3D Printing User’s Guide

Lightning Lab

MCLD 257
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Training & Access - 3D Printing

Training

• Request a training session via 3d@ece.ubc.ca
• Attend the scheduled training session, in MCLD 257

Journal Voucher

• Submit a completed journal voucher to the finance clerk, in KAIS 5500
• **IMPORTANT:** keep a record of the reference RT# and speedchart

Access

• Access to 3D printers will be granted only once these steps are complete
• Remember to log all of your prints and clean up after yourself

More information is located on our website at:
eng-services.ece.ubc.ca/fabrication/3d-printing/
Quick Guide - 3D Printing

Before Printing
• Check info board for notices to users
• Saves files in your own directory
• Place any waiting parts on counter

Printing
• Print your parts
• Report any issues to 3d@ece.ubc.ca

After Printing
• Clean up in and around the printer
• Log your print using the online form

The Self-Serve 3D Printing Form is located at:
eng-services.ece.ubc.ca/fabrication/3d-printing/self-serve-3d-printing-form/

Scan here to log your print
Engineering Services reserves the right to cancel access at any time for improper use of the laboratory.

Training session may be done individually or in small groups.

Completion and submission of a journal is required before any printing can begin.

Access is valid for the time period specified on the journal voucher.

Keep a record of your Reference RT, given during training.

Access expires annually on March 31st.
ECE uses journal vouchers (JVs) to bill groups for 3D printer usage. JVs provide authorization for a user to print using a supervisor’s speedchart.

**Required Information:**
- Speedchart
- Max. amount per transaction
- User’s name and ID#
- Start & end date of JV

**Request**
- Supervisor requests journal voucher
- Financial staff in user’s department prepares JV

**Complete**
- Supervisor signs JV
- JV must include the information listed below

**Submit**
- Submit JV to ECE finance clerk (in KAIS 5500)
- Keep a copy for your records

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ECE Electrical and Computer Engineering

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March 2018 (Revision 1)
Laboratory Rules

1. Maintain laboratory safety
   - No food or drinks allowed
   - Clean up printer after every print
   - Clean up around sink after removing support material

2. Access is non-transferable
   - Do not provide access to other persons, including in your research group
   - User access will be revoked if found providing access for non-authorized persons

3. Each print must be logged
   - Use the online form to log the material used for each print
   - Card access will be revoked for all users if parts are printed without being logged – parts will need to be submitted through the Engineering Services staff
Keep in mind; 3D printing is primarily a prototyping process, not a production process.

- **Material Limitations**
- **Material Cost**
- **Time/Cost Tradeoffs**
- **Parts Submission**
- **File Directories**
- **Printer Materials**

The price for materials is posted on our website.

The final cost is based on the material used (build + support).

You can also submit parts for printing online (+$15 setup fee).

Materials available:
- VeroWhite Plus (build)
- VeroBlue (build)
- FullCure 705 (support)

Copy your files to your own folder, within your supervisor’s directory.

Time and cost can be balanced by changing the layout of the parts.

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Preparing to Print

Check Notices
• Consult info board for notices
• Consult usage calendar to find longest idle printer (use this printer)

Choose Printer
• Consult printers to see which material is loaded in machine
• Record printer use in usage calendar (write first initial of printer)

Remove Finished Parts
• Only if necessary:
  • Remove any finished parts from printer and place on counter
  • Clean the printer (see cleaning up section)
Embedded & Host Computers

Embedded Computer
- Runs Objet.exe
- Inside printer

KVMP Switch
- Toggles between computers

Host Computer
- Runs Object Studios
- Runs job manager software
- Contains user file directories
- Underneath table

Monitor, Keyboard, Mouse
Printing Software

**Objet Studio**
- Insert STL files
- Places models on tray
- Estimates material use
- Verifies layout

**Job Manager**
- Manages print jobs in queue
- Runs automatically once models are set up and ‘Build Tray’ is pressed

**Objet.exe**
- Turns printer online/offline
- Indicates material levels
- Displays current printer functions & information

Report low material supply levels to 3d@ece.ubc.ca
Laying out Parts

**Import**
- In Objet Studio, press **Object -> Insert** to import your STL files
- Check the units and overall dimensions
- Choose **Glossy** under the **Options** tab (lower left corner) for all parts

**Layout**
- Press the **Automatic placement** button
- Manually adjusting the placement of parts *may* save material (see next page for tips for better design & layout)

**Verify**
- Press the **Production estimate** button to estimate material consumption (estimate will appear on the status bar)
- Press the **Tray validation** button to check for layout errors
- Press **Save Tray As** to save the tray in .OBJTF format in your directory
Automatically placement aims to minimize print time; it may use more support material.

Enclosed cavities will be filled with support material; design to be able to clean out cavities.

Build material always has support material underneath it; design to minimize overhang and lay out to face cavities upwards.

Matte finish is better for gluing and painting; but covers the part in a thin support layer.

The part's mechanical properties are different along layer axis vs. across the layer axis.

Parts will print faster laying down, but use a bit more support material for the bed.
Printing Parts

• In Objet Studio, press **Build Tray**
• Objet Studio will close and open Job Manager

**Build Tray**

**Printer On**

• In Objet.exe, check that there is enough material
• Press **red button**; it will turn green

**Printer will start preparing to print**
• Wait for message: ‘**Heads Warming**’ before leaving

**Print Begins**

On the embedded computer, in Objet.exe, this button looks like:
Cleaning Up

**Parts**
- Gently remove your parts from the print tray
- Clean off support material at sink using dental-type tools

**Printer**
- Clean inside printer and print tray with water and towels provided in lab (do not use acetone or isopropyl alcohol on print tray)
- Manually center the print head on the print tray (push by hand)

**Sink**
- Put any scraps of support material from sink area in garbage
- Wipe any water off the counter
Logging the Print

When you are picking up your parts, log your print using the form on our website. You will need the following information:

- Your name, email, research group
- Speedchart
- Reference RT#
- Amount of material used (grams)
- Which printer you used
- Info on any issues when printing

Self-Serve 3D Printing Form

Please use the form below to record each print on the 3D printers in MCLD 257.

3D Self-Serve Printing

Use this form if you are requesting 3D printing for research work (i.e., ECE faculty and graduate students, and other researchers).

Name *

FirstName

LastName

Email *

UserEmail@ece.ubc.ca

Department & Research Group *

DepartmentResearchGroup

The Self-Serve 3D Printing Form is located at:
eng-services.ece.ubc.ca/fabrication/3d-printing/self-serve-3d-printing-form/