Potential Improvements to Makerspace

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1. Major Improvements

1.1 Employee wall

Working in makerspace takes a lot of energy because the staff needs to learn a lot of tools and they need to build projects. Keeping in mind that the hourly pay is not high, money cannot be the motivation. Therefore, I strongly encourage to make a bond between the staff and CEED. The staff should feel special for working at makerspace. I think we should have an employee wall for the same reason we give are names in Starbucks: To create a personal connection.

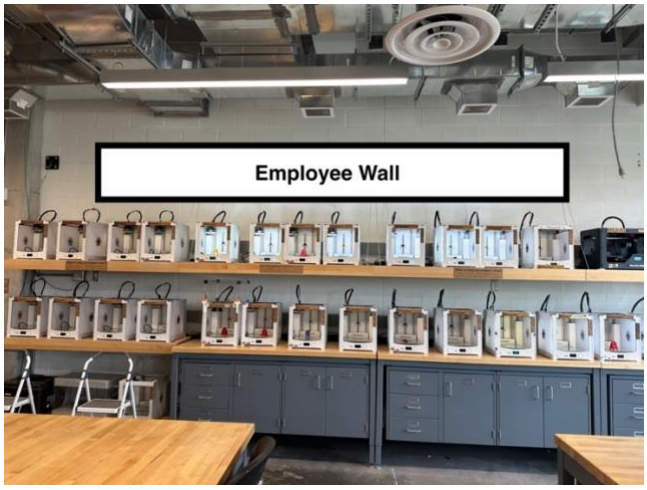

Figure 1 Employee wall area

Advantages: The users in makerspace will know the staffs name and talk with them by using their names. The users will have some knowledge about staff responsibilities (i.e., who is doing the workshop, who is doing the maintenance)

With this, the staff will have the motivation to do their tasks and stay a little bit more to finish the cleaning tasks. However, if a complete cleaning is expected, the closing staff should work until 6:15 and pay 15 minutes more. During covid, I was spending 20 to 30 minutes cleaning which was very discouraging.

1.2 Alternatively, put a clock at the employee wall section:

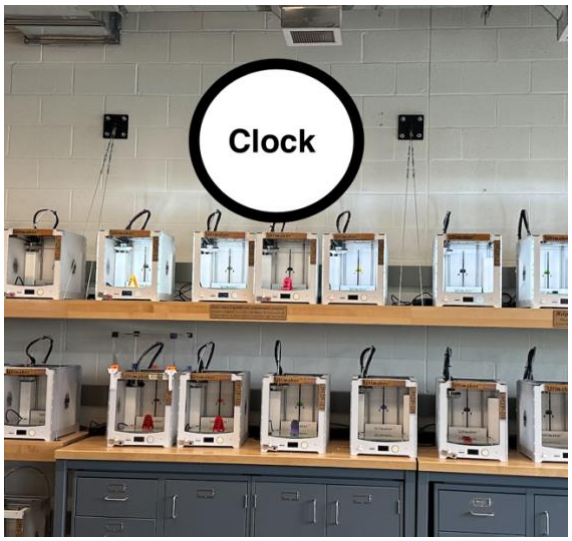

Figure 2 Alternative to the employee wall

We are losing significant number of filaments because people are not respecting the closing time limit. This is because the TV we display the time is not visible. Having a TV or even an analog clock at this area with a clear “your print should finish before 6, or it will be canceled” sign will be helpful to prevent that.

