

Simple Print (MK1)

HYREL 3D TRAINING SERIES

Agenda

- “Terra Firma”
- Physical Setup
- Print Vase

Terra Firma

- Q: What is / why “Terra Firma”?

- A: Terra Firma translates to “Solid Earth”.

This is the “firm ground” from which we will help build your knowledge, experience, and confidence to a point where you can explore, build, and be successful with your future projects with your HYREL machine(s) on your own.

With firm ground under your feet, we can be sure your HYREL machine is operating properly.

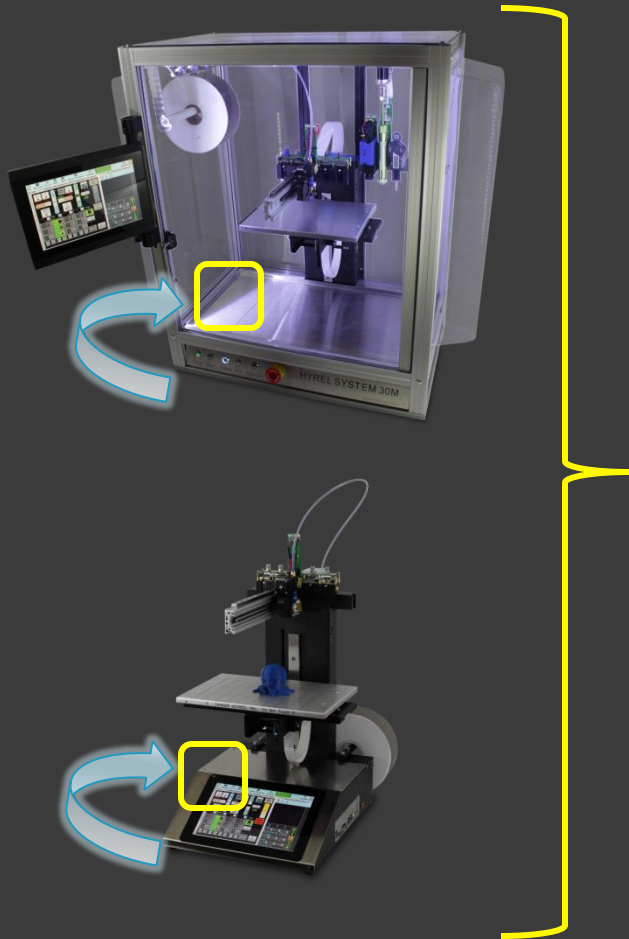
- The purpose of this guide is to bring you back to firm ground if you suspect there are issues with your machine, G-code, slicing, .stl, etc.

Terra Firma

- ⦿ For this to be effective, your HYREL machine must be able to do the following:
 - Turn on
 - Check communications
 - Move all axis
 - Heat up heated build platform
- ⦿ After your HYREL performs the above, you have confirmed a firm foundation from which to create your models.

Terra Firma

Step 1: Turn on



Power Supply:
ATX Form Factor
500W



Terra Firma

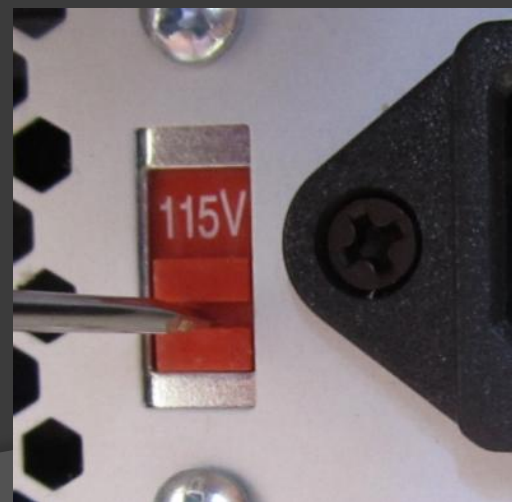
Step 1: Turn on

CAUTION:

Make sure you know your Outlet's Voltage Requirements.

If you are unsure, *start* with the Power Supply set to 230V and turn it on. If the machine does not turn on with the Power Supply set to 230V, then Set the Power Supply to 115V and turn it on.

Doing this in reverse WILL blow a capacitor in your Power Supply and will void your warranty.



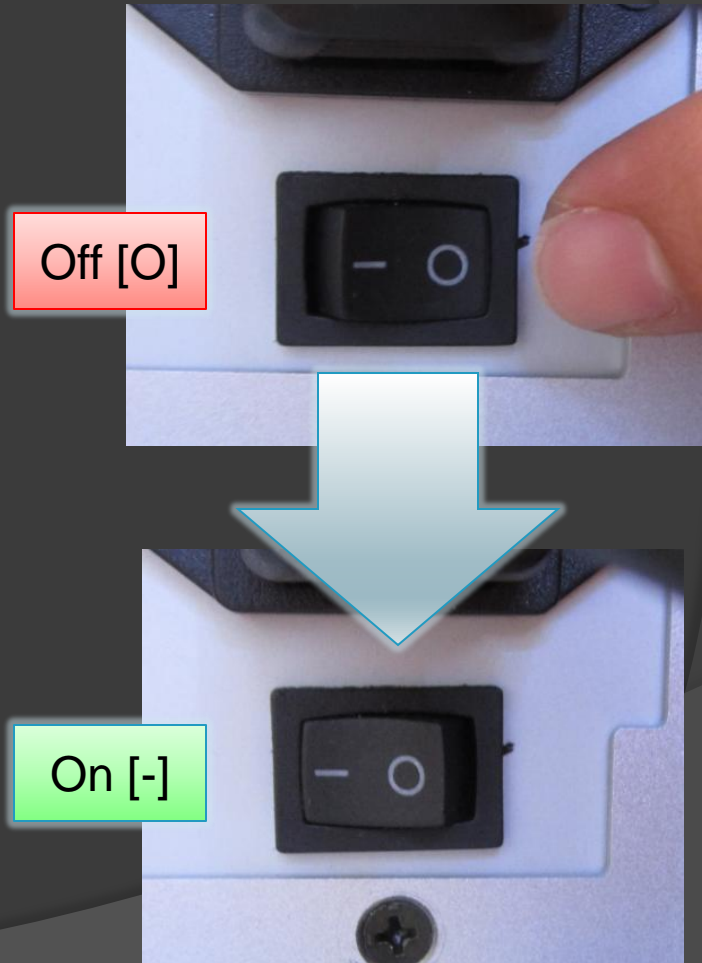
Terra Firma

Step 1: Turn on

1. Plug in your power cord

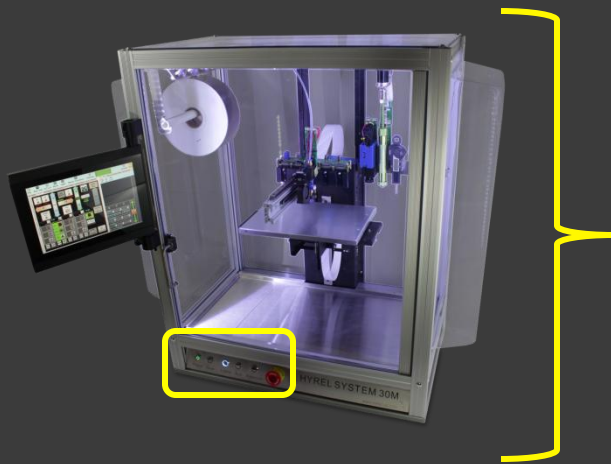


2. Turn on your Power Supply



Terra Firma

Step 1: Turn on



System 30M Power On Button

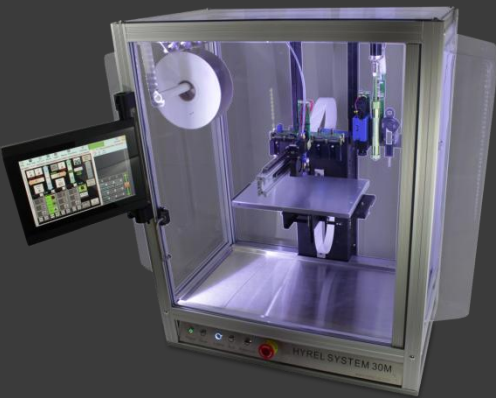


Engine Power On Button



Terra Firma

Step 2: Check communications



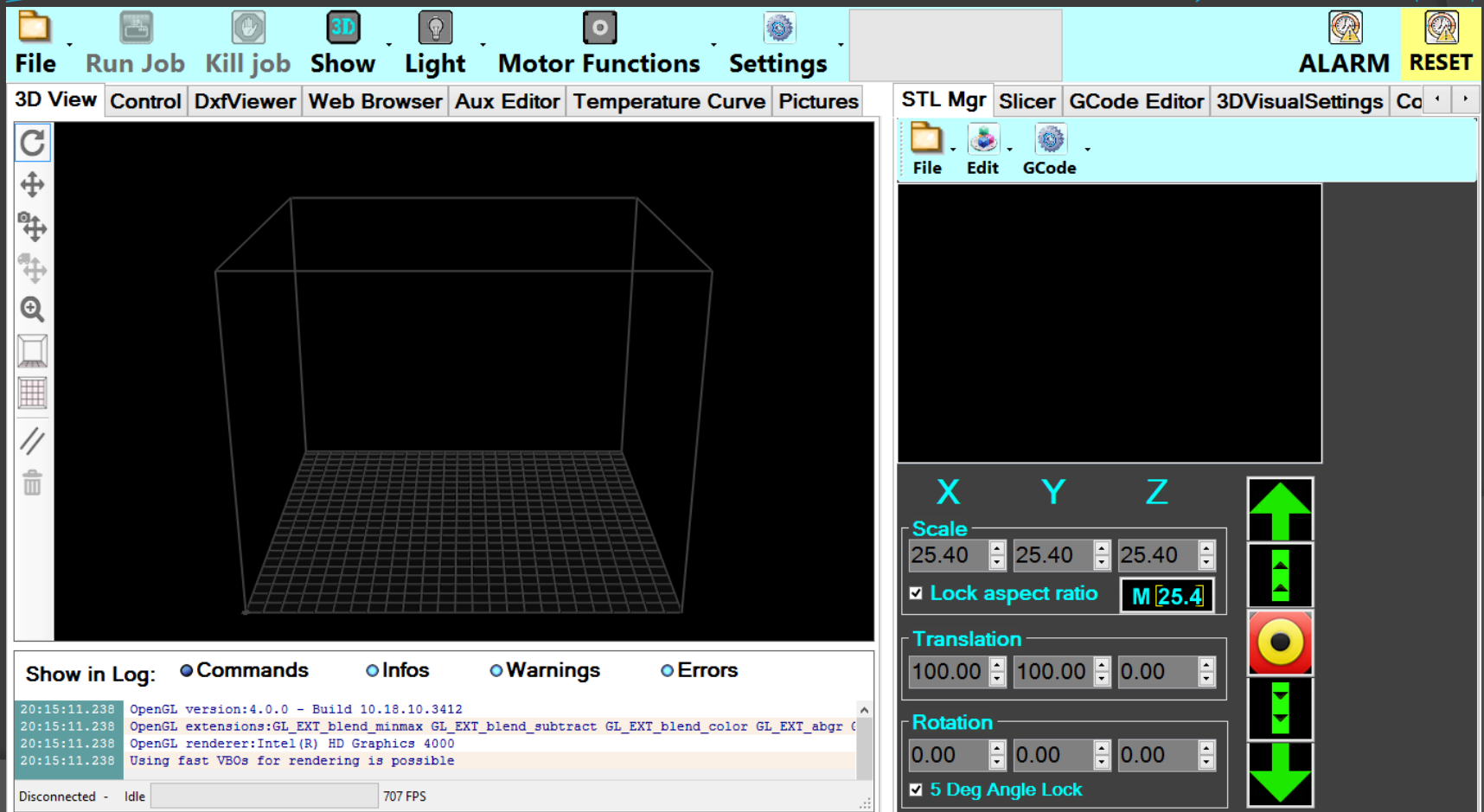
System 30M
Emergency Off Button

Turn Clockwise
to disengage

Terra Firma

Step 2: Check communications

Desktop Icon
opens this window:



The screenshot shows the Terra Firma software interface. At the top, there is a menu bar with options: File, Run Job, Kill job, Show, Light, Motor Functions, Settings, ALARM, and RESET. Below the menu bar is a toolbar with icons for 3D View, Control, DxfViewer, Web Browser, Aux Editor, Temperature Curve, and Pictures. The main window is divided into several panels. On the left is a 3D view area showing a wireframe cube on a grid. On the right is a control panel with sections for Scale, Translation, and Rotation. The Scale section has X, Y, and Z axes, each with a value of 25.40 and a 'Lock aspect ratio' checkbox checked. The Translation section has X, Y, and Z axes, each with a value of 100.00. The Rotation section has X, Y, and Z axes, each with a value of 0.00, and a '5 Deg Angle Lock' checkbox checked. At the bottom left, there is a log window showing system messages and a status bar indicating 'Disconnected - Idle' and '707 FPS'.

Terra Firma

Step 2: Check communications

The screenshot displays the Terra Firma software interface. At the top, a menu bar includes 'File', 'Run Job', 'Kill job', 'Show', 'Light', 'Motor Functions', and 'Settings'. The 'Light' button, represented by a lightbulb icon, is highlighted with a red rectangular box. Below the menu bar, a secondary bar contains '3D View', 'Control', 'DxfViewer', 'Web Browser', 'Aux Editor', 'Temperature Curve', and 'Pictures'. On the right side, there are 'ALARM' and 'RESET' buttons.

The main 3D view area shows a wireframe grid on a black background. A red text overlay reads: "Click here to turn on / off the light". Below this, white text states: "This also serves as a double-check to make sure the PC is communicating with the printer".

At the bottom left, a log window titled "Show in Log:" has tabs for "Commands", "Infos", "Warnings", and "Errors". The log contains the following text:

```
20:15:11.238 OpenGL version:4.0.0 - Build 10.18.10.3412
20:15:11.238 OpenGL extensions:GL_EXT_blend_minmax GL_EXT_blend_subtract GL_EXT_blend_color GL_EXT_abgr
20:15:11.238 OpenGL renderer:Intel(R) HD Graphics 4000
20:15:11.238 Using fast VBOs for rendering is possible
```

At the bottom of the log window, it shows "Disconnected - Idle" and "707 FPS".

On the right side, a control panel features a menu bar with 'File', 'Edit', and 'GCode'. Below this is a large black area. Further down, there are sections for 'Scale', 'Translation', and 'Rotation'. The 'Scale' section has X, Y, and Z axes with values of 25.40 and a 'Lock aspect ratio' checkbox checked. The 'Translation' section has X, Y, and Z axes with values of 100.00, 100.00, and 0.00. The 'Rotation' section has X, Y, and Z axes with values of 0.00, 0.00, and 0.00, and a '5 Deg Angle Lock' checkbox checked. To the right of these sections are several green arrow buttons for navigation.

Terra Firma

Step 2: Check communications

NOTE: Only do this step if the light and/or motors are not moving

The screenshot shows the Terra Firma software interface. The main window displays a 3D view of a printer bed. The top menu bar includes File, Run Job, Kill job, Show, Light, Motor Functions, and Settings. Below the menu bar, there are tabs for 3D View, Control, Pictures, Web Browser, Aux Editor, Temperature Curve, Slic3r, 3DVisualSettings, Comm Link, Camera, and Slicer. The 3DVisualSettings tab is active, showing a 'Comm Link' section with a 'COM5' dropdown, a '38400' baud rate field, an 'Apply' button, and a 'PING' button. The 'Comm Link' tab is highlighted with a red box. Below the 3D view, there is a log window showing system messages and a control panel with Xmit, RCv, and HEX buttons. The control panel also shows a 'MsgQue' indicator set to 0.

1. Select COM Port

2. Set Baud Rate to 38400

3. Click "Apply"

4. Click "PING"

Show in Log: Commands Infos Warnings Errors

```
12:28:38.076 OpenGL version:4.0.0 - Build 10.18.10.3412
12:28:38.077 OpenGL extensions:GL_EXT_blend_minmax GL_EXT_blend_subtract GL_EXT_blend_color GL_EXT_abgr
12:28:38.077 OpenGL renderer:Intel(R) HD Graphics 4000
12:28:38.077 Using fast VBOs for rendering is possible
```

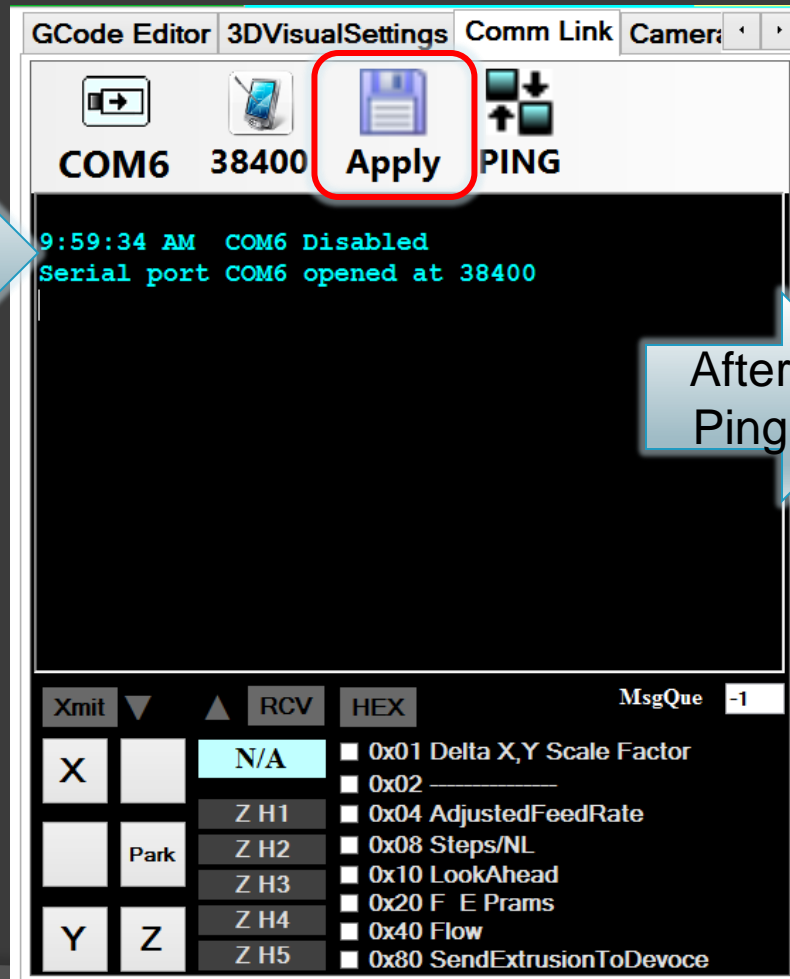
Disconnected - Idle 18 FPS

Xmit	RCV	HEX
X	N/A	0x01 Delta X,Y Scale Factor
	Z H1	0x02
Park	Z H2	0x04 AdjustedFeedRate
	Z H3	0x08 Steps/NL
	Z H4	0x10 LookAhead
Y	Z H4	0x20 F E Prams
Z	Z H5	0x40 Flow
		0x80 SendExtrusionToDevoce

Terra Firma

Step 2: Check communications

NOTE: If you do not see that the printer connected with the PC, try the reset button at the top right of REPETREL, or the reset button on the front of the System 30Ms (with tablets) and retry.



