

Create a Slicer Profile Using Resonance Testing

Presented by

Reth

Portland “PDX” Vice

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Special thanks to DraftShift Design, the stealthchanger folks, for letting me practice on them

Who am I

- My secret agent name is Reth.
 - The name was chosen because this is my D&D character name.
 - Currently up to Reth XV
- Currently hold a BSEEET, MSEE, and JD.
- Work as a Primary Patent Examiner at the United States Patent and Trademark office, where I examine semiconductors.
- I am not a mechanical engineer. Basically, I am learning as I go.

CYA notice and disclaimer:

The views and comments expressed herein are solely the opinion of the author, do not reflect the performance of duties in the author's official capacity, and are not endorsed by, nor should be construed as, any viewpoint official or unofficial of the United States Patent and Trademark Office. The author confirms to the best of his or her knowledge that no information contained herein is privileged, confidential or classified.

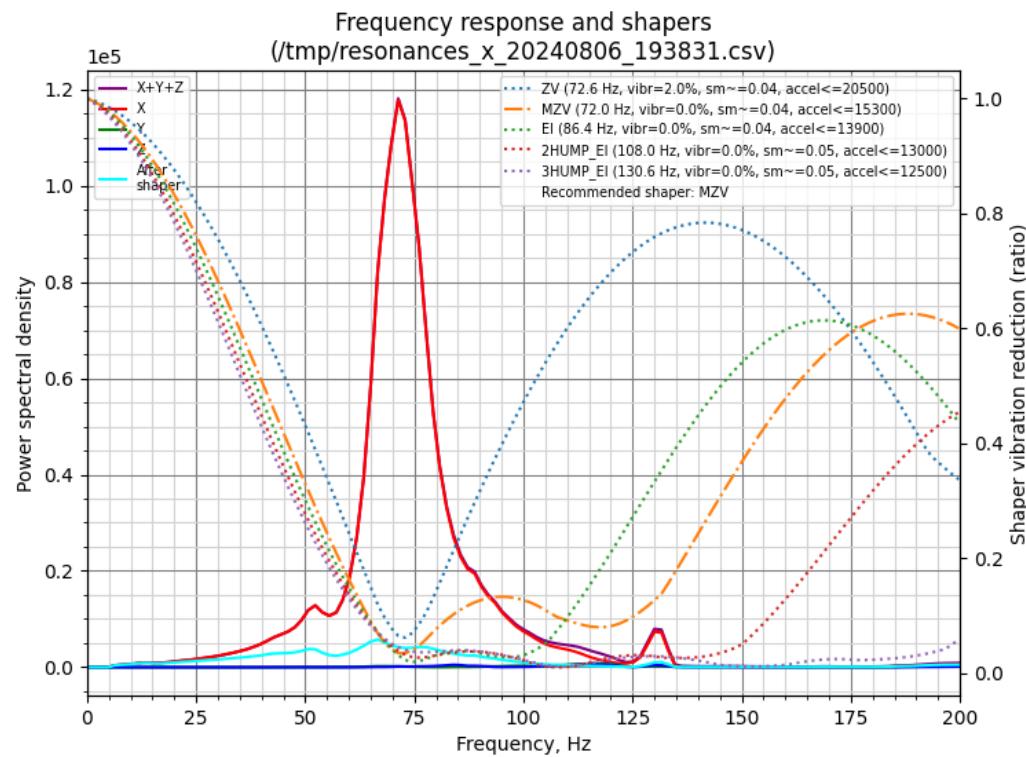
Background

What is resonance

The natural frequency at which an object exacerbates oscillations based upon an external vibration.

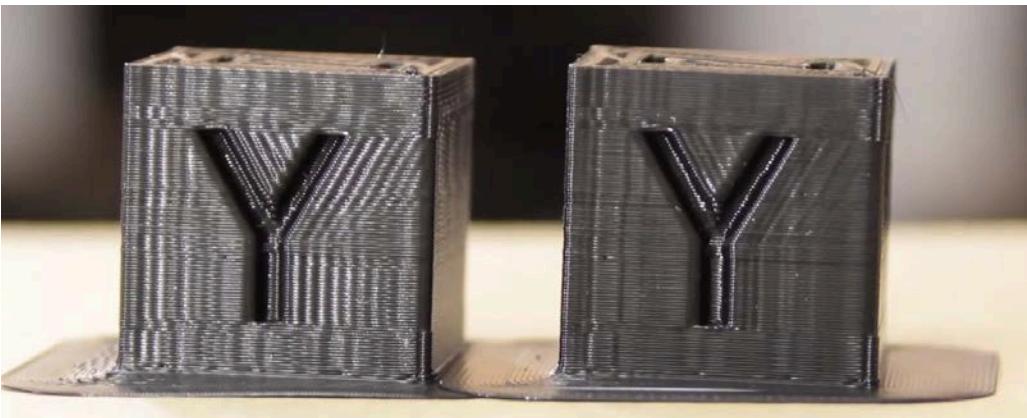
Damping ratio is the loss of energy of the oscillating system by natural dissipation. The decay of the oscillations in a system after excitation

In Voron printers our damping ratio is normally in the range of 0.04-0.06
Standard Klipper sets the value to 0.1



Why do we need to worry about resonance; Why didn't we worry about it before

- Printers are getting faster.
- Ghosting/ringing/resonance is more pronounced with increased acceleration
- The faster you go the harder it is to turn



	MK3	Voron VT/V2 (PLA)
Internal perimeter	60	120
External Perimeter	35	120
Internal accel	800	3000
External accel	800	3500

*ABS can be run faster

Issue

- 10K exterior perimeter accel values are becoming more common due to:
 - AWD,
 - Metal Gantry
 - Light weight x-axis
 - TMC 4671 (Ouroboros) with motor encoders
- Premade slicer profiles are not setup for these accelerations.
- We need a way to find set the slicer settings for these higher accelerations, and potentially higher speeds

Printer and Settings

Test printer

- V2 350 – “BOG” serial 8077
- Vitalii 3D – 9mm AWD
- LDO Kraken Motors - 42sth60-3004ah
- Dragon Burner
- Sherpa mini
- Rapido ACE with 0.5 WC nozzle (West3d)
- EBB36
- Carto
- Vitalii 9mm AWD



My Current Print Settings

Speed for print moves	Speed for non-print moves
<ul style="list-style-type: none"> Perimeters: <input type="text" value="125"/> mm/s Small perimeters: <input type="text" value="60"/> mm/s or % External perimeters: <input type="text" value="85"/> mm/s or % Infill: <input type="text" value="150"/> mm/s Solid infill: <input type="text" value="125"/> mm/s or % Top solid infill: <input type="text" value="65"/> mm/s or % Support material: <input type="text" value="65"/> mm/s Support material interface: <input type="text" value="100%"/> mm/s or % Bridges: <input type="text" value="60"/> mm/s Over bridges: <input type="text" value="0"/> mm/s or % Gap fill: <input type="text" value="20"/> mm/s Ironing: <input type="text" value="15"/> mm/s 	<ul style="list-style-type: none"> Travel: <input type="text" value="400"/> mm/s Z travel: <input type="text" value="0"/> mm/s
Dynamic overhang speed	Modifiers
<ul style="list-style-type: none"> Enable dynamic overhang speeds: <input checked="" type="checkbox"/> speed for 0% overlap (bridge): <input type="text" value="15"/> mm/s or % speed for 25% overlap: <input type="text" value="25"/> mm/s or % speed for 50% overlap: <input type="text" value="50"/> mm/s or % speed for 75% overlap: <input type="text" value="65"/> mm/s or % 	<ul style="list-style-type: none"> First layer speed: <input type="text" value="50"/> mm/s or % First layer solid infill speed: <input type="text" value="0"/> mm/s or % Speed of object first layer over raft interface: <input type="text" value="30"/> mm/s or % Small perimeter thresholds: Lower: <input type="text" value="10"/> mm Upper: <input type="text" value="30"/> mm
Speed for non-print moves	Acceleration/jerk control (advanced)
<ul style="list-style-type: none"> Travel: <input type="text" value="400"/> mm/s Z travel: <input type="text" value="0"/> mm/s 	<ul style="list-style-type: none"> External perimeters: Acceleration: <input type="text" value="10000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="10"/> mm/s Perimeters: Acceleration: <input type="text" value="15000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="15"/> mm/s Top solid infill: Acceleration: <input type="text" value="5000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="5"/> mm/s Solid infill: Acceleration: <input type="text" value="15000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="15"/> mm/s Infill: Acceleration: <input type="text" value="20000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="20"/> mm/s Bridge: Acceleration: <input type="text" value="10000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="10"/> mm/s First layer: Acceleration: <input type="text" value="5000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="5"/> mm/s First object layer over raft interface: Acceleration: <input type="text" value="0"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="0"/> mm/s Wipe Tower: Acceleration: <input type="text" value="0"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="0"/> mm/s Travel: Acceleration: <input type="text" value="30000"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="30"/> mm/s Short distance travel: Acceleration: <input type="text" value="0"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0"/> mm Jerk: <input type="text" value="0"/> mm/s Default: Acceleration: <input type="text" value="4500"/> mm/s² Minimum Cruise Ratio: <input type="text" value="0.5"/> mm Jerk: <input type="text" value="5"/> mm/s
Modifiers	Auto Speed (advanced)
<ul style="list-style-type: none"> First layer speed: <input type="text" value="50"/> mm/s or % First layer solid infill speed: <input type="text" value="0"/> mm/s or % Speed of object first layer over raft interface: <input type="text" value="30"/> mm/s or % Small perimeter thresholds: Lower: <input type="text" value="10"/> mm Upper: <input type="text" value="30"/> mm 	<ul style="list-style-type: none"> Max print speed: <input type="text" value="300"/> mm/s Max volumetric speed: <input type="text" value="24"/> mm³/s

