

CAP Fab Lab D-Fab Facilities

CNC Milling Policies and Procedures

CAP Fab Lab Website: <http://capfablab.info>
CNC Lab Location: AB 032
D-Fab Staff Contact: capfablab@bsu.edu or join **CAP Fab Lab - Q&A** ([link](#)) on Microsoft Teams
Lab Manager: Dan Eisinger, dmeisinger@bsu.edu, 765-285-8843, AB 006

CAP offers CNC milling/routing services to CAP students, faculty and staff in order to provide CAP constituents equitable access to advanced fabrication tools. The following policies and procedures are designed ensure this access.

For the purposes of this document all users of CAP digital fabrication (D-Fab) services are called clients, including faculty, staff and students.

COVID-related changes and additions to policies and procedures are highlighted in red throughout this document.

1. Requests

- a. **Clients who have not used CAP's CNC milling services before must book a remote consultation session through the CAP Fab Lab website (<http://capfablab.info>)** to be introduced to the technology and to associated requirements and considerations for 3D modeling when preparing geometry for milling.
- b. **Faculty considering CNC milling as a suggested or required element of a class or studio project** are encouraged to contact the Lab Manager or a staff member prior to assigning the project for information about CNC milling constraints (machine size, geometry limitations, typical job duration, etc.) and the feasibility of accommodating the CNC milling request volume that may result. D-Fab staff members are available to provide introductory sessions for classes and studio sections upon request.
- c. **Client requests for CNC milling services initiate a geometry review process.** Milling cannot be scheduled until geometry is reviewed and Client resolves any issues with the geometry. Clients can make mill requests via the request form available online on the CAP Fab Lab website **or book a consultation session for review of geometry.**
- d. Clients must make mill requests well in advance of due dates to ensure that the requests can be processed and scheduled within an acceptable timeframe. **Normally a 3-4 day turnaround can be accommodated; however, during crunch times clients are advised to submit mill requests at least 5 days in advance.**

2. Review

- a. Geometry
 - i. All milling geometry must be reviewed by a D-Fab staff member before a mill request can be scheduled.
 - ii. Clients can **book a consultation session for remote review of geometry.** Remote review will require that the client can connect to an online meeting for screen sharing and audio during consultation. Alternatively remote review over email is possible but will necessarily take longer.

- iii. Requirements for milling geometry are less stringent than for 3D printing (closed volumes are not required), but bad meshes and the like can still cause problems that may require the client to make corrections.
 - iv. **Valid geometry does not necessarily mean that the geometry can be milled.** D-Fab staff members are trained as to the capabilities of the mill and have the right to deny mill requests if deemed unsafe or highly impractical. In such cases the staff member will make recommendations for alternative fabrication approaches. If a client believes a D-Fab staff member is unreasonably denying a request, the Lab Manager should be contacted for resolution.
- b. Materials
- i. **Clients are responsible for supplying all of their own materials for milling.**
 - ii. Only NEW materials may be used on the mill. Pallets, skids, packing crates and any stock which may contain nails, staples or other fasteners are NOT considered “new.”
 - iii. Only DRY materials may be used on the mill. Moisture from wet or damp materials is quickly absorbed by the MDF spoil board on the mill bed, causing it to warp and negatively impact mill operation.
 - iv. Permitted materials include wood (softwoods, hardwoods), wood products (MDF, particle board, hardboard, OSB, plywood), foam (XPS, EPS, HDF), and certain plastics (acrylic, polycarbonate, HDPE). Other materials require special permission or arrangement.
 - v. The maximum thickness (height) for any material or laminated composite is 8 inches. The maximum thickness for through-cuts or cut-outs is 3 inches.
 - vi. All glued/laminated items must cure or set for 24 hours before being used on any of the machines. Glue must be spread evenly and be allowed to fully cure to prevent delamination during milling.

3. Queues and Scheduling

- a. We reserve the right to deny non-CAP affiliated CNC milling requests in order to manage our resources effectively in service of CAP-affiliated clients.
- b. Reviewed and accepted CNC mill requests will be processed in the order they are received; however, constraints related to job size, mill availability and staff availability may result in newer jobs that are shorter or smaller being processed before older jobs that are longer or larger.
- c. D-Fab staff members will work with clients to schedule a mutually acceptable time to run the job.
- d. **D-Fab staff will do their best to accommodate client “needed by” dates but can make no guarantees** due to constraints including mill/lab availability, staff availability and expected job duration. If a job cannot be completed by client’s “needed by” date, client will be notified as soon as possible.
- e. **Changes to geometry or materials after a job is scheduled may introduce delays and require rescheduling the job.** CNC milling is a complex fabrication process that involves a high number of variables and requires substantial effort to set up. It may take 1-2 hours (prior to the scheduled milling appointment) to program the toolpaths for a given job. Changes after setup may render completed programming useless and require additional setup time.

