CUT VS SCORE

- Line Mode isn't cut mode
- Difference between a cut line and a score (engrave/ mark) line is your settings
- Lower power and increase speed to score.





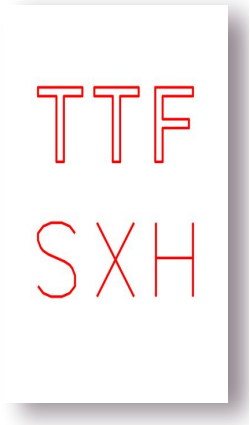
- Increase line thickness by setting Z-Offset outwards/away from material.
- Different lenses = different results, test.

- This also applies to Text.
- Engraving a word takes a lot longer than outlining it.
- And outlining a word takes longer than a single line font.

SINGLE-LINE FONTS

SHX = format that allows open shapes

1. Download SHX fonts (forum)
2. Add to a folder on your computer
3. LightBurn > Preferences/Settings
4. Set SHX Font Path (to your folder)
5. Apply like normal font
6. Can filter by right-clicking font list



- Single line fonts generally have a different format to normal fonts that word or photoshop would use.
- This is to support ‘open’ geometry (not enclosed shapes)
- Currently we support SHX.
- SHX Fonts installed differently, https://docs.lightburnsoftware.com/latest/Reference/Text/#shx-fonts
- These can be downloaded online, there’s a pack a user has provided on our forum.

Save Favorite fonts by selecting a font > right clicking the font selector > add to favorites.

More Info

- SHX Fonts: https://docs.lightburnsoftware.com/latest/Reference/Text/#shx-fonts
- Some SHX Fonts to get you started.

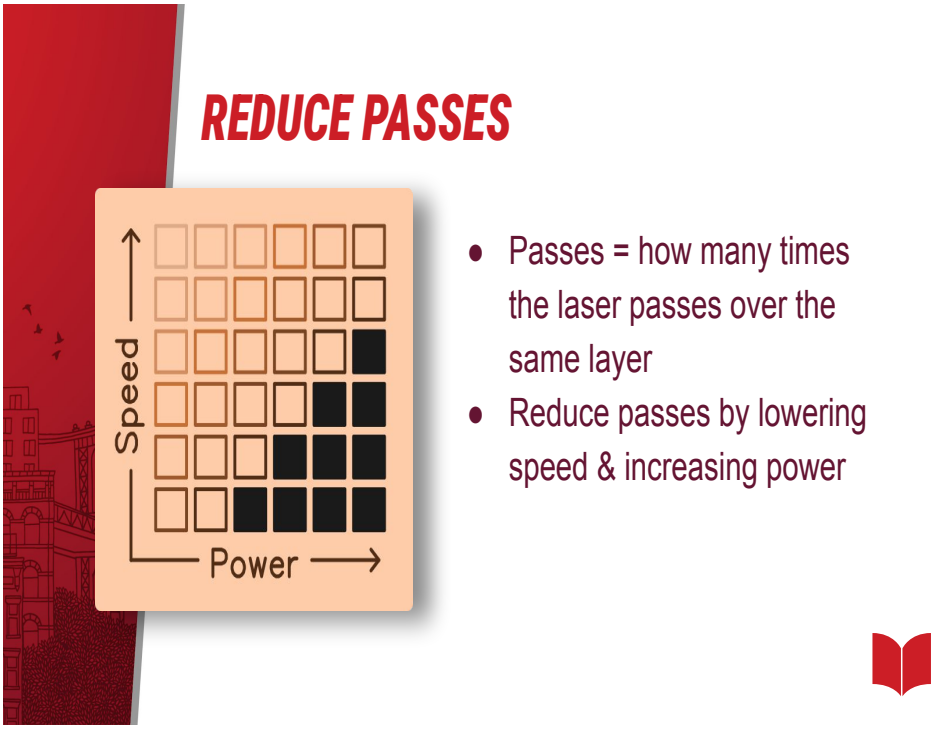
REMOVE OVERLAPPING LINES

- Edit> Delete Duplicates (just for one job)
- For all Jobs:
  - Laser Window > Optimization Settings > Remove Overlapping Lines
  - Distance = how close lines need to be, in order to be considered ‘duplicate’
  - Will even remove short lines that are entirely covered by another line

- Tells the Cut Planner to remove lines that are overlapping, and would cause the laser to cut in the same place twice.
- The Distance field to the right of the switch controls how close two lines need to be in order for the Cut Planner to remove one of them when sending the job to your laser.

