

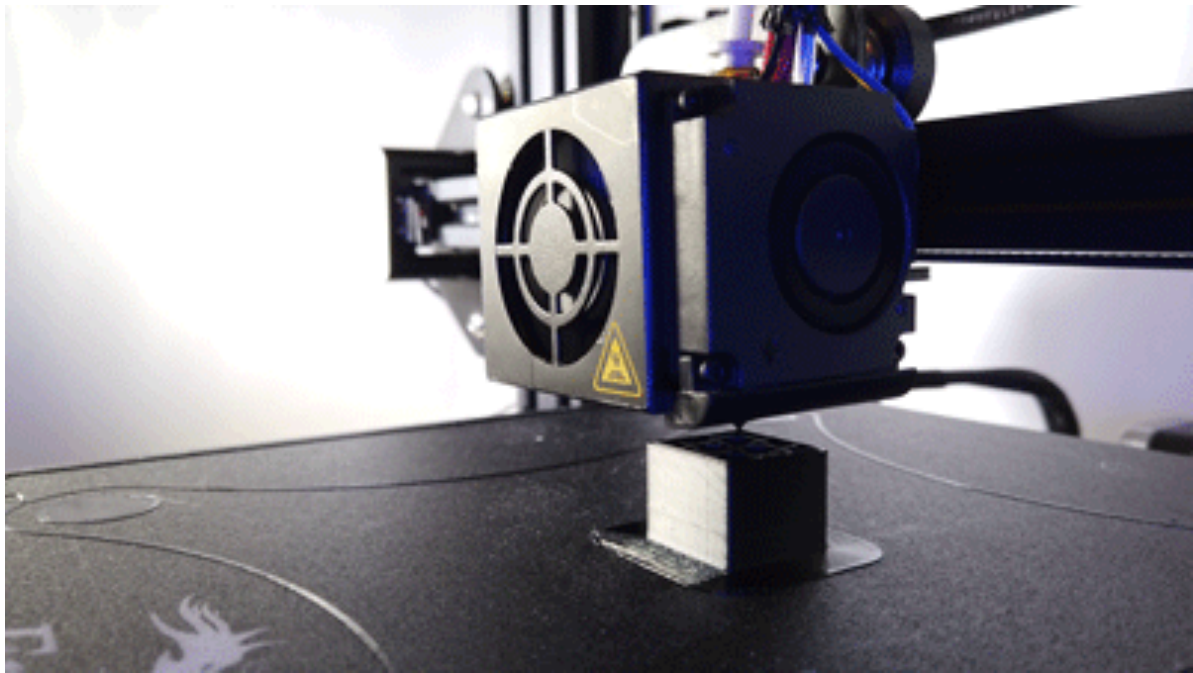


**A2: Getting Started with 3D Printing**

Kevin Philbin

Human Centered Design + Engineering

Digital Fabrication 598





Exprience



SLACK





Assembly



Prints

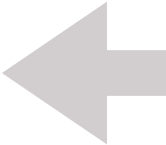


Fais

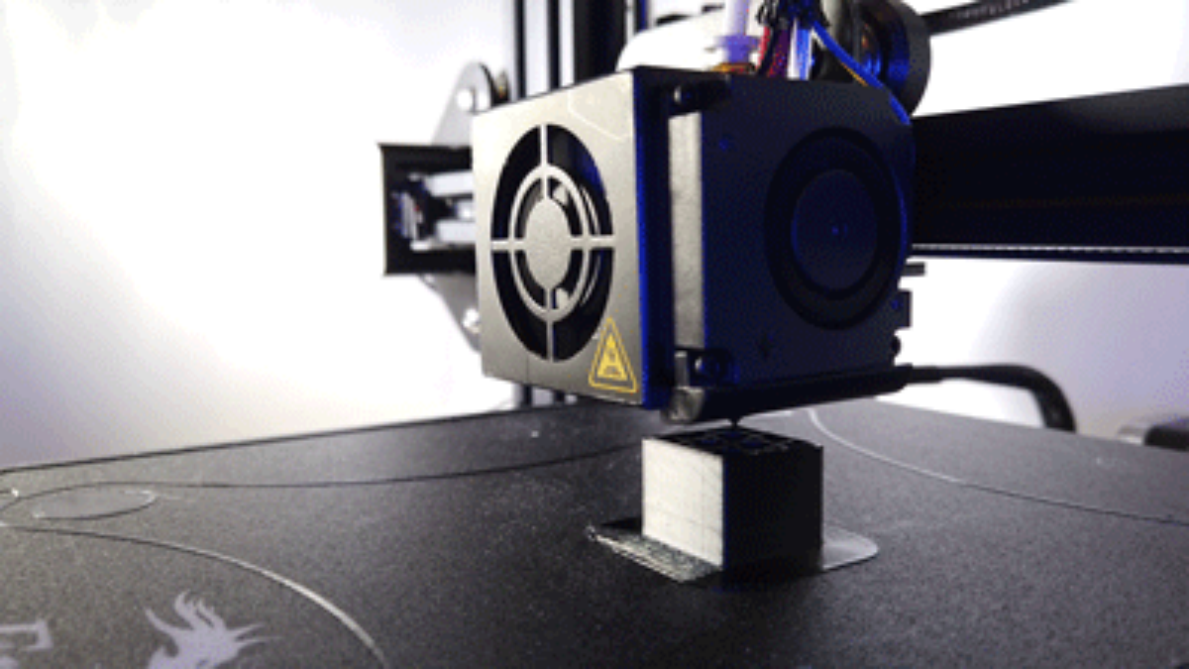


Fires

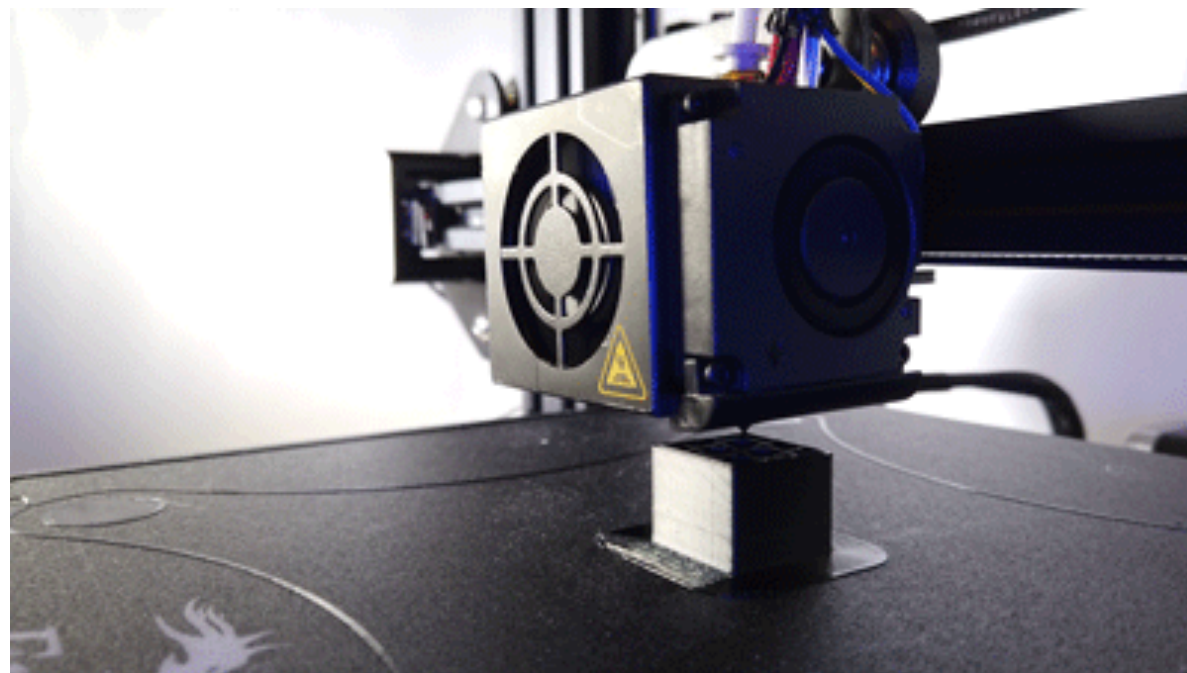




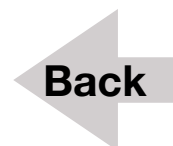
BECK



# A2: Getting Started with 3D Printing



Kevin Philbin  
Human Centered Design + Engineering  
Digital Fabrication 598



Experiments

