

YT Video 14 Super Slicer + Klipper Kalibrierung

Duku Download at <https://github.com/Schmelzerboy/I3-Mega-Klipper>

Printer Anycubic I3 Mega MK4 THE REAL ORBITER KLIPPER Version

Dominik Schmidt (YT Dr. Klipper) <https://www.youtube.com/@dr.klipper>

Jan Oerter (YT Schmelzerboy)

<https://www.youtube.com/channel/UCTYNFDNzhLzgfR8x1OPZsGg>

Video Links:

Part 1 - <https://youtu.be/kW5aFmzocZc> (Anycubic I3Mega Tuning Teil 13 Mainsail + Klipper feat. @dr.klipper)

Part 2 - [#46 - Klipper FAQ - komplette Installation\)](https://youtu.be/CcnwJQRyG4Y)

Part 3 - TBD

Super Slicer

Super Slicer Installation

Installation:

1. Download <https://github.com/supermerill/SuperSlicer/releases/tag/2.4.58.5>



You can have daily builds in the action menu or github.
You can support me with the "sponsor" button

Assets 8

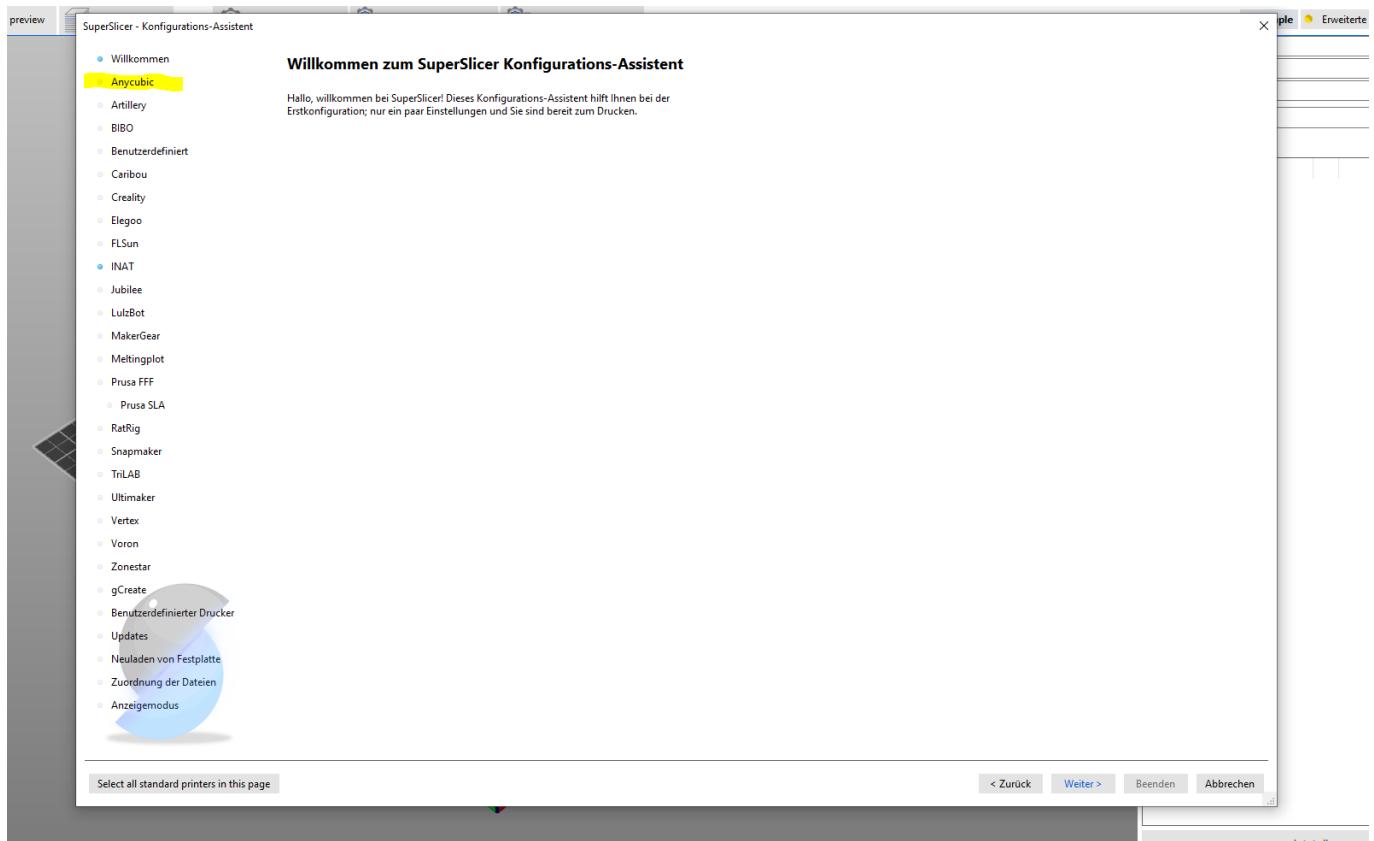
SuperSlicer_ubuntu_18.04-2.4.58.5.AppImage	56.1 MB	Sep 24, 2022
SuperSlicer_ubuntu_18.04-gtk2-2.4.58.5.AppImage	56.1 MB	Sep 24, 2022
SuperSlicer_2.4.58.5_linux64_220924.tar.zip	55.9 MB	Sep 24, 2022
SuperSlicer_2.4.58.5_macos_220924.dmg	56.8 MB	Sep 24, 2022
SuperSlicer_2.4.58.5_macos_arm_220924.dmg	53.6 MB	Sep 24, 2022
SuperSlicer_2.4.58.5_win64_220924.zip	70.8 MB	Sep 24, 2022
Source code (zip)		Sep 24, 2022
Source code (tar.gz)		Sep 24, 2022

🕒 37 🤗 1 🎉 17 ❤️ 16 💬 10 📁 4 61 people reacted

2. Enpacken und Exe Starten ⇒ Verknüpfung auf den Desktop

⇒ Assistent startet

⇒ I3 Mega konfigurieren oder Abbrechen Drücken



Import Profil Super Slicer

Rechte Maustaste „Speichern unter“

Download Profil unter:

https://github.com/Schmelzerboy/I3-Mega-Klipper/tree/main/Profile_Super_Slicer

3. Import TEST PLA

Datei → Import ⇒ Importiere Konfiguration

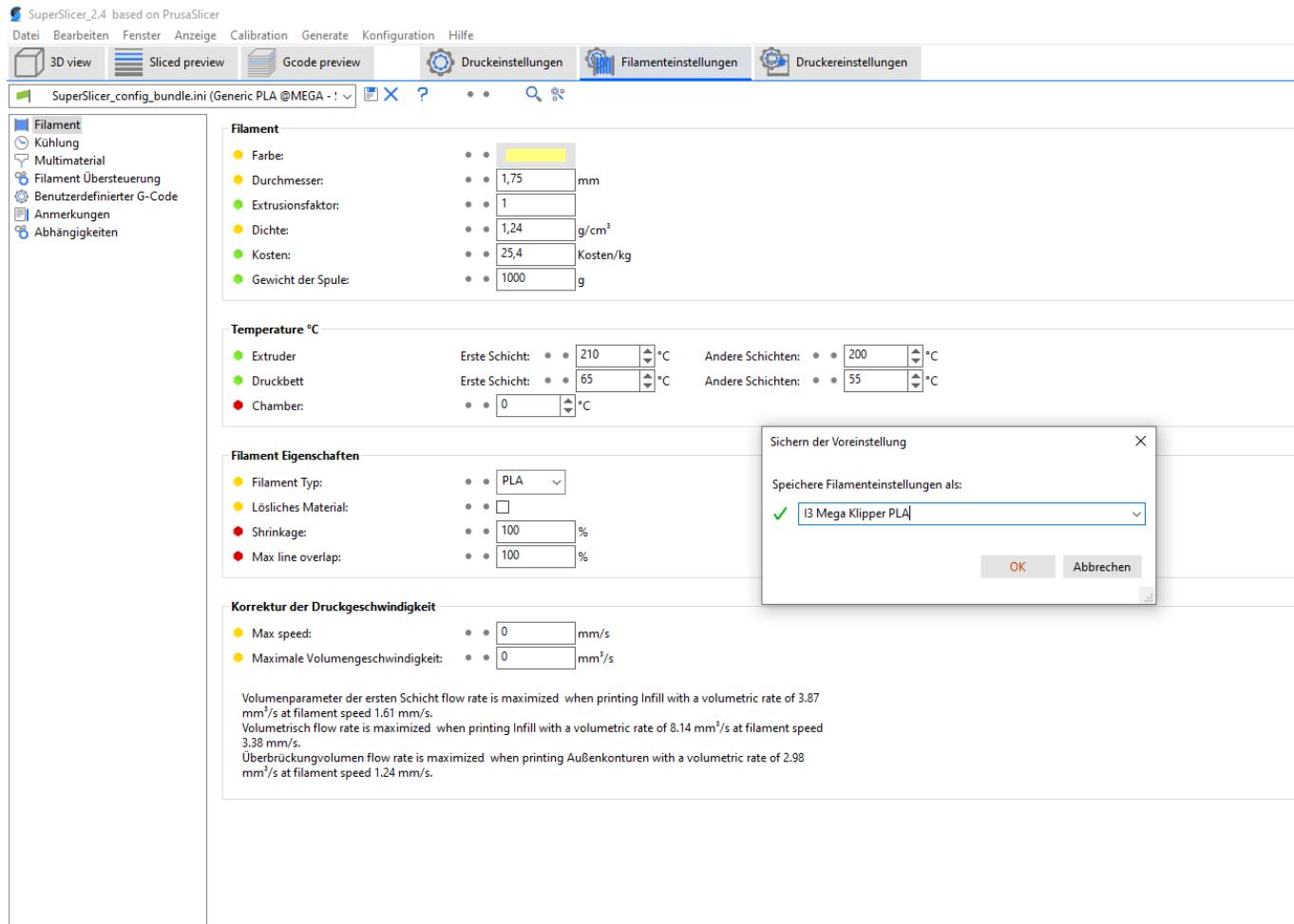
Last update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32

Drucker Einstellungen eindeutigen Namen vergeben

The screenshot shows the SuperSlicer 2.4 software interface with the following details:

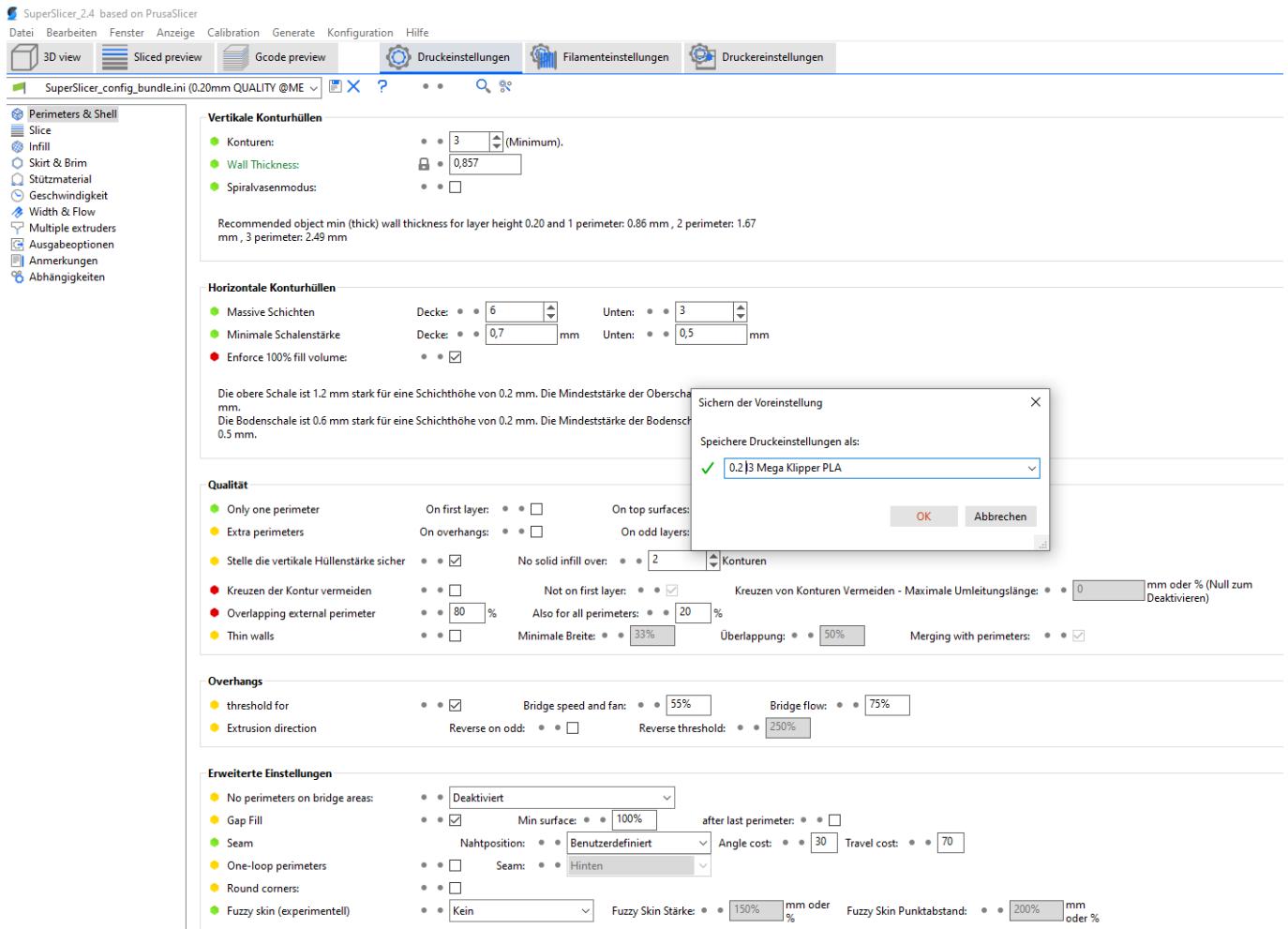
- Top Bar:** Datei, Bearbeiten, Fenster, Anzeige, Calibration, Generate, Konfiguration, Hilfe.
- Toolbars:** 3D view, Sliced preview, Gcode preview, Druckereinstellungen, Filamenteinstellungen, Druckereinstellungen.
- Left Sidebar:** SuperSlicer_config_bundle.ini (Anycubic i3 Mega S - S), Allgemein, Benutzerdefinierter G-Code, Maschinengrenzen, Extruder 1, Anmerkungen, Abhängigkeiten.
- Main Area - Druckereinstellungen Tab:**
 - Größe und Koordinaten:** Max. Druckhöhe: 180 mm, Preferred orientation: 0°, Z full step: 0.005 mm, Min height for travel: 0 mm, Z-Abstand: 0 mm.
 - Fähigkeiten:** Extruder: 1, Einzelextruder mit Multi-Material: 0, Milling cutters: 0.
 - Hochladen zum Druckhost:** Note: All parameters from this group are moved to the Physical Printer settings (see changelog). A message box is displayed: "Sichern der Voreinstellung" (Save settings) with "Speichere Druckereinstellungen als:" dropdown set to "3 Mega Klipper". Buttons OK and Abbrechen are shown.
 - Firmware:** G-Code Typ: Klipper, Unterstützt Stealth Modus: 0, Print remaining times: checked, Method: M117, xyz decimals: 3, Extruder decimals: 5, Maximum G1 per second: 1500, Minimum extrusion length: 0.035 mm.
 - Cooling fan:** Speedup time: 0 s, Kickstart duration: 0 s, Only for overhangs: checked.
 - Thumbnails:** Size for Gcode: Small x: 32, y: 32; Big x: 400, y: 300, Color override: 0, Format of G-code thumbnails: PNG, Bed on thumbnail: checked, Print at the end: 0.
- Bottom:** Erweiterte Einstellungen (Advanced Settings).