1.3 Clearly indicate the staff area:

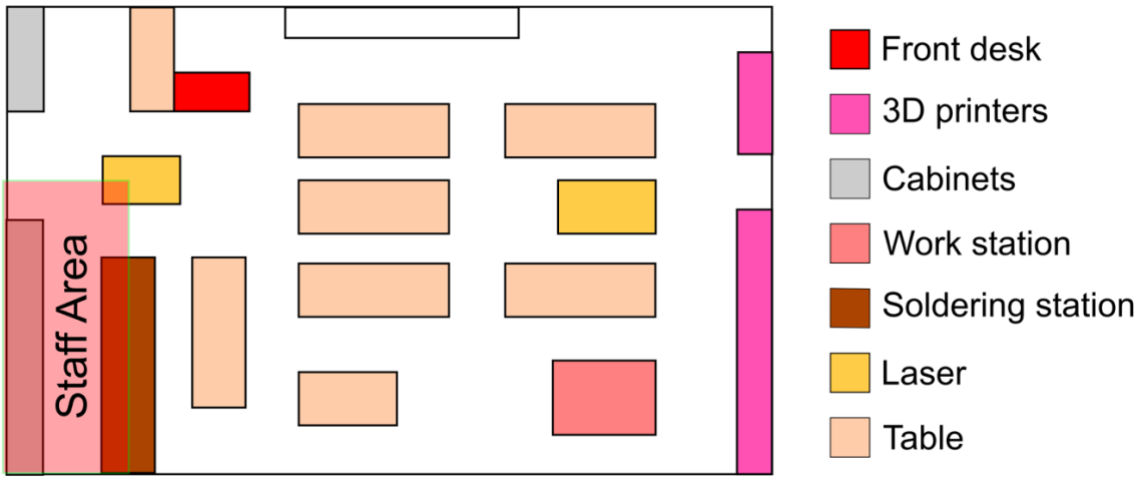

Figure 3 Layout of the makerspace indicating the staff area

It is almost impossible to control the people when there is more than 20 people in the space. People sneak into the cabinet area and grab tools without asking the staff. A masking tape sticked to the floor which says “staff area” could be nice and easy to implement. However, I don’t think it would be very useful. A better option would be a physical thing like a barrier or chain. But it would be harder to implement.

Clearly indicate that the maintenance cabinet is for staff. Of all those cabinets, the maintenance cabinet is the one that has the expensive and dangerous tools. But people are unaware that they don’t have access to that cabinet. Even the staff (including me) gave a drill or a Dremel to a student.

1.4 Maintenance

Usually, the staff is busy with other things and don’t fill out the maintenance form. Also, the comments they put usually not useful. Instead of using the form, we can color code the out of order signs. The red ones can be clogged nozzle and the yellow ones can be unlevelled bed. To achieve this, we need to print more out of order signs.

The number one reason for clogged nozzles is turning off the printer without letting it cool down. Unfortunately, no one is aware of this fact. I have seen some staff members who shut down the machines immediately and I warned them about potential consequences. However, I understand that they have their reasons for doing so. After a long day, at 6pm, you just want to shut down everything and go home. Same thing I said before, if employees are expected to wait until the machine is cooled down before shutting it off, then he/she should pay until 6:15. But in most cases, they were not even aware of this practice. Therefore, this fact should be clearly stated in the staff training.

2 Staff Training

2.1 List of machines:

- Laser cutter
- Heat press
- Ultimaker 2+ printers
- MakerBot printers
- raise3d pro2 plus
- 3d scanner
- SLa printer
- Solder iron
- VR
- LPFK
- Markforged printer
- Embroidery

2.2 Training for machines

Watching slide shows during the training is useful but does not build a core memory. My experience and chat from staff showed me that we usually forgot most of the things we learn in couple weeks. Therefore, there must me some projects in the training. Not tasks like in planner.

2.2.1 For laser cutter and Heat press

The new staff should do their own t shirts by themselves. Ideally everyone should make 1 t-shirt but if you think it will take too much time you can divide the team into 2 and they can make 2 t shirts.

Things they will learn: Laser cutting, color mapping, Inkscape, heat press.

Side note: Show the defects in the machine like unlevelled bed, scratched lens and scratched encoder so the staff will have an idea when a student's print fails.

2.2.2 For 3d printers and 3d scanner

Tell them to bring a small object to 3d print at the first day of training. 3d scan the object and start the print.

Things they will learn: 3d scanning, Cura, 3d printing.

MakerBot: There is no need to make a separate training for MakerBot as they are rarely used. Just need to show how to download MakerBot desktop software.

Raise3d pro2 plus: show the slicing software and the machine. Clearly state that how a student can use the machine. Do they need to pay for it?

3 Cabinets:

Over time, I tried to organize the cabinets, but I have not been successful because it requires a collective effort. When designing a workshop, I always suggest following the 5S rule: sort, set in order, shine, standardize, sustain. This method not only improves organization but also ensures that the system is maintained over time.