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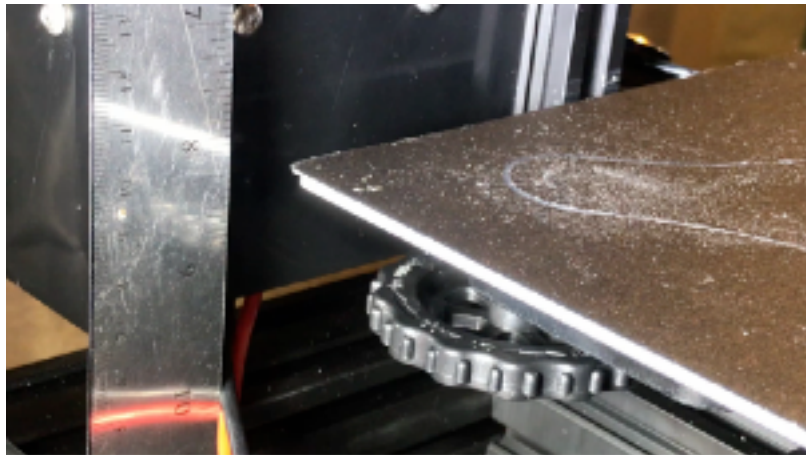
Prints

Fails

Files

# Printer Assembly Notes

- Printer purchased Wednesday, April 1
- Arrived Friday, April 3 from Shenzhen, China
- Build took 3 hours using included Creality instructions and Youtube set-up videos.
- May have over tightened eccentric bolts which caused Z Axis binding and wheel issue.
- Purchased a fire blanket, smoke detectors and fire extinguisher.



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# Digital Files

• 2cm Cube Low Quality	3d	STL	Gcode
• 2cm Cube Med Quality	3d	STL	Gcode