4. Expectations

- a. Clients will be notified of the time scheduled to process client's request.
- b. **D-Fab staff can make no guarantees about the success of a given milling operation.** Staff members are trained but are not professionals. They will make every effort to set up a job to avoid any problems. They will, to the best of their abilities, identify any potential issues and communicate them to clients before starting a job; however, not all failures can be predicted. Please consider purchasing and/or preparing extra material in case of a failure that is not recoverable.
- c. **Clients will be responsible for any material costs associated with a failed job** unless the failure is directly related to an issue with the associated machine(s) or if a staff member has clearly been negligent in setting up a job. If a client believes a D-Fab staff member has been negligent, the Lab Manager should be contacted for resolution.
- d. **By making a CNC milling request, clients assume the risk of job failure in terms of both material cost and time for any failure due to client error not reasonably detectable by a D-Fab staff member.**
- e. **D-Fab staff will run all mill jobs on behalf of clients.** Due to difficulty in obtaining N95 dust masks, which are necessary for safety during milling, clients will NOT be allowed in the CNC Lab during milling.
- f. **Clients must be present (outside lab) during milling of large jobs.** Large jobs are defined as jobs whose entire results cannot be moved by one person in one trip. In such cases client must be present to receive results of job as each major component is completed unless other arrangements are made ahead of time.
- g. **Clients not present (outside lab) during milling of small jobs must arrange a pickup time.** Jobs can be:
 - i. **Picked up at a pre-defined time.** Client must come to the CNC Lab (AB 032) during the one of the standard pickup times (listed on website) following notification of job completion to pick up completed project. Note that the staff person on duty may be in 3D Printer Lab (AB 005) across the hall.
 - ii. **Picked up at an individually arranged time.** To arrange an individual pickup time (outside of standard times) client must respond to the notification they receive when their job is scheduled to request an individual pickup time.

5. Safety

- a. The Lab Manager has the authority to halt unsafe operations at any time. The manager will enforce these rules and limit client access to equipment if clients are carelessly using the facility in a way that would cause injury to themselves or others. The manager has the authority to restrict client use of any tool or machine if they habitually ignore safety precautions in the lab.
- b. D-Fab staff members and trained faculty are the only people authorized to interact directly with the equipment in the lab.
- c. **Clients will not be permitted to enter the CNC Lab except during job pickup.** In order to allow for social distancing, a maximum of two clients and two staff members may be in the lab at one time.
- d. **D-Fab staff members must wear face masks and gloves when handling client materials.** Primary contact surfaces will be sanitized on a regular basis.

e. Staff Safety

i. Eye Protection:

1. Safety glasses or a face shield must be worn at all times when working in the CNC lab.
2. Safety glasses are provided by the shop for your use. Face shields can be checked out from the woodshop.

ii. Ear Protection:

1. Ear muffs or foam ear plugs should be worn by all individuals in the lab when the mill, dust collector or vacuum are in use.
2. Ear muffs and foam ear plugs are provided by the shop for your use.
3. Ear buds and headphones are NOT acceptable as hearing protection.

iii. Lung Protection:

1. Face masks (N95-grade) must be worn during and after milling and when handling sawdust.
2. To reduce the risk of germ transmission, face masks (of some kind) must be worn whenever more than one person is in the lab.

iv. Footwear:

1. Closed-toe shoes must be worn at all times in all shop areas.
2. Flip-flops and sandals are not appropriate footwear for the shop.
3. Clients with inappropriate footwear will be asked to leave the facility and return with proper footwear.

v. Clothing/Personal Attire:

1. Loose fitting clothing, including garments with long, flowing sleeves, neck ties, and scarves are not permitted in the shop. Dangling strings on “hoodies” must be tucked in shirt.
2. Long hair must be tied back. Loose jewelry such as long necklaces and bracelets must not be worn in the shop.

f. Tool and Equipment Safety

i. Mill

1. Always remain clear of the machine by staying outside the caution tape applied to the floor. **Do not stand between the machine and the machine controller—this is a potential pinch point.** The machine is not aware of your presence and could crush you.
2. **Never reach into the machine envelope while the machine is running.** Never assume that you know where it will move next.

ii. Ventilation:

1. Keep the lab well ventilated.
2. If the dust collector cannot be used for a given project the loading dock door must be opened to allow for air exchange.

iii. Compressed Air:

1. Never point a compressed air gun at another person.
2. Never use compressed air to clean skin, clothing or hair.

iv. Shop-Vac:

1. Use broom/brush and dust pan first to clean up bulk sawdust/debris.

- 2. Do not use the Shop-Vac for any sawdust/debris that may be hot to avoid the risk of fire (which has happened in the past).**
- g. Report ANY injuries to the lab manager or assistant immediately.