everyone must go through safety orientations to work in Solid Space. It is a 2 part process, one part is online and another, in-person. You should also read all the guides (for the laser and the 3D printer) available online & via the production technologist (that’s me). http://www.sfu.ca/siat/about/space.html Just because a note on a file format, a booking link, or material limitation is not mentioned here, doesn’t mean it doesn’t apply.

Guidelines? Why?

The guidelines are there to ensure everyone is aware of safety procedures and to help coordinate Lab use. (The last few pages in this, also list common materials suppliers) There is limited room in the shop & lab, and the machines have important limits. The PCs in Solid Space exist only to run machines, thus students need to prep work, files elsewhere, and coordinate with staff via email to make sure things work. All staff are part-time and/or on-call, so you have to be prepared. So, this is to help you learn more about that.

Basic safety rules in the Lab are detailed in the EHS Shop Safety Canvas module (online), which is required for access.

Bookings for undergrads:

- e-mail: spacetime@sfu.ca, IN ADVANCE, 1-2 working days (ie don’t mail on a Sunday for times on a Monday). The earlier you ask, the more likely it is that you will get your time, especially for laser use.
- State what you are doing (laser or powertool) and how many team members/who will be there.
- Laser bookings require that the Coreldraw file (.cdr) be emailed at time of the request. This is detailed under “laser cutting” in this doc.

People who are late for space bookings (over 10 minutes) or for in-lab orientations (5 minutes) will forfeit their times. If re-booked, it will be with the lowest priority so BE ON TIME! Repeated issues with lateness will result in a suspension of Lab privileges. Bookings are not transferable.

Think: Before you go to the Lab, everything must be READY TO GO. This means, PLAN:
For 336/437: You essentially have what amounts to one work-day’s worth of time to actually construct your project using the Lab itself.

- YOU WILL NEED TO BRING YOUR OWN SUPPLIES (DUST MASKS, SPECIAL GLUES, SCREWS, WASHERS, ETC).

Large material sheet sizes cannot be cut down in the Lab: Get the vendor to precut sheet goods to your required size. We cannot flatten/plane wood stock in the lab. There are also limits to how deep stock can be drilled, and types of joinery we can do well.

Laser: Keep sheet materials to laser bed size (18” x 32”) or less, for materials you are laser cutting,
3D Printing (Fortus):
Submit print requests via e-mail, to 3dprint@sfu.ca
You do not need to show up at the lab for this.

- Files must be in STL format for the 3D printer. See the online
  3d print guidelines for process details.
- Note the # copies needed of each part when submitting a
  request via email.

3d printing guidelines can be found on the SIAT/Solid Space website:
http://www.sfu.ca/siat/about/space.html
It is titled “3D printer guidelines” (right hand side).

Part size limits apply for UG.
ALL PARTS MUST BE ABLE TO FIT IN A 5" X 5" x 5" box. If your part(s)
exceeds the recommended size, it will not be printed in time for your
deadline. 3D printing takes time.

Cut off dates apply for UG: You may have submit models in advance
by as much as 2 weeks, prior to the final deadline. Check class e-mails for
details. (Note: Please don’t use the printer for printing out items that can
easily be made by other methods, like cubes and boxes)

Laser Cutting (x660):
Laser cutter materials must be “ready to go”, and laser files
MUST be in Coreldraw (.cdr). See guidelines on the following page
for materials permitted.
Good laser files:
1) Are scaled properly (INCHES).
2) Laid out in Coreldraw, in the right page/doc size; 32” x 18”
 (We cannot reformat, modify or fix files in the Lab)

Coreldraw is on the PCs in the drop-in lab (firemans) on the
Mezzanine. Files need to be e-mailed prior to the appointment, in
order to be checked.

How do I do all this?
• Demos showing how to export work into Coreldraw can be given,
  just ask.

