

1. Tool Name and Location:

The MiiCraft 50 3D printer is located on the west wall lab bench in 2442 Elings Hall

2. Safety Concerns:

The resin used for casting PDMS molds is highly toxic. Wear gloves and a labcoat when handling

Follow proper fume hood procedure when cleaning parts

Transport prints in dedicated transport containers to prevent resin spillage

Dispose of liquid waste in labeled waste jugs and solid waste in the yellow waste bin

3. Training:

Training Requirements:

In person training is required to use this machine. New users should read the MiiCraft manual and follow along to the operating checklist (found on the IW GauchoSpace Website).

Supplemental videos are also provided to follow along to

Training Outline:

Description of the system:

The system is comprised of the MiiCraft 3D printer, the connected desktop computer with the MiiUtility software, and the IPA bath and cleaning station in Fume Hood #4

A resin tank with a thin teflon bottom is placed over a glass projection window and clamped down to create a flat interface

A z-axis travelling build platform is lowered into the resin tank, where a fine layer of resin is cured through the teflon bottom using a DLP projector chip

After printing, the entire build plate is removed and placed in the FormWash station, an agitated IPA bath that will clean off excess resin

The MiiCraft has a build envelope of 57x32x120 mm (2.24x1.26x4.27 in). The manufacturer specifications state a 30 μm XY Resolution and a 60 μm feature capability. The current layer recipes include 20 μm , 30 μm , and 50 μm layers.

The Innovation Workshop has two resins in stock, a clear resin (BV-007A) purchased from MiiCraft, and a master mold for PDMS devices resin purchased from ResinWorks 3D. Other resins are available from MiiCraft, ResinWorks, and third party vendors.

The MiiCraft requires 3 file types to complete a print:

1. An .stl file provided by the user
2. An .slc file generated by the MiiPrinter window that contains the layer slice information
3. A .mii file generated by the MiiController window that contains the movement and projection commands

How to Print a Part:

At the Printer:

Turn on the power if the printer is not already on

Retrieve a clean build plate from fume hood #4, clean off any excess resin with IPA

Open the printer door and remove the resin tank cover

Visually inspect the resin. Stir it up gently with a card if any discolored oily streaks are present at the surface

Install the clean build plate, make sure it is firmly seated, and press down on the locking lever

Close the printer door and move on to the software.

At the Computer:

MiiUtility:

Open up the Utility application (found in the most recent MiiUtility version folder) (explain that the software does not install and instead runs locally)

Import an .stl using the plus icon at the top right corner. Use the icons that appear on the right side of the screen to scale, move, and rotate the part to the desired orientation.

Click the downward facing arrow icon to locate the part directly on the build platform

Check the layer thickness displayed in the blue box at the top left corner of the screen. If you want to change the thickness, click on the box and a dialogue window will open up. (Note that the drop box contains more layer thicknesses than we have recipes, so check the available recipes beforehand)

Once you are satisfied with the part placement, select the upward facing arrow icon (below the plus sign). This will bring up a dialogue box asking if you want to enter half-auto mode. Click "no". You will then be prompted to name and save the .slc file

The MiiPrinter window will automatically open

MiiPrinter:

Step 1: If MiiCraft Ultra 50 with the name "Test #1" is present, it is okay to leave the IP address area blank

Step 2: Use the dropdown window under "Input" to display the correct .slc file, if it isn't already. Note the name of the .mii file that will be created. Double check that the correct layer thickness is displayed

Step 3: Use the dropdown menu to select the resin and layer thickness that matches the desired recipe. The edit button can be used to duplicate and modify recipes.

Step 4: Double check the settings and click convert to create the .mii file

Step 5: Press "Launch to Printing". The MiiController window will automatically open inside the MiiCraft Simple Browser window

MiiController

If there are any issues with connecting, press the refresh button at the top left corner of the Simple Browser

Click on "Select from PC" and choose the appropriate .mii file

The print settings will appear in the left part of the screen, and the part itself will appear in the right part of the screen.

Confirm the settings and click "Print". A round progress bar will appear and the build plate will move into position

How to Remove/Clean a Part:

At the Printer:

Put on gloves and a lab coat. Retrieve a plastic transport container from the fume hood and line with an absorbent pad

After the print has finished, allow several minutes for the excess resin to drip off the build tray into the resin tank

Release the locking lever and carefully remove the build tray and place in the plastic transport
Visually inspect the interior of the printer and wipe up any resin that may have accumulated on the exterior of the resin tank

Replace the resin tank cover and close the printer door. This prolongs the life of the resin and prevents contamination or accidental curing

Take the plastic transport container containing the build plate over to fume hood #4, being careful not to spill any resin. Immediately wipe up any spilled drops with IPA.

At the Fume Hood:

Open the FormWash IPA washing station (See resin wash SOP)

Place the build plate with the part still attached into the basket

Adjust the time settings to 20 minutes and start the cleaning cycle

Once the cycle is completed, take out the build plate and remove the part over the absorbent pads in the fume hood.

Place any contaminated waste in the yellow hazardous waste bin

Clean the base with IPA to remove any resin and place in a clean transport container

How to Edit a Recipe:

Let's say you want to use a different layer thickness and therefore need a different recipe. Open up the MiiPrinter window and click the edit icon to open a new window. Click the duplicate window and rename it with the resin and the layer thickness. Adjust the settings in the menu and save to create a new recipe.

