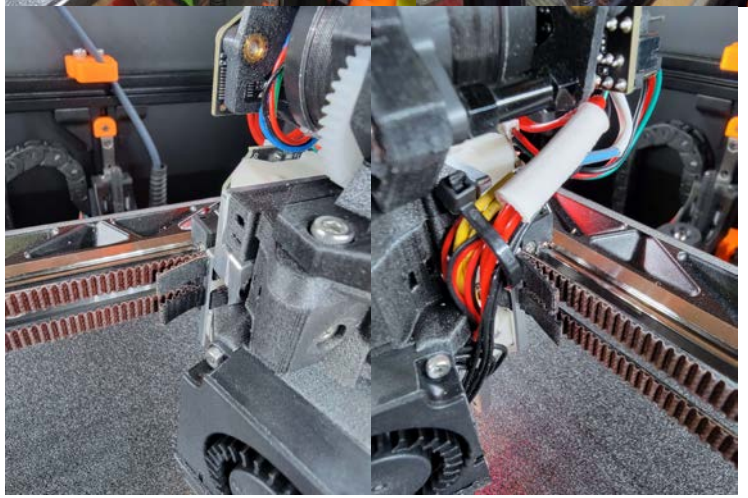
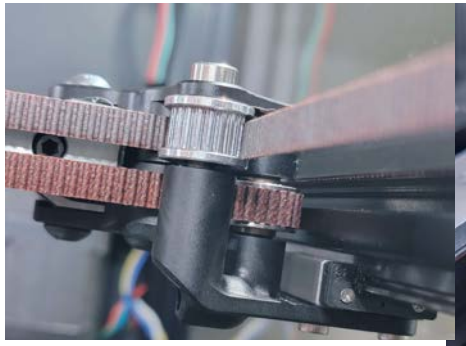
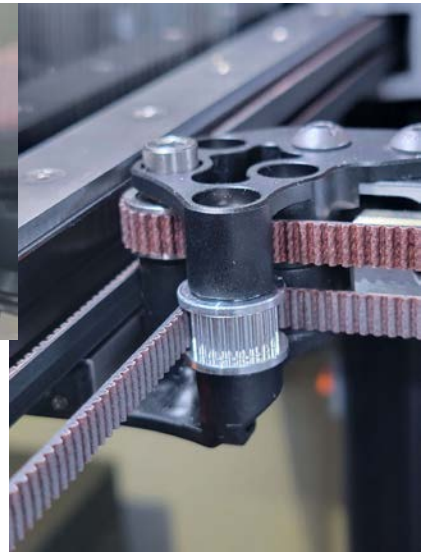
Einsteins V2.4004: resonance adventure: 300 trident machine

Ebb36 v1.2

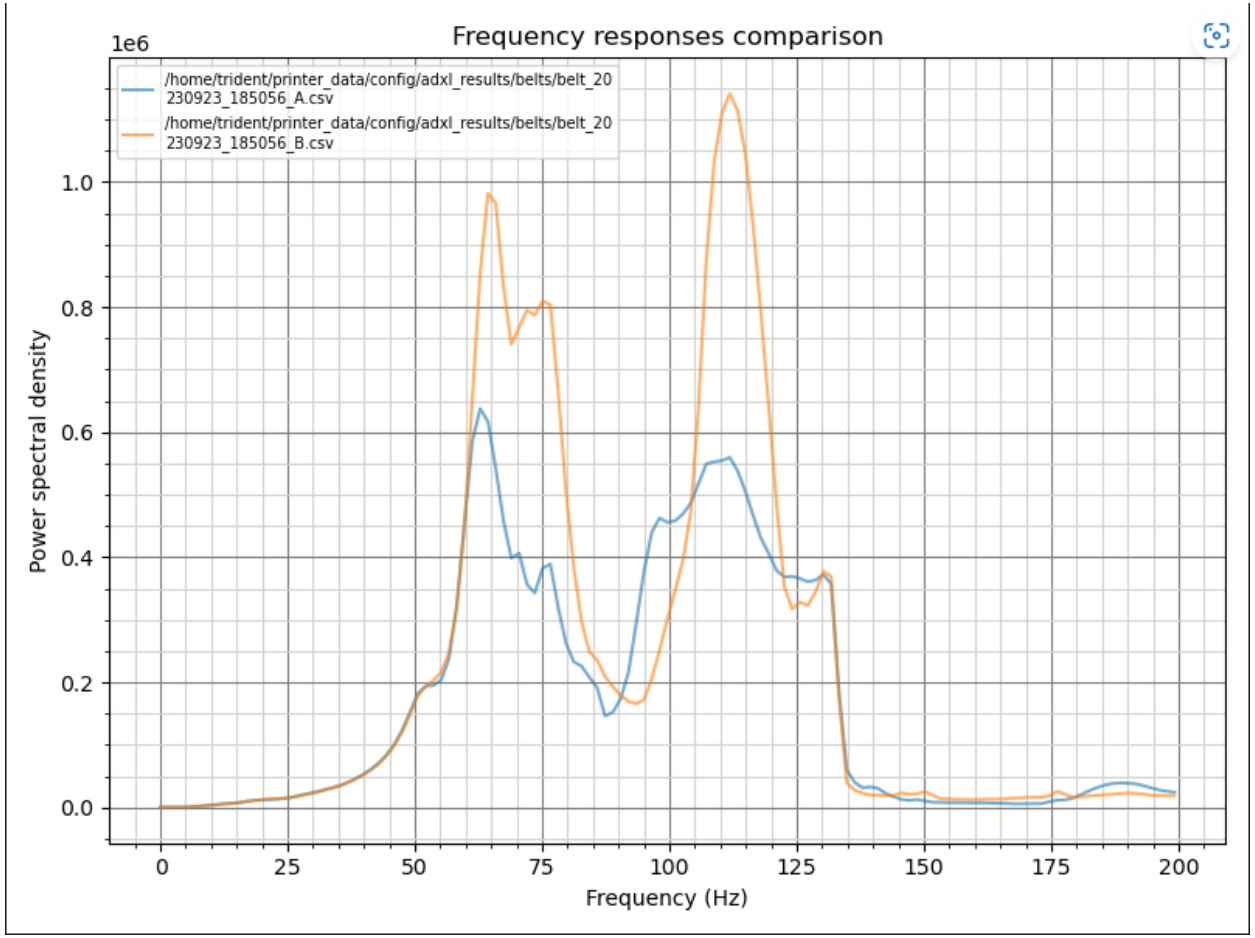
Initial machine state





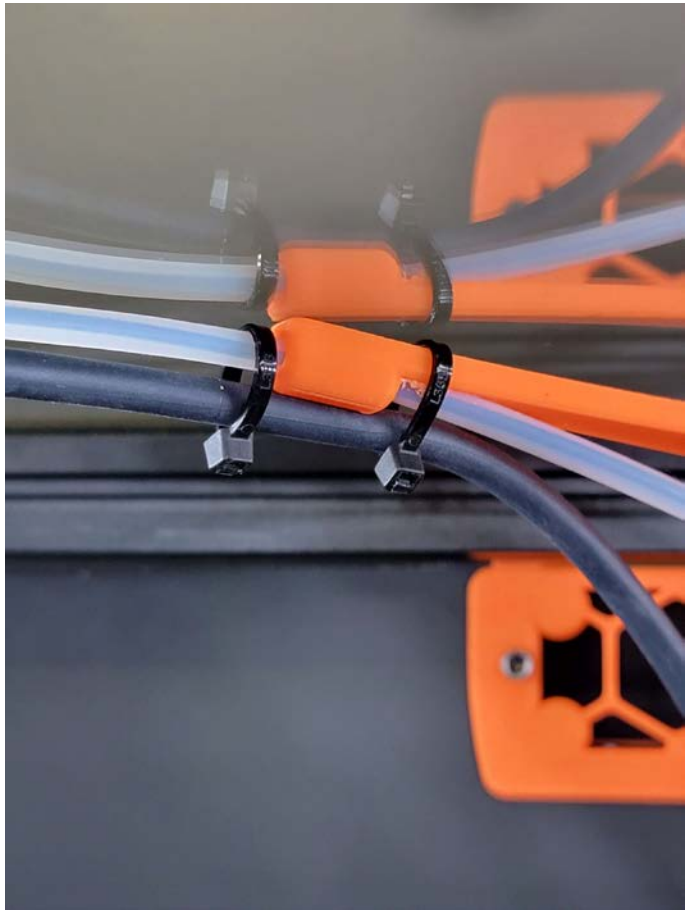


Initial belt shaper



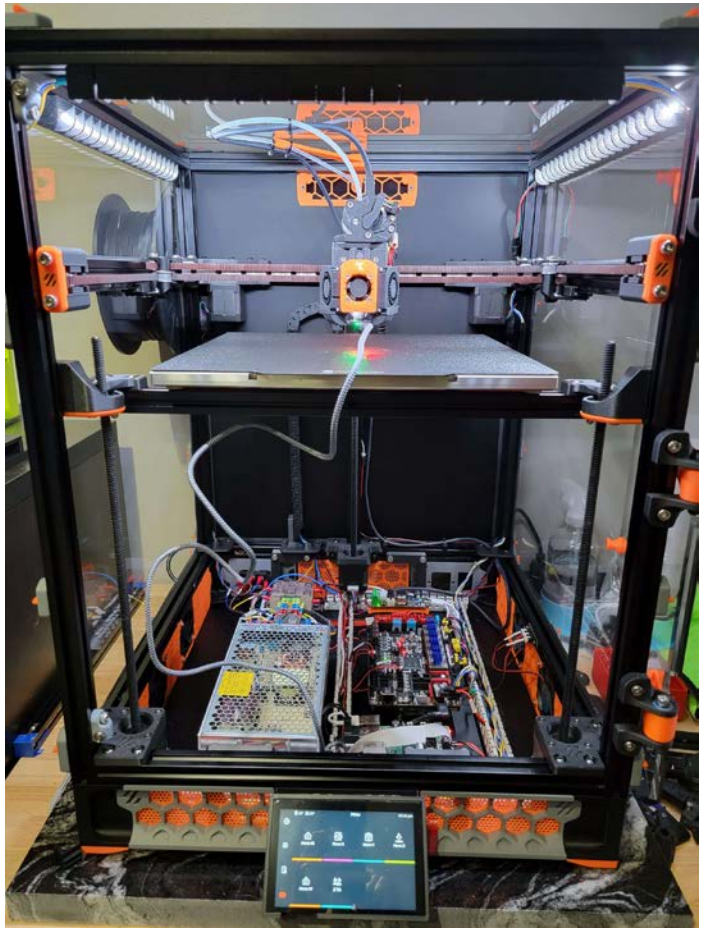
Recommended securing canbus cable better

recommendation



New zip ties

State of printer at this point

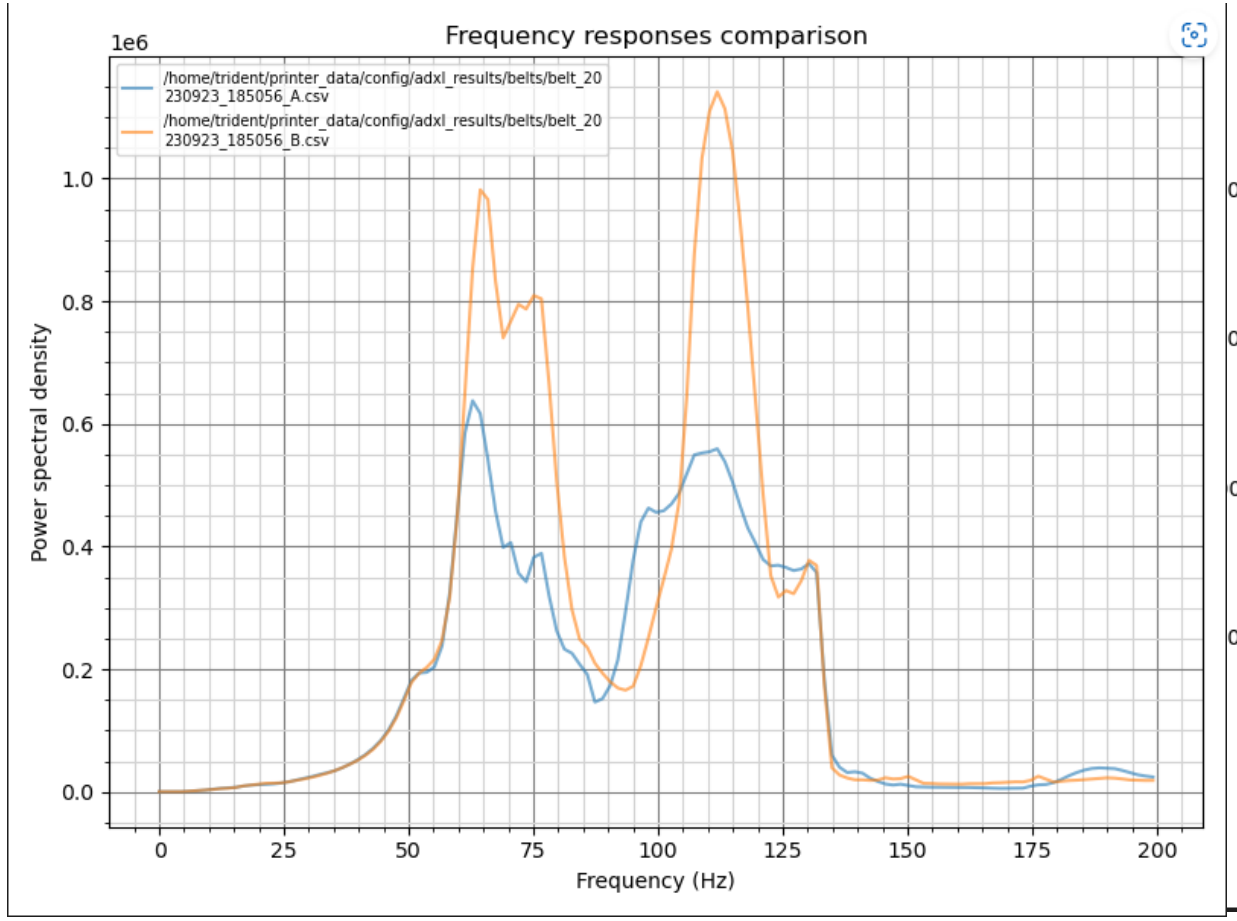


Recommendation

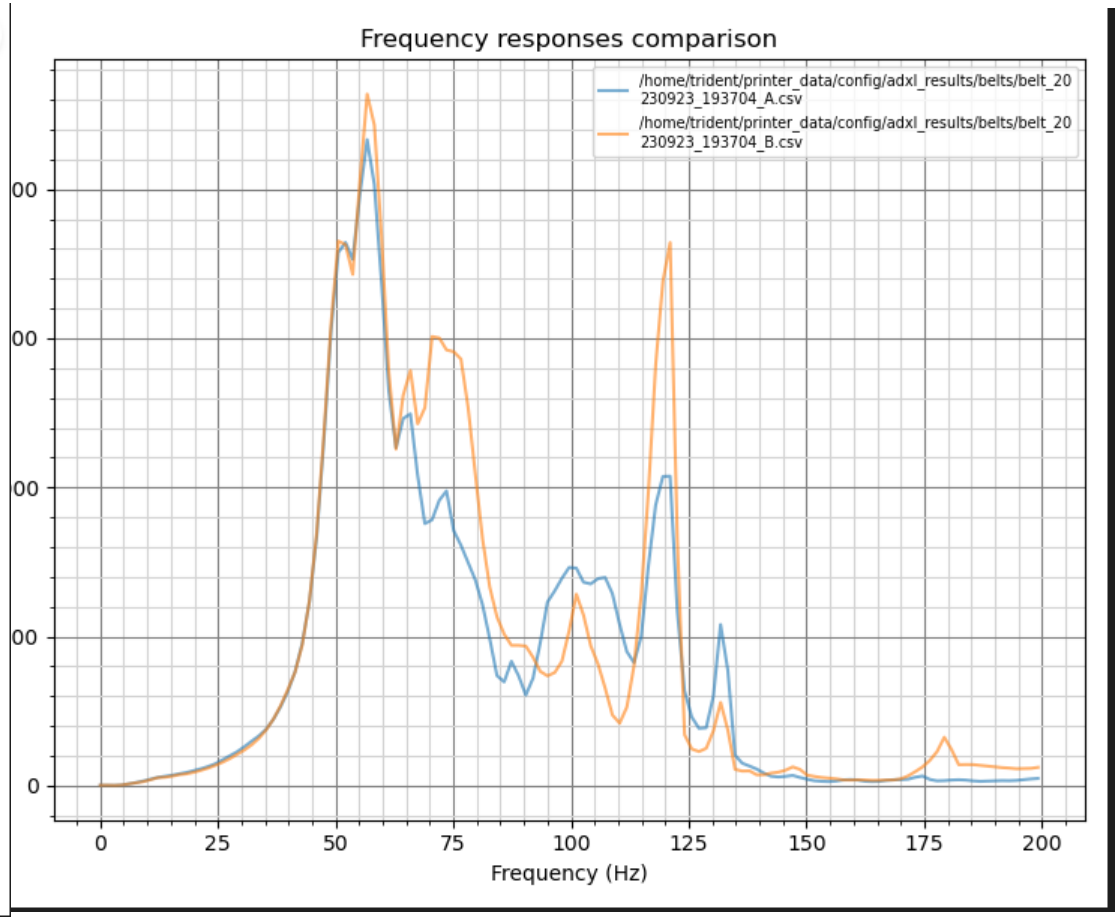
- Rerun beltshaper
- Compare nozzle probe to canbus adxl
- When using canbus adxl remove usb cable

Adxl settings for ebb36
[adxl345]
cs_pin: ebb36:PB12
spi_software_sclk_pin: ebb36:PB10
spi_software_mosi_pin: ebb36:PB11
spi_software_miso_pin: ebb36:PB2