Filament eindeutigen Namen



Druckeinstellungen eindeutigen Namen

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Drucker Hinzufügen

Drucker Einstellungen ⇒ Physischen Drucker hinzufügen ⇒ auf das Zahnrad klicken

Name and Size

- Tool name: (radio button)
- Düsendurchmesser: (radio button) mm

Schichthöhen Grenzen

- Min: mm oder %
- Max: mm oder %

Offsets (for multi-extruder printers)

- Extruder Offset: x: y: mm
- Extruder temp offset: °C
- Extruder fan offset: %

Einzug

- Länge: mm (Null zum Deaktivieren)
- Z Hebung: mm
- Nur Z anheben
- Über Z: mm Unter Z: mm
- Lift z enforcement
- Enforce on first layer:
- On surfaces: mm
- Einzugsgeschwindigkeit: mm/s
- Deretraction: mm/s
- Extra Länge bei Neustart: mm
- Minimalbewegung nach Einziehen: mm
- Bei Schichtwechsel einziehen:

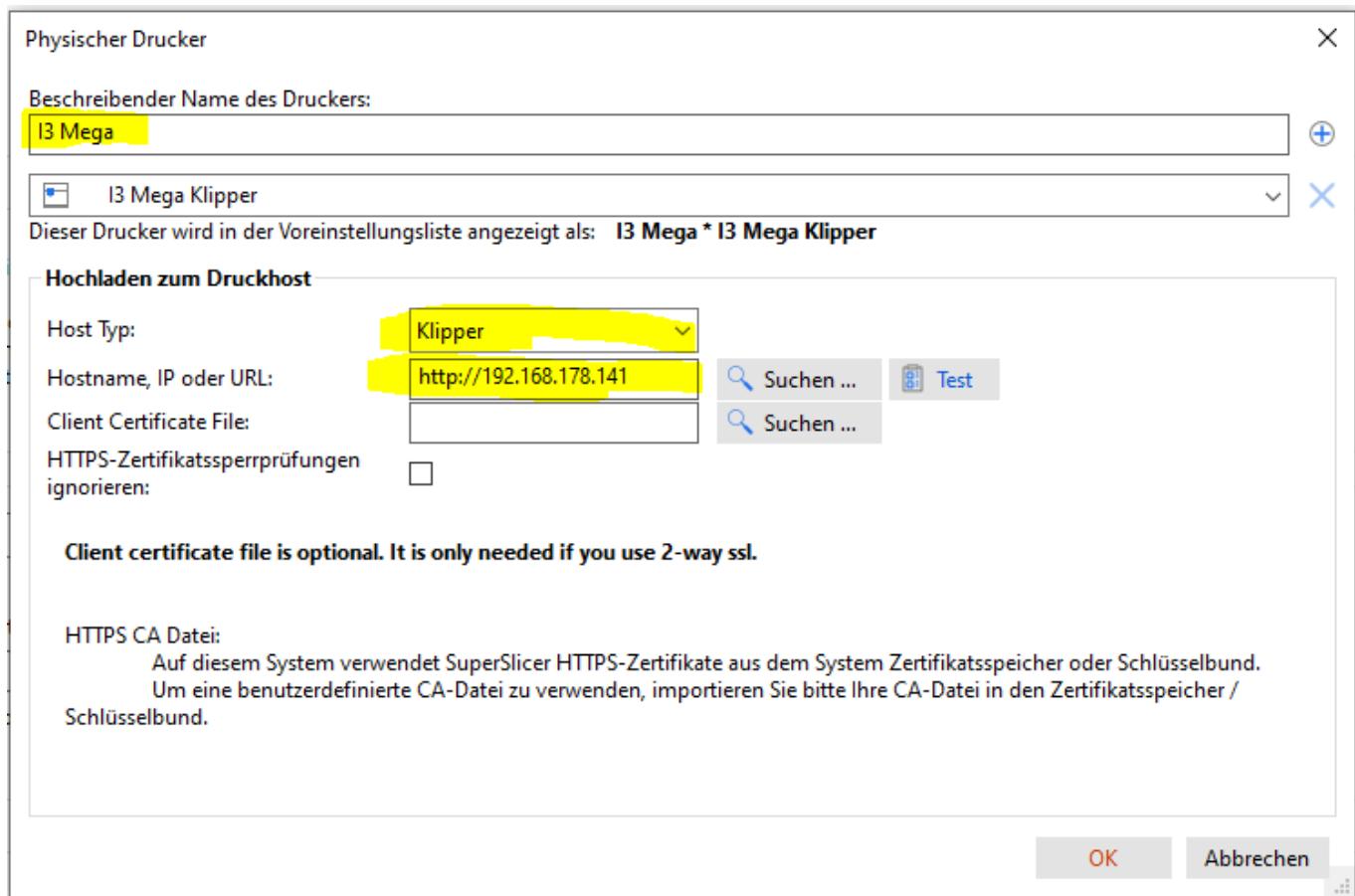
Retraction wipe

- Während Einzug reinigen:
- Wipe speed: mm/s
- Einzugslänge vor einer Reinigung: %

Benötigte Einstellung - Drucker Name

- Host Typ: Klipper
- IP Adresse

Last update: 2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



Drucker Kalibrierung

PID TUNING Hotend / BED

Printer.cfg

[extruder]

[Link öffnen für Erklärung](#)

```

1 ##### Extruder Config #####
2 ## https://www.klipper3d.org/Config_Reference.html#extruder
3 #####
4 [extruder]
5   step_pin : PD4
6   dir_pin : !PD3
7   enable_pin : !PD6
8   microsteps : 16
9   rotation_distance : 4.70448           #https://www.klipper3d.org/Rotation_Distance.html
10  nozzle_diameter : 0.400
11  filament_diameter : 1.750
12  heater_pin : PA5
13  sensor_pin : PA4
14  sensor_type : ATC Semitec 104GT-2    # https://www.klipper3d.org/Config_Reference.html#common_thermistors
15  pullup_resistor : 2200                #pullup_resistor: standard 4700 E3_Pro_2200
16  control : pid                      # https://www.klipper3d.org/G-Codes.html?h=pid#pid_calibrate_1
17  pid_Kp : 26.131
18  pid_Ki : 1.124
19  pid_Kd : 151.884
20  min_temp : 0
21  max_temp : 280
22  max_extrude_cross_section : 25
23  max_extrude_only_distance : 120
24 ;pressure_advance : 0.04812          #https://www.klipper3d.org/Pressure_Advance.html
25 min_extrude_temp : 150
26
27 [tmc2209 extruder]
28   uart_pin : PDS
29   run_current : 0.720
30   interpolate : False
31

```

Erklärung Klipper PID Tuning

Klipper documentation
Overview
Features
Frequently Asked Questions
Releases
Configuration Changes
Contact
Installation and Configuration
Installation
Configuration Reference
Configuration checks
Bed Level
Resonance Compensation
Pressure advance
G-Codes
Command templates
TMC drivers
Multiple Micro-controller Homing and Probing
Slicers
Skew correction
Exclude Objects
Using PWM tools
Developer Documentation
Device Specific Documents
Sponsors

PID_CALIBRATE ↗

PID_CALIBRATE HEATER=<config_name> TARGET=<temperature> [WRITE_FILE=1] : Perform a **PID** calibration test. The specified heater will be enabled until the specified target temperature is reached, and then the heater will be turned off and on for several cycles. If the **WRITE_FILE** parameter is enabled, then the file /tmp/heattest.txt will be created with a log of all temperature samples taken during the test.

[pause_resume]

The following commands are available when the **pause_resume config** section is enabled:

PAUSE

PAUSE : Pauses the current print. The current position is captured for restoration upon resume.

RESUME

RESUME [VELOCITY=<value>] : Resumes the print from a pause, first restoring the previously captured position. The **VELOCITY** parameter determines the speed at which the tool should return to the original captured position.

CLEAR_PAUSE

CLEAR_PAUSE : Clears the current paused state without resuming the print. This is useful if one decides to cancel a print after a **PAUSE**. It is recommended to add this to your start gcode to make sure the paused state is fresh for each print.

CANCEL_PRINT

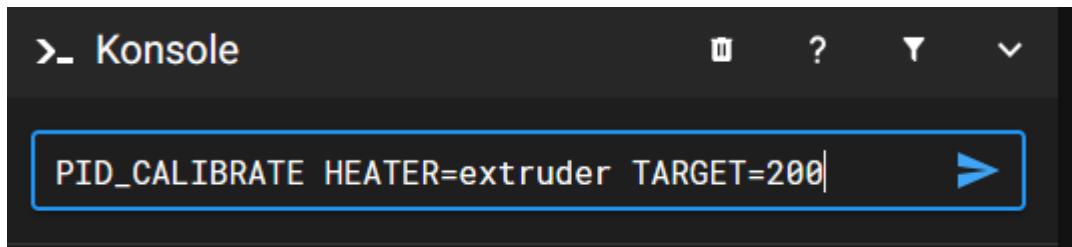
Table of contents

G-Code commands
Additional Commands
[adx345]
ACCELEROMETER_MEASURI
ACCELEROMETER_QUERY
ACCELEROMETER_DEBUG_R
ACCELEROMETER_DEBUG_W
[angle]
ANGLE_CALIBRATE
ANGLE_DEBUG_READ
ANGLE_DEBUG_WRITE
[bed_mesh]
BED_MESH_CALIBRATE
BED_MESH_OUTPUT
BED_MESH_MAP
BED_MESH_CLEAR
BED_MESH_PROFILE
BED_MESH_OFFSET
[bed_screws]
BED_SCREWS_ADJUST
[bed_tilt]
BED_TILT_CALIBRATE
[bltouch]
BLTOUCH_DEBUG

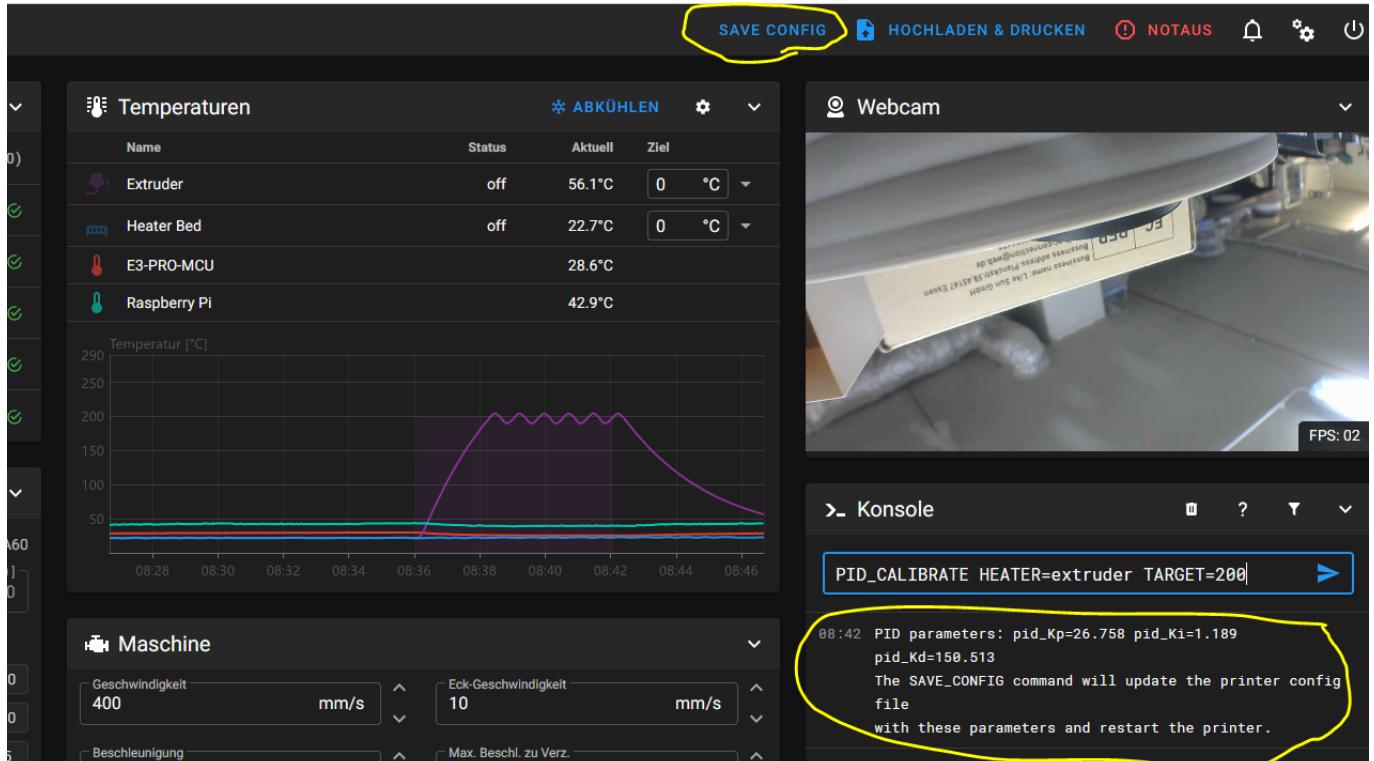
Eingabe Konsole:

[download](#)

PID_CALIBRATE HEATER=<config_name> TARGET=<temperature>

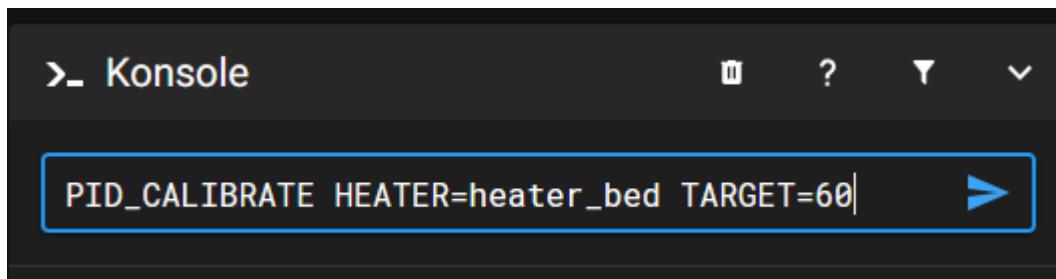


Wenn PID Tuning fertig ist erscheint der Hinweis unter Konsole achten und mit „save konfig“ übernehmen, Printer.cfg muss dazu nicht ediert werden



PID Tuning Bed

Eingabe in Konsole:



Hinweis unter Konsole achten und mit „save konfig“ übernehmen, Printer.cfg muss dazu nicht ediert werden

The screenshot shows the Klipper control interface with several panels:

- Temperaturen**: Displays current temperatures for Extruder (33.8°C), Heater Bed (53.8°C), E3-PRO-MCU (30.9°C), and Raspberry Pi (45.1°C). A graph shows the temperature profiles over time (08:38 to 08:56) for the extruder and heater bed.
- Webcam**: Shows a live video feed of the printer's build plate area.
- Maschine**: Shows machine settings: Geschwindigkeit (400 mm/s), Eck-Geschwindigkeit (10 mm/s), Beschleunigung, and Max. Besch. zu Verz.
- Konsole**: Shows the command `PID_CALIBRATE HEATER=heater_bed TARGET=60` being entered. The terminal output shows PID parameters and a note about the `SAVE_CONFIG` command.

Yellow circles highlight the `SAVE CONFIG` button at the top right and the terminal message about the configuration update.

Z Offset Einstellen

Drucker „Homen“, Hotend / Base nicht vorheizen; Düse muss schauber sein, Z Tilt ausführen und Base von Hand mit den Bettschrauben nivellieren



In printer.cfg Link öffnen [bltouch]

Lezezeichen importieren... DSM Photo Station 6 Synology Surveillance ... DSM DS HOME DSM DS Unterwegs Doku Wiki Jan Doku Wiki unterwegs Pool Status Robi E3DC RAT

printer.cfg

```
91 ## BLTouch
92 ## https://www.klipper3d.org/Config_Reference.html#bltouch
93 #####
94 [bltouch]
95 sensor_pin : ^PC5
96 control_pin : PB0
97 pin_move_time : 0.680
98 x_offset : 32
99 y_offset : -12
00 z_offset : 0.843 #https://www.klipper3d.org/Probe_Calibrate.html
01 speed : 80
02 #####
03 ## Firmware_retraction
04 ## https://www.klipper3d.org/G-Codes.html?h=fir#firmware_retraction
05 #####
06 #####
07 [firmware_retraction]
08 RETRACT_LENGTH: 0.4
09 retract_speed: 40
10 unretract_speed: 40
11 unretract_extra_length: 0.0
12
13
14 #####
15 ## Neopixel
16 ## https://www.klipper3d.org/Config_Reference.html#neopixel
17 #####
18 [neopixel Leds]
19 pin : PB11
20 # The number of Neopixel chips that are "daisy chained"
21 chain_count : 16
22 # Options are GRB, RGB, GRBW, or RGBW. The default is GRB.
23 color_order : GRB
24 # Sets the initial LED color of the Neopixel. Each value should be
25 # between 0.0 and 1.0. The WHITE option is only available on RGBW
26 # LEDs. The default for each color is 0.
27 initial_PFD : 0.6
```

Alle Details sind hier beschrieben

https://www.klipper3d.org/Probe_Calibrate.html

Klipper documentation

Frequently Asked Questions
Releases
Configuration Changes
Contact
Installation and Configuration
Installation
Configuration Reference
Configuration checks
Bed Level
Bed leveling
Delta calibration
Probe calibration
BL-Touch
Manual leveling
Bed Mesh
Endstop phase
Resonance Compensation
Pressure advance
G-Codes
Command templates
TMC drivers
Multiple Micro-controller Homing and Probing
Slicers
Skew correction
Exclude Objects

Probe calibration

This document describes the method for calibrating the X, Y, and Z offsets of an "automatic z probe" in Klipper. This is useful for users that have a [probe] or [bitouch] section in their config file.

Calibrating probe X and Y offsets

To calibrate the X and Y offset, navigate to the OctoPrint "Control" tab, home the printer, and then use the OctoPrint jogging buttons to move the head to a position near the center of the bed.

Place a piece of blue painters tape (or similar) on the bed underneath the probe. Navigate to the OctoPrint "Terminal" tab and issue a PROBE command:

```
PROBE
```

Place a mark on the tape directly under where the probe is (or use a similar method to note the location on the bed).

Issue a GET_POSITION command and record the toolhead XY location reported by that command. For example if one sees:

```
Recv: // toolhead: X:46.50000 Y:27.00000 Z:15.00000 E:0.00000
```

then one would record a probe X position of 46.5 and probe Y position of 27.

After recording the probe position, issue a series of G1 commands until the nozzle is directly above the probe.

