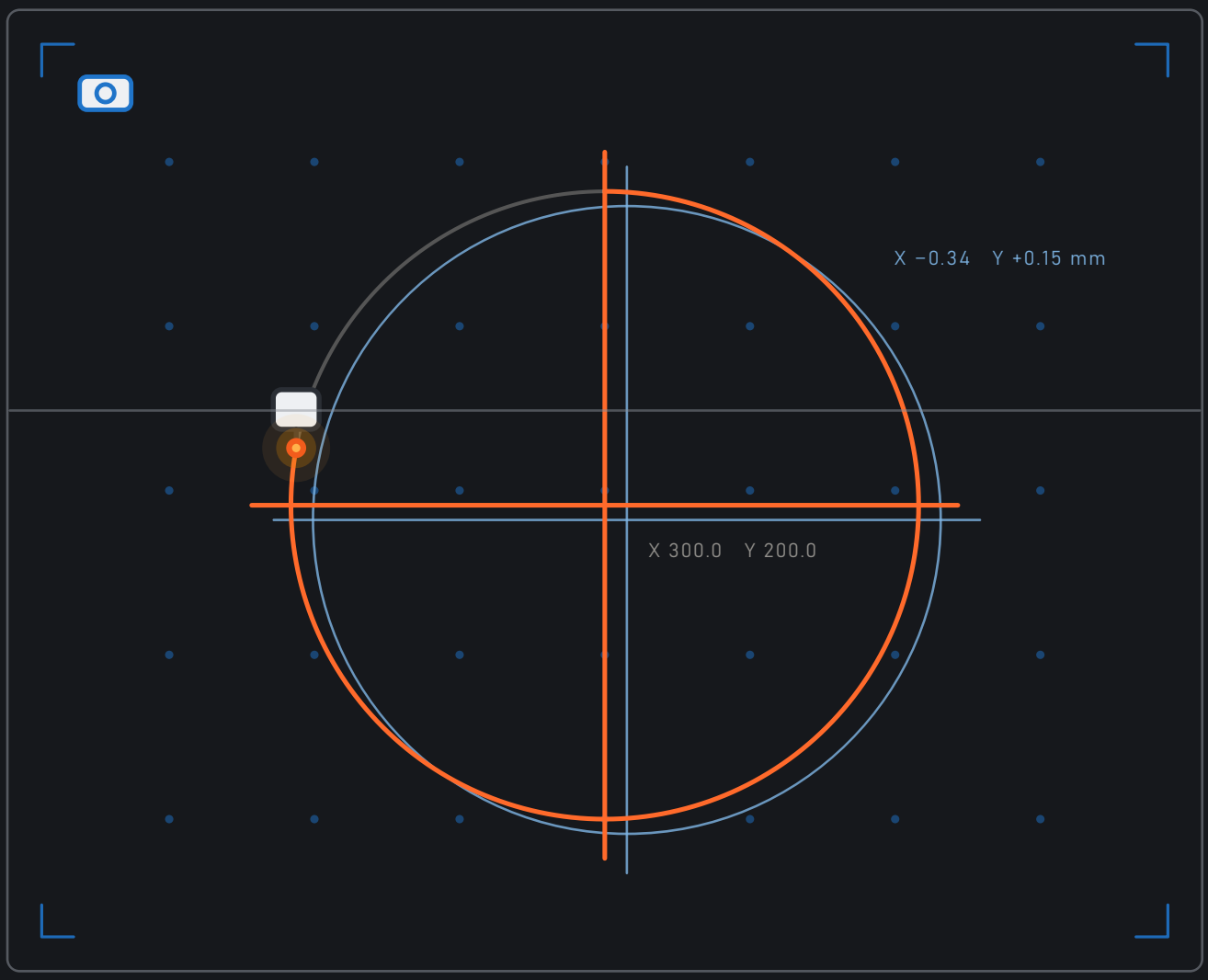


RayBurn Studio

User Manual

Design, camera and laser control in one program.

Contents

What RayBurn Studio does 03
The powerful parts at a glance

01 Installing and the first start 05
Installing · Thirty days with everything · From an empty bed to a first job

02 The window 07
The menus in the top bar · Search tools and settings · Rich tooltips · Looking around

03 Drawing and editing 10
Shapes · Lines · Selecting, moving, sizing · Text · Edit Nodes · Combining shapes · Offset · Arrays

04 Layers and the job 13
Layers: cut or fill · Speed and power · Finding the settings for a new material · Cut order · Preview

05 Running the laser 15
Connecting · Moving the head · Home and origin · Framing · Start · Pause and Stop

06 The camera 18
Starting the camera · Resolution · Camera zoom · Camera Settings

07 Camera calibration 21
Why a calibration · Engraving the dot target · White stickers · The questions at startup · Auto-calibrate

08 Pictures 26
Art Library · Importing a picture · Adjust Image and Convert to Bitmap · Remove Background

09 Production tools 30
Fit to Material · Repeat on Parts, one by one · Repeat on Parts: Put on all parts · Lead-in / lead-out lines

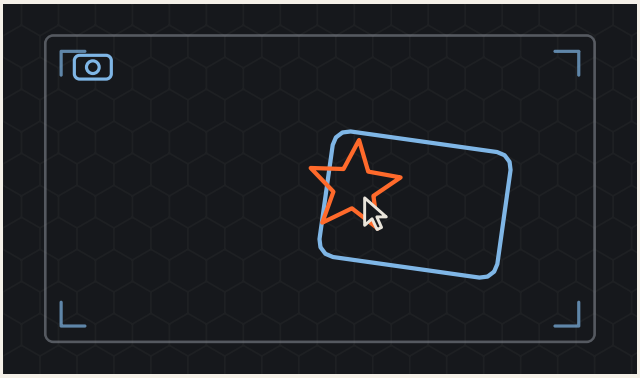
10 Files, settings, AI assistant 34
Projects and files · The AI assistant · Settings · Language · Help at hand

11 Licence and activation 36
The trial · Activating · One key, two PCs

12 Safety and shortcuts 37
What the program does for you

What RayBurn Studio does

Design, camera and laser control in one program. First, what the camera makes possible.



A camera that knows the bed

PAGE 20

The lid camera shows the bed under your design. Drag the design onto the material: that is where it lands.



Fit to Material

PAGE 30

The camera finds the piece. The design is centred on it, turned to its edges and scaled to fit.



Repeat on Parts

PAGE 30

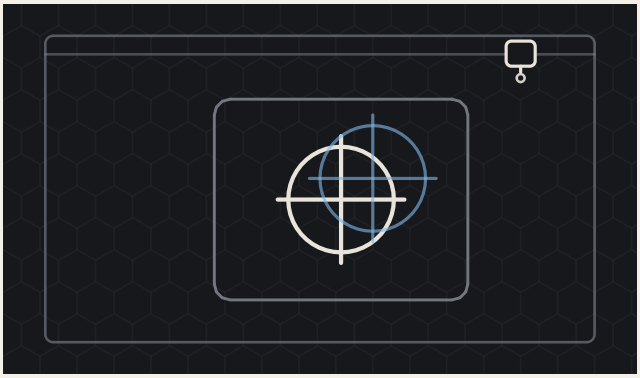
Teach the first part. Lay down the next one, turned any way: the design is put on it.



Put on all parts

PAGE 31

Several like parts on the bed at once: a copy of the design on each, and one Start for them all.



Cal check

PAGE 23

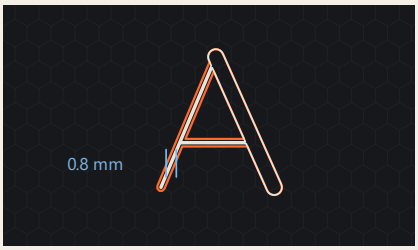
A small target is engraved and measured against the overlay. Apply takes the difference away.



The adaptive overlay

PAGE 24

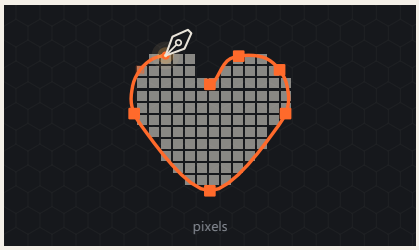
It learns from your corrections. After three, the usual offset is set by itself.



Widen Letters

Thickens only the strokes too thin to survive, for fine scripts in acrylic and wood.

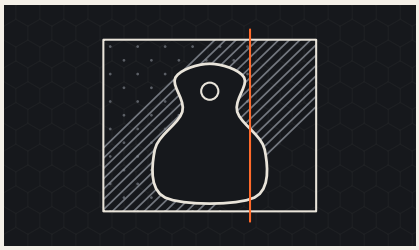
PAGE 32



Vectorize Image

A picture rebuilt as clean shapes. Auto finds how many colours it really has.

PAGE 28



Remove Background

Automatic, or by colour. What became transparent is never burned.

PAGE 27



Lead-in / lead-out lines

Each cut starts and ends in the waste, so the part carries no mark.

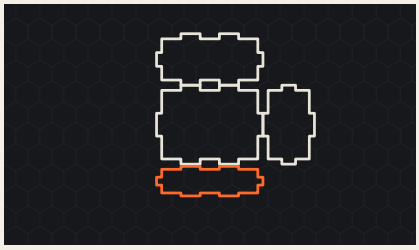
PAGE 31



Nesting

Packs parts by their real outlines, small ones inside the holes of bigger ones.

PAGE 32



Box Maker

Finger-jointed boxes from a few sizes: hinged lid, drawers, dividers and more.

PAGE 32



Block of Text

Lines stretched to one width and welded into one outline: a sign in one piece.

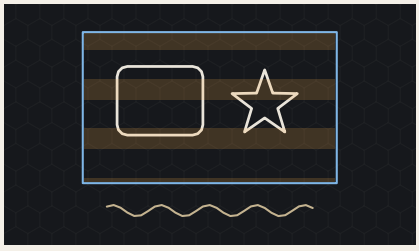
PAGE 33



Detect Shapes on Sheet

Finds the drawings on a printed sheet and puts a cut boundary round each.

PAGE 33



The flicker filter

Takes the rolling bands of LED and mains light out of the camera picture.

PAGE 20



The AI assistant

Ask in plain words. It reads the machine, camera and design, and changes nothing.

PAGE 34



Tutorial and moving tooltips

66 steps with a Try it button, and a moving picture on every tool.

PAGE 9



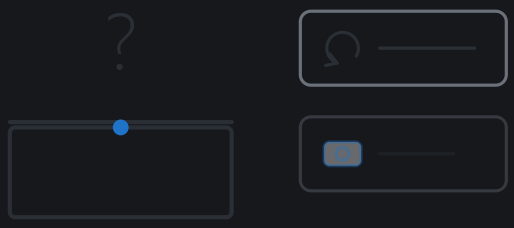
Search and a floating tool bar

Ctrl+Alt+K finds any tool or setting. Your own tools float where your hand is.

PAGE 8

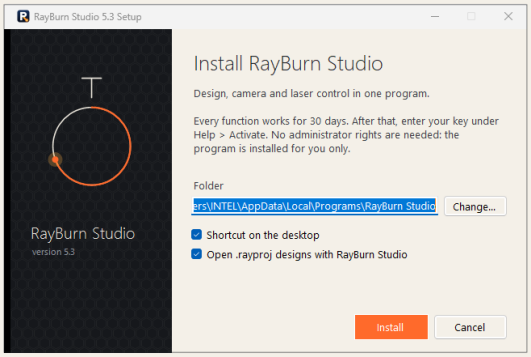
CHAPTER

01



Installing and the first start

Setup takes a minute and needs no administrator rights. Every function works for 30 days.



