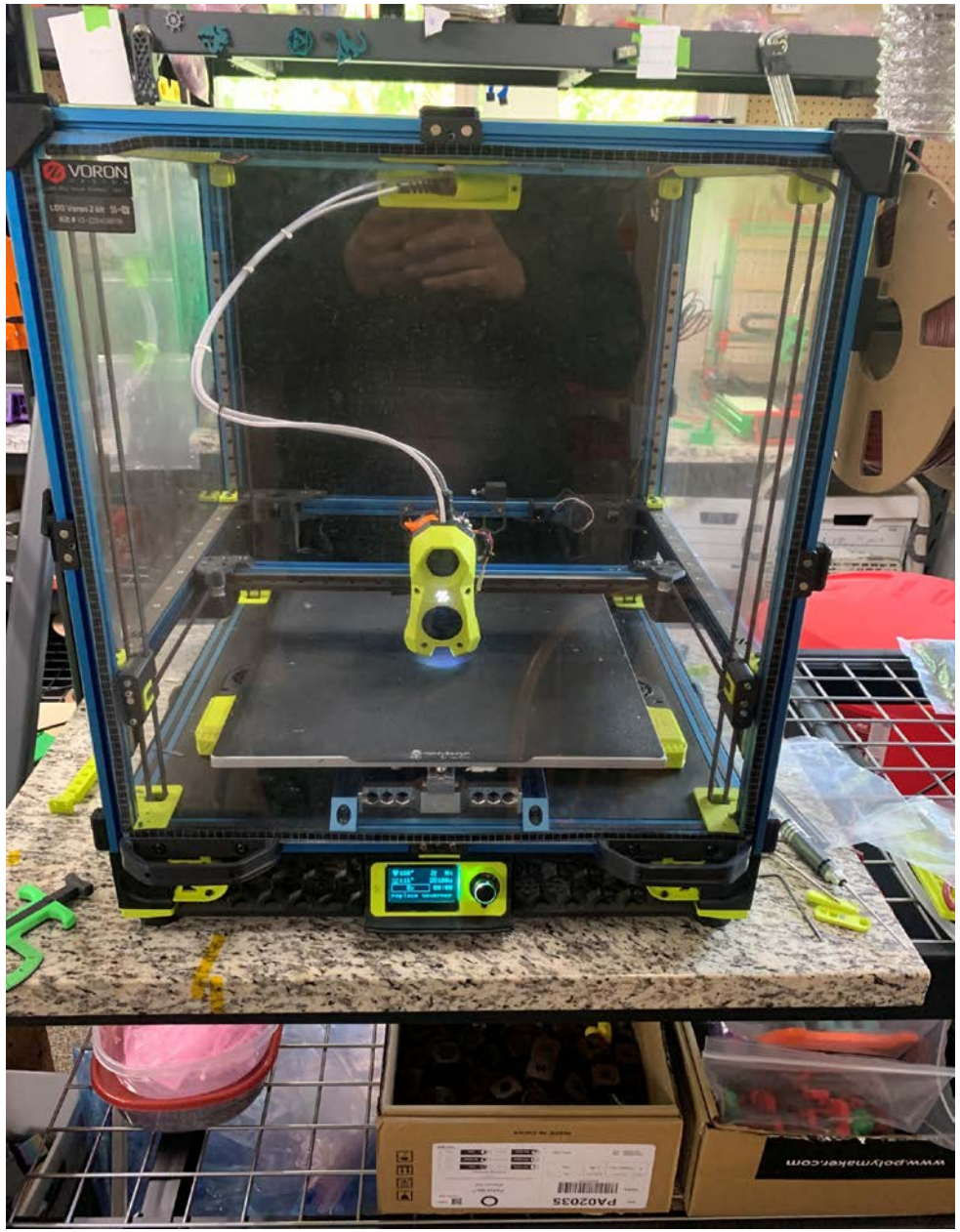
Shaketune vs. Klipper

Comparison between the input shapers

Voron V2.4 350 - 3812



Printer Mods

- Stealth Burner
- Mellow Fly SB-2040 toolhead board
- Rapido v1
- 0.4 CHT
- Umbilical – using igus cable (prefer 3do cable)
- Rama Idlers
- Pin Mod (xy joints and AB motor mounts)
- Hartk umbilical pass through
- Nevermore x2 on left and right side of build plate
- Mandala Rose Works build plate with magnets
- Mandala Rose Works Kinematic Kit
- TI backers (x and y)
- FlexTap (AndrewMcGr)