Hotend aus / Bed auf 60 Grad vorheizen; Mainsail ⇒ Drucker erneut „Homen“ ⇒ „Z Tilt“ ausführen

„PROBE_CALIBRATE“ in die Konsole eingeben

Temperaturen

Name	Status	Aktuell	Ziel
Extruder	off	31.1°C	0 °C
Heater Bed	22%	60.2°C	60 °C
E3-PRO-MCU		32.2°C	
Raspberry Pi		46.2°C	

Maschine

Geschwindigkeit 400 mm/s	Eck-Geschwindigkeit 10 mm/s
Beschleunigung 3000 mm/s ²	Max. Besch. zu Verz. 1500 mm/s ²

Webcam

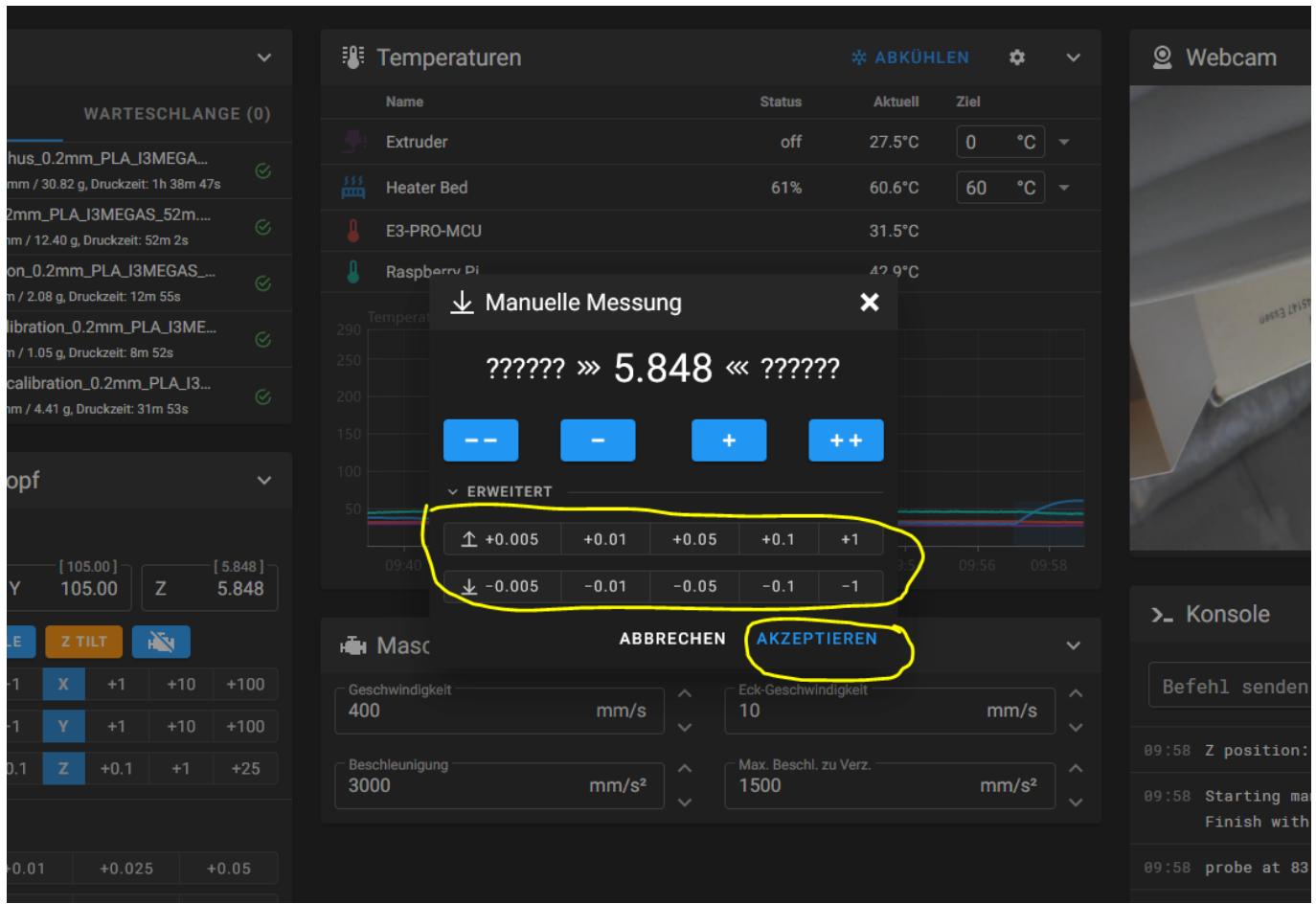
Konsole

```
PROBE: Probe Z-height at current XY position
PROBE_CALIBRATE: Calibrate the probe's z_offset
PROBE_ACCURACY: Probe Z-height accuracy at current XY
position

09:19 SET_HEATER_TEMPERATURE HEATER=heater_bed TARGET=60
09:18 Klipper state: Disconnect
09:18 SAVE_CONFIG
09:18 SET_HEATER_TEMPERATURE HEATER=heater_bed TARGET=60
```

Drucker fährt auf Mitte Bed und BLTouch nimmt höhe auf ⇒ mit einem „Kassenzettel“

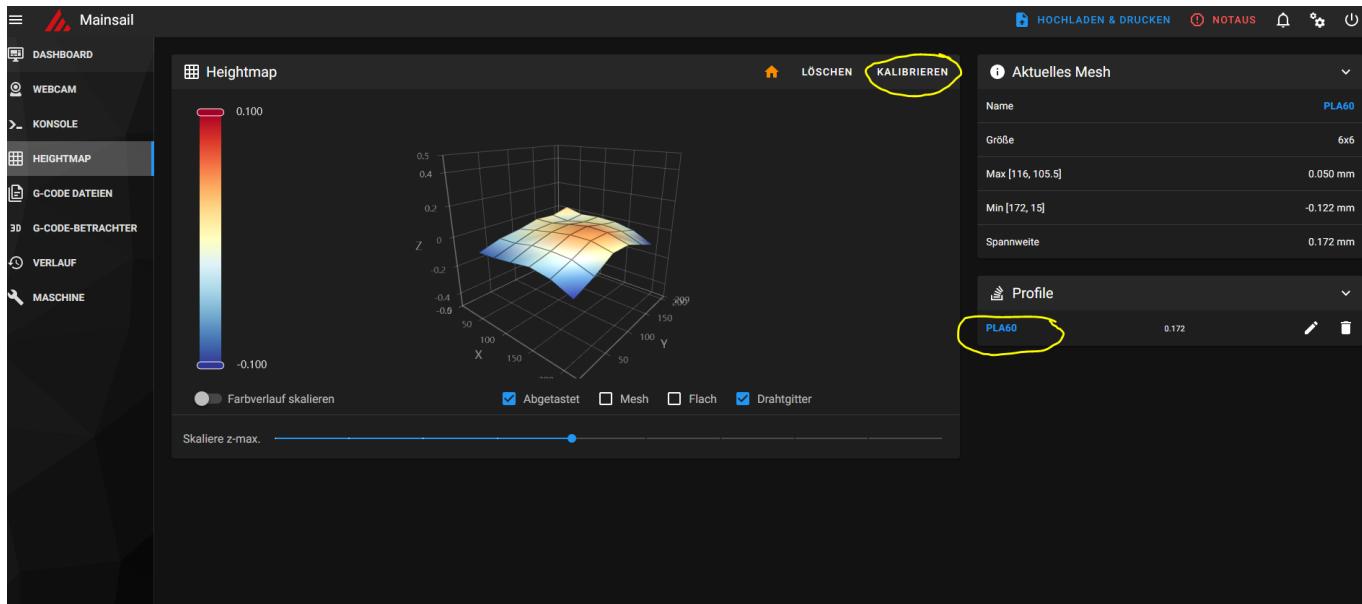
kann jetzt die Z Höhe eingestellt werden. Wenn die Höhe passt dann „Akzeptieren“ Dürcken



Bed Mesh erstellen

Bed auf 60 Grad 5 min. Vorheizen

Mainsail ⇒ Hightmap ⇒ Kalibrieren ausführen, wenn das Mesh fertig ist einem eindeutigen Namen vergeben und „save config“



Mainsail ⇒ Maschine ⇒ macros öffnen

The screenshot shows the Mainsail software interface. The sidebar on the left is identical to the previous one. The main area shows a list of configuration files under the 'Konfigurationsdateien' section. The current path is set to 'config'. The table lists the following files:

Name	Dateigröße	zuletzt geändert
crowsnest.conf	1.8 kB	26.03.2023 16:16
macros.cfg	6.4 kB	29.03.2023 17:00
mainsail.cfg	11.3 kB	18.03.2023 15:57
moonraker.conf	2.1 kB	18.03.2023 16:00
printer-20230327_201259.cfg	11.8 kB	27.03.2023 19:02
printer-20230327_201436.cfg	11.8 kB	27.03.2023 20:12
printer-20230327_201614.cfg	11.8 kB	27.03.2023 20:14
printer-20230327_201652.cfg	11.8 kB	27.03.2023 20:16
printer.cfg	12.0 kB	29.03.2023 19:38
sonar.conf	0.8 kB	18.03.2023 16:00

unter `BED_MESH_PROFILE LOAD=` den Namen des Mesh eintragen und Abspeichern

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2023/04/04 16:32

```
17 [gcode_macro START_PRINT]
18 gcode:
19
20     {% set T_BED = params.TEMP_BED|default(60)|int %}
21     {% set T_EXTRUDER = params.TEMP_EXTRUDER|default(200)|float %}
22     LED_off                                ; LED OFF
23     M83                                     ; Set relative Extrusion
24     LED_Homing                             ; HOME LED
25     _CG28                                    ; Home
26     LED_Heating                            ; LED HEATING
27     PREHEAT                                 ; PREHEAT Bed and Nozzle
28     {% if printer.heater_bed.temperature <= 50 %}
29     RESPOND MSG="Start Preheating Phase...."
30     {% endif %}
31     M140 S{{T_BED}}                         ; Bed heat up temp
32     M190 S{{T_BED}}                         ; Wait for Bed heat up
33     #LOAD_MESH_TEMP BED_TEMPERATURE={{T_BED}} ; Load mesh for bed temp
34     RESPOND MSG="Start Z-Tilt Adjust...."
35     LED_Homing                             ; LED HOMING
36     Z_TILT_ADJUST                           ; Adjust Z axes
37     LED_Heating                            ; LED HEATING
38     G1 X0 Y200 Z30 F6000
39     RESPOND MSG="PREHEAT now ist time to clean the Bed"
40     M104 S{{T_EXTRUDER}}                   ; Extruder heat up temp
41     M109 S{{T_EXTRUDER}}                   ; Extruder heat up to target temp
42     LED_Homing                             ; LED HOMING
43     RESPOND MSG="Final Z Homing"
44     G91                                    ; Relative Positionierung
45     G1 E-3 F6000                          ; zieh Extruder zurck
46     G90                                    ; absolut Positionierung
47     G1 X83 Y117 F6000
48     G28 Z                                  ; fahre auf Home XY
49     BED_MESH_PROFILE LOAD=PLA60           ; Home Z final
50     #G0 Z5                                ; Load Mesh
51     M107                                   ; Lift nozzle a bit
52     G92 E0.0                               ; start with the fan off
53     G92 E0.0                               ; Reset extruder length
54     RESPOND MSG="Start Primline...."
55     PRIME_LINE                            ; Prime Line
56     LED_Printing                           ; LED Printing
57
```

Extruder Kalibrieren

in der Printer.cfg

[Extruder] Sektion

```

run_current : 0.800
interpolate : False

#####
## Extruder Config
## https://www.klipper3d.org/Config_Reference.html#extruder
#####

[extruder]
step_pin : PD4
dir_pin : !PD3
enable_pin : !PD6
microsteps : 16
rotation_distance : 4.70448
nozzle_diameter : 0.400
filament_diameter : 1.750
heater_pin : PA5
sensor_pin : PA4
sensor_type : ATC Semitec 104GT-2      # https://www.klipper3d.org/Config_Reference.html#common-thermistors
pullup_resistor : 2200                  #pullup_resistor: standard 4700 E3-Pro: 2200
#control : pid                         # https://www.klipper3d.org/G-Codes.html?h=pid#pid_calibrate_1
#pid_Kp : 26.131
#pid_Ki : 1.124
#pid_Kd : 151.884
min_temp : 0
max_temp : 280
max_extrude_cross_section : 25
max_extrude_only_distance : 120
;pressure_advance : 0.04812           #https://www.klipper3d.org/Pressure_Advance.html
min_extrude_temp : 150

[tmc2209 extruder]
uart_pin : PDS
run_current : 0.720
interpolate : False

```

https://www.klipper3d.org/Rotation_Distance.html

Wert notieren = „Previous_rotation_distance“

Orbiter herunter bauen, Hotend auf 150 Grad heizen, Hotend bleibt eingebaut

In Konsole eingeben:

download

```
M83
G1 E50 F300
```

Extruder, extrudierte 50 mm Filament

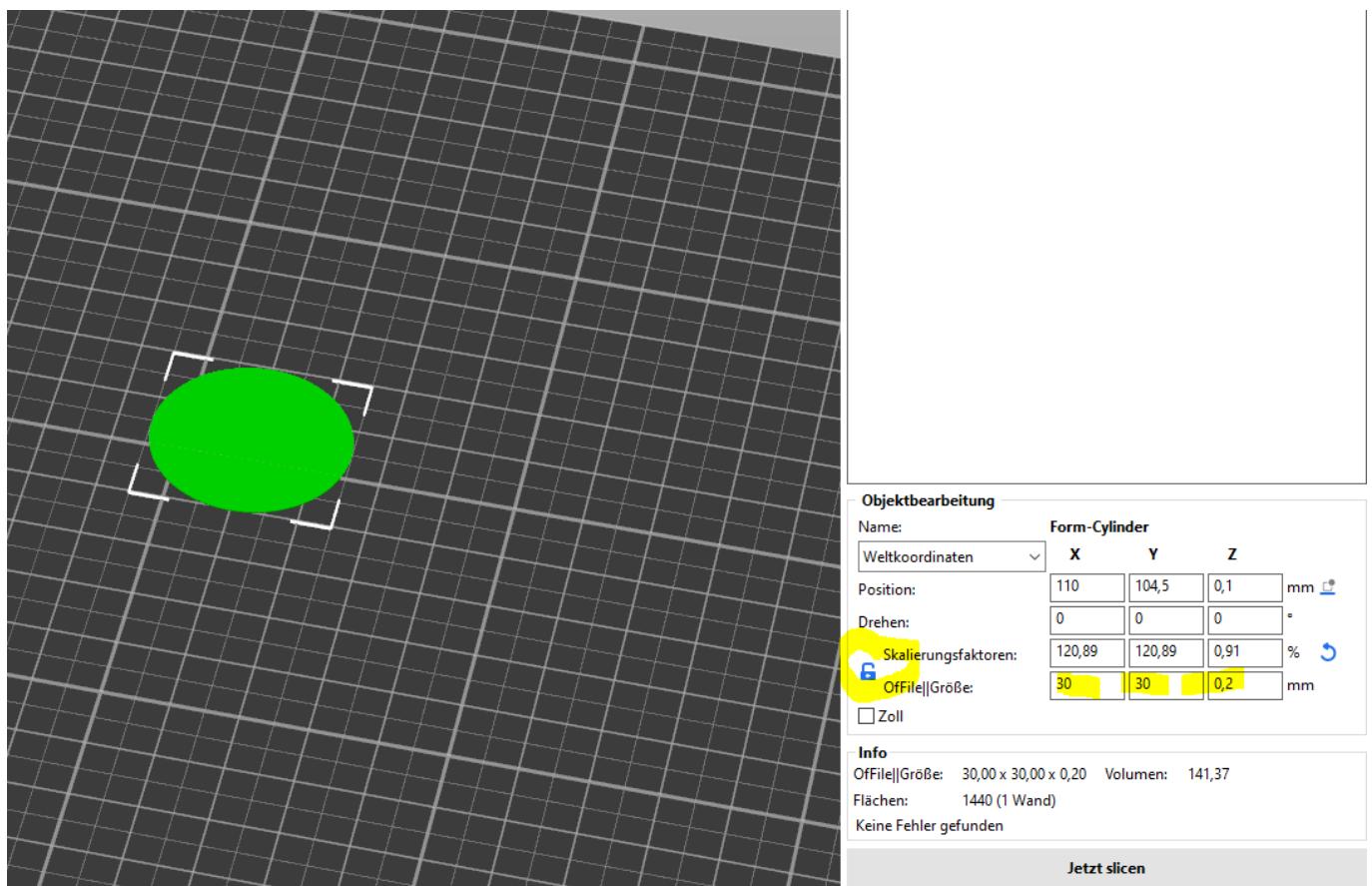
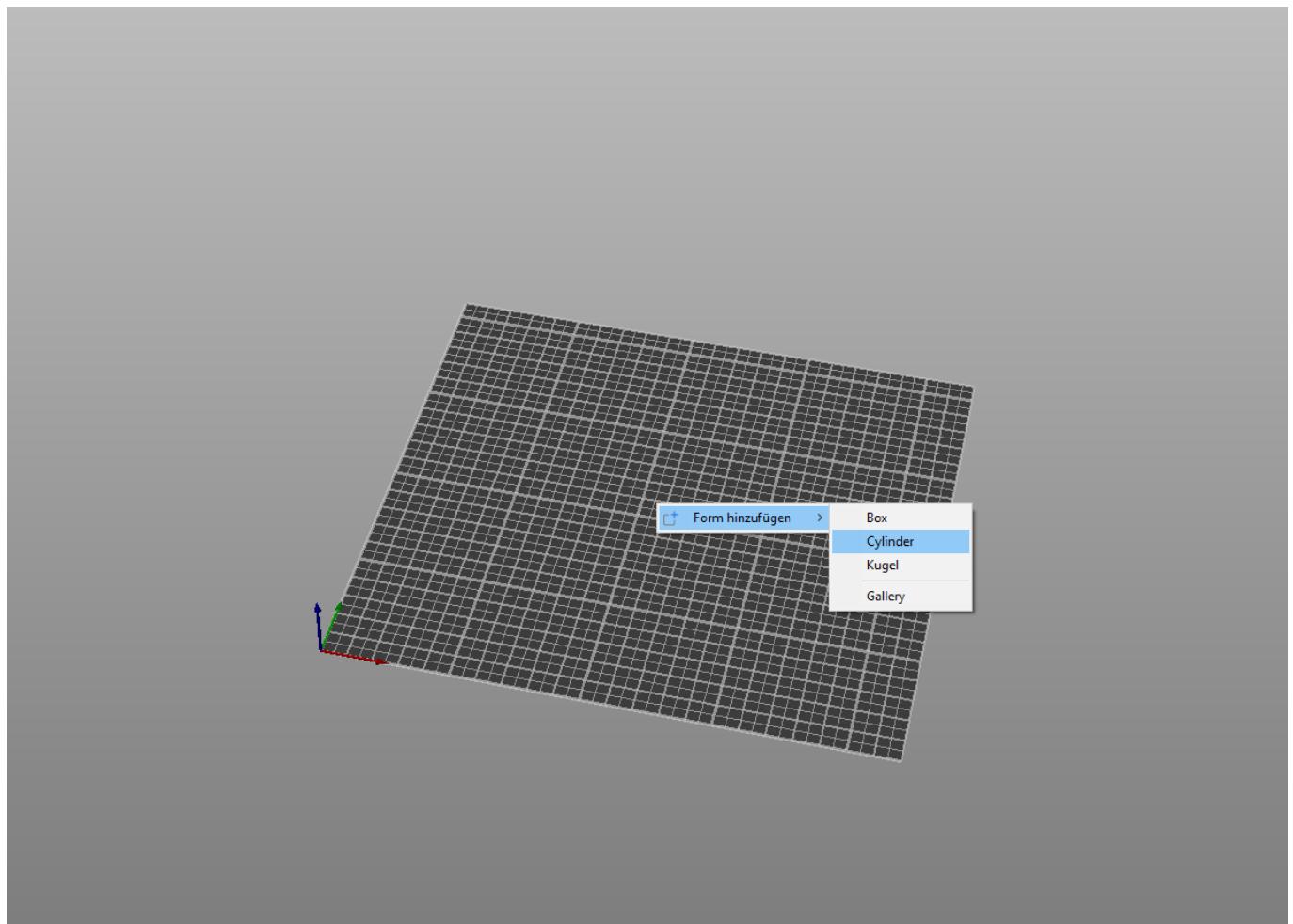
Hier fehlt ein Bild!