Installing

1. Run the RayBurn Studio Setup program. No administrator rights are needed: the program is installed for you only.
2. Keep the folder, or press **Change...** to choose another.
3. Tick **Shortcut on the desktop** and **Open .rbs designs with RayBurn Studio** if you want them.
4. Press **Install**, then **Finish**.

To remove the program later, use the list of installed apps of your PC. You are asked whether your settings, camera calibration and licence key should go too. Your design files are never touched.



Thirty days with everything

1. RayBurn Studio runs as a trial for 30 days. Every function works during the trial.
2. The top bar shows how many days are left.
3. After the trial, designs can still be opened and saved; the laser and the exports need a key. See page 36.

The first hour

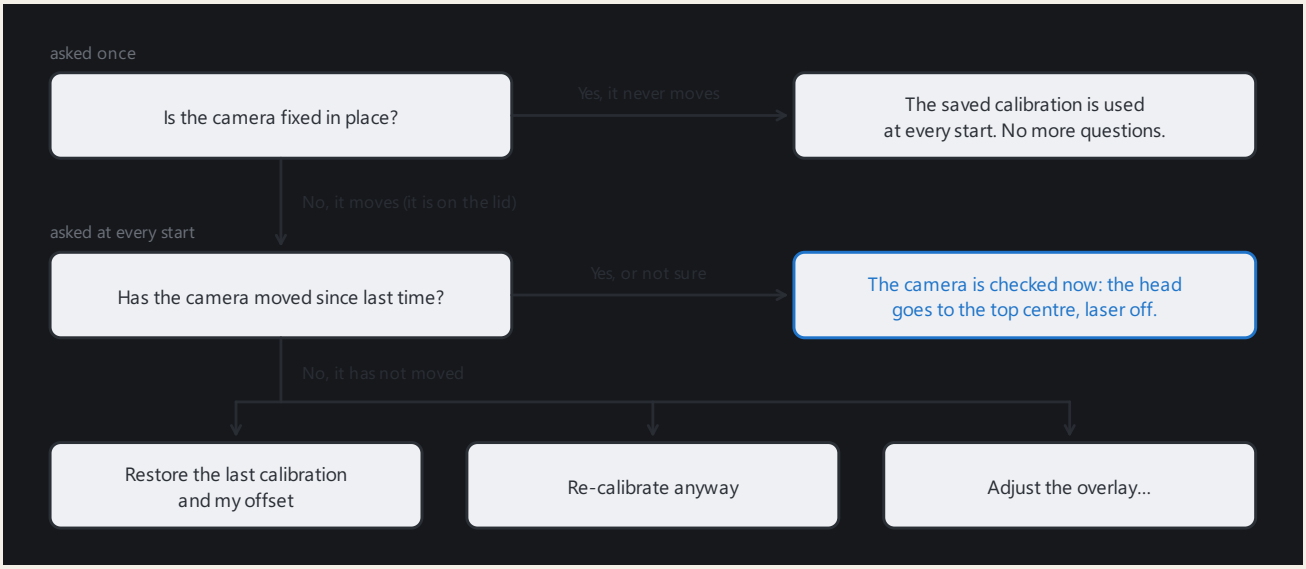


From an empty bed to a first job

1. Connect the machine: Laser panel › **Devices**, then **Connect**. Page 15.
2. Start the camera in the Cameras / Overlays tab. Page 18.
3. Calibrate the camera once, on a sheet of scrap. Page 21.
4. Draw or import a design and give its layers a speed and a power. Pages 10 and 13.
5. **Preview**, **Frame**, then **Start**. Page 15.

The camera questions at startup

With a camera set up, the program asks before it does anything. Nothing moves before you answer, and the machine waits meanwhile.



The first question is asked once. The switch **The camera is fixed in place** in the camera panel changes the answer later. Edit › Settings: **Camera auto-calibration when RayBurn starts** switches the questions on or off.

WHERE THINGS ARE KEPT

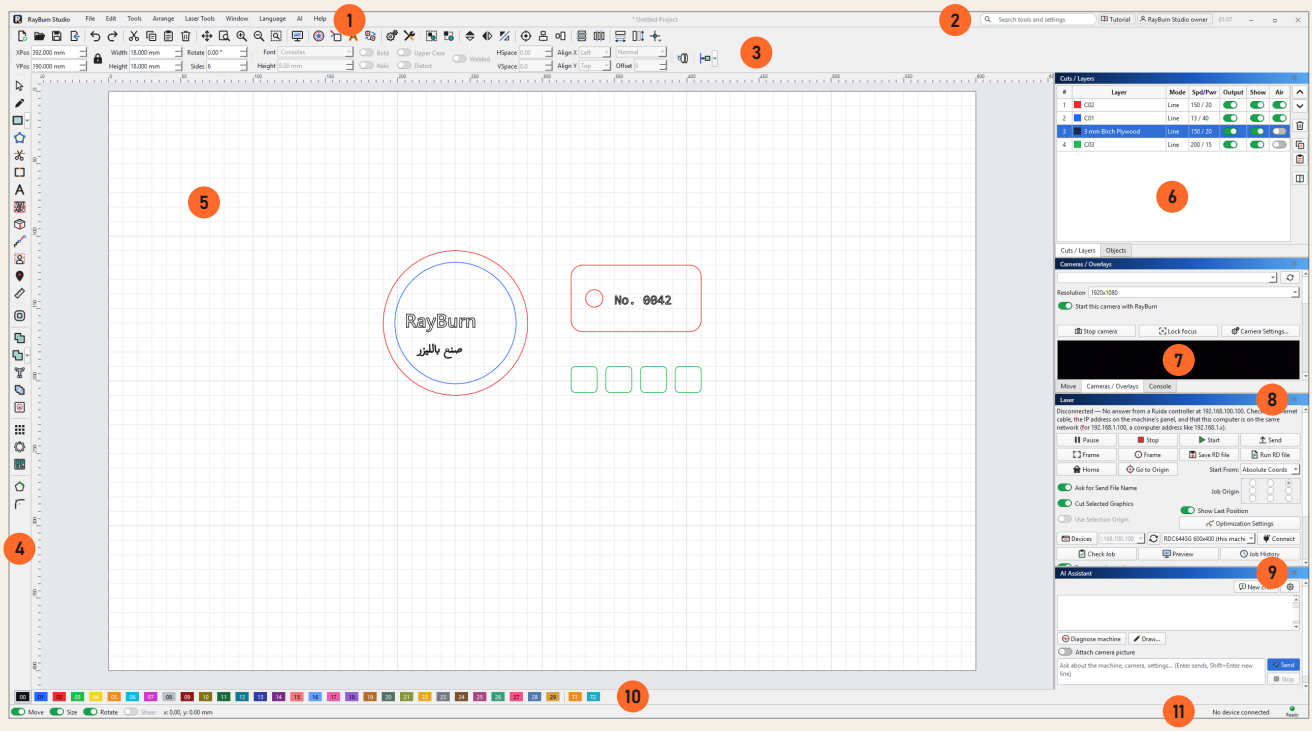
Designs are saved where you choose, as .rbs projects (older .rayproj files still open and are renamed to .rbs). Settings, layers, materials, the camera calibration, the job history and the autosave are in %APPDATA%\RayBurnStudio.

CHAPTER

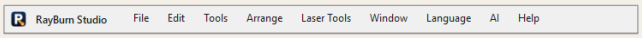
02

The window

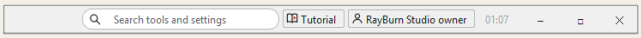
The bed in the middle, the tools round it, and every command in a menu.



1. The top bar with the menus, beside the program's name.
2. Search, the **Tutorial** button, your licence and the clock.
3. Tool bars: files, editing and the job tools; under them the exact position and size, and the Text Options.
4. Drawing tools.
5. The drawing area: the bed of your machine, at its real size.
6. Cuts / Layers, with Objects as a second tab.
7. Move, Cameras / Overlays and Console, as tabs.
8. The Laser panel: connect, frame, Start, Pause and Stop.
9. The AI Assistant.
10. The colour palette: every colour is a layer.
11. The status bar: the job's progress and the calibration light.



Left: the program's name and the menus.

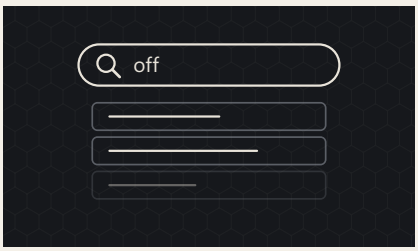


Right: search, Tutorial, your licence, the clock.



The menus in the top bar

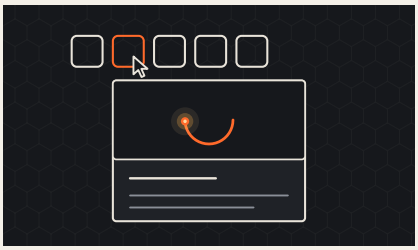
1. The menus sit in the top bar beside the program's name: **File**, **Edit**, **Tools**, **Arrange**, **Laser Tools**, **Window**, **Language**, **AI**, **Help**.
2. Every command is in a menu. The tool bars hold only the ones used most.
3. Edit › Settings has the switch **Menus in the title bar** if you prefer the system's own title bar. It takes effect at the next start.



Search tools and settings

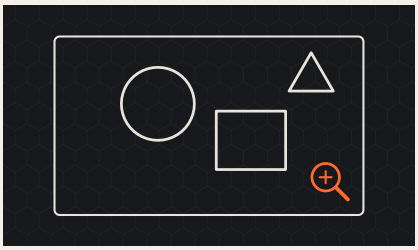
Window › Search Tools and Settings · Ctrl+Alt+K

1. Click the search box in the top bar, or press **Ctrl+Alt+K**.
2. Type a few letters of any tool, command or setting.
3. Press Enter to run the first one found, or click another in the list.



Rich tooltips

1. Rest the mouse on any tool: a small moving picture shows what it does, with its name, its shortcut and a sentence or two.
2. It works on the tool bars, in the menus and on the buttons of the panels.
3. To switch them off, open Edit › Settings. **Show tooltips** switches every tooltip off or on; **Rich tooltips** switches only the animations.



Looking around

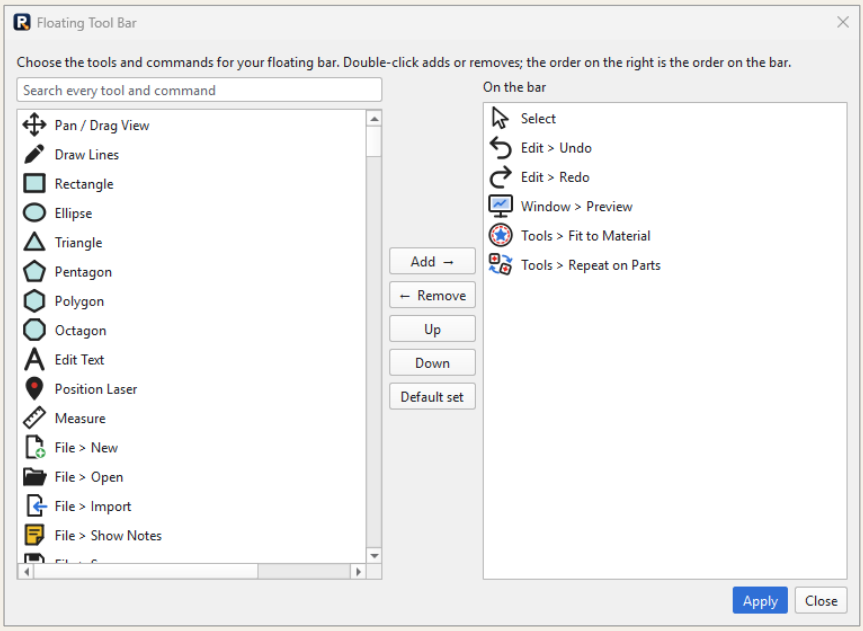
1. Turn the mouse wheel to zoom at the pointer.
2. Hold the middle mouse button, or the space bar, and drag to move the view.
3. **Ctrl+0** shows the whole bed. **Ctrl+Shift+A** fills the view with the selection.
4. **F12** hides the side panels and brings them back. Window › **Reset to Default Layout** puts everything back in place.



