Shaketune v5.0

Update and differences

Why version 5?

- On or about Dec. 3, 2024 Klipper made a change to the resonance testing.
- They added a sweeping test. This broke shaketune
- https://www.klipper3d.org/Config_Changes.html

Difference between old and new test

- The old test vibrated the toolhead in place.
- The new test move the toolhead across the axis.
- This new sweeping test is suppose to give a more accurate depiction of the system.
- Less rigid systems will likely get more out of this new test.

What does Frix say

https://github.com/Frix-x/klippain-shaketune/blob/main/docs/is_tuning_generalities.md#should-i-use-the-sweeping-or-pulse-only-test

- **Should I use the sweeping or pulse-only test?**
- The "sweeping" test superimposes a slow motion sweep on top of the usual back-and-forth pulses of the original test. This causes the toolhead (and stepper motors) to pass through multiple positions, rather than getting stuck on the same motor steps, rotor angle, and kinematic position. The added benefit is that it can help filter out some of the random motor and mechanical noise in the measurement, especially on less rigid machines, which can be problematic with the original test. This can help focus on only the "toolhead on belts" resonance peak, which is the most important one, and prevent the recommendation results from being muddled by extra vibration and noise you might have on the graph. It can be seen as a complementary solution to placing your accelerometer right at the center of gravity of the toolhead: you'll end up with a cleaner signal.
- On the other hand, if you're looking for mechanical problems (like a wobbly toolhead, binding axis, loose belts, or other gremlins), the pulse-only mode can actually be more revealing. In fact, because the sweep mode smooths things out, it can hide some of the problems you want to find and fix. So if you're in full diagnostic mode, my advice is to use the pulse-only test and try placing the accelerometer in different places, like the nozzle tip, to better see the problems and fix them. Once everything is fixed, if there's still a bit of noise on your graphs, you can switch back to sweep mode for one last nice, clean reading.

What is new in version 5 of shaketune

- Frix has created a change log…
- https://github.com/Frix-x/klippain-shaketune/releases/tag/v5.0.0
- Most of the updates are behind the scenes to deal with issues such as TTC, and saving files.
- We will go over the differences in the graphs below.

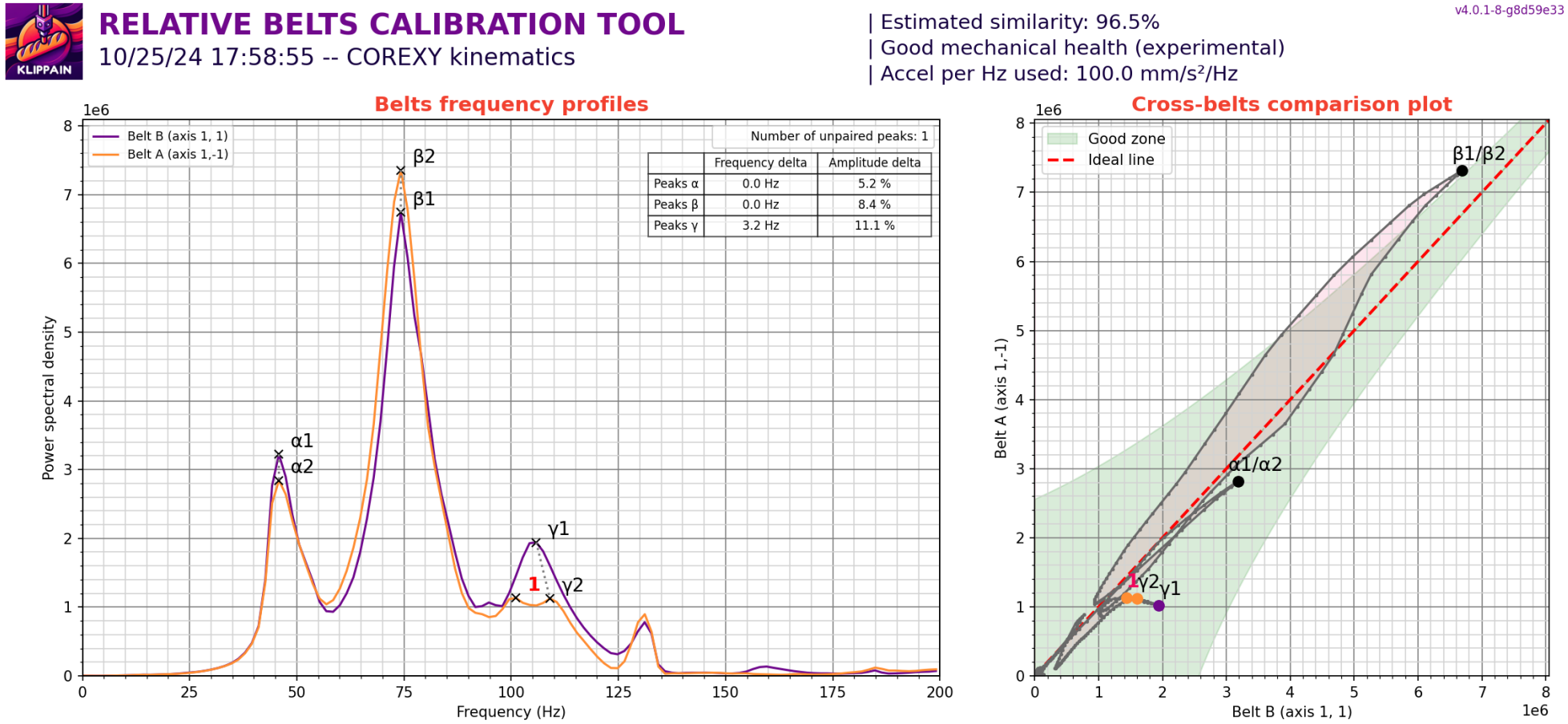
Comparison of Shaketune V4 vs. V5

Test System

- VT 300 (LDO) – serial 1026
- EBB36 – used for measurements
- Umbilical
- Cartographer touch – not used for measurements
- Rama front idlers
- XOL toolhead
- Sherpa mini extruder
- Rapido v1 with 0.4cht

