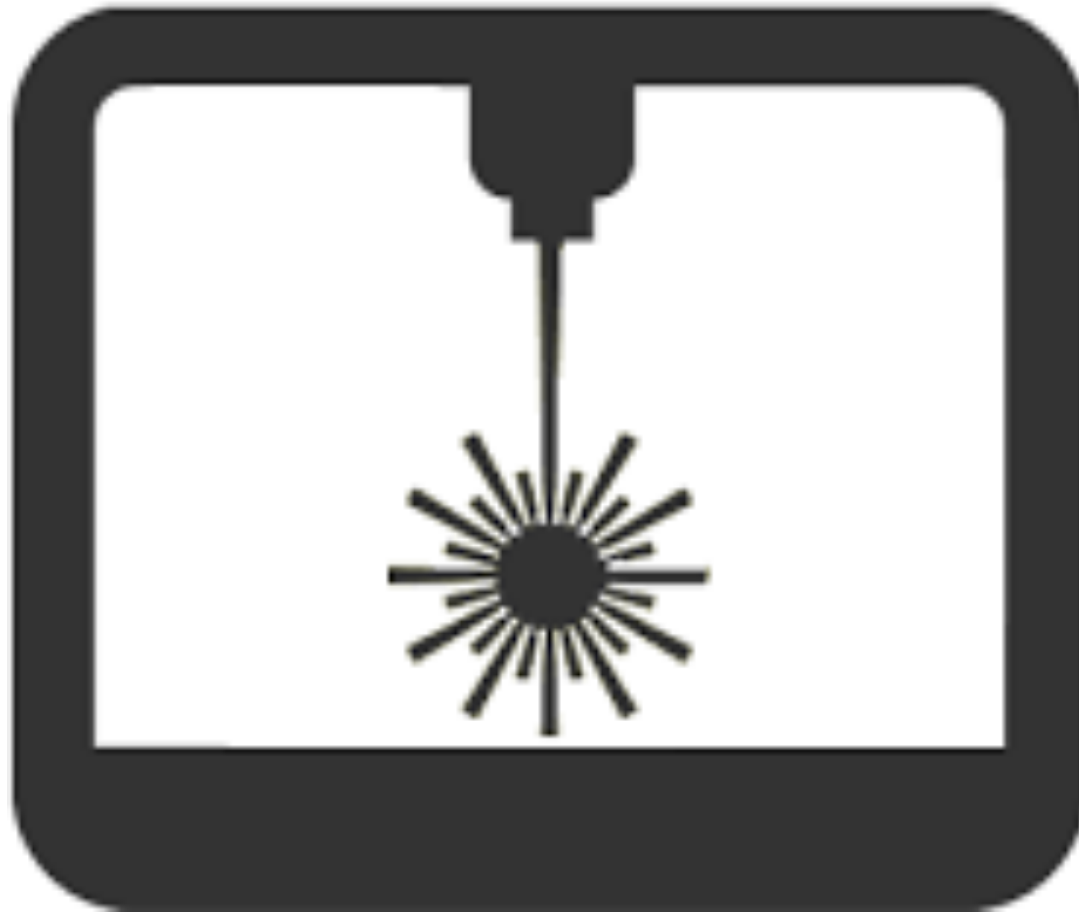


# Laser Cutting/ Engraving System



# Introduction to Laser Cutting

A laser is a device that emits light through an optical amplification process through the stimulated emission of electromagnetic radiation

Laser cutting is a method which uses a CAD file to guide it and precisely cut a design

3 main types of lasers used in the industry are: CO2, Fiber, Neodymium

Examples of Laser Cut Products:



Phone Case



Laser Cut Bag



Decorative  
Lamp

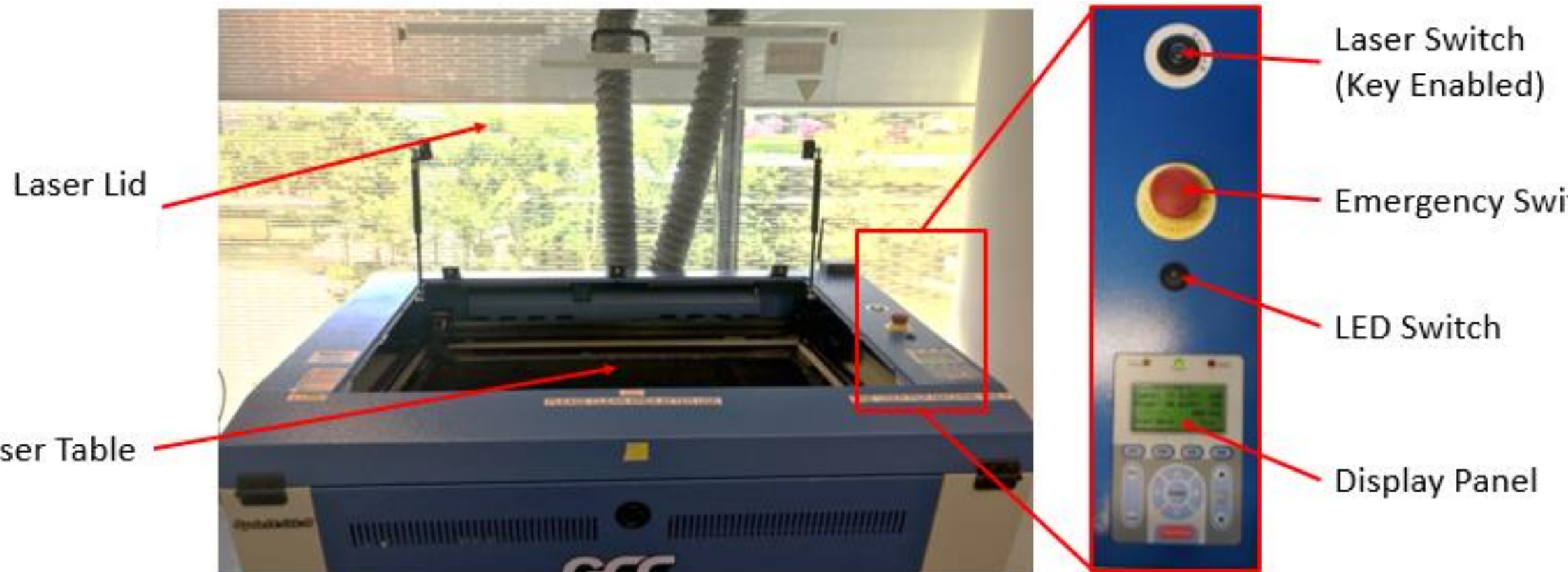


Paper Cut

# Laser Cutting/ Engraving Materials

Recommended Material	No-no Material
<p>Acrylic</p> <p>Wood (Plywood)</p> <p>Cardboard (<u>Greyboard</u>/Bristol Board/Paper)</p> <p>Recommended Material</p> <p>Thickness Range: &lt; 6mm</p>	<ul style="list-style-type: none"><li>• Highly Flammable Material</li><li>• Corrugated Cardboard</li><li>• Reflective Material</li><li>• Glass</li><li>• Metal</li><li>• Stone</li><li>• PVC (cutting PVC releases extremely toxic fumes)</li><li>• Foam</li><li>• Styrene (primarily used in the production of polystyrene plastics and resins)</li></ul>

# Laser Cutting/ Engraving System Overview



## Specifications:

**Overall Dimension (W x L x H):** 1365 x 880 x 1010 mm

**Work Area:** 960 x 610mm



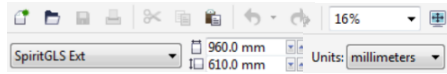
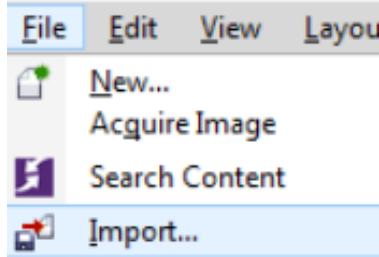
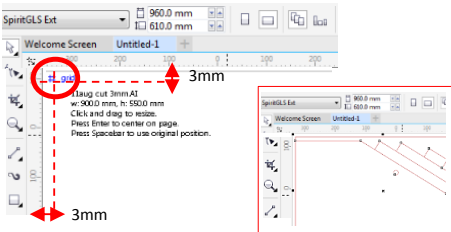
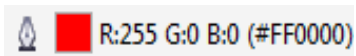
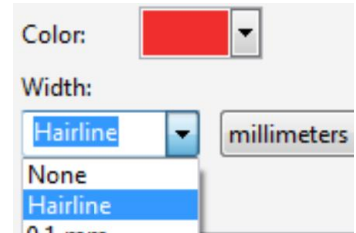
**Engraving Capability:** 256-level gray scale image processing capability