Shaketune Test

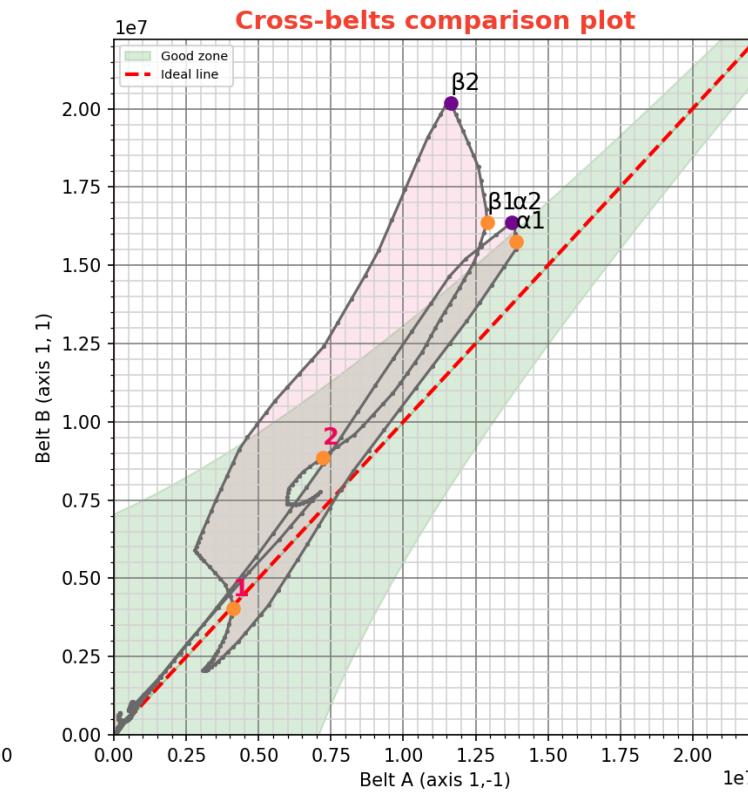
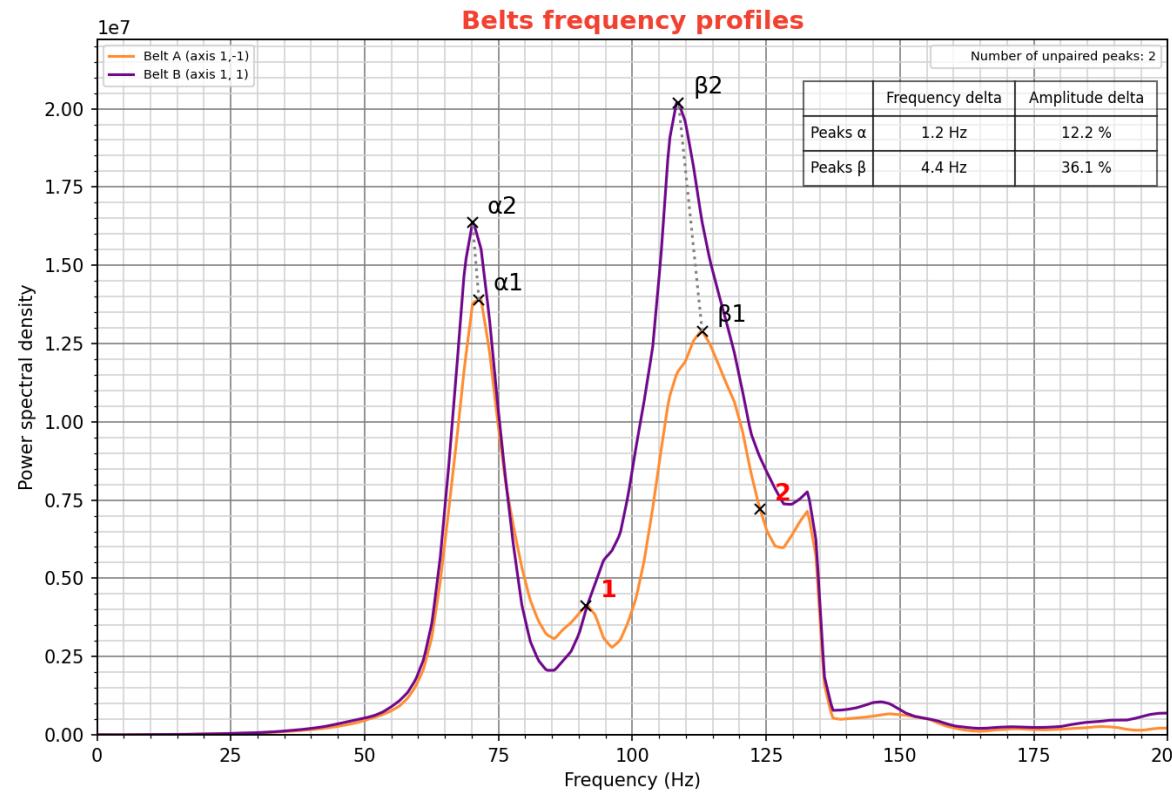
Belts – for completeness only