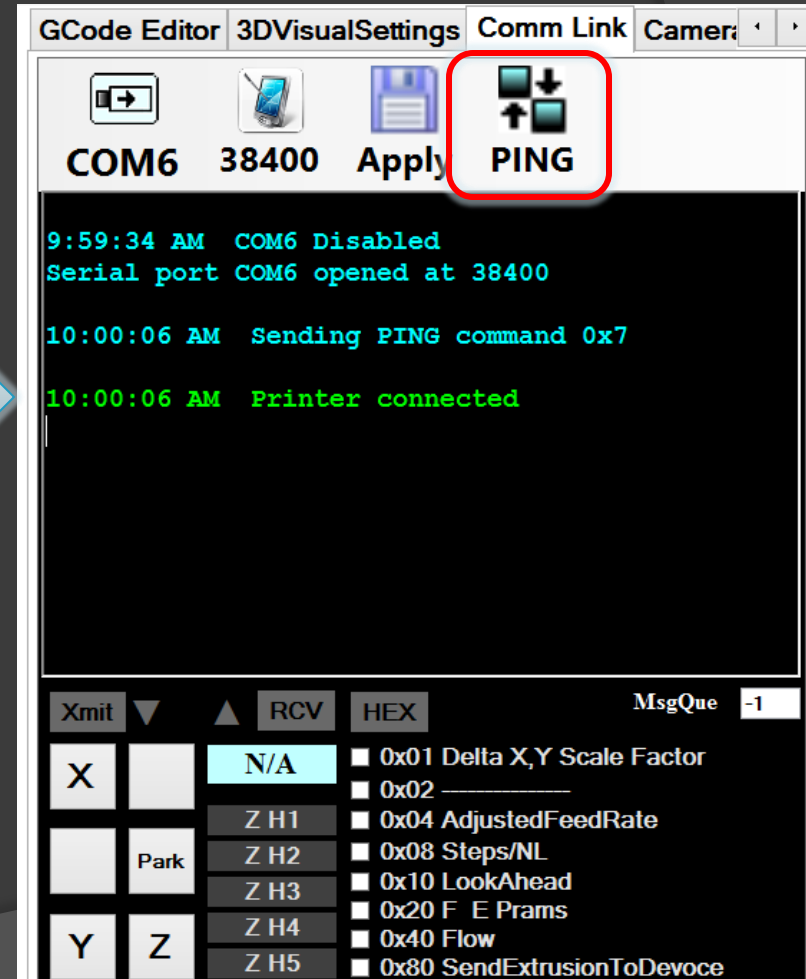
The screenshot shows the Terra Firma software interface. The top bar contains tabs for "GCode Editor", "3DVisualSettings", "Comm Link", and "Camera". Below the tabs, there are icons for a printer, a smartphone, a floppy disk (labeled "Apply"), and a ping icon. The status bar shows "COM6 38400 Apply PING". The main window displays the following text:

```
9:59:34 AM COM6 Disabled  
Serial port COM6 opened at 38400
```

Below the main window is a control panel with "Xmit" and "RCV" buttons, a "HEX" checkbox, and a "MsgQue -1" indicator. The control panel includes buttons for "X", "Park", "Y", and "Z", and a list of printer settings:

- 0x01 Delta X,Y Scale Factor
- 0x02 _____
- 0x04 AdjustedFeedRate
- 0x08 Steps/NL
- 0x10 LookAhead
- 0x20 F E Prams
- 0x40 Flow
- 0x80 SendExtrusionToDevoce

A blue arrow labeled "After Apply" points to the "Apply" button.



The screenshot shows the Terra Firma software interface. The top bar contains tabs for "GCode Editor", "3DVisualSettings", "Comm Link", and "Camera". Below the tabs, there are icons for a printer, a smartphone, a floppy disk (labeled "Apply"), and a ping icon. The status bar shows "COM6 38400 Apply PING". The main window displays the following text:

```
9:59:34 AM COM6 Disabled  
Serial port COM6 opened at 38400  
  
10:00:06 AM Sending PING command 0x7  
10:00:06 AM Printer connected
```

Below the main window is a control panel with "Xmit" and "RCV" buttons, a "HEX" checkbox, and a "MsgQue -1" indicator. The control panel includes buttons for "X", "Park", "Y", and "Z", and a list of printer settings:

- 0x01 Delta X,Y Scale Factor
- 0x02 _____
- 0x04 AdjustedFeedRate
- 0x08 Steps/NL
- 0x10 LookAhead
- 0x20 F E Prams
- 0x40 Flow
- 0x80 SendExtrusionToDevoce

A blue arrow labeled "After Ping" points to the "PING" button.

Terra Firma

Step 3: Move all axis

The screenshot displays the Terra Firma control interface, which is divided into several functional panels. At the top, a menu bar includes options like 'File', 'Run Job', 'Kill job', 'Show', 'Light', 'Motor Functions', and 'Settings'. Below this, a secondary menu bar contains '3D View', 'Control', 'Pictures', 'Web Browser', 'Aux Editor', 'Temperature Curve', and 'Slic3r'. The 'Control' panel is highlighted with a red box and contains the following elements:

- Motion Control:** Includes buttons for X, Y, Z, and FINE MOVE. The current coordinates are X=0.0, Y=0.0, and Z=0.00. There are also directional arrows for -X, +X, -Y, +Y, -Z, and +Z.
- Advanced Settings:** Features a 'Layer Height' set to 0.300 and a 'Park' button (marked with a red box). There are also 'Enable Big Z Move' and 'Enable Z Calibrat' buttons.
- Advanced Head Control:** Shows four motor control sections, each with a 'RUN' button and a fan speed indicator. The first two sections are labeled '1' and '2' with blue arrows pointing to them.
- Temperature Control:** Displays 'T=21 Hot Bed' and a temperature readout of '110'.

On the right side of the interface, the 'STL Mgr' panel is visible, with sub-sections for 'File', 'Edit', and 'Slice'. It includes 'Stl object Orientation' and 'Slic3r settings' tabs. The 'Scale' section shows X, Y, and Z values of 25.40. The 'Translation' section shows X and Y at 100.00 and Z at 0.00. The 'Rotation' section shows X, Y, and Z values of 0.00. There are also directional arrows for scale, translation, and rotation.

Terra Firma

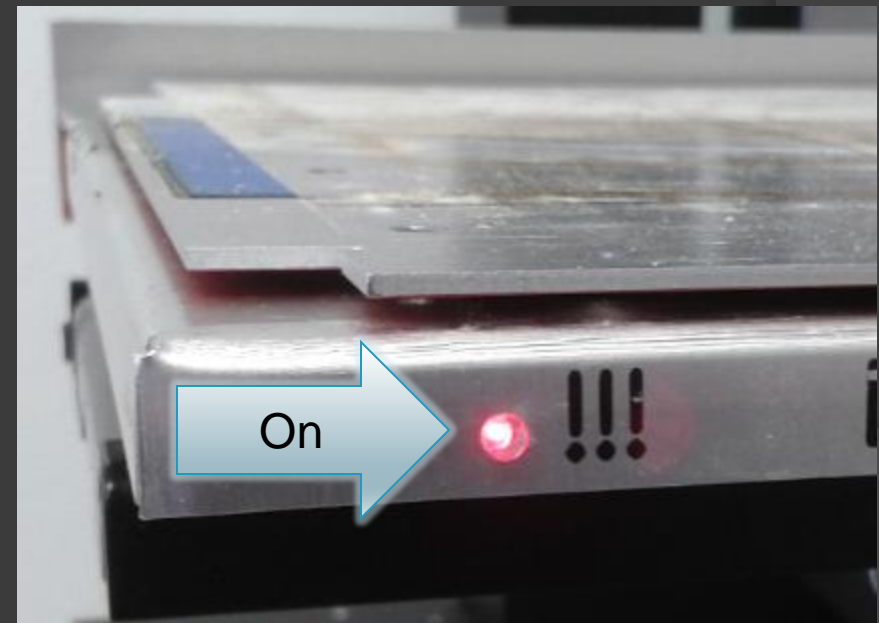
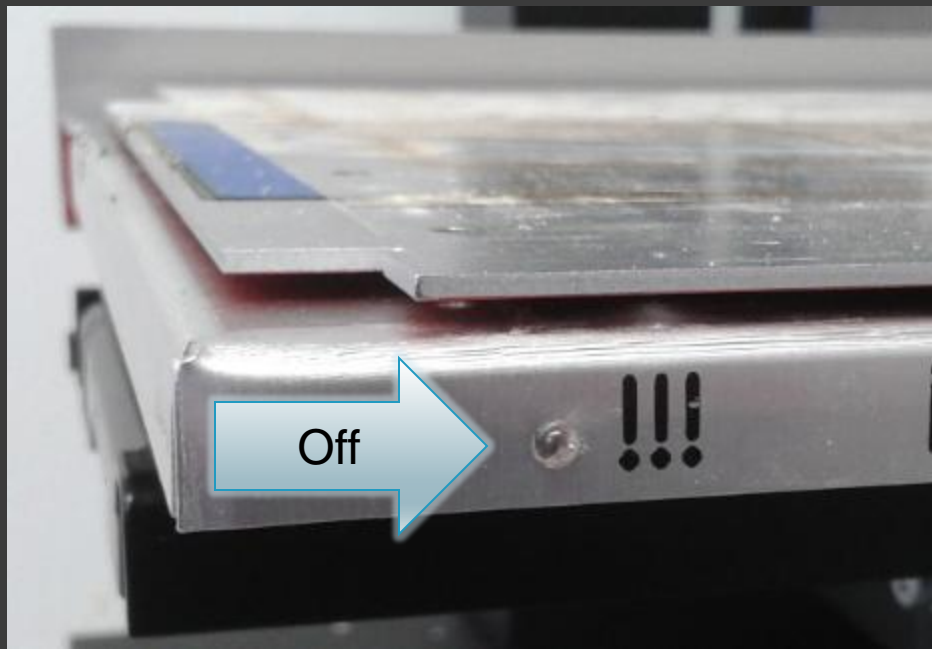
Step 4: Heat up heated build platform

The screenshot displays the Terra Firma software interface, divided into several functional panels. At the top, a menu bar includes 'File', 'Run Job', 'Kill job', 'Show', 'Light', 'Motor Functions', and 'Settings'. On the right side of the top bar, there are 'ALARM' and 'RESET' buttons. Below the menu bar, a secondary bar contains tabs for '3D View', 'Control', 'Pictures', 'Web Browser', 'Aux Editor', 'Temperature Curve', and 'Slic3r'. The main interface is split into two primary sections. The left section, titled 'Motion Control', features a grid of directional buttons: 'X' (home), 'Y' (home), '-Y', '+Y', '-X', '+X', '-Z', '+Z', 'HOME ALL', and 'Park'. It also includes a 'FINE MOVE' button, a 'Z' axis home button, a 'Z' position display showing 'Z=0.00', a 'Layer Height' display set to '0.300', and two yellow buttons: 'Enable Big Z Move' and 'Enable Z Calibrat'. The right section, titled 'STL Mgr', 'Project Composer', 'GCode Editor', and '3DVisual', contains a 'File Edit Slice' menu and a 'Stl object Orientation' / 'Slic3r settings' panel. This panel has three columns for 'X', 'Y', and 'Z' axes, with sub-sections for 'Scale' (values: 25.40, 25.40, 25.40), 'Translation' (values: 100.00, 100.00, 0.00), and 'Rotation' (values: 0.00, 0.00, 0.00). A 'Lock aspect ratio' checkbox is checked, and a '5 Deg Angle Lock' checkbox is also checked. The bottom section, 'Advanced Head Control', shows four temperature control panels for extruders, each with 'OFF', 'RUN', and 'OFF' buttons. A fifth panel for the 'Hot Bed' is highlighted with a red circle and a blue arrow; it shows 'Hot Bed' at 'T=21', 'OFF' status, and a temperature display of '110'. A vertical sidebar on the far left contains 'Tables and Firmware', 'Advanced Settings', and 'Advanced Head Control' labels.

Terra Firma

Step 4: Heat up heated build platform

When the heated build platform button is activated, the embedded LED on the front, left of the heated build platform turns on.



Click the heated build platform button again to turn off your heated build platform.

Physical Setup

- ⦿ Q: What is / why do the “Physical Setup”?
- ⦿ A: All machinists perform a physical setup (calibration) of their machines before they build. This process of leveling / putting things in tram and setting head offsets is vital to produce parts to specifications. In addition, this process *prevents* head crashes, which can damage heads and other parts of the machine.
- ⦿ Performing the following steps will ensure the next level of “Terra Firma” calibration.

Physical Setup

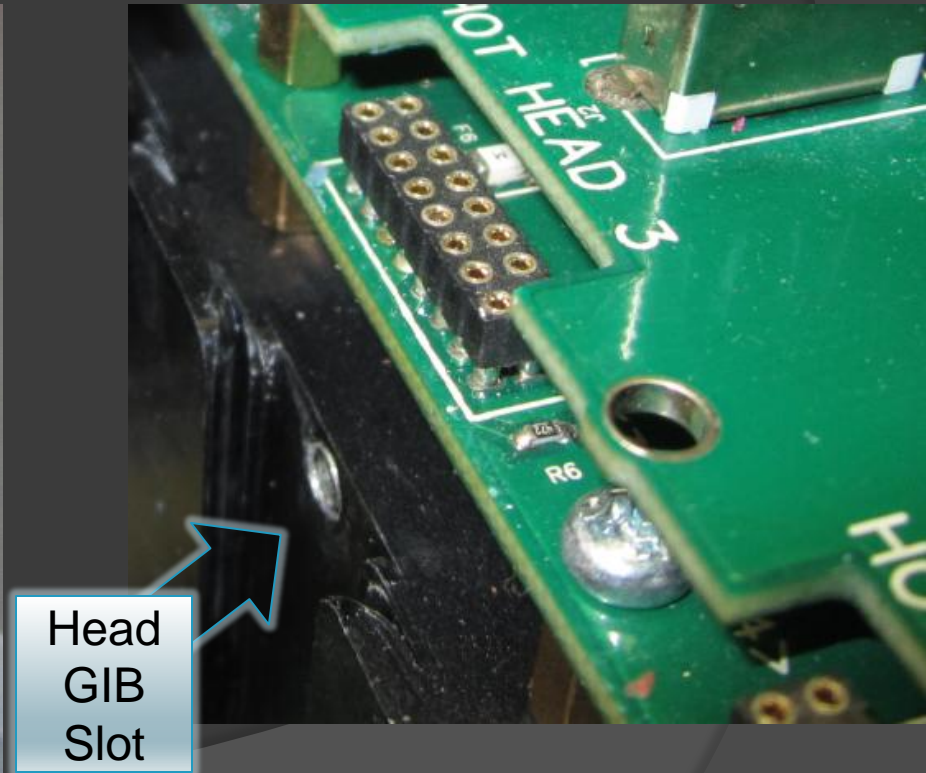
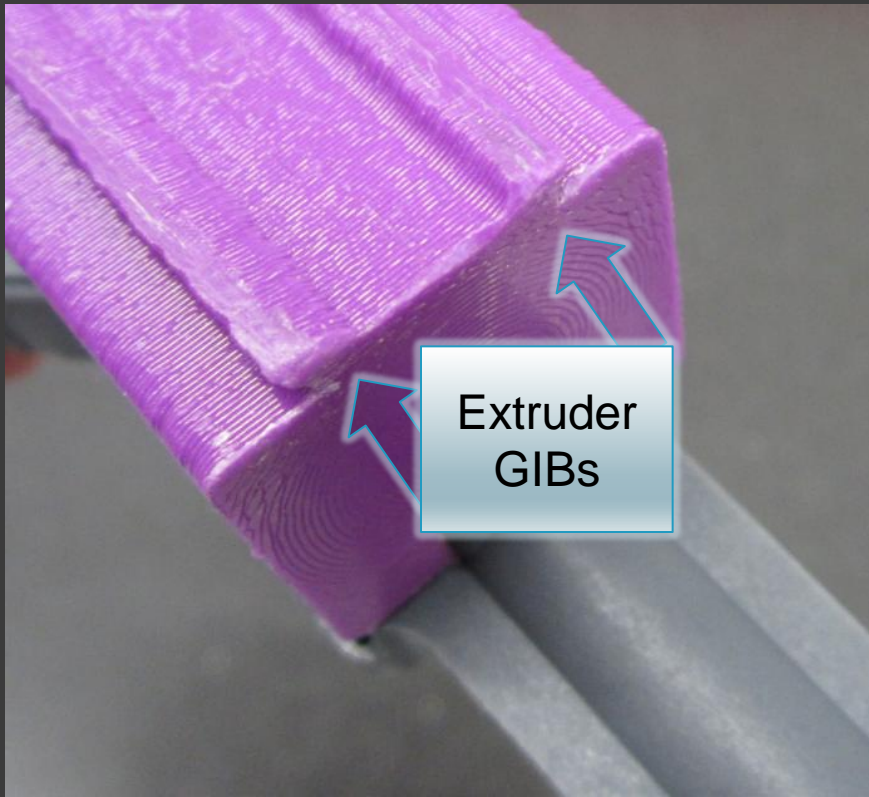
- ⦿ Tram
- ⦿ Install MK1 extruder
- ⦿ Unload / load filament
- ⦿ Heat up & purge MK1 extruder
- ⦿ Set MK1 extruder Z-axis offset
- ⦿ Prepare heated build platform
- ⦿ Load G-code file

- ⦿ After the above has been performed, your HYREL will be ready to print the vase.