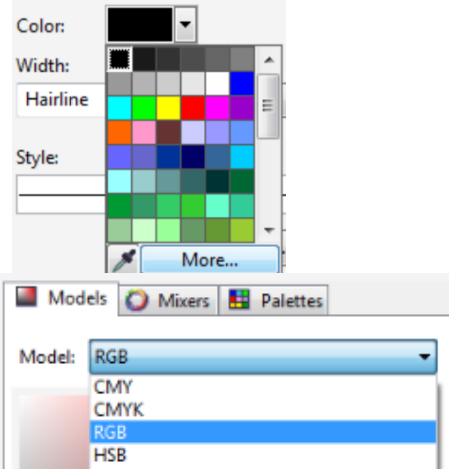
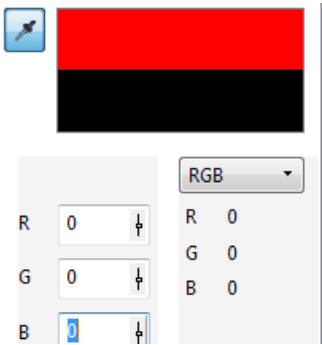

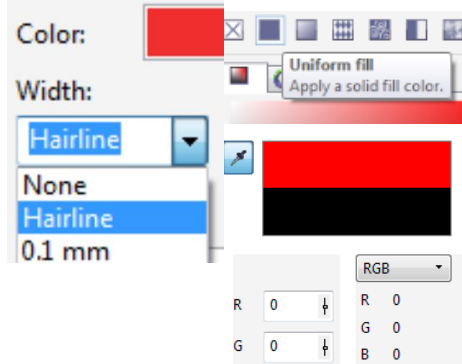
**Safety:** Class I Laser Product Compliant with EN60825

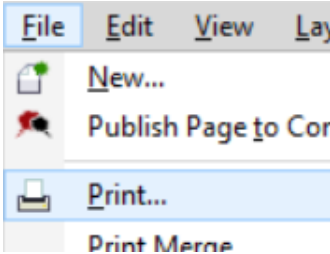
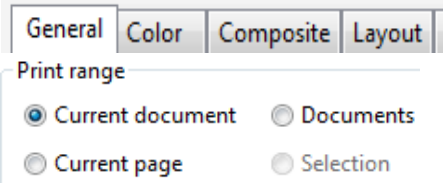
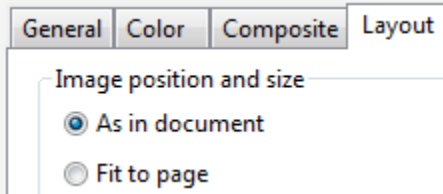
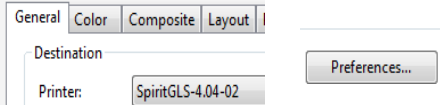
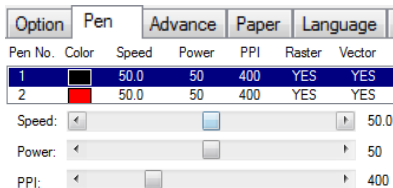
**Laser Source:** 80W 10.6- $\mu$ m sealed CO2 Laser

# Laser Cutting/ Engraving System Operation

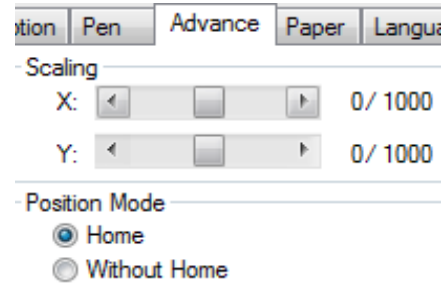
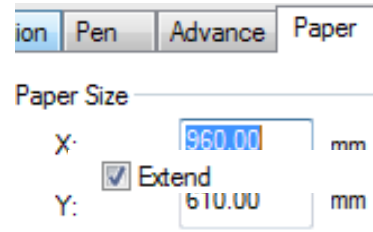
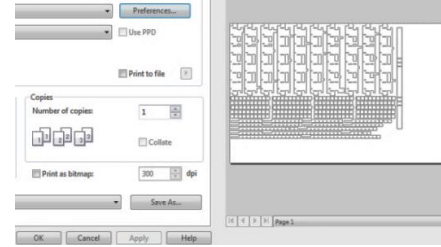