No belts were harmed in the making of this video

Belts V4


RELATIVE BELTS CALIBRATION TOOL
10/25/24 17:58:55 -- COREXY kinematics
v4.0.1-8-g8d59e33
| Estimated similarity: 96.5%
| Good mechanical health (experimental)
| Accel per Hz used: 100.0 mm/s²/Hz
Belts frequency profiles
Belt B (axis 1, 1)
Belt A (axis 1,-1)
Number of unpaired peaks: 1
Frequency delta
Amplitude delta
Peaks α 0.0 Hz 5.2 %
Peaks β 0.0 Hz 8.4 %
Peaks γ 3.2 Hz 11.1 %
α1
α2
β2
β1
γ1
γ2
1
Power spectral density
Frequency (Hz)
Cross-belts comparison plot
Good zone
Ideal line
β1/β2
α1/α2
γ2
γ1
Belt A (axis 1,-1)
Belt B (axis 1, 1)

Belts V5

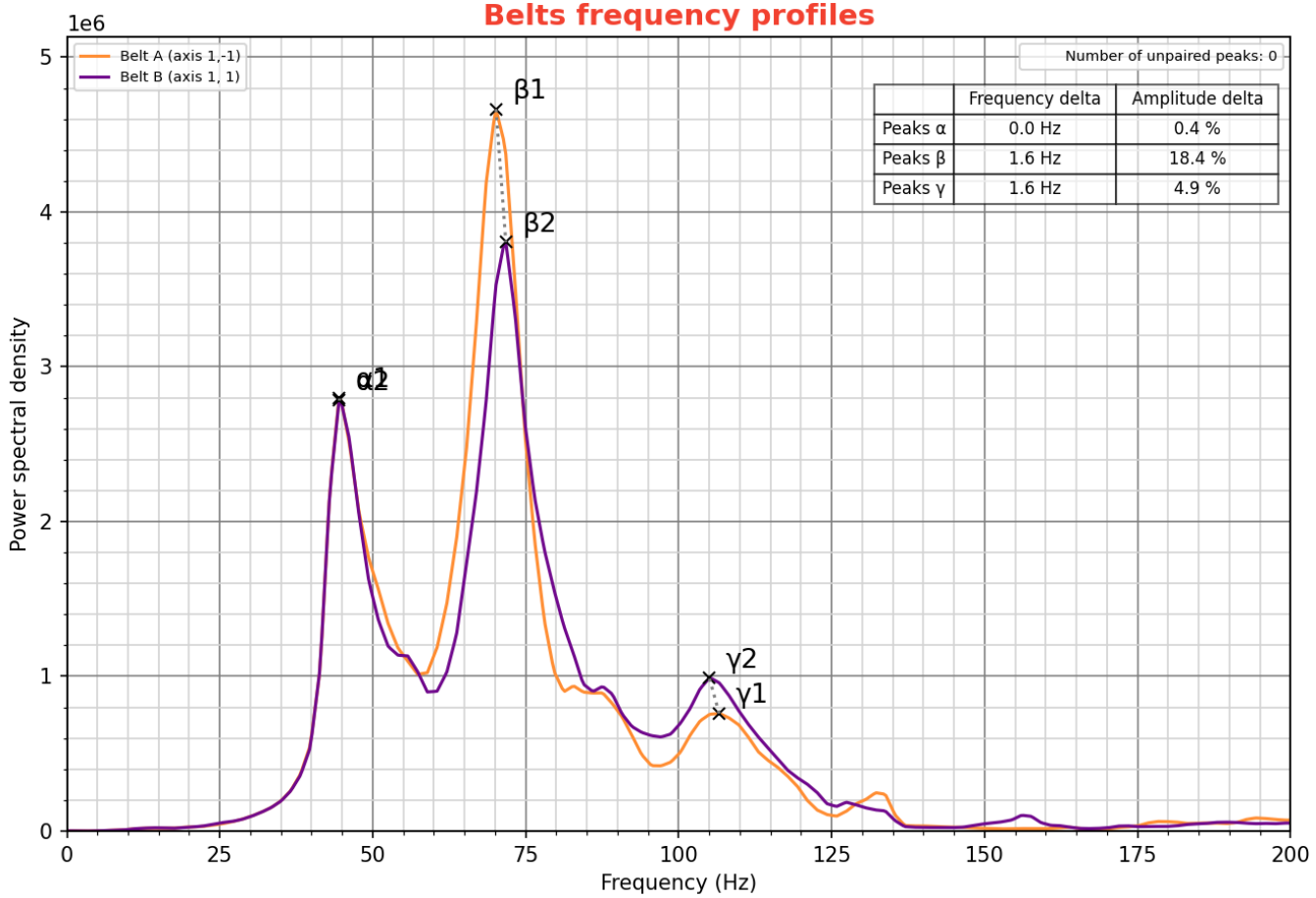
RELATIVE BELTS CALIBRATION TOOL

12/30/24 08:22:15 -- COREXY kinematics

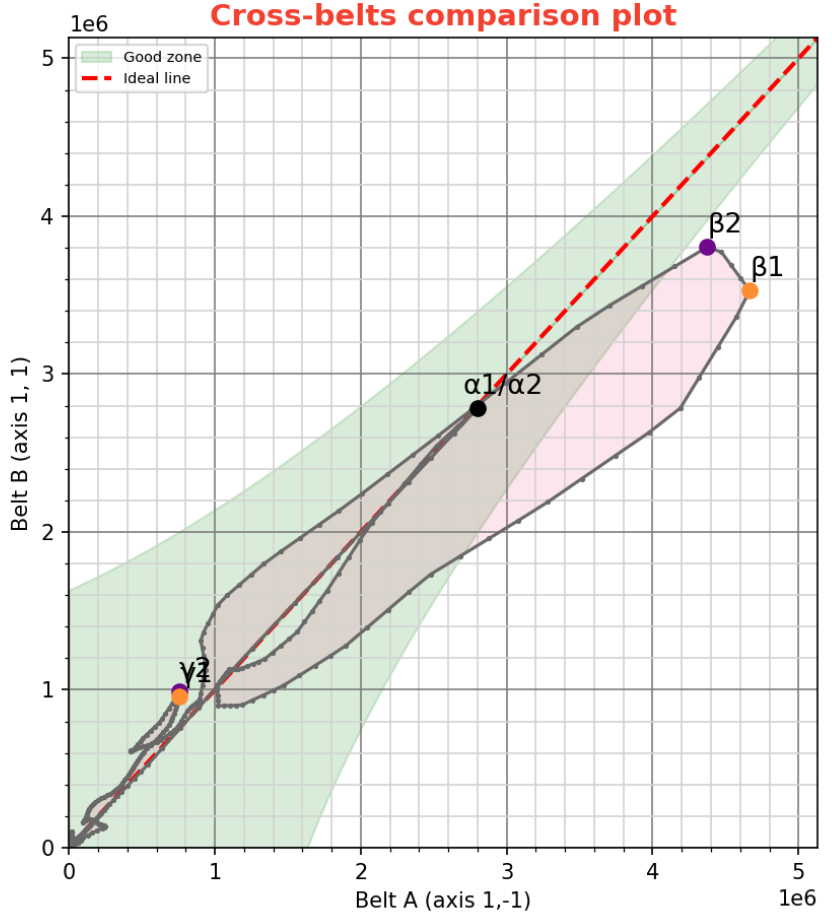
| Mode: PULSE-ONLY -- ApH: 100.0
| Estimated similarity: 97.3%
| Good mechanical health (experimental)