More Info

- Remove Overlapping Lines Documentation
  https://docs.lightburnsoftware.com/latest/Reference/OptimizationSettings/#remove-overlapping-lines
- Remove Overlapping Lines Video
  https://www.youtube.com/shorts/tHTnb6MURdU?feature=share
- Grid Array
  https://docs.lightburnsoftware.com/latest/Reference/GridArray/

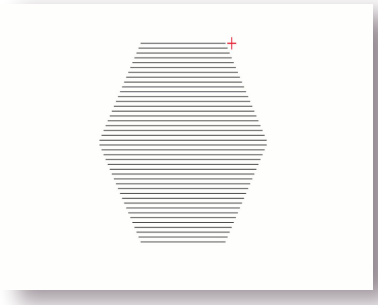


Passes:

- Passes: https://docs.lightburnsoftware.com/latest/Reference/CutSettingsEditor/LineMode/#number-of-passes

WHEN 'SCANNING' IS NECESSARY:

- Images (photos, greyscale graphics)
- Fill areas with flat color
- Remove material from areas



LAYOUT IS CRITICAL

- Run more than one job at a time
- Stack multiple objects side-by-side
- Align, Distribute, Docking helpful
- Put tall objects on side

- Layout is critical
  - Layout of jobs (particularly when engraving) tall objects, put on side.
  - Duplicate objects, fit horizontally. Multiple objects- stack side-by-side
  - Reduce the red in the preview. halving frame-like jobs and fill groups together (e.g. clock face)
  - Alignment, Distr

FILL METHODS

- Fill (large areas)
  - Fill Grouping (all, groups, individual)
  - Flood Fill
- Offset Fill
- Manually ‘broken’ fill

These options control which shapes are engraved at the same time by the laser. If you run your laser fast, or your laser accelerates slowly, it is often most efficient to scan things all at once, so the laser spends most of its time moving at the speed you've chosen, and less time changing direction. If you are engraving slowly, your laser accelerates fast, or the design contains a lot of blank space, it can be more efficient to fill clusters of close shapes, or to fill the shapes one by one.

Fill all shapes at once: The default, this setting means that everything on this layer will be filled at the same time, sweeping back and forth across the whole job. If you are running the laser fast (300 mm/sec or more) this is usually the most efficient option, with some exceptions.

Fill groups together: This setting will fill all shapes in a group at the same time.

Fill shapes individually: This setting fills all shapes one by one.

Advanced Settings:

Flood Fill: calculates an engraving path that attempts to reduce or eliminate travel moves across blank space. It's useful for engraving things like large, empty rectangles, where the blank area in the middle would consume most of the time spent.

More Info

- https://docs.lightburnsoftware.com/latest/Reference/CutSettingsEditor/FillMode/

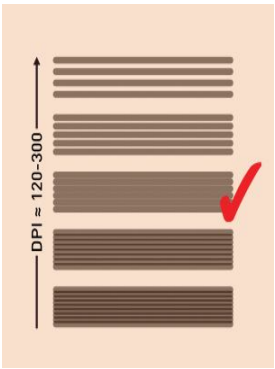
- Found in Cut Settings for Fill/Image Modes
- Turns laser around at each end, drastically saving travel moves
- Reasons to have it off:
    - Your laser has slop/starts and ends don’t line up.
    - Unlikely given your machines,
    - but if you do encounter this you can compensate with Scanning Offset Adjustment

More Info:

- Bi-directional Fill Docs: https://docs.lightburnsoftware.com/latest/Reference/CutSettingsEditor/ImageMode/#bi-directional-scanning
- Scanning Offset Adjustment: https://docs.lightburnsoftware.com/latest/Guides/ScanningOffsetAdjustment/

LINE INTERVAL

- DPI and Line Interval are linked
- Higher DPI not always better quality
- When lines overlap:
  - Images too dark
  - Details muddy
  - Engravings textured



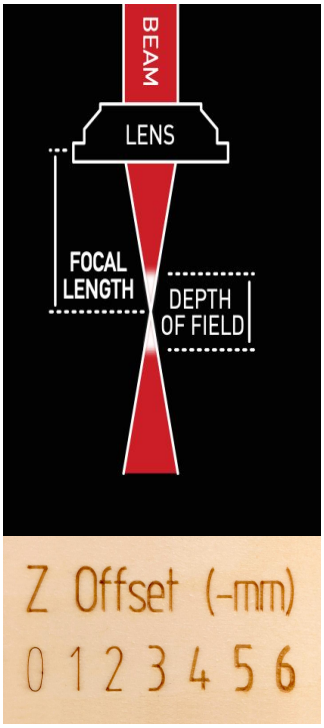
- Higher DPI isn't better when it causes your scan lines to overlap. This will make muddy designs.
- CO2 actually has rather large beam size compared to Diode or MOPA that Tong spoke about yesterday.
- Ideally you want each line to juuust touch. Use magnifying jewelers loop or USB Microscope to assess.
- Interval or materials test generator tools.