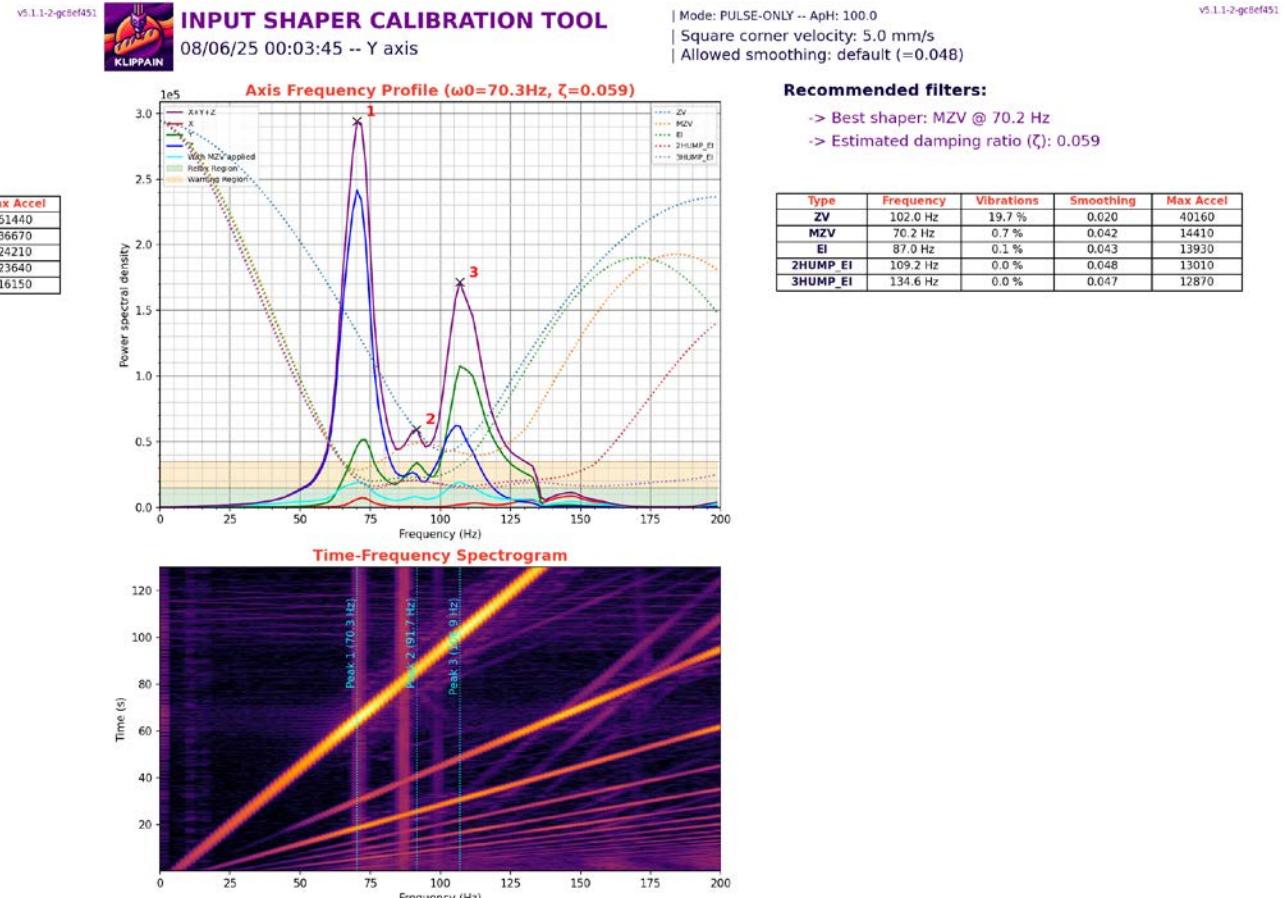
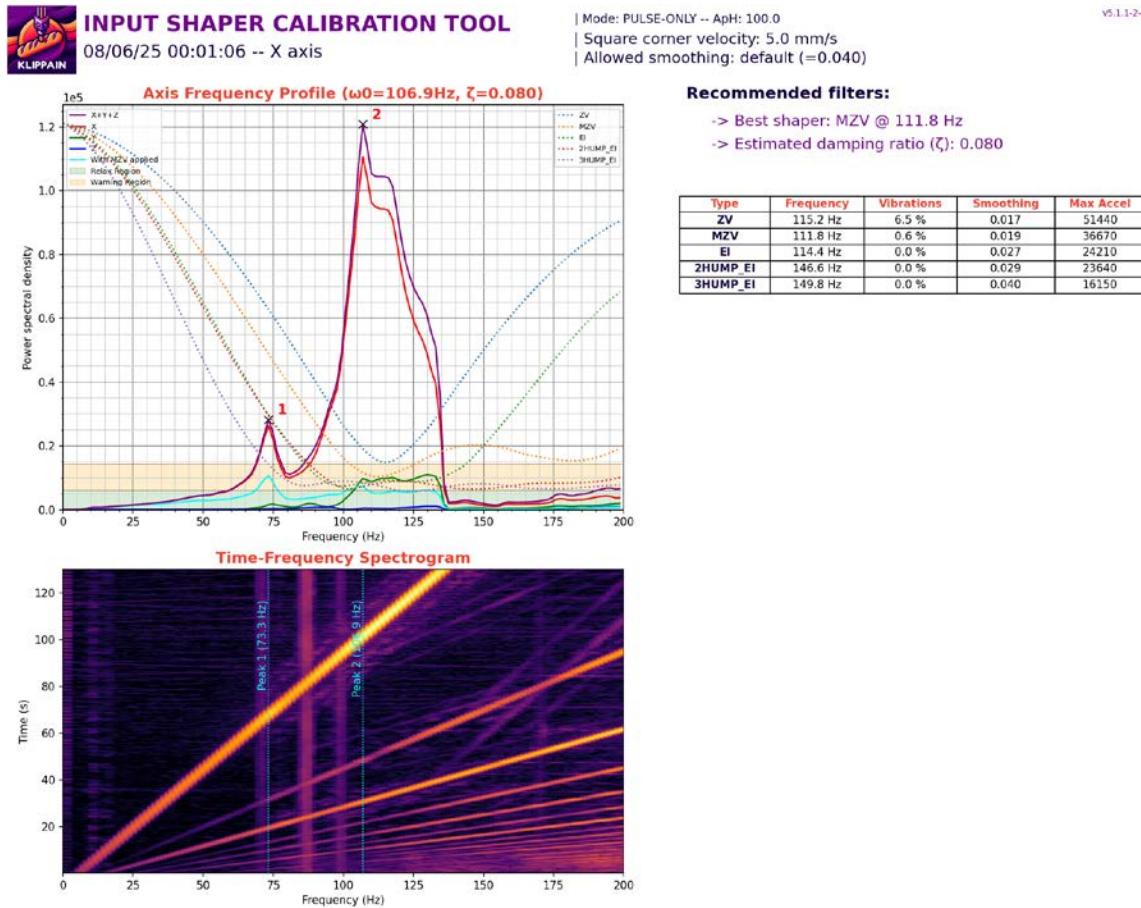
RELATIVE BELTS CALIBRATION TOOL

08/05/25 23:31:02 -- COREXY kinematics

v5.1.1-2-gc8ef451



Input Shaper



Y-axis



INPUT SHAPER CALIBRATION TOOL

08/06/25 00:03:45 -- Y axis

| Mode: PULSE-ONLY -- ApH: 100.0

| Square corner velocity: 5.0 mm/s

| Allowed smoothing: default (=0.048)

v5.1.1-2-gc8ef451

Recommended filters:

-> Best shaper: MZV @ 70.2 Hz

-> Estimated damping ratio (ζ): 0.059

Type	Frequency	Vibrations	Smoothing	Max Accel
ZV	102.0 Hz	19.7 %	0.020	40160
MZV	70.2 Hz	0.7 %	0.042	14410
EI	87.0 Hz	0.1 %	0.043	13930
2HUMP_EI	109.2 Hz	0.0 %	0.048	13010
3HUMP_EI	134.6 Hz	0.0 %	0.047	12870

Double hump is likely due to:

- 1) Toolhead
- 2) Lack of frame supports

EI does not have zero vibr%

[input_shaper]