v5.0.0

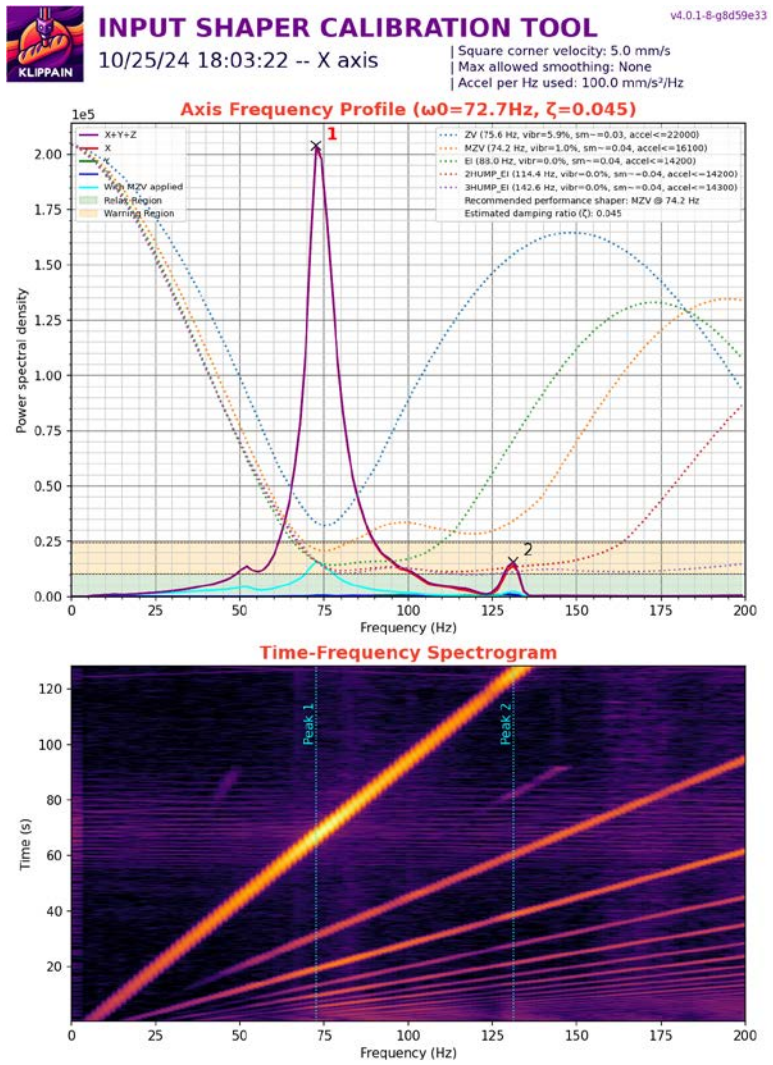
Belts frequency profiles

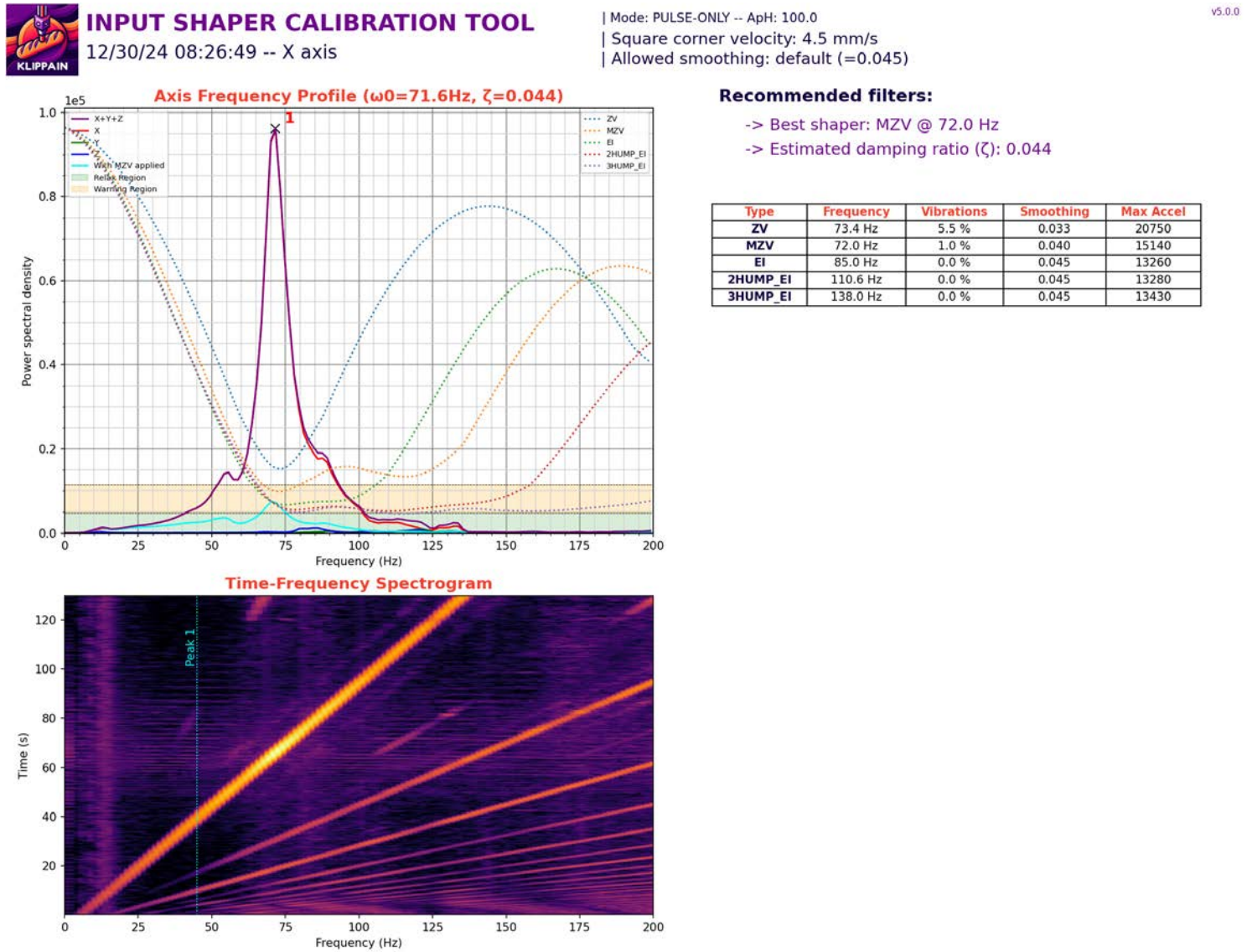


Cross-belts comparison plot



V4 Input Shaper X V5



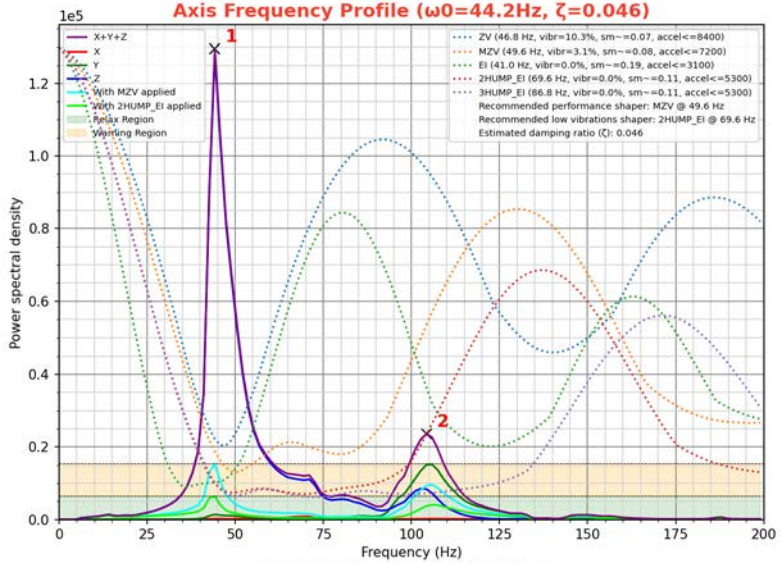