Your floating tool bar

Window › Floating Tool Bar

1. Window › **Floating Tool Bar** shows a small bar that floats over the drawing.
2. Drag it by its grip to where your hand is. It can also stand upright.
3. Right-click it, or press its + button, to choose the tools on it.
4. Its tools and its place are remembered.



Choosing the tools

Every tool and command is on the left; what is on your bar is on the right, in its order.

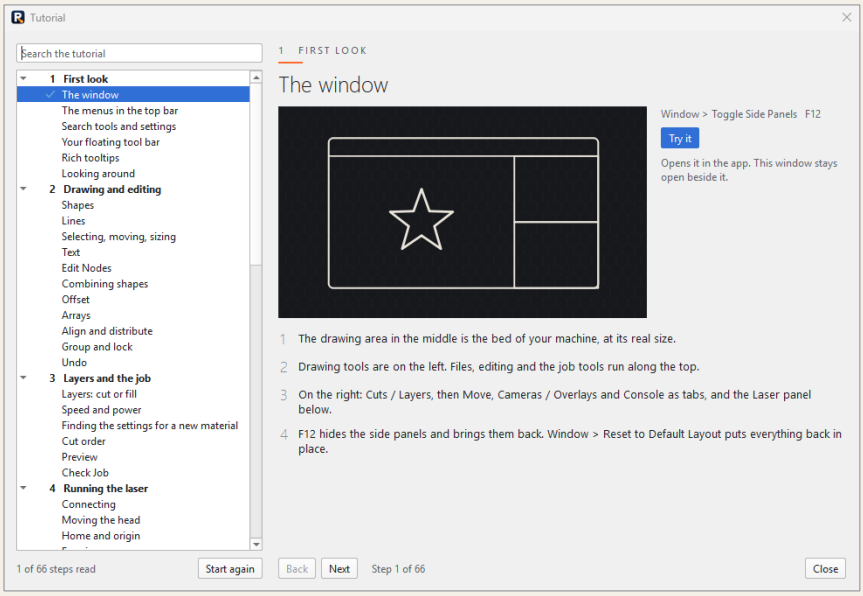
A double click adds or removes. **Default set** brings the first set back.



The Tutorial

Help › Tutorial

1. Press **Tutorial** in the top bar, or choose Help › **Tutorial**.
2. It has 66 steps in 9 chapters, each with a moving picture. The search box finds a step by any word.
3. **Try it** opens the tool a step is about. It never moves the machine and never fires the laser.



One step of the Tutorial

Chapters and steps on the left; ticks mark what you have read.

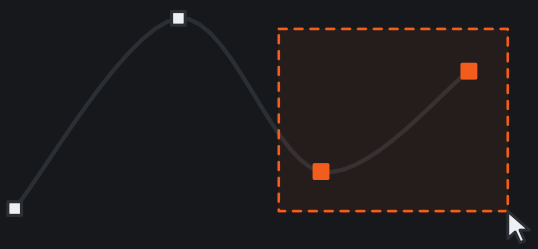
The line beside the picture says where the tool is in the menus, with its shortcut.

ONE WINDOW AT A TIME

While a tool or settings window is open, a click outside it does nothing: the window shakes and comes to the front. **Stop** and **Pause** in the Laser panel always work.

CHAPTER

03



Drawing and editing

Shapes, lines, text and nodes; then combine, offset, repeat and align them.



Shapes

Tools › Draw Shape · Ctrl+R Ctrl+E

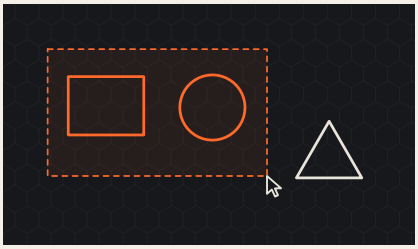
1. Pick **Rectangle** or **Ellipse** on the left and drag on the page. Hold Shift for a square or a circle.
2. The same button holds **Triangle**, **Pentagon**, **Polygon** and **Octagon**. **Sides**, in the top bar, sets the number of sides.
3. Type exact numbers in **XPos**, **YPos**, **Width** and **Height**. The padlock keeps the proportions.



Lines

Tools › Draw Lines · Ctrl+L

1. Choose **Draw Lines** and click from point to point.
2. A double click or Esc ends the line.
3. Click the first point again to close the shape. Only a closed shape can be filled or cuts a part free.



Selecting, moving, sizing

Tools › Select · Esc

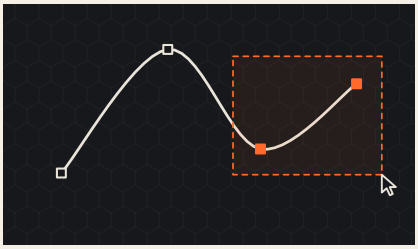
1. Choose **Select**. Click a shape, or drag a box over several.
2. Drag the selection to move it. Pull the handles to size or turn it.
3. The arrow keys nudge by 1 mm; with Shift 10 mm, with Ctrl 0.1 mm.
4. Sizing keeps the centre where it is. Hold Ctrl while dragging to pin the opposite side instead.



Text

Tools › Edit Text · Ctrl+T

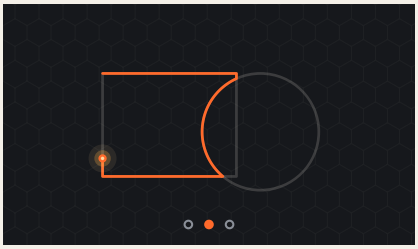
1. Choose **Edit Text**, click on the page and type.
2. Font, size and spacing are in the Text Options bar at the top.
3. Tools › **Convert to Curves** (**Ctrl+Alt+C**) turns text into outlines, so the letters' shapes can be edited.



Edit Nodes

Tools › Edit Nodes · Ctrl+`

1. Select a shape and choose **Edit Nodes**. Drag a node: the line follows.
2. Drag a box over empty space to select every node inside it. Shift or Ctrl adds more.
3. Drag any selected node to move them all together. Delete removes them; the arrow keys nudge them.



Combining shapes

Tools › Boolean Assistant · Ctrl+B

1. Select two or more closed shapes that overlap.
2. **Boolean Union** joins them, **Boolean Subtract** cuts one out of the other, **Boolean Intersection** keeps what both cover.
3. **Boolean Assistant** offers the three, so you can choose by trying. The first shape is the base for Subtract.
4. **Weld Shapes** (**Ctrl+W**) joins everything that overlaps or touches, such as the strokes of a letter; letter holes stay.



Offset

Tools › Offset Shapes · Alt+O

1. Select a shape and choose **Offset Shapes**.
2. Type the distance in mm: positive goes outward, negative inward.
3. Use it for a border round a design, an inlay, or a cutting margin.



Arrays

Arrange › Grid / Array

1. Select a shape and choose **Grid / Array** on the left bar: rows, columns and spacing.
2. **Circular Array** sets copies round a centre point.
3. Arrange › **Copy Along Path** sets copies out along a line.



Align and distribute

Arrange › Align

1. Select two or more shapes. The Arrange bar at the top lines them up: **Align Centers**, **Align Vertically**, **Align Horizontally**.
2. Arrange › Align has **Left**, **Right**, **Top** and **Bottom**, each with a shortcut (Alt + arrow key).
3. Distribute needs three or more shapes: it gives them equal gaps.
4. **Make Same Width** and **Make Same Height** take the size of the shape you selected last.



Group and lock

Arrange › Group · Ctrl+G

1. **Group** ties the selected shapes together; **Ungroup** (**Ctrl+U**) lets them go.
2. Arrange › **Auto-Group** groups every shape with the shapes inside it.
3. Arrange › **Lock Selected Shapes** keeps shapes from being moved by accident. They are still cut.

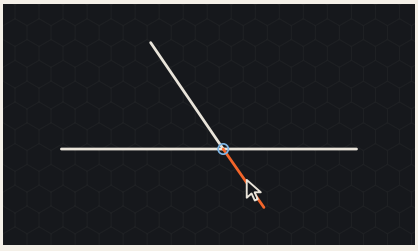


Undo

Edit › Undo History

1. **Ctrl+Z** takes back the last change; **Ctrl+Shift+Z** brings it back.
2. Edit › **Undo History** lists your last changes: click one to go back to that moment.
3. Whatever a tool window does with **Apply** or **Add to design** is one undo step.

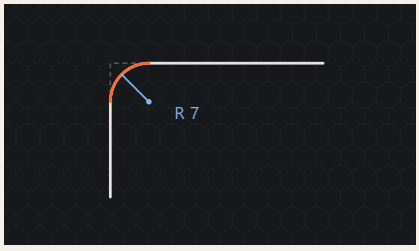
More tools for drawing



Trim Shapes

Tools › Trim Shapes · Ctrl+K

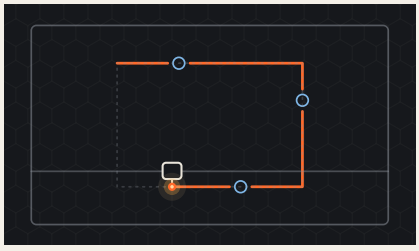
Click the piece of a line between two crossings to remove it.



Radius / Fillet

Tools › Radius / Fillet…

Rounds sharp corners with the radius you set: click a corner, or round the whole selection.



Add Tabs

Tools › Add Tabs · Ctrl+Tab

Leaves small bridges in a cut, so the part stays in the sheet until you break it out.

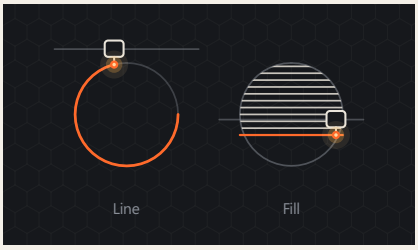
CHAPTER

04



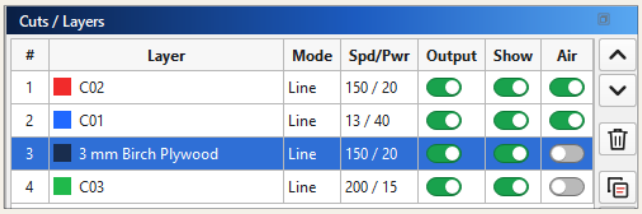
Layers and the job

Every colour is a layer with its own mode, speed and power. Preview the job before anything burns.



Layers: cut or fill

1. Every colour is a layer. Click a colour in the palette at the bottom to put the selection on that layer.
2. The Cuts / Layers panel lists the layers in use, with their **Mode** and **Spd/Pwr**.
3. Mode **Line** cuts along the shape. **Fill** scans its inside. **Offset Fill** fills with outlines. **Image** is for pictures.
4. **Output** takes a layer out of the job without deleting it. **Show** hides it on the screen.



Cuts / Layers

One row per layer in use: its colour and name, Mode, speed / power, and the switches Output, Show and Air.



Speed and power

Window › Material Library

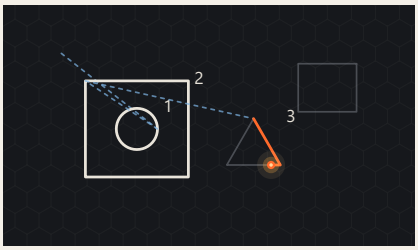
1. Double-click a layer in Cuts / Layers to open the Cut Settings Editor.
2. Set **Speed**, **Max power**, **Min power** and **Number of passes**. For a Fill layer also **Fill interval** and **Scan angle**.
3. Slow and strong cuts deep; fast and weak only marks.
4. Window › **Material Library** keeps what worked for each material: **Apply to selected layer** writes it to the layer.