shaper_freq_x: 114.4

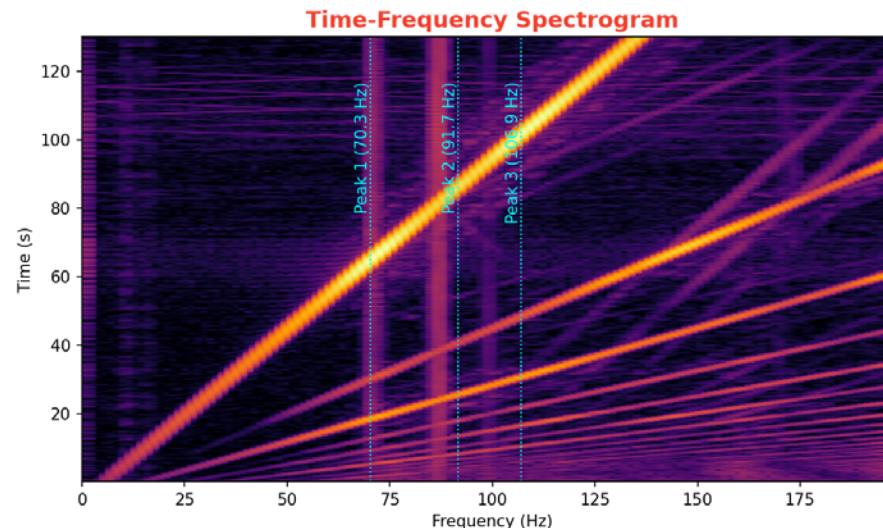
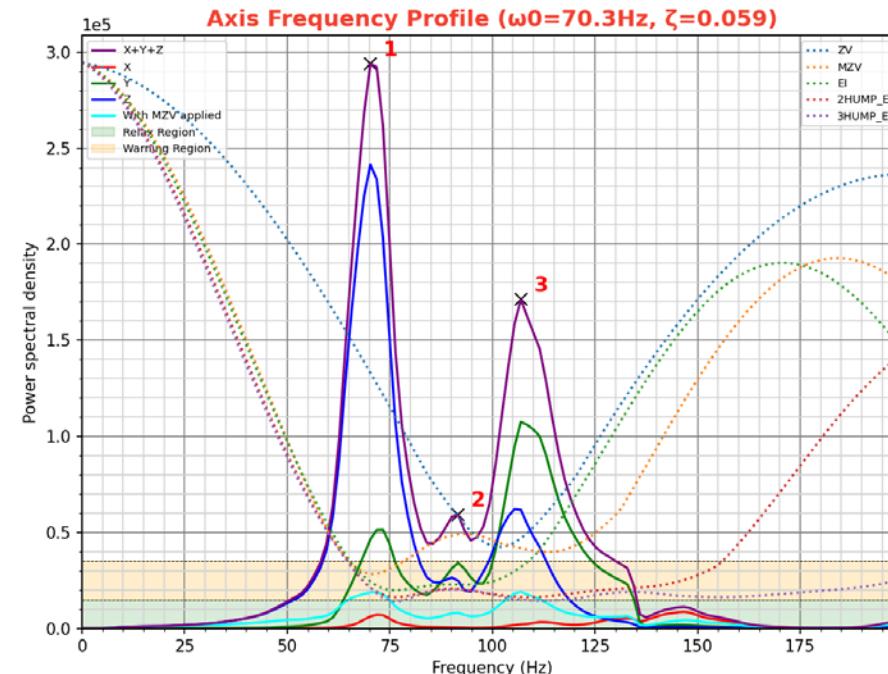
shaper_type_x: ei

damping_ratio_x: 0.080

shaper_freq_y: 87.0

shaper_type_y:

eidamping_ratio_y: 0.059

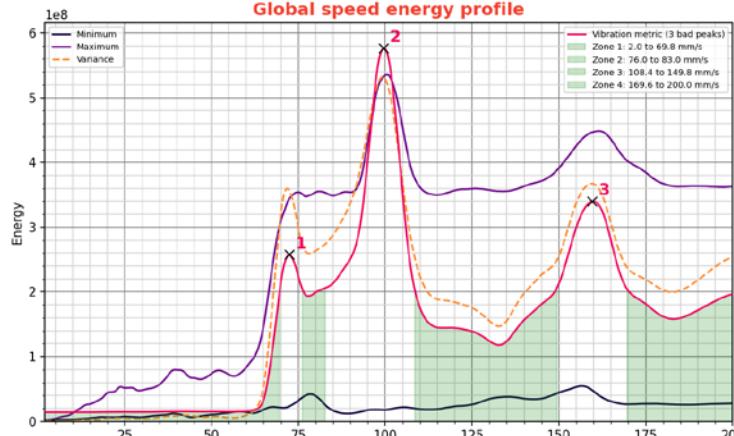
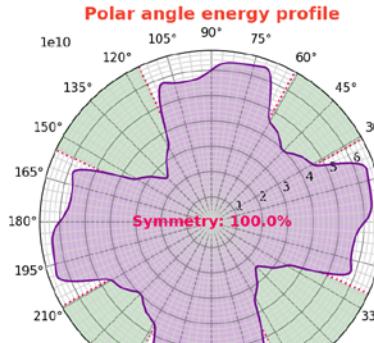


Vibrations

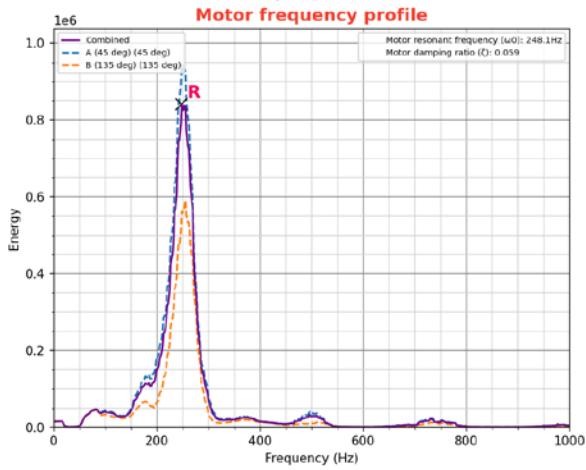
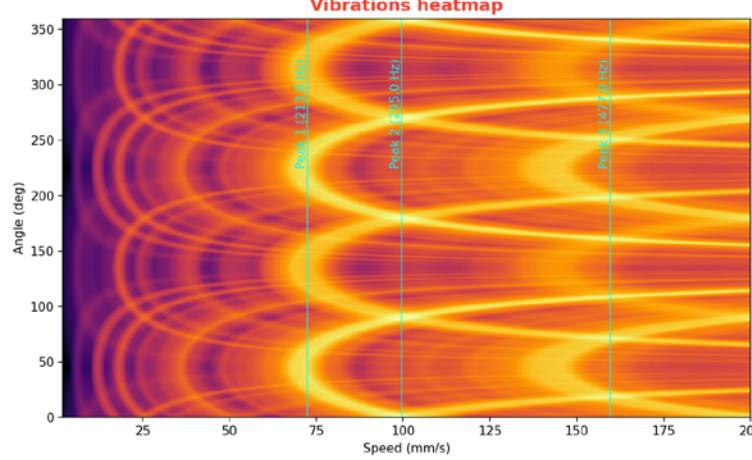
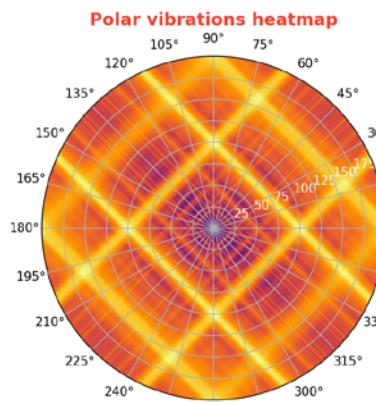
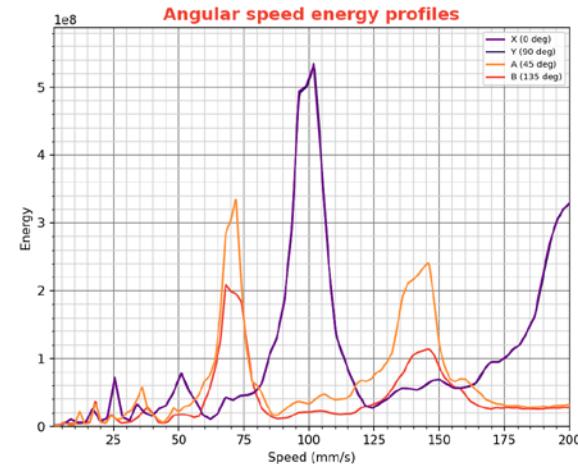


MACHINE VIBRATIONS ANALYSIS TOOL

08/06/25 06:46:55 at 3000 mm/s² -- COREXY kinematics



```
v5.1.1-2-gc0ef451  
CHOPCONF: toff=1 hstrt=7 hend=5tbl=1 tpfd=1 intpol=1 dcedge=1  
PWMCONF: of=16 grad=6 freq=2 autoscale=1 autograd=1 reg=15 lim=4  
COOLCONF: semin=2 seup=3 semax=4 sedn=2 selmin=1 sgt=1  
THRS: tpwmthrs=1048575 tcoolthrs=313
```



Setting Slicer

Setting Accelerations

Note

- Klipper does not have JERK
 - In slicers Jerk is klipper's SCV value.
- Square Corner Velocity “SCV”
 - A good point to start with SCV is to take your accel and divide it by 1000.
- Example
 - Input shaper says 7365
 - Set SCV at 7.365 or simply 7.