4. Safe Operation of this Tool

Key Points and Operating Checklist

Key Points:

Wear gloves and labcoats when handling the resin and IPA, dispose of all waste in the designated yellow waste bin

Double check that the build plate is installed and the resin cover is removed before starting a print

Operating Checklist:

At the Printer:

Power on the printer if not already on

Grab a clean build tray and a plastic transport container from the fume hood

Open the printer and remove the resin tank cover

Inspect the resin tank. Stir the resin if discolored oily streaks are present

Install the build plate, confirm it is properly seated, and press down on the locking lever

At the Computer:

Open MiiUtility

Import the .stl, properly orient it, and place flat on the build plate

Make sure the proper layer thickness is displayed in the blue box in the upper corner

MiiPrinter Window:

Click “no” when asked to enter half auto mode, save .slc file

Step 1: Test #1 MiiCraft Ultra 50

Step 2: Select correct .slc input file, take note of .mii output file name. Double check layer thickness

Step 3: Select correct recipe for resin and layer thickness

Step 4: Convert to .mii file

Step 5: Select “Launch to Printing”

MiiController:

Use “Select from PC” to select proper .mii file

Confirm that the part and print settings are correct

Confirm that the build plate is secured, the resin cover is removed, and the printer door is closed

Select “Print” to start job

After Print is Done:

Wait several minutes for the excess resin to drip off

Open the door, release the locking lever, remove the build tray, and place it in the plastic transport container

Replace the resin tank cover and close the printer door

Carefully transport the container to the fume hood, cleaning any spills immediately

Place the build tray in the IPA wash and start a 20 minute cycle

Remove the build tray from the wash and remove the parts

Clean the build tray with IPA and place in a clean transport container

Detailed Procedure:

Supplies:

Resin tanks, resin tank covers, and printer resins (BV-007A and ResinWorks 3D PDMS master mold resin) kept in cabinet underneath Hawker 3D printer in 2442.

Absorbent pads and extra hazardous waste plastic bags kept in cabinet next to fume hood #4 in 2442. Yellow hazardous waste bin located on floor in front of fume hood.

Build trays and plastic transport tanks kept in fume hood #4 in 2442. FormWash IPA wash station and waste bottles for resin and IPA kept in fume hood #4. Spare bottles of reagents kept in cabinets underneath fume hood #4.

Lab coats found on the wall rack, gloves and paper towels found above the sink.

Setup:

Description of the system:

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6. A .mii file generated by the MiiController window that contains the movement and projection commands

Operation:

How to Print a Part:

At the Printer:

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Open the printer door and remove the resin tank cover

Visually inspect the resin. Stir it up gently with a card if any discolored oily streaks are present at the surface

Install the clean build plate, make sure it is firmly seated, and press down on the locking lever

Close the printer door and move on to the software.

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Cleanup:

How to Remove/Clean a Part:

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Release the locking lever and carefully remove the build tray and place in the plastic transport. Visually inspect the interior of the printer and wipe up any resin that may have accumulated on the exterior of the resin tank

Replace the resin tank cover and close the printer door. This prolongs the life of the resin and prevents contamination or accidental curing

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At the Fume Hood:

Open the FormWash IPA washing station (See resin wash SOP)

Place the build plate with the part still attached into the basket

Adjust the time settings to 20 minutes and start the cleaning cycle

Once the cycle is completed, take out the build plate and remove the part over the absorbent pads in the fume hood.

Place any contaminated waste in the yellow hazardous waste bin

Clean the base with IPA to remove any resin and place in a clean transport container

How to Edit a Recipe:

Let's say you want to use a different layer thickness and therefore need a different recipe. Open up the MiiPrinter window and click the edit icon to open a new window. Click the duplicate window and rename it with the resin and the layer thickness. Adjust the settings in the menu and save to create a new recipe. See written document (Convert this document to sections of the SOP)

5. Accident Response

Technical Error with Printer:

Accident: A user leaves a build tray or foreign object inside the printer when starting a print.

Technical: A mechanical error warning displays on screen. Printer is not responsive to computer commands and requires a hard reboot.

Process

Press and hold power button for 2 seconds, then release.

A dialogue on the printer window will appear asking if you wish to power down.

Press and hold power button for 2 more seconds to completely power off machine.

Wait 60 seconds, and then press power button to start the machine.

This will initiate an automatic homing process that will raise the build platform to the top of the printer enclosure.

Remove obstructions and refresh computer connection in MiiController Window

Accident: Scratching glass projection plate or teflon surface of the resin tank.

Technical: Prints are poor quality or inaccurate.

Process:

Accident: Build tray is not installed

Technical: New prints will not start, build platform stand immersed in resin.

Process:

Accident: Chemical spill of IPA or toxic resin

6. References

Manuals:

Link to MiiCraft Manual

MiiUtility Software if possible

Other SOP's:

Resin IPA Wash Station SOP

Toxic Material handling SOP

Fume hood SOP

MSDS:

BV-007A Clear Resin

Master mold for pdms devices resin

(In contact with company for both sheets)

Sources for supplies:

MiiCraft Website

Creative Cadworks 3D website

ResinWorks 3D website

Contact information:

Names + emails

Recipes:

Clear Resin Recipes (Technical specifications)

PDMS mold resin (Technical Specifications)

Other references:

Insert links.

7. **Maintenance**

Routine Preventative maintenance:

Inspect Resin

Cover Resin Tank

Run a calibration print

Replace Resin as needed?

Troubleshooting:

Print's wont start

Mechanical error

Resin cover left on

8. Appendices

Quizzes

MiiCraft Recipe procedure