Finding the settings for a new material

Laser Tools › Material Test

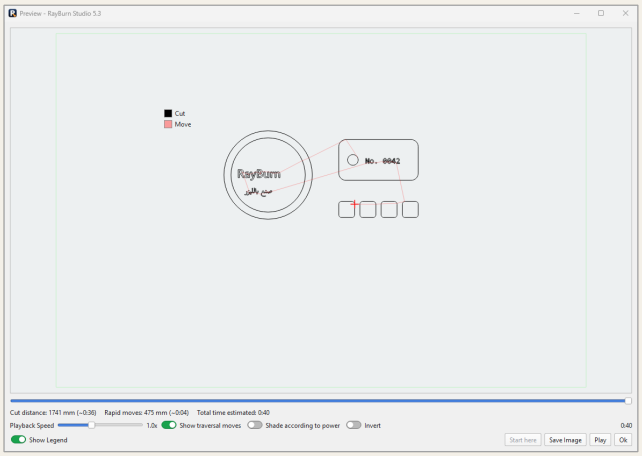
1. Laser Tools › **Material Test** draws a grid of squares, each with another speed and power.
2. Engrave it on a piece of scrap of the new material.
3. Pick the square you like and note its speed and power in the Material Library.



Cut order

Laser Tools › Optimization Settings…

1. Layers are cut from the top of the list down. Drag a layer up or down the list to change the order.
2. Within a layer, inner shapes are always cut before the shape around them.
3. Above the layer list, **Job starts from**: **Top down** or **Bottom up**. Either way the layers keep their order and the head goes to the nearest shape next.
4. Laser panel › **Optimization Settings**: the shortest path, **Cut shared lines once** (where shapes touch, the line between them is cut only once) and **Cut selected graphics only**.



Preview

Window › Preview · Alt+P

1. **Preview** plays the whole job before anything burns.
2. **Show traversal moves** draws the moves with the laser off. **Playback Speed** makes it faster or slower.
3. Drag the slider to any moment of the job. The time the job takes is shown.

   Black is what the laser cuts; the thin red lines are the moves between cuts. Under the picture: the cut distance, the rapid moves and the estimated time.



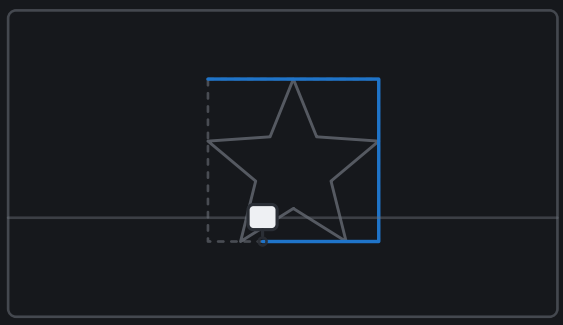
Check Job

Laser Tools › Check Job… · Ctrl+Shift+J

1. Laser panel › **Check Job** looks the job over before it runs.
2. It lists speed limits, room at the edges of the bed, the cut order, open shapes and objects off the bed.
3. **Select** shows the shapes a line is about; **Fix** repairs what can be repaired.

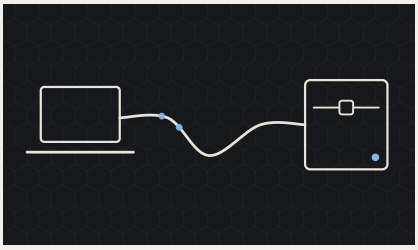
CHAPTER

05



Running the laser

Connect, move, frame, then Start. Nothing fires without your click.



Connecting

Laser Tools › Device Settings

1. Laser panel › **Devices** opens Device Settings: choose the connection type, **USB/COM** or **Network**.
2. Pick the port in the Laser panel and press **Connect**. The line at the top of the panel says whether it worked, and why not.
3. Only one program can hold the controller at a time: close any other laser program first.

RayBurn Studio drives a laser cutter with a Ruida controller, over USB or the network, or with a G-code controller.



Moving the head

○ MOVES THE MACHINE · LASER OFF

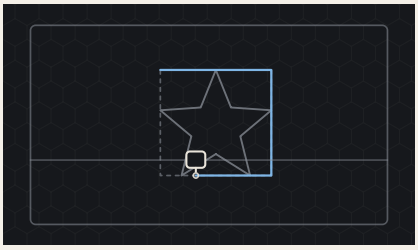
1. Move panel: the arrows move the head by the **Distance**, at the **Speed** set beside them.
2. **Continuous jog (hold the arrows)** moves for as long as you hold an arrow.
3. **Get Position** reads where the head is. **Move to Position** X, Y and **Go** sends it to an exact place.
4. **Position Laser** (**Alt+L**): click a place on the bed and the head goes there, laser off.



Home and origin

MOVES THE MACHINE · LASER OFF

1. Laser panel › **Home** sends the head to its home corner, where the machine knows exactly where it is.
2. **Go to Origin** sends it to the origin you set on the machine.
3. **Start From** in the Laser panel and **Job Origin** on the top tool bar decide where a job is placed.
4. **Send** always asks for the job's name. A job of the same name in the machine is replaced, and a message says when the job is in.



Framing

MOVES THE MACHINE · LASER OFF

1. **Frame** runs the head round the box of the job with the laser off, to show where it will land.
2. The second Frame button (Rubber Band Frame) follows an outline pulled tight round the job.
3. **Frame continuously** keeps it going until Stop or Esc, while you shift the material into place.



Start

THE LASER FIRES

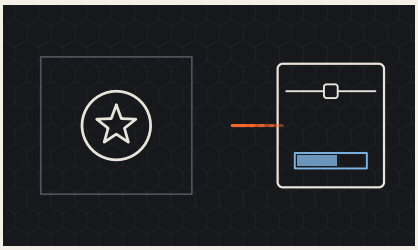
1. Material on the bed, lid closed, air assist and extraction on.
2. Press **Start** in the Laser panel. You are asked: “Start the job now? THE LASER WILL FIRE.” and reminded: “Check Focus.”
3. Check the focus height for this material, then confirm. Nothing fires without that click.
4. The bar at the bottom of the window shows how far the job is and the time left.
5. Stay at the machine while it runs.



Pause and Stop

1. **Pause** halts the job where it is; press it again to go on.
2. **Stop** ends the job, a frame or a jog at once.
3. Both always work, even while a tool window is open and the rest of the program waits.

While the camera is checked, at the start of the program or by Auto-calibrate, the other machine controls wait and say “Calibration In Progress!! Please Wait”.



Send, and job files

THE LASER FIRES

1. **Send** writes the job into the controller's memory without starting it: start it at the machine's own panel.
2. **Save RD file** writes the job to a file, for a USB stick.
3. **Run RD file** sends a file made earlier to the machine and runs it.

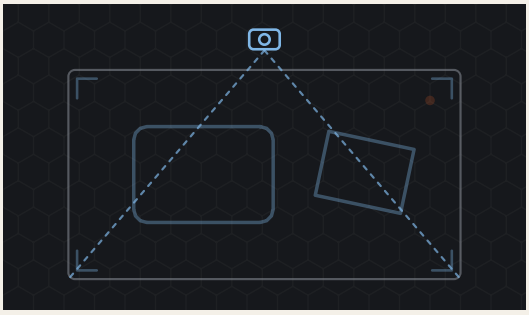
CHAPTER

06



The camera

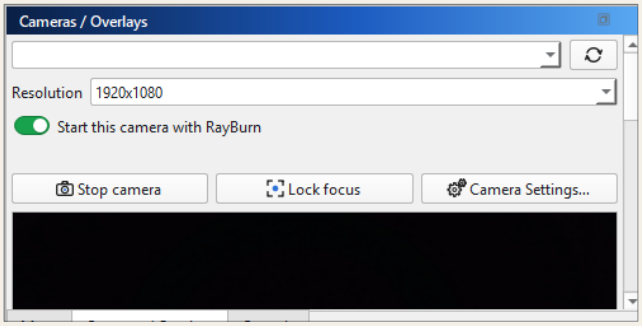
The lid camera shows the bed under your design, so work is placed by sight.



Starting the camera

Laser Tools › Manage Cameras

1. Open the Cameras / Overlays tab on the right (Laser Tools › **Manage Cameras**).
2. Choose your camera in the list and press **Start camera**.
3. Switch on **Start this camera with RayBurn** and it starts by itself next time.
4. The small picture in the panel shows what the camera sees.



The camera panel

The camera list and its Resolution, the switch that starts it with the program, and the buttons **Stop camera**, **Lock focus** and **Camera Settings...**.

Further down the same panel: Live overlay, Calibrate..., Stickers..., Auto-calibrate and Cal check with engraving....

Only one program can hold the camera at a time.



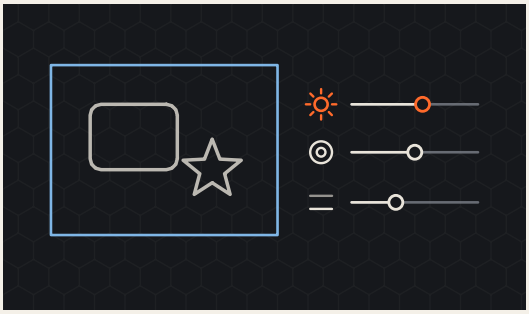
Resolution

1. Pick the **Resolution** in the camera panel, or in Camera Settings under Picture.
2. Any size with the same proportions as the calibration works with it: 3840x2160 (4K), 2560x1440, 1920x1080, 1280x720 and 960x540 are the same picture.
3. A bigger size gives a sharper overlay at a lower frame rate.
4. A size with other proportions (640x480) shows another part of the bed and needs its own calibration. The program says so when the camera starts.



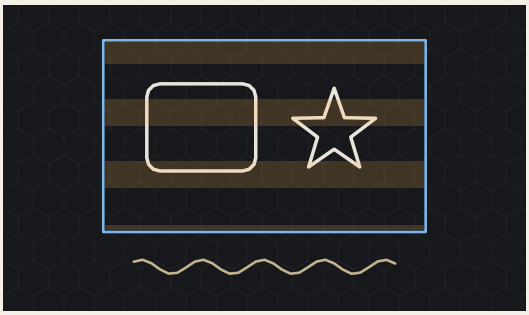
Camera zoom

1. For a camera with an optical zoom, switch on **Optical Zoom** in the camera panel.
2. On the workspace the mouse wheel zooms the view as always. **Ctrl** + wheel zooms the camera itself in on the material, for a sharper picture when placing shapes.
3. **Ctrl** + double-click an empty place: back to the whole bed. The camera never zooms out further than its normal view.
4. The calibration is not changed. Calibrating and measuring wait until the camera is zoomed out again. Cal check takes its pictures zoomed in.



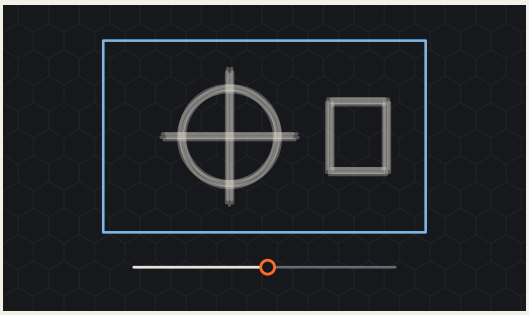
Camera Settings

1. Press **Camera Settings…** in the camera panel. The window lists every setting this camera offers; what it lacks is greyed.
2. Exposure: switch **Auto** off and set it so the bed is neither washed out nor dark.
3. Changes show in the live picture at once and are kept for this camera.
4. **Default** puts one setting back; **Restore defaults** all of them.
5. Zoom and aim change what the camera sees: after changing them the overlay does not fit until you set them back or recalibrate.