What is the difference

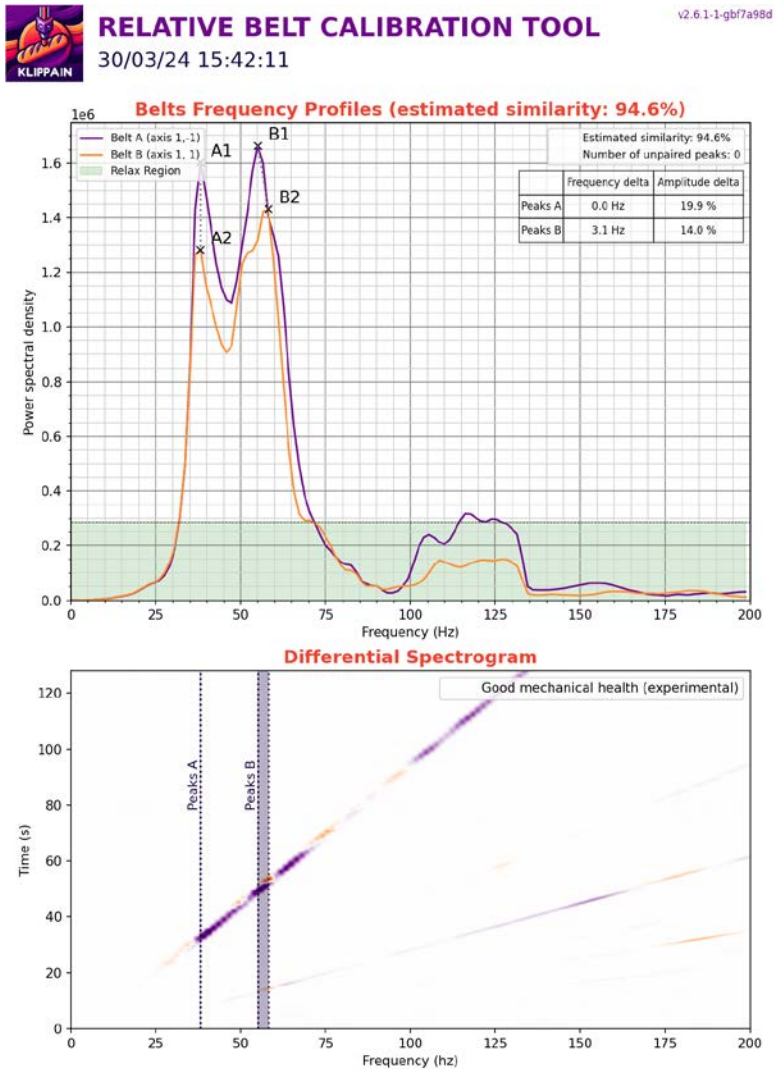
- Klipper uses a default damping ratio of 0.1 in the calculation of the shapers.
- Shaketune uses the damping ratio calculated from the measured graphs in the calculation of shapers.
- Both use the built-in TEST_RESONANCE macro to run.
- Thus, the major difference is how the shaper values are calculated