Setting Perimeter Acceleration

Use this max accel as the basis for ext. perimeter accel
A safe starting point for int. perimeter accel is +500 more than ext. perimeter accel

Type	Frequency	Vibrations	Smoothing	Max Accel
ZV	102.0 Hz	19.7 %	0.020	40160
MZV	70.2 Hz	0.7 %	0.042	14410
EI	87.0 Hz	0.1 %	0.043	13930
2HUMP_EI	109.2 Hz	0.0 %	0.048	13010
3HUMP_EI	134.6 Hz	0.0 %	0.047	12870



•

— Acceleration/jerk control (advanced) —

● External perimeters:	Acceleration:	13900	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	13.9	mm/s
● Perimeters:	Acceleration:	14400	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	14.4	mm/s
● Top solid infill:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● Solid infill:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● Infill:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	• 0	mm/s
● Bridge:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● First layer:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● First object layer over raft interface:	Acceleration:	• 0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	• 0	mm/s
● Wipe Tower:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● Travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	0	mm/s
● Short distance travel:	Acceleration:	• 0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk:	• 0	mm/s
● Default:	Acceleration:	4500	mm/s ²	Minimum Cruise Ratio:	• 0.5	mm	Jerk:	• 5	mm/s

Set (Sparse) infill Acceleration

Set Max Flow Rate/Max Volumetric flow – google realistic numbers

Use max acceleration you think your system can do, or

Just run the max speed/accel test from Ellis print guide (or your favorite test)

Depending on how the infill prints you may need to slow down.

Starting point

For 2WD – 8-10k

For 4WD & 4671 – 15-20k



Picture Taken from
<https://forum.prusa3d.com/forum/original-prusa-i3-mk3s-mk3-how-do-i-print-this-printing-help/sparse-broken-infill/>



Picture Taken from
<https://pranit3dprints.blogspot.com/2023/05/5-common-3d-printing-problems-and-their.html>



Picture Taken from <https://www.additive-x.com/blog/how-to-choose-the-right-3d-printing-file-format>

Set (Sparse) infill Acceleration

Acceleration/jerk control (advanced)							
● External perimeters:	Acceleration:	13900	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 13.9
● Perimeters:	Acceleration:	14400	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 14.4
● Top solid infill:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● Solid infill:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● Infill:	Acceleration:	• 20000	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: • 20.0
● Bridge:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● First layer:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● First object layer over raft interface:	Acceleration:	• 0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: • 0
● Wipe Tower:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● Travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: 0
● Short distance travel:	Acceleration:	• 0	mm/s ²	Minimum Cruise Ratio:	• 0	mm	Jerk: • 0
● Default:	Acceleration:	4500	mm/s ²	Minimum Cruise Ratio:	• 0.5	mm	Jerk: • 5



Set Solid and Top solid Infill

- Both Solid infill and Top solid infill may need to be less than Sparse Infill
 - This is because top solid infill needs to be a pretty part as it is can be seen
 - Solid infill needs to be printing smoothly to prevent curling and the nozzle hitting the curls
- Good starting point:
- 2WD = standard Voron value (slicer) / standard Voron value
- 4WD & 4671 = previous ext perimeter accel / 5000 less than infill

Acceleration/Jerk control (advanced)							
● External perimeters:	Acceleration:	<input type="range" value="13900"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Perimeters:	Acceleration:	<input type="range" value="14400"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Top solid infill:	Acceleration:	<input type="range" value="5000"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Solid infill:	Acceleration:	<input type="range" value="15000"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Infill:	Acceleration:	<input type="range" value="20000"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Bridge:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● First layer:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● First object layer over raft interface:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Wipe Tower:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Travel:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Short distance travel:	Acceleration:	<input type="range" value="0"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0"/>	mm	Jerk:
● Default:	Acceleration:	<input type="range" value="4500"/>	mm/s ²	Minimum Cruise Ratio:	<input type="range" value="0.5"/>	mm	Jerk:

Other Settings

- Travel – based upon the previous speed/accel test use the fastest your printer can go.
- Bridge – a good starting point is standard Voron setting, and then increase with testing
- Wipe tower – leave at Voron standard. Do you really want to test knocking down wipe towers

Acceleration/jerk control (advanced)							
● External perimeters:	Acceleration:	13900	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 13.9 mm/s
● Perimeters:	Acceleration:	14400	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 14.4 mm/s
● Top solid infill:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 5 mm/s
● Solid infill:	Acceleration:	15000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 15 mm/s
● Infill:	Acceleration:	20000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 20 mm/s
● Bridge:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 5 mm/s
● First layer:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 5 mm/s
● First object layer over raft interface:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 0 mm/s
● Wipe Tower:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 4 mm/s
● Travel:	Acceleration:	30000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 30 mm/s
● Short distance travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk: 0 mm/s
● Default:	Acceleration:	4500	mm/s ²	Minimum Cruise Ratio:	0.5	mm	Jerk: 5 mm/s

Other Settings

- First layer – half of ext. perimeter – may need to slow down
- Short Distance Travel – your previous default value, or Voron standard default.

Acceleration/jerk control (advanced)								
● External perimeters:	Acceleration:	13900	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	13.9 mm/s
● Perimeters:	Acceleration:	14400	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	14.4 mm/s
● Top solid infill:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	5 mm/s
● Solid infill:	Acceleration:	15000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	15 mm/s
● Infill:	Acceleration:	20000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	20 mm/s
● Bridge:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	5 mm/s
● First layer:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	5 mm/s
● First object layer over raft interface:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	0 mm/s
● Wipe Tower:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	4 mm/s
● Travel:	Acceleration:	30000	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	30 mm/s
● Short distance travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0	mm	Jerk:	0 mm/s
● Default:	Acceleration:	4500	mm/s ²	Minimum Cruise Ratio:	0.5	mm	Jerk:	5 mm/s

Notes on Acceleration

- All of the values are starting points.
- You will need to run test to verify they work

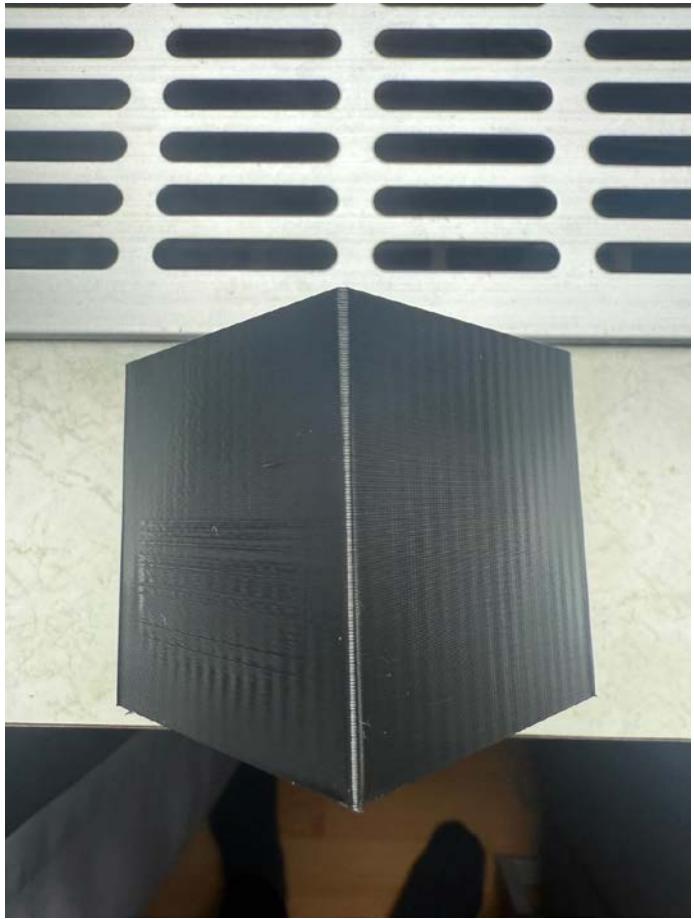
Final settings

Acceleration/jerk control (advanced)					
● External perimeters:	Acceleration:	10000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 10 mm/s
● Perimeters:	Acceleration:	15000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 15 mm/s
● Top solid infill:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● Solid infill:	Acceleration:	15000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 15 mm/s
● Infill:	Acceleration:	20000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 20 mm/s
● Bridge:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● First layer:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● First object layer over raft interface:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 0 mm/s
● Wipe Tower:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 4 mm/s
● Travel:	Acceleration:	30000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 30 mm/s
● Short distance travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 0 mm/s
● Default:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0.5 mm Jerk: 5 mm/s