Loosen belts by ½ turn to see if second peak dies down

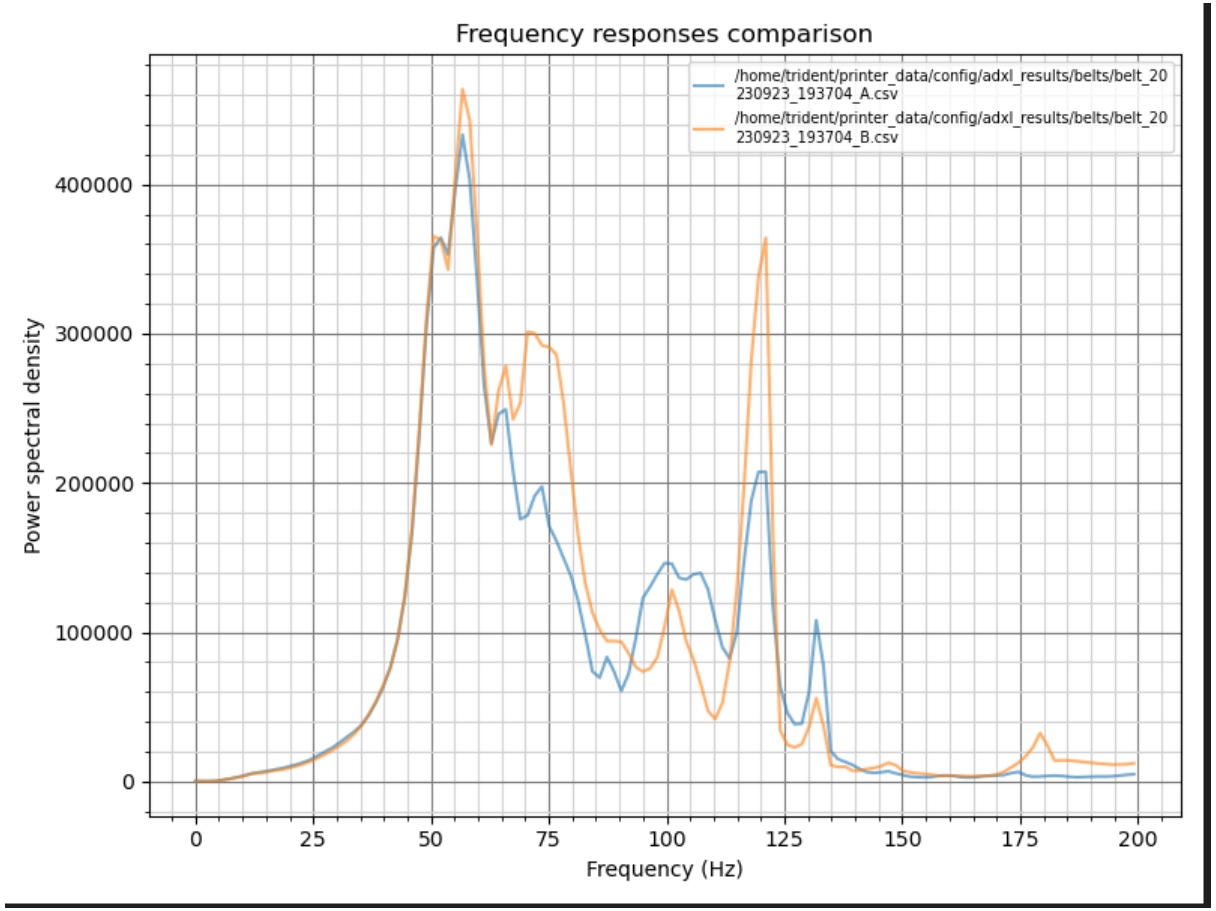


Original

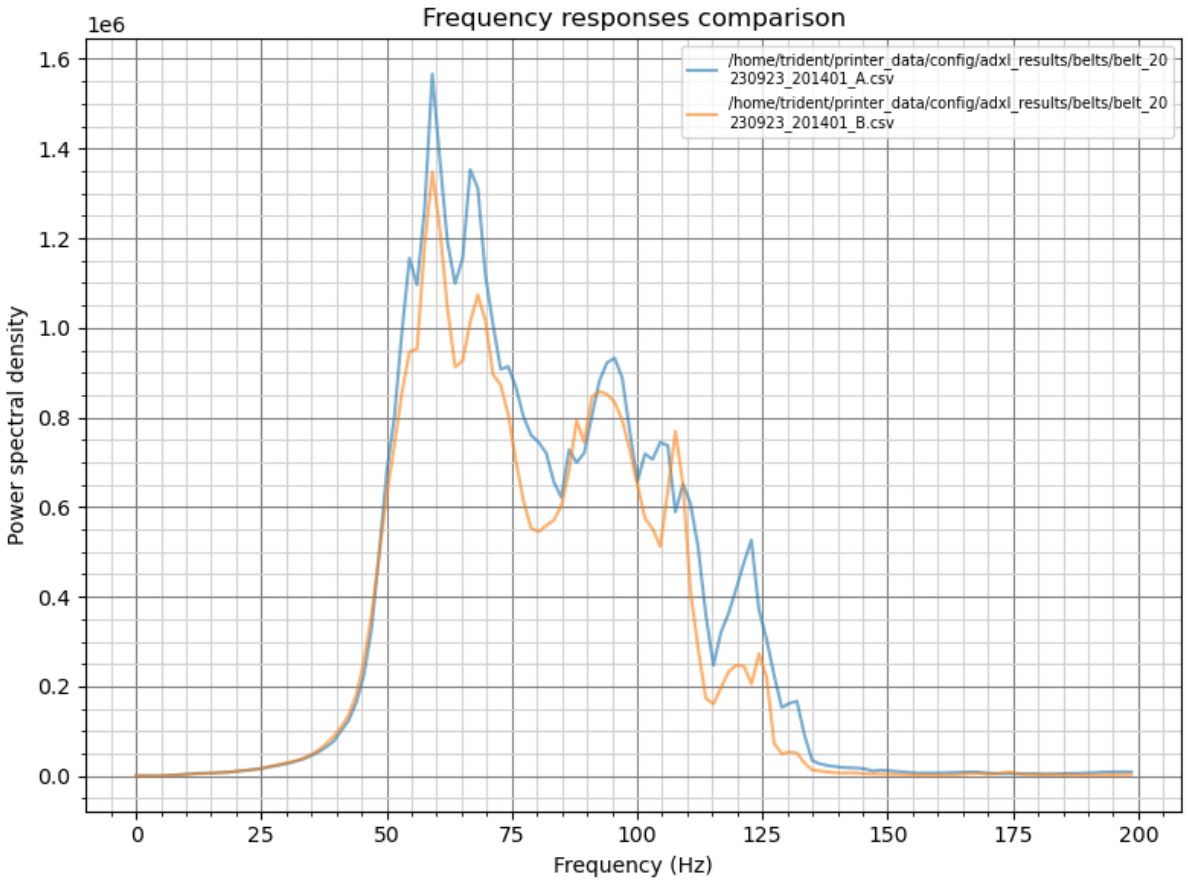


½ turn loose

EBB36 ADXL Belt shaper (still ½ turn loose) 73hz @150mm vs Nozzle ADXL at same tension

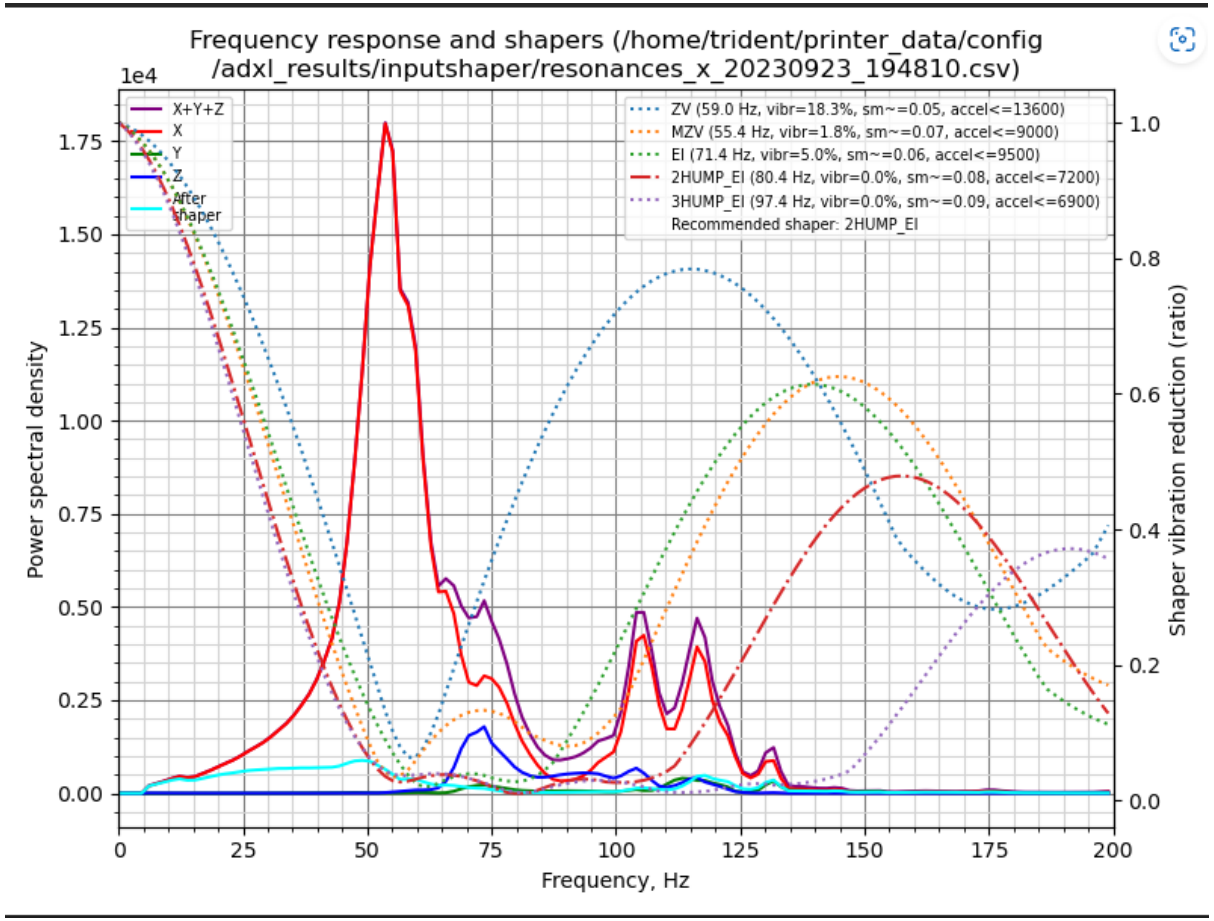


Nozzle

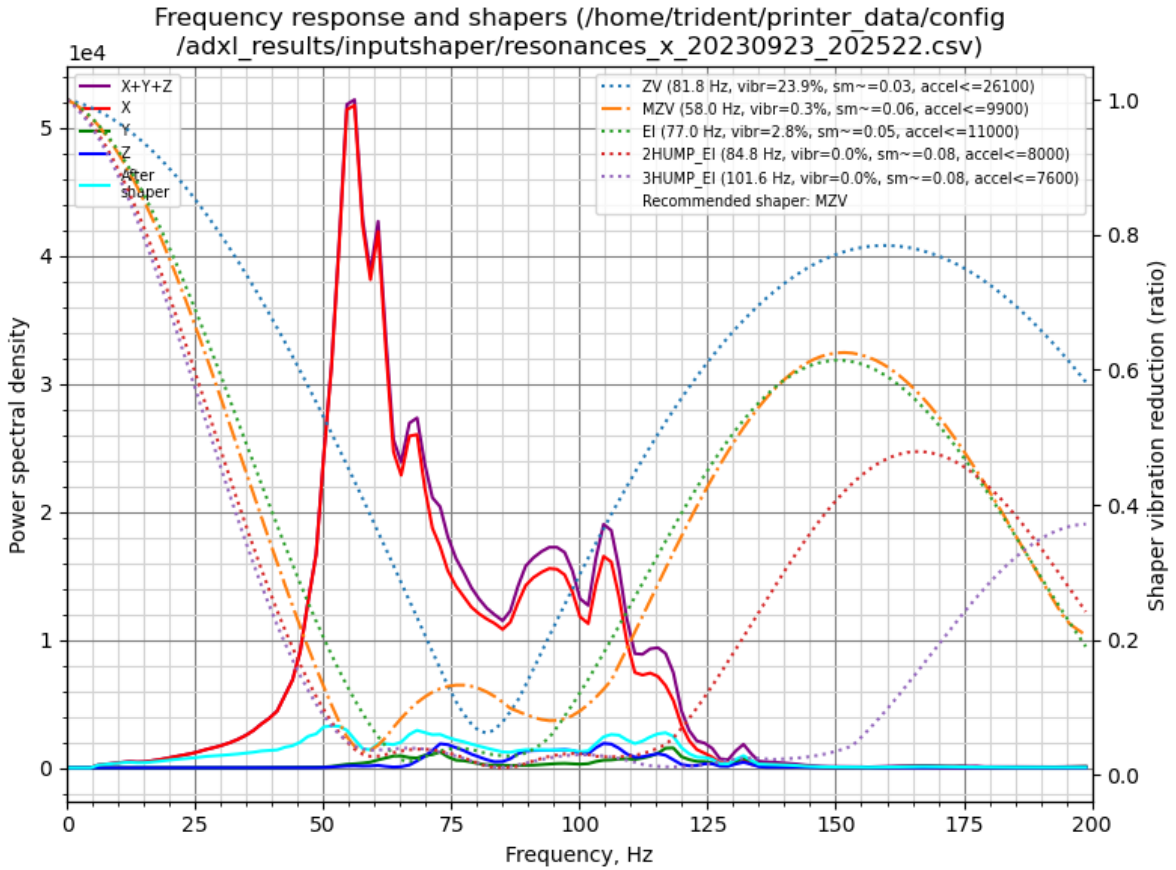


EBB36

EBB36 ADXL Input shaper (still ½ turn loose) 73hz @150mm vs Nozzle ADXL at same tension -X

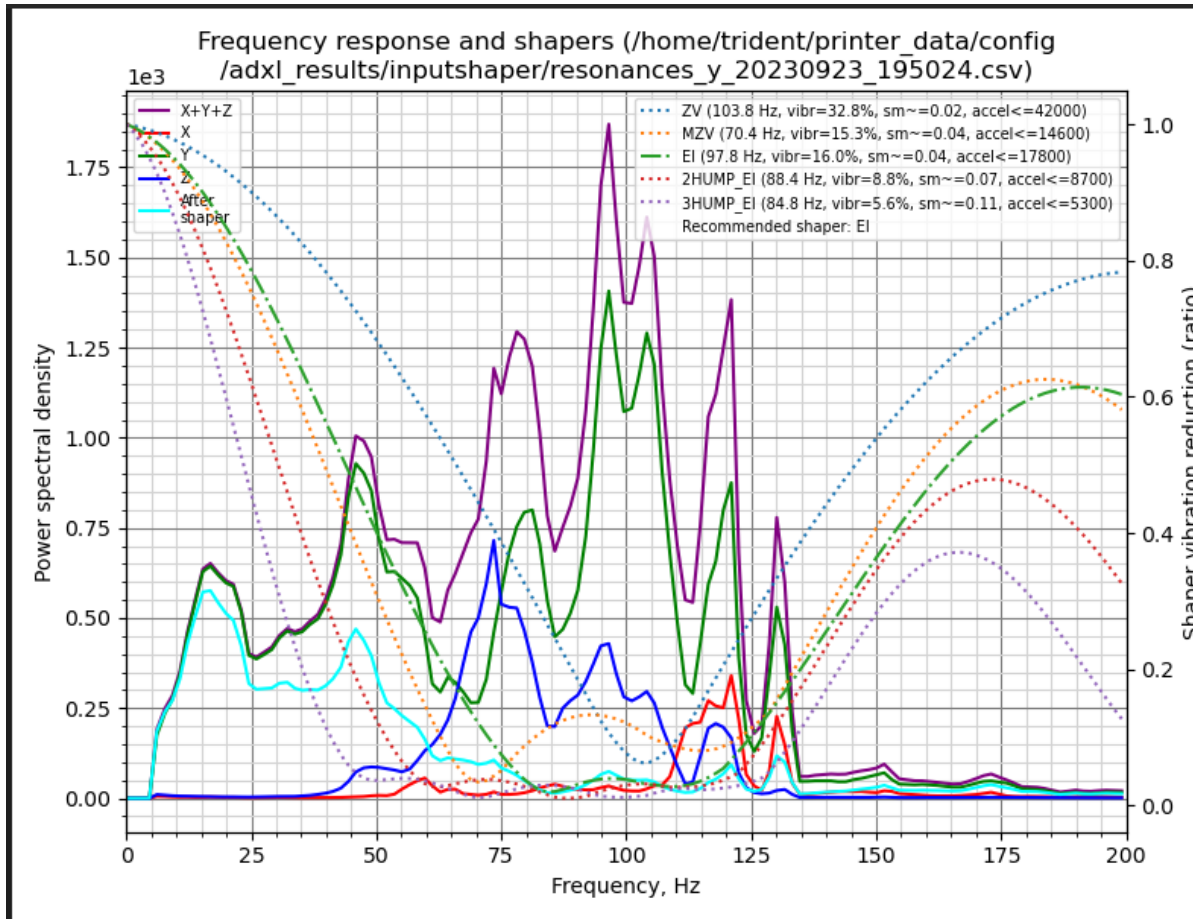


Nozzle

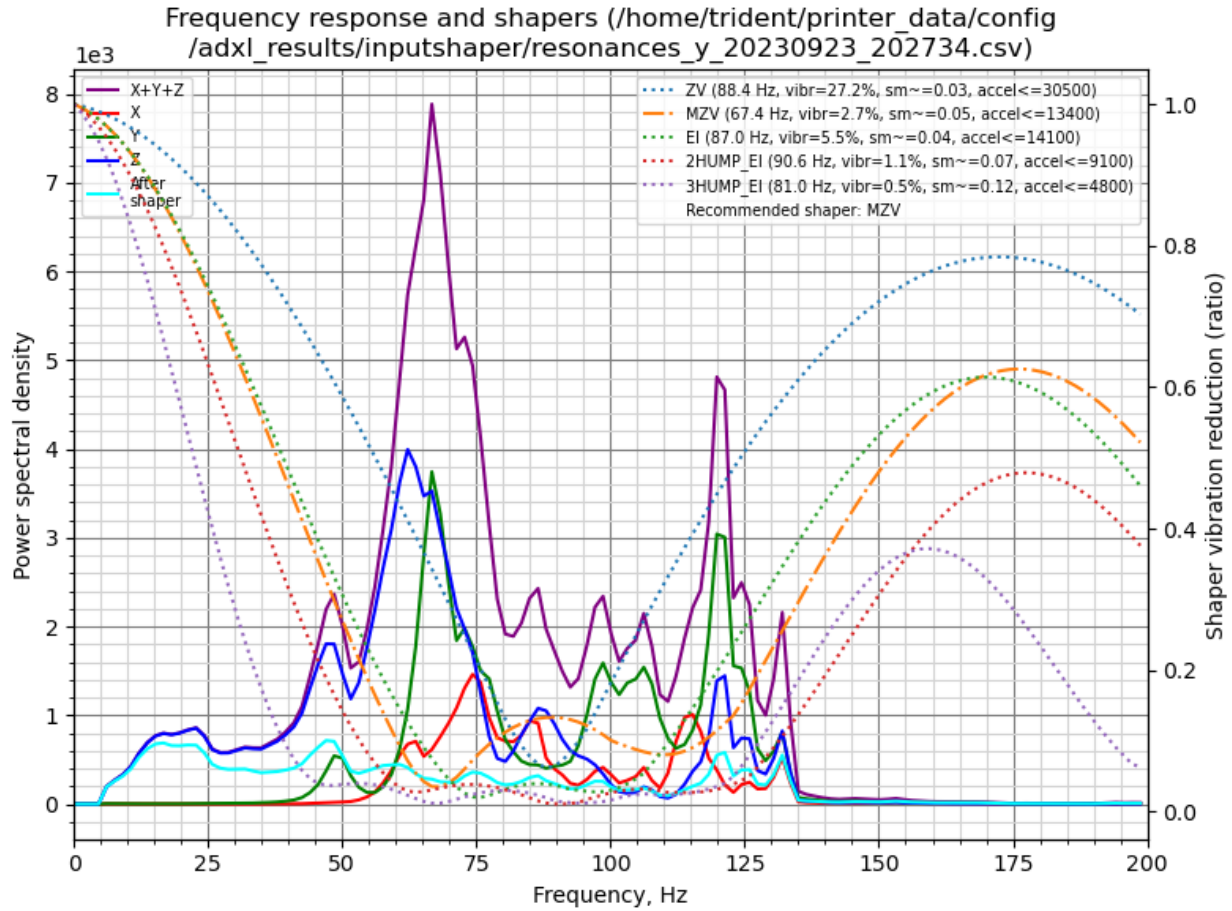


EBB36

EBB36 ADXL Input shaper (still ½ turn loose) 73hz @150mm vs Nozzle ADXL at same tension -Y