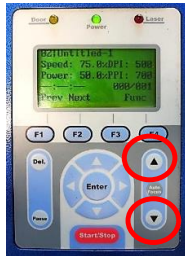
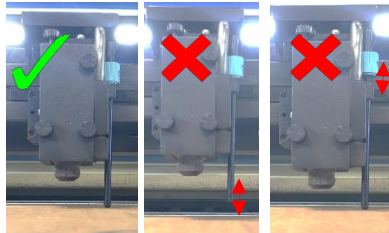
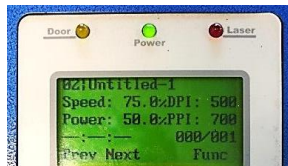
S/N	Procedure	Pictorial Aid
1	Open CorelDraw X7 from Desktop	
2	Click on the “ <b>New Document</b> ” Icon (Located on the Welcome Screen to create new document)	 New Document
3	Check if parameters are the same as image (If not, change parameters according to image)	
4	Import your prepared file for laser cutting/ engraving (File format must be DWG, DXF or AI)	
5	Position and drop imported file (Drop at the Top Left corner of blank sheet, advisable to leave at least 3mm gap on each side for a clean cut)	
6	Select LINE(s) to cut and double click icon (Icon located at the bottom of the screen)	
7	Select “Hairline” as line weight for cutting	


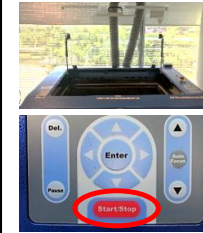
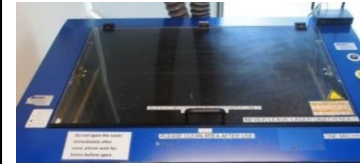


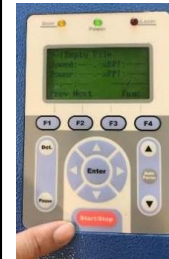

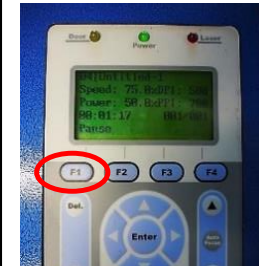
8	<p>Click on “<b>More</b>” at the Color pull down tab</p> <p>Select “<b>RGB</b>” in the pull down tab after pop-up appears</p>	
9	<p>Change colour to <b>Red (R-255, G-0, B-0)</b> for cutting</p>	
10	<p>Select <b>AREA(s) or LINE(s)</b> to engrave and double click either icons</p> <p><i>(Icons located at the bottom of the screen)</i></p>	
11	<p>Click “<b>Uniform Fill</b>” to fill area</p> <p>Select “<b>Hairline</b>” as line weight for engraving lines</p> <p>Change colour to <b>Black (R-0, G-0, B-0)</b> for</p>	