More Info

- Fill Mode
  https://docs.lightburnsoftware.com/latest/Reference/CutSettingsEditor/FillMode/
- Materials Test
  https://docs.lightburnsoftware.com/latest/Reference/MaterialTest/
- Line Interval Test
  https://docs.lightburnsoftware.com/latest/Reference/IntervalTest/

LINE INTERVAL

- Minimize scan lines by increasing Line Interval (Layer Settings)
- Defocus increases line width, allows you to increase line interval further
- Defocus via Z Offset (Layer Settings)



- Higher Line interval = larger gap between lines = fewer lines = quicker
- Beam has a ‘waist’ smallest at focal point
- Either side of this the beam gets thicker
- We can use this to make thicker lines and lower out interval even more.

HACKING LINE INTERVAL

- V. High Line Interval = interesting effects
- Combine with Scan Angle for slanted lines
- SUPER quick

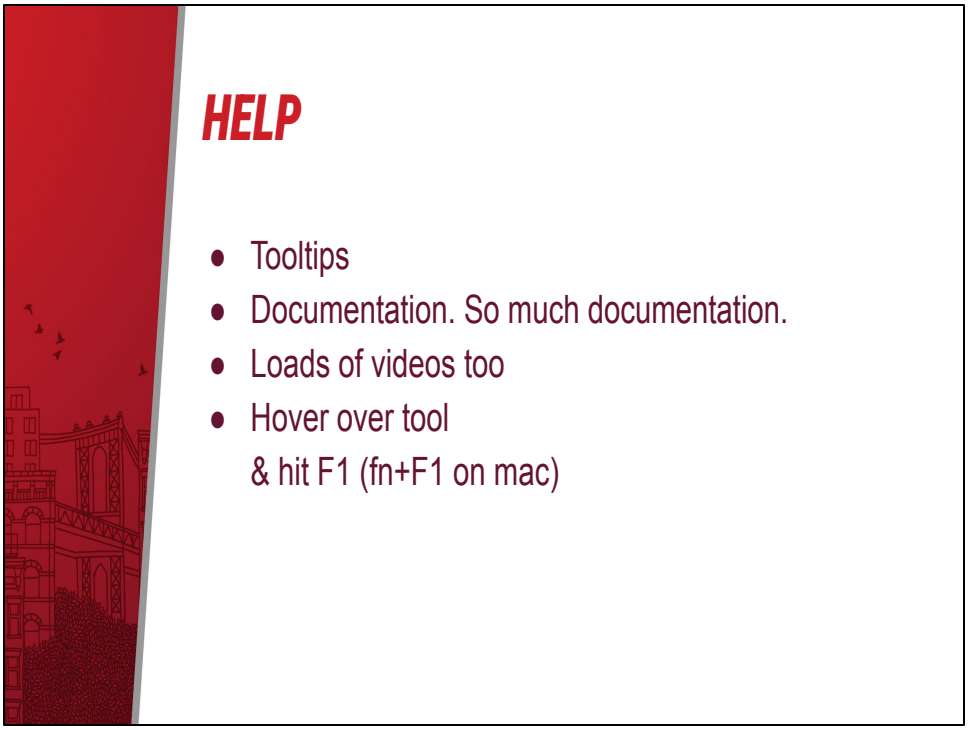
https://youtu.be/KrAQY9wFv2c?si=CbtAy8wpbHl8L65X


SAVE FOR FUTURE
• Settings to Library
• Designs to Art Library
• Cut-out pieces to tool layers

WHEN TO OPTIMIZE?

- When it costs you no extra time:
  - Optimization Settings
  - Reusing known settings
- When the time it takes you to set up is less than the time it saves in the job. E.g.
  - When doing many similar jobs
  - When you are running large engraves

- When is it right to spend time optimizing?


HELP
Tooltips
Documentation. So much documentation.
Loads of videos too
Hover over tool
& hit F1 (fn+F1 on mac)

LIGHTBURN

BETTER SOFTWARE FOR LASER CUTTERS

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