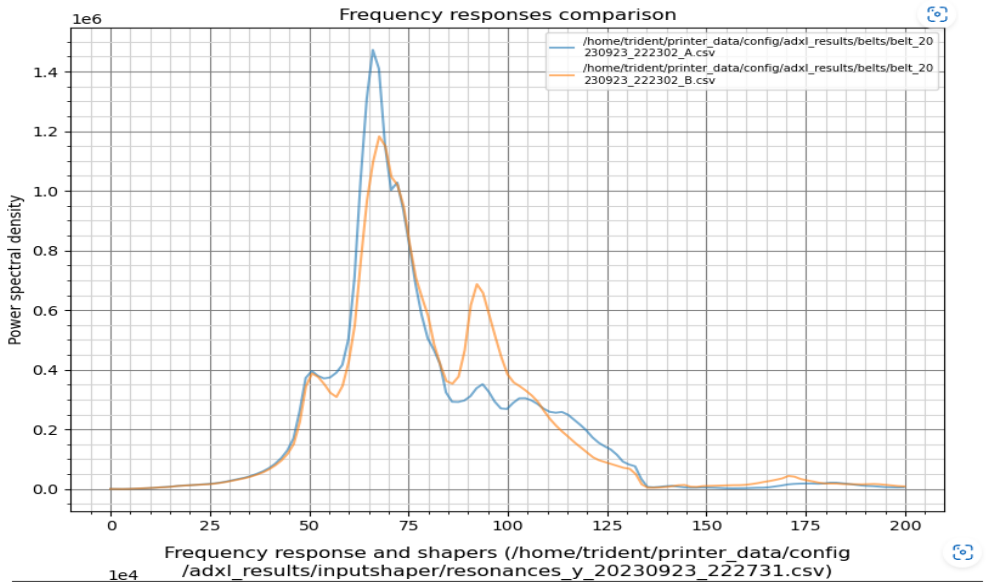


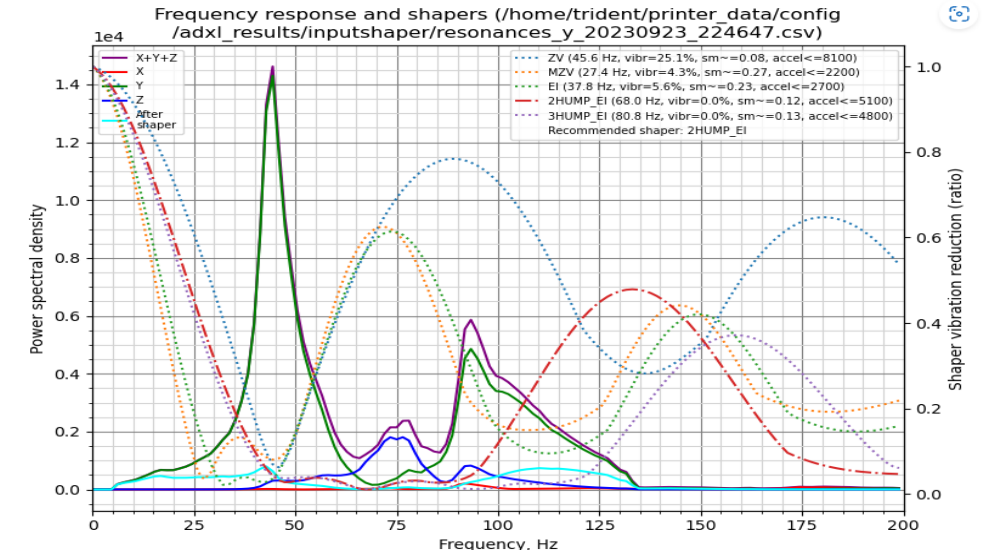
Nozzle

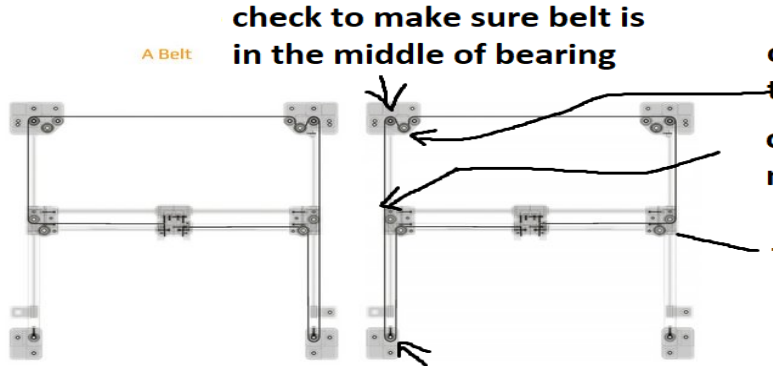


EBB36

The Attack Plan…







check to make sure belt is in the middle of bearing

check to make sure belt is in the middle of motor pulley

check to make sure belt is not rubbing on xy joint

This mainly controls x-axis

check to make sure no belt dust and belt is middle of bearing

Comparing these two graphs we see that they have a common spike around 100Hz. In the belt shaper it is on the B belt. Above is a picture of the belt paths.

Based upon the data from this y-graph,

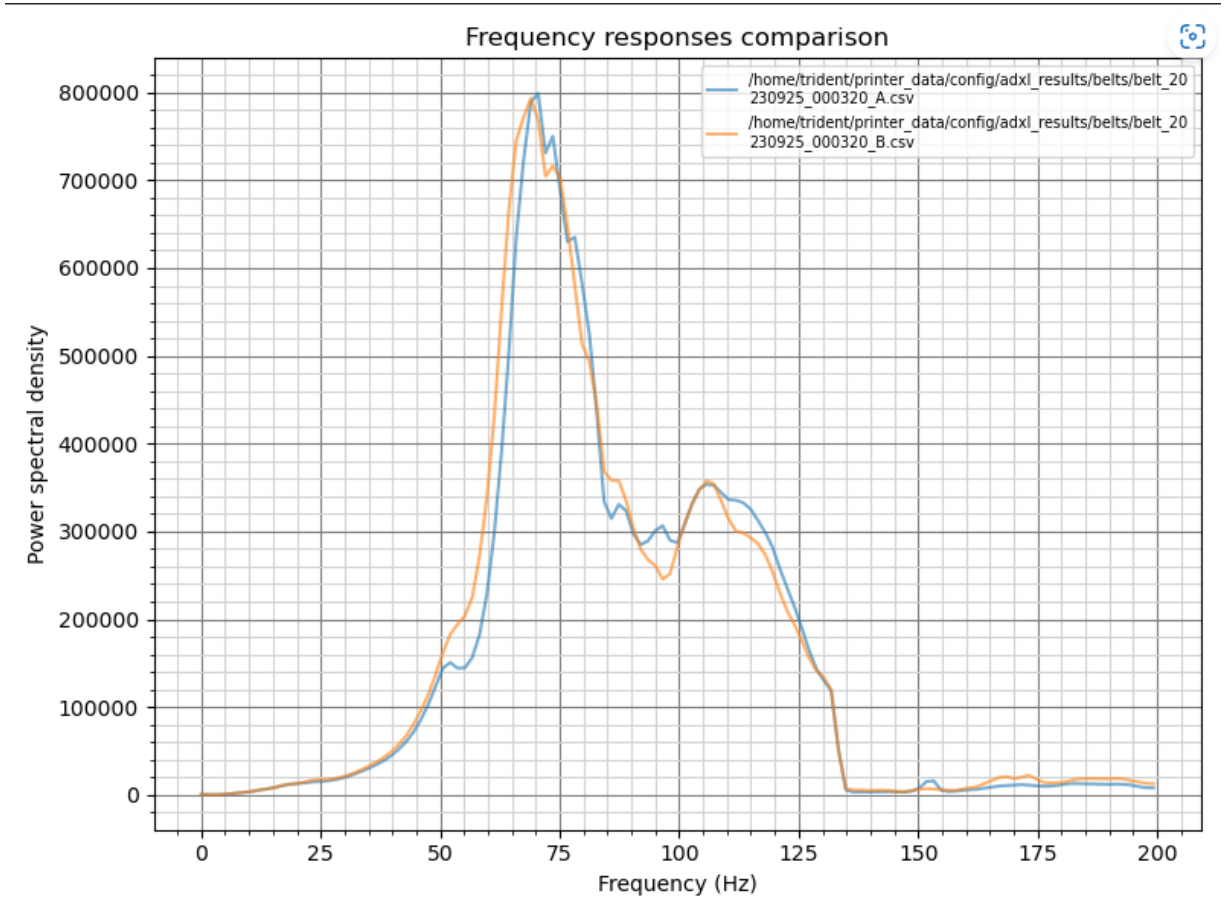
I think something in your b-belt path is the cause. What I would do is take the panels off and run a speed test. Watch the B-belt move and see what happens. I woudl also be listening to the y-linear rails and see if they sound good.

What I found…

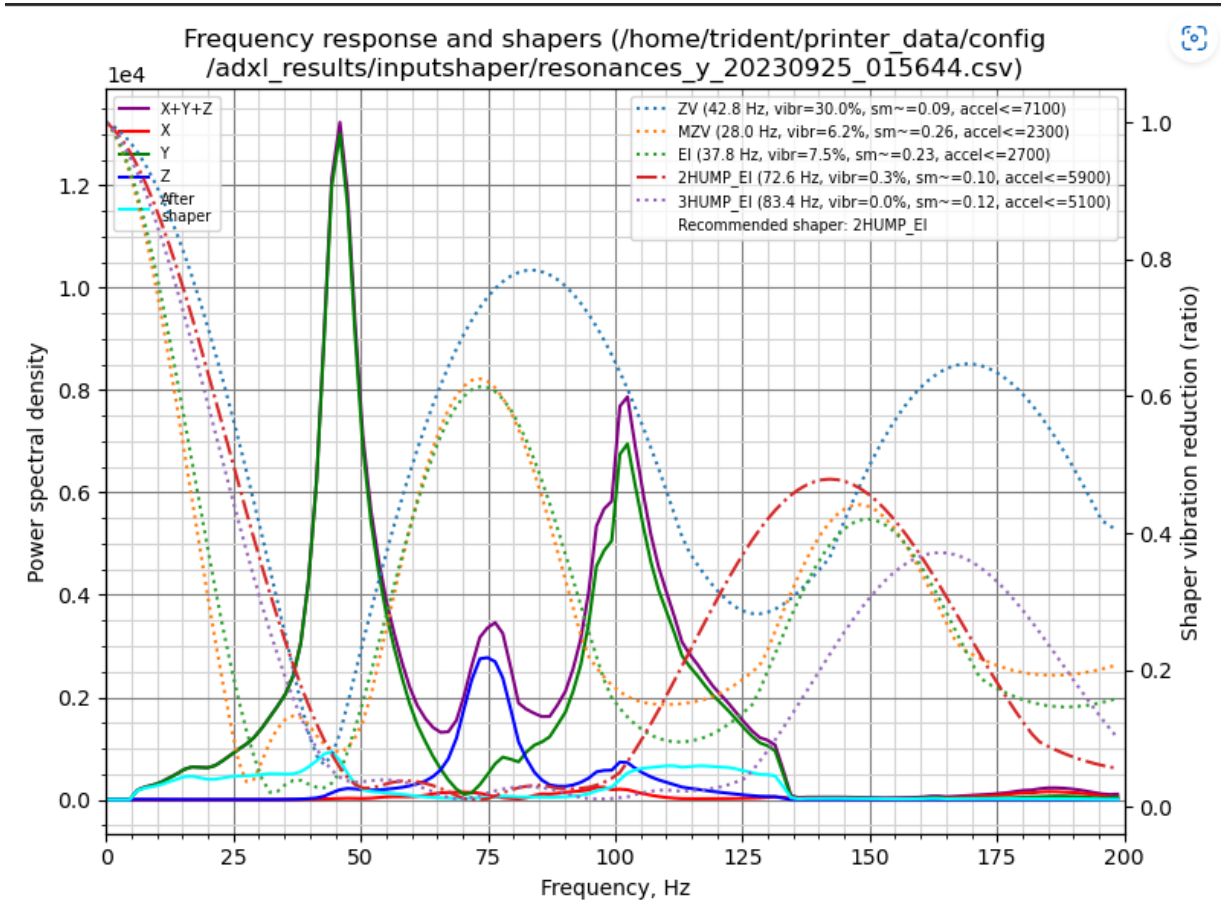
- When assembling the CNC XY Joints I put together the bearings in the same Stack configuration as a stock XY joint.
  This was incorrect and ended up with 1 additional 1mm washer in one of the bearing stacks.
  This caused the joint to not properly fit together and put a lot of additional pressure on the bearing pins.

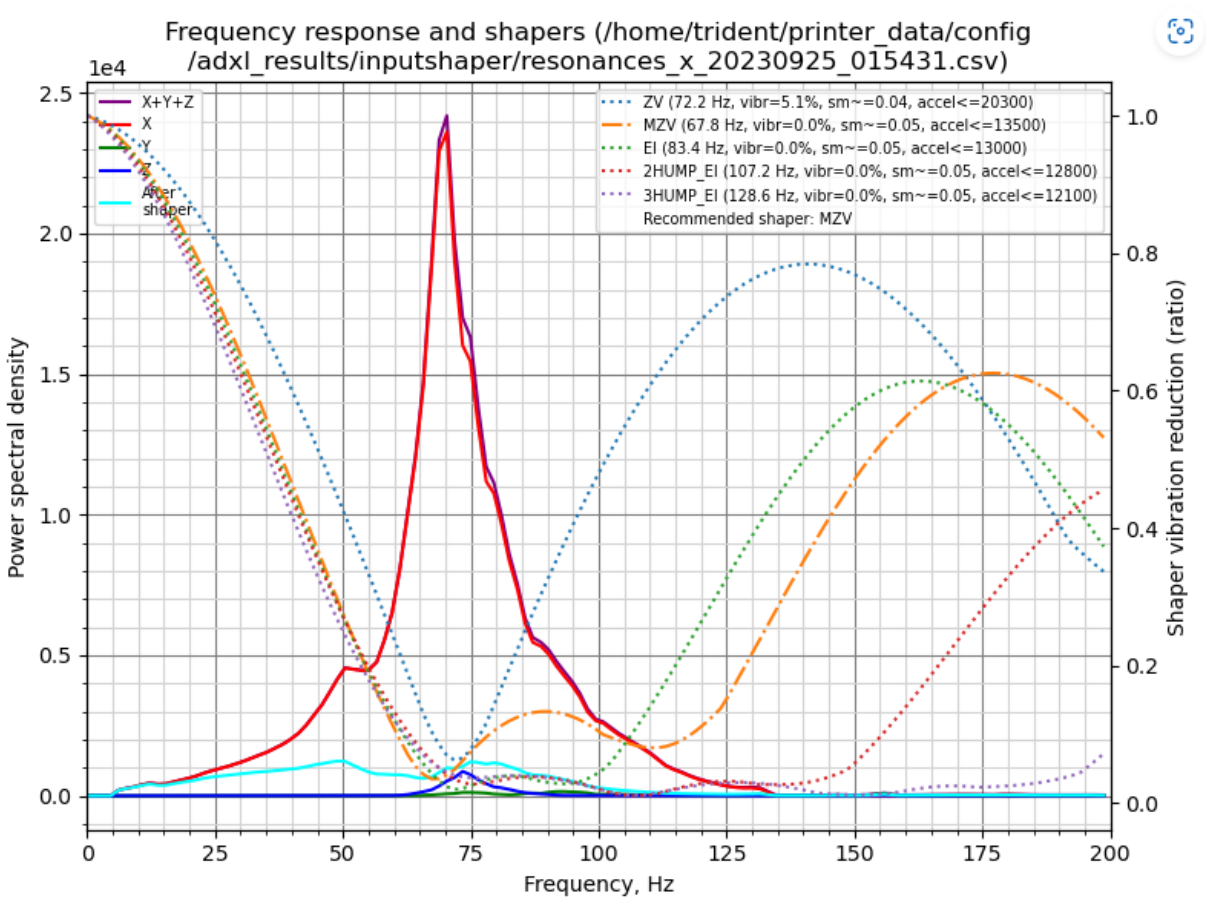
- Disassembled the gantry and Fixed Bearing stacks (1 on each side)
- De-racked the gantry
- Reassembled remaining Gantry components and ran motion test
- Re-tensioned belts to between 108hz and 110hz
- Adjusted belt using Belt Shaper to get the following result

Belt shaper after Ganty rebuild and couple adjustments, Tension 108hz -110hz

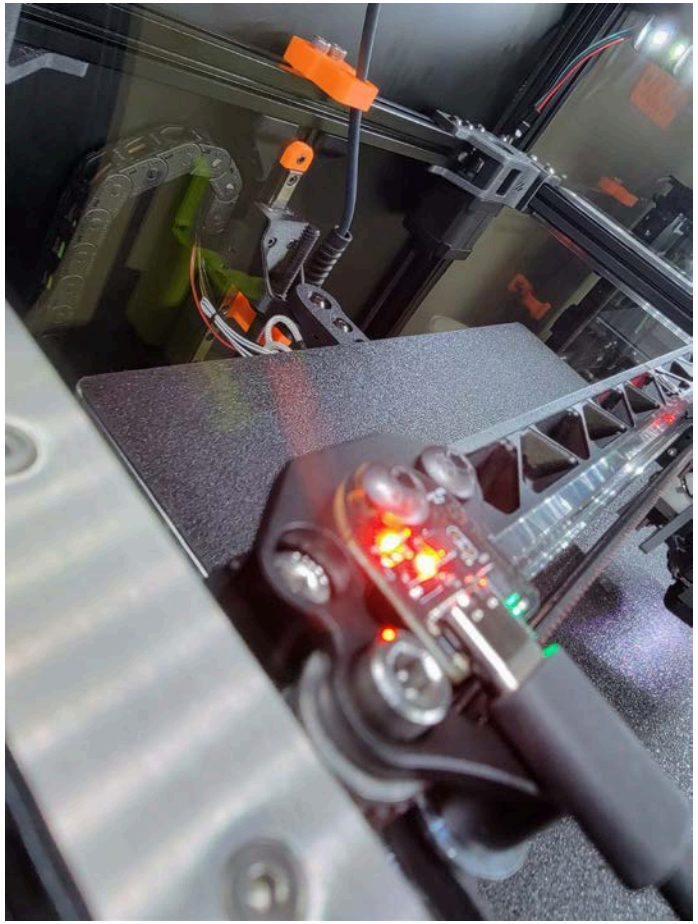


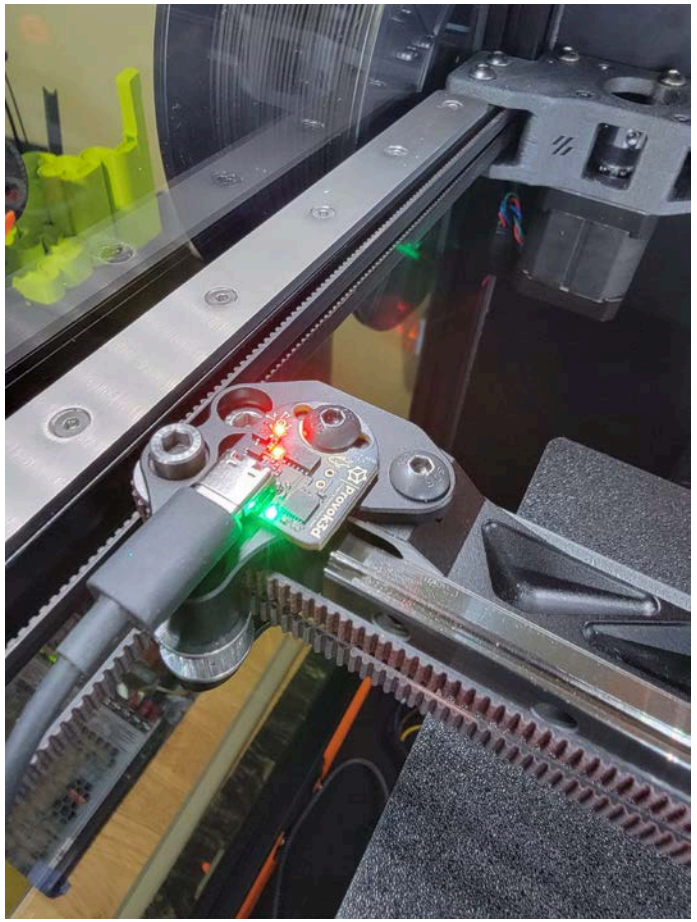
Not the results I expected on the Y Shaper after the gantry repair.