Physical Setup

Tram

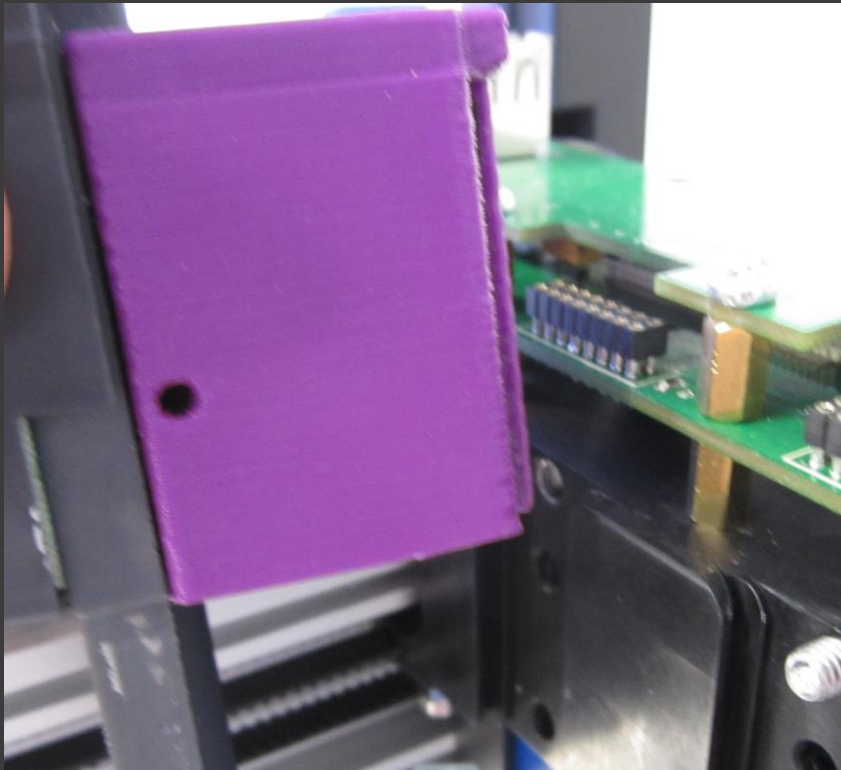
Step 1: Install Digi-tram



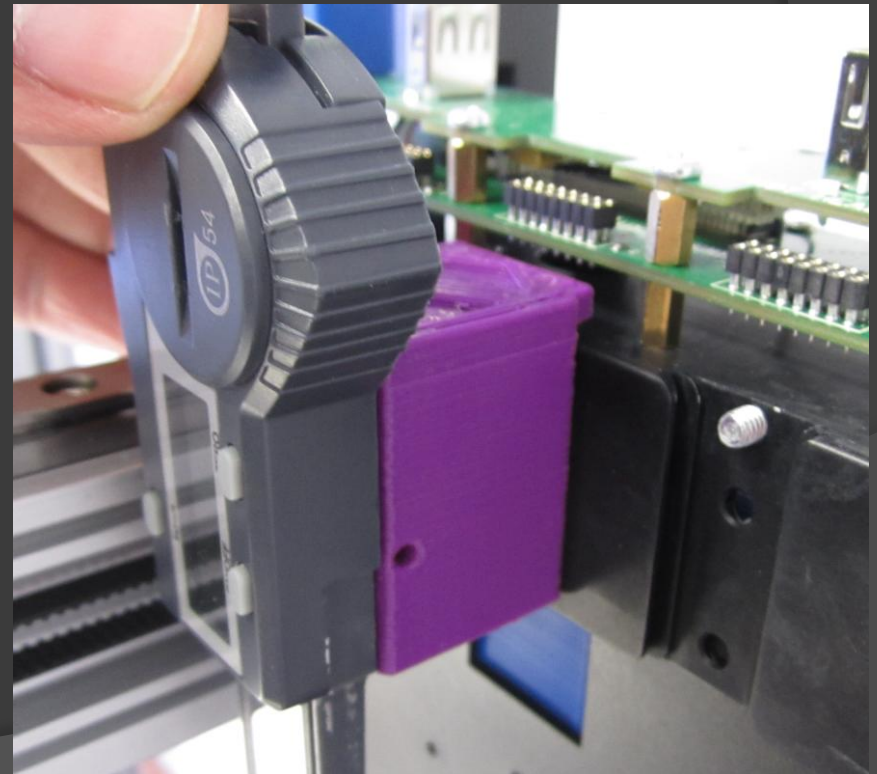
Physical Setup

Tram

Step 1: Install Digi-tram



Slide into place



Physical Setup

Tram

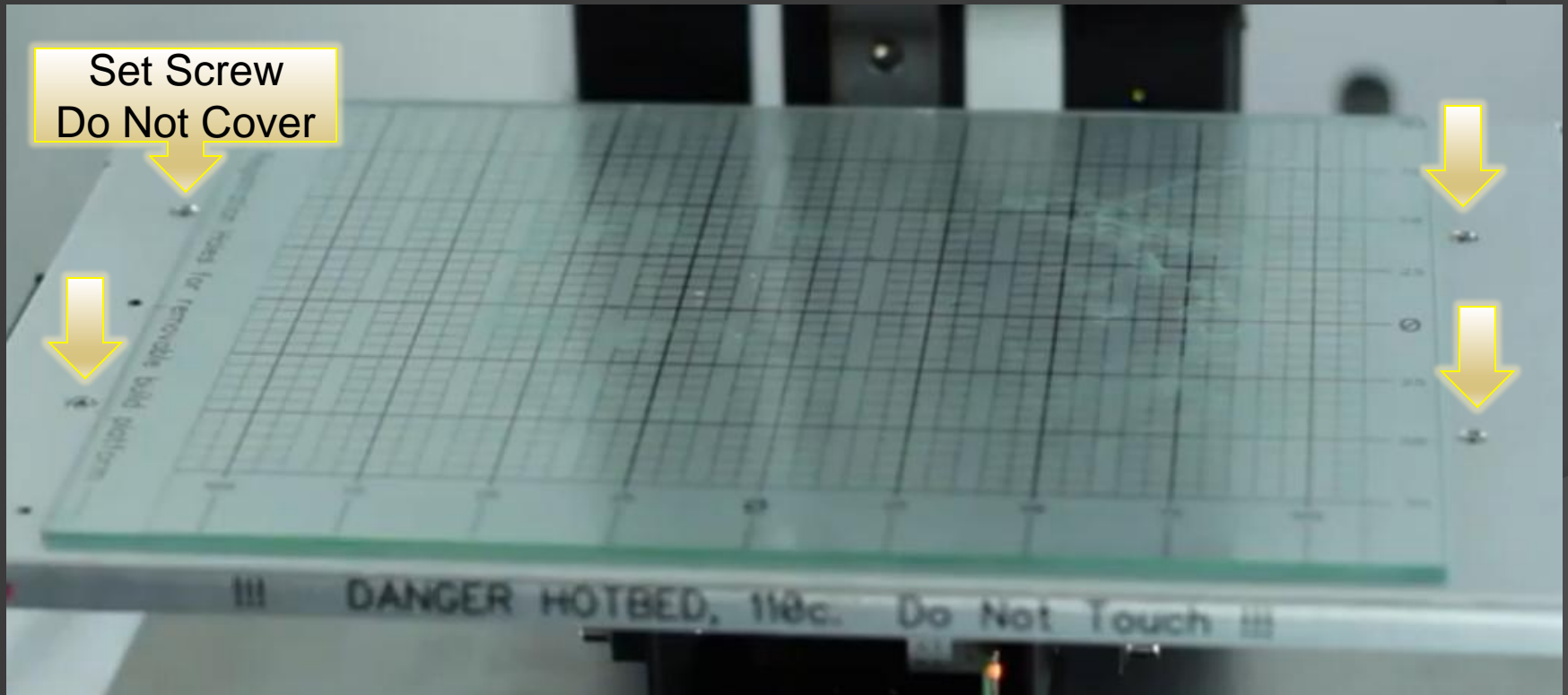
Step 1: Install Digi-tram



Physical Setup

Tram

Step 2: Place Removable Build Platform



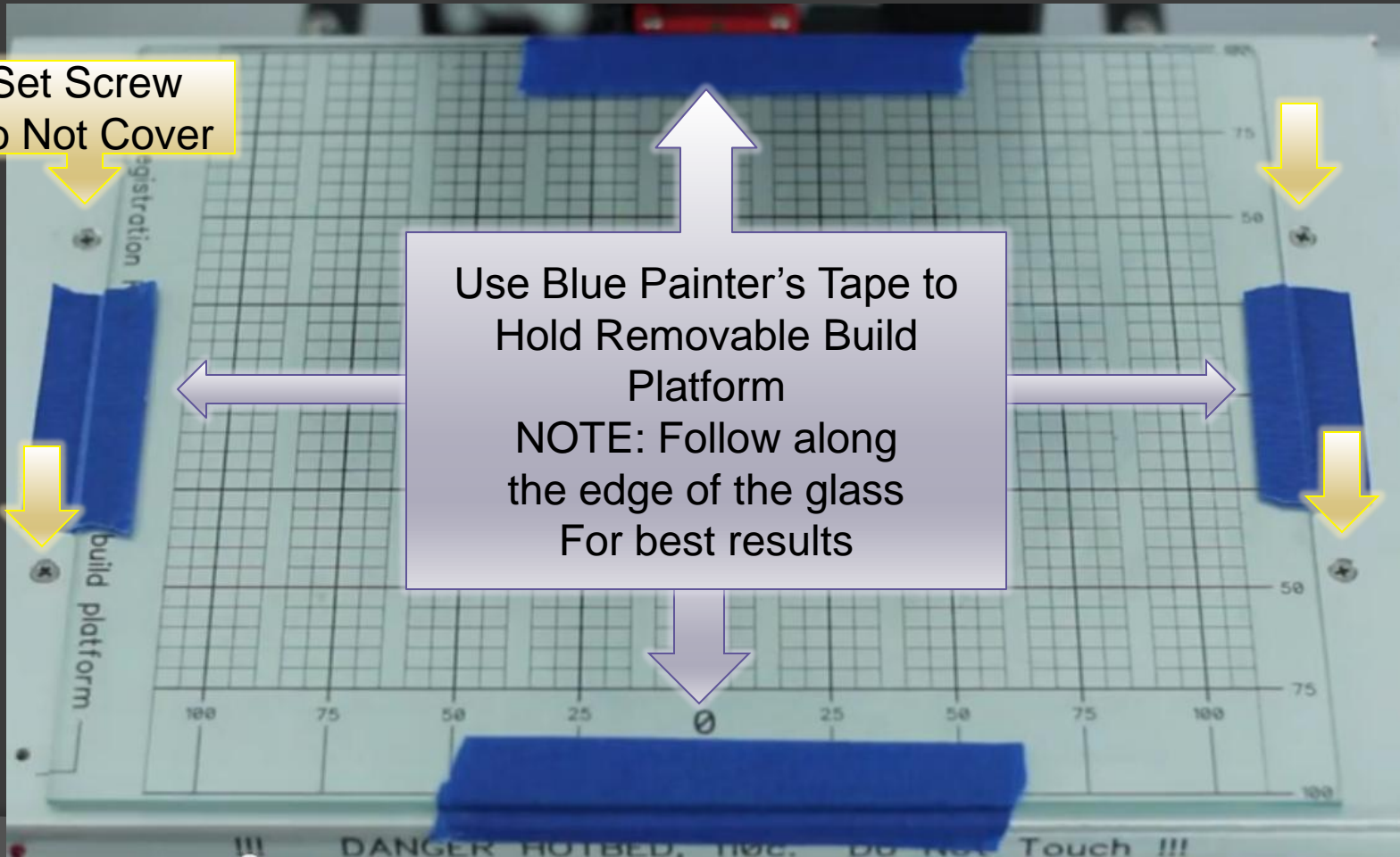
Physical Setup

Tram

Step 2: Place Removable Build Platform

Set Screw
Do Not Cover

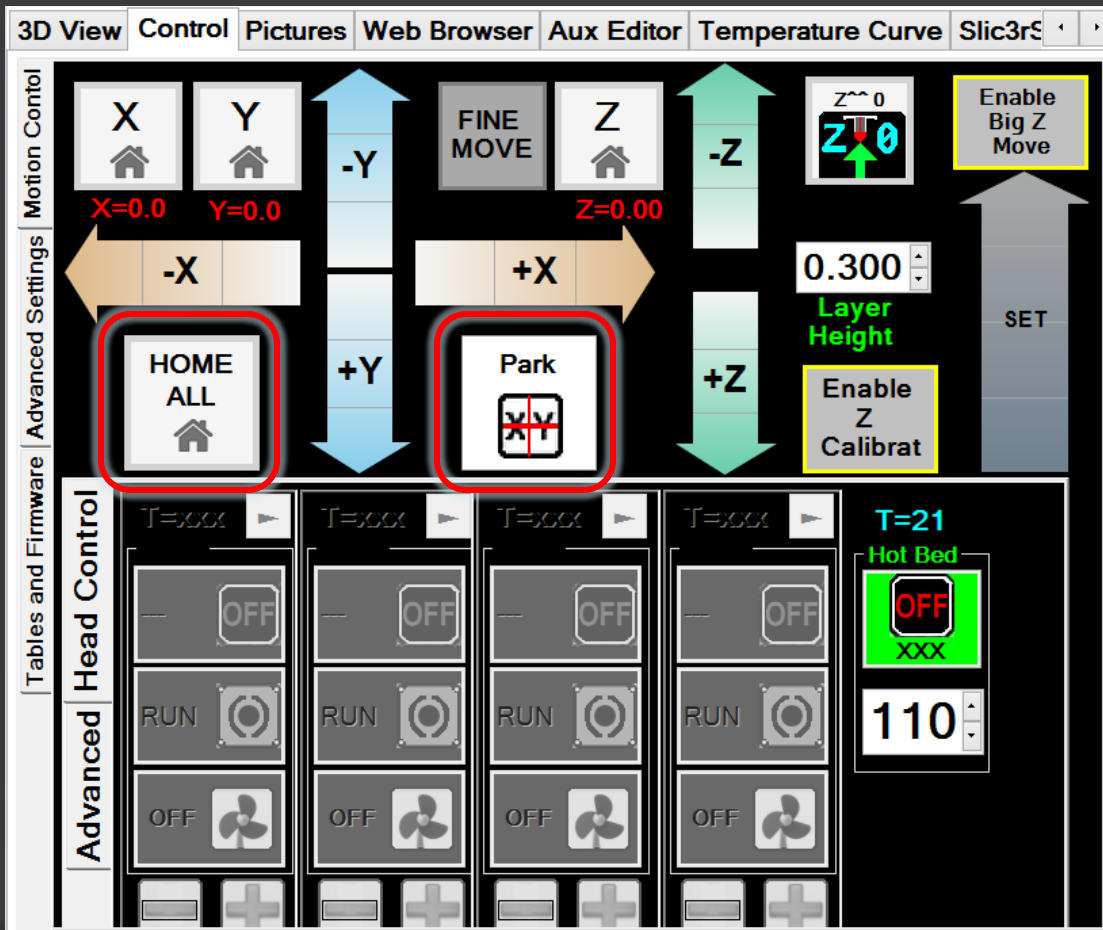
Use Blue Painter's Tape to
Hold Removable Build
Platform
NOTE: Follow along
the edge of the glass
For best results



Physical Setup

Tram

Step 3: Home, then Park

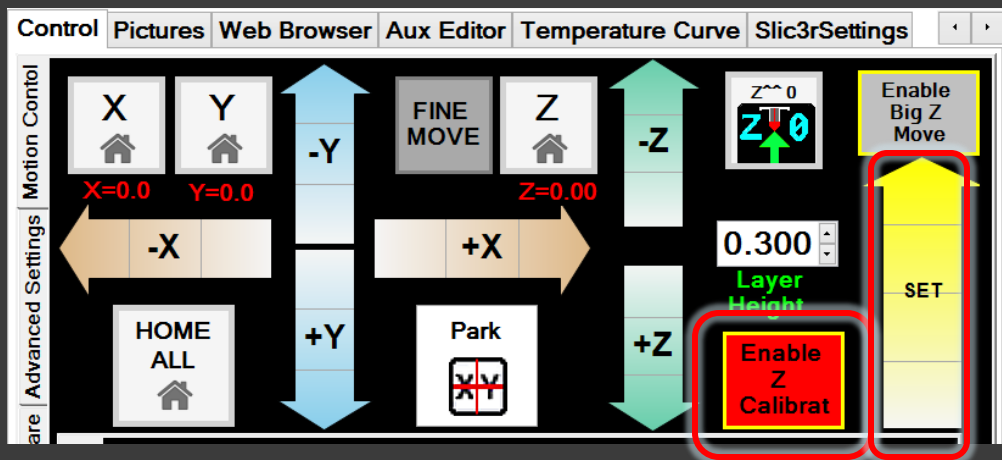


This will place the Digi-tram over the center of the build platform

Physical Setup

Tram

Step 4: Setting the Zero



Elevate the build platform just pass the point the pin of the Digi-tram touches.

The Digi-tram will register the distance the pin was displaced.



Physical Setup

Tram

Step 4: Setting the Zero

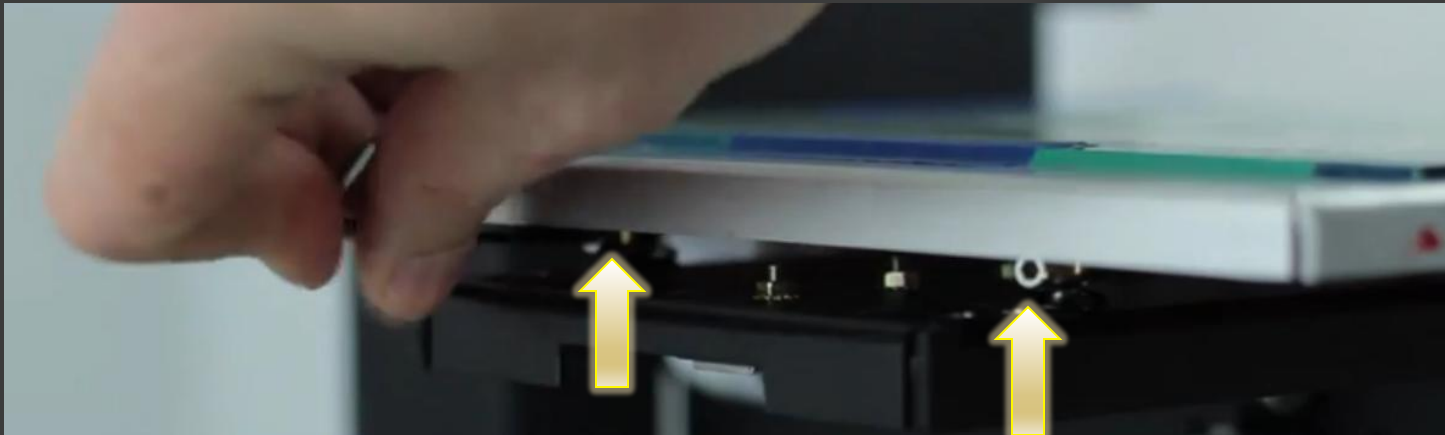


Press the “Zero”
button to set this
point to zero

Physical Setup

Tram

Step 5: Unlock the Four (4) Lock Screws



Included in your kit, use the 2.5mm Allen wrench to unlock the four (4) lock screws under the build platform



Physical Setup

Tram

Step 6: *Unlock your Motors*

The screenshot displays the software interface for a 3D printer. The top menu bar includes 'File', 'Run Job', 'Kill job', 'Show', 'Light', 'Motor Functions', and 'Settings'. The 'Motor Functions' menu is open, showing a list of options: 'UNLOCK MOTORS', 'Home XY Motors', 'Home Z Axis', 'Send Z To Zero', 'Clean Head 1', 'Clean Head 2', 'Clean Head 3', and 'Clean Head 4'. The 'UNLOCK MOTORS' option is highlighted with a red box. The main window shows a 3D view of a printer bed with a grid. On the right, there are controls for X, Y, and Z axes, including 'Scale' (25.40), 'Translation' (100.00, 100.00, 0.00), and 'Rotation' (0.00, 0.00, 0.00). The 'Lock aspect ratio' checkbox is checked, and the '5 Deg Angle Lock' checkbox is also checked. The bottom status bar shows 'Disconnected - Idle' and '707 FPS'.