Rotation Distance Rechner https://www.service-uplink.de/esteps_cal/calculator.php

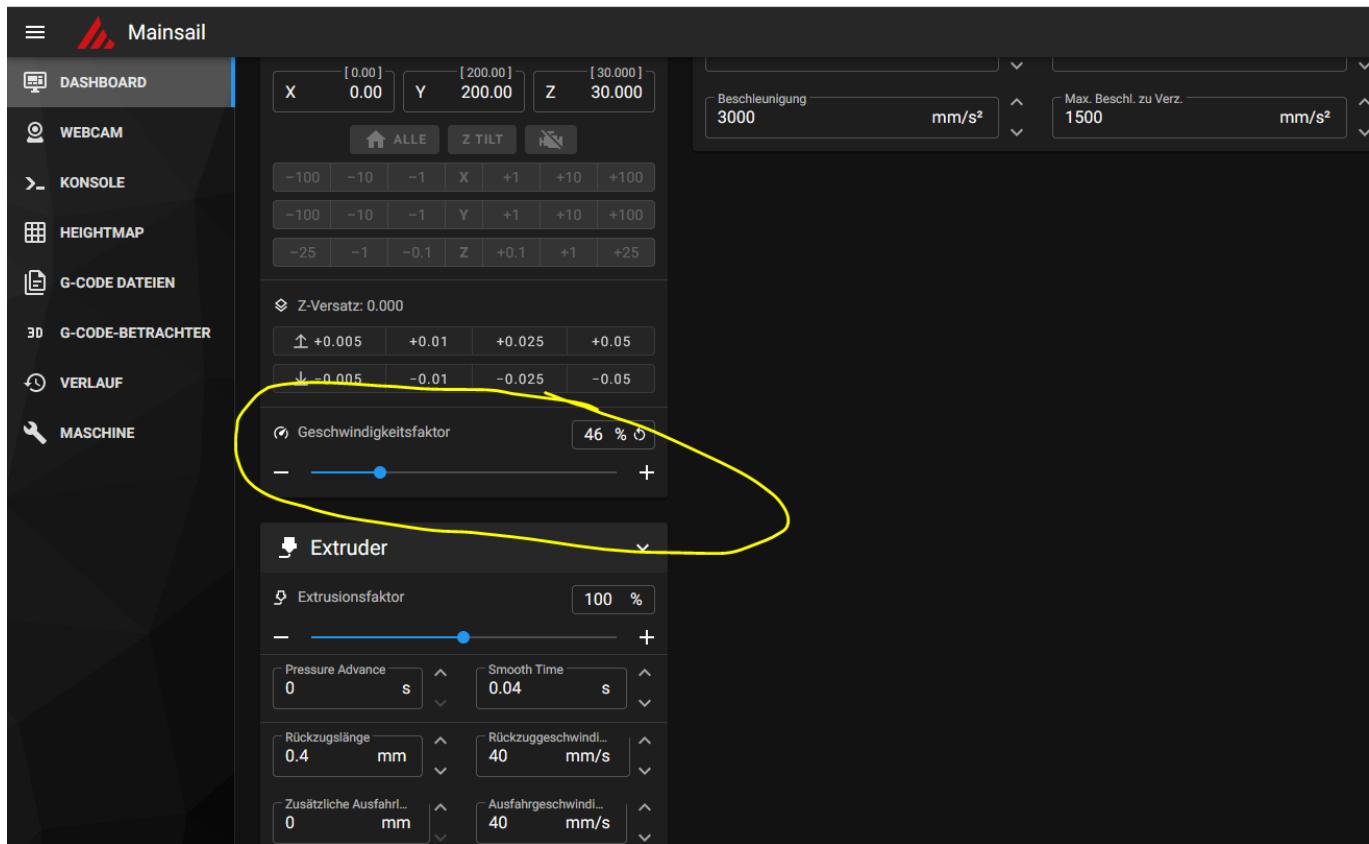
First Layer Test

Super Slicer **rechte Maus auf das Bett klicken** ⇒ **Form hinzufügen** ⇒ **Zylinder 30 mm ⇒ 0,2 mm Höhe** ⇒ **Slicen** ⇒ **zum Drucker senden**

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16:32



Mainsail Geschwindigkeit auf 50%



Mit Z-Versatz jetzt first Layer einstellen

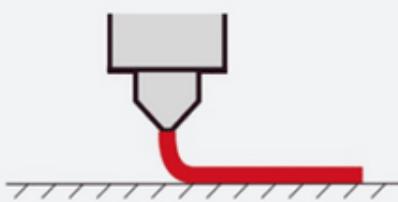
The screenshot shows the Klipper control interface with the following details:

- Left Sidebar:** DASHBOARD, WEBCAM, KONSOLE, HEIGHTMAP, G-CODE DATEIEN, G-CODE-BETRACHTER, VERLAUF, MASCHINE.
- Top Center:** Werkzeugkopf (Toolhead) configuration panel.
 - Position: absolut
 - Material: PLA60
 - Coordinates: X: 110.49, Y: 118.99, Z: 0.200
 - Buttons: ALLE, Z TILT, H
 - Stepper Control: -100, -10, -1, X, +1, +10, +100; Y, +1, +10, +100; Z, +0.1, +1, +10, +25
- Middle Panel (Enclosed in Yellow Circle):**
 - Z-Versatz: 0.000
 - Up: +0.005, +0.01, +0.025, +0.05
 - Down: -0.005, -0.01, -0.025, -0.05
 - Geschwindigkeitsfaktor: 100 % (with a slider from - to +)
- Bottom Panel:** Extruder configuration panel.
 - Extrusionsfaktor: 100 % (with a slider from - to +)
 - Pressure Advance: 0.048 s (with up and down arrows)
 - Smooth Time: 0.04 s (with up and down arrows)
- Right Sidebar:** Maschine (Machine) configuration panel.
 - Geschwindigkeit: 400
 - Beschleunigung: 3000

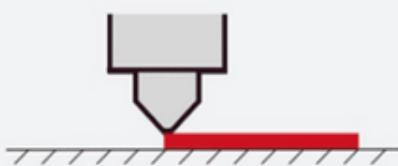
Druckbild auswerten und anpassen mit Z-Versatz und mit „Save Konfig“ abspeichern



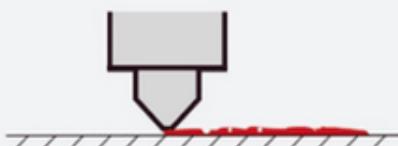
TOO HIGH



GOOD

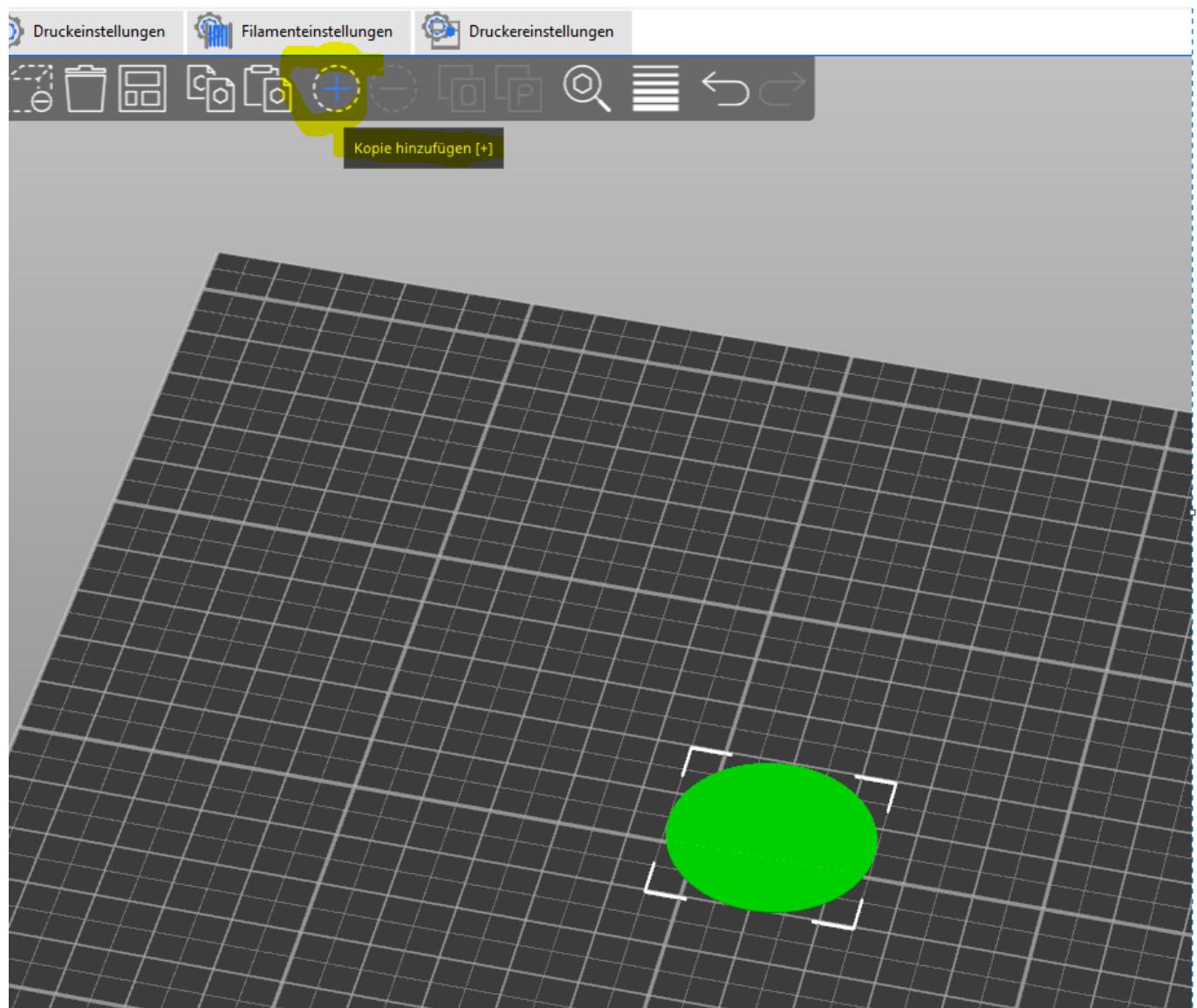


TOO LOW

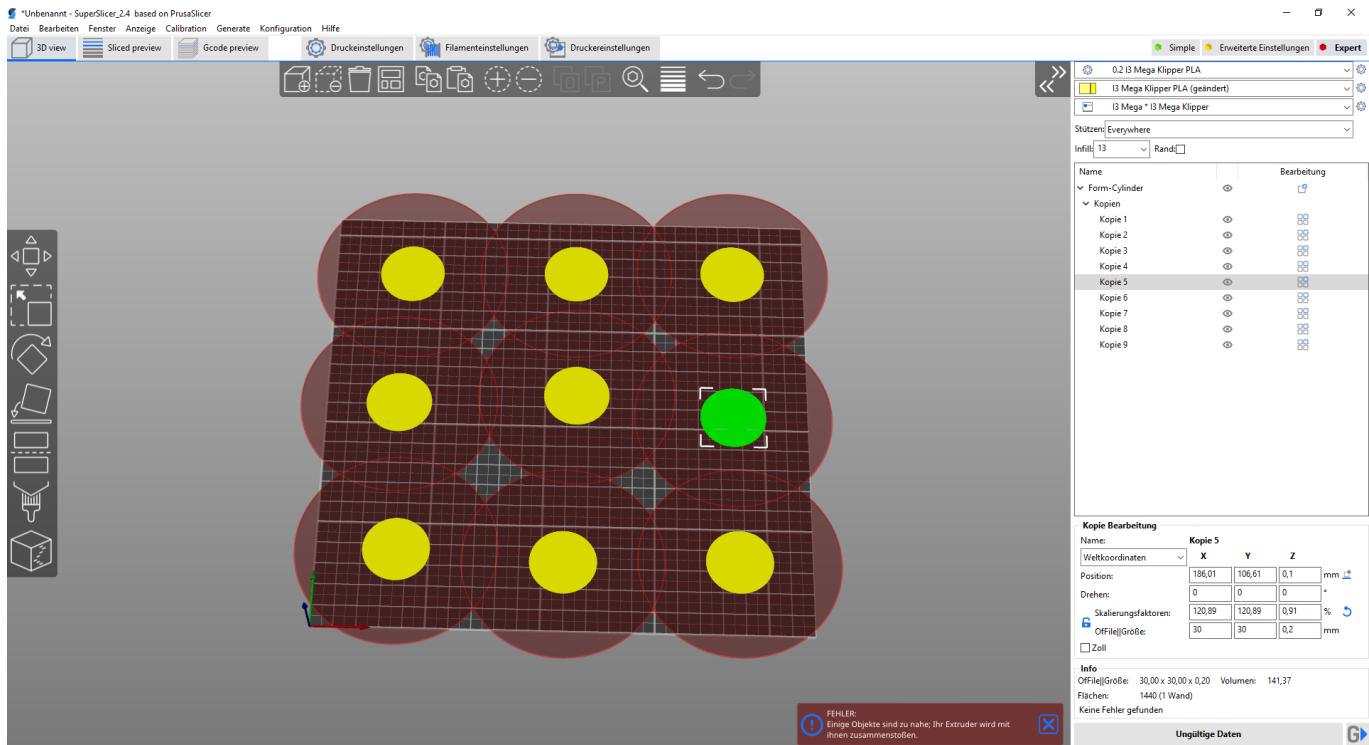


Blättchen mit „+“ kopieren

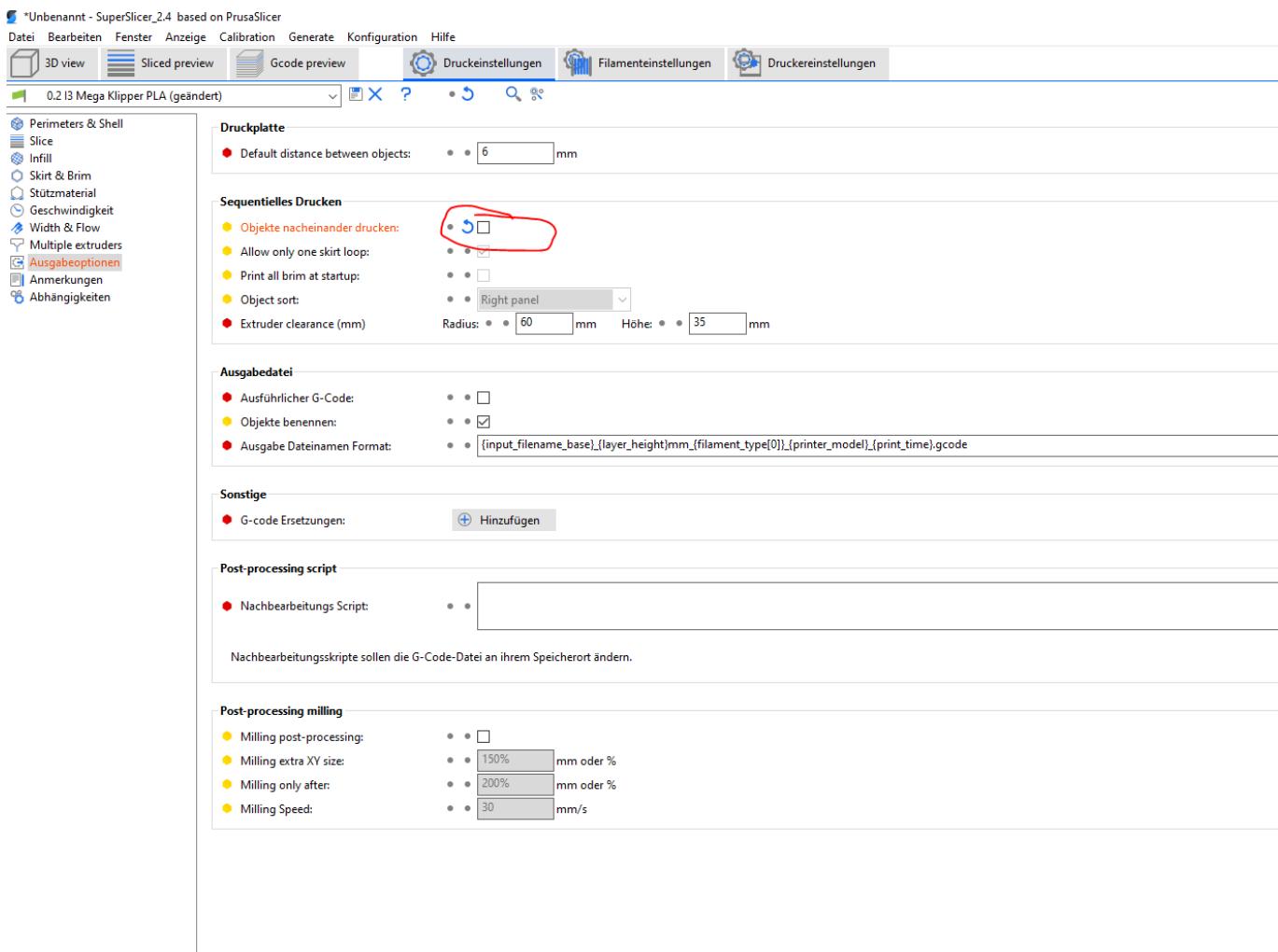
Last
update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