Starting point

Acceleration/jerk control (advanced)					
● External perimeters:	Acceleration:	13900	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 13.9 mm/s
● Perimeters:	Acceleration:	14400	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 14.4 mm/s
● Top solid infill:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● Solid infill:	Acceleration:	15000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 15 mm/s
● Infill:	Acceleration:	20000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 20 mm/s
● Bridge:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● First layer:	Acceleration:	5000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 5 mm/s
● First object layer over raft interface:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 0 mm/s
● Wipe Tower:	Acceleration:	2000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 4 mm/s
● Travel:	Acceleration:	30000	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 30 mm/s
● Short distance travel:	Acceleration:	0	mm/s ²	Minimum Cruise Ratio:	0 mm Jerk: 0 mm/s
● Default:	Acceleration:	4500	mm/s ²	Minimum Cruise Ratio:	0.5 mm Jerk: 5 mm/s

Setting Velocities/Speed

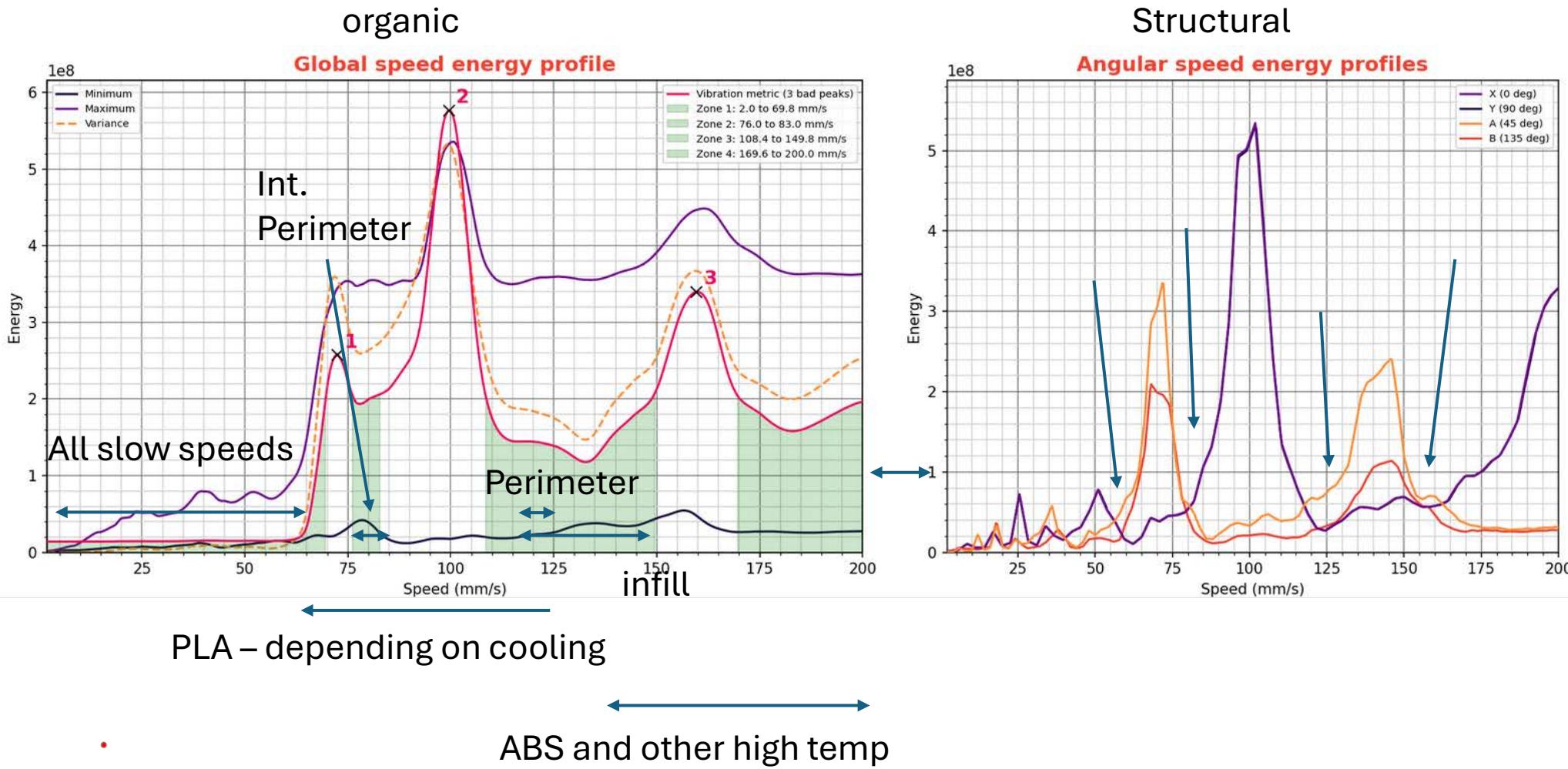


Picture Taken from Anrar Voron Discord

Picture Taken from Kleitenberger Voron Discord

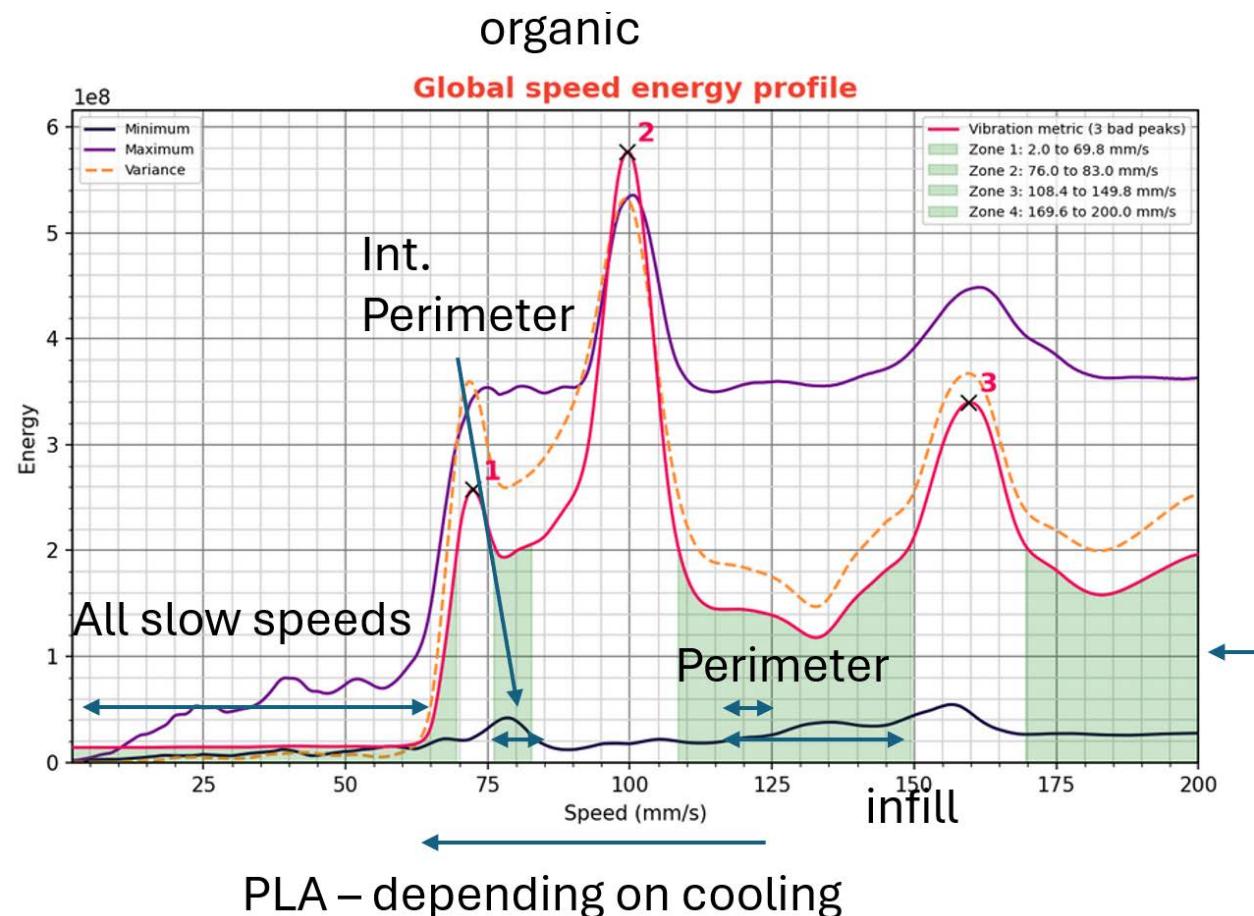
Picture Taken from thebigone2087 Voron Discord