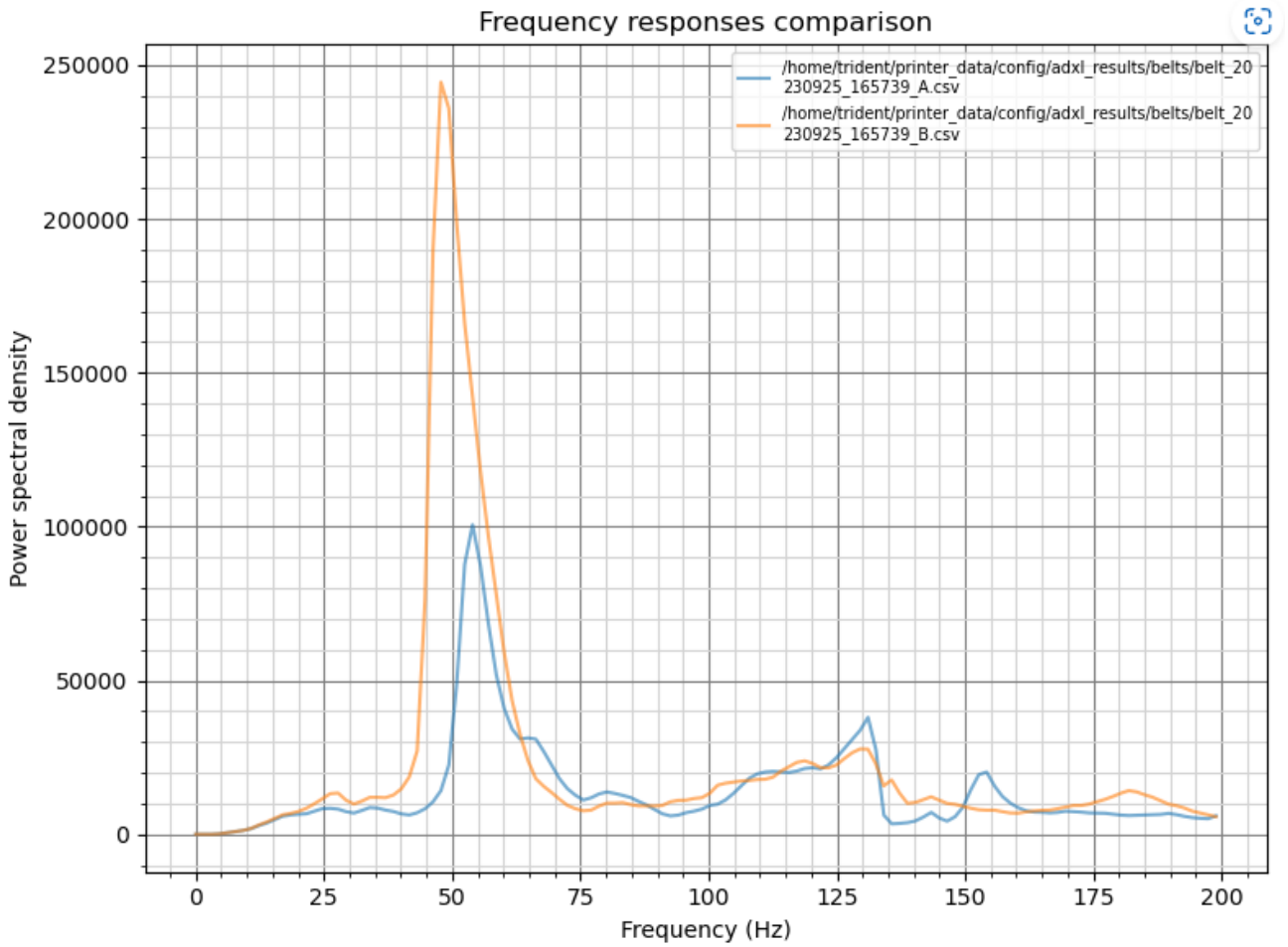


Left xy joint

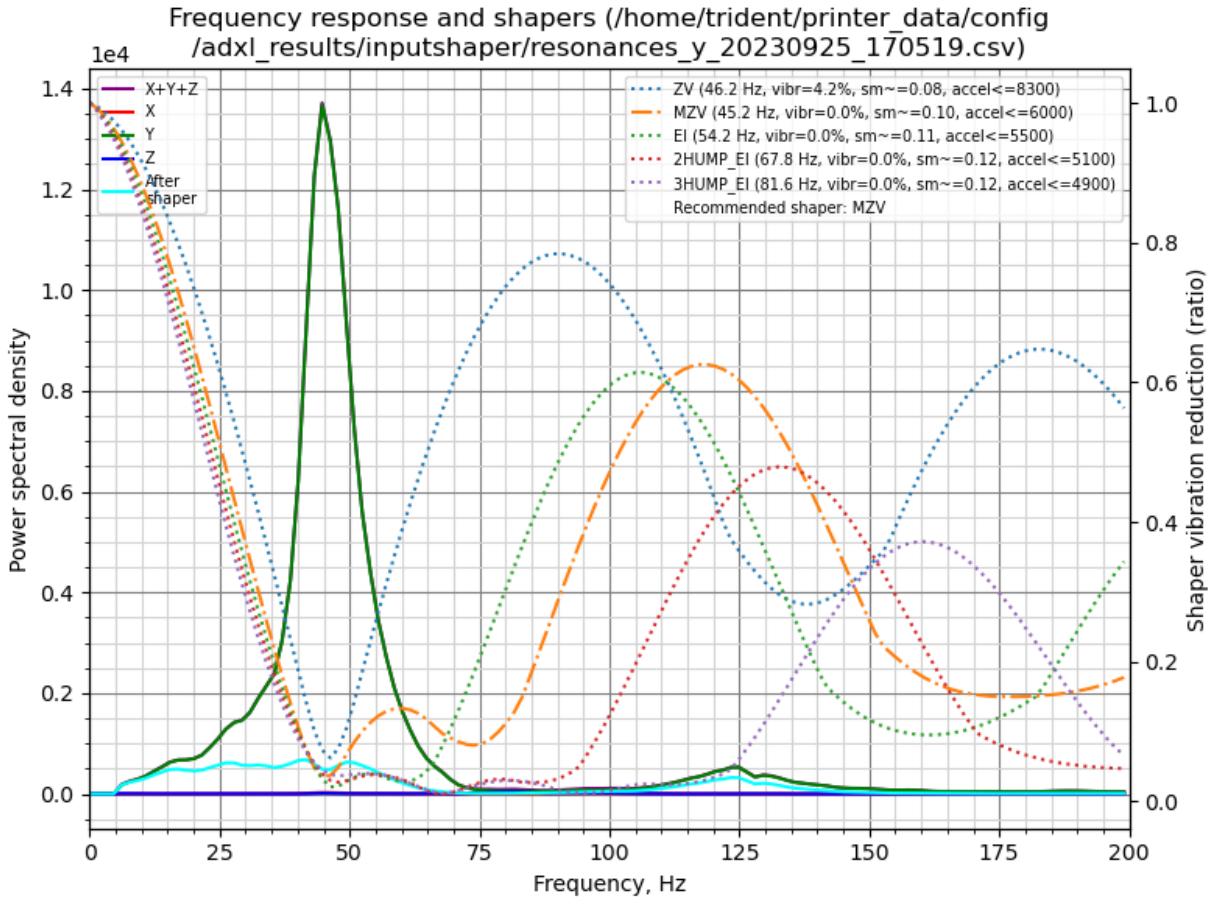




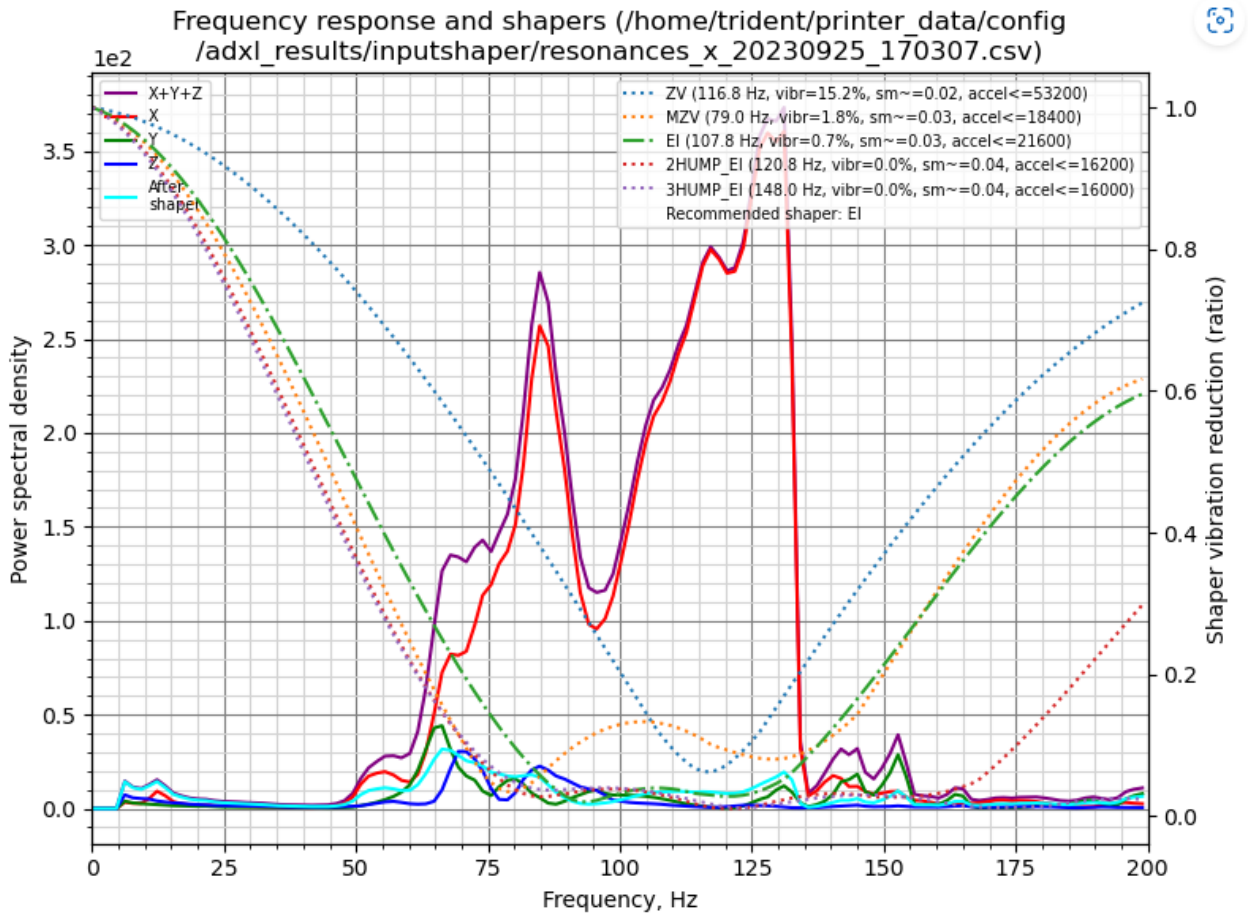
Left –xy joint – belt shaper – bearing/idlers are loose



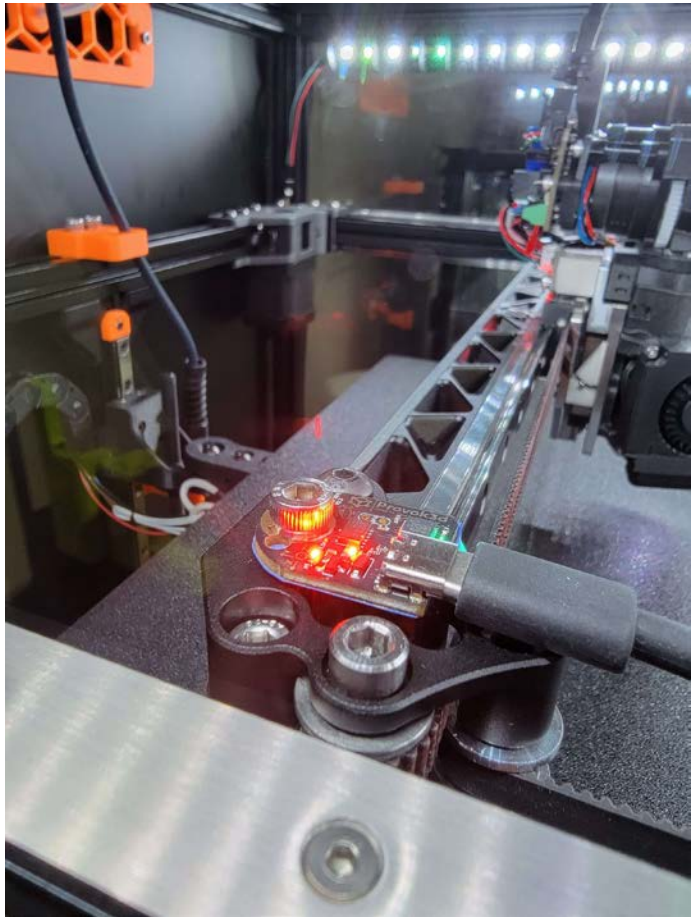
Left xy-joint y-axis – bearing/idlers are loose



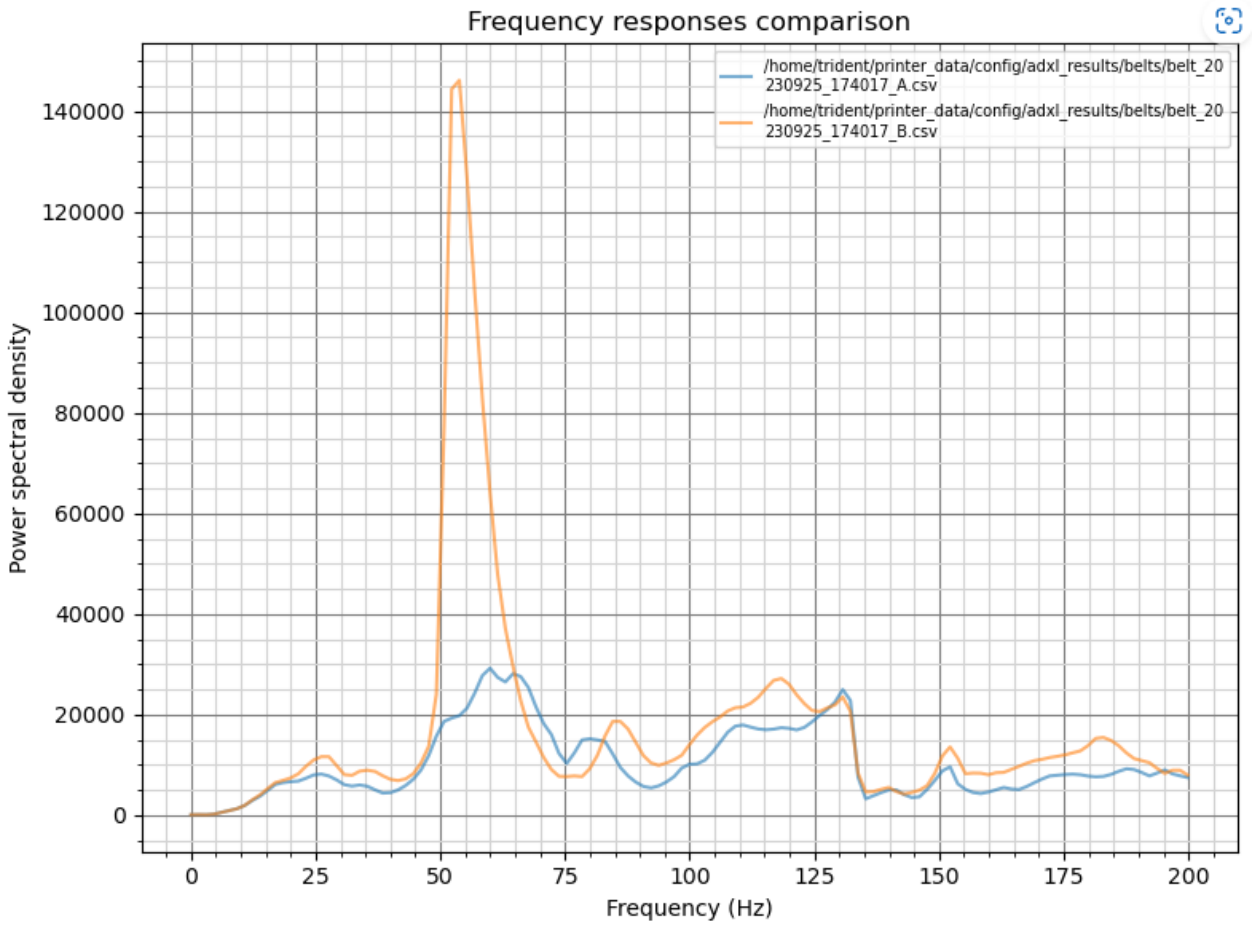
Left –xy joint – x axis – bearing/idlers are loose



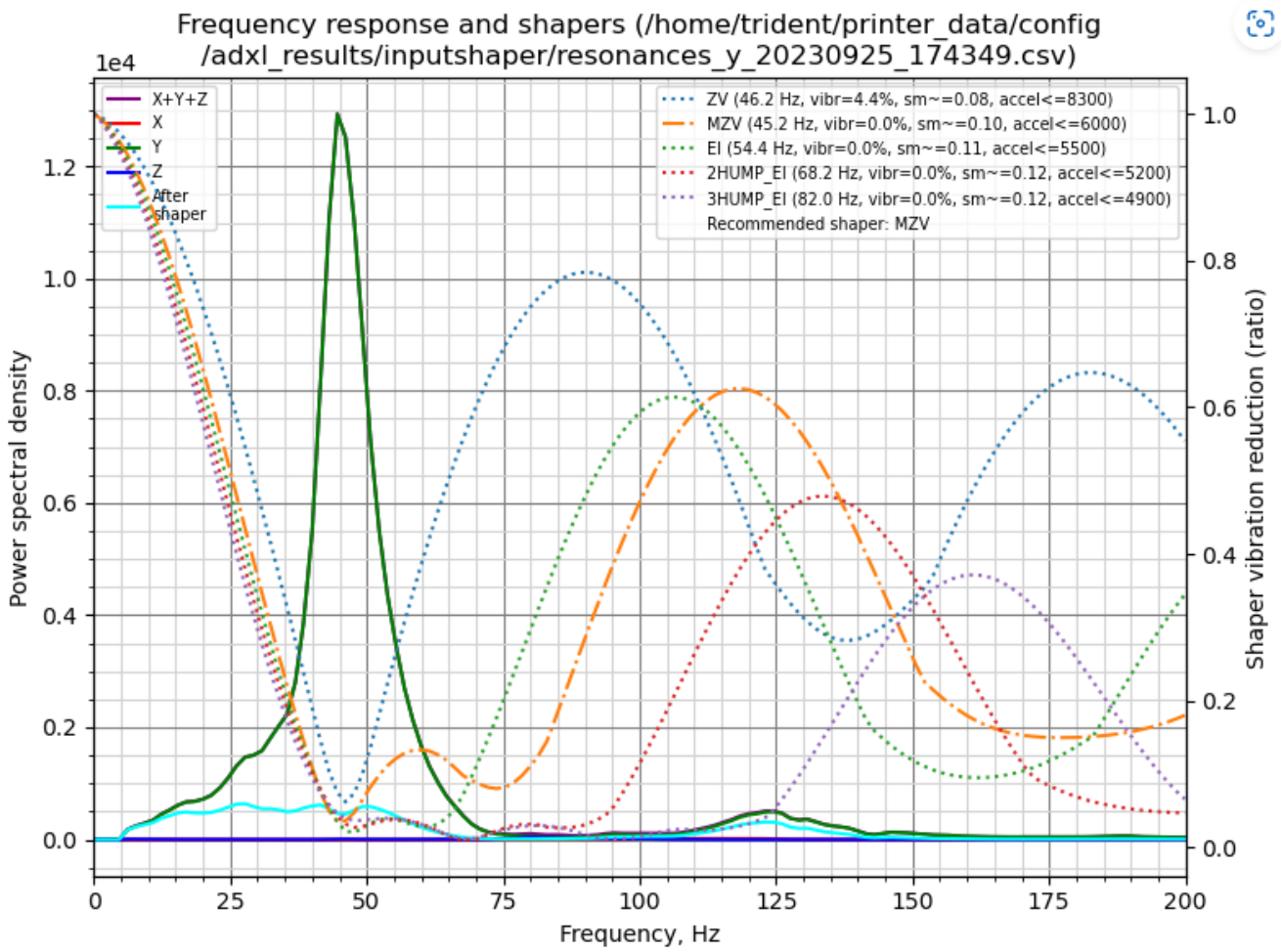
Added shim and painters tape to adxl – tightend bearing and 20 tooth idler snug, not cranked down