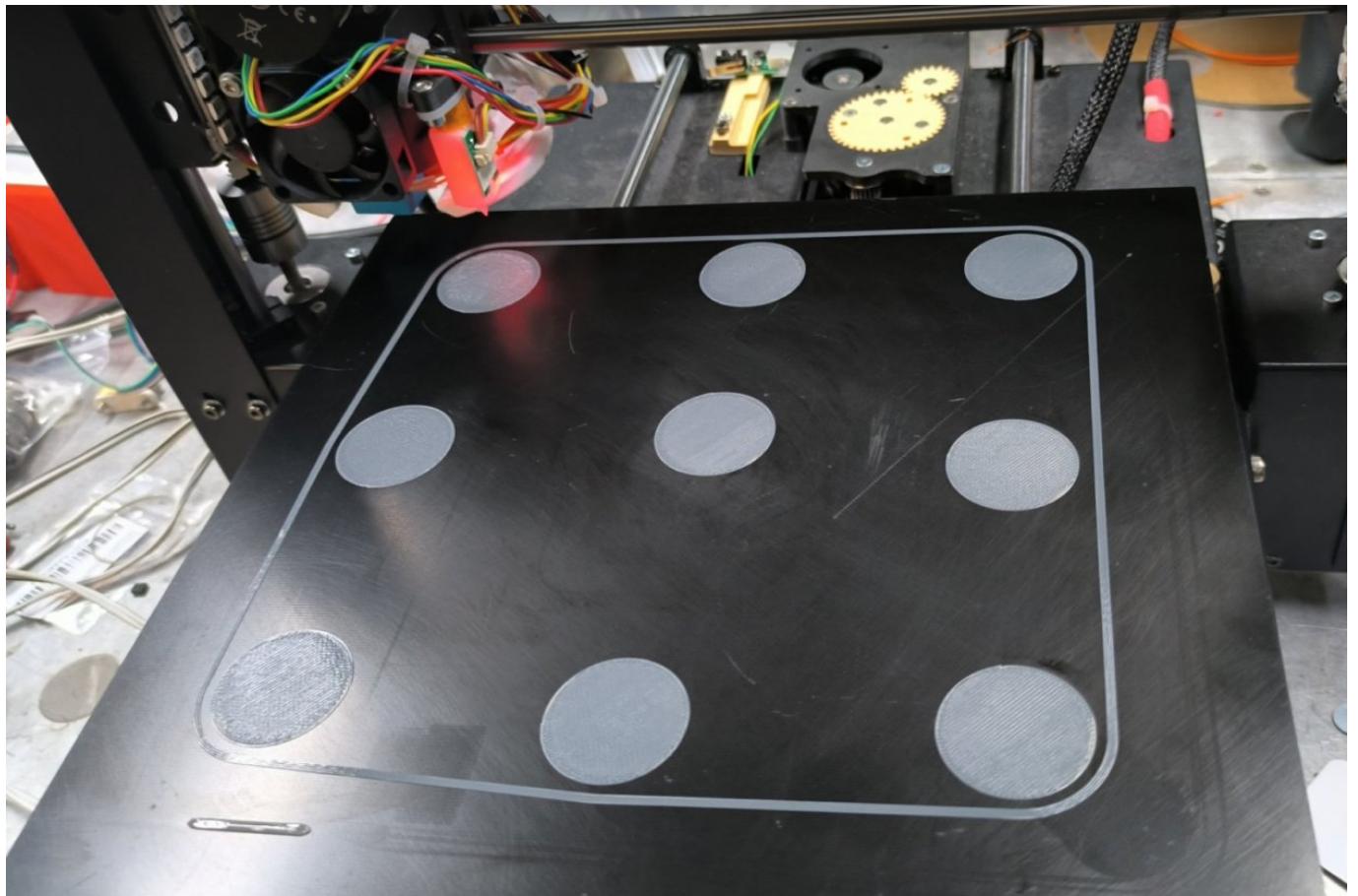
9 Blättchen gleichmässig auf der Base verteilen



rote Kreise sichtbar? ⇒ Super Slicer ⇒ Druckeinstellungen ⇒ Ausgabeoptionen Slicen und Drucken



alle 9 Plättchen sollten gleich gedruckt sein



Pressure Advance

Printer.cfg und Link öffnen

[extruder]

https://www.klipper3d.org/Pressure_Advance.html

```

47 dir_pin : !PD3
48 enable_pin : !PD6
49 microsteps : 16
50 rotation_distance : 4.70448
51 nozzle_diameter : 0.400
52 filament_diameter : 1.750
53 heater_pin : PA5
54 sensor_pin : PA4
55 # https://www.klipper3d.org/Config\_Reference.html#common-thermistors
56 sensor_type : ATC Semitec 104GT-2
57 pullup_resistor : 2200      #pullup_resistor: standard 4700 E3-Pro: 2200
58 control : pid
59 pid_Kp : 26.131
60 pid_Ki : 1.124
61 pid_Kd : 151.884
62 min_temp : 0
63 max_temp : 280
64 max_extrude_cross_section : 25
65 max_extrude_only_distance : 120
66 #pressure_advance : 0.0      #https://www.klipper3d.org/Pressure\_Advance.html
67
68 [tmc2209 extruder]
69 uart_pin : PD5
70 run_current : 0.800
71 interpolate : False
72
73 |
74 #####
75 ## Bed Config
76 ## https://www.klipper3d.org/Config\_Reference.html#heater\_bed
77 #####
78 [heater_bed]
79 heater_pin : PA9

```

Download Modell:

This document provides information on tuning the "pressure advance" configuration variable for a particular nozzle and filament. The pressure advance feature can be helpful in reducing ooze. For more information on how pressure advance is implemented see the [kinematics](#) document.

Tuning pressure advance
Important Notes

Tuning pressure advance

Pressure advance does two useful things - it reduces ooze during non-extrude moves and it reduces blobbing during cornering. This guide uses the second feature (reducing blobbing during cornering) as a mechanism for tuning.

In order to calibrate pressure advance the printer must be configured and operational as the tuning test involves printing and inspecting a test object. It is a good idea to read this document in full prior to running the test.

Use a slicer to generate g-code for the large hollow square found in [docs/prints/square_tower.stl](#). Use a high speed (eg, 100mm/s), zero infill, and a coarse layer height (the layer height should be around 75% of the nozzle diameter). Make sure any "dynamic acceleration control" is disabled in the slicer.

Prepare for the test by issuing the following G-Code command:

```
SET_VELOCITY_LIMIT SQUARE_CORNER_VELOCITY=1 ACCEL=500
```



This command makes the nozzle travel slower through corners to emphasize the effects of extruder pressure. Then for printers with a direct drive extruder run the command:

```
TUNING TOWER COMMAND=SET PRESSURE ADVANCE PARAMETER=ADVANCE START=0 FACTOR=.005
```



Slicer Einstellen

Last update: 2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32

1. Speed 100 mm/s
2. Infill 0%
3. Layer height 75% der Düsendurchmesser = 0,3mm
4. 1 Perimeter

The screenshot shows the PrusaSlicer software interface with the following settings highlighted:

- Print Settings (Druckeinstellungen):**
 - Geschwindigkeit für Druckbewegungen:** Standard speed is set to 100 mm/s for % based speed.
 - Geschwindigkeit für Bewegungen zwischen den Druckvorgängen:** Travel speed is set to 300 mm/s.
- Slice Settings (Slice):**
 - Schichthöhe:** Base Layer height is set to 0,3 mm.
 - Filtering:** Slice Auflösung is set to 0.0125 mm.
- Modifying slices:**
 - Precision is set to 0 mm.
 - Outer compensation is set to 0 mm.
 - Inner compensation is set to 0 mm.
 - Min convex angle is set to 0°.
 - Min concave angle is set to 0°.
 - Erste Schicht height in layers is set to 1 Schichten.
 - XY compensation is set to 0 mm.
 - Vertical Hole shrinking compensation threshold is set to 100 mm².

Infill

- Spars: 0 % (Kubisch)
- Connection length: 1000 (unbegrenzt) mm oder %
- Fett: Gerdlinig
- Decke: Monotonisch
- Unten: Monotonisch

Druckzeit wird verkürzt

- Infill kombinieren alle: 1 Schichten
- Infill nur wo es notwendig ist drucken:
- Supporting dense layer Algorithm: Automatic, or anchored if too big

Erweiterte Einstellungen

- Massives Infill alle: 0 Schichten
- Massives Infill Flächen Schwellwert: 0 mm²
- Angle: 45°
- Anchor solid infill by X mm: 150% mm oder %
- Nur bei Kontursüberquerungen einziehen
- Infill vor Kontur:

Perimeters & Shell

Vertikale Konturhüllen

- Konturen: 1 (Minimum)
- Wall Thickness: 0,857
- Spiralvasenmodus:

Recommended object min (thick) wall thickness for layer height 0.20 and 1 perimeter: 0.86 mm

Horizontale Konturhüllen

- Massive Schichten: Decke: 1, Unten: 2
- Minimale Schalenstärke: Decke: 0,7, Unten: 0,5
- Enforce 100% fill volume:

Die obere Schale ist 0.8 mm stark für eine Schichthöhe von 0.2 mm.
Die Bodenschale ist 0.6 mm stark für eine Schichthöhe von 0.2 mm.

Qualität

- Only one perimeter: On first layer: On top surfaces: Minimum
- Extra perimeters: On overhangs:
- Stelle die vertikale Hüllenhärte sicher: No solid infill over: 2 Konturen
- Kreuzen der Kontur vermeiden: Not on first layer: Kreuzen von Konturen
- Overlapping external perimeter: 80 % Also for all perimeters: 20 %

Dann die Befehler in Kommand Zeile kopieren

Overview Use a high speed (eg, 100mm/s), zero infill, and a coarse layer height (the layer height should be around 75% of the nozzle diameter). Make sure any "dynamic acceleration control" is disabled in the slicer. Tuning pressure advance
Important Notes

Features

Frequently Asked Questions

Releases

Configuration Changes

Contact

Installation and Configuration

 Installation

 Configuration Reference > This command makes the nozzle travel slower through corners to emphasize the effects of extruder pressure. Then for printers with a direct drive extruder run the command:

 Configuration checks

 Bed Level > TUNING_TOWER_COMMAND=SET_PRESSURE_ADVANCE_PARAMETER=ADVANCE_START=0_FACTOR=.005

 Resonance Compensation >

 Pressure advance For long bowden extruders use:

 G-Codes > TUNING_TOWER_COMMAND=SET_PRESSURE_ADVANCE_PARAMETER=ADVANCE_START=0_FACTOR=.020

 Command templates >

 TMC drivers

Then print the object. When fully printed the test print looks like:

[download](#)

```
SET_VELOCITY_LIMIT SQUARE_CORNER_VELOCITY=1 ACCEL=500
```

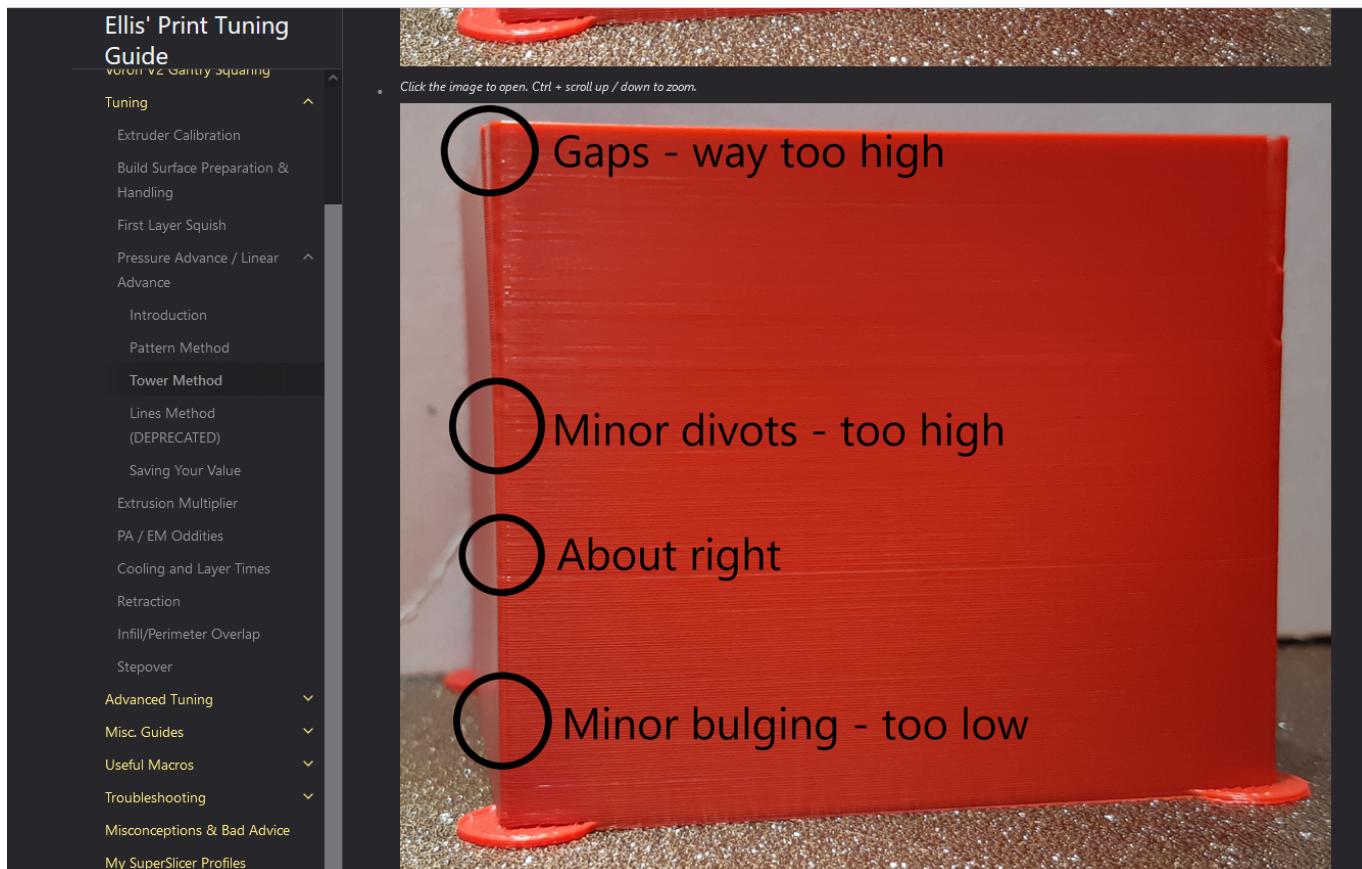
[download](#)

```
TUNING_TOWER_COMMAND=SET_PRESSURE_ADVANCE_PARAMETER=ADVANCE_START=0_FACTOR=.002
```

Druck Starten

The screenshot shows the Mainsail software interface. On the left, a sidebar lists various tabs: DASHBOARD, WEBCAM, KONSOLE, HEIGHTMAP, G-CODE DATEIEN, G-CODE-BETRACHTER, VERLAUF, and MASCHINE. The DASHBOARD tab is active, displaying a 3D preview of a square tower model. Below the preview, it says "1% Printing". The preview shows a yellow outline of the tower's base. Underneath the preview, the file name "square_tower_0.3mm_PLA_I3MEGAS_1h14m.gcode" is listed. The STATUS section shows: Geschwindigkeit (Speed) at 19 mm/s, Fluss (Flow) at 2.0 mm³/s, Filament at 103.73 mm, and Schicht (Layer) at 1 of 167. The SÄCHZUNG section shows: Slicer at 1:48:49, Gesamt (Total) at 0:05:45, and ETA at 17:06. The WERKZEUGKOPF (Toolhead) section shows absolute coordinates: X at 79.79, Y at 136.32, Z at 0.300. The right side of the interface contains several panels: Temperaturen (Temperatures) showing current and target temperatures for Extruder (200.1°C), Heater Bed (65.2°C), E3-PRO-MCU (30.7°C), and Raspberry Pi (40.2°C); a graph of Temperature [°C] over time from 15:10 to 15:28, showing a sharp rise in temperature; Webcam showing a view of a spray bottle labeled "LiquiLink Spray Duster 400 ml"; and Konsole (Console) showing terminal output with commands like "pressure_advance: 0.00608" and "echo: Start Primeline....".

https://ellis3dp.com/Print-Tuning-Guide/articles/pressure_linear_advance/tower_method.html