File Run Job Kill job Show Light Motor Functions Settings

3D View Control DxFViewer Web Browser Au Manual Control

UNLOCK MOTORS

Home XY Motors

Home Z Axis

Send Z To Zero

Clean Head 1

Clean Head 2

Clean Head 3

Clean Head 4

Type Here

STL Mgr Slicer GCode Editor 3DVisualSettings Co

File Edit GCode

X Y Z

Scale

25.40 25.40 25.40

Lock aspect ratio M 25.4

Translation

100.00 100.00 0.00

Rotation

0.00 0.00 0.00

5 Deg Angle Lock

Show in Log: Commands Infos Warnings Errors

20:15:11.238 OpenGL version:4.0.0 - Build 10.18.10.3412

20:15:11.238 OpenGL extensions:GL_EXT_blend_minmax GL_EXT_blend_subtract GL_EXT_blend_color GL_EXT_abgr

20:15:11.238 OpenGL renderer:Intel(R) HD Graphics 4000

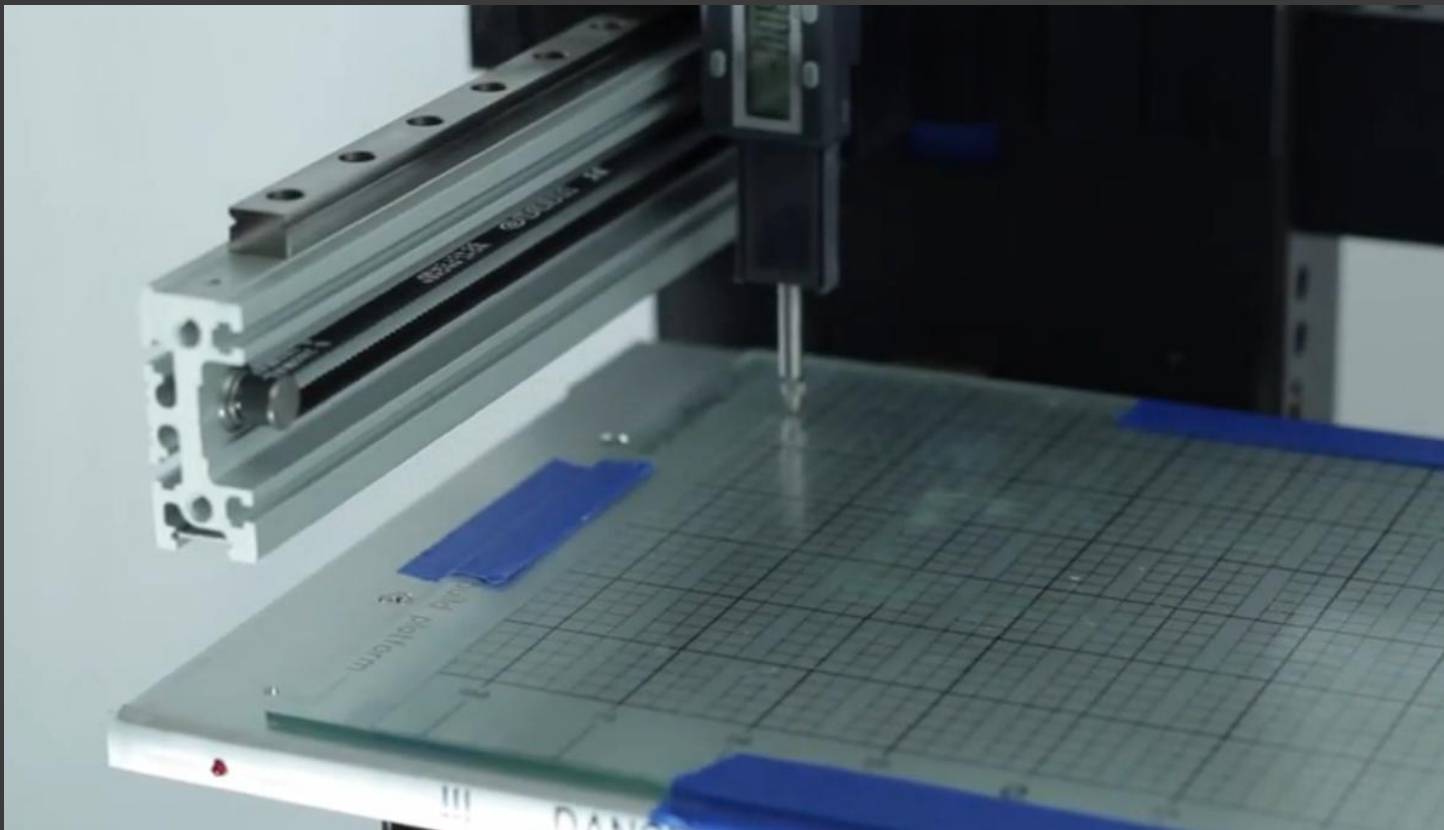
20:15:11.238 Using fast VBOs for rendering is possible

Disconnected - Idle 707 FPS

Physical Setup

Tram

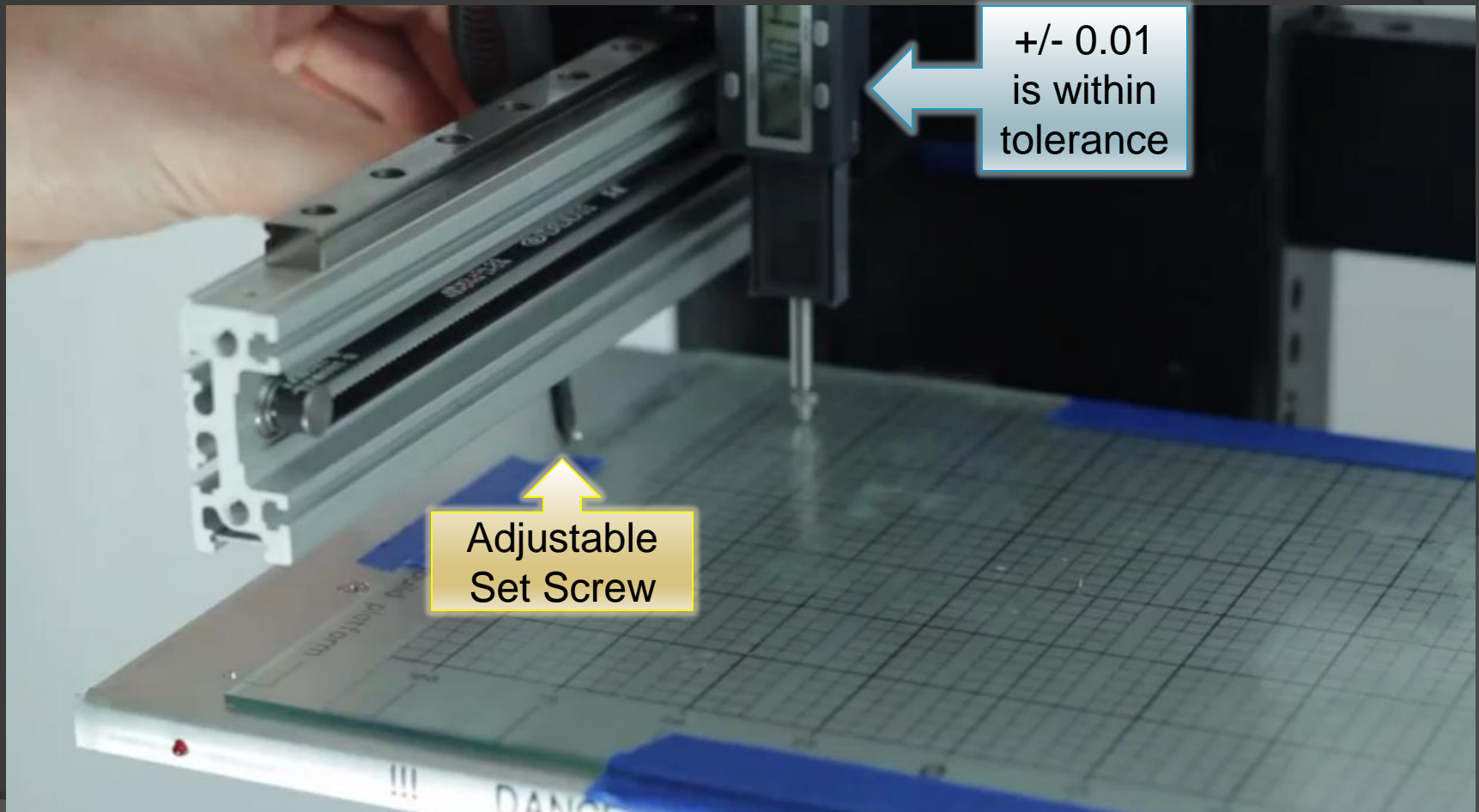
Step 7: Position Pin in first corner



Physical Setup

Tram

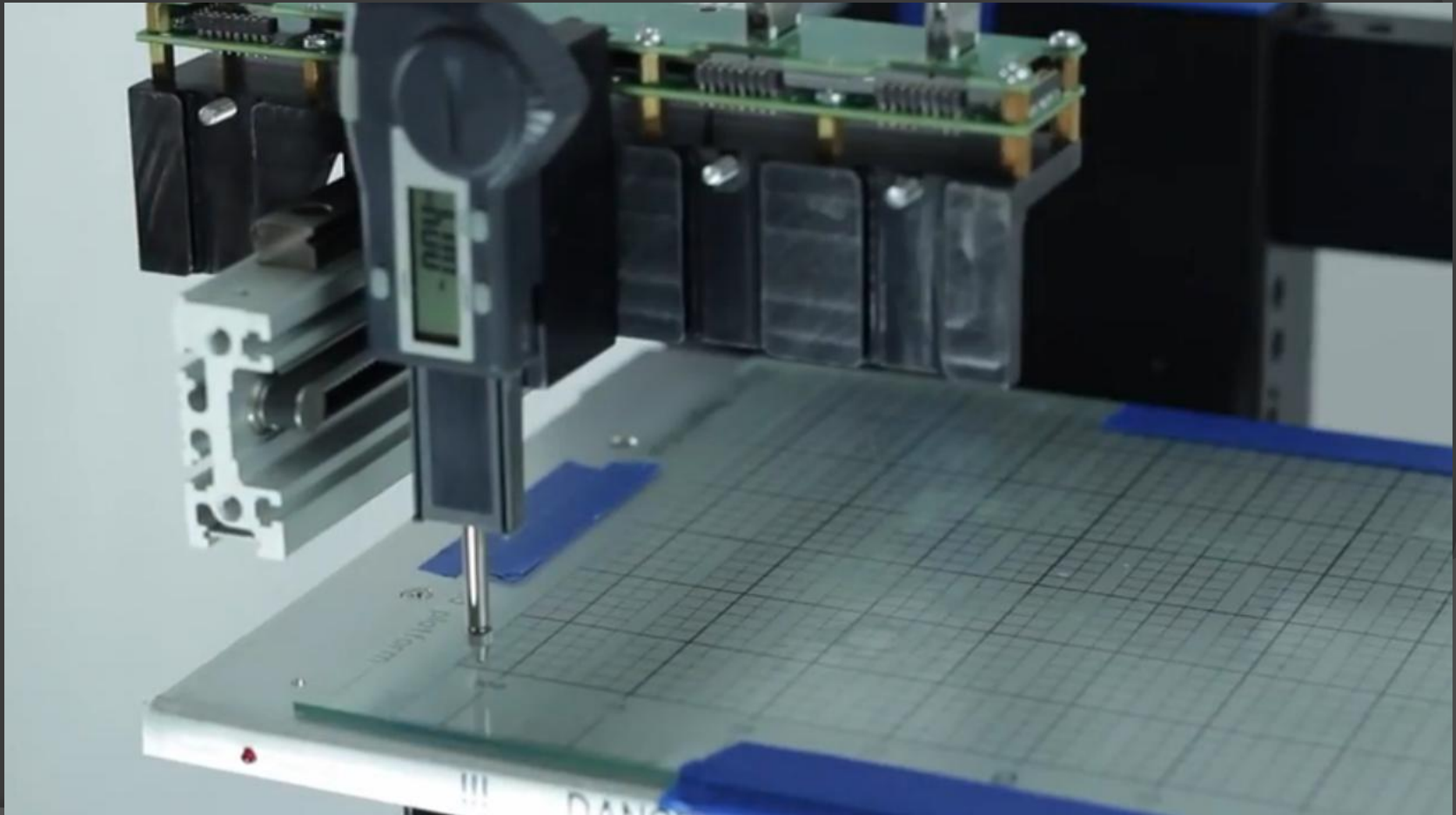
Step 8: Adjust Set Screw with Philips Head Screwdriver



Physical Setup

Tram

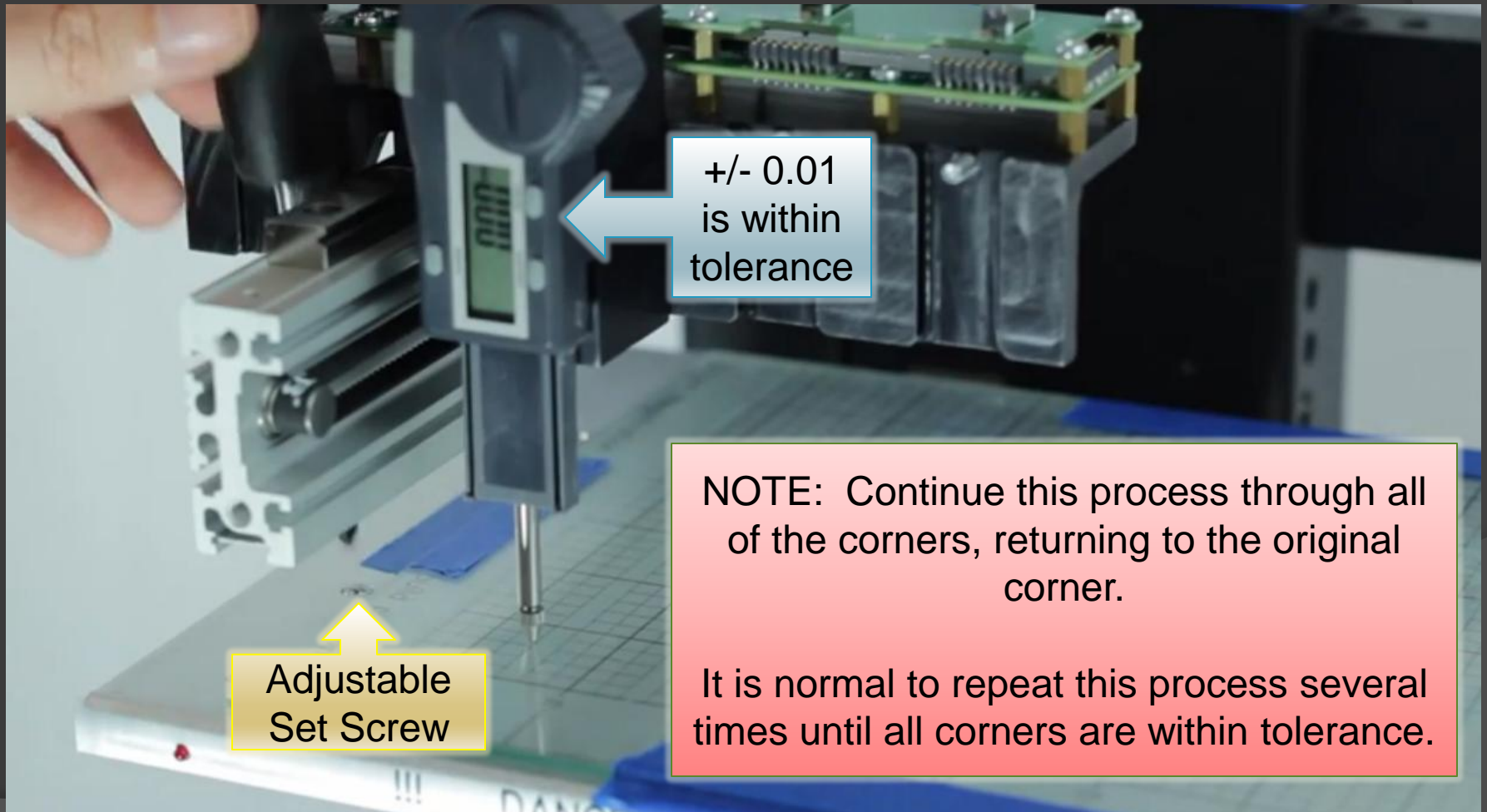
Step 9: Position Pin in next corner



Physical Setup

Tram

Step 10: Adjust Set Screw with Philips Head Screwdriver



+/- 0.01
is within
tolerance

Adjustable
Set Screw

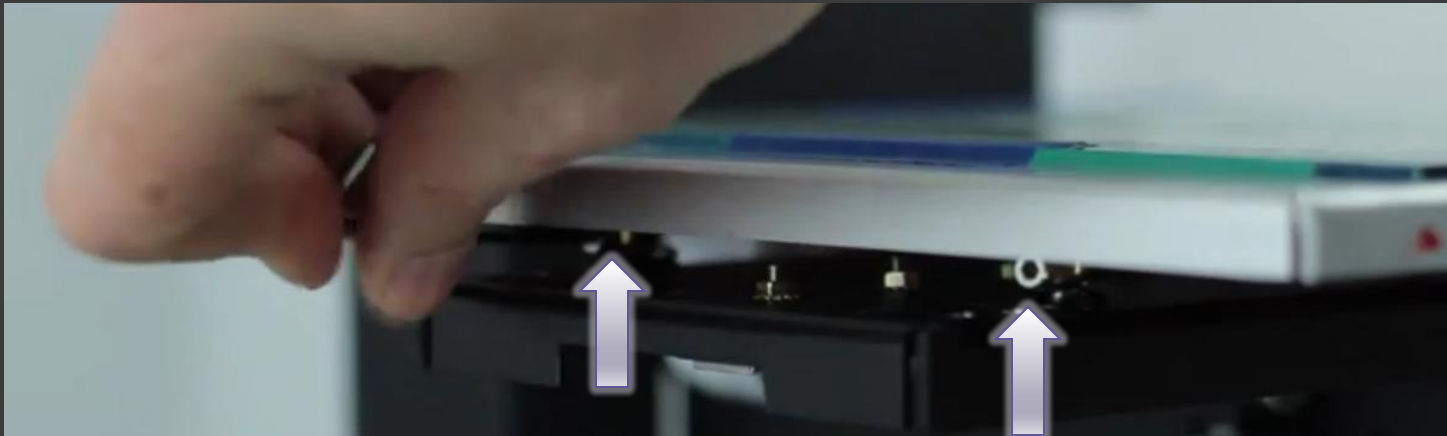
NOTE: Continue this process through all of the corners, returning to the original corner.

It is normal to repeat this process several times until all corners are within tolerance.