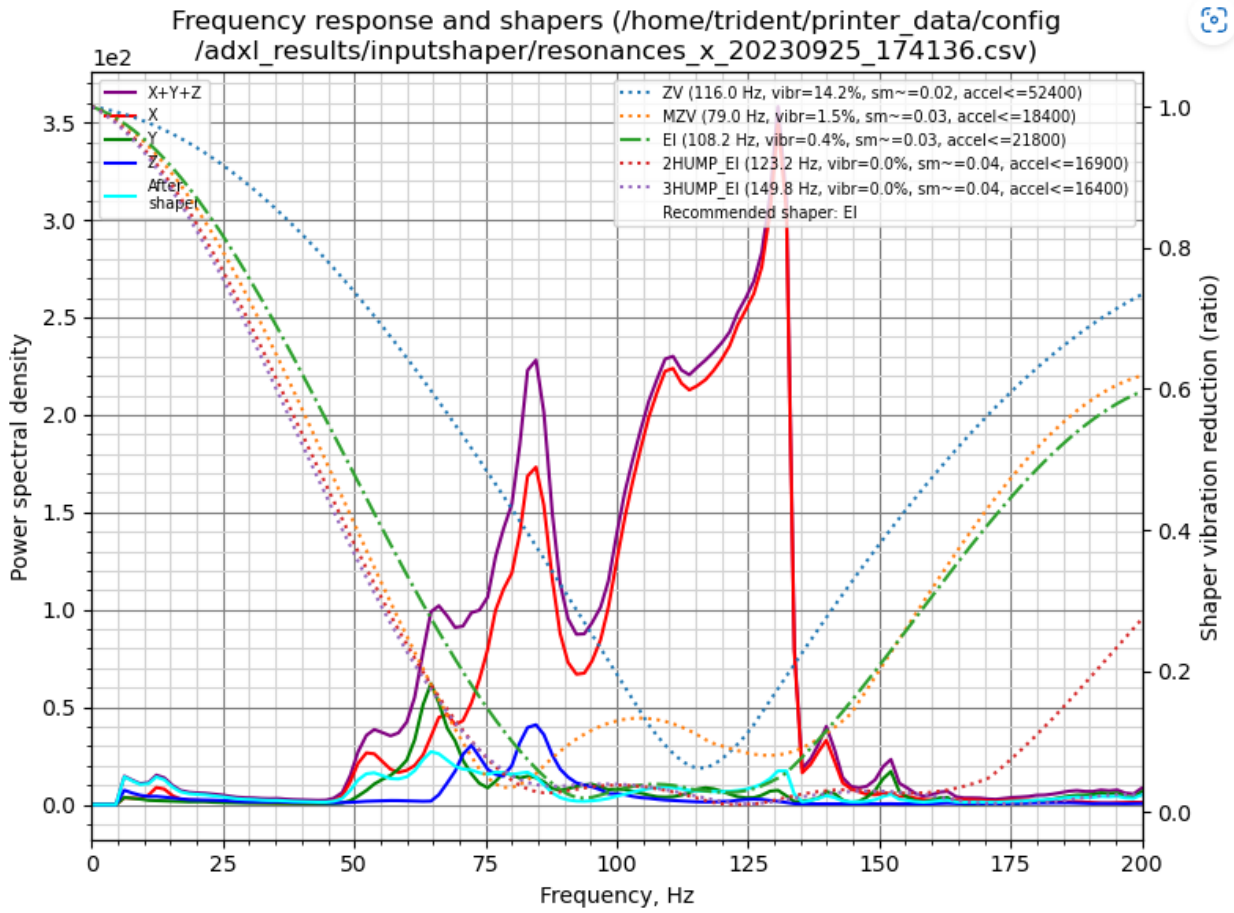
Left –xy joint – belt shaper – bearing/idlers are snug



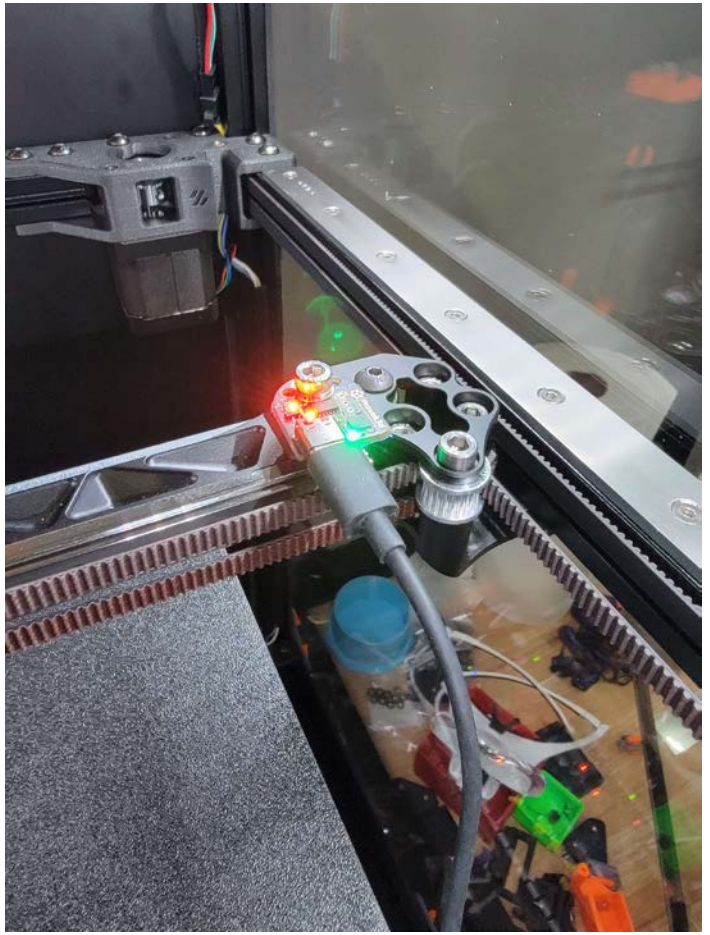
Left xy-joint y-axis – bearing/idlers are snug



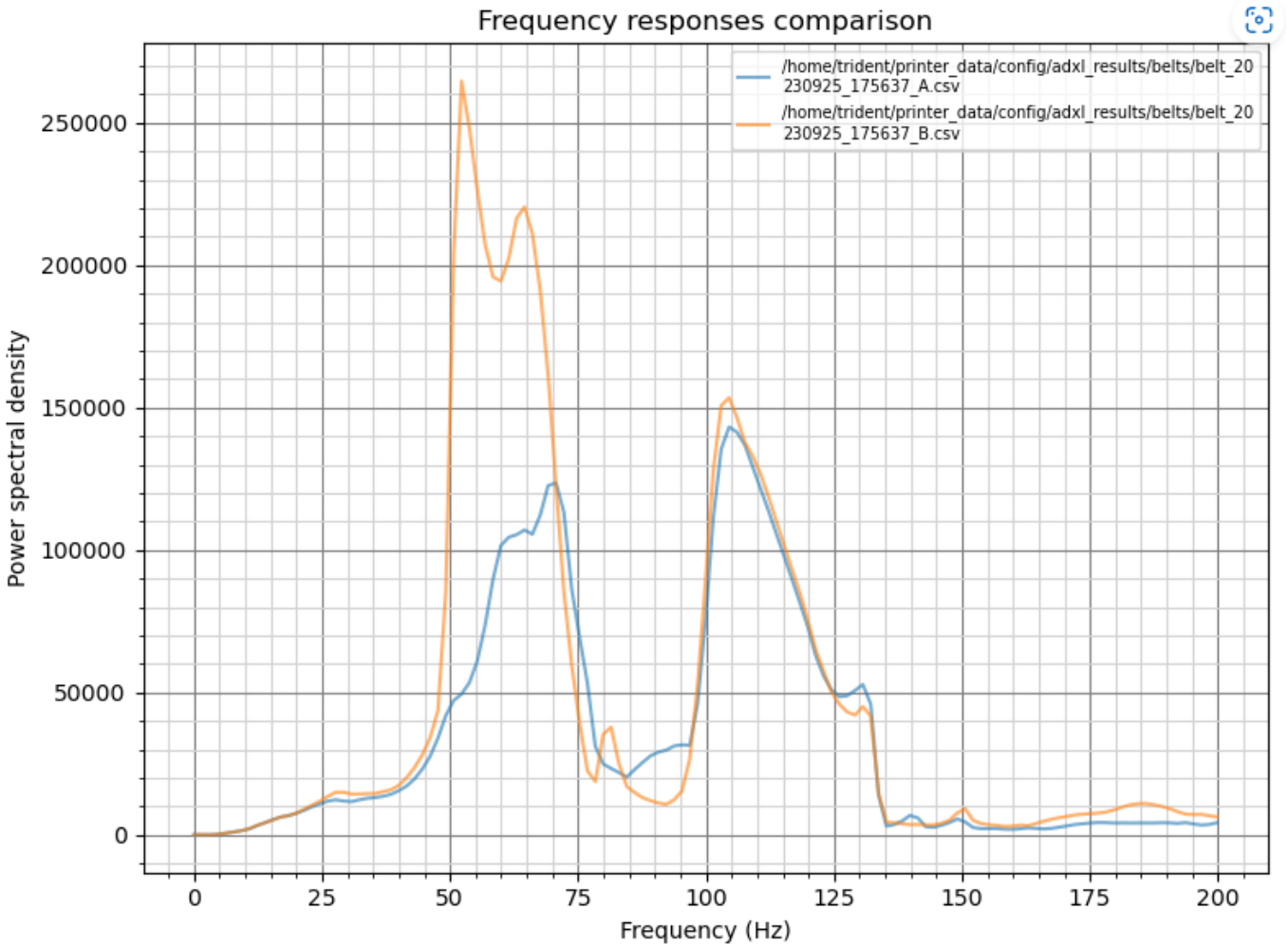
Left xy-joint x-axis – bearing/idlers are snug



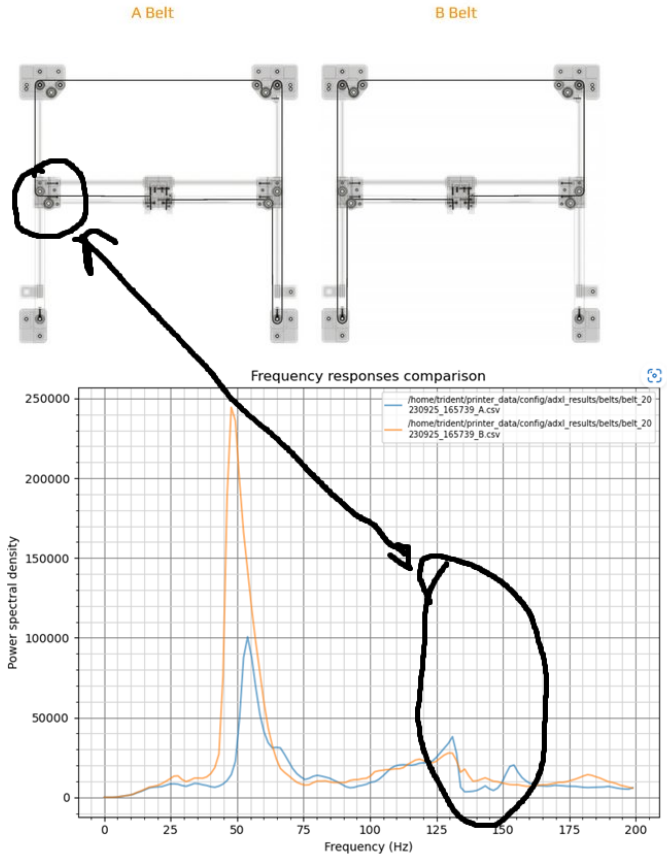
right xy joint



Left –xy joint – belt shaper – bearing/idler screws untouched



Thoughts on xy joint belt shaper graph

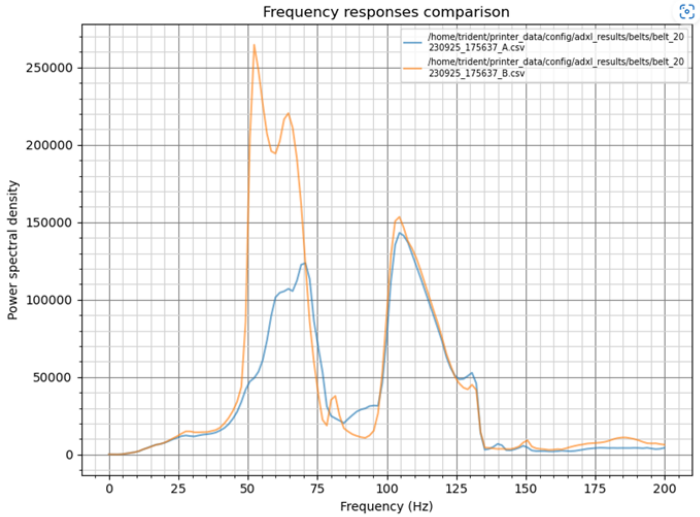


left xy joint

missing second hump

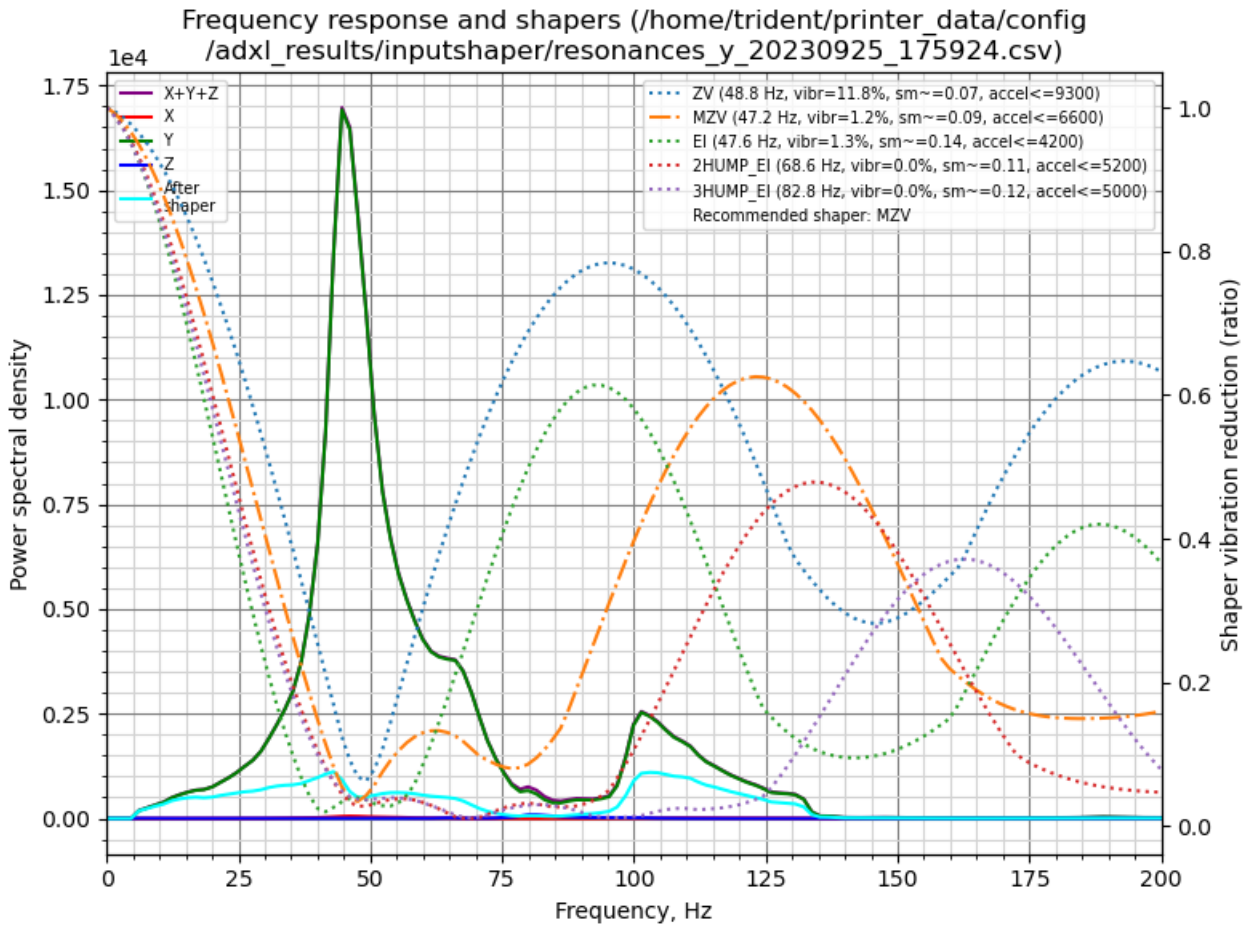
where does this lead us in troubleshooting. What information can be gleam?

Is it the bearings that are bad? Is it the 20tooth idler? Is the extrusion level? Is the linear rail good? Does the linear rail need more lube?