• 2cm Cube Ultra Quality	3d	STL	Gcode
• 2cm Cube Concentric Top/Bottom	3d	STL	Gcode
• 2cm Tube Single Extrusion	3d	STL	Gcode
• 2cm Tube Double Extrusion, Random Z axis	3d	STL	Gcode
• 2cm Cylinder .1cm Tolerance w/ supports	3d	STL	Gcode
• 2cm Cylinder .005cm Tolerance	3d	STL	Gcode
• 20mm Cube with 5mm hole	3d	STL	Gcode



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**Prints**

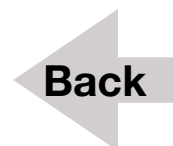
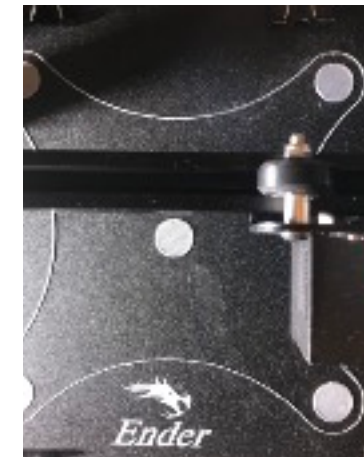
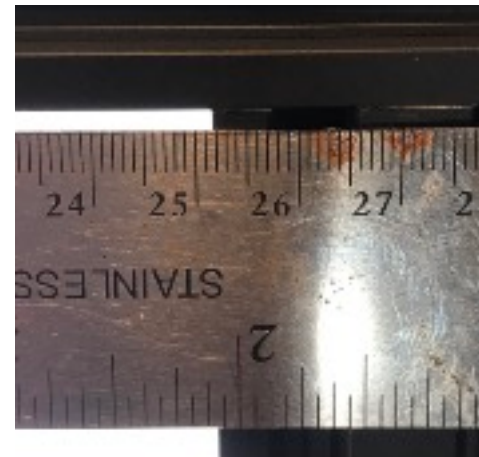
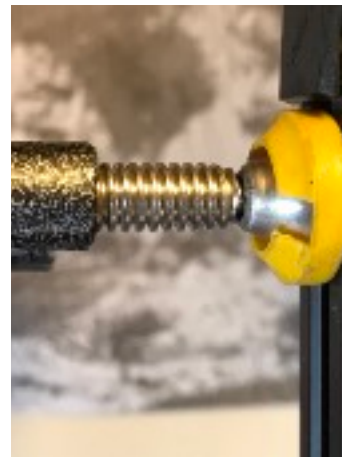
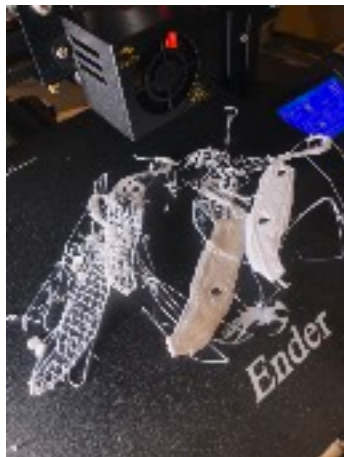
**Fails**