Right now, almost nothing has a designated place in the cabinets. Having a disposables cabinet isn't good enough. There must be a place for each component (where does the tape go, where does the sandpaper go)

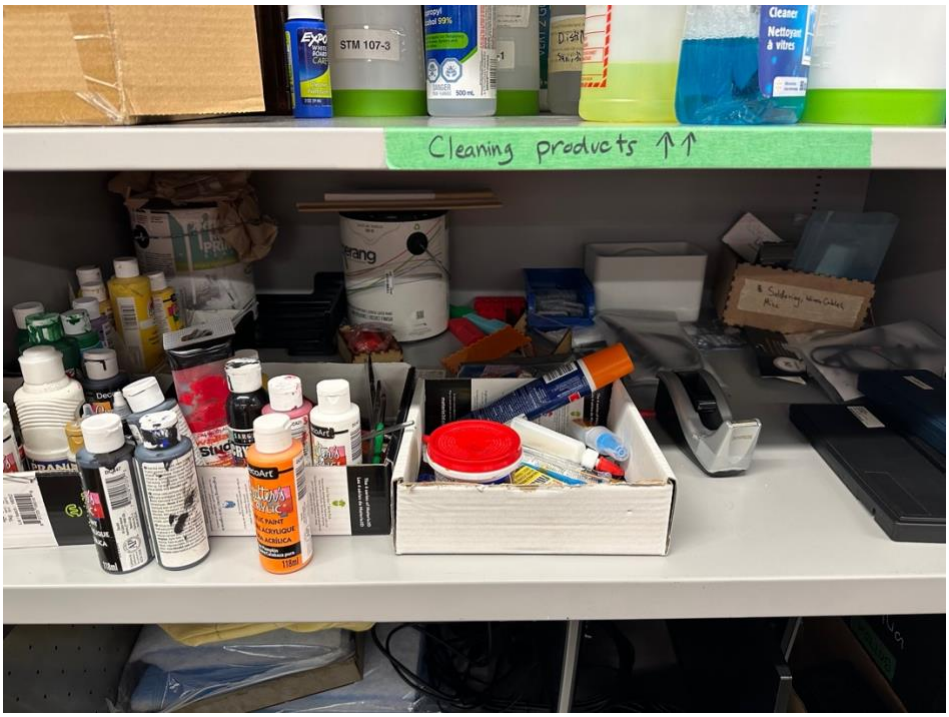

Figure 4 Current disposable shelf

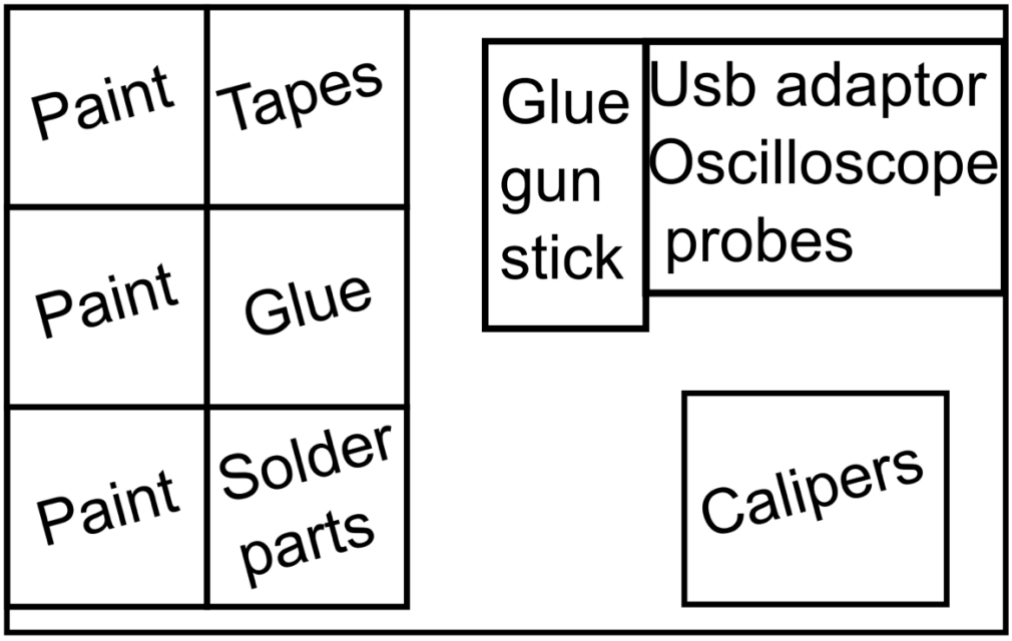

Figure 5 Improved disposable shelf

3.1 Disposable list:

Item	Warning quantity
Masking tape	2
Electrical tape	2
Duct tape	2
Black acrylic paint	2
White acrylic paint	2
Wood glue	1
Super glue	1
Solder wire	2
Heat shrinks	30
Glue gun stick	20
Usb adaptor	2
Filament	20

Table 1 Disposables list

Each week one employee should check the list and inform if the materials are running low.

3.2 Broken things in the cabinets

Over time, broken things just pile up. They take too much space, reduce sustainability, and reduce efficiency. However, the staff shouldn't be allowed to throw things out because it will create the suspicion of stealing. When something brakes, staff should inform the manager and the manager should give a high priority to this. Either find a solution or throw the broken thing.