Dann Messen



und Rechnen $20,7 * 0.002 = 0,0414$

Dann den Wert ich die config Speichern

Last update: playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
2023/04/04 16:32

```
139
140
141 ##### Extruder Config
142 ## https://www.klipper3d.org/Config_Reference.html#extruder
143 #####
144 [extruder]
145   step_pin : PD4
146   dir_pin : !PD3
147   enable_pin : !PD6
148   microsteps : 16
149   rotation_distance : 4.70448           #https://www.klipper3d.org/Rotation_Distance.html
150   nozzle_diameter : 0.400
151   filament_diameter : 1.750
152   heater_pin : PA5
153   sensor_pin : PA4
154   sensor_type : ATC Semitec 104GT-2    # https://www.klipper3d.org/Config_Reference.html#common-thermistors
155   pullup_resistor : 2200               #pullup_resistor: standard 4700 E3-Pro: 2200
156   #control : pid                   # https://www.klipper3d.org/G-Codes.html?h=pid#pid_calibrate_1
157   #pid_Kp : 26.131
158   #pid_Ki : 1.124
159   #pid_Kd : 151.884
160   min_temp : 0
161   max_temp : 280
162   max_extrude_cross_section : 25
163   max_extrude_only_distance : 120
164   pressure_advance : 0.0414          #https://www.klipper3d.org/Pressure_Advance.html
165   min_extrude_temp : 150
166
167
168 [tmc2209 extruder]
169   uart_pin : PD5
170   run_current : 0.720
171   interpolate : False
172
173
174 #####
175 ## Bed Config
176 ## https://www.klipper3d.org/Config_Reference.html#heater_bed
177 #####
```

Input Shaper

pinter.cfg

[input shaper]

```
246 retries : 5
247 retry_tolerance : 0.02
248
249
250 ######
251 ## Safe Z homing
252 ## https://www.klipper3d.org/Config_Reference.html#safe_z_home
253 #####
254 [safe_z_home]
255 # Change coordinates to the center of your print bed
256 home_xy_position : 83,117
257 speed : 80
258 z_hop : 15
259 z_hop_speed : 5
260
261
262 #####
263 ## Input Shaper
264 ## https://www.klipper3d.org/Config_Reference.html#input_shaper
265 ## https://www.klipper3d.org/Resonance_Compensation.html
266 #####
267 [input_shaper]
268 shaper_freq_x : 54.4
269 shaper_type_x : mzv
270 shaper_freq_y : 38.8
271 shaper_type_y : mzv
272
273
274 #####
275 ## ADXL345
276 ## https://www.klipper3d.org/Config_Reference.html#adxl345
277 #####
278 [adxl345]
279 cs_pin : rpi:None
280
281 #####
282 ## Resonance Tester
283 ## https://www.klipper3d.org/Config_Reference.html#resonance_tester
284 #####
285 [resonance_tester]
```

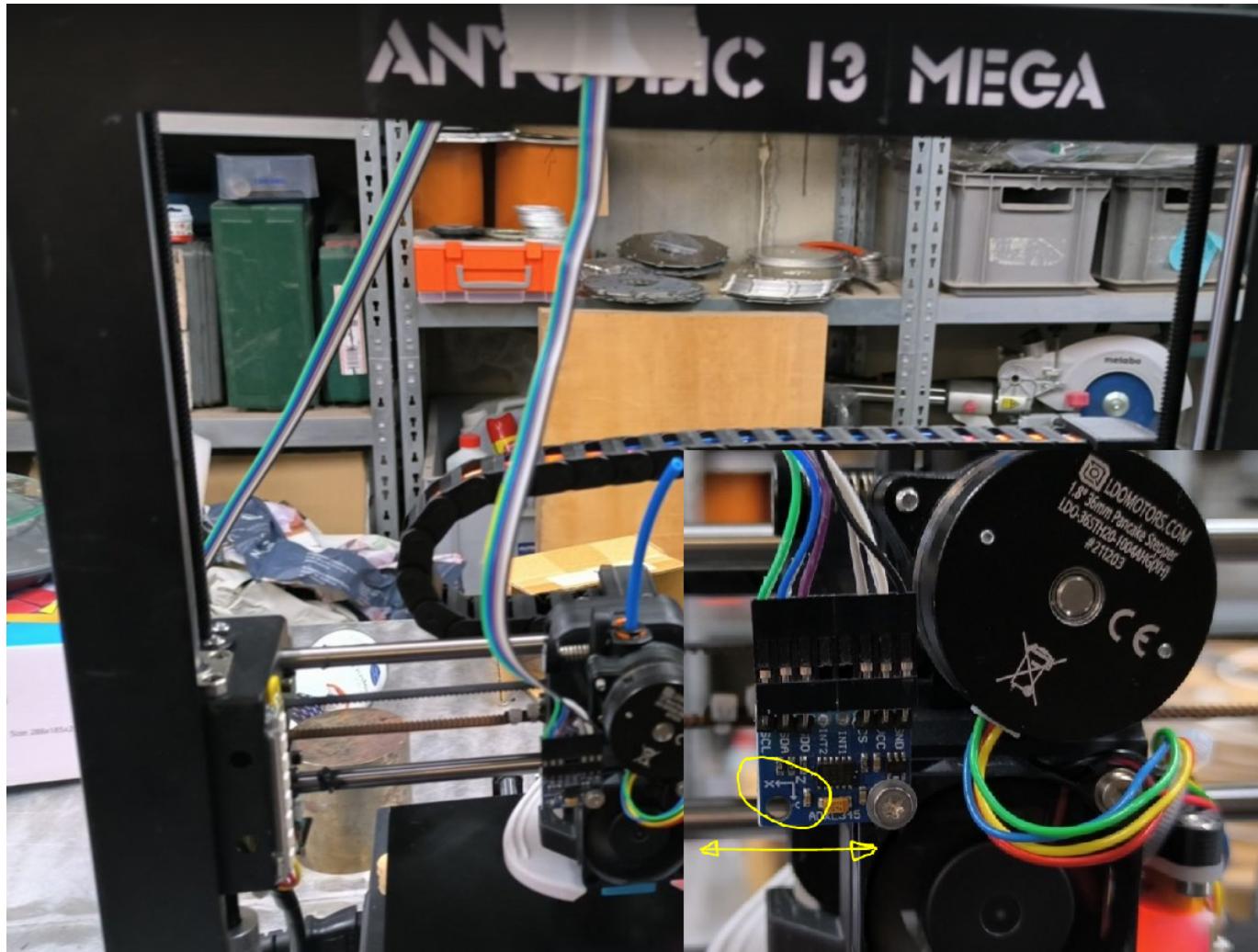
Eingabe

* **max_accel=10000**
* **max_accel_to_decel=10000**

Last update: 2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32

```
53 [mcu]
54 serial : /dev/serial/by-id/usb-Klipper_stm32f407xx_28002C000E47393438343535-if00
55
56 ## Uncomment this part if you use the Raspberry Pi MCU
57 ## > https://www.klipper3d.org/RPi_microcontroller.html
58 [mcu rpi]
59 serial : /tmp/klipper_host_mcu
60
61
62 #####
63 ## Printer Config
64 ## https://www.klipper3d.org/Config_Reference.html#printer
65 #####
66 [printer]
67 kinematics : cartesian
68 max_velocity : 400
69 max_accel : 10000
70 max_accel_to_decel : 10000
71 max_z_velocity : 15
72 max_z_accel : 200
73 square_corner_velocity : 10
74
75
76 #####
77 ## Stepper
78 ## https://www.klipper3d.org/Config_Reference.html#stepper
79 #####
80 [stepper_x]
81 step_pin : PE3
82 dir_pin : PE2
83 enable_pin : !PE5
84 microsteps : 16
85 rotation_distance : 40
86 endstop_pin : !PA2
87 position_endstop : 0
88 position_max : 220
89 homing_speed : 80
90
91 [tmc2209 stepper_x]
92 uart_pin : PE4
```

ADXL Sensor an X Achse Schrauben Keine Kabel sollten lose herum baummeln Achten Sie darauf, dass die X-Achsenmarkierung auf dem Accelerometer auch tatsächlich parallel zur X-Achse ist. Das Modul muss gut fixiert sein!



Test ADXL Sensor

Eingabe Konsole: ACCELEROMETER_QUERY ⇒ ADXL muss Antworten, siehe Ausgabe Konsole

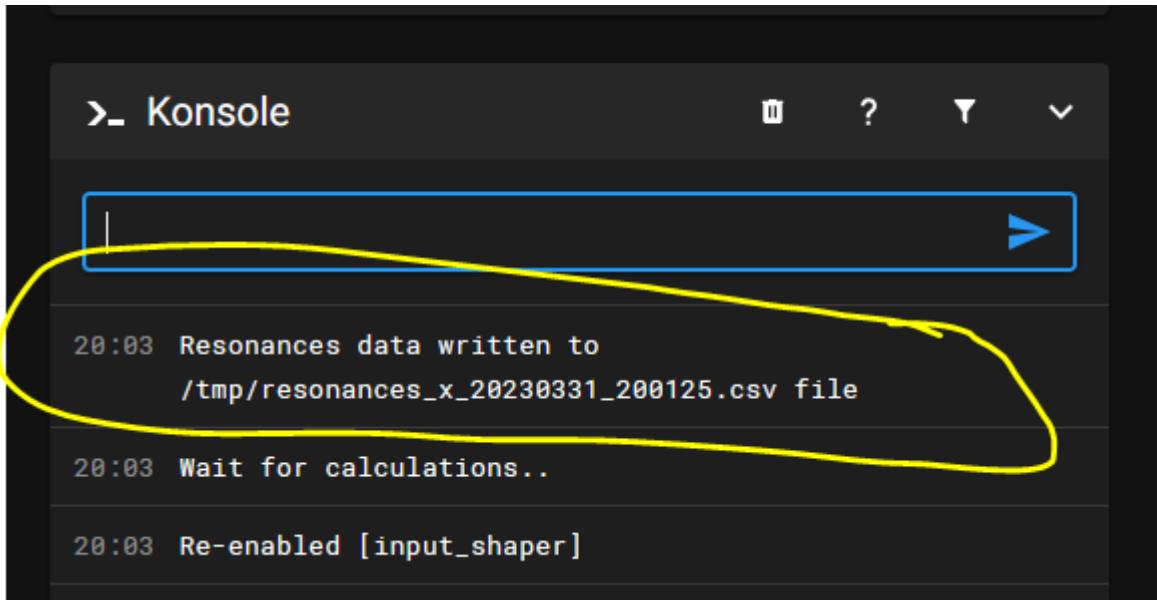
```
ACCELEROMETER_QUERY
20:49 accelerometer values (x, y, z): 444.123565,
-9474.636058, 1685.410096
20:49 ACCELEROMETER_QUERY
20:19 TURN_OFF_HEATERS
20:19 LED_off
20:17 SET_HEATER_TEMPERATURE HEATER=extruder TARGET=160
20:16 G28
20:16 Klipper state: Disconnect
```

Eingabe Konsole:

download

```
TEST_RESONANCES AXIS=X
```

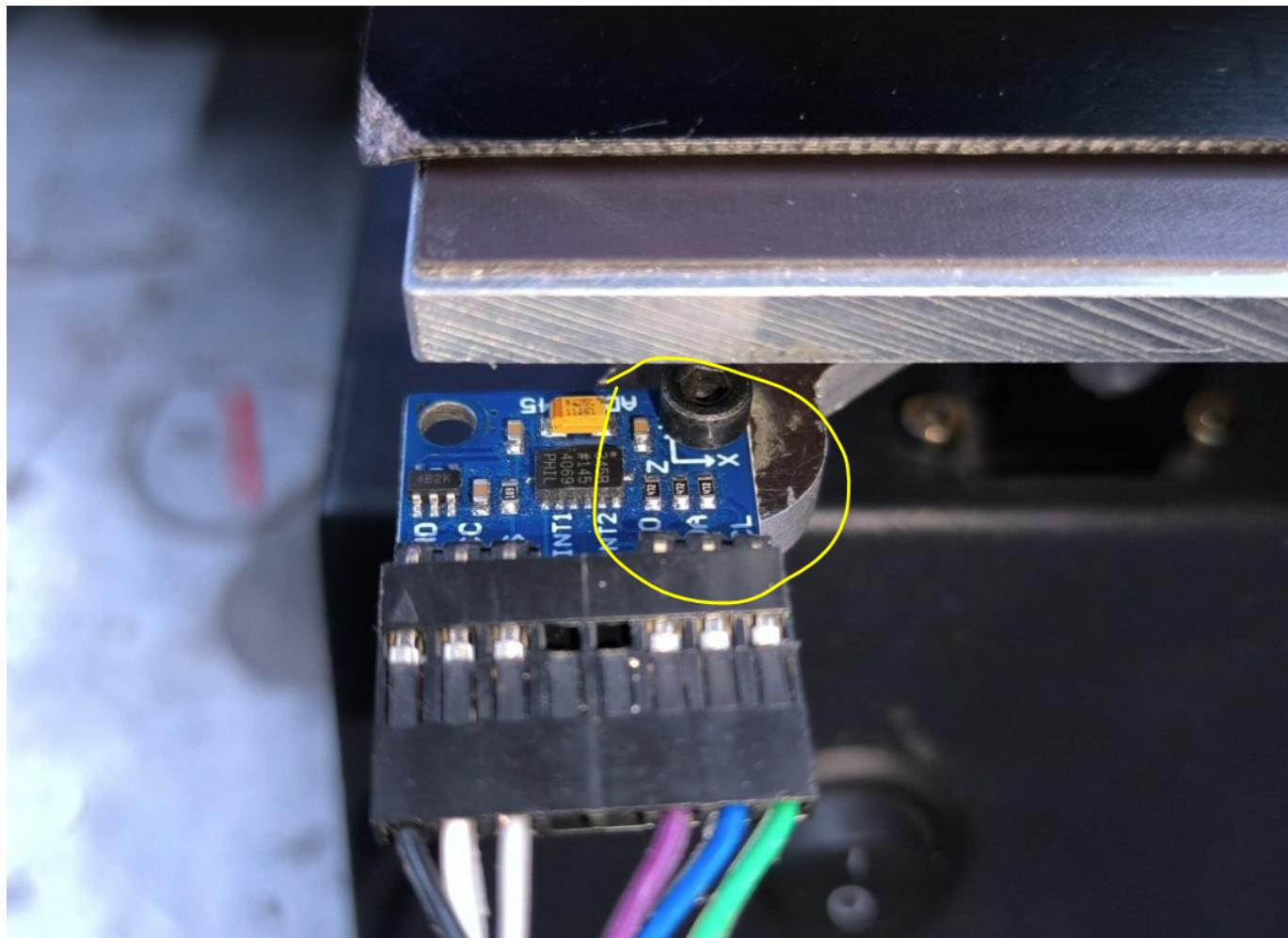
Wenn Kalibration fertig ist wird dieser Text ausgegeben:



```
>_ Konsole
```

```
20:03 Resonances data written to
/tmpp/resonances_x_20230331_200125.csv file
20:03 Wait for calculations..
20:03 Re-enabled [input_shaper]
```

wenn die Messung fertig ist dann Sensor von X Achse bauen und an das Bett des DRucker bauen. Hier ist wieder die Einbau Richtung zu beachten

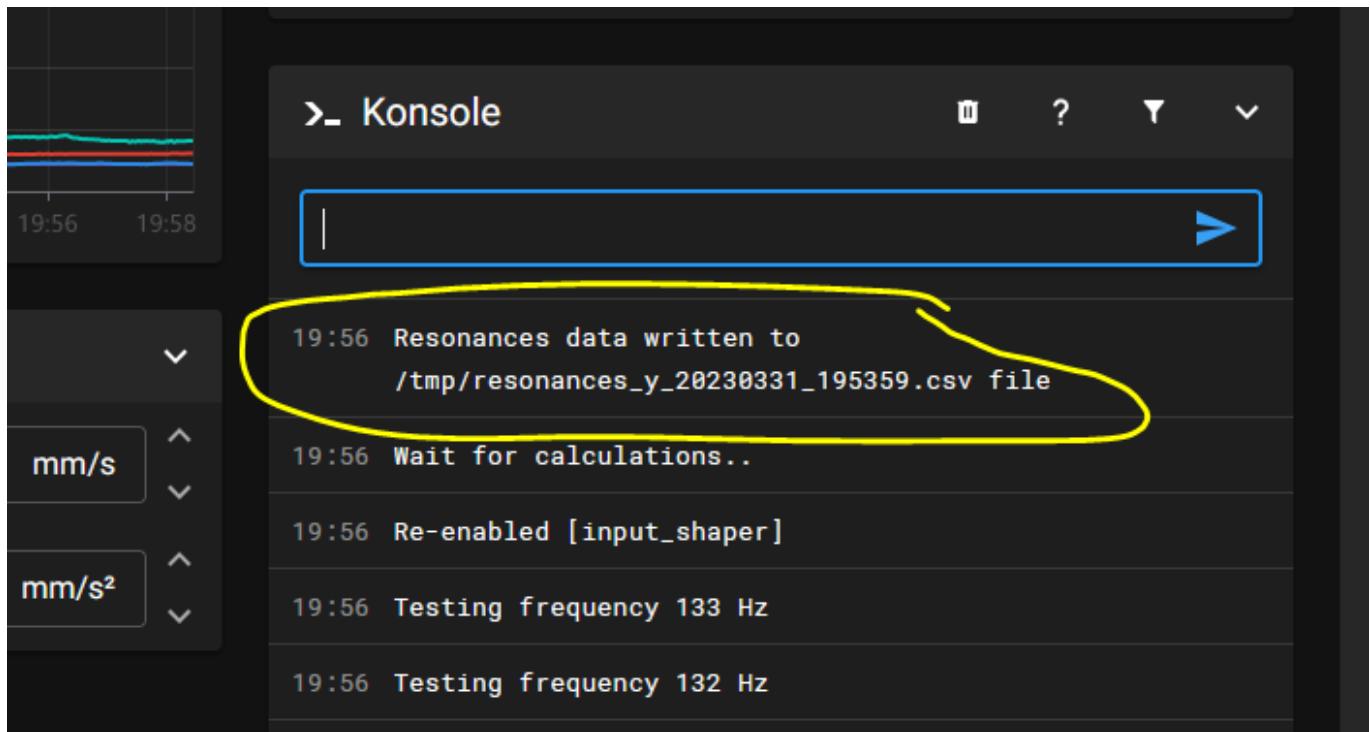
**Eingabe Konsole:**

[download](#)