12	<p>Select object to print</p> <p>Click “<b>Print</b>”</p>																																																																																								
13	<p>Choose either “<b>Selection</b>” or “<b>Current Document</b>” under the General Tab</p>																																																																																								
14	<p>Select “<b>As in Document</b>” under the Layout Tab</p>																																																																																								
15	<p>Select “<b>Preferences</b>” under the General Tab</p>																																																																																								
16	<p>Adjust the parameters for Red and Black colour using the Speed, Power, PPI slide bars under the Pen Tab</p> <p><i>(Refer to the reference table for settings)</i></p>	 <table><tr><th colspan="8">LASERPRO (Spirit GCC)</th></tr><tr><th colspan="2">Acrylic</th><th colspan="3">Cutting</th><th colspan="3">Engraving</th></tr><tr><th>Thickness</th><th>Power</th><th>Speed</th><th>PPI</th><th>Power</th><th>Speed</th><th>PPI</th></tr><tr><td>1mm</td><td>40%</td><td>3</td><td>700-800</td><td>50%</td><td>70-80</td><td>600-800</td></tr><tr><td>2mm</td><td>40%</td><td>2</td><td>700-800</td><td>50%</td><td>70-80</td><td>600-800</td></tr><tr><td>3mm</td><td>50%</td><td>2</td><td>700-800</td><td>50%</td><td>70-80</td><td>600-800</td></tr><tr><td>5mm</td><td>70%</td><td>2</td><td>700-800</td><td>50%</td><td>70-80</td><td>600-800</td></tr><tr><th colspan="2">Greyboard</th><th colspan="3">Cutting</th><th colspan="3">Engraving</th></tr><tr><th>Thickness</th><th>Power</th><th>Speed</th><th>PPI</th><th>Power</th><th>Speed</th><th>PPI</th></tr><tr><td>1.5mm</td><td>40-50%</td><td>3-5</td><td>400</td><td>50%</td><td>70-80</td><td>400-500</td></tr><tr><td>2mm</td><td>70%</td><td>6</td><td>400</td><td>50%</td><td>70-80</td><td>400-500</td></tr><tr><td>3.5mm</td><td>70%</td><td>2-3</td><td>400</td><td>50%</td><td>70-80</td><td>400-500</td></tr></table>	LASERPRO (Spirit GCC)								Acrylic		Cutting			Engraving			Thickness	Power	Speed	PPI	Power	Speed	PPI	1mm	40%	3	700-800	50%	70-80	600-800	2mm	40%	2	700-800	50%	70-80	600-800	3mm	50%	2	700-800	50%	70-80	600-800	5mm	70%	2	700-800	50%	70-80	600-800	Greyboard		Cutting			Engraving			Thickness	Power	Speed	PPI	Power	Speed	PPI	1.5mm	40-50%	3-5	400	50%	70-80	400-500	2mm	70%	6	400	50%	70-80	400-500	3.5mm	70%	2-3	400	50%	70-80	400-500
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S/N	Procedure	Pictorial Aid
17	Set “ <b>Home</b> ” for Position Mode under the Advance Tab	 <p>The screenshot shows the 'Advance' tab selected. Under the 'Position Mode' section, the 'Home' radio button is selected, and the 'Without Home' radio button is unselected.</p>
18	Select “ <b>Extend</b> ” under the Paper Tab (Ensure that paper size is 960 x 610mm)	 <p>The screenshot shows the 'Paper' tab selected. Under the 'Paper Size' section, the 'Extend' option is checked. The X dimension is 960.00 mm and the Y dimension is 610.00 mm.</p>
19	Check the Preview before transferring file to machine  Click “ <b>OK</b> ”	 <p>The screenshot shows a 'Preferences' dialog box. In the 'Copies' section, 'Number of copies' is set to 1. The 'Print as bitmap' checkbox is checked. The 'OK' button is highlighted.</p>

S/N	Procedure	Pictorial Aid
1	Place material onto the Laser Table <i>(Align to the Top Left Corner)</i>	
2	Lightly pull Laser Head towards you <i>(Bringing it closer to you will enable better accessibility during set-up of Laser Table Z-Height setting)</i>	
3	Place Manual Probe into the Laser Head Slot to start setting the Z-Height of the laser table	
4	Press the <b>UP</b> or <b>DOWN</b> arrows on the Display Panel to raise or lower Laser Table	
5	Bring the tip of the probe to just touch the material surface by repeating step 3 <i>(Leaving no gap between probe and top surface of material and no gap between probe and laser head slot)</i> <b>*Remove manual probe when completed</b>	
6	Return Laser Head to Home Position by pressing onto <b>F4</b> twice on the Display Panel <ul style="list-style-type: none"> <li>Function – F4</li> </ul>	

S/N	Procedure	Pictorial Aid
1	Check if print job is correct, or else, press <b>F1</b> or <b>F2</b> to scroll and find the correct job	
2	Press the “ <b>Start/Stop</b> ” button on the Display Panel with the Laser Lid open to do a test run. Check if tracing path is correct.	
3	Press the “ <b>Start/Stop</b> ” button again to stop test run if tracing is satisfactory and close the Laser Lid	
4	Switch the laser on by inserting and turning the key to the “ <b>ON</b> ” position	
5	Press the “ <b>Start/ Stop</b> ” button to begin printing  <i>DO NOT LEAVE MACHINE UNATTENDED WHILE PRINTING</i>	
6	Press <b>F1</b> to pause and press <b>F1</b> again to resume To completely stop printing, press the “Start/ Stop” button 	

