



The [Writing Safe Work Procedures Guideline \(OHS027\)](#) should be consulted to assist in the completion of this form

Faculty/Division: Faculty of the Built Environment		School/Unit: BE Design Laboratory		
Document number SWP_ARJ210713	Initial Issue date: 22/07/13	Current version: V_01	Current Version Issue date: 22/07/13	Next review date: July 2016

2.Safe work procedure title and basic description of activity

Title: SWP - Universal Laser Systems Model ILS9.150D Laser Engraving and Cutting System

Description of activity: - Use of Universal Laser Systems Model ILS9.150D to engrave and cut various types of material.



3.List Hazards and risk controls as per risk assessment

Associated risk assessment number and location:	Hazards	Controls
RA_ARJ210713 Design Lab office Squarehouse(Room G06B)	<ul style="list-style-type: none"> • Toxic fumes • Moving parts • Fire • Electricity • Trip hazards • Laser energy • Heavy materials • Untrained operators • Bystanders • Dust • Compressed air 	<ul style="list-style-type: none"> • Training • SWP / RA / MSDS • Equipment manual • Scheduled maintenance • Fume extraction system • Housekeeping • Fire extinguisher • Restricted access • Manual handling guidelines • Audible 'over-temperature' alarm

4.List resources required including personal protective clothing, chemicals and equipment needed

Fire extinguisher (CO2-type), Fume extraction system, trained operators, accredited servicing technician, compressed air supply, I.T. assistance, methylated spirits, lens cleaner solution, cotton buds, paper toweling, laser focus tool.

5.List step by step instructions or order for undertaking the task

NOTE:

- This document needs to be read in conjunction with the 'ILS9.150D Laser Engraving and Cutting System Manual' (manual is located near the laser-cutting equipment in room G09A).

MAINTENANCE: (see also System Manual, section 7-8)

- This system requires maintenance tasks to be performed in order to operate correctly. The frequency of these tasks varies depending on the type of material being processed, quantity of material being removed, hours of operation & quality of the exhaust system. Refer to the System manual for more detail.

WARNING: Do not attempt any maintenance task unless you have been trained to perform it – if in any doubt, ask lab staff for assistance!

PRE-START CHECKLIST:

OPERATOR:

- You must obtain initial instruction and competency sign-off from lab staff before you can use the laser.
- Don't consume any food, or liquids in open containers, when you are in the laser room.
- Don't operate the laser if you are feeling tired, stressed or under the effects of medication, alcohol or drugs.

WORKSPACE:

- Remove any slip/trip hazards.
- Confirm room lighting is sufficient.
- Non-authorized persons should leave the room.
- Confirm fire extinguisher (CO2-type) & UNSW Emergency Procedures flipchart are present & accessible.
- Know the location of nearest first aid officer, first aid kit & telephone.

EQUIPMENT:

- Refer to sections '7-1' to '7-8' of the '**ILS9.150D Laser Engraving and Cutting System Manual**', perform checks/maintenance on the following items: Motion System, Main Enclosure, Optics, Cooling Fan Filters
- Remove debris from the 2 trays under the cutting table - provided debris is not hot, empty into a garbage bin.
- Record any maintenance performed in the laser system maintenance log.
- **Report any problems to lab manager or technical officer before proceeding to 'Start-Up Procedure'.**

POWER-UP PROCEDURE:

- Power-on connected computer, log-in & allow to fully boot-up.
- Power-on laser using '**On/Off**' switch on ILS keypad.
- Confirm that system has performed self-check of drive motors, focus carriage has returned to the home position(rear-right corner of cutting table) and LCD display on ILS keypad is highlighting the '**FILE**' menu item.

LOADING MATERIAL (see also System Manual, section 5-7)

- Check relevant M.S.D.S.(Material Safety Data Sheet) that material is safe for laser-cutting (a verbal assurance from the person supplying the material is not sufficient proof, always check with the M.S.D.S. and/or lab staff).

WARNING: If in any doubt, DO NOT CUT THE MATERIAL!

- Check material fits within the limits of cutting table and is flat enough so that it will not obstruct the moving focus carriage.

WARNING: If in any doubt, DO NOT CUT THE MATERIAL!

- Referring to manual handling guidelines, open top door and position material in rear-left corner of cutting table against edge rulers, secure material to cutting table with masking tape or plastic clips.

FOCUSING THE LASER (see also System Manual, section 9-17)

- Check there is clearance between highest point of material to be cut and lowest point of focus carriage. If insufficient clearance, use '**DOWN**' button on ILS keypad to lower cutting table until there is clearance.
- Press '**AUTOFOCUS**' button on ILS keypad once to move focus carriage to focusing position.
- Place base of focus tool on top on material with its flat edge against front side of focus carriage.

WARNING: DO NOT position focus tool directly under focus carriage – this can damage the unit.

- Keeping hands away from the area in-between focus tool & focus carriage, slowly raise the cutting table using 'UP' button on ILS keypad until top of beveled edge on focus tool meets bottom edge of focus carriage – when these points meet, the laser is focused.

WARNING: Engraving/cutting out of focus is a potential fire hazard! (max. allowable focus error is 1mm)

- Close top door.

START EXTRACTION:

STAGE 1 EXTRACTION:

- Switch-on both extractor fans in the laser room, confirm that green light on both switchboxes illuminate and that you can hear both fans ramp-up to full speed.