Setting Velocity/Speed



Int/Ext Speed

- Start with Internal perimeter
 - PLA 125 mm/s or less
 - ABS 125 mm/s or more
- External perimeter
 - This is going to take test prints.
 - Start with your external perimeter speed then slow down as needed
 - Example: if 125 mm/s is no good move to next green zone
 - For PLA 76-83 mm/s
 - If ext. perimeter prints good move up slightly.
 - On these graphs I was able to print
 - Internal perimeter 125mm/s
 - External perimeter 85 mm/s
 - Small perimeters
 - Going to be slower than ext. perimeter
 - Go to next lower green zone



Infill Speed

- Sparse infill
 - To set infill velocity start with your internal perimeter and infill acceleration
 - If the infill looks good increase the speed. If the infill is broken slow down.
 - You don't want too much broken infill or else it can curl and hit your nozzle which could result in skipped steps.
- Solid infill
 - Start with internal perimeter speed.
 - Will generally need to be slower than sparse infill.
 - Looking for the max speed which does not result in curling.
- Top solid infill
 - Start with external perimeter speed.
 - This needs to look pretty.

Perimeter and Infill results

Speed for print moves

- Perimeters: mm/s
- Small perimeters: mm/s or %
- External perimeters: mm/s or %
- Infill: mm/s
- Solid infill: mm/s or %
- Top solid infill: mm/s or %
- Support material: mm/s
- Support material interface: mm/s or %
- Bridges: mm/s
- Over bridges: mm/s or %
- Gap fill: mm/s
- Ironing: mm/s

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

Starting point

Speed for print moves

- Perimeters: mm/s
- Small perimeters: mm/s or %
- External perimeters: mm/s or %
- Infill: mm/s
- Solid infill: mm/s or %
- Top solid infill: mm/s or %
- Support material: mm/s
- Support material interface: mm/s or %
- Bridges: mm/s
- Over bridges: mm/s or %
- Gap fill: mm/s
- Ironing: mm/s

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

end point

Dynamic Overhang Speed

- Start with the default settings
- Set 75% overlap to external perimeter speed
 - Adjust downward to next green zone if needed
- Set 50% overlap
 - Start either equal to 75% or next lower green zone
- Set 25% overlap
 - Start lower or equal to 50% overlap.
 - Or make it half of 50% so long as it is still in green zone
- Set 0% overlap
 - This can be thought of as an exterior perimeter bridge
 - Safe bet is to keep it at the default value

Dynamic overhang results

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

Starting point

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

end point

Rest of Speed Settings

- Support Material – set to top solid infill speed
- Bridges – start speed for 75 overlap, or top solid infill speed
 - Test will show if you can increase, or need to decrease the speed
- Gap fill – per the tooltip want to keep this slow
 - Start with your 25% overlap
- Over Bridge – set to 0 to use top solid infill
- Support material interface – I have no idea I leave it at 100%
 - Seems to work for me.
- Ironing – I have no idea I do not use it.

Final Speeds

Speed for print moves

- Perimeters: mm/s
- Small perimeters: mm/s or %
- External perimeters: mm/s or %
- Infill: mm/s
- Solid infill: mm/s or %
- Top solid infill: mm/s or %
- Support material: mm/s
- Support material interface: mm/s or %
- Bridges: mm/s
- Over bridges: mm/s or %
- Gap fill: mm/s
- Ironing: mm/s

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

Starting Point

Speed for print moves

- Perimeters: mm/s
- Small perimeters: mm/s or %
- External perimeters: mm/s or %
- Infill: mm/s
- Solid infill: mm/s or %
- Top solid infill: mm/s or %
- Support material: mm/s
- Support material interface: mm/s or %
- Bridges: mm/s
- Over bridges: mm/s or %
- Gap fill: mm/s
- Ironing: mm/s

Dynamic overhang speed

- Enable dynamic overhang speeds:
- speed for 0% overlap (bridge): mm/s or %
- speed for 25% overlap: mm/s or %
- speed for 50% overlap: mm/s or %
- speed for 75% overlap: mm/s or %

Final Results

Extra's

- Travel speed
 - based upon speed/accel test pick a speed that complements the acceleration and prevents skipped steps
- First layer
 - Go slow to make sure first layer gets down good.
 - Play with speed when doing first layer calibrations