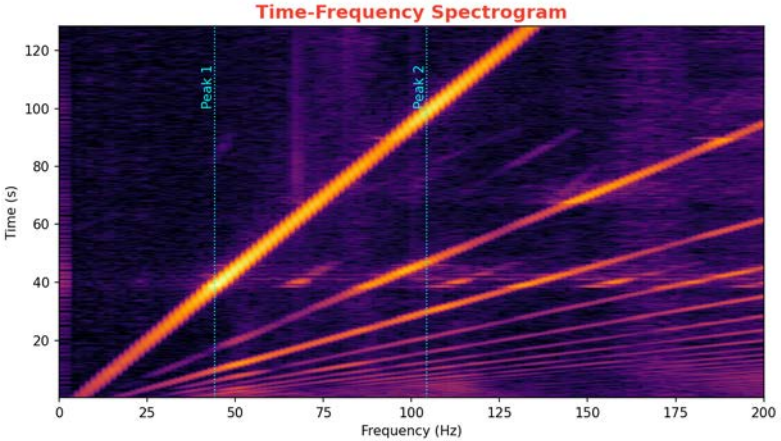
V4 Input Shaper Y V5

INPUT SHAPER CALIBRATION TOOL v4.0.1-8-g8d59e33

10/25/24 18:03:22 -- Y axis

| Square corner velocity: 5.0 mm/s
| Max allowed smoothing: None
| Accel per Hz used: 100.0 mm/s²/Hz



