

## 6.18 Makerspaces

### General

A Makerspace is a collaborative workspace where individuals can make, learn, explore, and share ideas using a variety of high-tech equipment in a space that supports this equipment. Makerspaces are critical learning spaces that support creativity, innovative thinking and risk-taking. Makerspaces can be classified as classrooms specifically focused on creating, so any learning environment that requires the use of specialized tools (that is not a lab) and project areas could be considered a makerspace. Campus Architecture can help determine the classification of the space.

The makerspace should have controlled access managed by a faculty or unit as these spaces will have a variety of high-tech digital tools and equipment that may include 3D printers, laser cutters, cnc-machines, robots, soldering irons and, occasionally, sewing machines.

### Location

Locating a Makerspace will need to consider safety first. The following should be evaluated in the site selection process:

1. Proper ventilation and exhausting: equipment and activities that require exhaust should be properly routed vertically—not through the side of the building. Removing windows for venting/exhausting is not supported.
2. Proper electrical infrastructure.
3. Noise and vibration: relating to the equipment, activities and the adjacent uses.
4. Code Classification: If the Makerspace equipment triggers an industrial classification, then the construction of the floors, walls, ceiling, and openings will have to meet fire resistance ratings as per the current Building Code and Fire Code.
5. Security: The space will need to be secure so that only users with equipment training are able to use the space. It will need associated technicians who are familiar with the equipment and responsible for its maintenance. Card reader access should be included in the design.
6. Access routes: consideration of oversized equipment installation and removal.
7. Safety: The location of the makerspace within the building should consider the personal safety of all occupants and provide necessary provisions to ensure the safety of individuals working alone or after hours.

The architectural, structural, mechanical, and electrical capacity of the space within the building will need to be examined before a location is finalized. Some of the university's older buildings are limited in their capacity.

### Layout

A full list of the proposed equipment with specification sheets and installation instructions will be needed early in the design process to inform the design of the Makerspace. When placing equipment in the room the following should be observed:

1. Maintain 1 metre clear access to any floor, wall or ceiling panels, doors to service shafts, electrical or data rooms, controls, access hatches, mounted equipment, or lighting.
2. Maintain 1 metre in front of all safety equipment (including but not limited to hand-wash sinks, emergency eye washes, emergency showers, fire extinguishers, first aid kits, fire alarm pull stations and fire hose cabinets).

3. Equipment should not block thermostats, light switches, or wall mounted telephones. Placing heat-generating equipment within 1 meter of a thermostat is not permitted.

**Safety**

The risks to safety in the Makerspace include combustible dust, sparks, flames, vapors, shock, and water. Therefore, the equipment and volume of materials and the use of the space must be well understood.

It is recommended that all makerspaces have card reader access and may require security camera coverage on the entrance door. For makerspaces that operate outside regular hours, or are in less populated areas, provisions to ensure the safety of users working alone need to be provided. Ideally, makerspaces should be centrally located with natural surveillance from the building occupants.

Depending upon the activities in the space an eyewash station may be required. A first aid kit is required in all makerspaces.

While the Makerspace can be designed safely, it then needs to be operated safely. It is assumed that there will be a Standard Operating Procedures (SOP) established for each piece of equipment or distinct operation that will be updated and maintained (and enforced) by the Faculty/Unit responsible for the makerspace. Furthermore, training in the use of these spaces should include etiquette training to ensure that each user is responsible for maintaining a clean and safe workspace. It is the responsibility of the user to remove their projects from the space upon completion.

Please note:

- All equipment MUST be Canadian Standard Association (CSA) approved
- 3D printer operation manuals will need to be reviewed by Campus Engineering (CE) and the consultant team to understand ventilation requirements.
- Equipment making use of lasers will need to be reviewed by EHS to determine if radiation safety requirements apply.
- The use of robotics will require review from Campus Architecture (CA), CE and EHS.

**Acoustics**

Makerspace equipment creating vibration or noise should be identified in the early design phase and the floor, walls and ceiling must be designed to ensure proper performance of the makerspace while ensuring no negative impact to adjacent uses.

**Accessibility**

All new spaces at the University of Calgary need to consider universal access for students, faculty, and staff so this space will be required to meet those provincial requirements.

**Sustainability**

Energy efficient equipment, in alignment with the latest Energy Star program, should be selected where possible. Equipment not in use should automatically be turned off or put in sleep mode to minimize energy usage.

Waste generation needs to be well understood and addressed in the design of the space. This includes waste generated by the equipment as well as the activities so that containers can be incorporated into the design. The easy removal and replacement of these bins by university staff should also be designed into the space. Include

creation of a waste management plan for each maker space which identifies the waste streams which will be regularly produced by the space and how these could be reduced.

**Finishes**

Durability and maintenance are key to the selection of finishes and fittings. Ceiling treatment should address the nature of the activities performed and allow for easy cleaning.

**Storage**

Storage of material within the Makerspace will be secure and not exceed volumes posted on the SOP safety notice inside the door. Stored items cannot be placed within 450mm of the ceiling or in the adjacent corridors. Storage of materials should be kept to a minimum. The storage of hazardous materials is not allowed or if required should be reviewed by CA, CE and EHS to meet safety and code compliant storage requirements.



**Revision History**

<b>Revision Date</b>	<b>Version</b>	<b>Description</b>
May 2023	1.0	Baseline version
August 11, 2023	1.0	Added Revision History table to end of document and reset to Version 1.0.