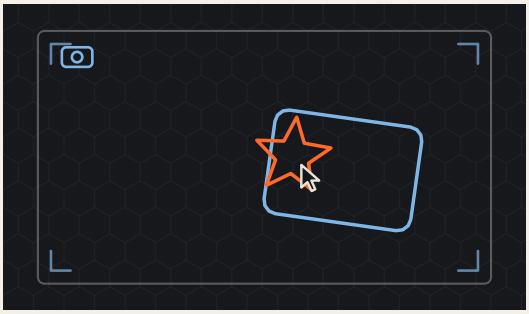
The flicker filter, for LED and mains light

1. LED strips and mains lamps can flicker: bands roll through the camera picture.
2. Camera Settings › Picture › **Flicker filter (any light)**: Off, Automatic or Always on.
3. Automatic works only while bands are there, at any frequency. Nothing has to be set.
4. The line under it tells what the light does, for example “The light flickers at about 100 Hz”.
5. The camera's own **Anti-flicker** setting only knows 50 and 60 Hz.



Focus

1. Press **Lock focus** in the camera panel: the focus is swept and locked at the sharpest value.
2. Or set **Focus** by hand in Camera Settings, with Auto switched off.
3. A locked focus keeps the picture from breathing, so the overlay stays where it is.



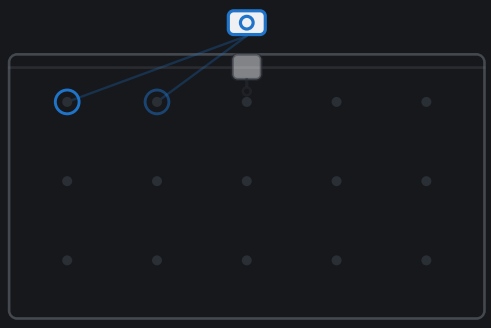
The overlay

Laser Tools › Toggle Camera Overlay · Ctrl+Shift+O

1. Switch on **Live overlay**: the bed as the camera sees it appears under your design. The slider beside it sets how strongly the picture shows.
2. Drag your design onto the material in the picture.
3. **Update Overlay** keeps a still picture instead, at the camera's full detail; **Clear** removes it.
4. **Live overlay detail**: Full is as sharp as the camera gives, Balanced suits most computers, Light is quickest. A camera that sees only part of the bed is drawn on just that part, at its own detail.
5. **Ctrl+Shift+O** switches the overlay on and off.

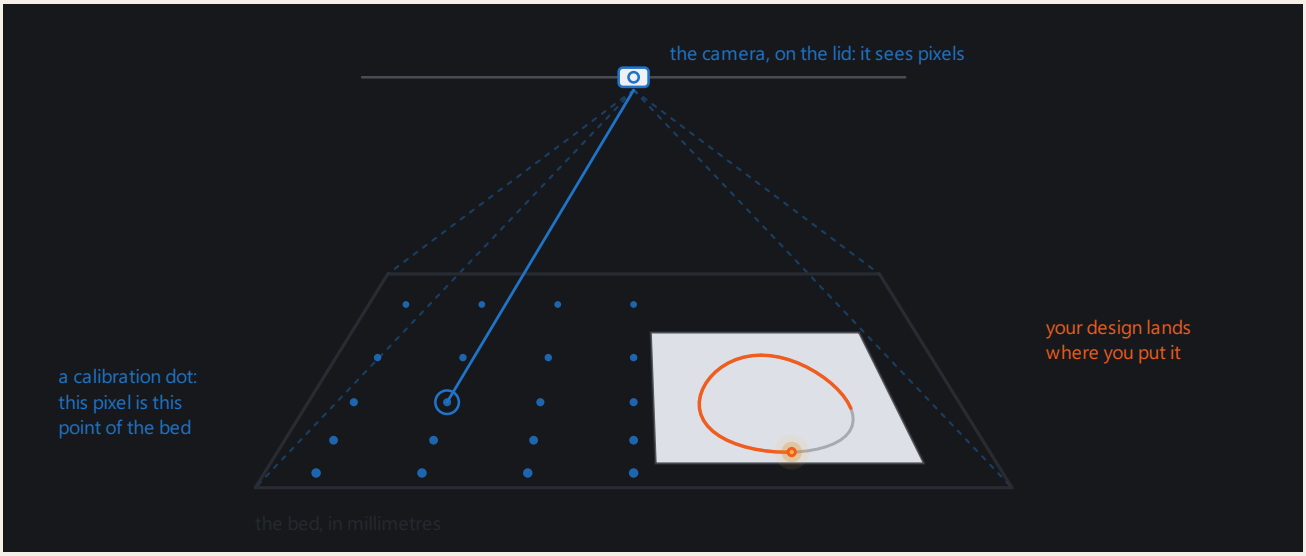
CHAPTER

07



Camera calibration

The calibration ties camera pixels to bed millimetres. Make it once, then keep it right.



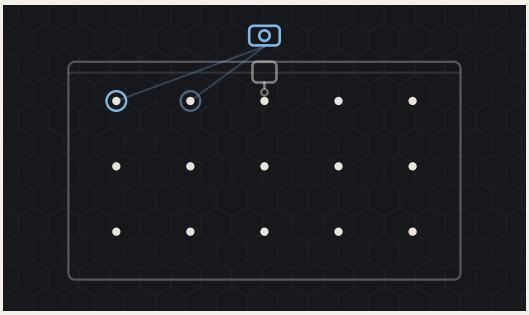
Why a calibration

1. The camera looks at the bed at an angle, through a lens that bends the picture.
2. The calibration tells the program which camera pixel is which point of the bed, in millimetres.
3. Only then does a design placed on the picture land on the same spot of the material.
4. Calibrate once, and again whenever the camera was re-mounted or the bed has moved.

THE CALIBRATION LIGHT

A small light at the right end of the status bar tells the state: green **Ready**, yellow **Cal in Progress**, red **Invalid Cal** (no calibration, a calibration for another work area, or a failed check). Rest the mouse on it for the reason.

The first calibration



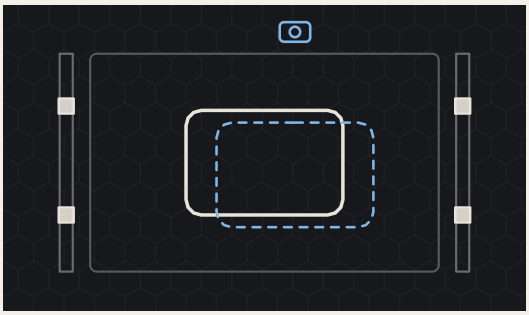
Engraving the dot target

Laser Tools › Camera Calibration… THE LASER FIRES

1. Cover the whole bed with scrap; cardboard works. Check air assist and extraction, and stay at the machine.
2. Camera panel › **Calibrate…**: **Columns**, **Rows**, **Edge margin (mm)** and **Dot power (%)** describe the target.
3. **Engrave target & calibrate** engraves the dots, then finds them with the camera.
4. The line under the fields then reads “Done: … dots used, fit … mm RMS”: the smaller the number, the better.
5. If a target is already engraved, **Calibrate from engraved target** uses it without burning again.

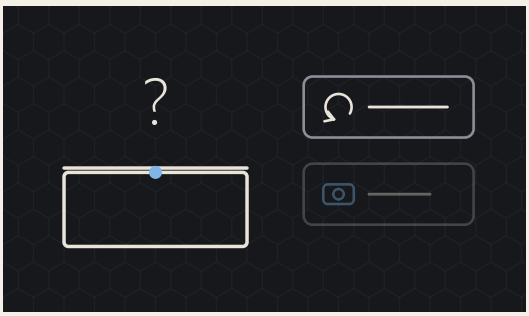
A camera on the lid

A camera on the lid sits a little differently each time the lid is closed. Three things keep the overlay in place.



White stickers

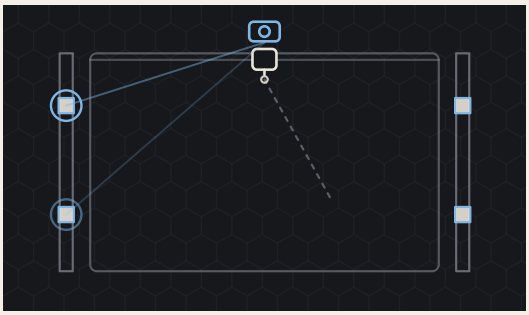
1. Put matte stickers on the machine's fixed frame: at least 2 on each side, outside the bed, where the gantry never touches them.
2. Camera panel › **Stickers…**: press **Pick stickers**, click each one in the picture, then **Save picked stickers**.
3. Switch on **Keep the overlay locked to the white stickers**: the overlay then follows the camera by itself.
4. Never put a sticker on the bed: the bed moves for focus.



The questions at startup

1. Asked once: “Is the camera fixed in place?” Answer **Yes, it never moves** and the saved calibration is simply used at every start.
2. **No, it moves (it is on the lid)**: every start then asks “Has the camera moved since last time?”
3. **Yes, or not sure** checks the camera now: the head moves to the top centre, out of the camera's view; the laser stays off.
4. **No, it has not moved** offers **Restore the last calibration and my offset**, **Re-calibrate anyway** or **Adjust the overlay…**

The whole path is drawn on page 6.



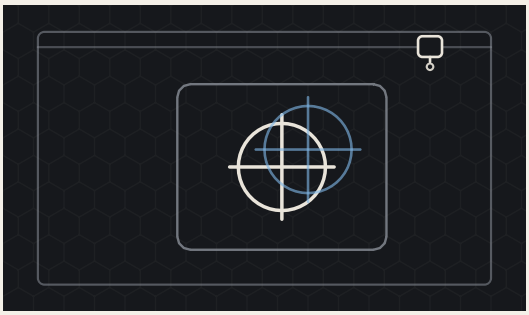
Auto-calibrate

MOVES THE MACHINE · LASER OFF

1. Camera panel › **Auto-calibrate** checks where the lid has put the camera, whenever you want.
2. The head moves to the top centre first, so it hides no sticker. The machine is not homed and the laser stays off.
3. While it runs the machine controls wait and say “Calibration In Progress!! Please Wait”. Stop and Pause always work.
4. If the camera has moved a lot you can choose: **Keep the correction**, **Undo the correction**, or **Redo calibration…**

Checking the overlay

The fit of a calibration does not prove that the overlay is right. Only a mark the laser really made does.



Cal check with engraving

THE LASER FIRES

1. Camera panel › **Cal check with engraving…** compares the overlay with lines the laser really engraved.
2. Put scrap on the bed and jog the head over it (Move panel). Press **At the head**.
3. Set **Power** and **Speed** for the scrap, then press **Engrave check target…**: a 10 mm circle with a cross. The laser fires after a confirmation.
4. The head moves away and the camera measures how far the overlay shows the target from where it was engraved.
5. **Apply** takes the measured offset and closes the window. **Show corrected** lets you look first.