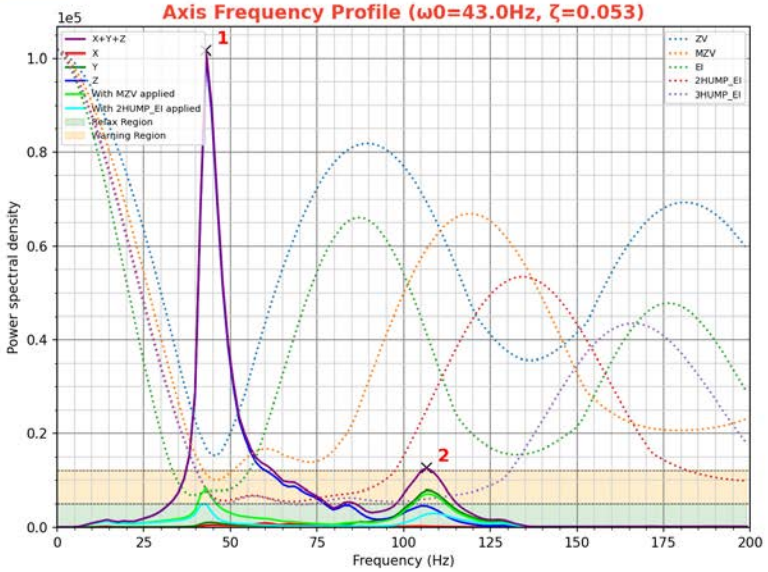


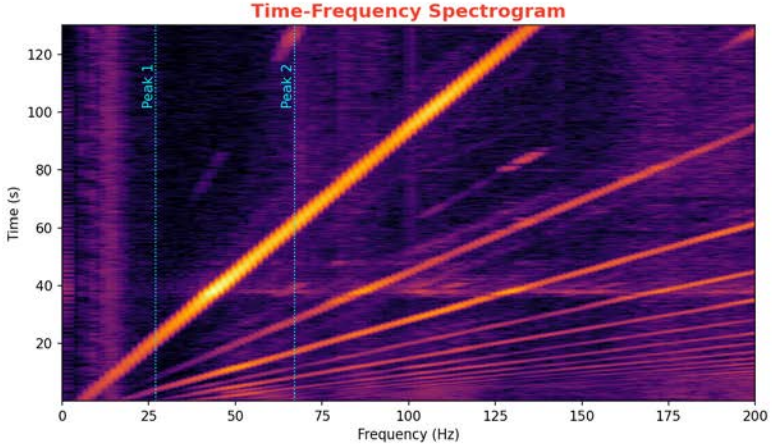
INPUT SHAPER CALIBRATION TOOL

12/30/24 08:29:14 -- Y axis

| Mode: PULSE-ONLY -- ApH: 100.0
| Square corner velocity: 4.5 mm/s
| Allowed smoothing: default (=0.166)