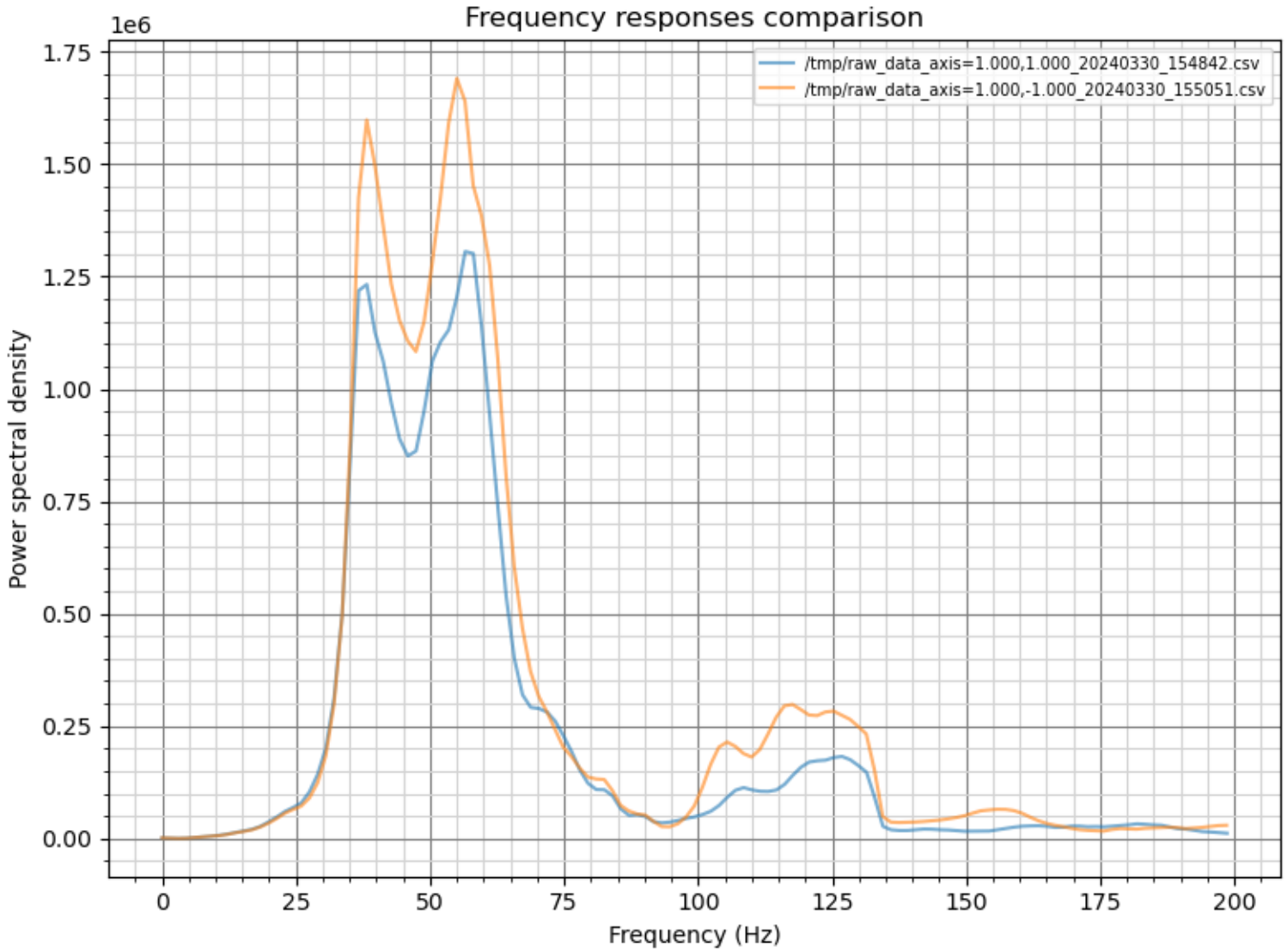
Belt Shaper

- Shaketune
  - Click “Belt Shaper Calibration” in mainsail
  - Files in mainsail in config files

- Klipper
  - https://www.klipper3d.org/Measuring_Resonances.html#testing-custom-axes
  - Commands (run individually in this order)
    - TEST_RESONANCES AXIS=1,1 OUTPUT=raw_data
    - TEST_RESONANCES AXIS=1,-1 OUTPUT=raw_data
    - ~/klipper/scripts/graph_accelerometer.py -c /tmp/raw_data_axis*.csv -o /tmp/resonances.png (ssh)
  - Files in /tmp