Checking with the head, without burning

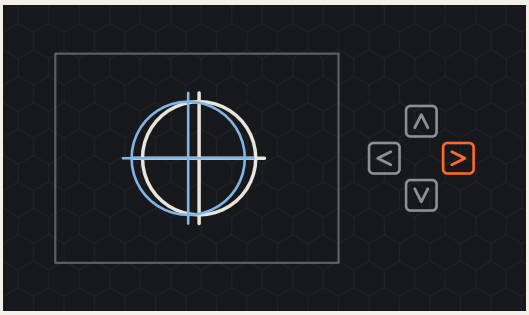
MOVES THE MACHINE · LASER OFF

1. Right after a check with an engraving, when the overlay is right, press **Learn the head…**.
2. After you confirm, the head visits 5 places with the laser off, and what it looks like at each is remembered.
3. Later, **Check with the head…** visits the same places and compares where the camera sees the head now.
4. The difference is the overlay's error. It needs 3 places that agree; otherwise it says it cannot tell.



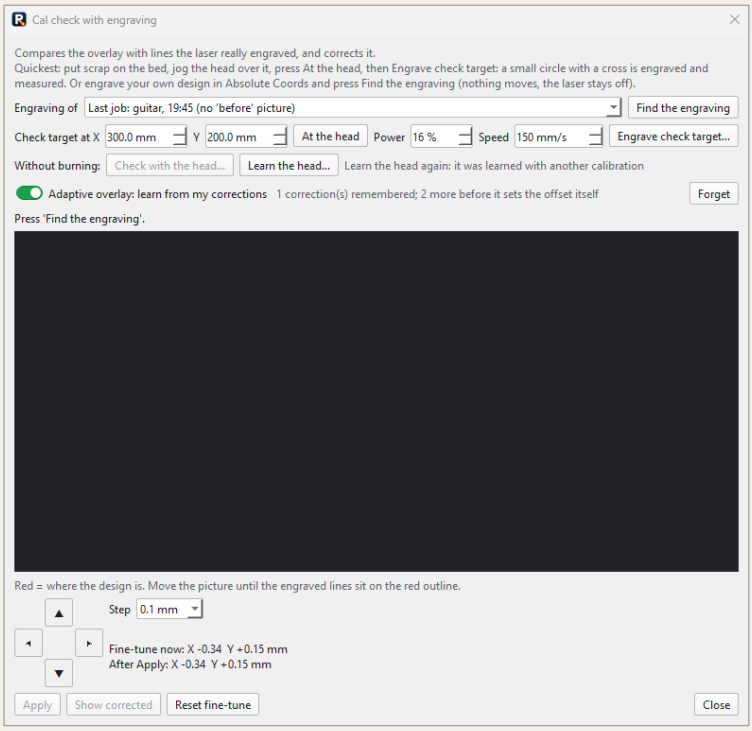
The adaptive overlay

1. In the Cal check window, switch on **Adaptive overlay: learn from my corrections**.
2. Every offset you apply there is remembered, together with where the camera sat.
3. After 3 corrections the usual offset is set by itself whenever the camera has moved or was checked.
4. A clearly measured check is applied without asking; never more than 3 mm in one step.
5. **Forget** throws away what was learned.



The picture offset arrows

1. Engrave a design in Absolute Coords, open the Cal check window and press **Find the engraving**. Nothing moves and the laser stays off.
2. Red shows where the design is. Use the arrows to move the picture until the engraved lines sit on the red outline.
3. **Step** sets how far one press moves it, from 0.05 to 2 mm.
4. **Apply** keeps the offset. **Reset fine-tune** goes back to the calibration as it was made.



The Cal check window

Top row: the engraving to compare with, and **Find the engraving**.

Second row: where the check target goes (X, Y or **At the head**), its Power and Speed, and **Engrave check target...**.

Then the check without burning, and the adaptive overlay with **Forget**.

Below the picture: the offset arrows with their Step, **Apply**, **Show corrected** and **Reset fine-tune**.

THREE WAYS TO CHECK	IT BURNS	IT MOVES	USE IT WHEN
Cal check with engraving	a 10 mm target, on scrap	the head, to the target and away	you want a measured answer
Check with the head	nothing	the head, to 5 places, laser off	the head was learned while the overlay was right
Find the engraving, and the arrows	nothing	nothing	you have just engraved a design in Absolute Coords



When something went wrong

Laser Tools › Restore Previous Camera Calibration

1. Laser Tools › **Restore Previous Camera Calibration** undoes the last change to the calibration.
2. Calibrate… › **Use current view as reference**: only when the overlay lines up with the bed right now.
3. **Export** and **Import** in the Calibrate window save a calibration to a file and bring it back.

CHAPTER

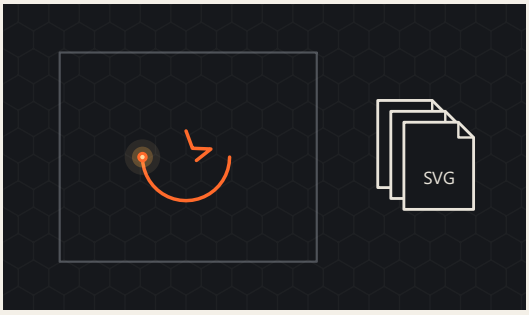
08



pixels

Pictures

Bring a picture in as it is. Then engrave it, lift it off its background or turn it into shapes.



Art Library

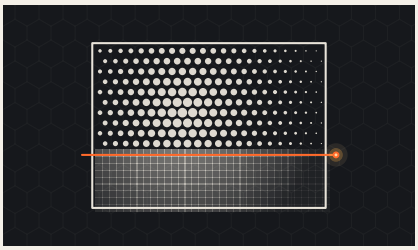
1. Window › **Art Library**, the Art Library button on the left bar, or **Ctrl+Alt+A** opens a panel of ready-made designs, each one on its own.
2. **Show** picks All designs, the **Basic Shapes** that come with the program (hearts, stars, tags, a seal, a paw print...) or one library.
3. **Add Library...** adds art library files (.lbart). They are copied into the program's own folder. A sheet of designs in a library is listed as its separate designs, without the notes written beside them.
4. Click a design to select it. Double-click it, or press **Add to Design**: just that design lands in the middle of the view, on the layer in use.



Importing a picture

File › Import · Ctrl+I

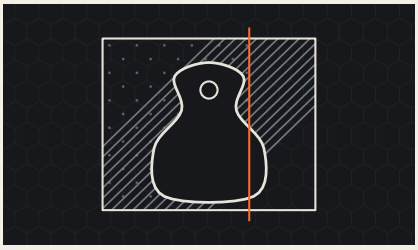
1. File › **Import** takes PNG, JPG, BMP and other pictures, besides SVG, DXF and HPGL drawings.
2. A picture comes in as it is and is shown in grey; nothing is changed yet.
3. Put it on a layer whose Mode is **Image**: the layer's settings decide how it is burned.



Adjust Image and Convert to Bitmap

Tools › Adjust Image · Alt+I

1. Select the picture and choose Tools › **Adjust Image**.
2. **Image Mode** chooses the dot pattern; **DPI** or **Line Interval** sets how fine it is. **Negative Image** swaps light and dark.
3. The preview shows the dots the laser will burn.
4. Edit › **Convert to Bitmap** (**Ctrl+Shift+B**) applies the dithering and shows the result on the page.

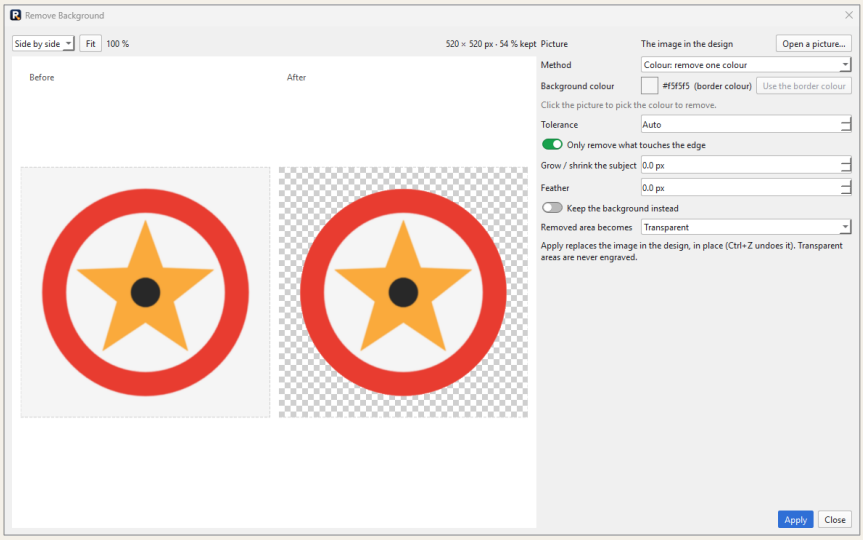


Remove Background

Tools › Remove Background…

1. Select a picture and choose **Remove Background** on the left bar, or use **Open a picture…** in its window.
2. **Method**: automatic, or by colour (click the background colour in the picture).
3. **Tolerance**, **Grow / shrink the subject** and **Feather** tidy the edge.
4. **Apply** replaces the picture in one undo step. Parts that became transparent are never burned.

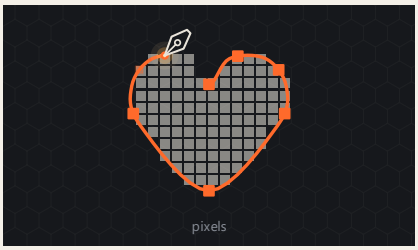
Weak on busy backgrounds, hair, and subjects the colour of the backdrop.



Before and after

The chequered area is transparent: the laser leaves it alone.

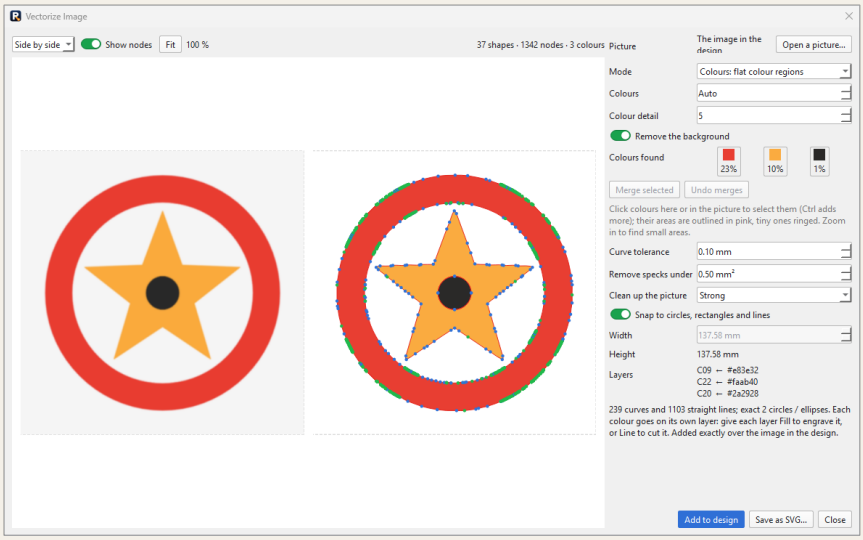
Only remove what touches the edge keeps the same colour inside the subject.



Vectorize Image

Tools › Vectorize Image…

1. Select a picture and choose **Vectorize Image**, or use **Open a picture…** in its window.
2. **Mode**: an outline in black and white, or flat colours.
3. **Colours**: Auto finds how many colours the picture really has. **Colour detail** (1 to 10) makes it finer or coarser.
4. Click colours under **Colours found** and press **Merge selected** to make them one.
5. **Add to design** puts the shapes on the page, a layer per colour. **Save as SVG…** writes a file.

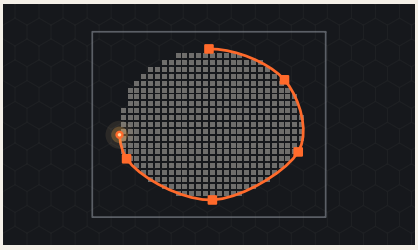


The picture, and its shapes

Left the picture, right the shapes with their nodes. The wheel zooms at the mouse, in both at once.

