Title:
Using the LS6090 Laser Cutter

Edition:
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Date Effective: 03/10/2024
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Author:

Staff new to SOP Must be trained by a competent member of staff

For individuals who already perform tasks in compliance with this SOP tick one box:

Training (competence) **Read Only** (familiarisation/reference only*)

Title	Name		Date
Mr	Oscar Healy		03/10/2024

PI/ Group Reviewed:

	Confirmed by Name	Date
	Dr David Labonte	07/10/2024

Contents

Equipment required

- Laser Cutter
- Material to cut
- Lab machine with Lightburn installed

Pre-requisite reading/training

- User Guide
- Material Sheet

Safety Overview – Procedural Risk assessment and control measures

Protocol steps	Hazard Type	Hazard	Severity	COSHH/Risk reference no.	Controls in place	Risk after controls
2, 3	Mechanical	Pinching fingers / hands from motorized axes	Low		Keeping cover closed when moving X/Y axis, using spacer when setting Z axis height. Long hair tied back, no dangling jewelry.	Low
1,2, 3	Laser	Burns/Cuts	Low		Laser is contained within a Class 1 enclosure which completely contains the laser beam.3 laser kill switches activate when opening any access point to the cutting bed. Emergency Stop.	Low
3	Laser	Fire	Low		A Fire Extinguisher is placed just outside the room. The machine shall not be operated unattended	Low

3	Laser	Some materials, when engraved, can produce toxic and corrosive fumes	Low		The unit is attached to a dedicated fume extractor. Material Safety Datasheets for new materials will be required from users and thoroughly reviewed (see below for details).	Low

Procedure

1. Step 1 – Software setup

1.1. Turn on the laser sign outside the room using the switch to the right of the door
1.2. Create/import your design into Lightburn, separate the elements to cut and to engrave into different layers (levels higher in the list are cut earlier)
1.3. Edit the power and speed for each layer according to the material sheet attached, **do not** cut material not on this list. When cutting anything other than plywood, cardboard, or acrylic (up to 12 mm in thickness), consult with Fabian Plum (f.plum@imperial.ac.uk) first.
1.4. Drag the engraving layer above the cutting layer to avoid misalignment
1.5. Turn on the laser cutter by turning the key next to the display
1.6. Set the origin mode to “user defined” and “top right” (from the 9 dots displayed below the origin setting). This ensures that a custom starting location can be chosen to line up the laser with the material.
1.7. Transfer your design to the Laser Cutter using the “Send” button