• A laser prep guide, showing what to do step by step, can
  be found on the SIAT/Solid Space website:
  http://www.sfu.ca/siat/about/space.html
  titled “laser cutter guidelines” (right hand side).
The guide also notes how to get Solid Works files into Coreldraw if you
need to use the 2D profiles from your 3D file for laser cutting.

Please note we no longer do decorative rastering or cutting of parts
not needed for project to function. Laser bookings are capped at 2
hours per team/day. Usually you only need about 45min for basic
project cuts.
A List of Acceptable Materials for LASER Cutting and Marking.

Note that sheet materials will vary in thickness by +/- 10% or so. Ask about laser kerf if you are fitting parts. You should account for this when you design. Generally, most wood composites (hdf, mdf, etc.), acrylic plastics, and INTERIOR grade plywood materials are great to cut at 1/8” thick (3mm). Windsor Plywood is a good source for woods and they have many locations. Windsor in Surrey will often give SFU SIAT students discounts also.

Always have extra material for testing. Leave yourself time to work something else out in case your material or design does not cut as hoped. MAXIMUM SHEET SIZE IS 18” X 32”. CUT MATERIALS TO SIZE PRIOR TO LASER BOOKING! : HAVE THE VENDOR DO IT, OR BOOK POWER TOOL TIME. LARGE SHEETS CANNOT BE CUT IN SOLID SPACE. Note: Wood edges will char. Materials must be flat!

To cut:

- Thin MDF: up to 3/16” thick (is 4.75mm but sold as 5mm,). 1/4” (6mm) under limited circumstances, -->smooth BOTH sides, no coatings! Do not use hardboard from Opus!
- Bristol board, Matte board, Museum board. Edges may char. Cuts well and is stiff enough for certain structures. Corrugated cardboard: up to 1/4”. Other thicknesses, please ask
- Flat hardwoods: up to 1/8” thick.
- Interior Plywood: up to 3/16” thick (5mm). Flat, higher grade sheets only.
- Plexiglas, Lucite, Acrylic : up to 1/4” thick for cutting,
- Thin leathers. Will halo if not masked.
- ASK, Allow time to test: Depron Foam, thin styrofoam, papers, vellum, fabrics and other materials like foamcore.

To mark/engrave: All of the above, plus:

- Certain fabrics can be marked provided they are prepared correctly: Please ask, allow time.
- Anodized aluminum and some metals with special coatings: Please ask, allow time.

Prohibited materials: If unsure about something, ask.

- Absolutely NO EXTERIOR GRADE, UNDERLAYMENT, or MARINE GRADE PLYWOOD WILL BE CUT. Just Nope.
- IF YOUR PLASTIC IS A MYSTERY, OR WOOD IS WARPED, IT WILL NOT BE CUT
- PVC, vinyl, other synthetic materials that may have PVC/chloride in them.
- Styrene plastic, Lexan (polycarbonate) plastics & most reflective materials

Prohibited materials damage the machine, or release toxic gas, or result in fires. If buying plastic, make sure you are buying confirmed, acrylic sheet or ‘Plexiglass’. Ask the vendor if you need to, and keep a bill of sale with you.
Where to buy stuff.

Note:
Most material suppliers (eg Windsor) will charge you for cutting down woods or plastics. It does not change the fact materials must be pre-sized for the laser cutter.

If you are slotting, fitting parts together, always double check material dimensions (ie thickness) as it usually not what it says it is. For example, 1/4" (.25") thick mdf may not actually be .25" - it is usually a little more, or a little less. Some materials may be sold as metric equivalents - check again. Same with dowels etc - check diameters, length, straightness if critical. Use a digital caliper for this if possible. As of this writing, calipers should be available from the library.