Near-perfect circles, rectangles and straight runs snap to exact ones.

Each colour goes on its own layer: give it Fill to engrave it, or Line to cut it.

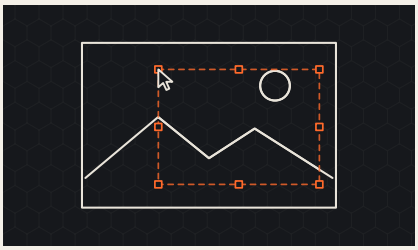


Trace Image

Tools › Trace Image · Alt+T

1. Select a picture and choose Tools › **Trace Image**.
2. It follows the edges of the dark areas and gives you lines to cut or engrave.
3. Trace is quick for a logo in black and white. Vectorize Image gives cleaner curves, and colours.

More tools for pictures



Crop Image

Tools › Crop Image

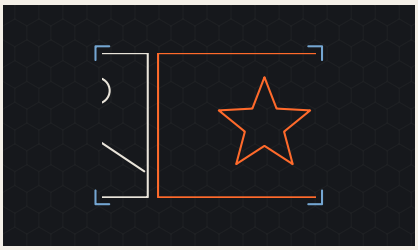
Cuts a picture down to the part you want to engrave.



Apply Mask to Image

Tools › Apply Mask to Image

Shows a picture only inside a shape. Select the picture and the shape first.



Replace Image

Edit › Image options › Replace Image

Puts another picture in place of the selected one and keeps its position and settings.

CHAPTER

09



Production tools

The tools that save the most time at the machine.



Fit to Material

Tools › Fit to Material… · Ctrl+Alt+F

1. Lay the piece on the bed, start the camera, and select the design (nothing selected: the whole design).
2. Choose Tools › **Fit to Material**. The camera takes a picture and outlines the pieces it finds: click yours.
3. A round design becomes concentric with a disc; a box is centred on a rectangle and turned to its edges.
4. **Scale the design to fit the piece**, **Distance from the edge**, **Rotate the design**, **Offset X** and **Offset Y** fine-tune it.
5. **Apply** moves the design in one undo step. For a clear piece the camera cannot see, use **Mark a circle** or **Mark a rectangle**.



Repeat on Parts, one by one

Tools › Repeat on Parts… · Ctrl+Alt+R THE LASER FIRES

1. Put the first part on the bed and the design on it where it belongs.
2. Choose Tools › **Repeat on Parts**: **Take a picture**, then **This is the first part**.
3. Press **Start job**: it is the usual Start, with its confirmation.
4. Take the finished part off and lay the next one down, turned any way. The camera finds it and puts the design on it.
5. Press **Start job** again. **Skip this part** and **Teach again** are there when you need them.

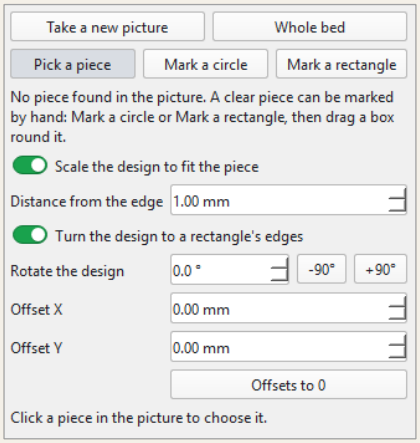


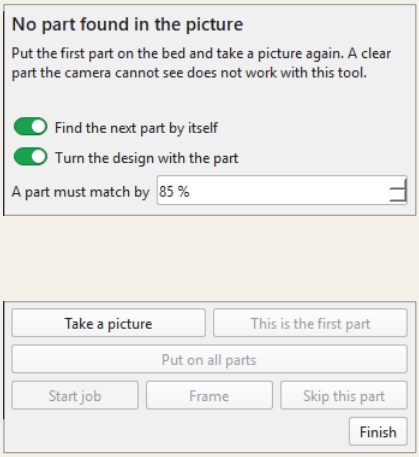
Repeat on Parts: Put on all parts

THE LASER FIRES

1. Lay several like parts on the bed at once.
2. **Put on all parts** finds every part like the first and puts a copy of the design on each, turned as the part lies.
3. One **Start job** engraves them all.
4. For the next batch lay new parts down. Parts still lying where they were engraved are left out.

Nothing fires by itself: every job starts with your click on Start job. The tool is not for clear parts the camera cannot see.





Fit to Material

Pick a piece, or mark a clear one by hand. **Whole bed** shows everything again.

The -90° and +90° buttons turn a tall design to lie across a wide piece.

Repeat on Parts

Find the next part by itself watches the camera: when the bed is still again, the next part is found.

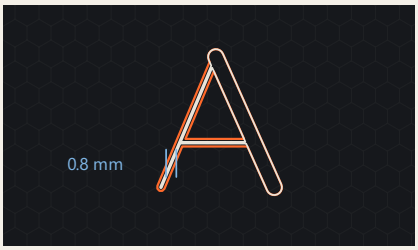
A part must match by sets how alike a part must be to the first.



Lead-in / lead-out lines

Tools › Lead-in / Lead-out Lines…

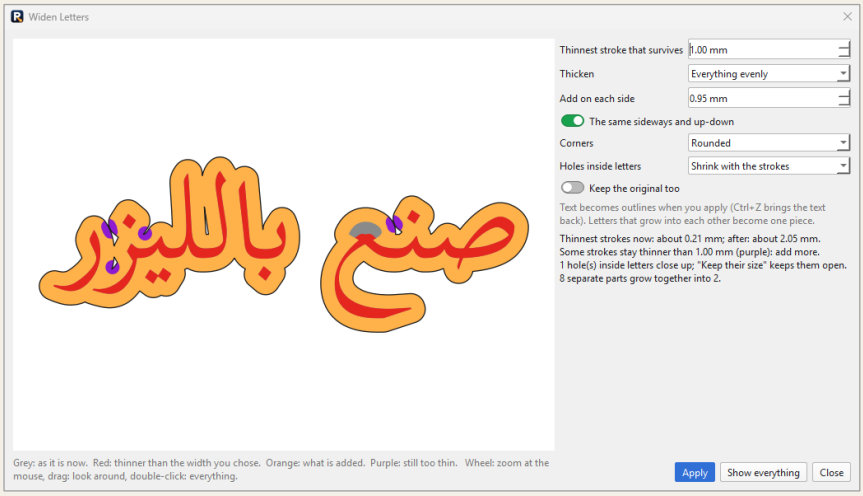
1. Where a cut starts, the beam leaves a small mark. A lead puts that mark in the waste.
2. Choose Tools › **Lead-in / Lead-out Lines**: pick the **Layer**, switch on **Lead-in: start the cut in the waste** and set its length.
3. **Shape of the lead**: a straight line, or an arc that meets the cut smoothly. **Angle** sets how it comes in.
4. A lead lies outside a part and inside a hole. In the picture red is the lead-in, blue the lead-out.
5. **Apply** writes it to the layer. **Preview the job** shows the whole job.



Widen Letters

Tools › Widen Letters… · Ctrl+Alt+W

1. Thin strokes of letters melt in acrylic or burn away in wood.
2. Select the text and choose Tools › **Widen Letters**.
3. Only the strokes that are too thin: set **Thinnest stroke that survives**. Thick strokes keep their exact outline.
4. Or thicken everything evenly, with separate amounts sideways and up-down.
5. **Apply** replaces the text by outlines. **Keep the original too** adds them instead.



What the preview shows

Grey: the letters as they are now.

Red: thinner than the width you chose.

Orange: what is added.

Purple: still too thin.

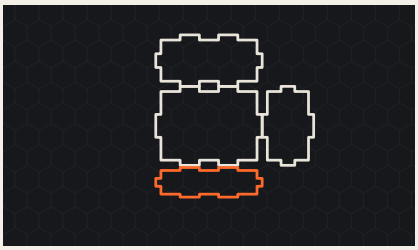
The text beside it gives the thinnest stroke before and after, and counts the holes that close up.



Nesting

Arrange › Nesting · Ctrl+Shift+N

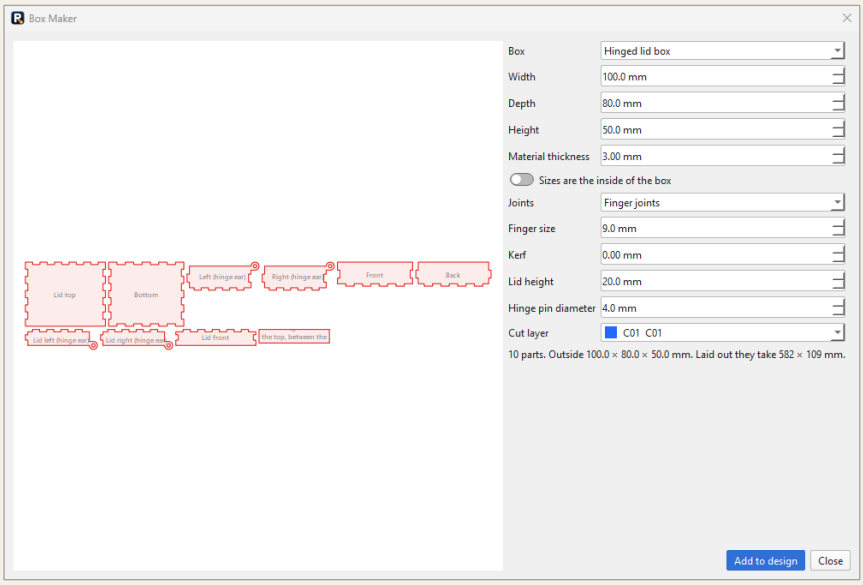
1. Select the parts and choose Arrange › **Nesting**.
2. Set **Gap between shapes**, **Rotate shapes to fit**, and the Material width and height.
3. **Put small shapes inside the cut-out holes of bigger ones** saves even more.
4. **Nest** packs the parts by their real outlines, in one undo step. Parts that do not fit stay where they were.



Box Maker

Tools › Box Maker…

1. Choose **Box Maker** on the left bar and pick the kind of box: basic, hinged lid, dividers, drawers, sliding lid, parts bin, polygon or curved.
2. Give the sizes, the **Material thickness**, the **Finger size** and the **Kerf** of your laser.
3. The preview shows every side with its finger joints.
4. **Add to design** lays the parts on the page, ready to cut.



A hinged lid box, laid out flat

Every part is shown as it will be cut, with its name.

The line under the fields counts the parts and gives the outside size and the room the layout takes.



Block of Text

Tools › Block of Text…

1. Choose **Block of Text** on the left bar and type a few lines.
2. Every line is stretched to the same **Width**, and the lines are stacked into the **Height** you give.
3. A + or - at the end of a line makes that line taller or lower.
4. **Add to design** gives one welded outline: a coaster or a sign in one piece.



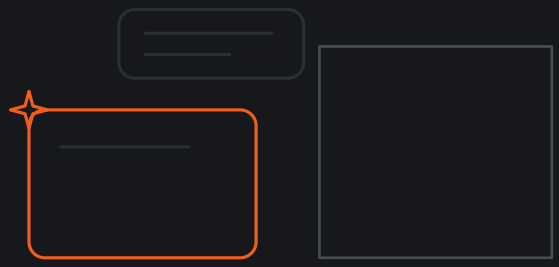
Detect Shapes on Sheet

Tools › Detect Shapes on Sheet… · Ctrl+Alt+D

1. Lay a sheet with drawings, stickers or prints on the bed and start the camera.
2. Choose Tools › **Detect Shapes on Sheet**: **Take a new picture**, or **Import a picture…** without a camera.
3. A boundary is drawn round each drawing. **Cut distance from shape** sets how far from the ink it runs.
4. **Join**, **Cut** and **Separate** change the boundaries; a double click brings back one that was left out.
5. **Add to design** puts the boundaries on the Cut layer as closed shapes, ready to cut.