Physical Setup

Tram

Step 11: Lock the build platform lock screws



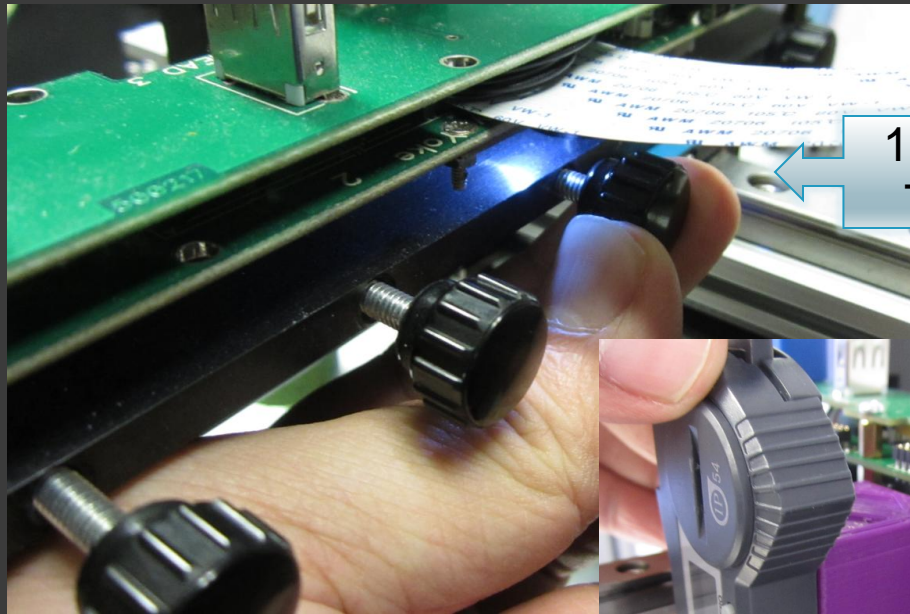
Included in your kit, use the 2.5mm Allen wrench to lock the four (4) lock screws under the build platform.



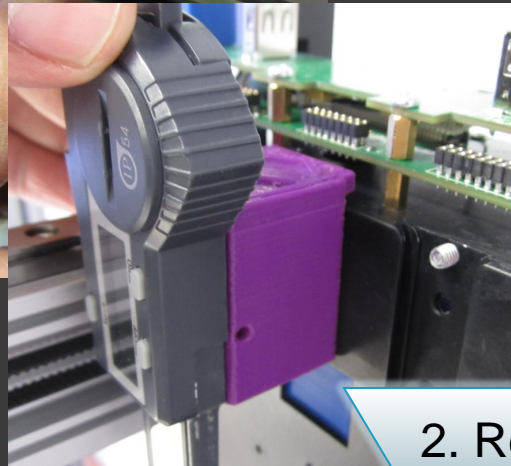
Physical Setup

Tram

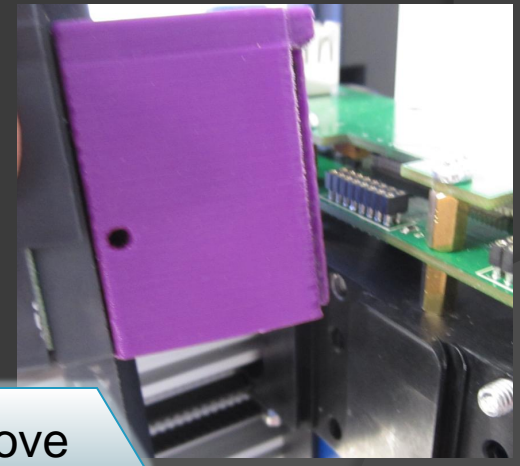
Step 12: Remove Digi-tram



1. Unlock Yoke
Thumbscrew



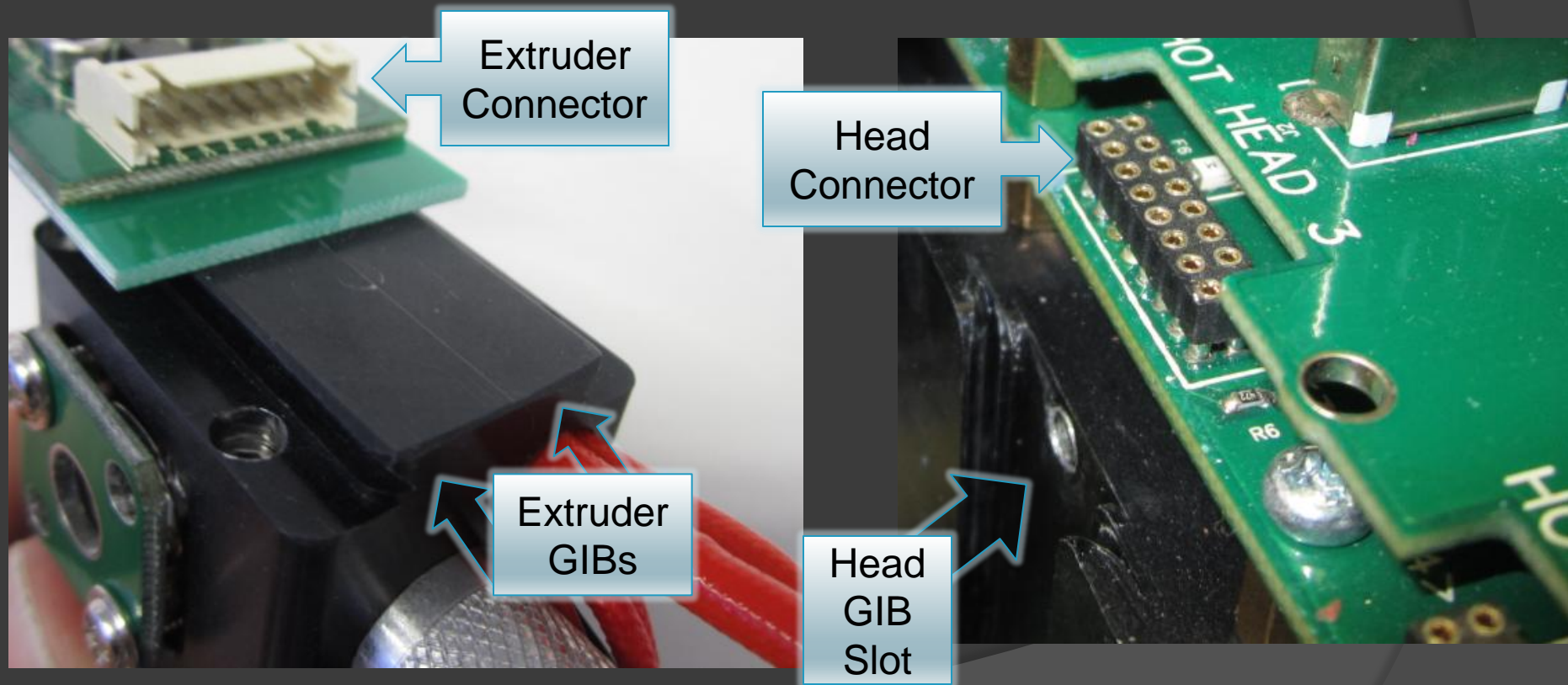
2. Remove
Digi-tram



Physical Setup

MK1 Installation

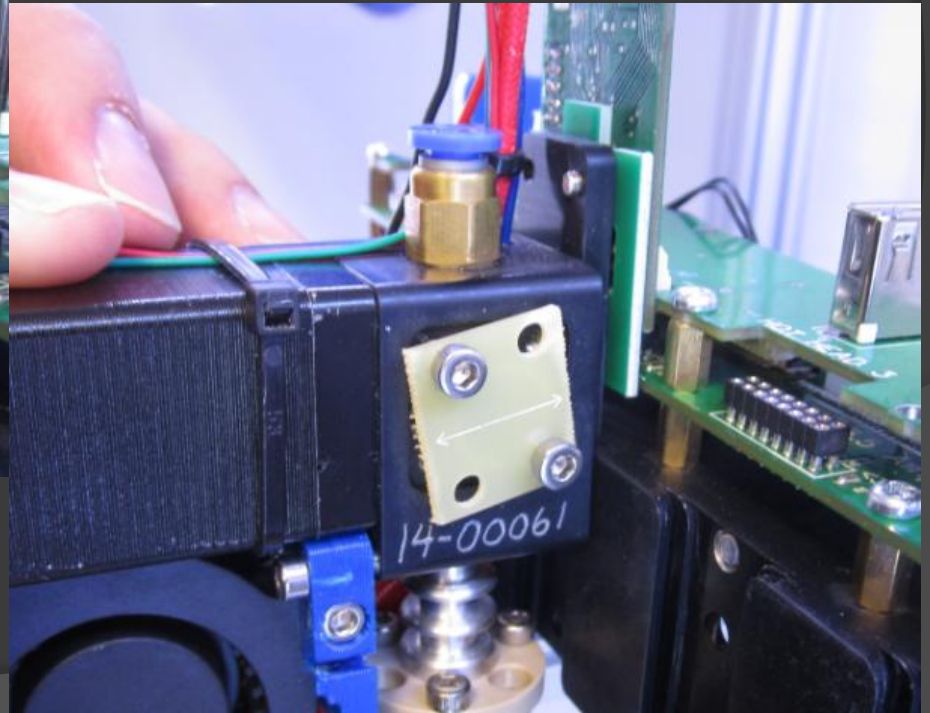
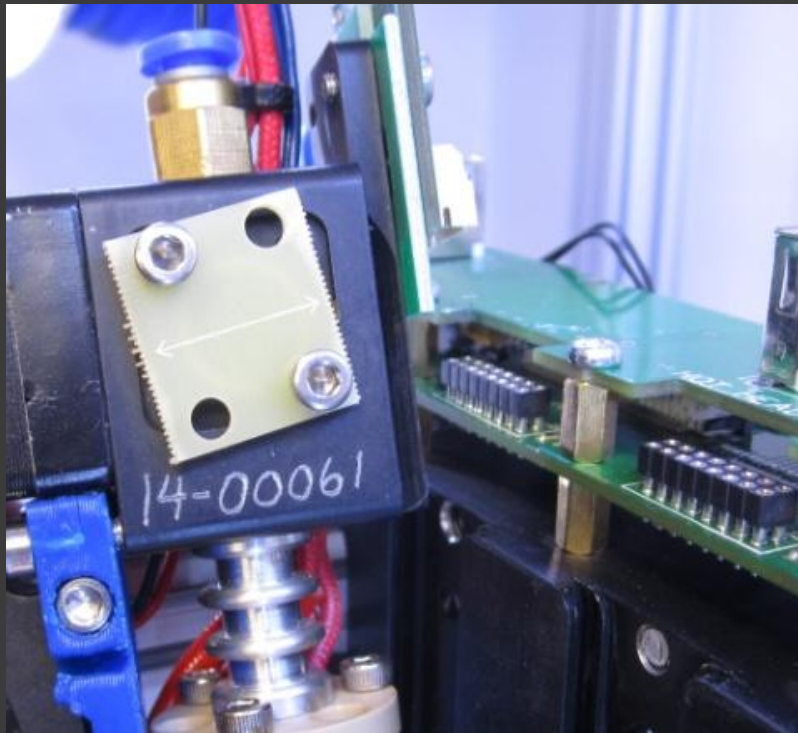
Step 1: Locate the MK1 & yoke and both gibs & connectors



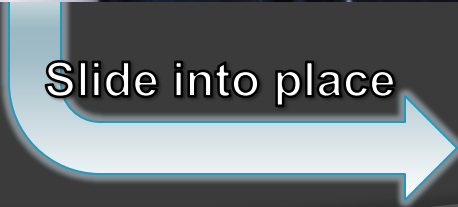
Physical Setup

MK1 Installation

Step 2: Align the gibs on the MK1 extruder and slide them into the yoke gib slot



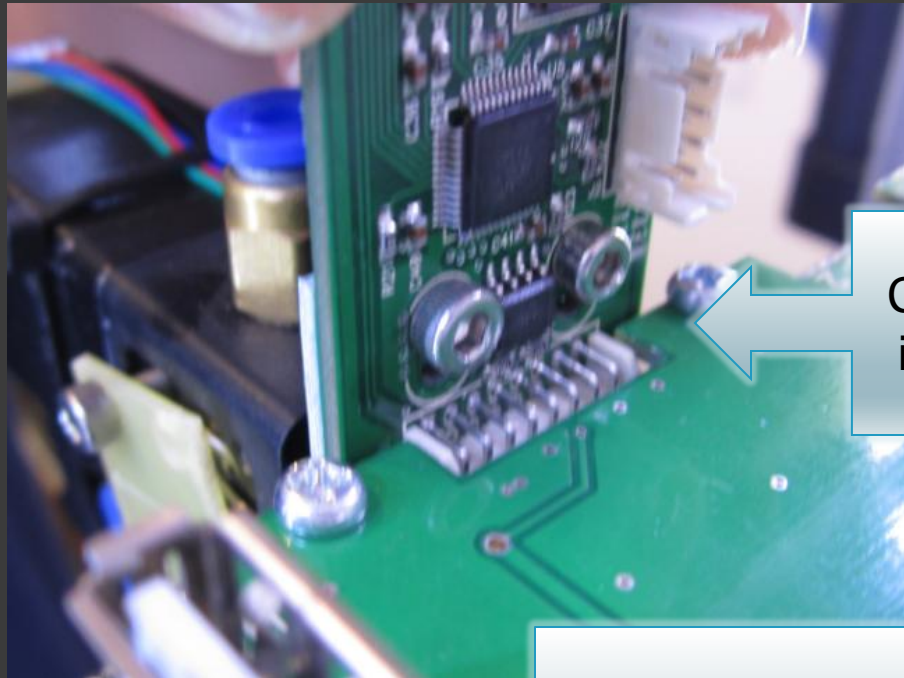
Slide into place



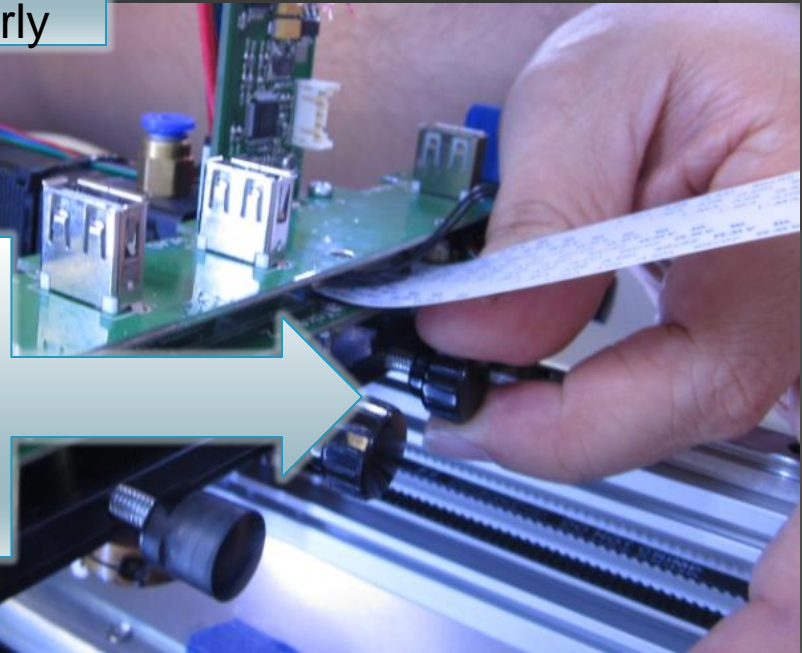
Physical Setup

MK1 Installation

Step 3: Check connection, then lock MK1 extruder into place on yoke



Ensure
Connector
is Seated
Properly



Tighten thumbscrew
in rear of Yoke to lock
in the Extruder

Physical Setup

MK1 Installation

Step 4: What you see in REPETREL, 1 of 2

The screenshot displays the REPETREL software interface, divided into two main sections: the physical control panel on the left and the GCode editor on the right.

Physical Control Panel (Left):

- Motion Control:** Includes X, Y, Z axis homing buttons (house icons), X and Y coordinate readouts (X=0.0, Y=0.0), and Z coordinate readout (Z=0.00). It also features FINE MOVE, -X, +X, -Y, +Y, -Z, and +Z directional buttons.
- Advanced Settings:** Includes a 'HOME ALL' button, a 'Park' button, a 'Layer Height' dropdown set to 0.300, and checkboxes for 'Enable Big Z Move' and 'Enable Z Calibrat'.
- Advanced Head Control:** A grid of controls for various components, including four temperature readouts (T=xxx) and four fan speed readouts (OFF). A red box highlights the first two columns of this grid. A blue arrow labeled 'Before' points to the second column.
- Hot Bed:** A control for the hot bed, currently set to 'OFF' with a temperature readout of 'T=22' and 'Hot Bed XXX'.
- Temperature:** A temperature readout of '110'.

GCode Editor (Right):

- File Menu:** Includes 'File', 'EDIT', and 'Refresh' options.
- Code:** Shows GCode generated by Slic3r 1.1.7 on 2015-04-28 at 09:01:41. The code includes:

```
; generated by Slic3r 1.1.7 on 2015-04-28 at 09:01:41
; perimeters extrusion width = 2.00mm
; infill extrusion width = 2.00mm
; solid infill extrusion width = 2.00mm
; top infill extrusion width = 2.00mm
G21 ; set units to millimeters
;
G21 ; set units to millimeters
```
- Find and Replace:** A search and replace interface with a 'Find' button, search directions (<<, >>, >Z), and options for 'Match Case' and 'Whole Word'. The 'Replace' field is empty, and the 'Replace All' button is visible.
- Buttons:** Includes 'Auto Prep Gcode' and 'Set All G1 Speed To >' buttons.

Physical Setup

MK1 Installation

Step 4: What you see in REPETREL, 2 of 2

The screenshot displays the REPETREL software interface for the MK1 printer. The top menu bar includes **File**, **Run Job**, **Kill job**, **Show**, **Light**, **Motor Functions**, and **Settings**. Below the menu is a toolbar with icons for **3D View**, **Control**, **Pictures**, **Web Browser**, **Aux Editor**, **Temperature Curve**, and **Slic3r**. The main interface is divided into several sections:

- Motion Control:** Features buttons for X, Y, Z axes, **HOME ALL**, and **Park**. It also shows coordinates: **X=0.0**, **Y=0.0**, and **Z=0.00**.
- Advanced Settings:** Includes **FINE MOVE**, **Z**, and a **Layer Height** of **0.300**. There are also buttons for **Enable Big Z Move** and **Enable Z Calibrat**.
- Advanced Head Control:** Shows the current temperature **T=9** for the **MK1** and **T=0** for the **Hot Bed**. It includes buttons for **OFF**, **RUN**, and **OFF** for various components. A red box highlights this section, and a blue arrow labeled "After" points to it.

On the right side, there is a **GCode Editor** window showing the generated GCode for the job. The GCode includes parameters like **perimeters extrusion width = 2.00mm**, **infill extrusion width = 2.00mm**, and **top infill extrusion width = 2.00mm**. The GCode Editor also has a **Find** and **Replace** section at the bottom.

Physical Setup

Unload / Load filament

Step 1: Heat up MK1 extruder

NOTE: Always unload / load filament into your MK1 extruder **at** the extruding / service temperature of the material.

Avoiding this step can potentially cause a jam and void your warranty.