Safety: N/A Risk level after control: **Low**

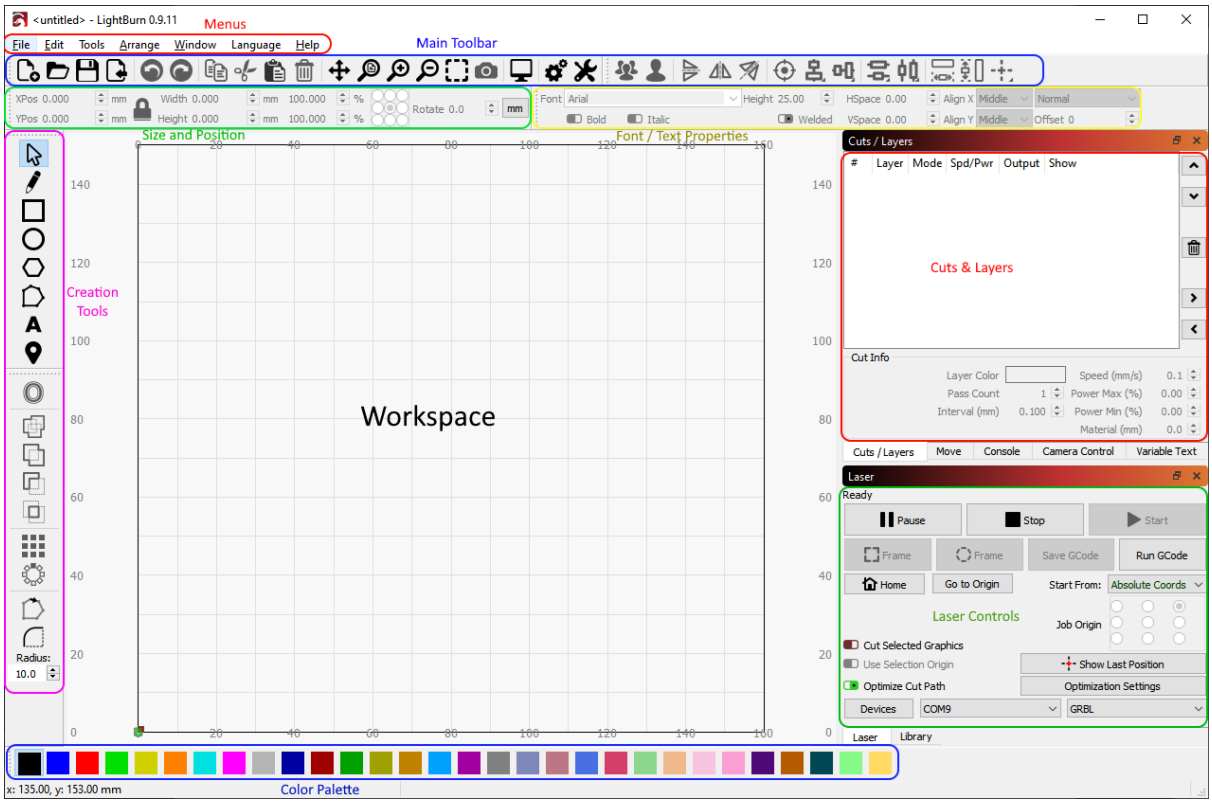

Figure 1: Lightburn editor

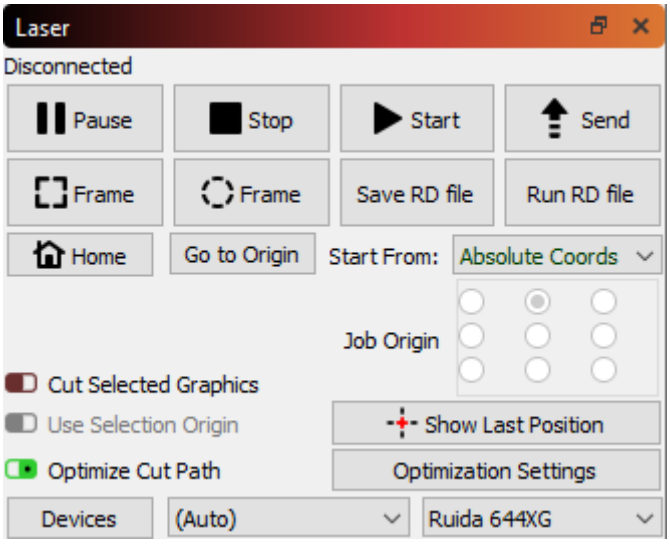

Figure 2: Laser editor

2. Step 2 – Laser cutter setup

2.1. Prepare the material: place roughly in the centre of the cutting bed (cannot exceed 600mm x 900mm, absolute maximum thickness of 20mm when using acrylic).
2.2. If engraving acrylic, peel back protective film, exposing enough space for your engraving.
2.3. Close the cover of the laser cutter, then use the arrows keys on the laser cutter (Figure 3) to position the laser where the top right of your design should be viewed from above the material.
2.4. Press “origin” and then “frame” to display the bounding box in which the laser will cut; adjust the origin if necessary so that the frame is always over the material.
2.5. Press the Z/U button to enable movement in the z axis.
2.6. Adjust the Z height (with the LEFT and RIGHT arrow keys) until the plastic spacer fits snugly between the dedicated spacer (Figure 4) and your material.

Figure 3: LS6090 display and controls

Safety: Do not put hands in cutting area whilst moving the laser head in X/Y direction. Slowly adjust the Z axis with the spacer in place to avoid pinching fingers. Risk level after control: **Low**

Figure 4: Views of spacer between material and tab

3. Step 3 – Running the cutting process

3.1. Turn on the BOFA fume extractor – should operate around 500m^3/hour.
3.2. Press the "start" button
3.3. Stay with the machine for the duration of the entire engraving / cutting process
3.4. If a part catches fire during cutting and the flames do not disappear by themselves when the cutting head moves or after a few seconds, press the emergency stop button. This will turn off the laser immediately. The fume extraction unit (BOFA) will continue to run, which aids in depleting the oxygen inside the cutting volume of the laser cutter.

Safety: Do not leave machine unattended while in use Risk level after control: **Low**

4. Step 4

4.1. When cutting has finished, wait at least 1 minute before opening the cover (2 minutes for acrylic) to allow the fume extraction unit to fully evacuate the cutting room.
4.2. Take out your part and rinse in the sink located next to the door to the backroom to remove dust build-up, if necessary

Safety: Allow fume extraction to clear residual particulates before opening hood Risk level after control: **Low**

Please report issues such as laser misalignment, dirty mirrors, or lack of water in the cooler (indicated by temperature/flow alert) to Fabian Plum (fabian.plum18@imperial.ac.uk) or Oscar Healy (oscar.healy19@imperial.ac.uk)