Woods:
Windsor Plywood is the best source for laserable mdf & laser safe suitable plywoods and they have many locations. They also carry wood spheres, dowels, nice solid lumber: http://windsorplywood.com/location-results.aspx?loc=British+Columbia

Note: Home Depot does NOT often carry permitted types of wood board, nor does Rona,

Michaels Craft Stores: Has some pre-cut hobby plywoods & smooth HB/mdf, but they can be expensive. Pick thin pieces. http://www.michaels.com/

Daiso: Has hollow dowels (woods) and other eclectic stuff. In Richmond http://daisocanada.com/

Lee Valley: Coquitlam and Vancouver. http://www.leevalley.com/en/home.aspx All kinds of hardware and tools. They also have project wood blocks (exotics), basswood, and veneers.

Plastics:
Get acrylic. Most vendors will sell glues for it as well.


Plasticworks: Surrey and Abbotsford. http://www.plasticworks.ca/catalog/index.php (if on a school PC when going to this link, ignore Trendmicro if it pops up). Students get a discount.


Misc parts:
Such as airplane servos, small brass tubes, various supplies for modelmaking:

Magicbox Hobbies: http://www.magicboxhobbies.net/
Imperial Hobbies: http://www.imperialhobbies.ca
**Electronic Parts:**

**Lees electronics:** Awesome store in Vancouver (Fraser street) with everything from 3d printers to Arduino: [http://www.leeselectronic.com/index.php](http://www.leeselectronic.com/index.php)

**Main Electronics:** [http://www.mainelectronics.com/](http://www.mainelectronics.com/)

**RP Electronics:** [http://www.rpelectronics.com/](http://www.rpelectronics.com/)

**Matte Board/Cardstock (and other specialty papers, plus art materials such as clay):**

**Deserres:** Various locations in the greater Vancouver area

**Opus:** Various locations in the greater Vancouver area

**Michaels Craft Stores:** Various locations in the greater Vancouver area. [http://www.michaels.com/](http://www.michaels.com/)

**Glass (NOTE: Solid Space is not set-up for glass work):**

**Kona Glass** (stained glass, note they provide lessons and space too)

**Bills Glass** (offers some basic services) [http://www.billsglass.ca/](http://www.billsglass.ca/)

**Glues:**

With all glues, if you are doing precise work: use a jig or some sort of material/clamps to help keep your piece in the right position for bonding (without bonding the jig of course). Even with fast acting glues, you may need both your hands with a syringe to do a nice job, so a jig will help.

**Cyanoacrylate** (instant or super glue).
Will bond acrylics but cannot take sudden/great force as it's a surface bond on them. Tip: Can use it as a temporary glue while another glue cures. Comes in various thicknesses (glues can be syrupy or as thin as water) and types.
Limited use with porous materials.

Recommended: Insta-Cure/Maxi-cure types or Zap-a-gap.

You can find it at (call ahead):

**Apollo Hobbies:** [http://www.apollohobbies.com/catalog/contact_us.php](http://www.apollohobbies.com/catalog/contact_us.php)

**Central Hobbies:** Call them to be sure. May have a different brand

**Imperial Hobbies:** [http://www.imperialhobbies.ca](http://www.imperialhobbies.ca)

**MagicBox Hobbies:** [http://www.magicboxhobbies.net/](http://www.magicboxhobbies.net/)

**SN Hobbies:** Different brands, also carry interesting small model parts:

**Epoxy:**
Will bond almost anything. Comes in a variety of forms depending on what you need to do. Available at most stores such as Home Depot, Rona. Specialty types available at Lee Valley, hobby Stores etc.

**Methylene Chloride:**
Bonds acrylic plastics through 'solvent welding'. Is fast-acting and can be very effective for some parts. Note: It is toxic- possible carcinogen.

**Don't get it on yourself- Glove up & use ventilation.**
Methylene Chloride needs the surfaces to be bonded to be flush, and as good a finish as you can get, as it cannot fill gaps or unevenness. Available at plastic suppliers listed previously.

**IPS Weld On** (various numbers, ie Weld on #14).
For gluing various plastics. Some Weld On types will glue ABS to acrylic - depends on the number/type designation. Available at plastic suppliers listed previously.