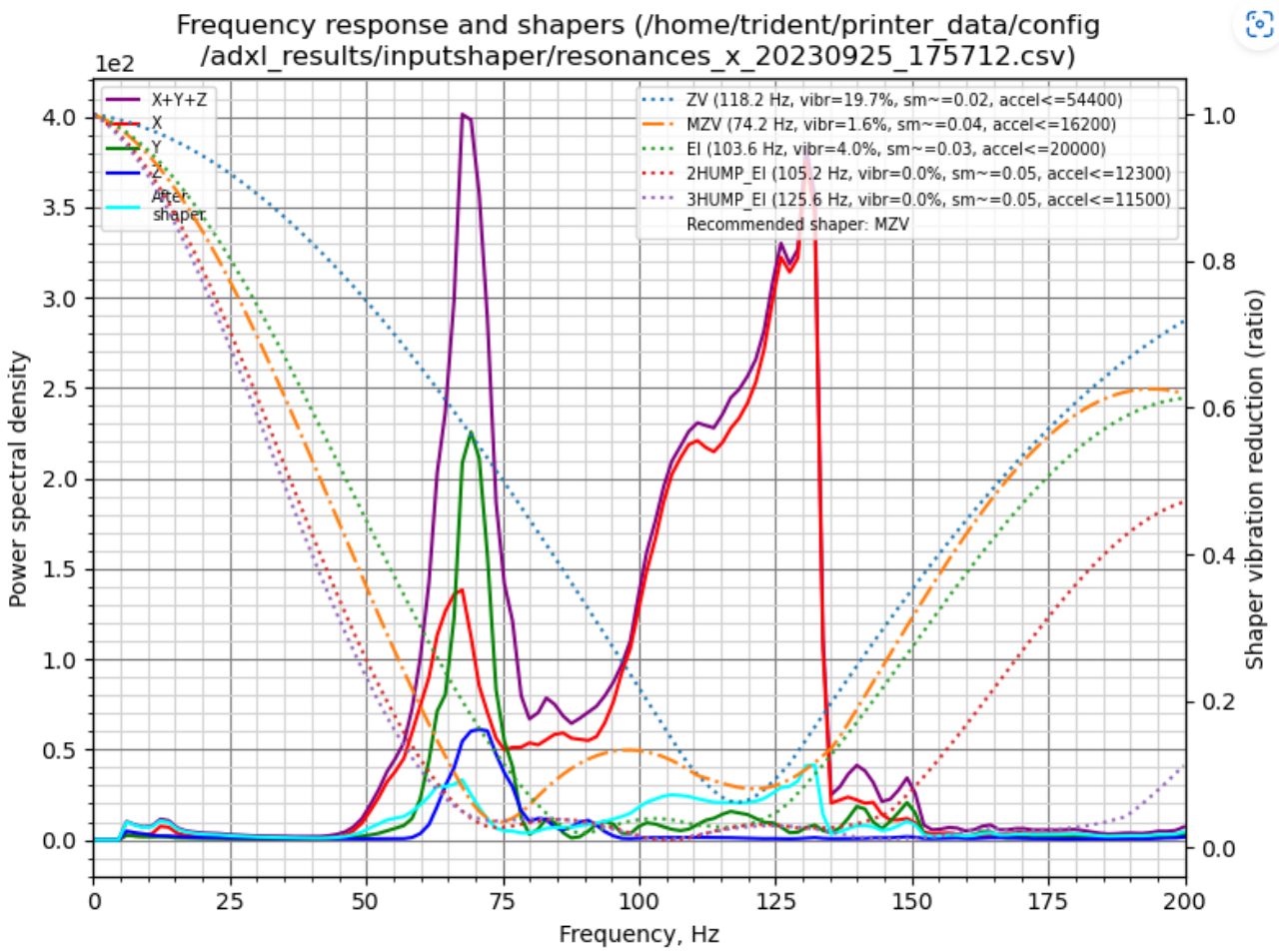


right xy joint

Right xy-joint y-axis – bearing/idlers not touched

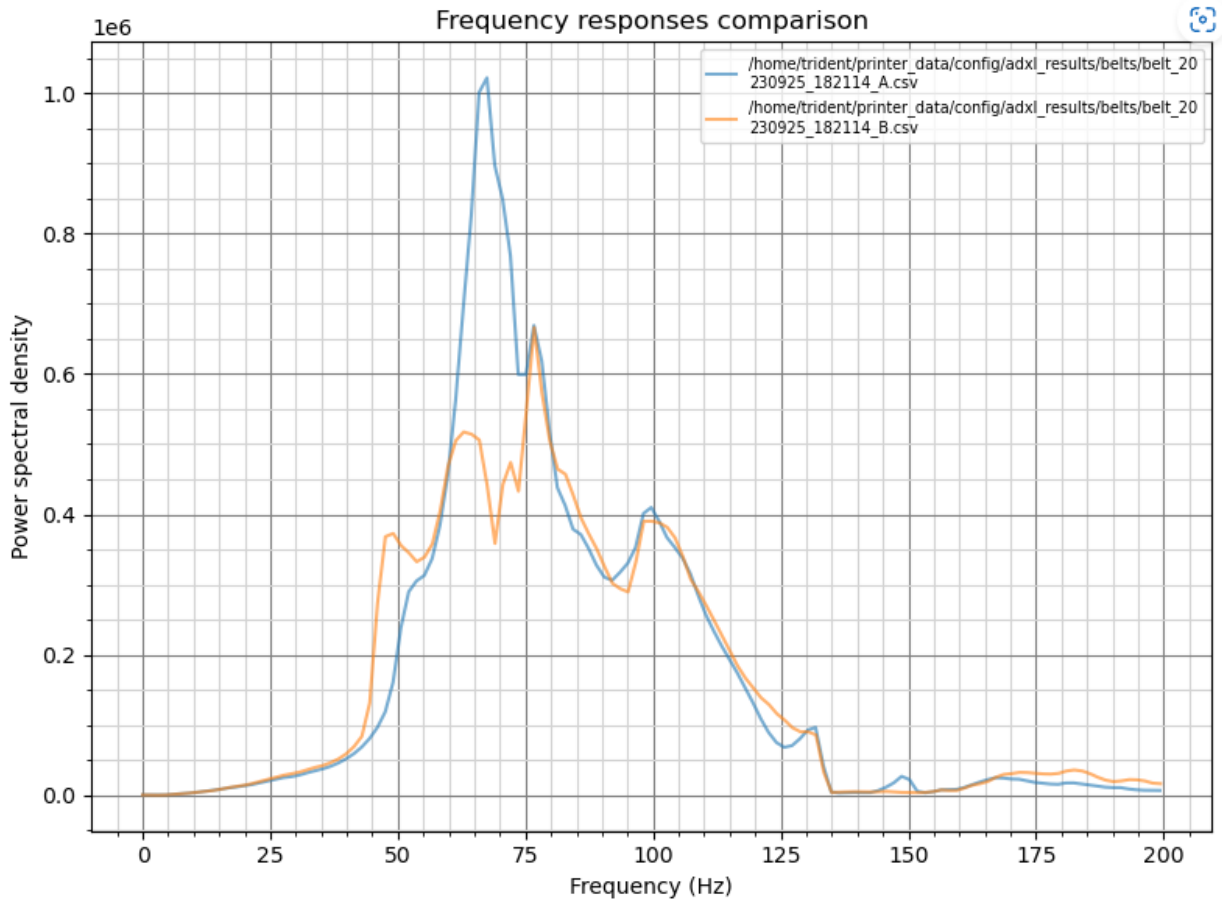


right xy-joint x-axis – bearing/idlers not touched

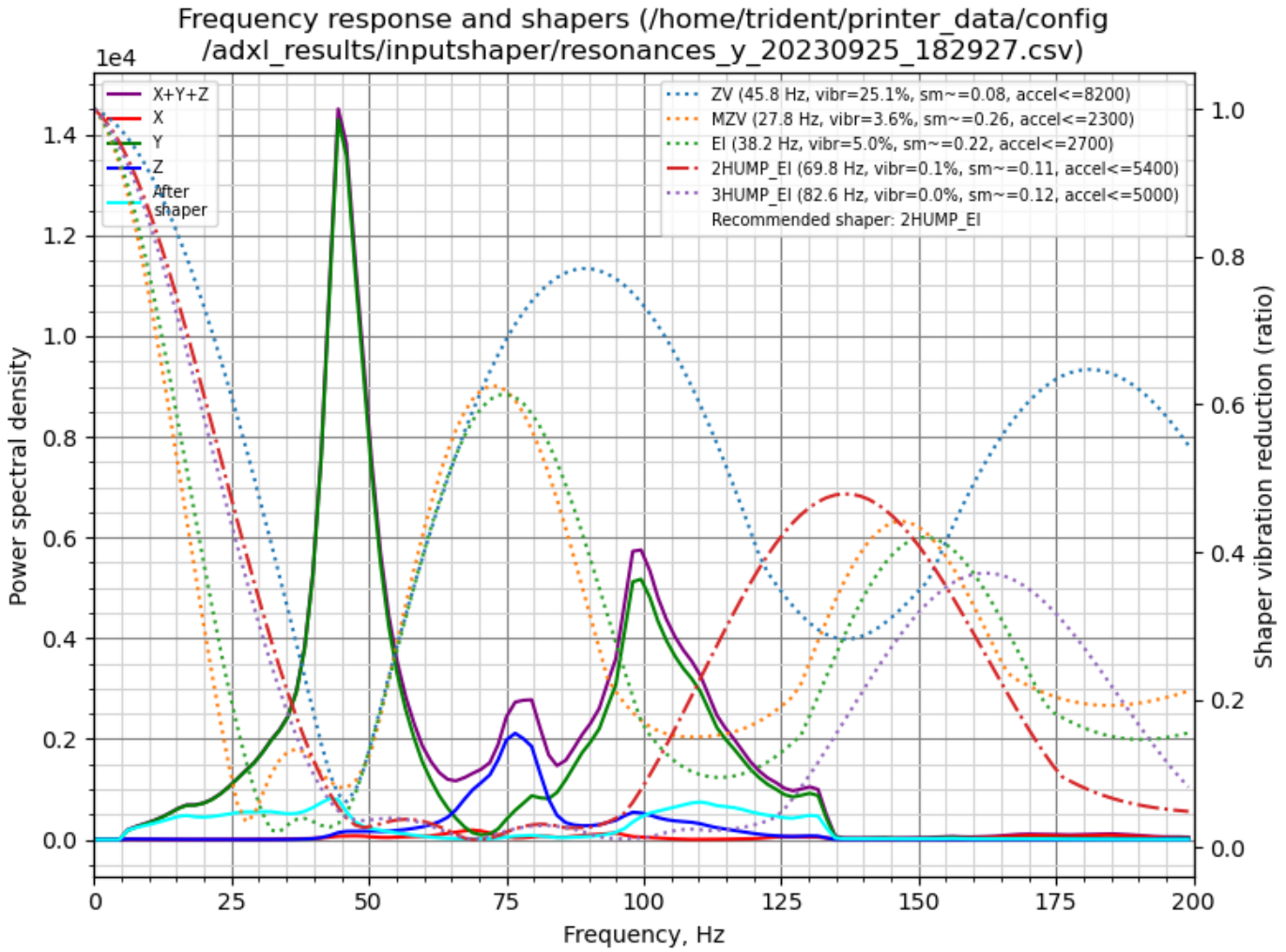


Nozzle probe

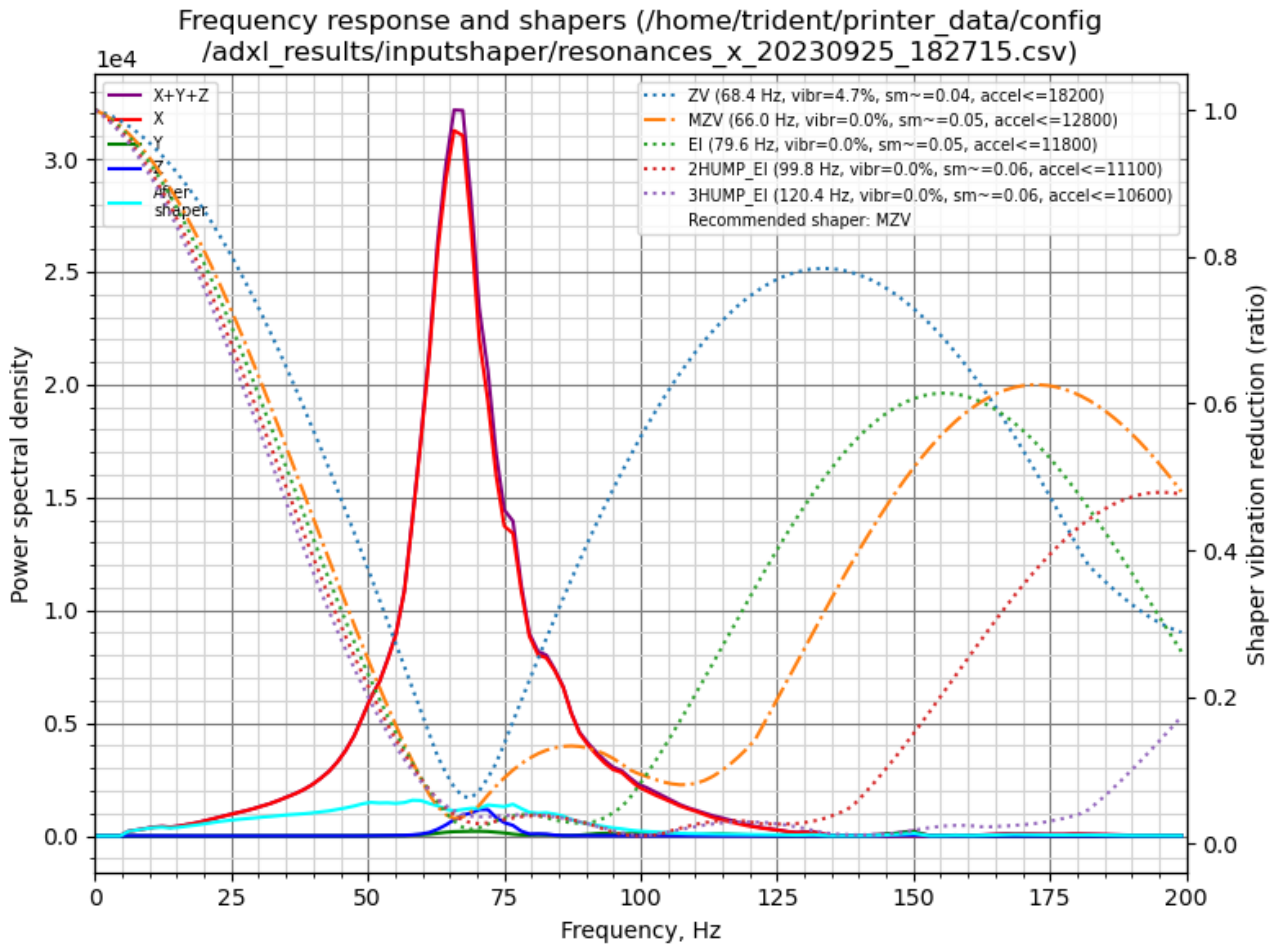
Belt shaper at nozzle probe



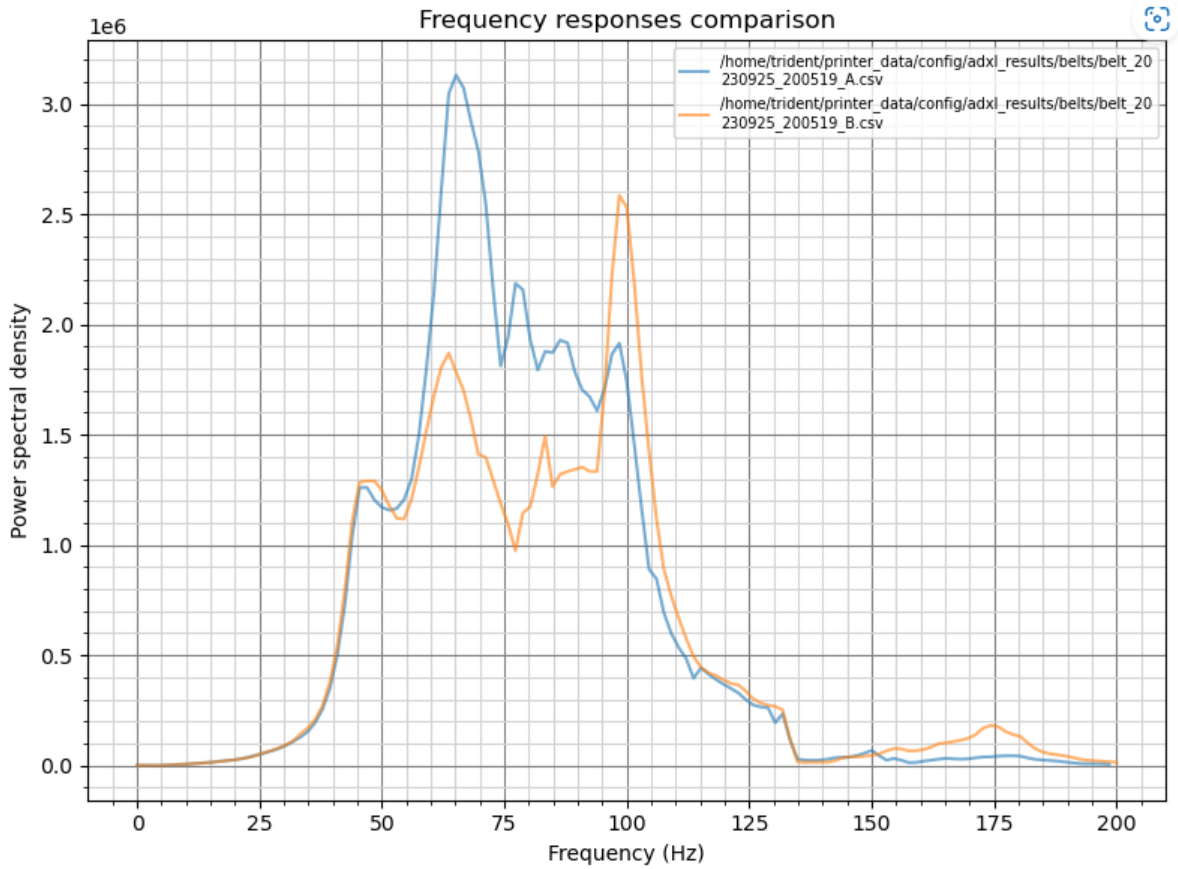
input shaper at nozzle probe – x-axis



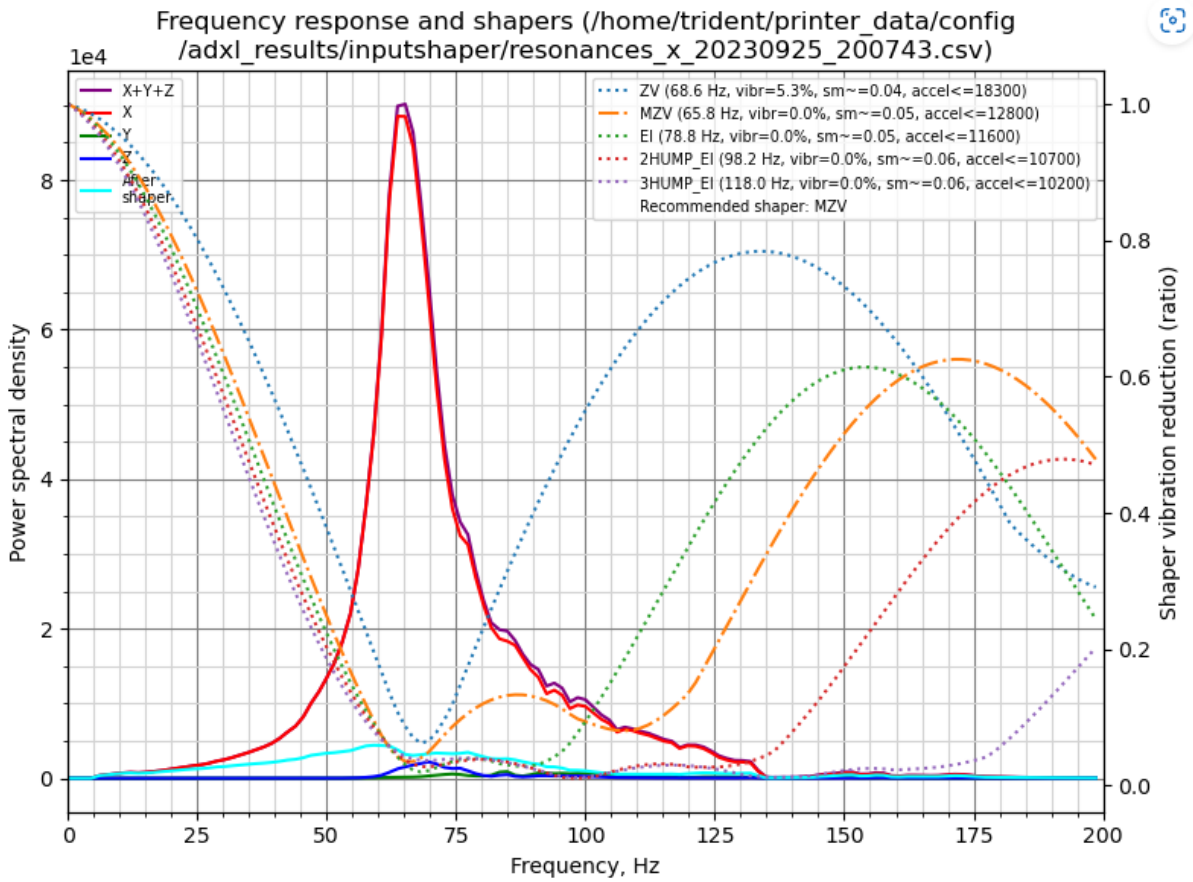
input shaper at nozzle probe – y axis



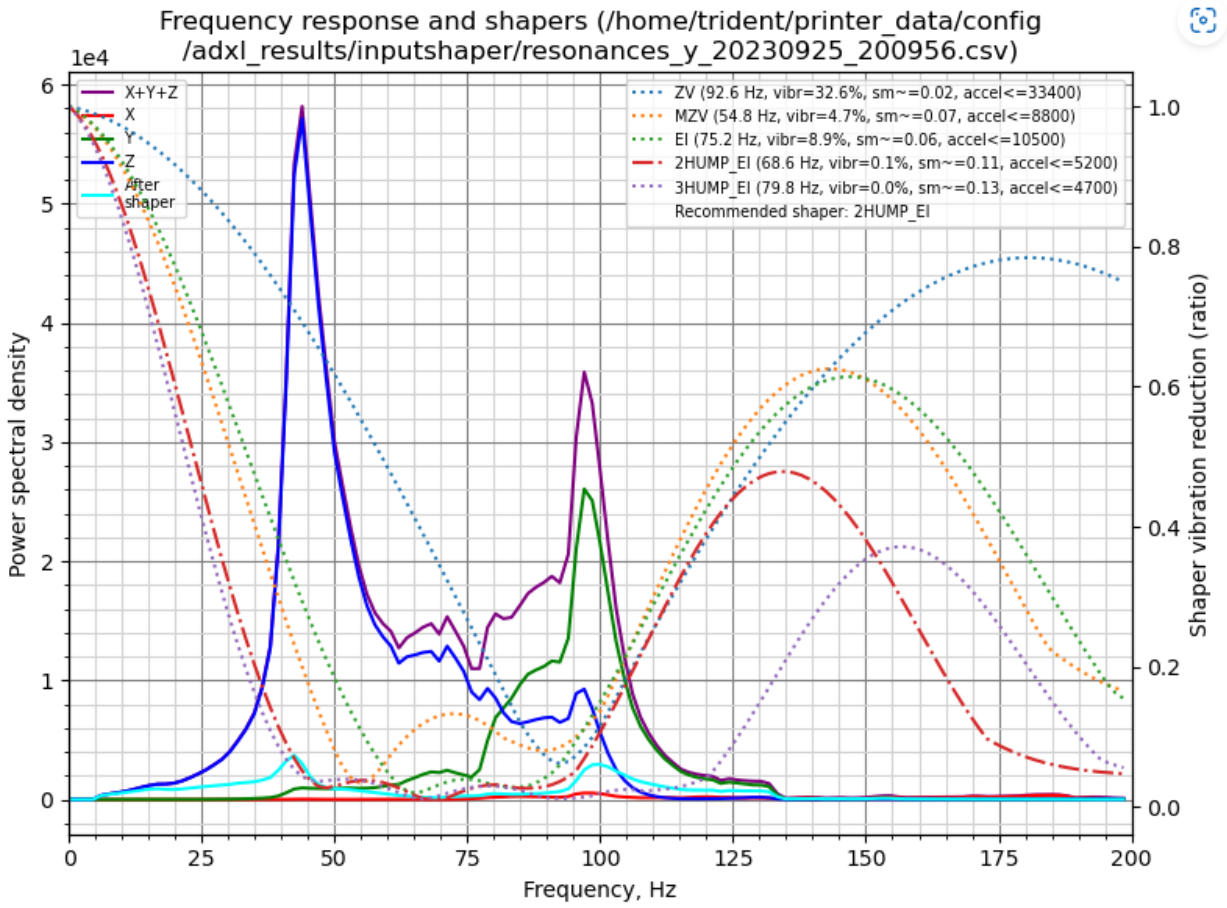
Canbus belts



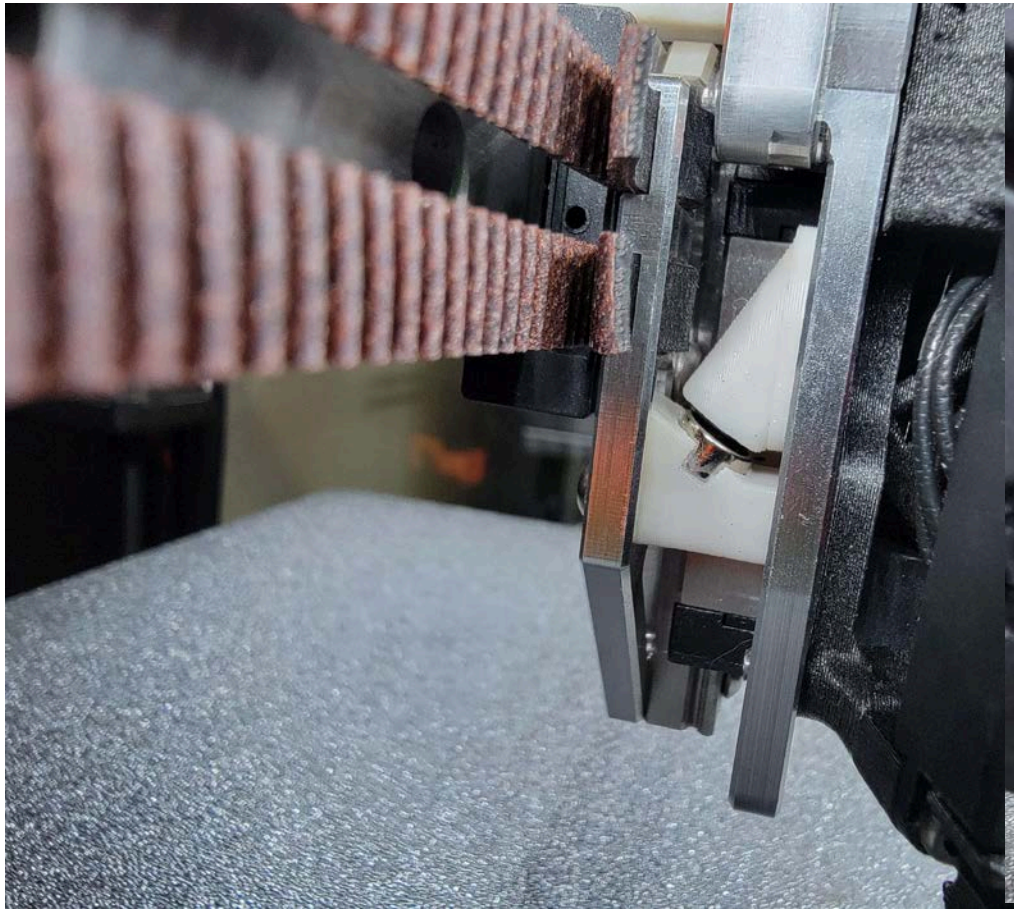
Canbus – x-axis

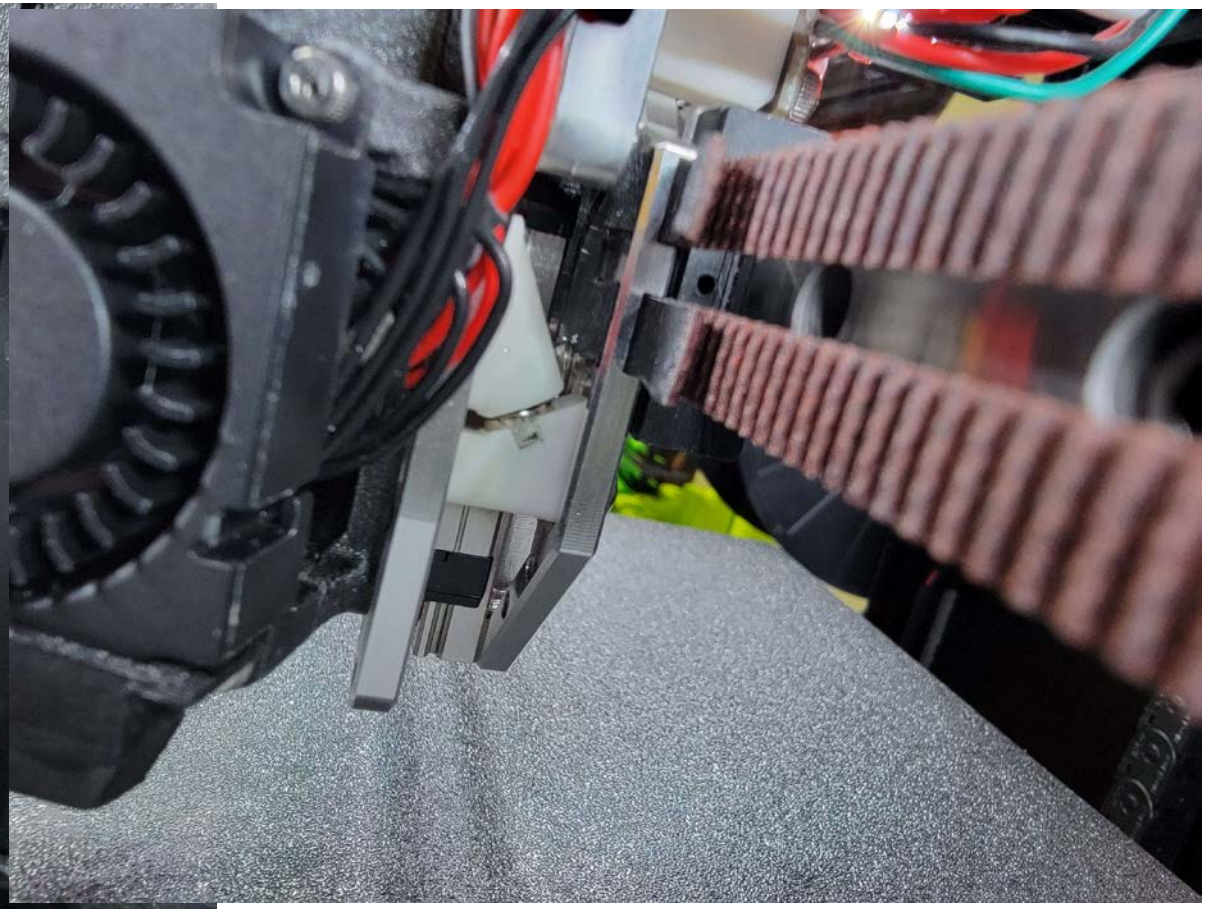


Canbus y-axis