**Files**



# Complications & Workarounds

- Jaguar Print, Making Spaghetti from poor leveling.
- Cube Prints, Z axis bind from misalignment and unlevel table, printer frame and Y axis.
- Print Bed Leveling issues. Used Ben's solution.
- Used clamps to get Z frame top and bottom aligned.
- Finger print adhesion issues, cleaned bed.



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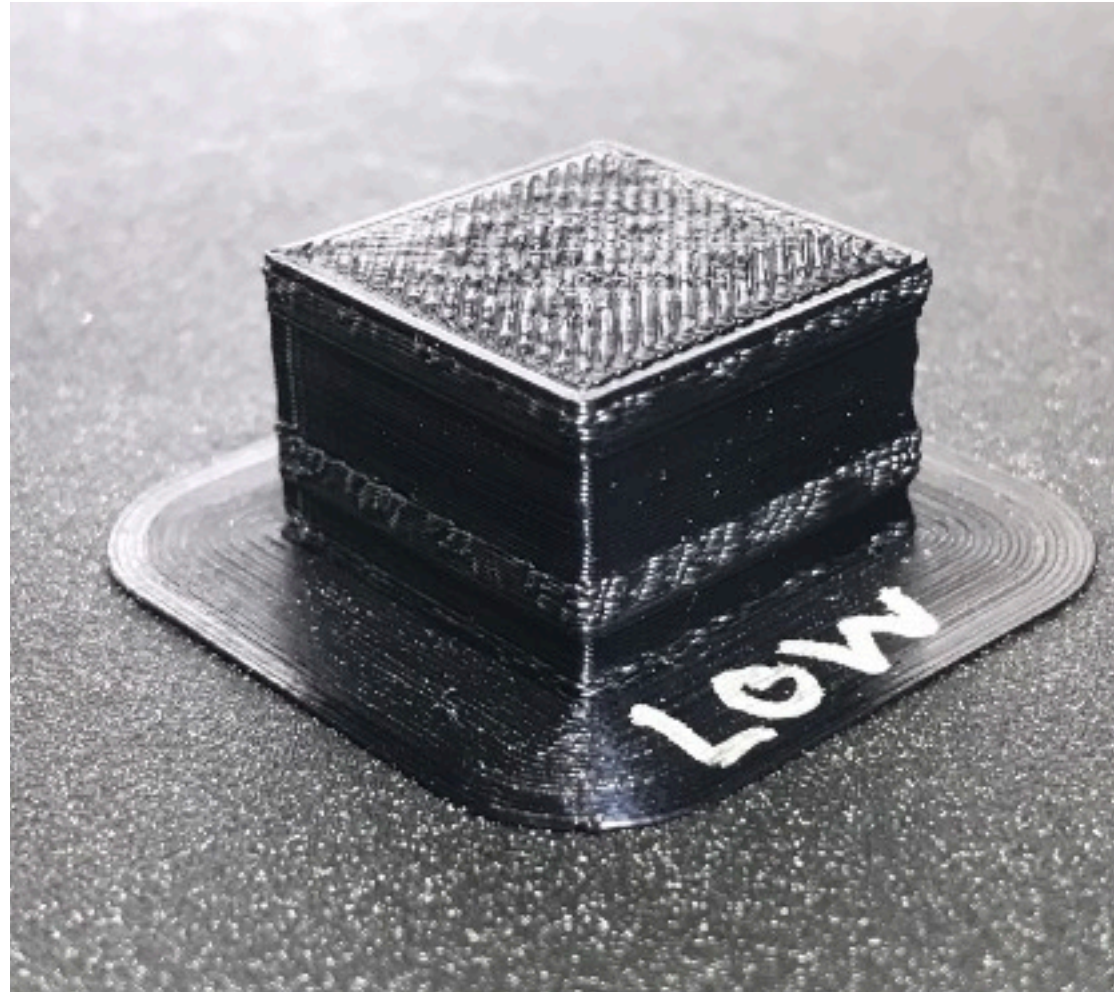
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# Test Prints