# **Laser Cutting/ Engraving System Guidelines**



**Rules & Regulations**

**Opening Hours**

**Safety Guidelines**

# Rules & Regulations

Limited to ***one laser machine per user***

Please ***sign in*** to the logbook before you start

***Failure to show up or cancel*** your booking may result in the ***suspension of your booking privileges***

***Booking is for individual and not transferable*** as every student is allocated equal timeslots based on total students capacity from all faculty

FabLAB Facilities are for ***authorised SUTD personnel only***

A standing fan is not allowed inside the laser section

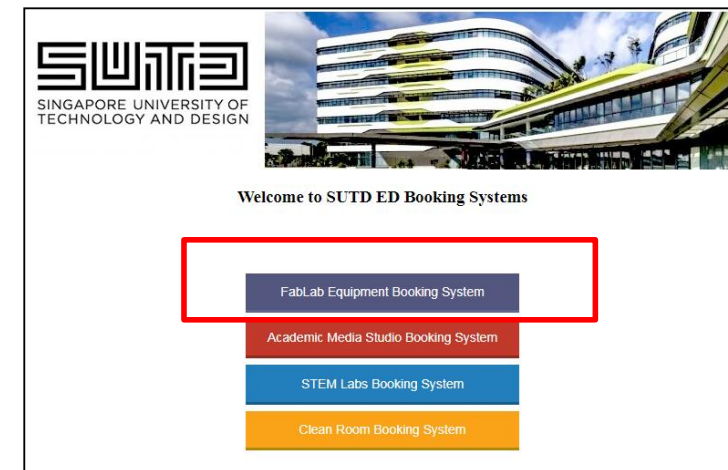
# Operating Hours & Bookings

- Monday to Friday, 9am to 5pm
- Closed on Public Holidays



- Please book laser machine on:

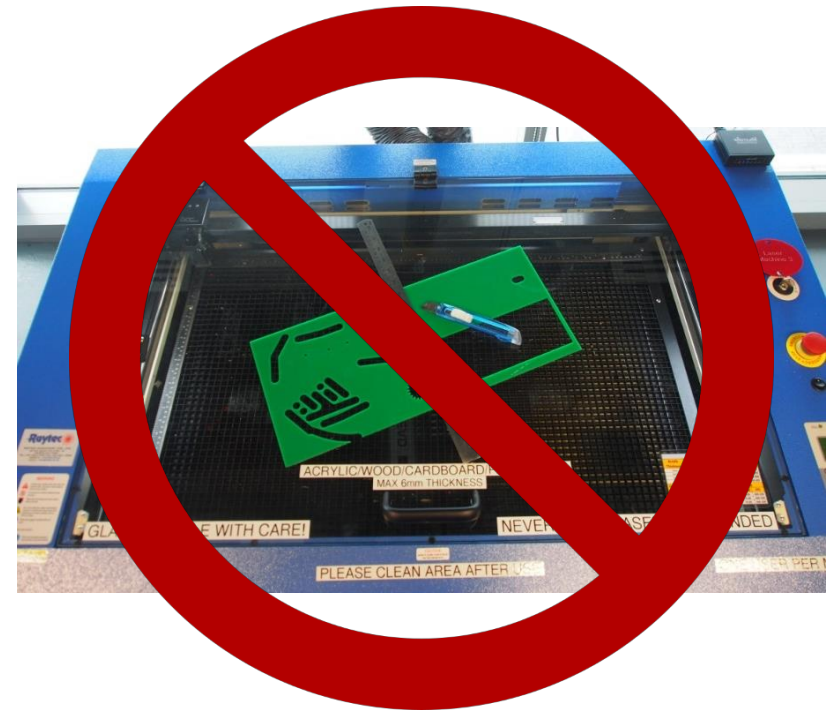
<https://edbyo.sutd.edu.sg/edsystems/index.html>