BeltShaper with FlexTap



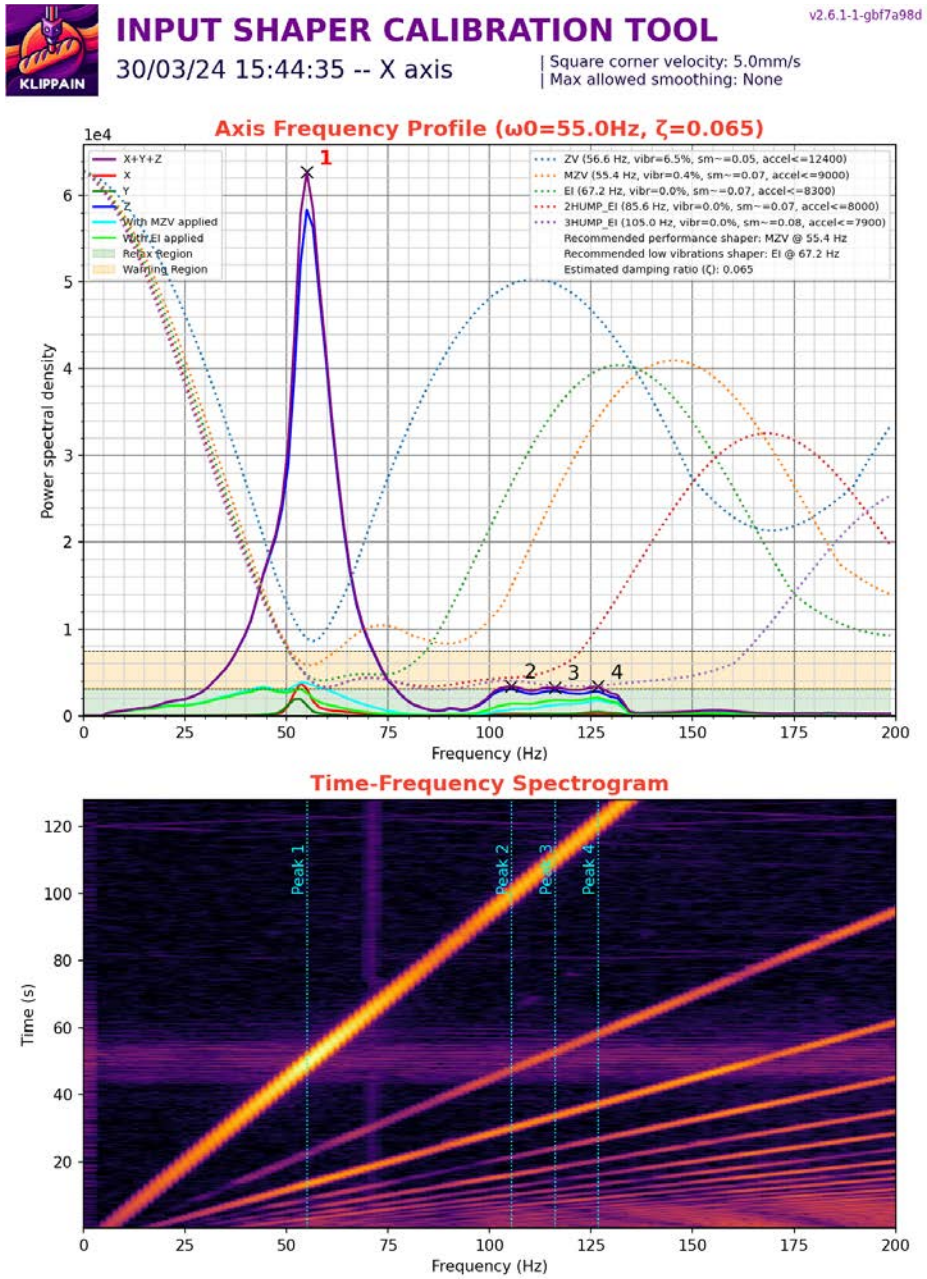


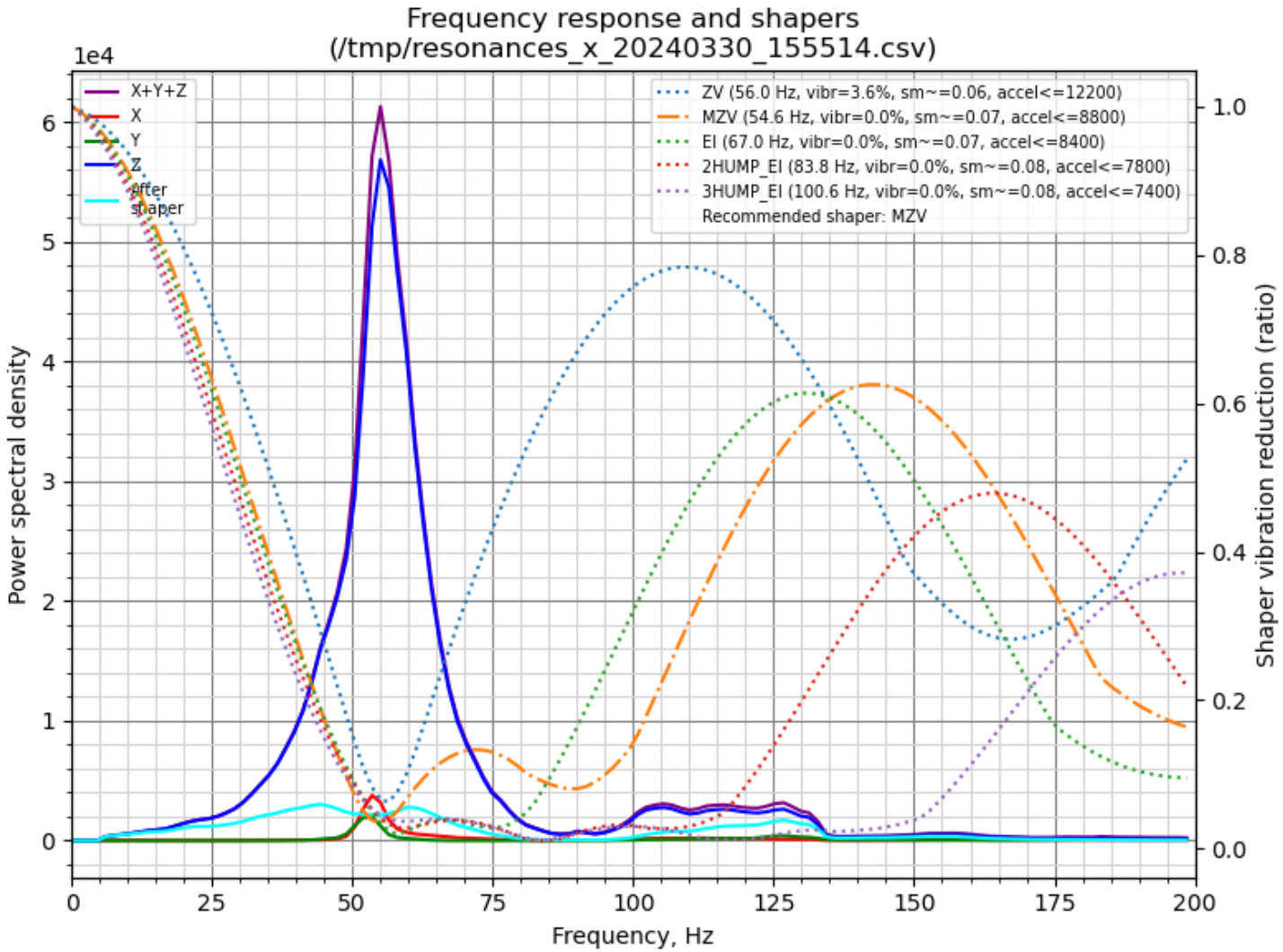
Input Shaper

- Shaketune
  - Click “Axes Shaper Calibration” in mainsail
  - Files in mainsail in config files

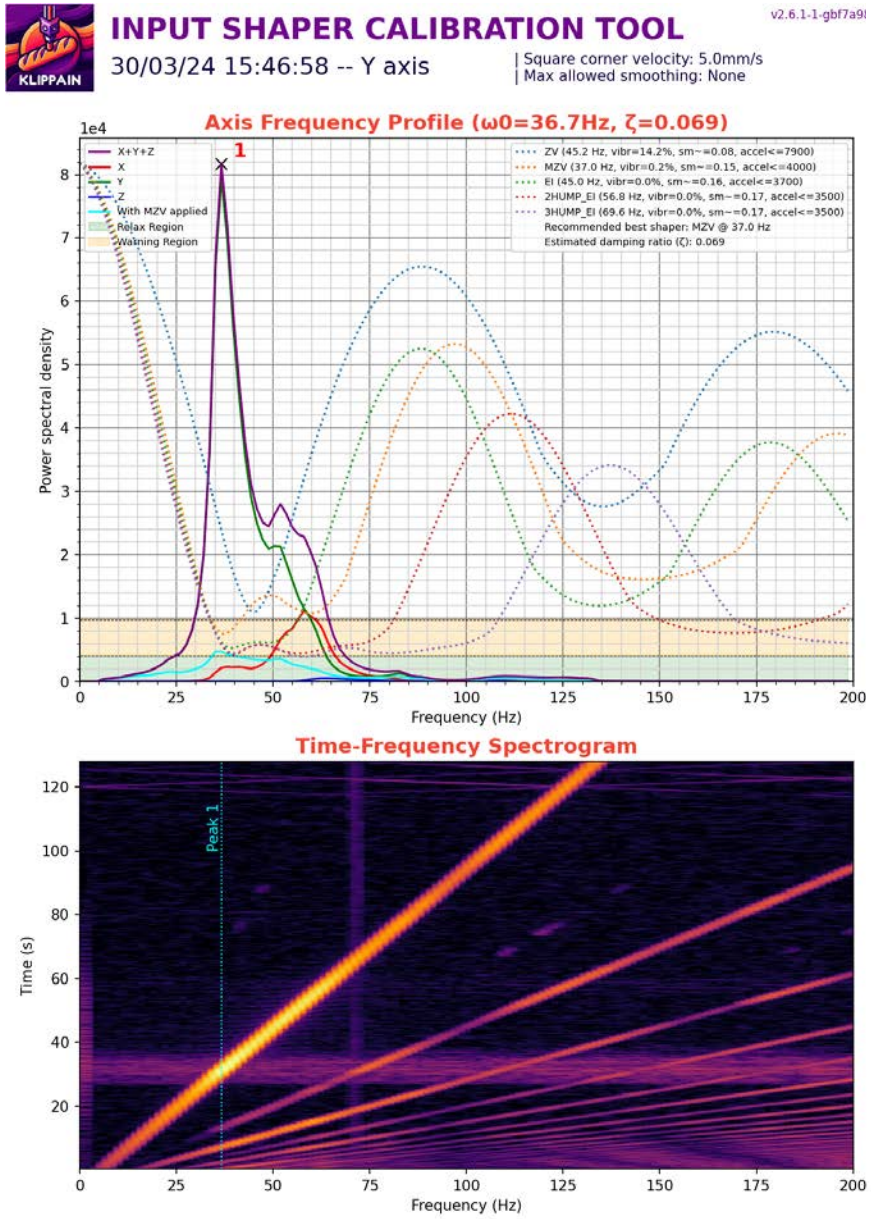
- Klipper
  - https://www.klipper3d.org/Measuring_Resonances.html#testing-custom-axes
  - Commands (run individually in this order)
    - TEST_RESONANCES AXIS=X
    - ~/klipper/scripts/calibrate_shaper.py /tmp/resonances_x_*.csv -o /tmp/shaper_calibrate_x.png (ssh)
    - TEST_RESONANCES AXIS=Y
    - ~/klipper/scripts/calibrate_shaper.py /tmp/resonances_y_*.csv -o /tmp/shaper_calibrate_y.png (ssh)
  - Files in /tmp