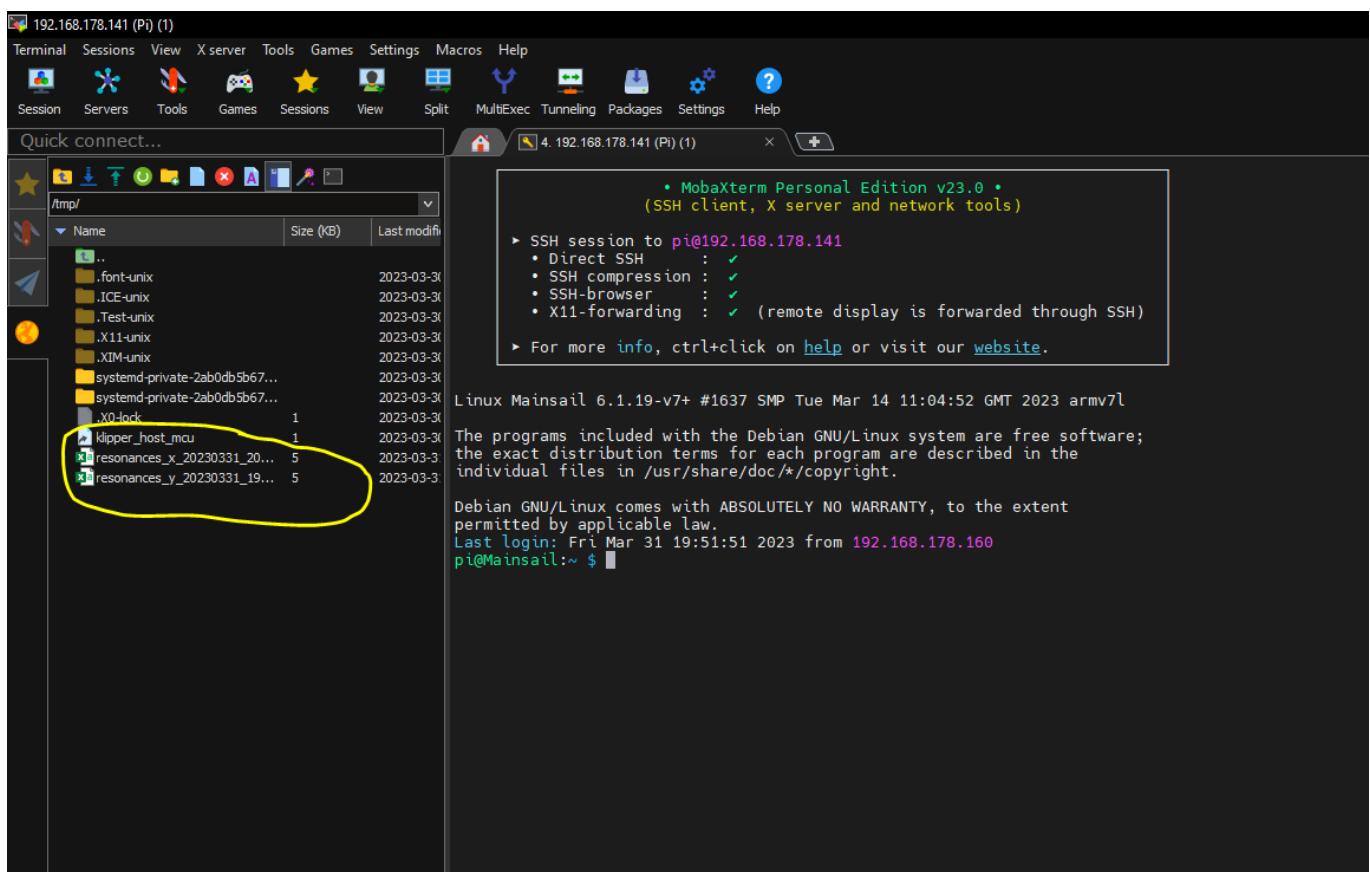
```
TEST_RESONANCES AXIS=Y
```

Kalibration Y Ache wird aus geführt ⇒ wenn Test fertig ist kommt diese Meldung:

Last update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



MobaXterm wechseln und in die Konsole diesen Befehl eingeben:



[download](#)

```
~/klipper/scripts/calibrate_shaper.py /tmp/resonances_x_*.csv -o
/tmp/shaper_calibrate_x.png
```

Dann Befehl für die Y Achse eingeben

[download](#)

```
~/klipper/scripts/calibrate_shaper.py /tmp/resonances_y_*.csv -o
/tmp/shaper_calibrate_y.png
```

The screenshot shows a MobaXterm window with two panes. The left pane is a file browser showing a directory tree under /tmp. The right pane is a terminal window titled 'pi@192.168.178.141 (Pi) (1)'.

```

MobaXterm Personal Edition v23.0 *
(SSH client, X server and network tools)

SSH session to pi@192.168.178.141
  • Direct SSH : ✓
  • SSH compression : ✓
  • SSH-browser : ✓
  • X11-forwarding : ✓ (remote display is forwarded through SSH)
  ▶ For more info, ctrl+click on help or visit our website.

Linux Mainsail 6.1.19-r7+ #1637 SMP Tue Mar 14 11:04:52 GMT 2023 armv7l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*-copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Mar 31 19:51:51 2023 from 192.168.178.160
pi@Mainsail: ~ /klipper/scripts/calibrate_shaper.py /tmp/resonances_x_*.csv -o /tmp/shaper_calibrate_x.png
Calibrated shaper 'zy' frequency = 92.2 Hz (vibrations = 27.7%, smoothing = 0.024)
To avoid too much smoothing with 'zy', suggested max_accel <= 33100 mm/sec^2
Fitted shaper 'mzv' frequency = 59.2 Hz (vibrations = 0.5%, smoothing = 0.058)
To avoid too much smoothing with 'mzv', suggested max_accel < 10300 mm/sec^2
Fitted shaper 'ei' frequency = 78.6 Hz (vibrations = 3.4%, smoothing = 0.052)
To avoid too much smoothing with 'ei', suggested max_accel < 11500 mm/sec^2
Fitted shaper '2hump_ei' frequency = 83.4 Hz (vibrations = 0.0%, smoothing = 0.078)
To avoid too much smoothing with '2hump_ei', suggested max_accel < 7700 mm/sec^2
Fitted shaper '3hump_ei' frequency = 103.6 Hz (vibrations = 0.0%, smoothing = 0.076)
To avoid too much smoothing with '3hump_ei', suggested max_accel < 7900 mm/sec^2
Recommended shape is mzv @ 59.2 Hz
pi@Mainsail: ~ /klipper/scripts/calibrate_shaper.py /tmp/resonances_y_*.csv -o /tmp/shaper_calibrate_y.png
Fitted shaper 'zy' frequency = 38.0 Hz (vibrations = 1.9%, smoothing = 0.110)
To avoid too much smoothing with 'zy', suggested max_accel <= 5600 mm/sec^2
Fitted shaper 'mzv' frequency = 38.4 Hz (vibrations = 0.0%, smoothing = 0.138)
To avoid too much smoothing with 'mzv', suggested max_accel < 4300 mm/sec^2
Fitted shaper 'ei' frequency = 46.0 Hz (vibrations = 0.0%, smoothing = 0.152)
To avoid too much smoothing with 'ei', suggested max_accel < 3900 mm/sec^2
Fitted shaper '2hump_ei' frequency = 57.2 Hz (vibrations = 0.0%, smoothing = 0.165)
To avoid too much smoothing with '2hump_ei', suggested max_accel < 3600 mm/sec^2
Fitted shaper '3hump_ei' frequency = 68.6 Hz (vibrations = 0.0%, smoothing = 0.174)
To avoid too much smoothing with '3hump_ei', suggested max_accel < 3400 mm/sec^2
Recommended shape is mzv @ 38.4 Hz
pi@Mainsail: ~ $ |
```

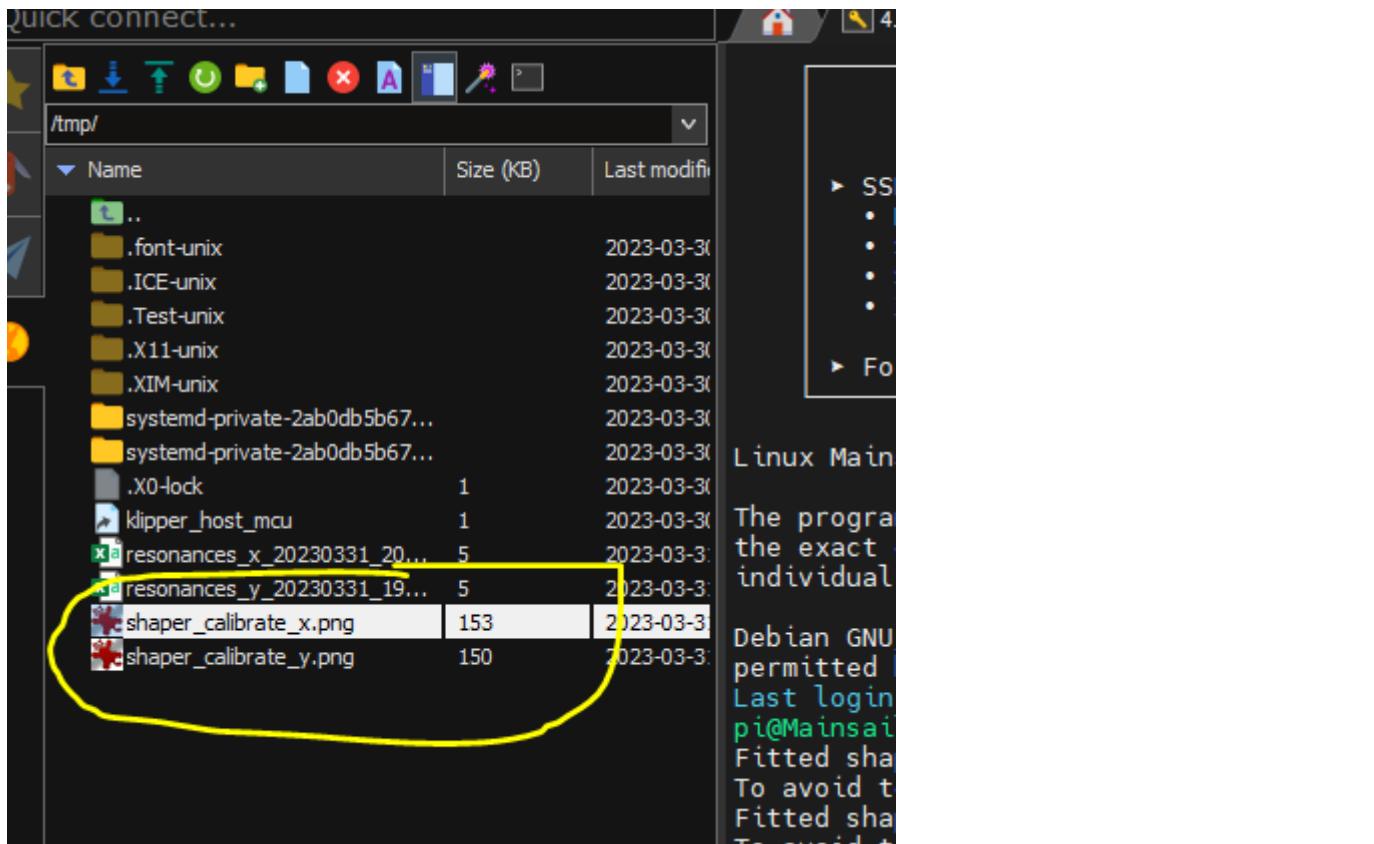
Below the terminal window, there are two checkboxes: 'Remote monitoring' and 'Follow terminal folder'. The 'Follow terminal folder' checkbox is checked.

Shaper X Achse = „mzv 59.2“ Wert notieren

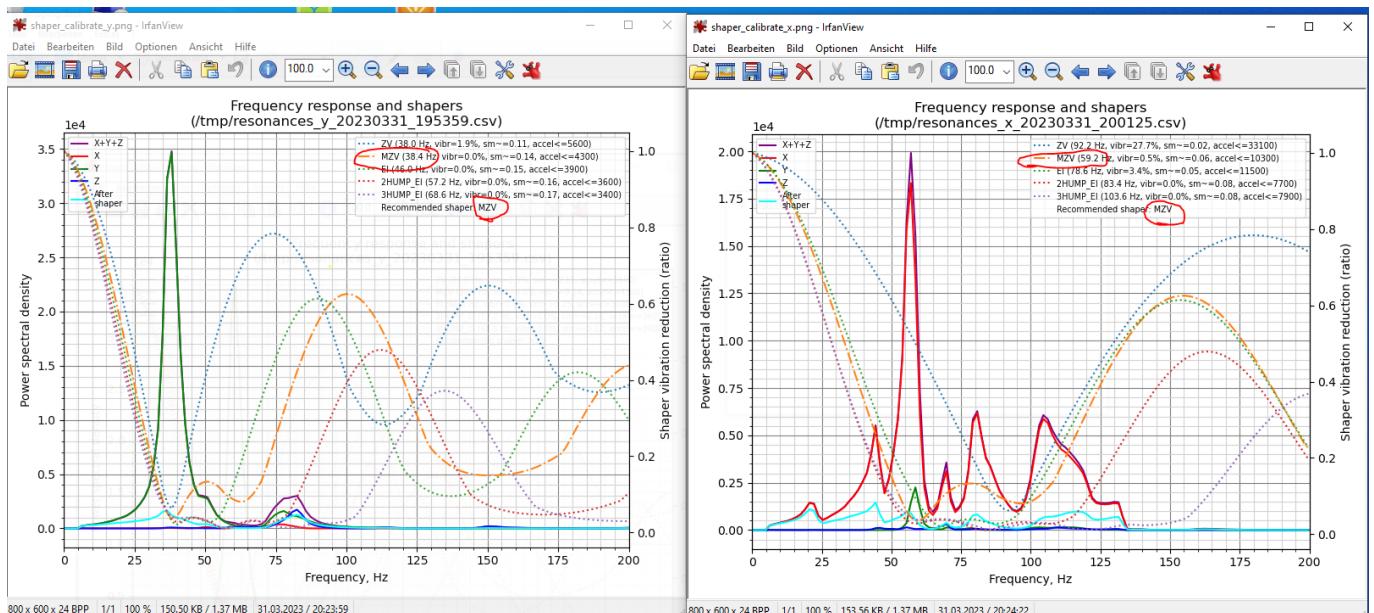
Shaper Y Achse = „mzv 38.4“ Wert notieren

Im Verzeichnis tmp liegen zu 2 PNG Dateien die mit Doppelklick geöffnet werden können

Last update: 2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



hier werden die Filter und Frequenzen graphisch angezeigt



in Printer.cfg „Input Shaper“ die Wert für X und Y egeben und übernehmen

```

261
262
263 ######
264 ## Input Shaper
265 ## https://www.klipper3d.org/Config_Reference.html#input_shaper
266 ## https://www.klipper3d.org/Resonance_Compensation.html
267 #####
268 [input_shaper]
269 shaper_freq_x : 59.2
270 shaper_type_x : mzv
271 shaper_freq_y : 38.4
272 shaper_type_y : mzv
273
274
275 #####
276 ## ADXL345
277 ## https://www.klipper3d.org/Config_Reference.html#adxl345

```

Maximale Beschleunigung Ermitteln

in Printer.cfg link öffnen

[input Shaper]

```

printer.cfg *
? KONFIG-REF

251 #####
252 ## Safe Z homing
253 ## https://www.klipper3d.org/Config_Reference.html#safe_z_home
254 #####
255 [safe_z_home]
256 # Change coordinates to the center of your print bed
257 home_xy_position : 83,117
258 speed : 80
259 z_hop : 15
260 z_hop_speed : 5
261
262
263 #####
264 ## Input Shaper
265 ## https://www.klipper3d.org/Config_Reference.html#input_shaper
266 ## https://www.klipper3d.org/Resonance_Compensation.html
267 #####
268 [input_shaper]
269 shaper_freq_x : 59.2
270 shaper_type_x : mzv
271 shaper_freq_y : 38.4
272 shaper_type_y : mzv
273
274
275 #####
276 ## ADXL345
277 ## https://www.klipper3d.org/Config_Reference.html#adxl345
278 #####
279 [adxl345]
280 cs_pin : rpi:None
281
282 #####
283 ## Resonance Tester
284 ## https://www.klipper3d.org/Config_Reference.html#resonance_tester
285 #####
286 [resonance_tester]
287 accel_chip : adxl345
288 probe_points : 100, 100, 20
289
290
291 #####
292 ## BI Touch

```

unter „docs/prints/ringing_tower.stl“ Modell herunter laden, Stettings des Slicers:

The screenshot shows a web browser displaying the Klipper3d.org website. The page title is "Resonance Compensation". On the left, there is a sidebar with a navigation menu for Klipper documentation, including sections like Overview, Features, Frequently Asked Questions, Releases, Configuration Changes, Contact, Installation and Configuration, Measuring Resonances, Pressure advance, G-Codes, Command templates, TMC drivers, Multiple Micro-controller Homing and Probing, Slicers, Skew correction, Exclude Objects, and Using PWM tools. The main content area discusses "input snapping" and provides tuning instructions for the "ringing_tower.stl" model. A red circle highlights the instruction "Slice the ringing test model, which can be found in [docs/prints/ringing_tower.stl](#), in the slicer:". Below this, a list of tuning steps is provided, many of which are highlighted in yellow. To the right of the main content, there is a sidebar with links to various troubleshooting and technical details pages.

input snapping is an open-loop control technique which creates a commanding signal that cancels its own vibrations. Input shaping requires some tuning and measurements before it can be enabled. Besides ringing, Input Shaping typically reduces the vibrations and shaking of the printer in general, and may also improve the reliability of the stealthChop mode of Trinamic stepper drivers.