# Safety Guidelines

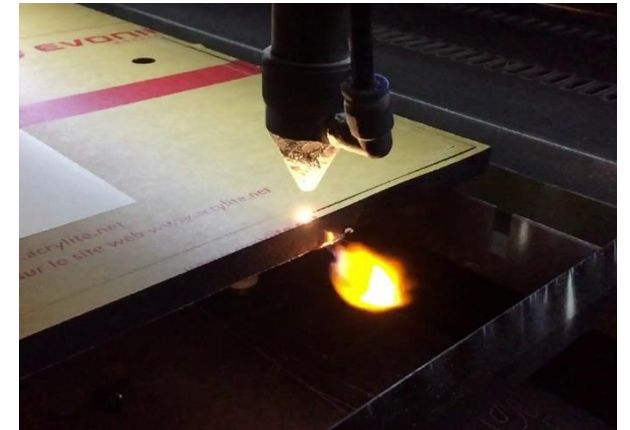
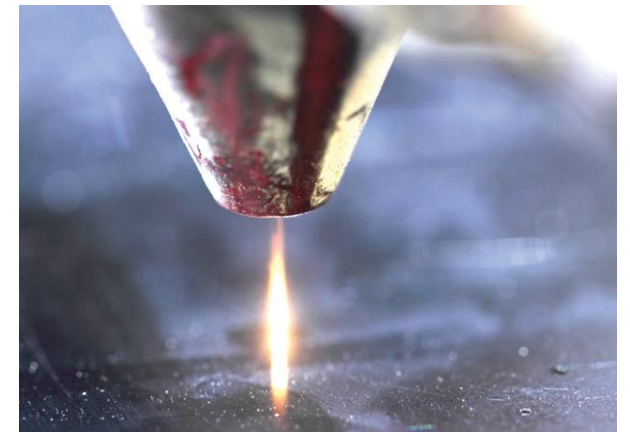
After cutting your material, ***wait 1-2 minutes*** before opening the laser lid so that the fumes disperse

Do not cut your material on top of the laser lid.





3. To avoid retinal damage, **do not stare at the laser beam.**
4. If you see *repeated flames while cutting*, **stop the laser cutter and adjust your settings.**
5. Never leave the laser machine unattended while it is running





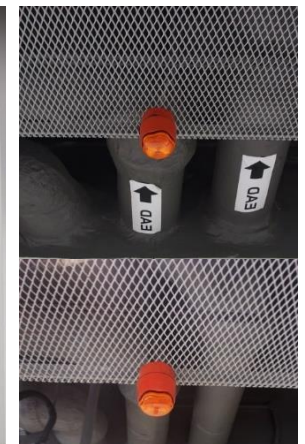
6. Laser cutting has **HIGH RISK OF FIRE**. Be Alert!



7. In the event of a fire, there is a **fire extinguisher located inside the laser section**



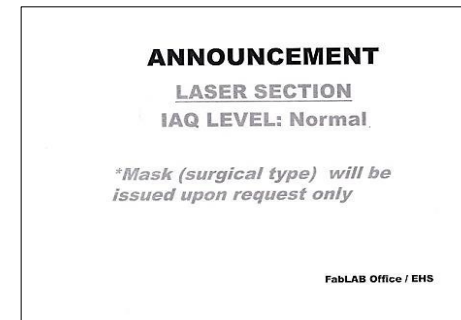
8. If the O<sub>2</sub>/CO<sub>2</sub> alarm sounds, all work must stop and **evacuate the room immediately**



Please check notices outside Laser Section



0. Wearing a mask is dependent on IAQ Level



. Peel off one side of protective layer completely on the acrylic before laser cutting



# Safety Documentation

Fill in the breakdown/faulty report form located inside the laser section if the machine breaks down or stops working while you are using it

Singapore University of Technology & Design Fabrication Lab		
Breakdown / Faulty Report Form		
Name (In Block): _____		Contact No: _____
Staff/Student ID: _____		Pillar/Dept: _____
S/N	Machine Description	Fault / Breakdown Cause
01		
02		
03		
Fault Explanation (Please provide full detail): _____ _____ _____ _____ _____ _____ _____		
Date: _____		Signature: _____
<b>For Staff only</b>		
FL Staff Name: _____		Part Replacement: _____
Date: _____		Repair Cost: _____
Remark : _____		Signature: _____