v5.0.0



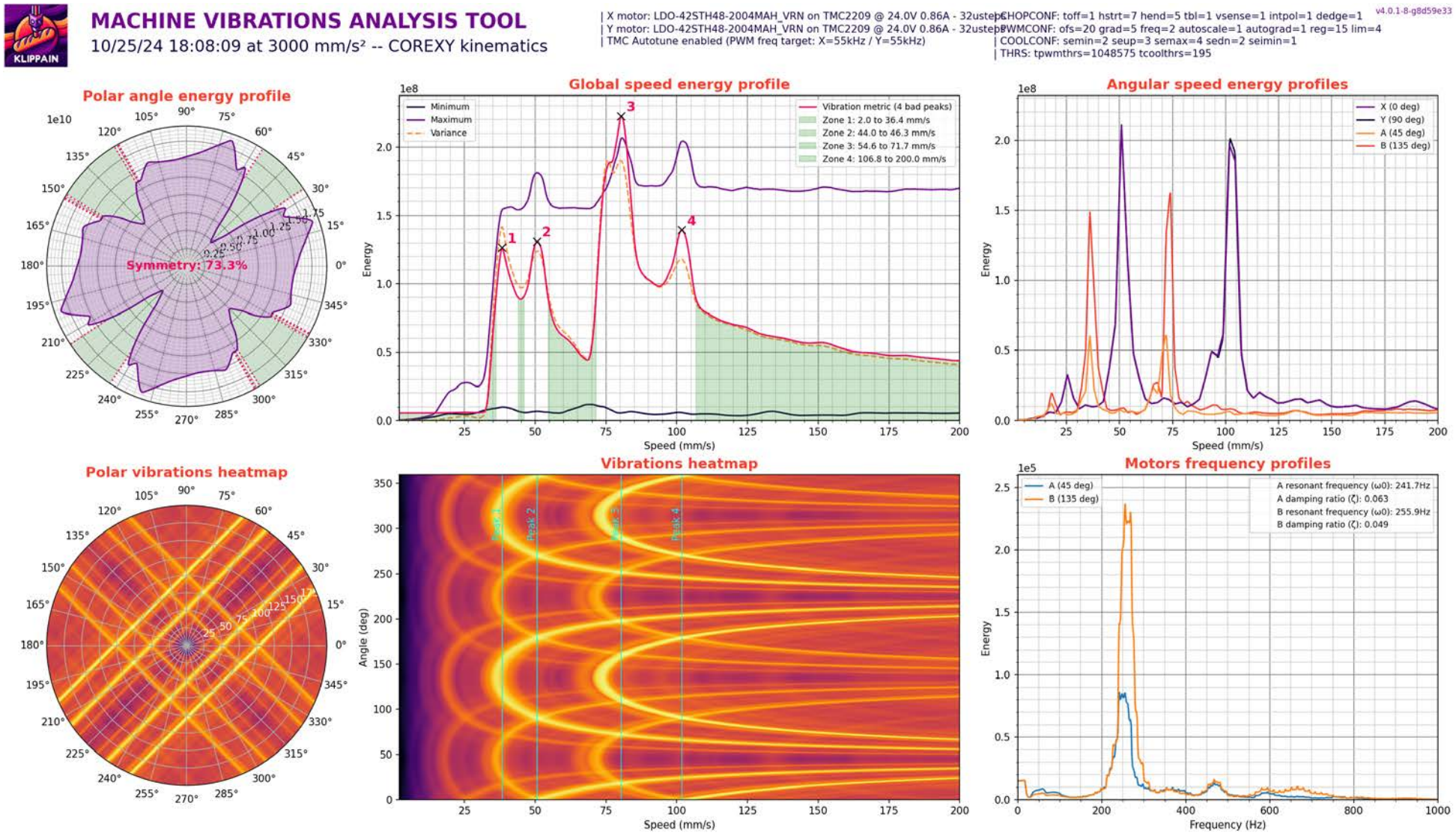


Recommended filters:

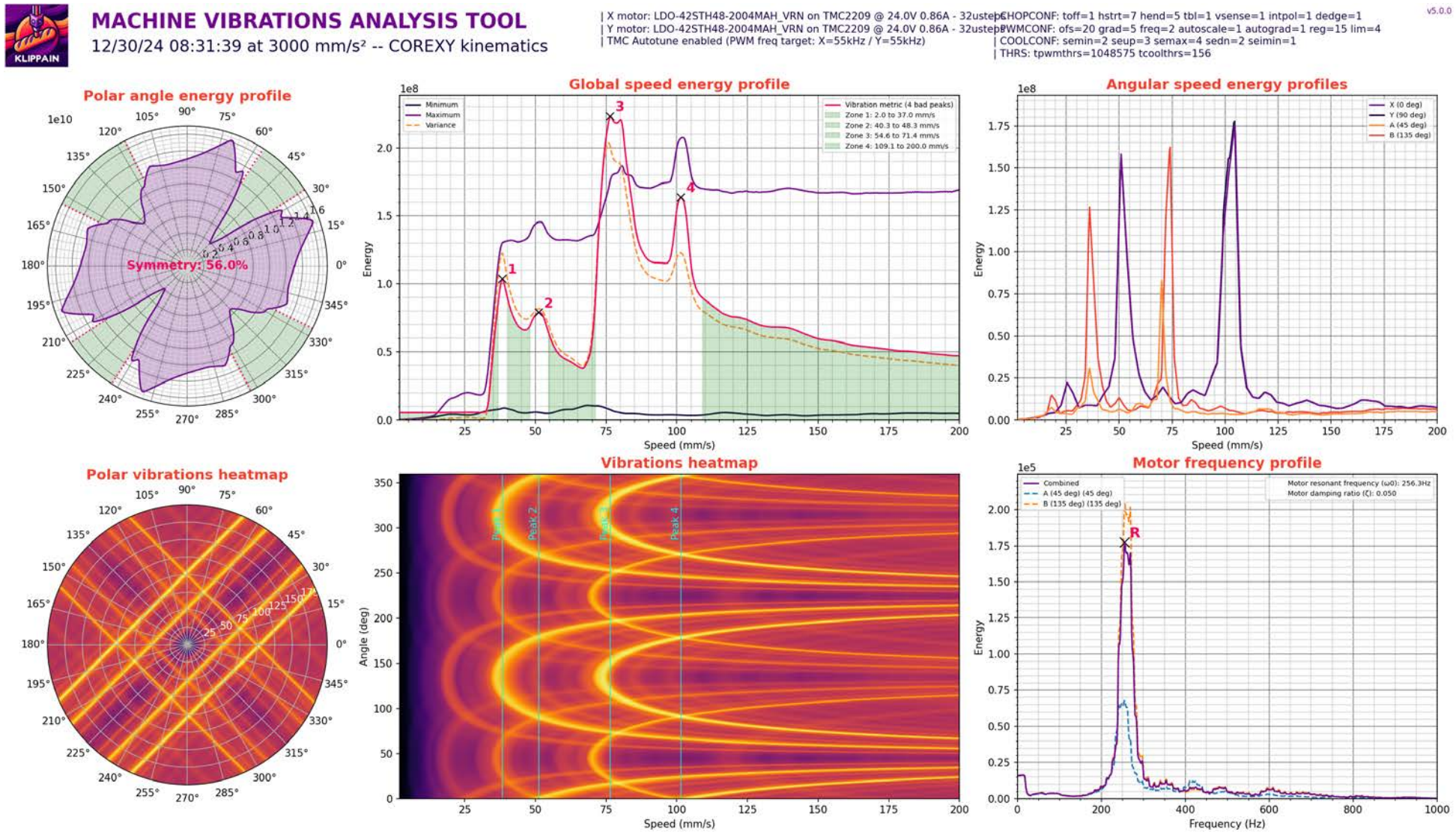
-> For performance: MZV @ 45.4 Hz
-> For low vibrations: 2HUMP_EI @ 68.2 Hz
-> Estimated damping ratio (ζ): 0.053