Act Temp → T=9
Set Temp → 235

Component	Act Temp	Set Temp	Status
MK1	9	235	ON
Hot Bed	0	XXX	OFF

Advanced Settings: X=0.0, Y=0.0, Z=0.00, Layer Height: 0.300, Enable Z Calibrat

MsgQue -1

Xmit	RCV	HEX
X	N/A	0x01 Delta X,Y Scale Factor
		0x02
		0x04 AdjustedFeedRate
		0x08 Steps/NL
		0x10 LookAhead
		0x20 F E Prams
		0x40 Flow
		0x80 SendExtrusionToDevoce

Physical Setup

Unload / Load filament

Step 1: Heat up MK1 extruder

The screenshot displays a 3D printer control interface. At the top, there are menu items: File, Run Job, Kill job, Show, Light, Motor Functions, and Settings. Below this is a toolbar with icons for 3D View, Control, Pictures, Web Browser, Aux Editor, Temperature Curve, and Slice. The main control area includes motion control buttons for X, Y, Z, and fine moves, as well as homing and park buttons. A temperature control section shows 'Act Temp' for the MK1 extruder at 234, with a target of 235. Other temperatures shown are 500 for the hot bed and 110 for the bed. A warning note on the right states: 'NOTE: Always unload / load filament into your MK1 extruder at the extruding / service temperature of the material. Avoiding this step can potentially cause a jam and void your warranty.' The bottom right shows a search and replace utility with 'Auto Prep Gcode' and 'Set All G1 Speed To >' buttons.

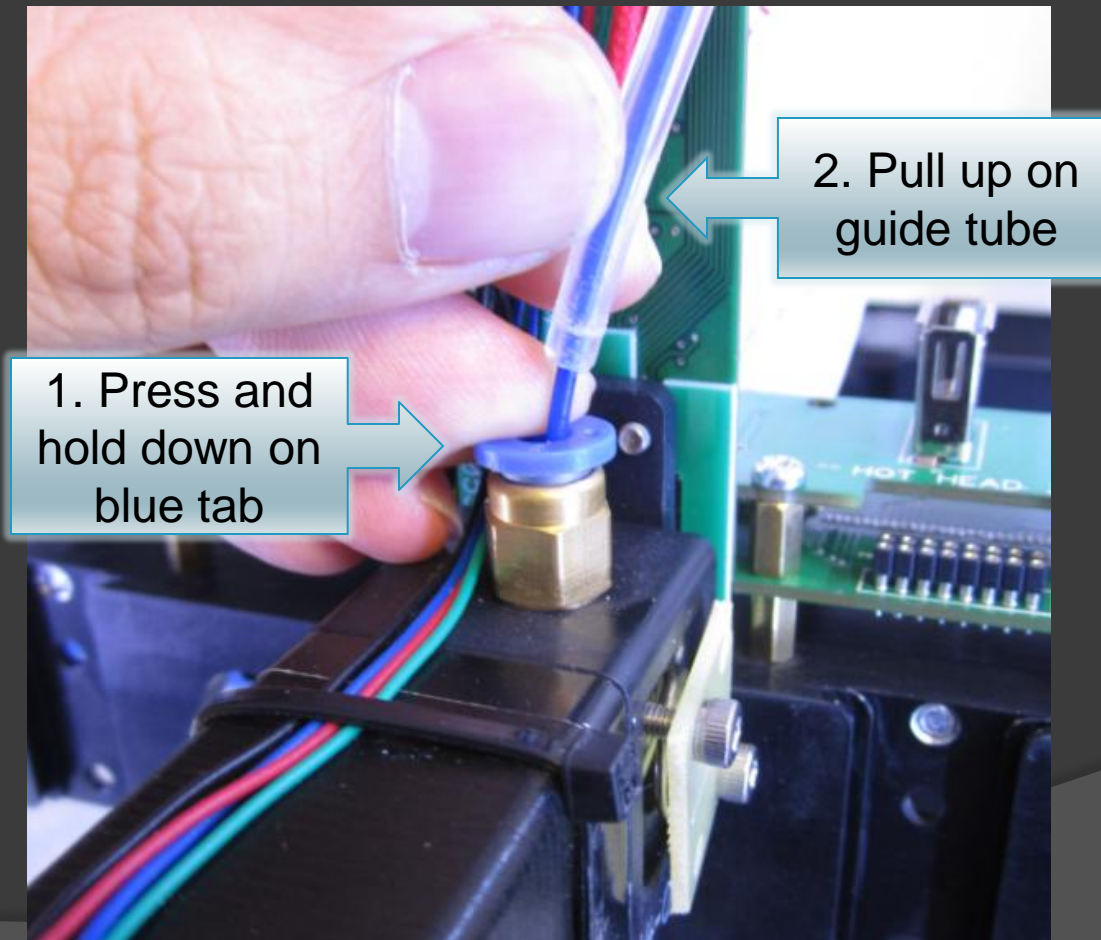
NOTE: Always unload / load filament into your MK1 extruder at the extruding / service temperature of the material.

Avoiding this step can potentially cause a jam and void your warranty.

Physical Setup

Unload / Load filament

Step 2: Unload filament – Release guide tube

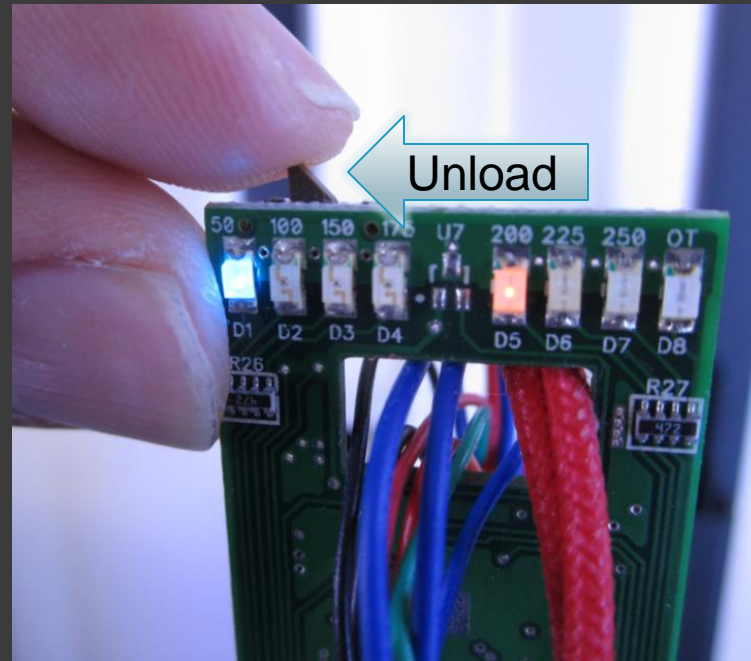


Physical Setup

Unload / Load filament

Step 3: Use Rocker switch to unload the filament from the MK1 extruder

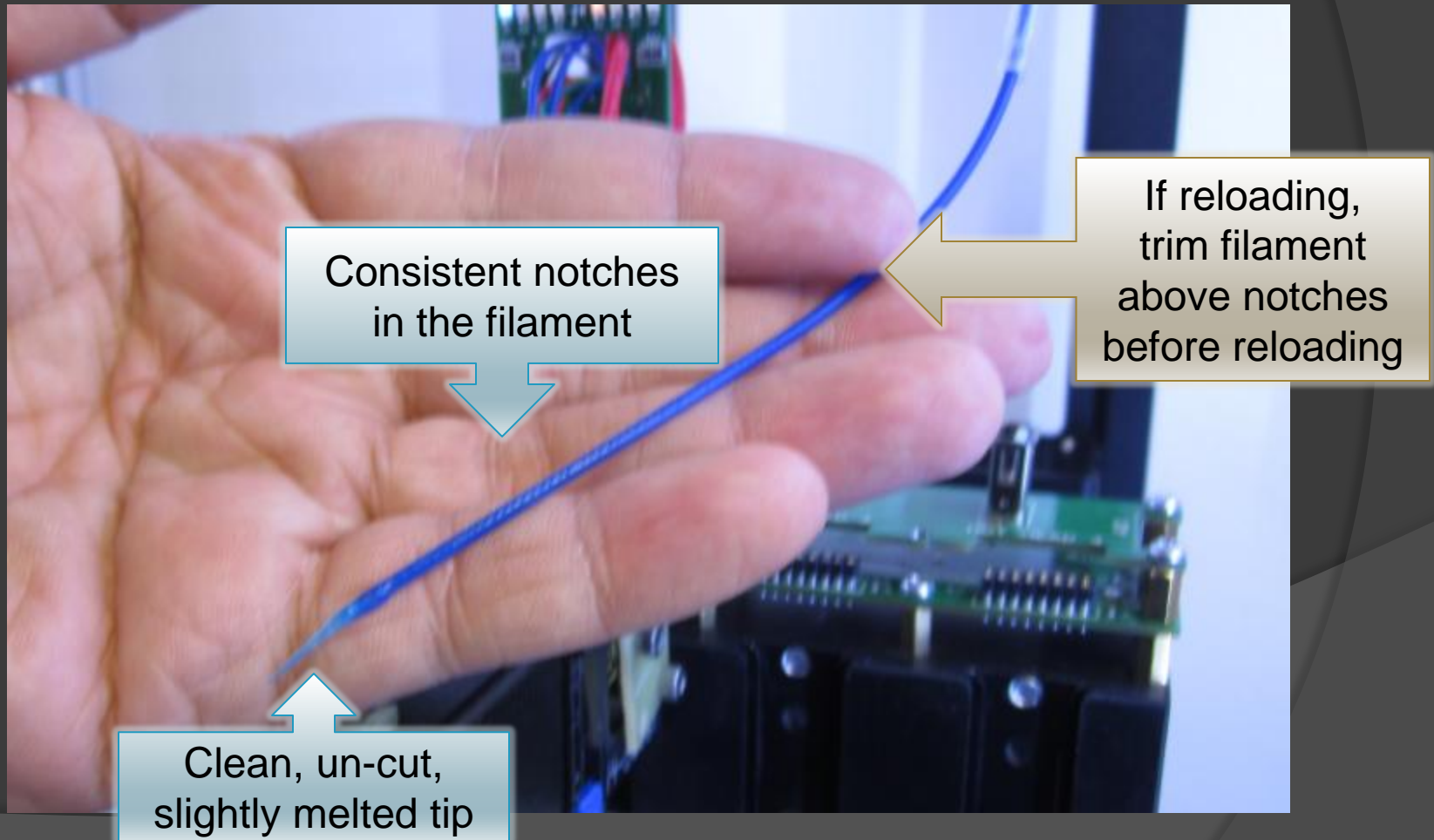
Rocker
Switch



Physical Setup

Unload / Load filament

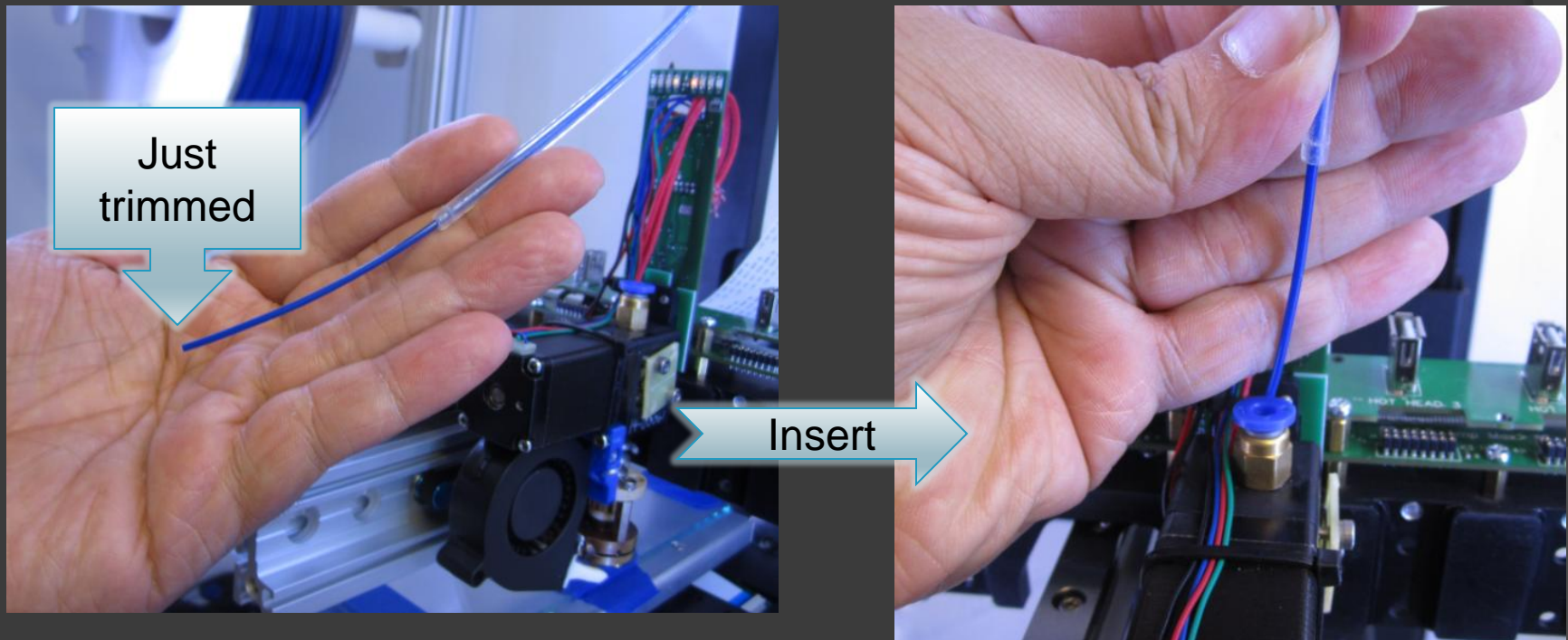
Step 4: Inspect the unloaded filament



Physical Setup

Unload / Load filament

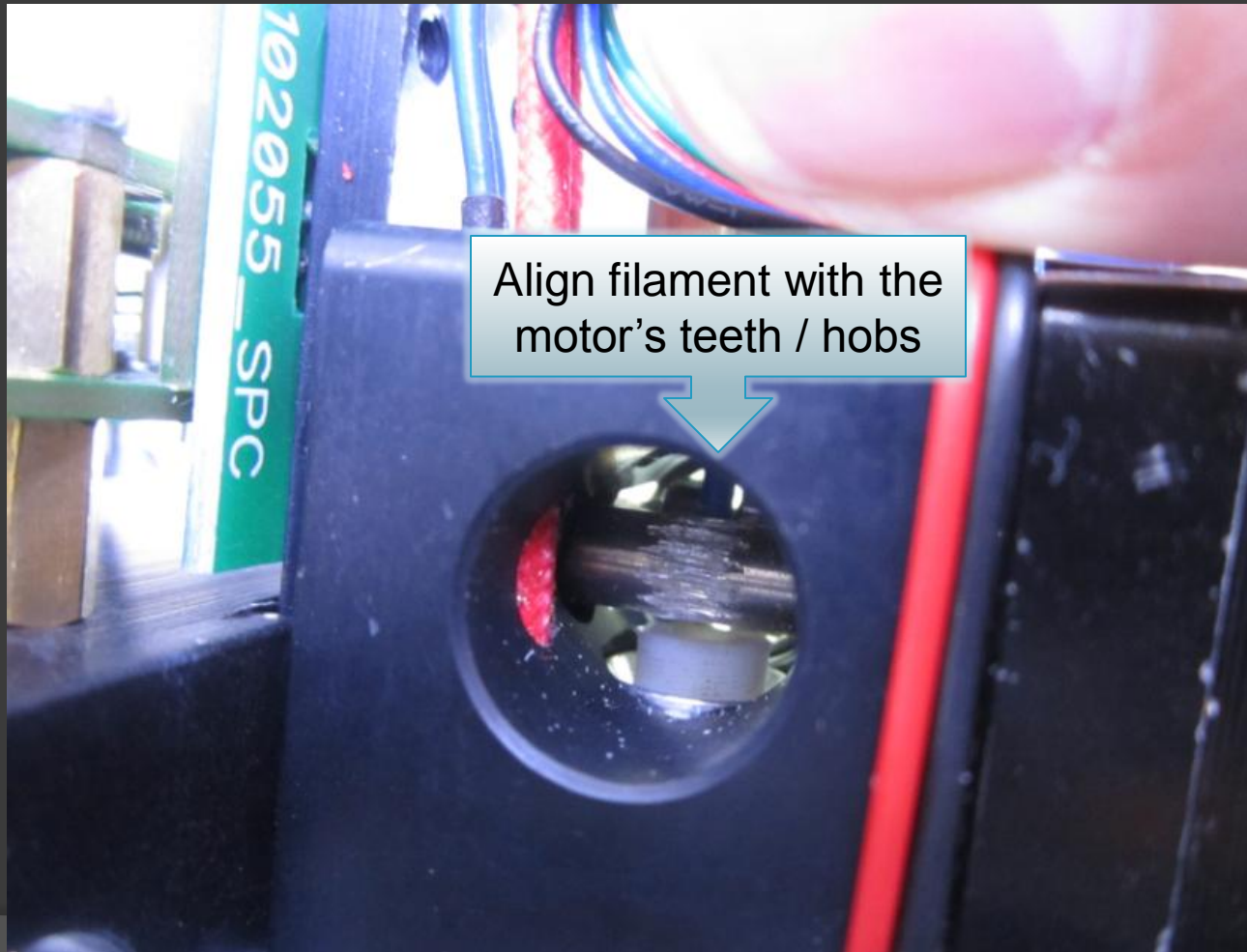
Step 5: Load the filament into the MK1 extruder