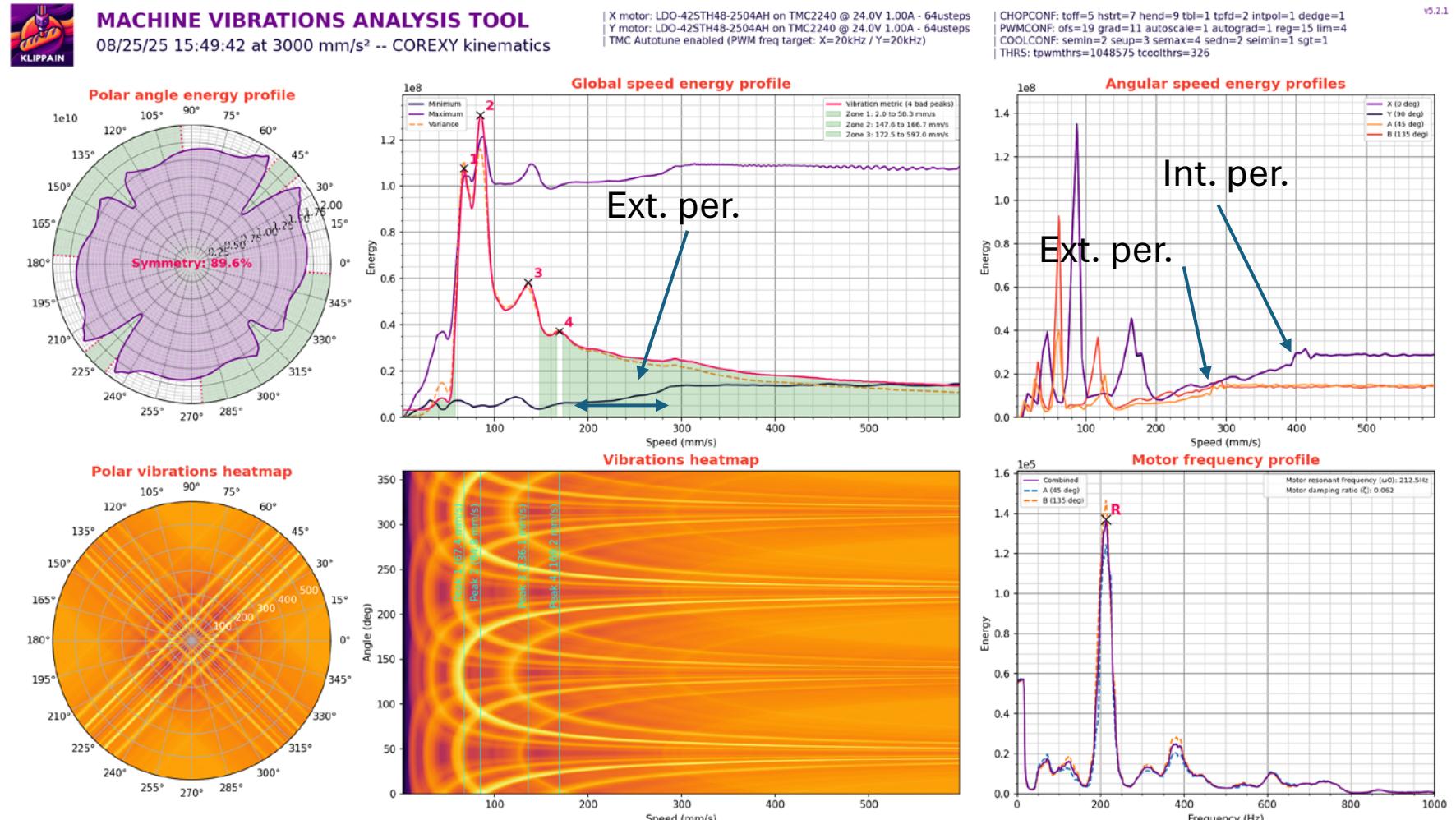
What about ABS

Congratulations
You get to print faster

Use the same procedure
as described above.
Except extend vibrations
profile test out to
400mm/s or 600 mm/s

May need to increase
interval from 2mm/s to
5mm/s depending on
your Pi's memory

Based upon the two
charts I would start:
Ext. Per. @ 280 mm/s
Int. Per. @ 400 mm/s



What about PA and EM calibration

- Once you have created the initial profile now what?
- Use Ellis Print Guide to set PA and EM
 - Use the interior perimeter and interior acceleration from your initial profile for PA
 - Use your initial profile to set EM

After you have PA and EM cals done, you can start your test prints.

Order of Calibrating

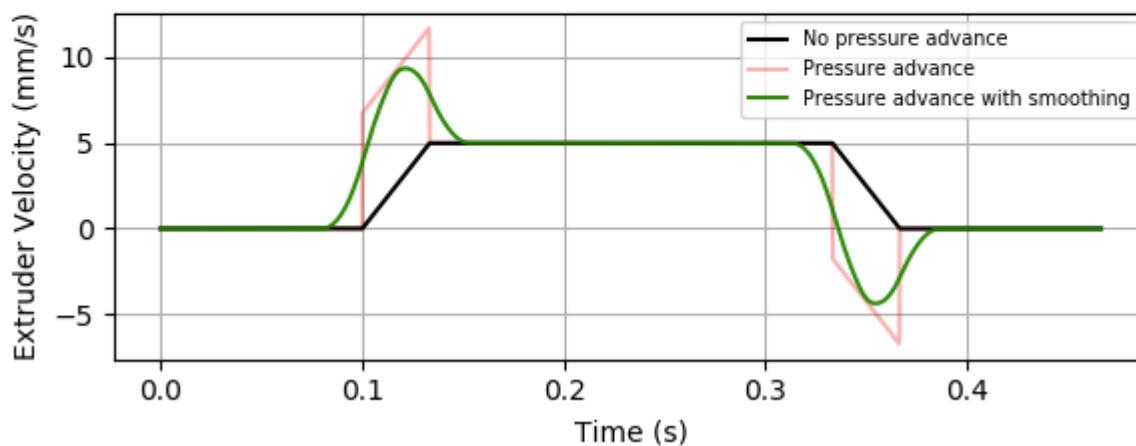
- E-Steps (if not already done)
- Belt shaper
- Input shaper
- Vibrations Profile
- Setup Slicer
- First layer
- EM – extrusion multiplier
- PA – pressure advance
- Print

Pressure Advance

Acceleration
Pressure given "in advance" to counter extrusion lag

Coasting
System pressure normalized, coasting at steady flow rate

Deceleration
Reverse move to alleviate system pressure while slowing/stopping



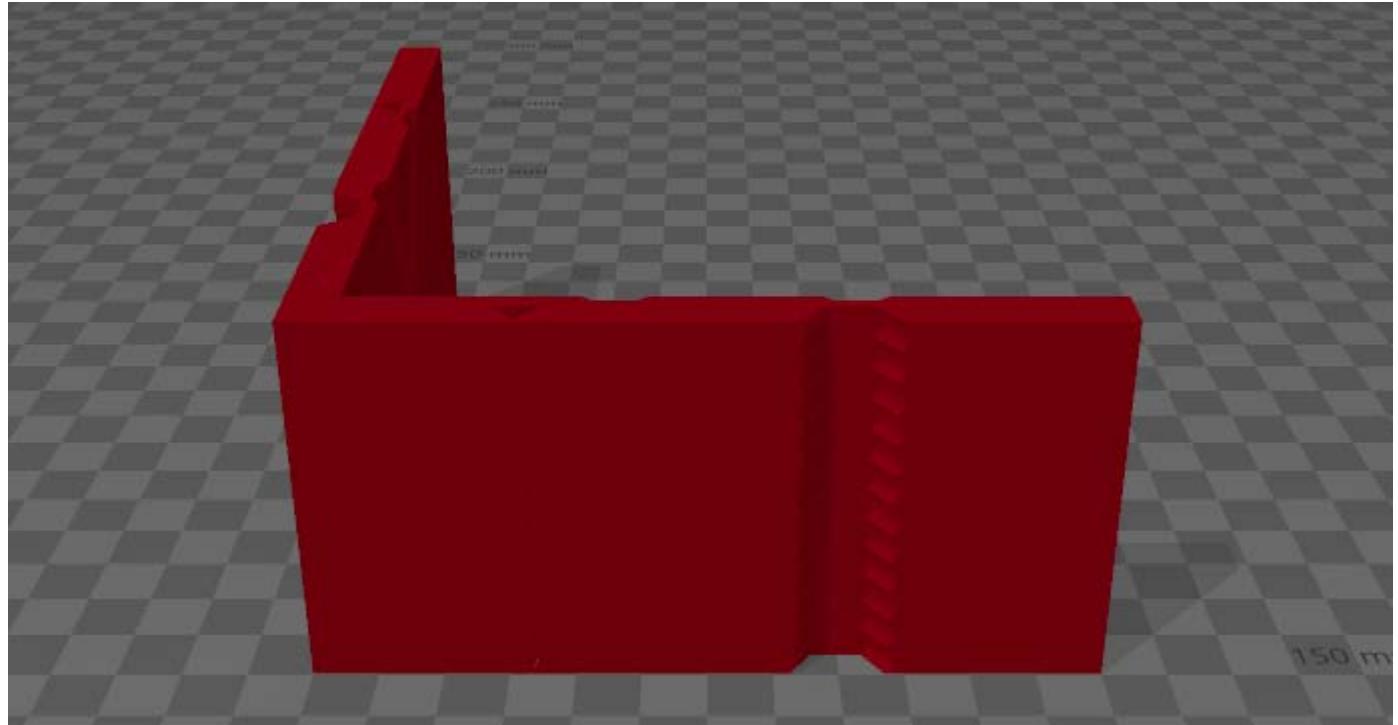
Set_pressure_advance advance=0.0xx

Extrusion Multiplier

- https://github.com/AndrewEllis93/Print-Tuning-Guide/tree/main/test_prints/extrusion_multiplier_cubes/labeled

Test prints

- https://www.klipper3d.org/Resonance_Compensation.html
 - Ringing tower test
 - Can be used to verify input shaper, or used to calibrate input shaper.
 - To calibrate input shaper it takes a long time
 - To verify use only 5-10mm of model



Motor Vibrations Print

- <https://mihaidesigns.com/motor-vibration-test/>

Can be used to verify speed of vibrations profile, or to use instead of vibrations profile

“Usually, there will be a speed range where the surface is not smooth. This speed range will be centered somewhere between 40 and 100mm/s and should be avoided...”



How long will it take to actually do this

- The entire process from input shaper to a final profile generally takes me about a week.
- Does it need to take a week?
 - Nope.
 - It can take you less or more time based upon the quality of prints you are looking for.



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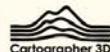
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Questions