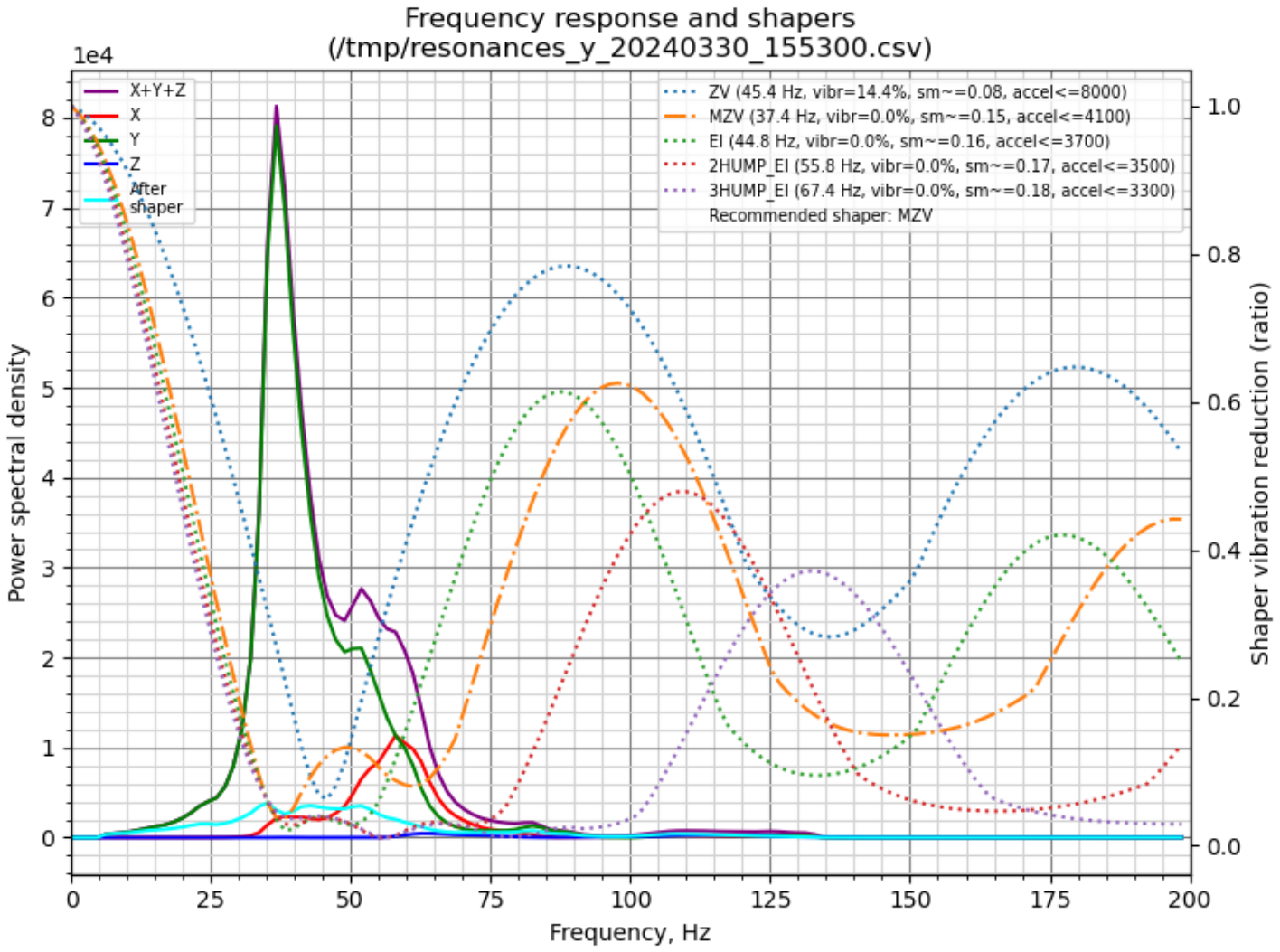
Input Shaper = x (FlexTap)