STAGE 2 EXTRACTION:

- Switch-on the 2nd-stage extraction (button located outside the laser room door to your left & is marked 'Vacuum 3-D Print Room EF-1' -)confirm green light illuminates and that you can hear the fan ramp-up to full speed.

START AIR ASSIST:

- Switch-on compressed air supply (valve located in the laser room to the right side of the door as you are about to exit) confirm that the pressure gauge (adjacent) is reading approx. 40 psi.

WARNING: If the Air Assist Cone has been fitted to the focus carriage, the compressed air supply must be switched-on before cutting/engraving starts!

PRINTING (SENDING A JOB) TO THE LASER *(see System Manual, section 5-2)*

CUTTING/ENGRAVING:

- Once cutting/engraving has started, visually check the material to ensure that there is no sign of flame and that smoke/fumes are not building-up inside the system. If you see either of these things, stop the cutting/engraving process immediately and contact lab staff.
- If cutting/engraving is in progress, do not leave the system unattended. If you need to leave the room for any reason, use the ILS keypad to 'STOP'/PAUSE' the system and confirm there are no signs of fire before you leave the room.

WARNING: Leaving the machine unattended is a fire risk!

REMOVING MATERIAL *(see also System Manual, section 5-3)*

- Confirm that the laser system has finished processing the material, the laser beam has turned-off, the focus carriage has moved to the home position(rear-right corner of cutting-table)and the red light on the ILS keypad has turned-off.
- Wait for a few seconds for the extraction system to evacuate any fumes from the inside of the system.
- Open top door, first check that material is cool enough to touch, then remove(referring to manual handling guidelines)and relocate to a well-ventilated, unoccupied area where any residual fumes can be emitted without harming anyone.

WARNING: Allowing debris to accumulate in the trays or emptying hot debris into a garbage bin are potential fire hazards!

STOP EXTRACTION:

STAGE 1 EXTRACTION:

- Switch-off both extractor fans in the laser room, confirm that green light on both switchboxes goes out and that you can hear both fans ramp-down to zero speed.

STAGE 2 EXTRACTION:

- Switch-off the 2nd-stage extraction (button is located to your left as you exit the laser room & is marked 'Vacuum 3-D Print Room EF-1' -)confirm green light goes out and that you can hear the fan ramp-down to zero speed.

STOP AIR ASSIST:

- Switch-off compressed air supply (valve is located to the right-hand side of the door as you are about to exit the laser room) confirm that the adjacent pressure gauge is reading 0 psi.

POWER - DOWN PROCEDURE:

- Power-off laser using 'On/Off' switch on ILS keypad.
- Log-off connected computer & allow to fully shut-down.

6.List emergency shutdown procedures

- To instantly disconnect all AC power to the system, depress the emergency stop button (located rear-left of the ILS keypad).

7.List Emergency procedures for how to deal with fires, spills or exposure to hazardous substances

- **Fires:**
Use the ILS keypad to put the system into 'STOP'/'PAUSE' mode. After focus carriage gets to 'home' position, power-off laser, switch-off fume extraction system and compressed air supply. Clear everyone from the immediate area, open top door of system, extinguish fire with CO2 extinguisher (pointing it at the base of the fire) and notify lab staff and/or UNSW security ASAP (ph 9385 6666) of the incident.
- **Building Evacuation:**
Put the system into 'STOP'/'PAUSE' mode. After focus carriage gets to 'home' position, power-off laser, switch-off fume extraction system and compressed air supply. After visual check to confirm there is no fire problem, close laser room door & proceed to evacuation assembly point.
- **Spills:**
If fumes are present, switch-on extraction system to help remove them. Leave the room, closing door behind you to contain fumes (grab MSDS info on the way out). When you are clear of the room and any fumes, notify lab staff of the situation. Lab staff will collect Chemical Response Spills-kit (located next to the safety shower) and follow recommended clean-up procedure listed on relevant MSDS.

8.List Clean up and waste disposal requirements

- **Debris from 2 trays under cutting table:** provided debris is cool, empty into metal garbage bin. If debris is still hot, allow to cool before emptying.
- **Solvent-soaked rags/paper toweling used when cleaning:** empty into the oily waste can located in the Spray Booth (room G08A).

9.List legislation used in the development of this SWP

- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2011
- Universal Laser Systems, Inc.: 2007 Industrial Systems Laser Engraving and Cutting System Safety, Installation, Operation, and Basic Maintenance Manual.
- AS/NZS 2211 (series) Safety of Laser Products
- Laser Laboratory Inspection Checklist - Laboratory Safety of laser products Part 14: A user's guide-IEC 60825.14-2011
- Laser Laboratory Inspection Checklist -Laboratory.....Safety of laser products Part 1 : Equipment classification and requirements -IEC 60825.1-2011

10a.List competency required – qualifications, certificates, licensing, training - e.g. course or instruction:

For service technicians engaged to perform annual major maintenance: Laser Safety officer training

10b. List competency of Assessor

5 years' experience supervising/operating the 2x ILS9150D lasers held by the BE Design Laboratory.

11.Supervisory approval, And review

Supervisor:	Lab Manager(Anthony Jones)	Signature:	
Responsibility for SWP review:	Lab Manager	Date of review:	

12.SWP Sign off sheet

SWP name and version:

In signing this section the assessor/ authorizer agrees that the following persons are competent in following this SWP

Name	Signature	Date Competent	Name of Assessor/Authorizer	Assessor/Authorizer signature