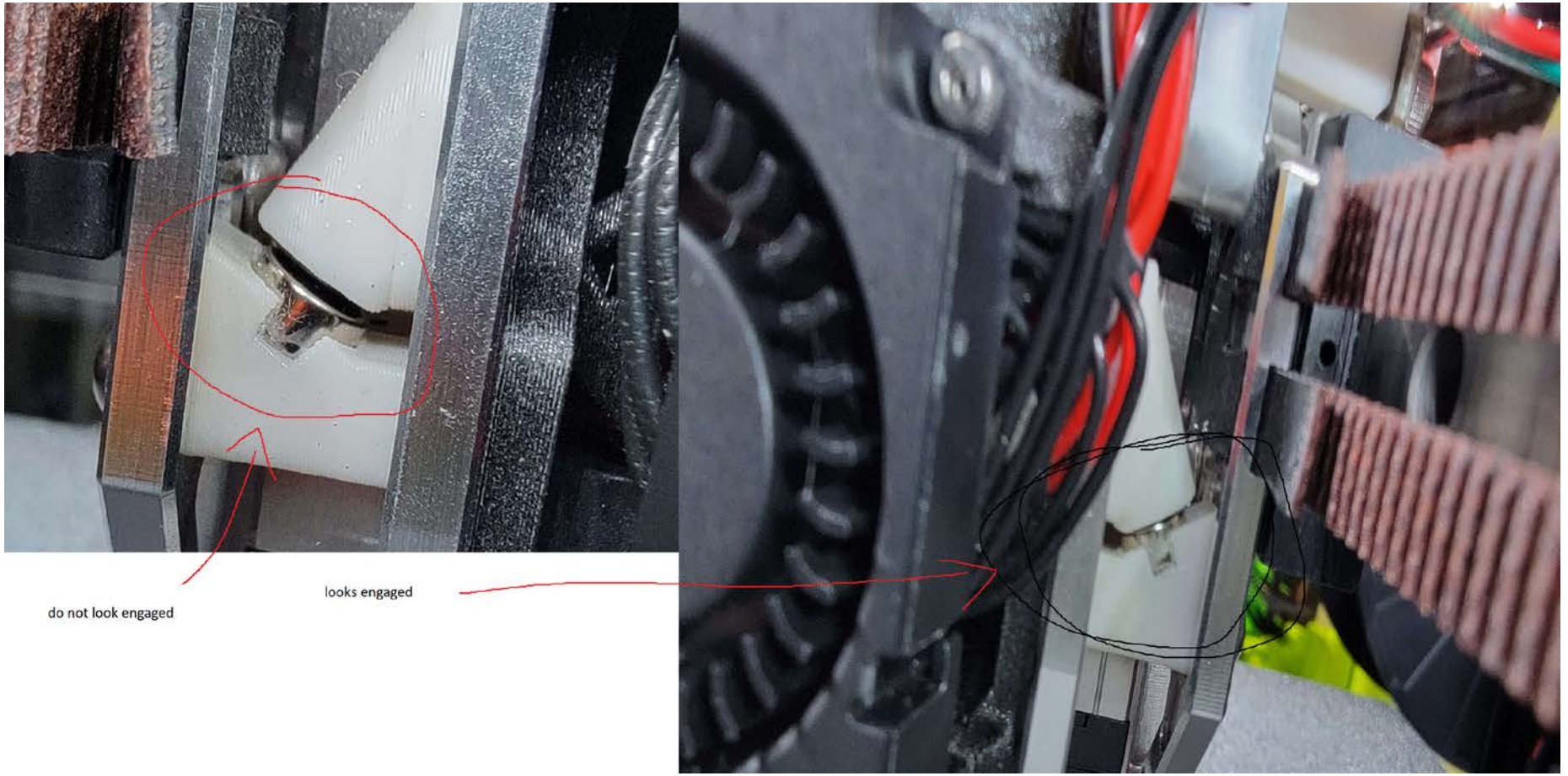


Vitalii tap





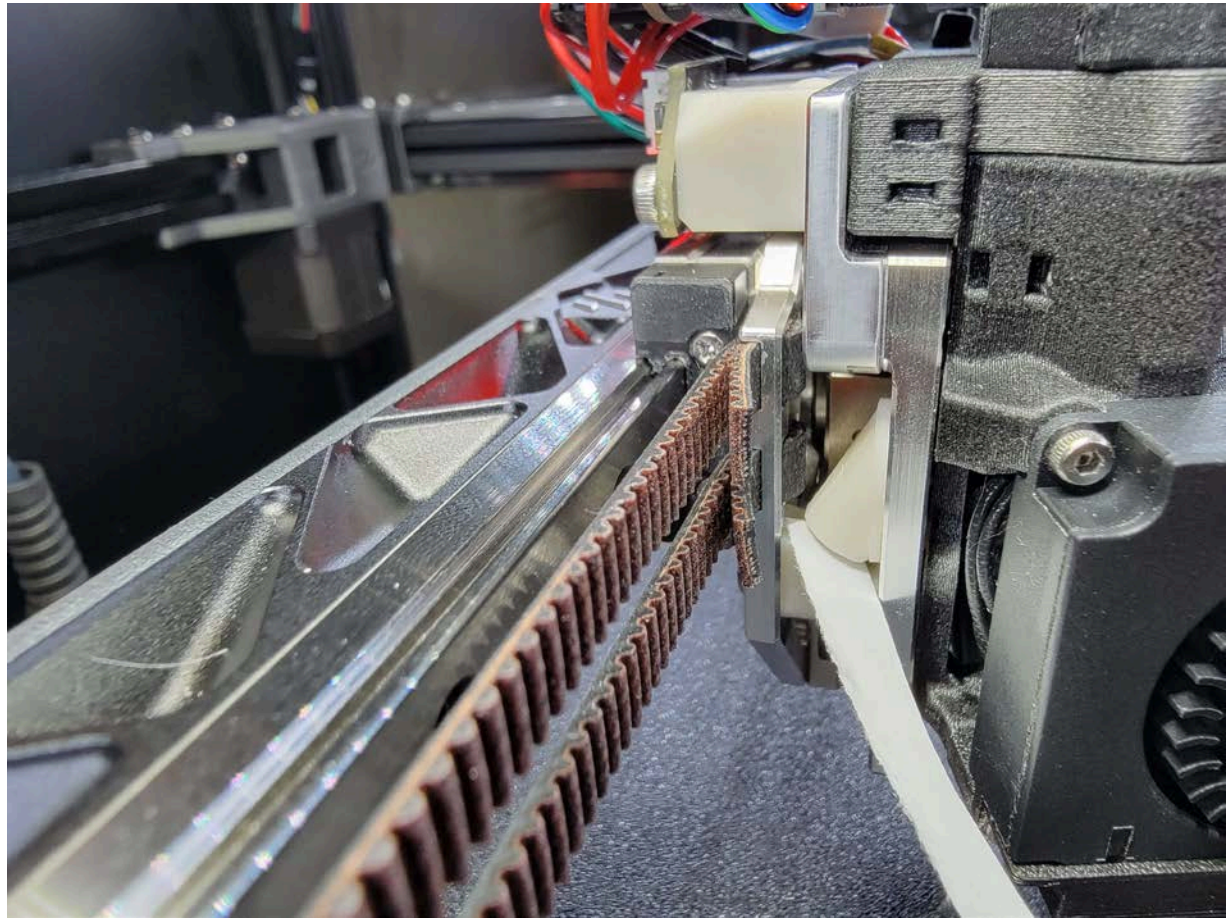
Recommendation adjust magnet on left side of printer for vitalii tap



Magnet on Vitalii tap not properly engaged

- Einstein states he can put the paper in as the right side of the left magnet only catches on the edge.
- Asked if he could rotate the magnet at all to make it flush

- If he cannot, for testing purposes only, I will ask if he can insert other magnets into the spot so hopefully that will fill the spot

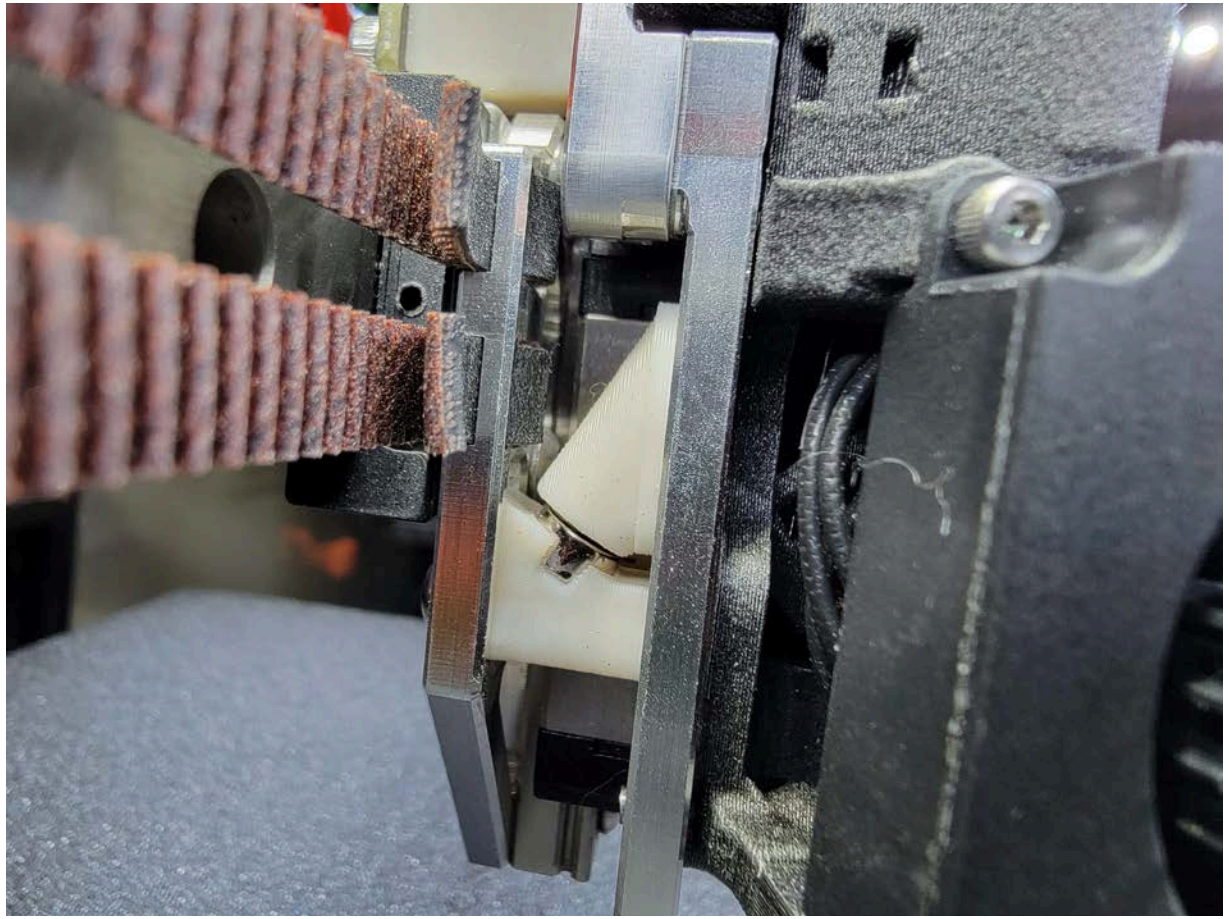


Vitalii metal tap instructions

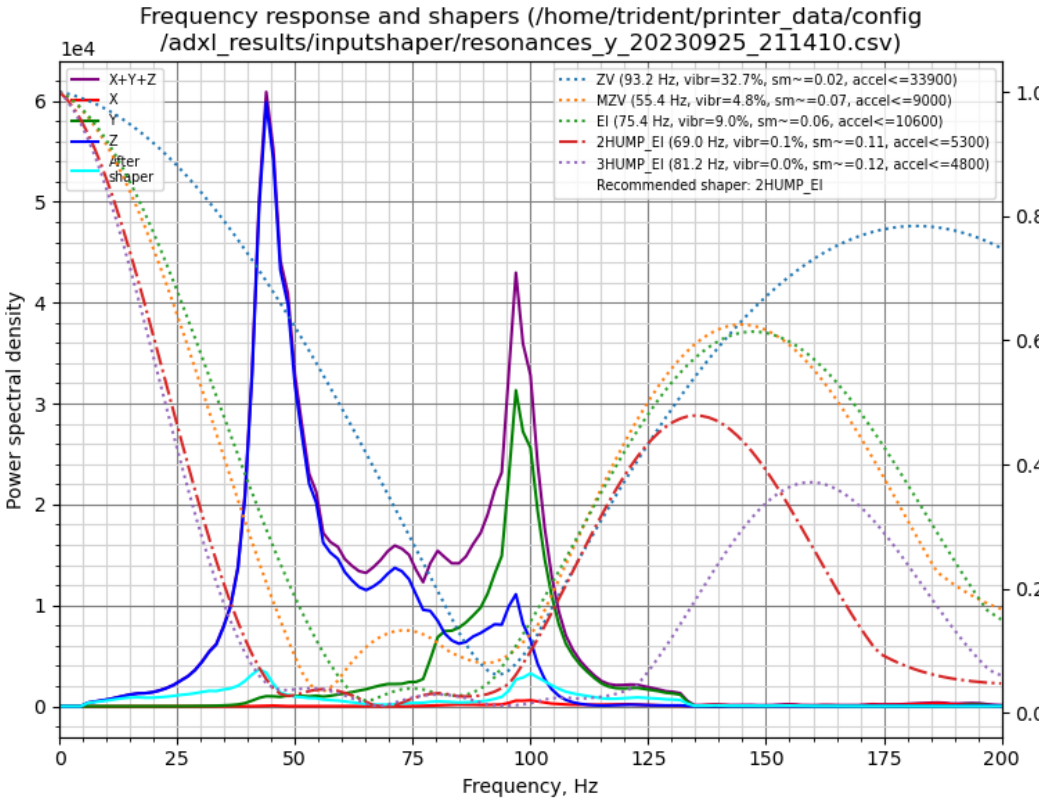
- https://www.youtube.com/watch?v=gwPNVVCuMag