4 Minor Improvements and General Notes

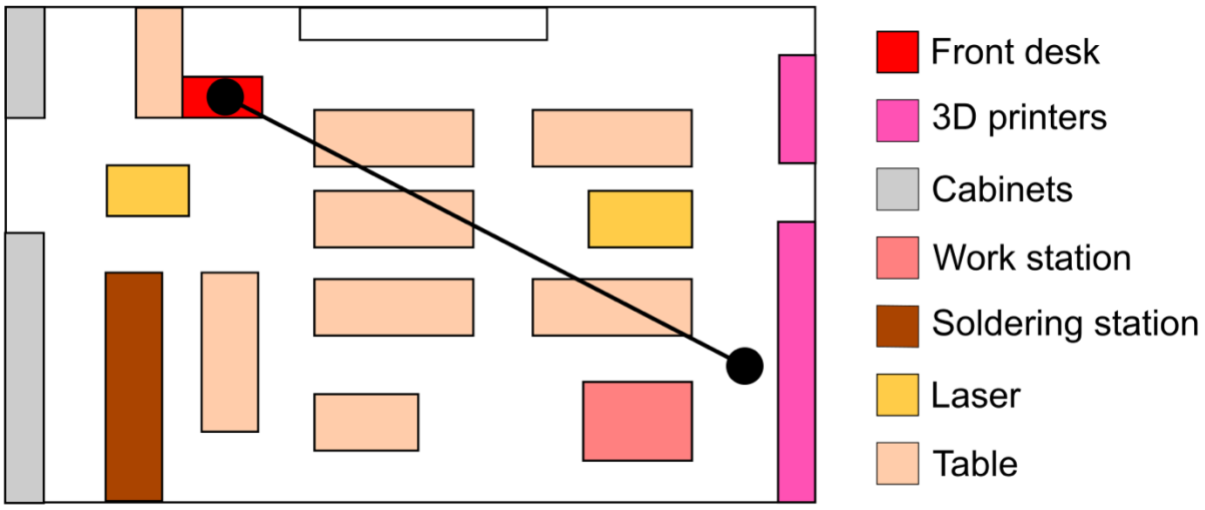

Figure 6 The distance between the front desk and the 3d printing area

The questions we answer are usually around 3d printing area. But the front desk is at the other side of the room. Personally, I answer a question at 3d printing area and check the front desk with one eye. If I see someone who is waiting at the front desk, I wrap up my answer and rush to the front desk. This is not a huge problem when the space is not busy, but it becomes a real problem at the end of the semester. To resolve this issue, there can be a volunteer at the front desk or 2 staff can work during the same time.

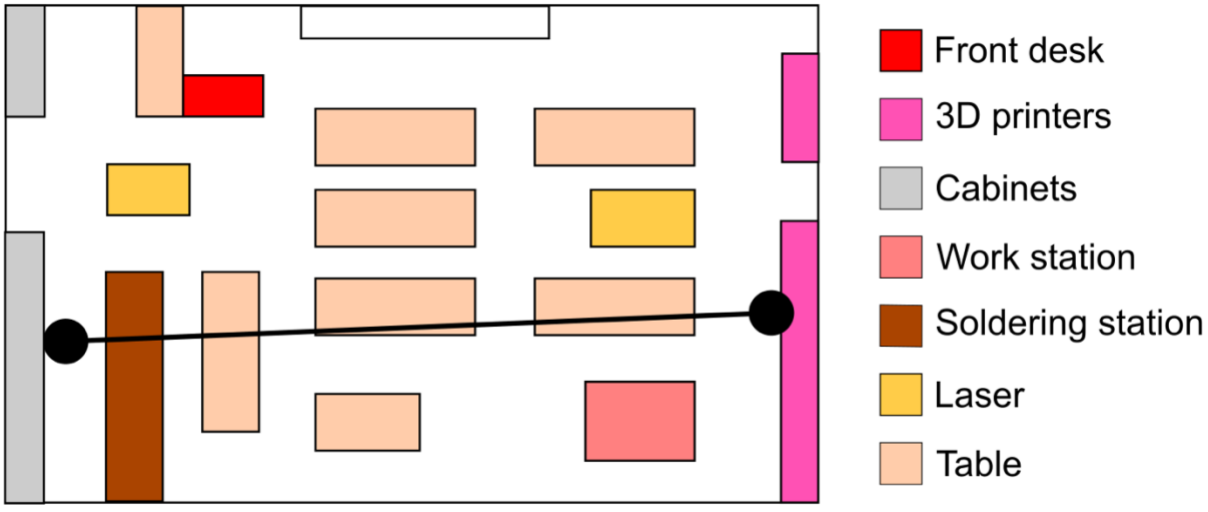

Figure 7 The distance between the cabinets and the 3d printing area

The staff should take the empty spools from the 3d printer area and put back to the cabinets at the back. This becomes a problem when the space is busy. There are some empty spaces below 3d printers. This space can be a “temporary empty spool cabinet” in those rush hours.