Physical Setup

Unload / Load filament

Step 5: Load the filament into the MK1 extruder



Physical Setup

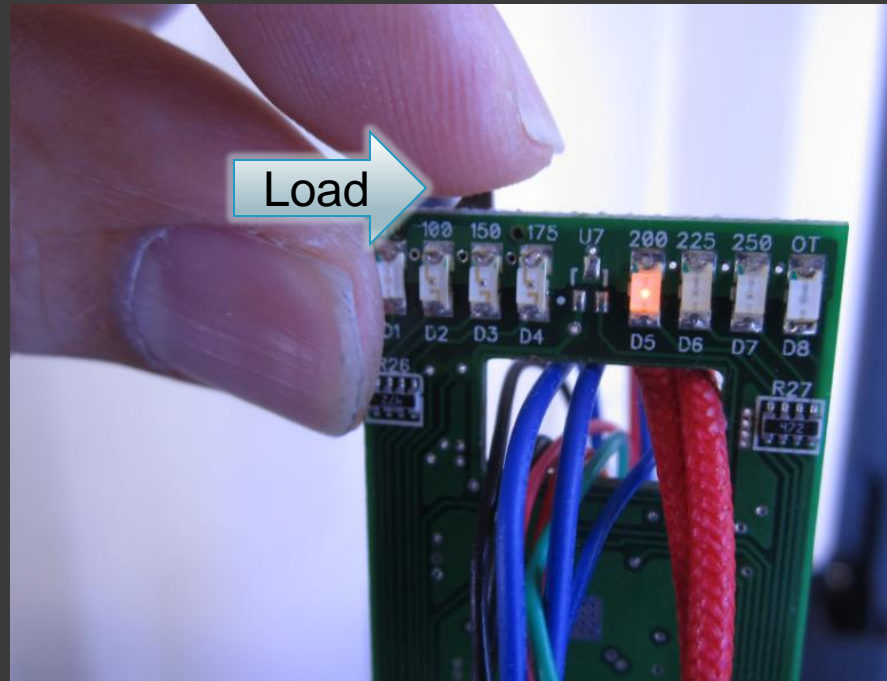
Unload / Load filament

Step 6: Use Rocker switch to load

Rocker
Switch



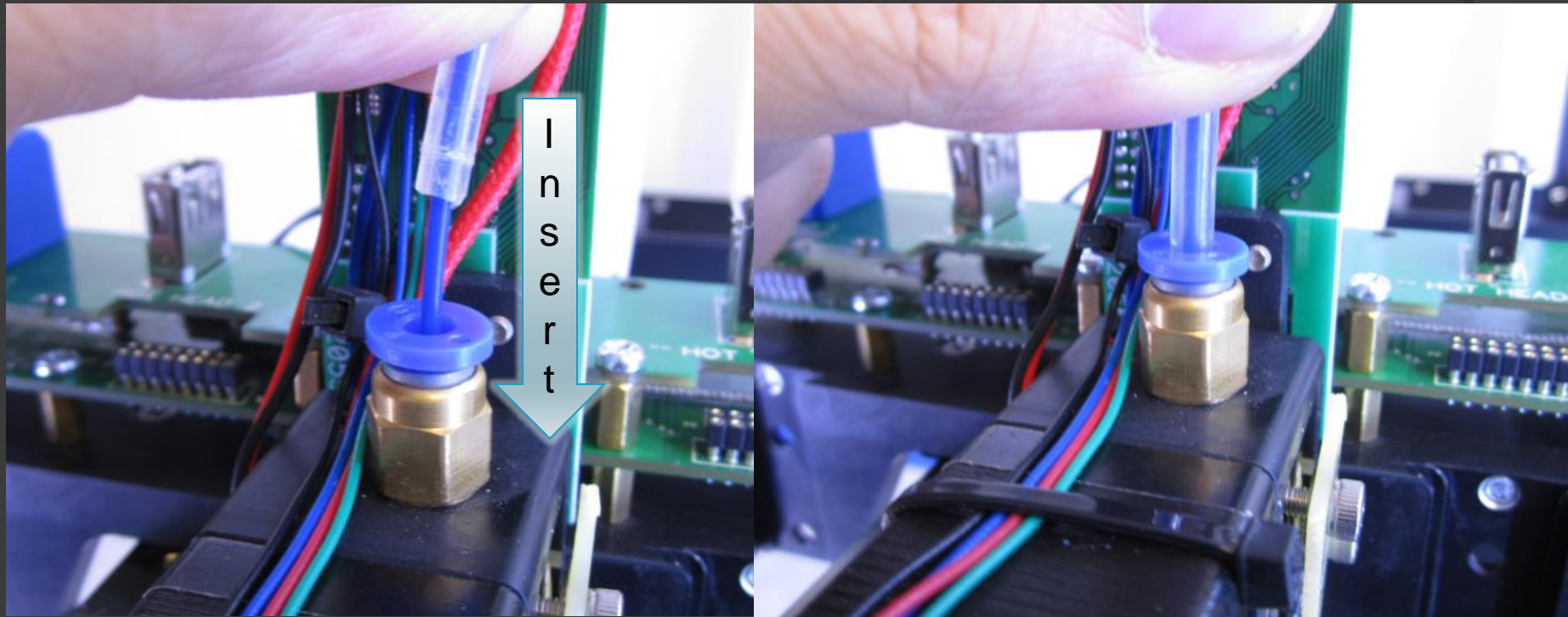
Load



Physical Setup

Unload / Load filament

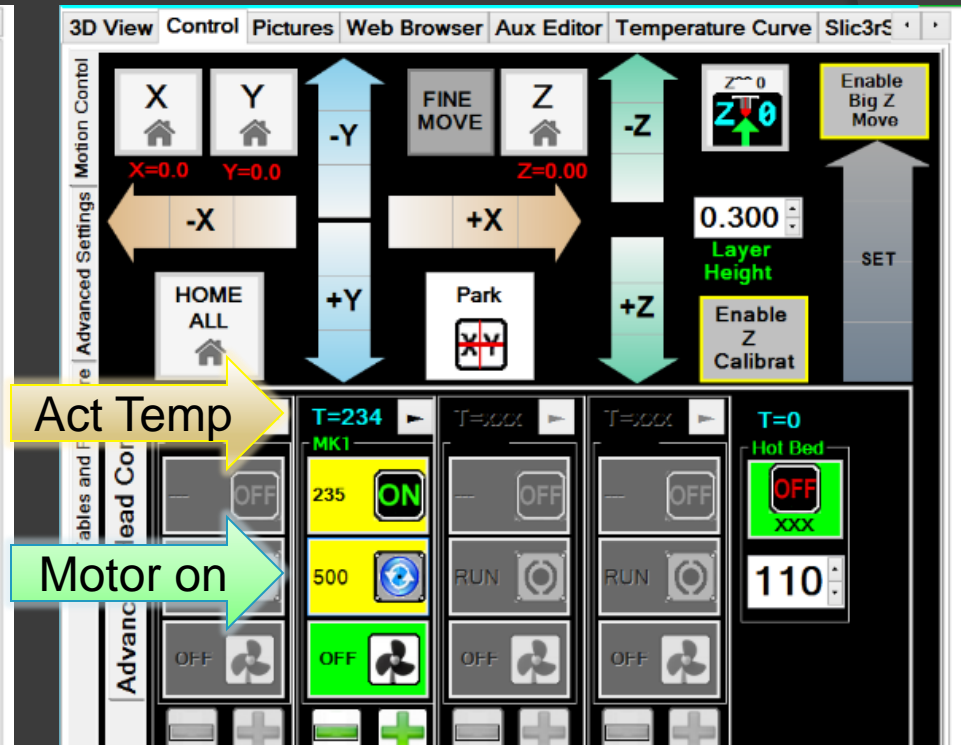
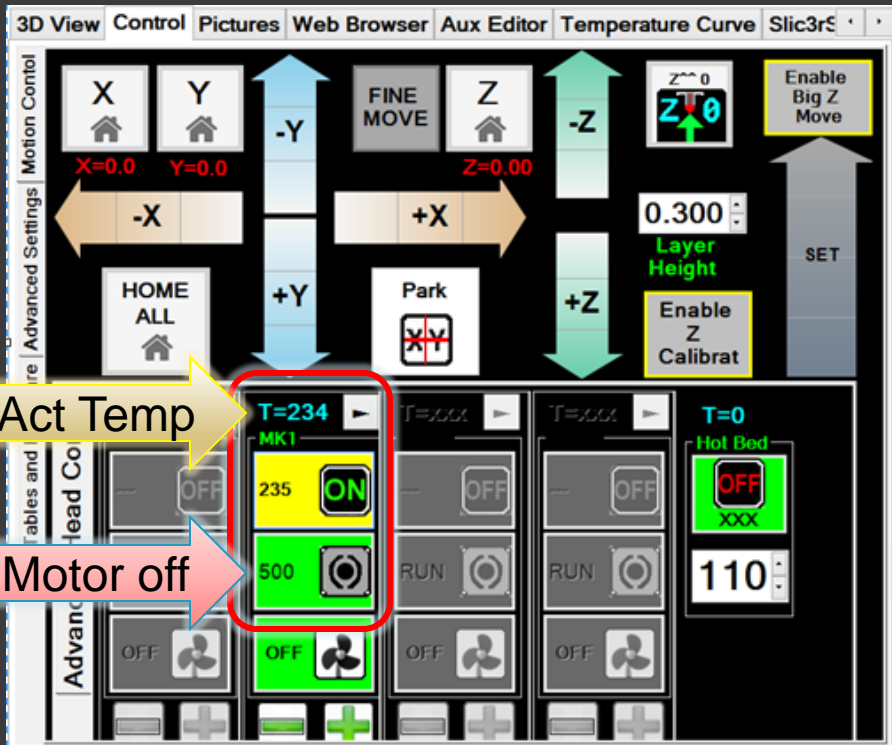
Step 7: Lock filament guide tube



Physical Setup

Heat up & purge MK1 extruder

Step 1: With the MK1 extruder at the material's service temperature, run the extruder's motor to purge the older material.

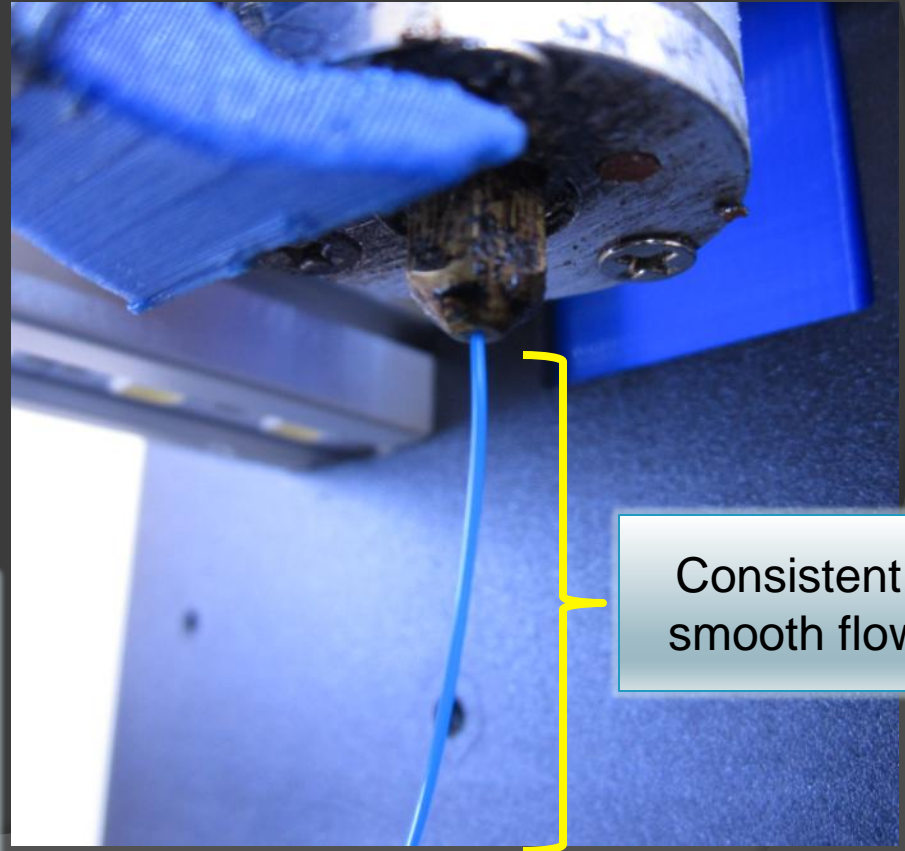


Physical Setup

Heat up & purge MK1 extruder

*Step 2: After 8-10 in / 20-30cm has been extruded, **stop** the MK1 motor from extruding. The extruded filament should have flowed consistently.*

NOTE: It may take 3-5 seconds before any material starts to extrude, this is normal.



Some dribble is normal. The heat causes the filament in the head to expand, and a small amount usually pushes out the bottom of the nozzle.

Consistent, smooth flow

Physical Setup

Set Z-Height to MK1 extruder nozzle

Step 1: Remove any filament dribble from the MK1 extruder nozzle



Use the included
wire brush or
tweezers to
remove

Physical Setup

Set Z-Height to MK1 extruder nozzle

Step 2: Press Home then Park to center the MK1 extruder over the print area.

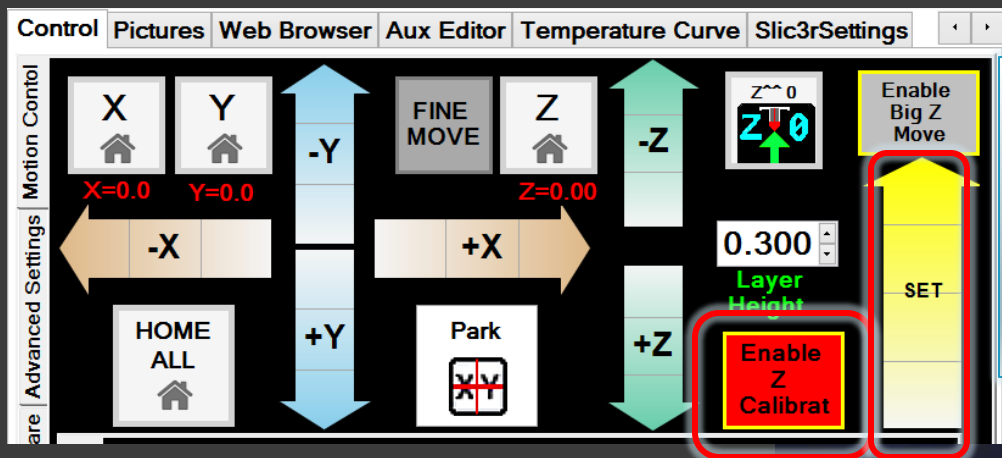
The image shows a screenshot of a 3D printer's control interface. The interface is divided into several sections:

- 3D View**: A tab at the top left.
- Control**: The main control area, containing:
 - Motion Control**: Buttons for X, Y, Z, and FINE MOVE. X and Y are set to 0.0, and Z is set to 0.00.
 - Advanced Settings**: Buttons for -X, +X, -Y, +Y, -Z, and +Z. A **Park** button (with a red X and Y) is highlighted with a red circle and a blue arrow labeled '2'. A **HOME ALL** button (with a house icon) is highlighted with a red circle and a blue arrow labeled '1'.
 - Layer Height**: A dropdown menu set to 0.300.
 - Enable Big Z Move**: A yellow button.
 - Enable Z Calibrat**: A yellow button.
 - SET**: A large grey button.
- Tables and Firmware**: A section at the bottom containing:
 - Head Control**: Four columns of controls for different extruders, each with a temperature display (T=xxx), a RUN button, and an OFF button.
 - Hot Bed**: A temperature display (T=21) and an OFF button.
 - 110**: A large number display.

Physical Setup

Set Z-Height to MK1 extruder nozzle

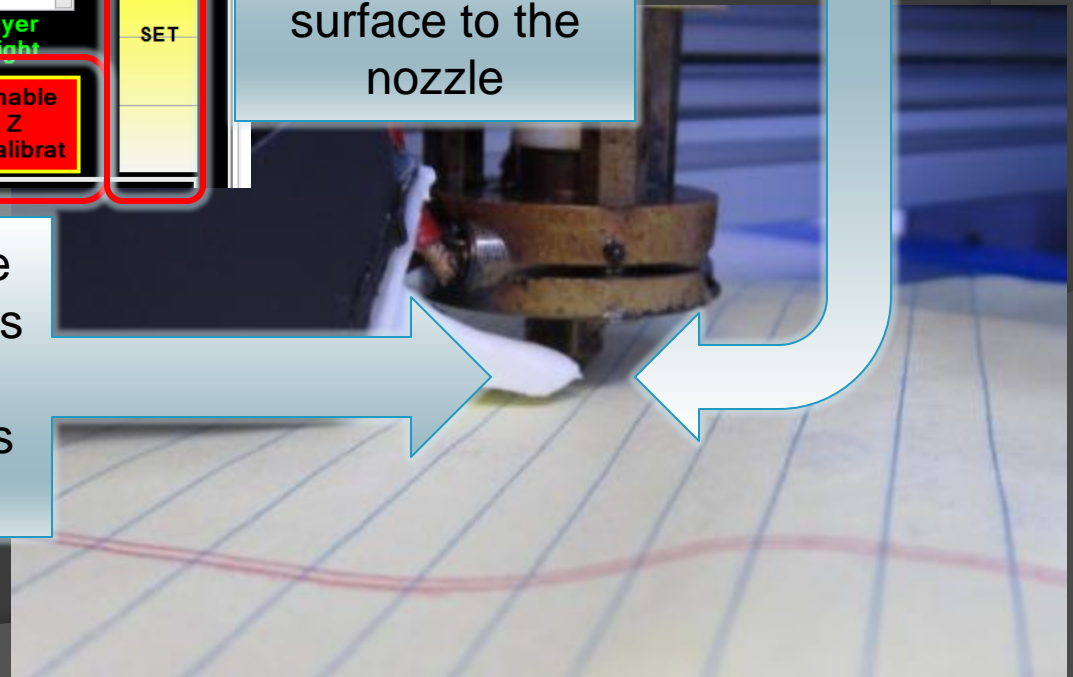
Step 3: Setting the Z-Height



2. Use Z-Height Calibration to bring the build surface to the nozzle

1. Place a piece of paper between the nozzle and the build surface

3. Once the piece of Paper just starts to pinch, the Extruder Height is correct.



Physical Setup

Bed Preparation

Step 1: Press Home, unlock motors, and turn on the heat to the bed

The screenshot shows the printer's control interface with several tabs at the top: 3D View, Control, Pictures, Web Browser, Aux Editor, Temperature Curve, and Slic3r. The interface is divided into three main sections: Motion Control, Advanced Settings, and Advanced Head Control. In the Motion Control section, the 'HOME ALL' button is circled in red, and a blue arrow labeled '1' points to it. Other buttons include X, Y, Z, -X, +X, -Y, +Y, -Z, +Z, FINE MOVE, Park, and a 'Z=0' button. The Advanced Settings section shows a 'Layer Height' of 0.300 and 'Enable Z Calibrat' and 'Enable Big Z Move' buttons. The Advanced Head Control section shows four extruders with 'RUN' buttons and a 'Hot Bed' section with an 'OFF' button circled in red and a blue arrow labeled '3' pointing to it. The 'Hot Bed' section also shows a temperature of 110 and 'xxx'.