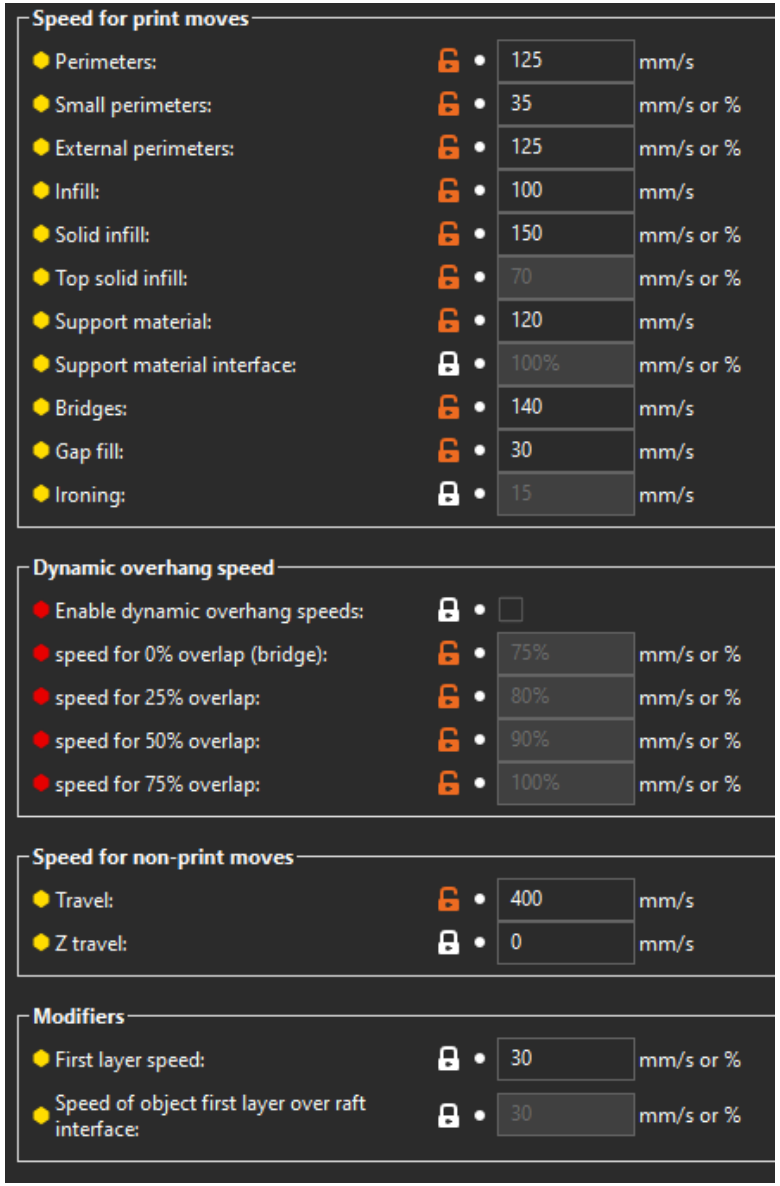
Input Shaper = y (FlexTap)





Prusa Slicer 2.7.2 setting

note: ext/int perimeter accel changes between prints



SCV=5.0

Filament Settings: KVP ABS

Filament

Color:			
Diameter:	1.75	mm	
Extrusion multiplier:	0.94		
Density:	1.03	g/cm³	
Cost:	25	money/kg	
Spool weight:	0	g	

Temperature

Idle temperature:	N/A	°C			
Nozzle:	First layer:	250	°C	Other layers:	250 °C
Bed:	First layer:	115	°C	Other layers:	110 °C

Enable

Keep fan always on:	
Enable auto cooling:	

If estimated layer time is below ~10s, fan will run at 100% and print speed will be reduced so that no less than 10s are spent on that layer (however, speed will never be reduced below 10mm/s).
If estimated layer time is greater, but still below ~60s, fan will run at a proportionally decreasing speed between 100% and 50%.
During the other layers, fan will always run at 50%

Fan settings

Fan speed:	Min:	50	%	Max:	100 %
Bridges fan speed:		0	%		
Disable fan for the first:		0	layers		
Full fan speed at layer:		0			

Dynamic fan speeds

Enable dynamic fan speeds:		
speed for 0% overlap (bridge):	0	%
speed for 25% overlap:	0	%
speed for 50% overlap:	0	%
speed for 75% overlap:	0	%

Cooling thresholds

Enable fan if layer print time is below:	60	approximate seconds
Slow down if layer print time is below:	10	approximate seconds
Min print speed:	10	mm/s

Line widths

- Note:
- Chamber preheated to 45 C (37 min)
- Chamber temp over total prints 57.5 C
- 0.2 layer height
- 0.44/0.46 int/ext perimeter width

ADXL settings

#Shaketune MZV

[input_shaper]
shaper_freq_x: 55.4
shaper_type_x: mzv
damping_ratio_x: 0.065
shaper_freq_y: 37.0
shaper_type_y: mzv
damping_ratio_y: 0.069

#Shaketune EI

[input_shaper]
shaper_freq_x: 67.2
shaper_type_x: ei
damping_ratio_x: 0.065
shaper_freq_y: 45
shaper_type_y: ei
damping_ratio_y: 0.069