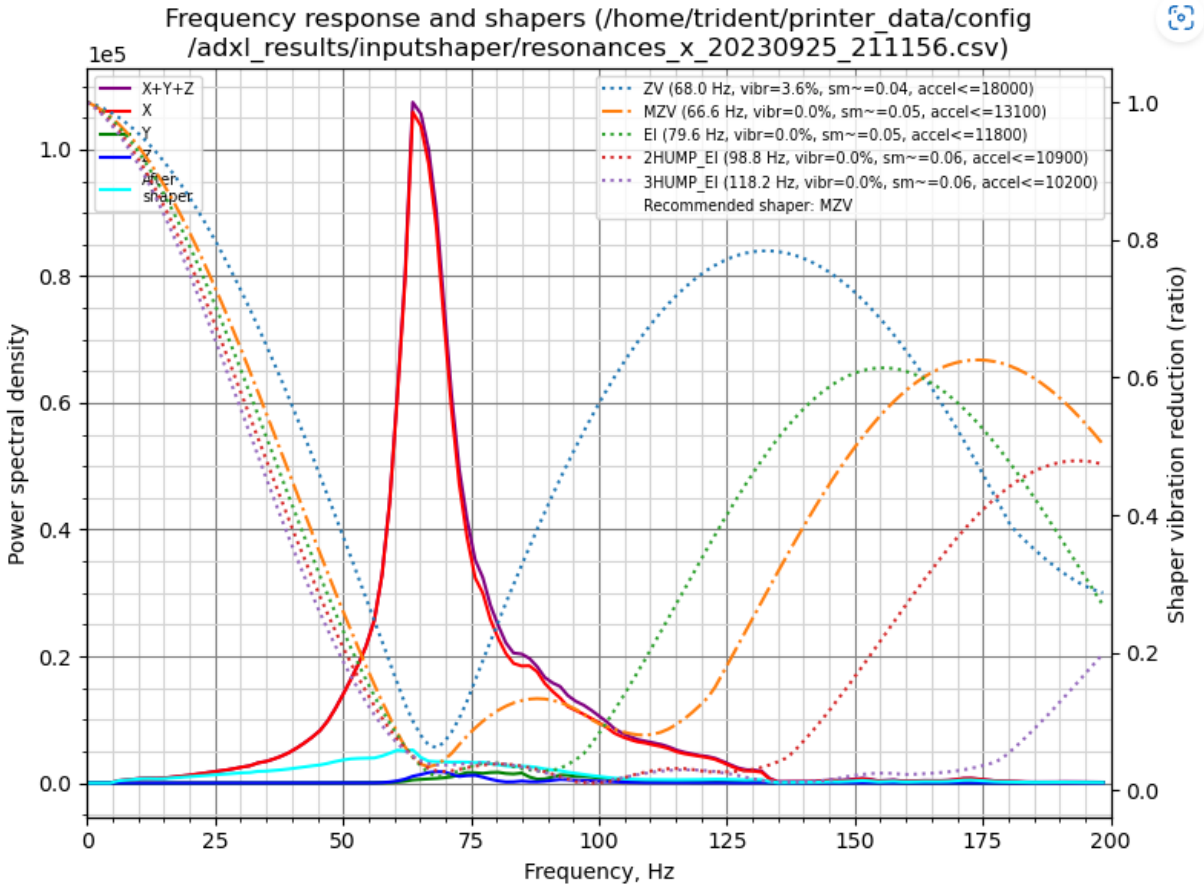
- At 1:24 it shows how to adjust the magnets

After rotational adjustment to left tap magnet



No change after rotational adjustment to left tap magnet
canbus





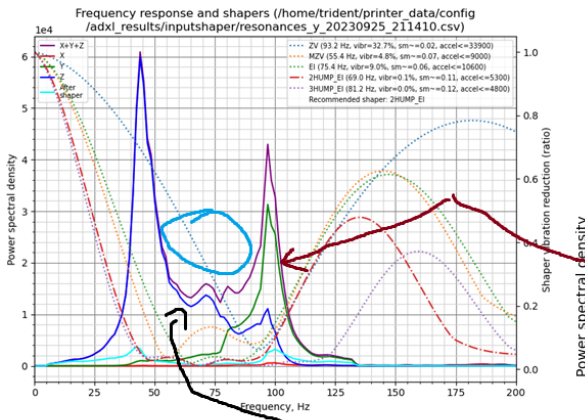
Current recommendation

- Print voron cube
- Remove back cover and inspect belt routing and position on bearings: look for belt dust
- Run input shaper again.
- If this does not work revaluate
  - Start by redoing belt tension. Loosen all the way and redo
  - Do we need to replace bearings/20 tooth idelers?
  - Do we need to take off toolhead and recheck it?

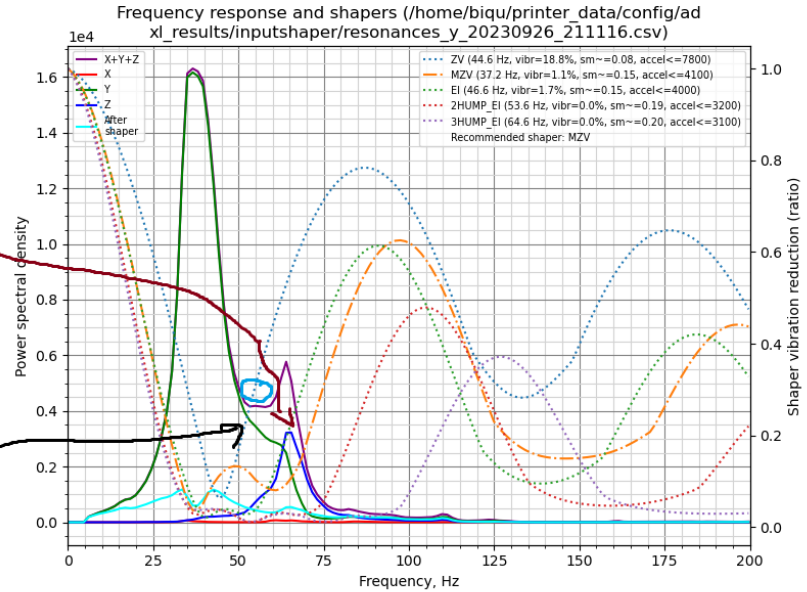
Results of printing a cube

```
92  #*#
93  #*# [input_shaper]
94  #*# shaper_freq_x = 67.8
95  #*# shaper_type_x = mzv
96  #*# shaper_freq_y = 72.6
97  #*# shaper_type_y = 2hump_ei
98  #*#
```

Possible issue with Vitalii tap



Einstein with Vitalii tap



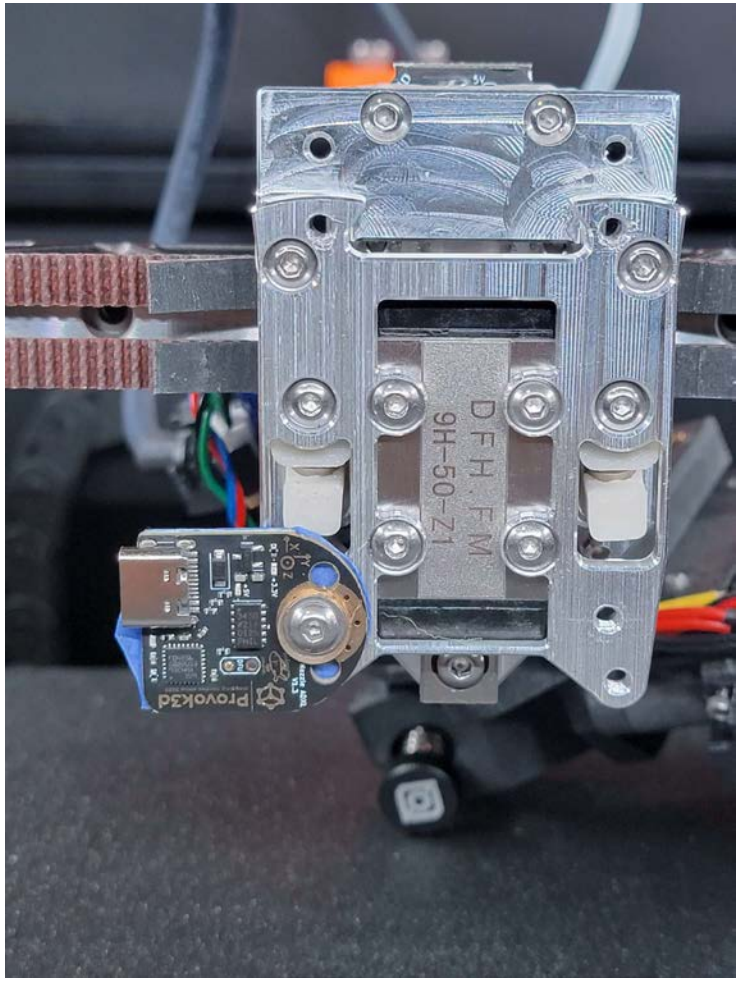
Alex with Vitalii tap

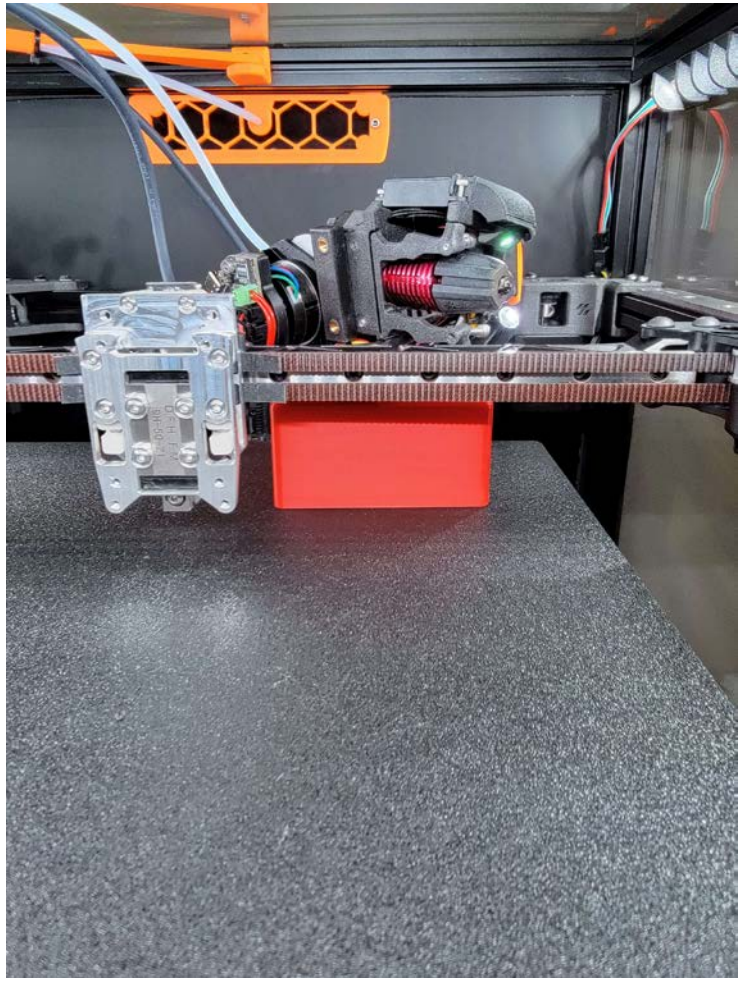
We see very similar graph the graphs are not the same, but we see that Y makes a peak and then trails off, followed by a z spike

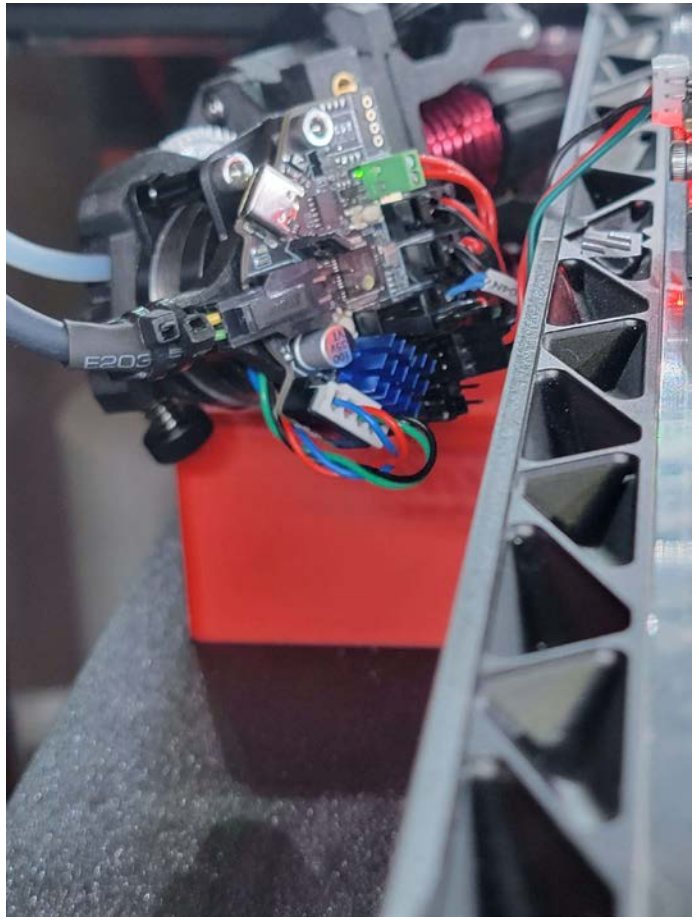
What appears to be different is the blue circled area - the spacing between the y spike and the z spike

however, this may be caused by the same thing.
I am receiving a vitalii tap this week I will investigate this

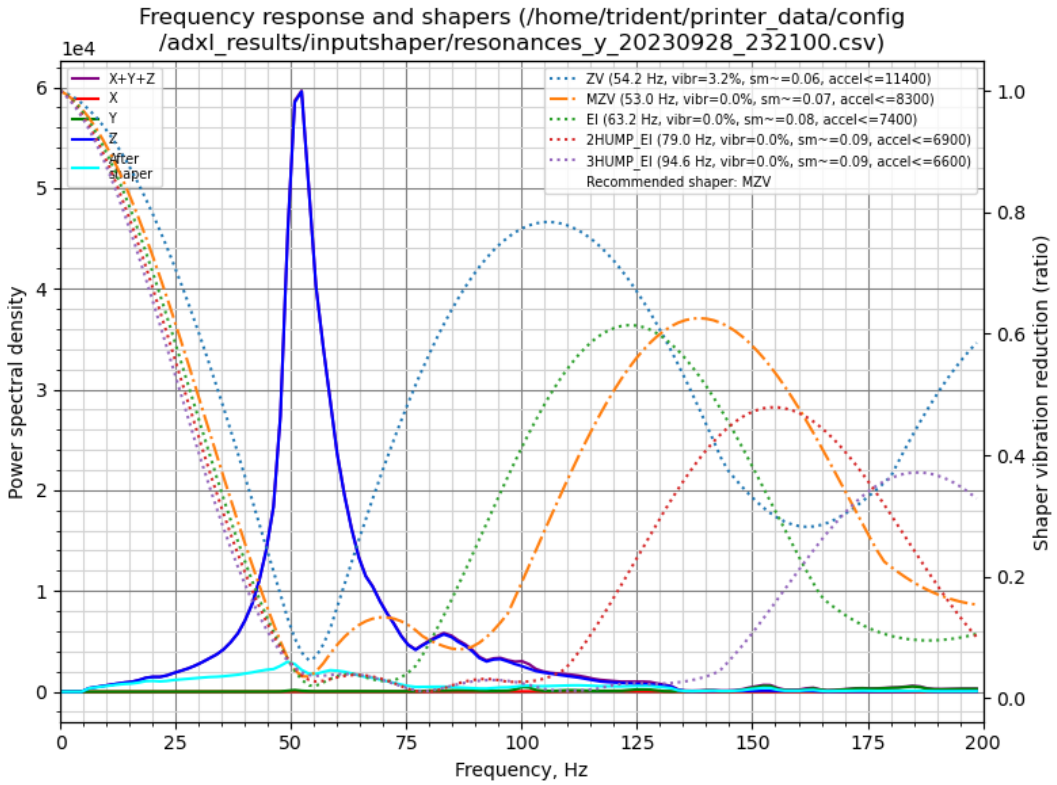
Testing the motion system sans the toolhead

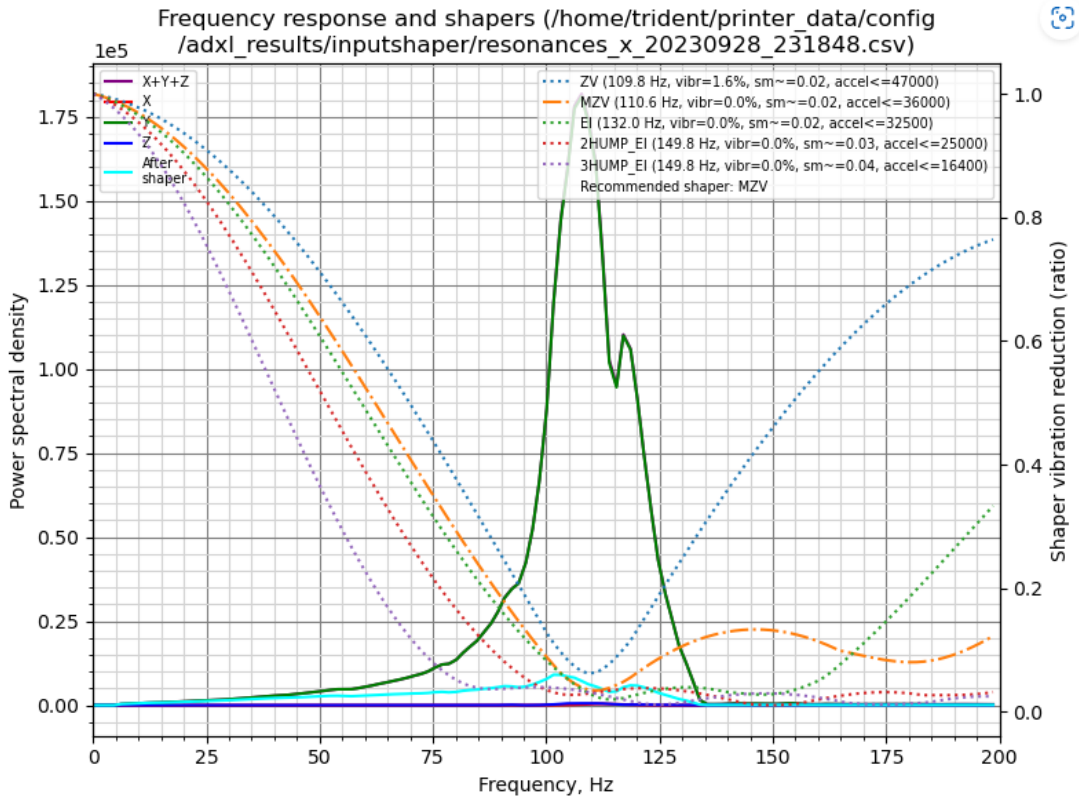






Results of Input shaper without toolhead





Observations/hypothesis

- By putting the adxl directly on the Vitalii tap we have shown through the resulting input shaper graphs that the motion system is solid. We are not getting the 100hz in y.
- What we cannot say is that the x-linear rail is solid. This is because there is no weight on it. However, in the case at hand that is not a real issue as the x-axis input shaper graphs were not an issue.
- Outside testing
  - More testing on this technique needs to happen. This needs to be verified with a known good system. Reth will try to develop a testing platform to determine if this can be a definitive test for testing the motion system to determine toolhead head issue from the rest of the motion system

Expectations when toolhead is reattached

- What I expect to have happen when the toolhead is reattached is that the main peak of x will go down due to the weight of the toolhead, and the peak will shift to the left (lower freq). This is also due to the weight of the toolhead.