Type	Frequency	Vibrations	Smoothing	Max Accel
ZV	45.6 Hz	6.2 %	0.075	8020
MZV	45.4 Hz	1.4 %	0.100	6020
EI	44.4 Hz	0.0 %	0.166	3620
2HUMP_EI	68.2 Hz	0.0 %	0.119	5060
3HUMP_EI	84.2 Hz	0.0 %	0.120	5020

Vibrations V4



Vibrations V5



Sweeping Test vs Non-sweeping test (old version)

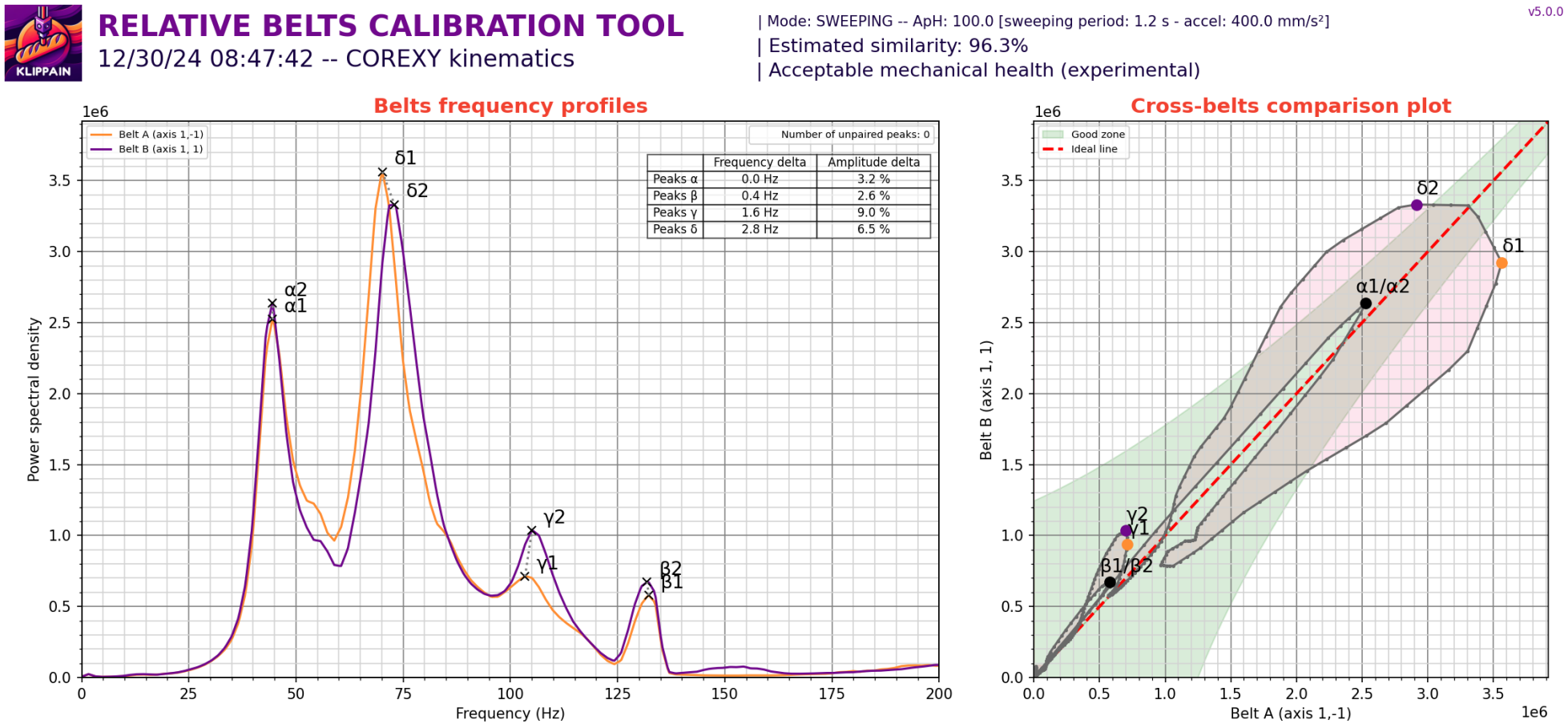
- The key config is “sweeping_period”.
- This can be found in [resonance_testor]
- https://www.klipper3d.org/Config_Reference.html#resonance_tester