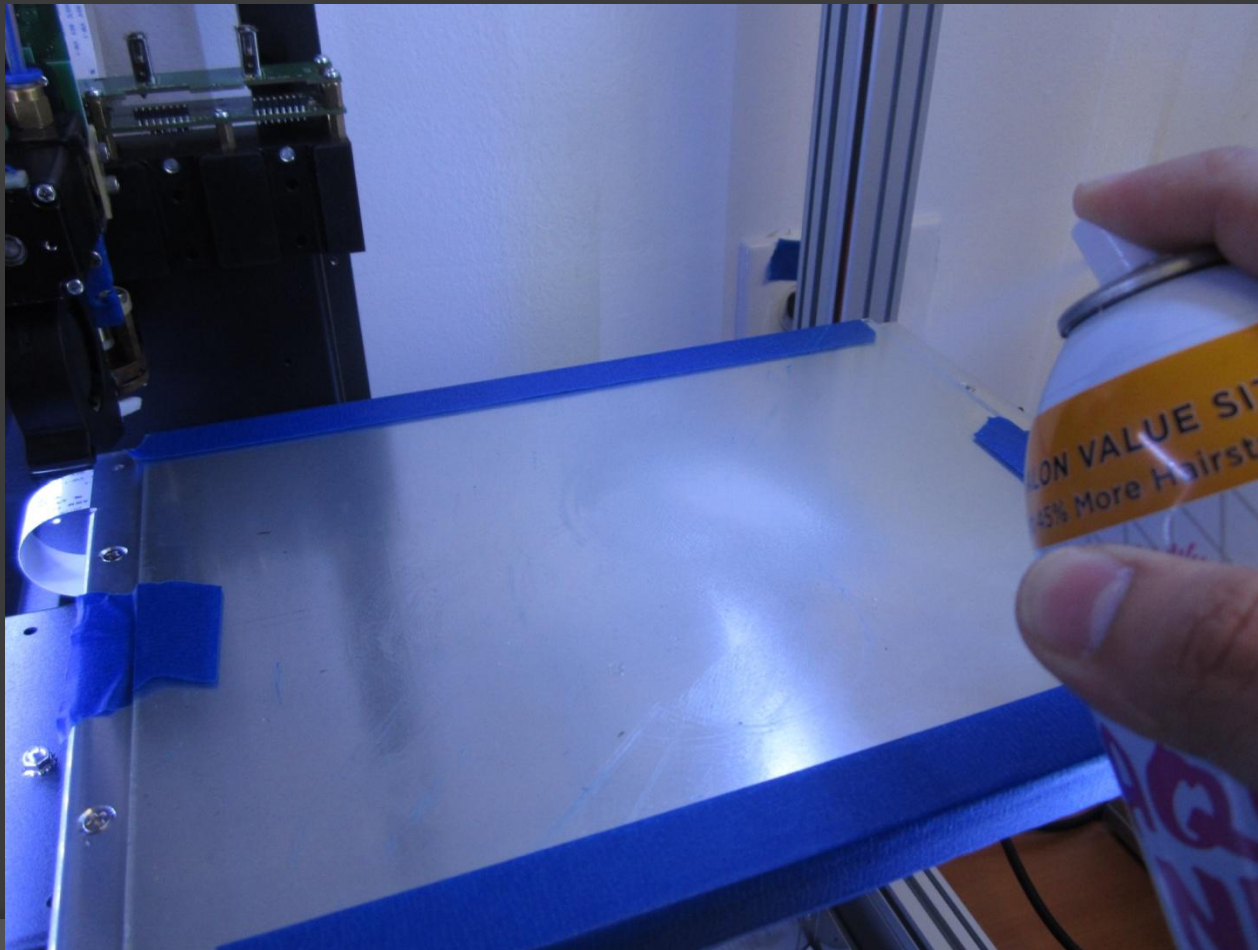
The screenshot shows the printer's control interface with a 'Motor Functions' menu open. The 'UNLOCK MOTORS' button is circled in red, and a blue arrow labeled '2' points to it. The menu also includes 'Manual Control', 'Home XY Motors', 'Home Z Axis', 'Send Z To Zero', 'Clean Head 1', 'Clean Head 2', 'Clean Head 3', and 'Clean Head 4'. A gear icon for settings is circled in red at the top of the menu.

Physical Setup

Bed Preparation

Step 2: Slide the bed to a position where you can spray the bed with AquaNet

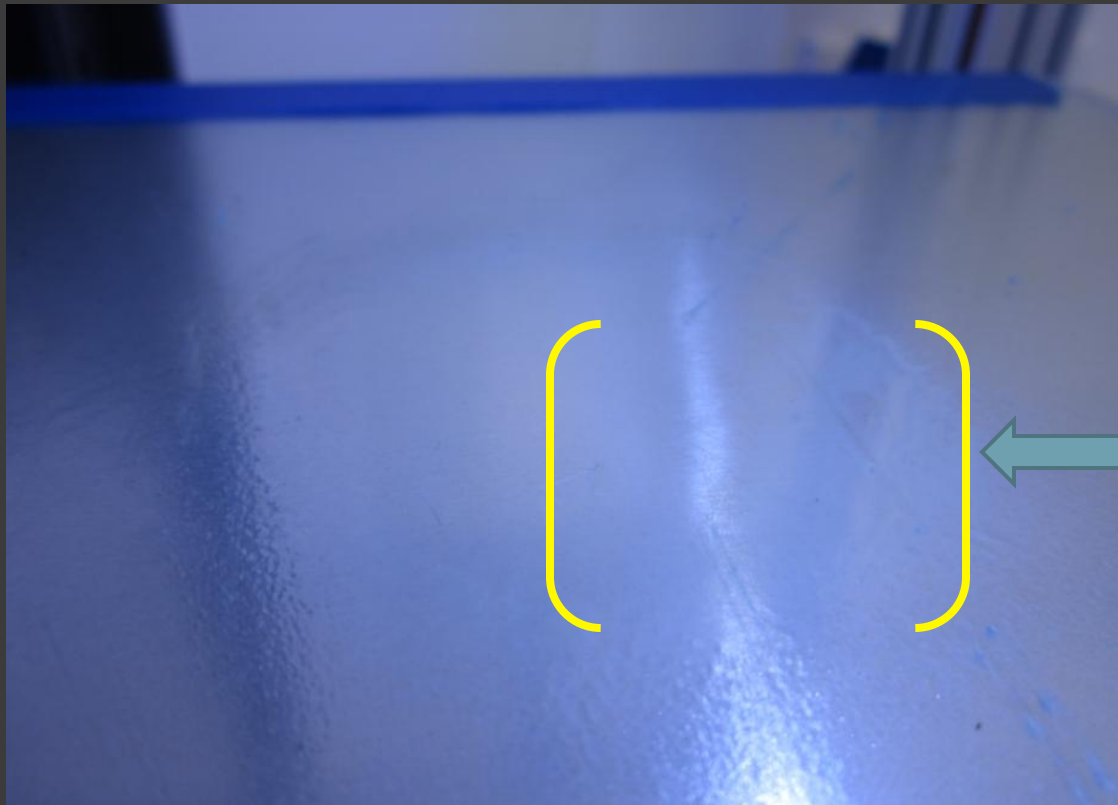
NOTE: Never get any spray on the linear slide bearings. Use a piece of paper to shield them as necessary.



Physical Setup

Bed Preparation

Step 3: Allow the “wet” or “milky” looking patches on the glass bed to dry. Do not touch the spray applied areas with your fingers, the oils from your fingers will prevent proper adhesion.



Milky-looking
patch

Physical Setup

Bed Preparation

NOTE: About sprays / AquaNet

- ⦿ Adhesion of the filament to the bed is of utmost importance because the bed is the only fixture for making the part.
- ⦿ We prefer to use AquaNet hairspray (specifically the unscented version) when printing with ABS filament.
- ⦿ The hairspray, when applied to the bed and dried, acts as a glue to keep ABS filament sticking to the bed.

- ⦿ The heat of the heated build platform keeps a few of the bottom layers of ABS from completely shrinking and pulling off of the bed.
- ⦿ **Make sure your bed temperature is at least 55°C before printing with ABS.**

- ⦿ There are other techniques for getting ABS and other filament materials to stick to the bed. These other techniques are covered in a separate presentation on our website.

Physical Setup

Loading a G-Code file

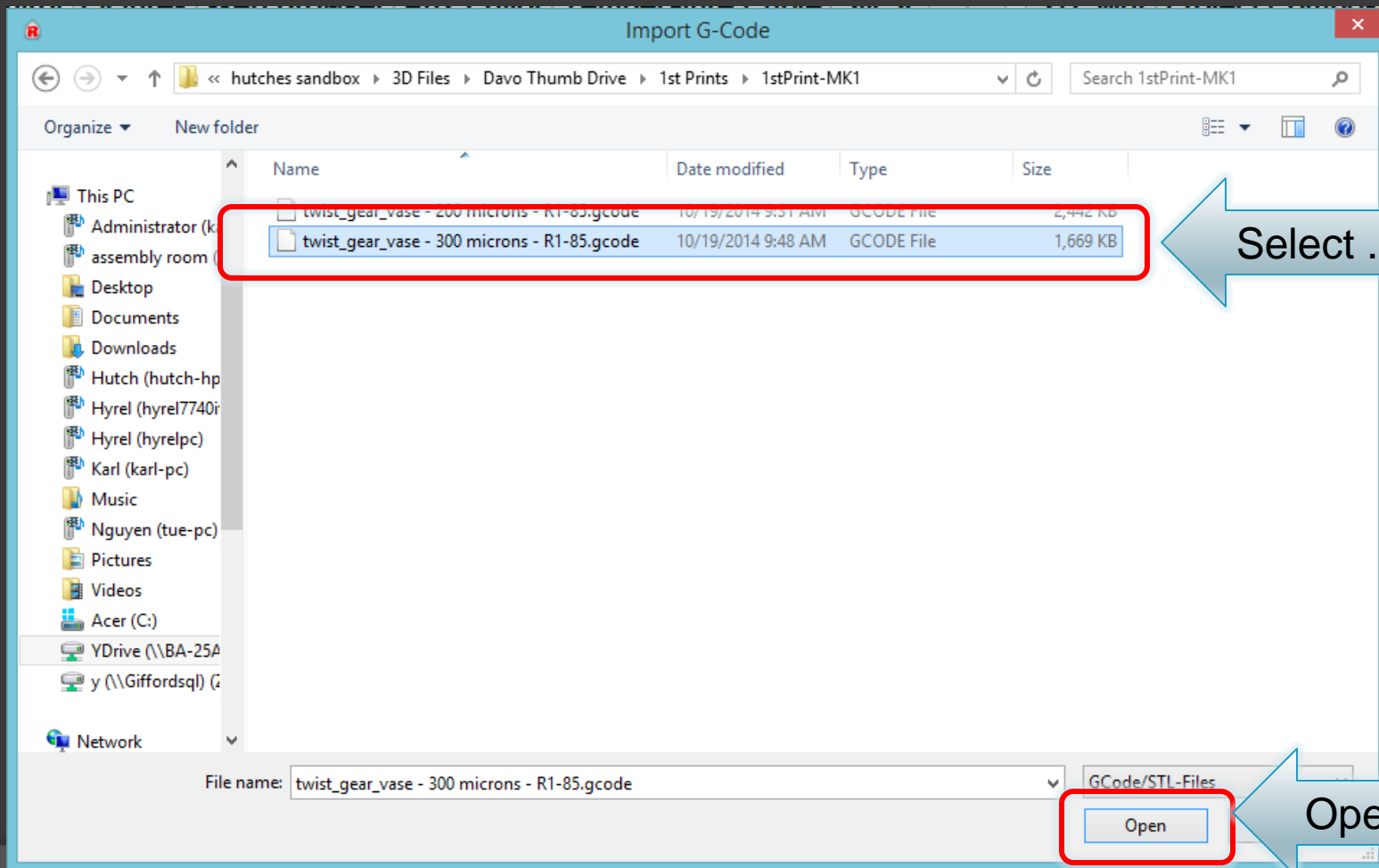
Step 1: Open a .gcode file

The screenshot displays the software interface for a CNC machine. The top menu bar includes 'File', 'Run Job', 'Kill Job', 'Show', 'Light', 'Motor Functions', and 'Settings'. The 'File' menu is open, showing options like 'Open', 'Open Recent', 'Save', 'Save as', 'Save JOB', 'Import', 'Export', 'Send File To Network Folder', 'ZIP and Send To USB', 'Email', 'Post To Server', 'Open Folder Browser', 'Update Firmware', and 'Exit'. The 'G-Code' option is highlighted. The main interface shows a 'GCode Editor' window with a 'File' menu and 'EDIT' options. The 'GCode Editor' window has a search bar and a 'Find' button. The 'Find' dialog is open, showing search criteria and options like 'Match Case' and 'Whole Word'. The 'Find' dialog has a search bar with the text '>Z', a 'Replace' button, and a 'Replace All' button. The 'Replace All' button is highlighted. The 'Find' dialog also shows a 'Set All G1 Speed To >' button and a value of '1500'. The background interface shows various controls for the CNC machine, including a 'Layer Height' control set to '0.300', a 'Hot Bed' control set to 'OFF', and a 'T=0' control set to '110'. There are also buttons for 'Enable Big Z Move' and 'Enable Z Calibrat'.

Physical Setup

Loading a G-Code file

Step 2: Browse and select .gcode file



Physical Setup

Loading a G-Code file

Step 3: This is the screen you will see when the .gcode file is loaded.

The screenshot displays a software interface for a 3D printer. The main window is divided into several sections:

- Top Bar:** Contains icons for File, Run Job, Kill job, Show, Light, Motor Functions, Settings, ALARM, and RESET.
- Navigation Bar:** Includes 3D View, Control, Pictures, Web Browser, Aux Editor, Temperature Curve, Slic3rS, STL Mgr, Project Composer, GCode Editor, and 3DVisua.
- 3D View:** Shows a wireframe model of a printer bed with a grid. A blue arrow labeled "G-Code" points from the 3D view towards the GCode Editor.
- GCode Editor:** A window with a cyan header and a black background. It contains G-code text:

```
; generated by Slic3r 1.1.7 on 2014-10-19 at 09:31:40
; perimeters extrusion width = 0.50mm
; infill extrusion width = 0.50mm
; solid infill extrusion width = 0.50mm
; top infill extrusion width = 0.50mm

G21 ; set units to millimeters
M107 ; disable fan
M190 S85 ; wait for bed temperature to be reached
```
- Show in Log:** A section with radio buttons for Commands, Infos, Warnings, and Errors. It displays a log of events:

```
09:59:11.230 >IN: 0: Buffer Flushed
09:59:12.388 >IN: 91: Scanner detached
10:00:06.385 Hyrel Printer Found, SW Rev>Hy: 2.5
10:00:06.469 >IN: 0: Buffer Flushed
>Hy: 2.5 Idle 28 FPS
```
- Settings Panel:** Located at the bottom right, it includes options like Show Single Layer, Enable Giant Preview >5MB, and Sync With Gcode Editor. A "Layer Display Range" slider is visible at the bottom.

Print Vase

Printing

Step 1: Press "Run Job" button

The screenshot shows a 3D printing control software interface. At the top, a menu bar includes 'File', 'Run Job', 'Kill job', 'Show', 'Light', 'Motor Functions', and 'Settings'. The 'Run Job' button is highlighted with a red box. Below the menu bar, a 'JOB Running' panel is visible, containing the following information:

- Layer: 1
- Lines: 41820
- TIME: 00:00:00 (elapsed), 00:00:02 (remaining)
- Buttons: Pause, Z Fine Adj (+/-), Kill JOB

The 'Pause' button is highlighted with a yellow box, and the 'Kill JOB' button is highlighted with a red box. Below the 'JOB Running' panel, there is an 'Advanced Head Control' section with various temperature and status indicators for different components (e.g., MK1, Hot Bed).

On the right side of the interface, a text box explains that the control panel opens when running and lists the most used buttons:

When running, this control panel opens.

The most used buttons are:

- 1.) Z Fine Adj [+] [-]
- 2.) Kill Job

Print Vase

Printing

Step 2: Pay close attention to the first layers & adjust height while printing



For ABS, this print is near perfection

Z Fine Adj

The image shows two yellow square icons with black borders, stacked vertically. The top icon contains a green plus sign and a black triangle pointing up. The bottom icon contains a green minus sign and a black triangle pointing down. Both icons have a 'Z' in the top left corner. The text 'Z Fine Adj' is written in cyan above the top icon.

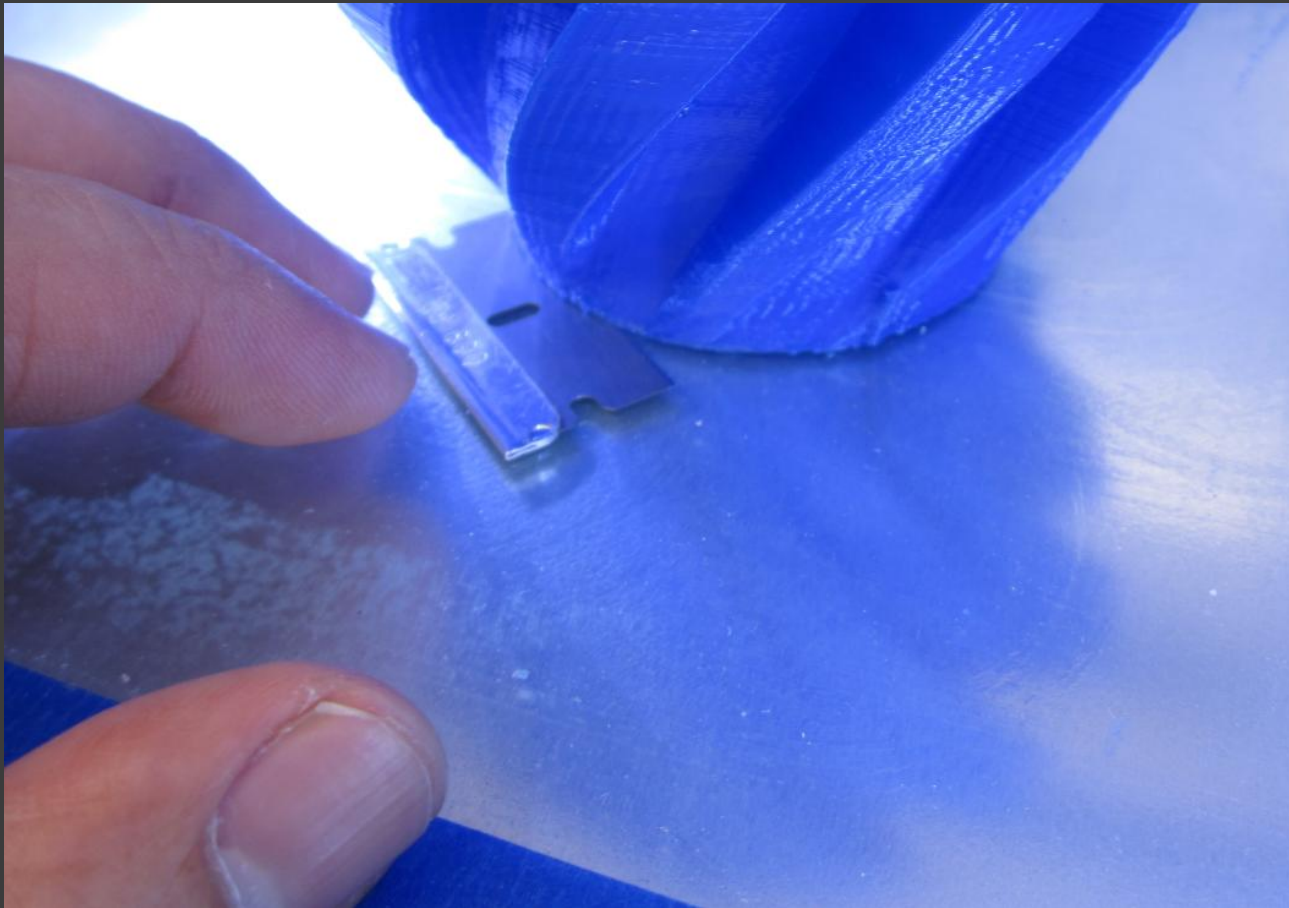
Use when lines are not touching

Use when lines are 50% wider than the adjacent lines

Print Vase

Printing

Step 3: When complete, remove print from build surface



More Information Available at:

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