CHAPTER

10



Files, settings, AI assistant

Projects and exports, the settings worth knowing, and an assistant that only reads.



Projects and files

File › Save · Ctrl+S

1. **Save** keeps the design with its layers, settings and notes in a .rbs project.
2. The design is also saved by itself every few seconds and recovered at the next start.
3. File › **Export** saves an SVG drawing; File › **Export G-code…** writes G-code; **Save RD file** writes a job file.
4. File › **Show Notes** keeps a few lines with the project.



The AI assistant

AI › AI Settings…

1. AI › **AI Settings…**: choose the **Provider** and the **Model** and paste your API key. The key is kept encrypted for your account on this PC.
2. Ask in plain words in the AI Assistant panel on the right. Enter sends; **Shift+Enter** starts a new line.
3. **Diagnose machine** checks the machine, camera, calibration, design and log. It only reads.
4. **Draw…** asks for a drawing; you decide whether to add it to the design.
5. **Attach camera picture** sends a fresh picture from the lid camera with each message.

The assistant never changes settings, files, the design or the machine. What you type, summaries of the machine, camera and design, and the pictures you attach are sent to the AI service you chose. To answer a question it may also ask for a camera picture or recent log lines by itself.



Settings

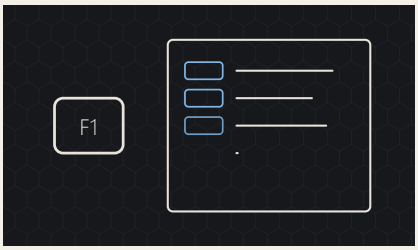
Edit › Settings

1. Edit › **Settings**: bed size, **Snap to objects**, **Theme**, **Confirm before Start (laser fires)**, autosave.
2. **Camera auto-calibration when RayBurn starts** switches the camera questions at startup on or off.
3. **Show tooltips** and **Rich tooltips** are here too.
4. **Ctrl+Shift+L** switches between the dark and the light look at any time.



Language

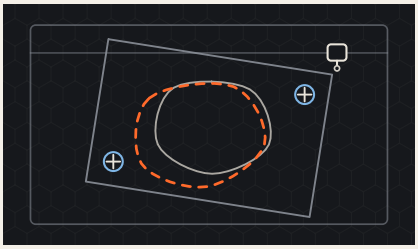
1. The **Language** menu switches the whole program to another language at once.
2. Arabic is laid out from right to left.



Help at hand

1. **F1** opens Quick Help and Notes: every keyboard shortcut on one page.
2. Help › **Offline Safety Notes**: what to keep in mind whenever the laser works.
3. Help › **Tutorial**, and the button in the top bar: the same steps as this manual, with moving pictures.

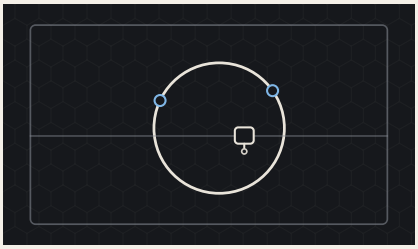
Also worth knowing



Print and Cut

Laser Tools › Print and Cut

Cuts round something already printed: mark two targets on the sheet with the head and the cut turns and moves to fit.



Center Finder

Laser Tools › Center Finder

Touch three points on the edge of a round piece with the head and its exact centre is found.



Saved Positions

Window › Saved Positions…

Places on the bed you keep by name, to send the head there with one click.

CHAPTER

11



Licence and activation

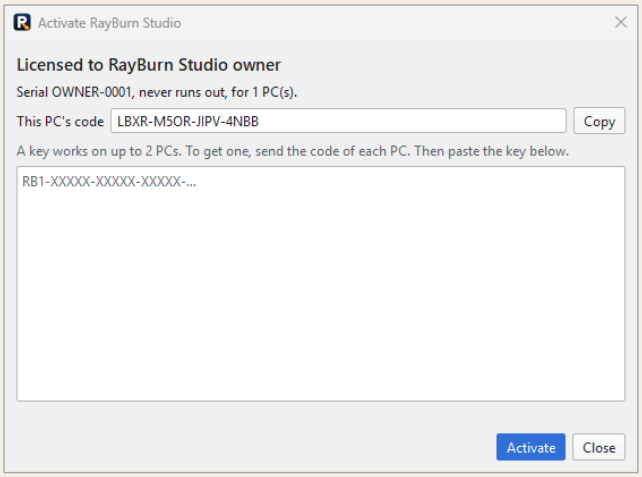
Thirty days with everything, then a key that works on up to two PCs.

The trial

RayBurn Studio runs as a trial for 30 days from its first start on a PC. Everything works during the trial.

The top bar shows how many days are left.

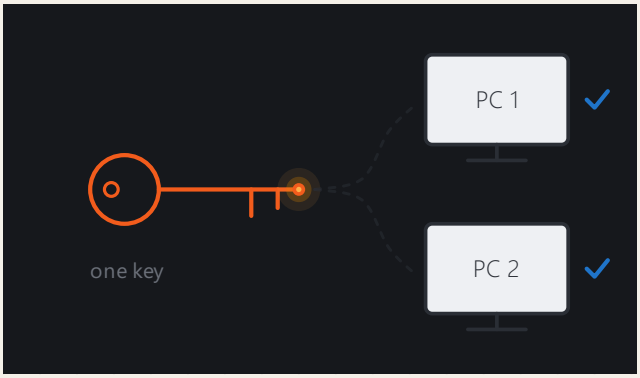
After 30 days the program still opens and saves designs. Nothing is sent to the laser and nothing is exported (SVG, G-code, RD file) until a key is entered. The top bar then shows “Trial ended”.



Activating

Help › Activate / Licence…

1. Open Help › **Activate / Licence…**, or press the key at the right of the top bar.
2. The window shows **This PC's code**. Press **Copy** and send the code to your RayBurn Studio supplier.
3. You get a key back: one long line that starts with RB1-.
4. Paste the key into the same window and press **Activate**. No internet connection is needed.

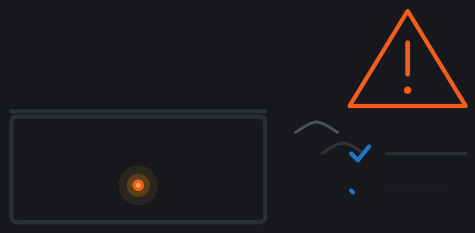


One key, two PCs

1. A key works on up to two PCs: the ones whose codes it was made for, and on no other.
2. For two PCs, send both codes together. Each PC has its own code.
3. A second PC later: ask for a new key that names both codes. It replaces the old one.
4. A PC that was replaced, or whose system was installed again, has a new code and needs a new key.

CHAPTER

12



Safety and shortcuts

What to keep in mind whenever the laser works, and the keys worth knowing.

Before the laser fires

A laser cutter burns, and it can blind. The program helps, but the care is yours. Follow the instructions of your machine's maker as well.

1 Stay with the machine

Never leave a running laser unattended. Keep it in view from Start until the job has ended.

2 Protect your eyes

Keep the lid closed while the laser fires. Wear eye protection suited to your laser whenever the beam could reach you.

3 Mind the fire risk

Cutting can set material alight. Keep the bed and the tray under it clean, and a suitable extinguisher within reach.

4 Clear the air

Run extraction and air assist. Some materials give off harmful fumes: cut only what you know is safe to cut with a laser.

5 Check the focus

Set the focus height for the material before every Start. The confirmation reminds you: “Check Focus.”

6 Know how to stop

Stop and Pause always work in the program. Know where the stop control on the machine itself is, too.

What the program does for you

1. The laser fires only from **Start**, after its confirmation. **Frame**, **Home**, **Move** and jogging move the head with the laser off.
2. While the camera calibration runs, the machine controls wait. **Stop** and **Pause** always work, also while a tool window is open.
3. **Preview** and **Check Job** show what a job will do before it is sent.

Keyboard shortcuts

F1 lists them in the program. On the page: the wheel zooms at the pointer; the middle mouse button or the space bar, held, moves the view; the arrow keys nudge the selection by 1 mm (Shift 10 mm, Ctrl 0.1 mm).

FILES

New	Ctrl+N
Open	Ctrl+O
Import	Ctrl+I
Save	Ctrl+S
Save As	Ctrl+Shift+S
Save RD file	Alt+Shift+L
Export	Alt+X
Show Notes	Ctrl+Alt+N
Print (Black Only)	Ctrl+P
Exit	Ctrl+Q

LOOKING AROUND

Zoom to Page	Ctrl+0
Zoom In	Ctrl+=
Zoom Out	Ctrl+-
Zoom to Selection	Ctrl+Shift+A
Toggle Side Panels	F12
Search Tools and Settings	Ctrl+Alt+K
Light / Dark Theme	Ctrl+Shift+L
Quick Help and Notes	F1

THE JOB AND THE CAMERA

Preview	Alt+P
Check Job	Ctrl+Shift+J
Position Laser	Alt+L
Toggle Camera Overlay	Ctrl+Shift+O

EDIT

Undo	Ctrl+Z
Redo	Ctrl+Shift+Z
Select All	Ctrl+A
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Paste in Place	Alt+V
Duplicate	Ctrl+D or +
Delete	Del
Convert to Path	Ctrl+Shift+C
Convert to Bitmap	Ctrl+Shift+B

ARRANGING

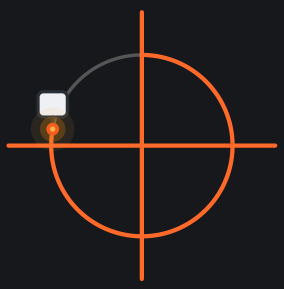
Group	Ctrl+G
Ungroup	Ctrl+U
Flip Horizontal	Ctrl+Shift+H
Flip Vertical	Ctrl+Shift+V
Rotate 90° Clockwise	" . "
Rotate 90° Counter-Clockwise	" , "
Align Centers	Alt+Home
Align Left / Right	Alt+Left / Right
Align Top / Bottom	Alt+Up / Down
Break Apart	Alt+B
Break Contour	Alt+Shift+B
Nesting	Ctrl+Shift+N

DRAWING

Select	Esc
Draw Lines	Ctrl+L
Rectangle	Ctrl+R
Ellipse	Ctrl+E
Edit Nodes	Ctrl+`
Edit Text	Ctrl+T
Trim Shapes	Ctrl+K
Measure	Alt+M
Offset Shapes	Alt+O
Weld Shapes	Ctrl+W
Boolean Union	Alt++
Boolean Subtract	Alt+-
Boolean Intersection	Alt+*
Boolean Assistant	Ctrl+B
Convert to Curves	Ctrl+Alt+C
Boundary	Ctrl+Alt+B
Contour	Ctrl+Alt+O
Stencil	Ctrl+Alt+S
Line Trace	Ctrl+Alt+L

PICTURES AND PRODUCTION

Adjust Image	Alt+I
Trace Image	Alt+T
Fit to Material	Ctrl+Alt+F
Repeat on Parts	Ctrl+Alt+R
Widen Letters	Ctrl+Alt+W
Detect Shapes on Sheet	Ctrl+Alt+D
Shape Multiply	Ctrl+Alt+M
Gear Maker	Ctrl+Alt+G
Puzzle Generator	Ctrl+Alt+Z
Barcode Generator	Ctrl+Alt+Q
Align to Previous Cut	Ctrl+Alt+P



RayBurn Studio

VERSION 5.3 · USER MANUAL

More help in the program: Help › Tutorial F1 Quick Help and Notes Help › Offline Safety Notes