**Failed 2cm 26min print time  
14.78mm H x 20.91mm W x 20.65mm L**



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# Summary & Learnings

- Assembly was the easy part.
- Many chances for failure; even simple things take patience and preparation.
- HCD documentation is its own kind of skill. Takes time and forward thinking!
- Print Bed Leveling issues. Must be patient. A tuned printer and manifold print work well together.
- Frame and Table leveling issues: Must start with a solid surface.
- Software programs take persistence.



**Experiments**

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# Experiments

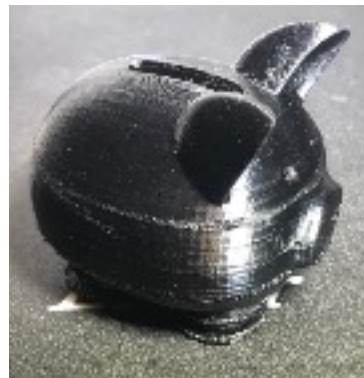
These were taken from [Thingiverse.com](https://www.thingiverse.com) as STL files or G-code included in Ender 3 Pro.



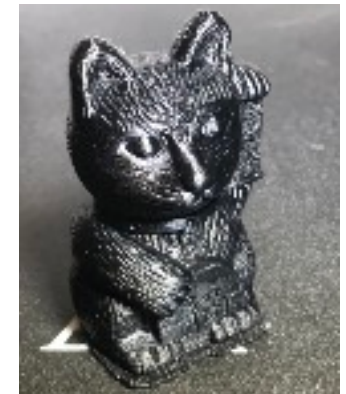
[Boba Credit](#)



[Lion Credit](#)



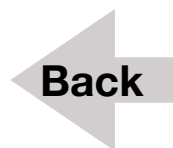
[Creality G-code](#)



[Jaguar Credit](#)



[X-Wing Credit](#)



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Please is there a preferred mac iOS Slicer to use with the Ender 3 Pro? It appears that Rhino has a slicer for Windows.

**Joshua** 17 days ago

For starters, I'd recommend Cura, as there are many predefined printers that you can simply import with their own printer-specific settings.



2  
**kevin philbin** 17 days ago  
thx Joshua!  
---

**kevin philbin** Apr 5th at 8:27 PM

My corners started peeling up mid build. Any recommendations on setting changes or best practices?

**Robert** 17 days ago

Most likely cause, at least in my experience, would be that the nozzle is too far from the print bed. If room temperature is varying a lot (printer is by a fan/vent/window/door) the temperature change could be a cause as well.

**kevin philbin** 17 days ago

Thx Robert. I'll check my nozzle gap. Maybe print on a raft would help?  
---

**kevin philbin** 8:55 AM

Cyrus, If I'm hearing you correctly, your Y axis is not working? Therefore we need to troubleshoot the movement of the print bed?

**Cyrus** Apr 7th at 8:57 AM

Thanks for looking at this @kevin philbin, but the elephant printed correctly and I have no issues printing the test pattern you posted. So I'm not sure why it's okay in some cases and not other ones

**kevin philbin** 12:57 PM

Nice! You're making progress!  
---

**kevin philbin** Apr 7th at 3:50 PM

I'm getting closer! But still had some issues. I ran the clean calibration test then immediately ran the panther print. Anyone have thoughts about what could help with the loose spaghetti? I'm extruding at 200c and bed is at 50c. Thx!

Image from iOS

**kevin philbin** 15 days ago

**Nadya** @JoshuaV

please any thoughts on how to improve?

**Cyrus** 15 days ago

@kevin philbin, not ready to call it fully tested, but firmware upgrade seems to have resolved all my issues! More to come on this soon; test should be done in 3-4 hrs ...

**kevin philbin** 15 days ago

Rad! Thx for the update.



**Nadya** 14 days ago

loose spaghetti can also come from how you slice

**kevin philbin** 14 days ago

Thx! I'll look into slicing settings.