#Klipper MZV

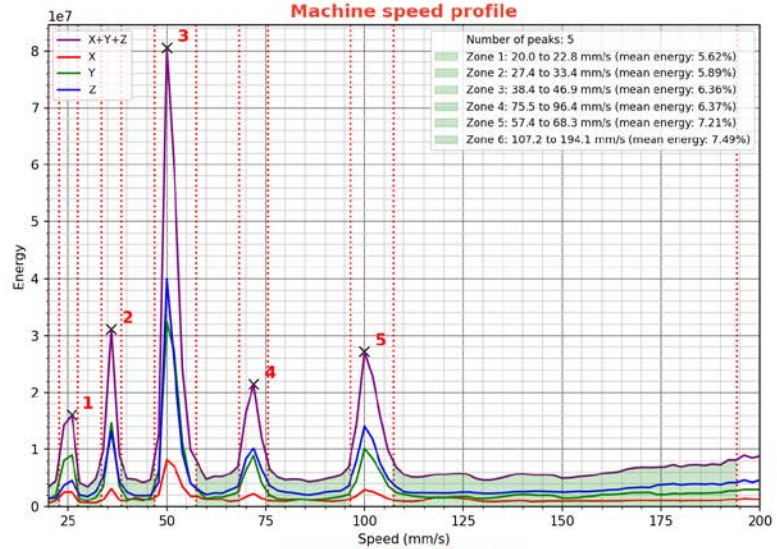
[input_shaper]
shaper_freq_x: 54.6
shaper_type_x: mzv
shaper_freq_y: 37.4
shaper_type_y: mzv

VIBRATIONS MEASUREMENT TOOL

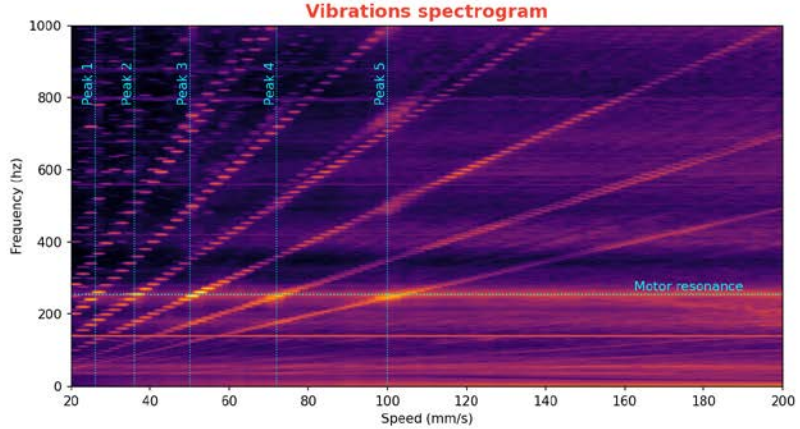
v2.6.1-1-gbf7a98d

29/03/24 16:31:58 -- ABXY axis at 3000 mm/s²

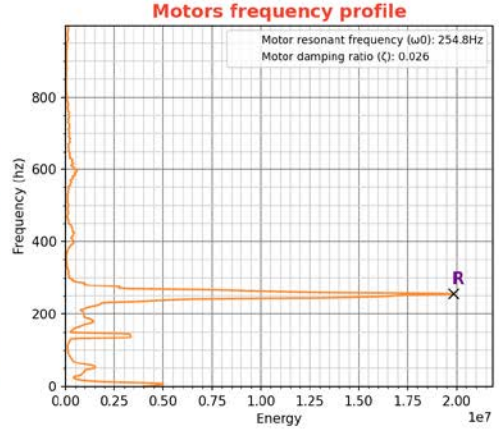
Machine speed profile



Vibrations spectrogram



Motors frequency profile



Let’s push it

1) Increased accel to 4k on shaketune MZV

2) internal/external perimeter speed=250
   - Internal perimeter accel = 6000

3) Increased Max volumetric speed/flow from 24 to 30
   - external perimeter speed = 350
   - Internal perimter speed =325
   - Solid infill = 275
   - Solid infill accel = 6000

4) Increased max volumetric speed/flow from 30 to 35
   - External perimeter speed = 375
   - Internal perimeter speed = 390
   - Infill = 155
   - Top solid infill = 125
   - Gap fill =125
   - internal perimeters accel = 6000
   - Top solid infill accel = 6000
   - Solid infill accel = 8000
   - Infill accel = 8000

5) increased max volumetric speed/flow from 35 to 40
   - External perimeter speed = 435
   - Internal perimeter speed =450
   - Infill = 190
   - Solid infill = 350
   - External Perimeter accel = 7k
   - Top solid infill = 7k
   - Solid infill = 9k
   - Infill = 9k
   - Travel = 10k
   - Small perimeter = 70

What I settled For…

6) Kept max volumetric speed/flow at 40

Speeds

Internal perimeters = 250/125

External perimeters = 250/125

Small perimeters = 85

Infill = 190

Solid infill = 125

Top solid infill = 125

Travel = 300

Max print speed = 400

Accels

External perimeter accel = 4000

Internal perimeter accel = 4000

Top solid infill = 4000

Solid infill = 4000

Infill = 6000

Travel = 8,000

Filament

EM 0.94 to 1.05 to 0.95