Old version: sweeping_period: 0

New version: sweeping_period: 1.2

Note: changing the sweeping_period requires restarting Klipper

Belts sweeping



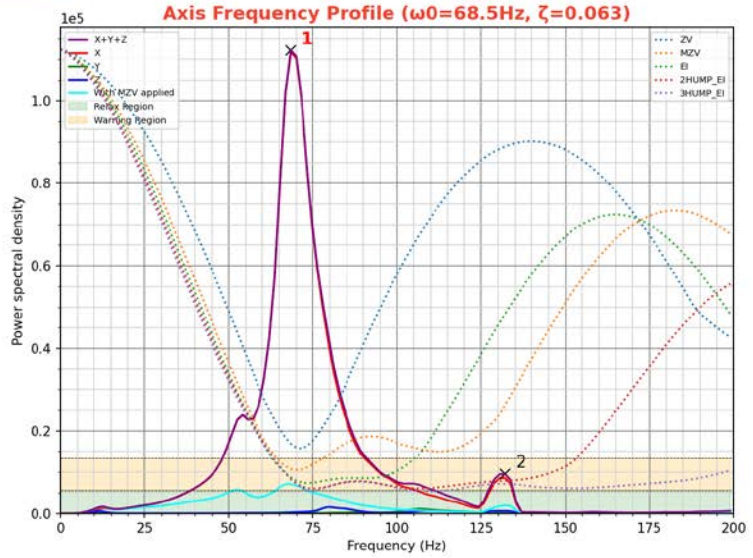
Input shaper sweeping X

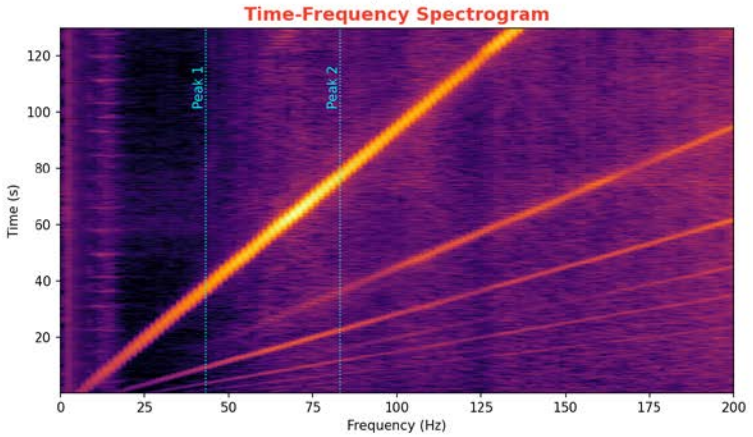
INPUT SHAPER CALIBRATION TOOL

12/30/24 08:52:17 -- X axis

| Mode: SWEEPING -- ApH: 100.0 [sweeping period: 1.2 s - accel: 400.0 mm/s²]
| Square corner velocity: 4.5 mm/s
| Allowed smoothing: default (=0.049)

v5.0.0





Recommended filters:

-> Best shaper: MZV @ 69.6 Hz

-> Estimated damping ratio (ζ): 0.063

Type	Frequency	Vibrations	Smoothing	Max Accel
ZV	71.4 Hz	6.1 %	0.035	19690
MZV	69.6 Hz	0.5 %	0.042	14170
EI	84.0 Hz	0.0 %	0.046	13000
2HUMP_EI	107.2 Hz	0.0 %	0.048	12550
3HUMP_EI	131.6 Hz	0.0 %	0.049	12320

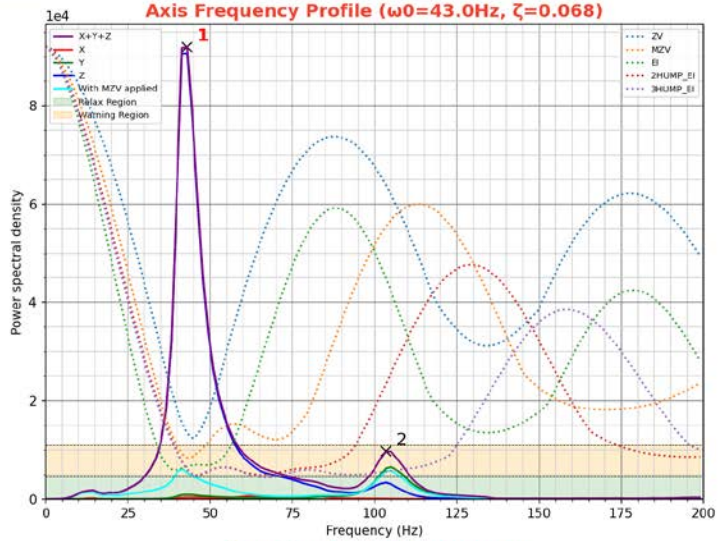
Input shaper sweeping Y

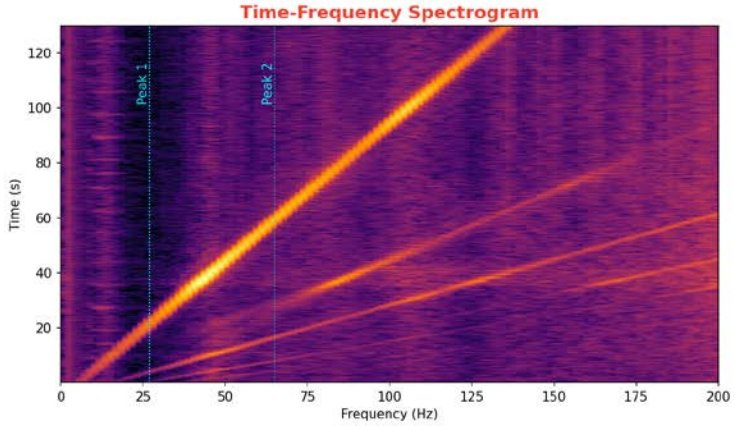
INPUT SHAPER CALIBRATION TOOL

12/30/24 08:54:42 -- Y axis

| Mode: SWEEPING -- ApH: 100.0 [sweeping period: 1.2 s - accel: 400.0 mm/s²]
| Square corner velocity: 4.5 mm/s
| Allowed smoothing: default (=0.161)

v5.0.0





Recommended filters:

-> Best shaper: MZV @ 43.2 Hz

-> Estimated damping ratio (ζ): 0.068

Type	Frequency	Vibrations	Smoothing	Max Accel
ZV	44.8 Hz	5.6 %	0.078	7760
MZV	43.2 Hz	0.5 %	0.110	5460
EI	45.0 Hz	0.0 %	0.161	3730
2HUMP_EI	65.8 Hz	0.0 %	0.127	4740
3HUMP_EI	80.4 Hz	0.0 %	0.130	4610

Vibrations sweeping