**Cyrus** 14 days ago

Update first test looks great!!! I fell asleep and running the second test now.

One negative thing that stood out is the new firmware slowing down the prints (edited)

Screen Shot 2020-04-14 at 9.12.57 AM.png

**Jasper** 8 days ago

Some things to check: did you BooleanUnion everything in Rhino so that it's a single closed polysurface? Also can you try loading this in Cura or slic3r or another slicer? It's kind of hard to see what's going on with MacOS's default STL previewer — — —

# Slack Threads

Working to answer questions

**kevin philbin** Apr 14th at 9:20 AM

Please help with STL export. I've tried a few settings but it appears I'm missing something. (edited)

**Victor** 8 days ago

It's also a little difficult to tell from the screen shot, if the cutting edge is capped/solid or not.

**kevin philbin** 8 days ago

Thx for the input!

**Ben** 8 days ago

Can you share your 3dm file?

**kevin philbin** 8 days ago

happy to. lemme check Jasper and Victor's points and i'll post it. thx for looking.

**kevin philbin** 8 days ago

Binary

**kevin philbin** 8 days ago

@Victor Allen Good point. Cutting edge was not capped.

**kevin philbin** 8 days ago

I tried cap command then selected both extrusions but then it filled across entire plane. Please do know how to cap just between my extruded walls?

**Ben** 8 days ago

i made a quick video for you. no sound sorry. delete the extrusion with a right to left selection. use extrude curve and make sure you select the solid option. the extrude outer curves the same way and then boolean union. sending video link in a minute

**kevin philbin** 8 days ago

thx Ben!

**Ben** 8 days ago

<https://drive.google.com/file/d/1W6egYdUMCNwFcLvezf1ZloPG98LNIqqb/view?usp=sharing>

**kevin philbin** 8 days ago

Sweet that totally helped

**kevin philbin** 8 days ago

Thanks a ton!

**kevin philbin** 10:05 AM

ok thx. I'll check that too.

**kevin philbin** 10:26 AM

Been crashing a bunch! Having issues with saving and permissions. So I'm delaying in posting the file.  
---

**kevin philbin** 10:56 AM

My prints are off by 5mm on the Z axis. Is this [All3dp.com](https://www.all3dp.com) calibration workflow the right approach?

Screen Shot 2020-04-17 at 10.34.55 AM.png

**Joshua** 10:57 AM

wait, 5mm? Hmm, that sounds like more than tuning the extruder would fix. In your Ender3 menu settings, what is the Z steps-per-mm?

**kevin philbin** 11:02 AM

Thx for chiming in. I'll take a look.

11:05400

**Paige Johnson** 11:06 AM

Hey Kevin, you might be skipping z-steps. Make sure your coupler on the lead screw is tight!

**Joshua** 11:07 AM

Ok 400 is correct (for ender3). Looking at your part, the first half (in Z) looks rather squished. @Paige Johnson is right. Check those screws! (edited)

**kevin philbin** 11:15 AM

Ok checked and snugged! Thx for the fast response @JoshuaV @Paige

**kevin philbin** 11:41 AM

Oh my. Maybe too snug?

Image from iOS

**Joshua** 11:42 AM

Hmm, something on the Z axis may be binding

with brim

s pic lo

M

ole mine

binding

crews

es to the extruder is not to

light

**Joshua** 11:45 AM

Here's one suggestion for debugging: unscrew the coupler from the leadscrew. You should now be able to freely move the y axis up and down with your hand (and the leadscrew will come with it). By hand, move it up-and-down. Does it bind? If so, you may need to loose

and-readjust some parts of the Y axis (Step 6) until they slide smoothly.

11:47

Also check page 3 of this to see if your motor is holding the leadscrew at an angle.

[https://docs.google.com/presentation/d/1QpFYa3phjAkS3OK3oN58Tejl3rdL9JeuzDDMPDz3TRI/edit#slide=id.g738f6ce37f\\_0\\_117](https://docs.google.com/presentation/d/1QpFYa3phjAkS3OK3oN58Tejl3rdL9JeuzDDMPDz3TRI/edit#slide=id.g738f6ce37f_0_117)

**kevin philbin** 11:58 AM

Great input. I'll get to it. Thx @JoshuaV and @Vincent

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