Figure 8 Alternative place to put empty spools

Suggested laser settings are placed at the column. A better place would be next to the monitor. This will make it easy to read the settings and will show that the table is assigned for the laser.

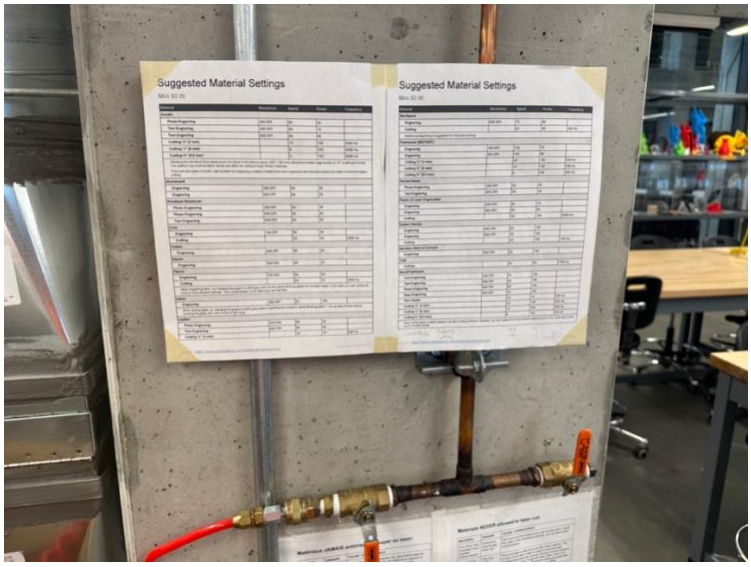

Figure 9 Laser settings

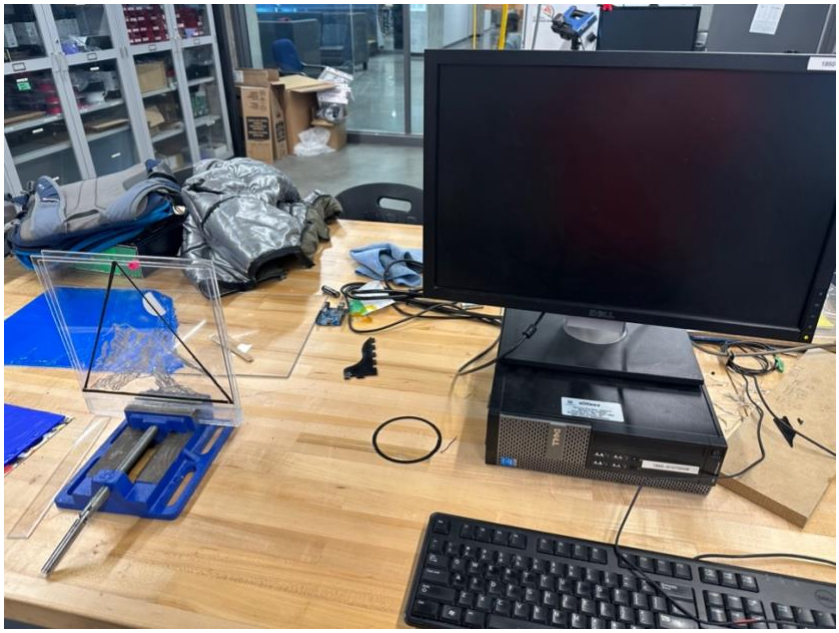

Figure 10 Alternative place to put laser settings

Volunteer task:

It is perfect to have volunteers in the space, but the tasks shouldn't be assigned randomly. If the volunteer just stays at the front desk all the time, he/she will be bored and won't come back again. Therefore, half of the assigned tasks should be boring like staying at the front desk, finishing the jobs that no one wants to do. And the other half should be interesting like a project that involves drill, laser, 3d printer so he/she won't lose interest in makerspace.

Potential items for repair café:

5-minute epoxy
Plumer epoxy
Small screws