Tuning

Basic tuning requires measuring the ringing frequencies of the printer by printing a test model. Slice the ringing test model, which can be found in [docs/prints/ringing_tower.stl](#), in the slicer:

- Suggested layer height is 0.2 or 0.25 mm.
- Infill and top layers can be set to 0.
- Use 1-2 perimeters, or even better the smooth vase mode with 1-2 mm base.
- Use sufficiently high speed, around 80-100 mm/sec, for external perimeters.
- Make sure that the minimum layer time is at most 3 seconds.
- Make sure any "dynamic acceleration control" is disabled in the slicer.

• Do not turn the model. The model has X and Y marks at the back of the model. Note the unusual location of the marks vs. the axes of the printer - it is not a mistake. The marks can be used later in the tuning process as a reference, because they show which axis the measurements correspond to.

Ringing frequency

First, measure the ringing frequency.

Table of contents

- Tuning
- Ringing frequency
- Input shaper config
- Choosing input sha
- Selecting max_acce
- Fine-tuning resonan
- Pressure Advance
- Unreliable measurem
- ringing frequencie
- Troubleshooting and I
- I cannot get reliable
- measurements of re
- frequencies
- After enabling [inpu
- get too smoothed p
- and fine details are
- After successfully p
- some time without i
- appears to come ba
- Is dual carriage sett
- supported with inpu
- Does input_shaper i
- time?
- Technical details
- Input shapers

Slicer Einstellungen Druckeinstellungen ⇒ Perimeter Shell

*Unbenannt - SuperSlicer_2.4 based on PrusaSlicer

Datei Bearbeiten Fenster Anzeige Calibration Generate Konfiguration Hilfe

3D view Sliced preview Gcode preview Druckereinstellungen Filamenteinstellungen Druckereinstellungen

0.213 Mega Klipper PLA (geändert)

Perimeters & Shell

- Slice
- Infill
- Skirt & Brim
- Stützmaterial
- Geschwindigkeit
- Width & Flow
- Multiple extruders
- Ausgabeoptionen
- Anmerkungen
- Abhängigkeiten

Vertikale Konturhüllen

- Konturen: 1 (Minimum).
- Wall Thickness: 0,837
- Spiralvasenmodus:

Recommended object min (thick) wall thickness for layer height 0.20 and 1 perimeter: 0.86 mm

Horizontale Konturhüllen

- Massive Schichten Decke: 0 Unten: 4
- Minimale Schalenstärke Decke: 0,7 mm Unten: 0,5 mm
- Enforce 100% fill volume:

Oben ist offen.
Die Bodenschale ist 0.8 mm stark für eine Schichthöhe von 0.2 mm. Die Mindeststärke der Bodenschale beträgt 0.5 mm.

Qualität

- Only one perimeter On first layer: On top surfaces: Minimum width: 100% mm oder %
- Extra perimeters On overhangs: On odd layers:
- Stelle die vertikale Hüllstärke sicher No solid infill over: 2 Konturen
- Kreuzen der Kontur vermeiden Kreuzen von Konturen Vermeiden - Maximale Umleitungslänge:
- Overlapping external perimeter Also for all perimeters: 20 %
- Thin walls Minimale Breite: 33% Überlappung: 50% Merging with perimeters:

Overhangs

- threshold for Bridge speed and fan: 55% Bridge flow: 75%
- Extrusion direction Reverse on odd: Reverse threshold: 250%

Erweiterte Einstellungen

Geschwindigkeit

Last
update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32

*Unbenannt - SuperSlicer_2.4 based on PrusaSlicer

Datei Bearbeiten Fenster Anzeige Calibration Generate Konfiguration Hilfe

3D view Sliced preview Gcode preview Druckeinstellungen Filamenteinstellungen Druckereinstellungen

0.213 Mega Klipper PLA (geändert)

Geschwindigkeit für Druckbewegungen

- Default speed Standard: 100 mm/s or %
- Perimeter speed Internal: 100 mm/s or % (highlighted)
- Infill speed Fett: 100% mm/s or %
- Support speed Standard: 100% mm/s or %
- Bridge speed Überbrückungen: 50% mm/s or %
- Gap fill speed maximum speed: 50% mm/s or %
- Other speed Thin walls: 80% mm/s or %

- External: 100 mm/s or % (highlighted)
- Sparse: 100% mm/s or %
- Interface: 80% mm/s or %
- Internal bridges: 100% mm/s or %
- Cap with: 0 % of perimeter flow
- Bügeln: 50% mm/s

Top solid: 50% mm/s or %

Brim & Skirt: 50% mm/s or %

Overhangs: 50% mm/s

Geschwindigkeit für Bewegungen zwischen den Druckvorgängen

- Travel speed xy: 400 mm/s z: 0 mm/s

Veränderer

- Druckgeschwindigkeit der ersten Schicht Min: 20 mm/s Max: 25 mm/s oder %
- Small perimeter speed Geschwindigkeit: 25 mm/s or % Min length: 6 mm or % Max length: 20 mm or %

Max infill: 50 mm/s or % Over raft: 30 m

Automatische Geschwindigkeit (fortgeschritten)

- Volumengeschwindigkeit: 0 mm³/s
- Maximale Druckgeschwindigkeit: 100% mm/s or %

Beschleunigungskontrolle (fortgeschritten)

- Default acceleration Standard: 0 mm/s² or % (highlighted)
- Perimeter acceleration Internal: 2000 mm/s² or %
- Infill acceleration Fett: 3000 mm/s² or %
- Support acceleration Standard: 1500 mm/s² or %
- Bridge acceleration Überbrückungen: 1000 mm/s² or %
- Other extrusions acceleration Lückenfüllung: 1500 mm/s² or %
- Travel acceleration Eingang: 3000 mm/s² or %
- First layer acceleration Max: 1500 mm/s² or %

- External: 1500 mm/s² or %
- Sparse: 3000 mm/s² or %
- Interface: 0 mm/s² or %
- Internal bridges: 0 mm/s² or %
- Thin Walls: 1500 mm/s² or %
- Decelerate with target acceleration: checked

Top solid: 1500 mm/s² or %

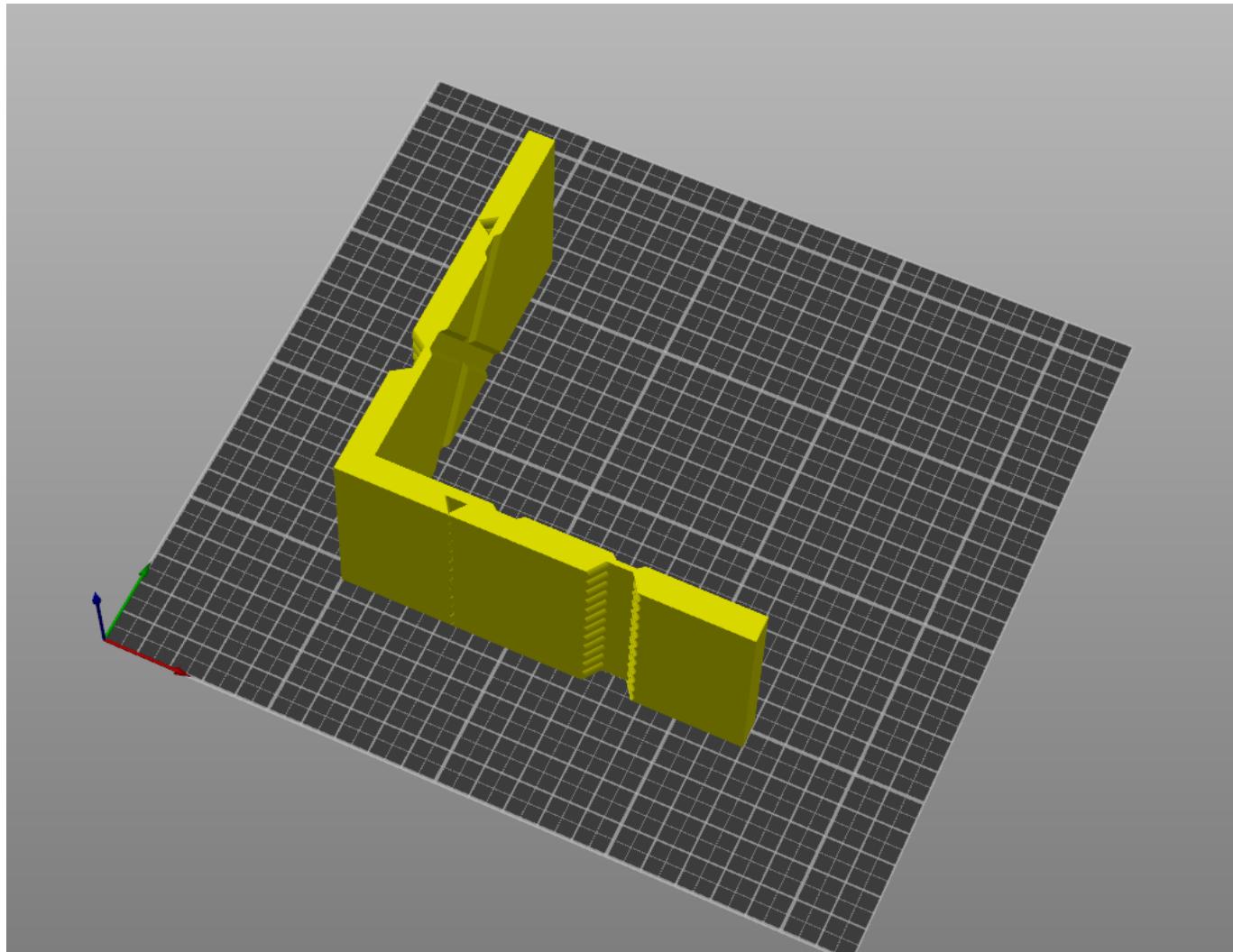
Brim & Skirt: 1500 mm/s² or %

Overhangs: 0 mm/s² or %

Bügeln: 0 mm/s² or %

Erste Objektschicht über der Raft-Schnitstelle: 0 mm/s²

Modell Slicen



In Printer.cfg ändern

```
* max_accel : 7000
* max_deaccel : 7000
* square_corner_velocity : 5
```

```

61 #####
62 ## Printer Config
63 ## https://www.klipper3d.org/Config_Reference.html#printer
64 ## https://www.klipper3d.org/Resonance_Compensation.html?h=selecting-max_accel
65 #####
66 [printer]
67 kinematics : cartesian
68 max_velocity : 400
69 max_accel : 7000
70 max_accel_to_decel : 7000
71 max_z_velocity : 15
72 max_z_accel : 200
73 square_corner_velocity : 5
74 #####
75
76
77 ## Stepper
78 ## https://www.klipper3d.org/Config_Reference.html#stepper
79 #####

```

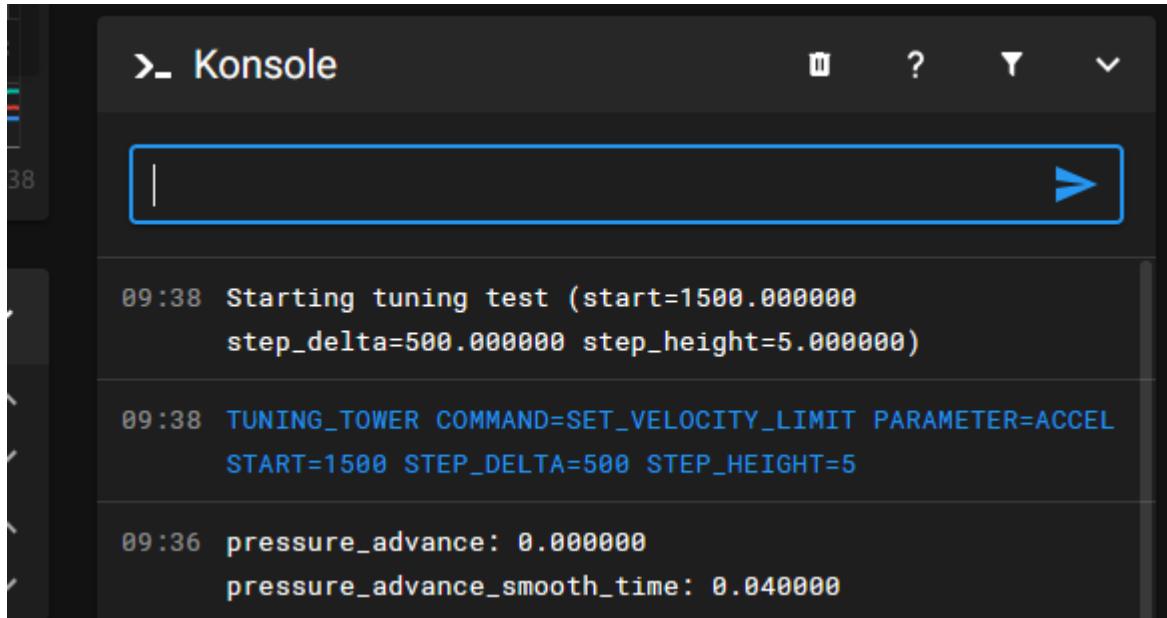
In die Mainsail Konsole folgende Befehle eingeben

[download](#)

```
SET_PRESSURE_ADVANCE ADVANCE=0
```

[download](#)

```
TUNING_TOWER COMMAND=SET_VELOCITY_LIMIT PARAMETER=ACCEL START=1500  
STEP_DELTA=500 STEP_HEIGHT=5
```

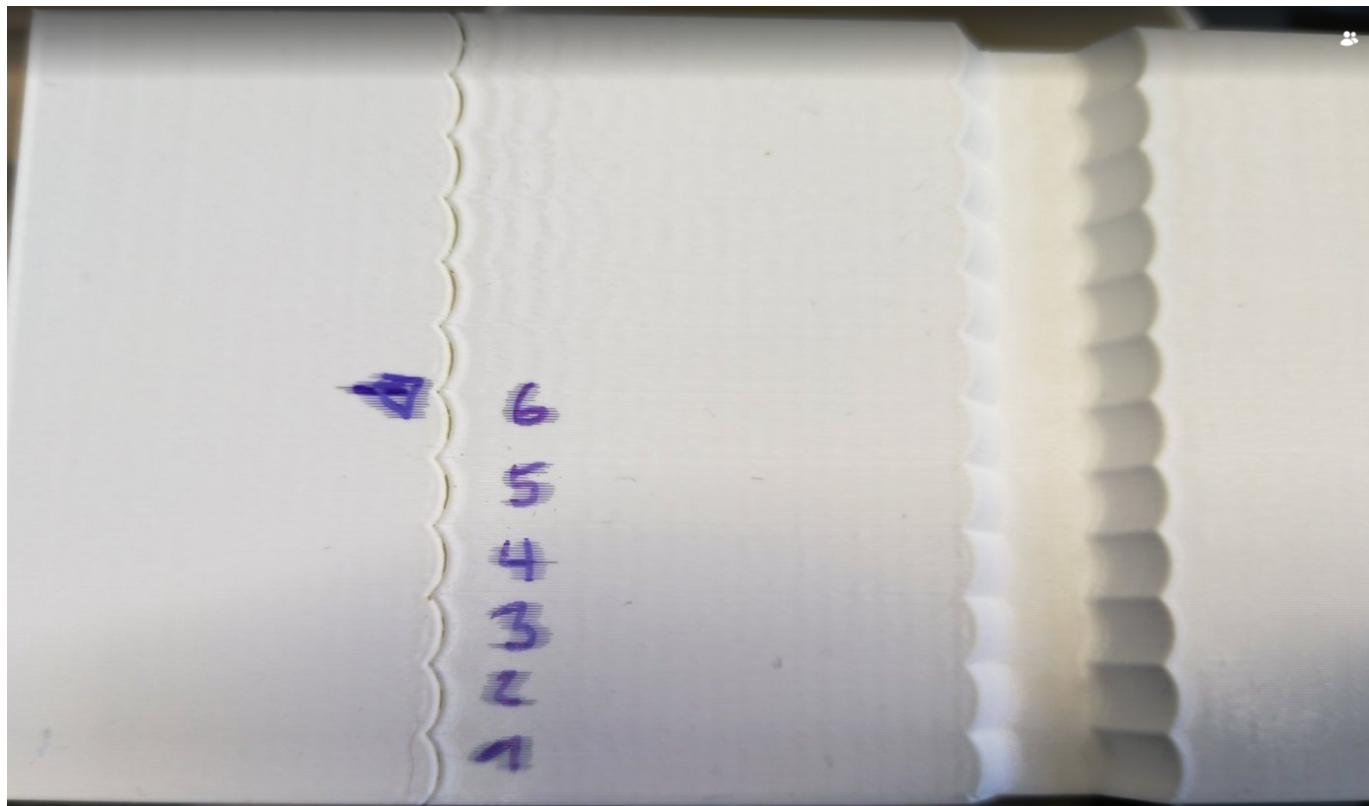


The screenshot shows a terminal window titled "Konsole". The log output is as follows:

```
09:38 Starting tuning test (start=1500.000000  
step_delta=500.000000 step_height=5.000000)  
  
09:38 TUNING_TOWER COMMAND=SET_VELOCITY_LIMIT PARAMETER=ACCEL  
START=1500 STEP_DELTA=500 STEP_HEIGHT=5  
  
09:36 pressure_advance: 0.000000  
pressure_advance_smooth_time: 0.040000
```

Modell ausdrucken

untere Sektion wird mit 1500 mm/s² gedruckt, jede weitere Sektion wird die Beschleunigung um +500 mm/s² erhöht die Sektion suchen die bei dem wieder Ghosting einsetzt



in diesem Fall $\Rightarrow 6 \cdot 500 = 3000 \text{ mm/s}^2 + 1500 \text{ mm/s}^2 = 4500 \text{ mm/s}$ max_accel = 4500

In printer.cfg die ermittelten Ergebnisse eingeben

max_accel : 4500
max_accel_to_decel : 2250
square_corner_velocity : 10

```
61
62 ######
63 ## Printer Config
64 ## https://www.klipper3d.org/Config_Reference.html#printer
65 ## https://www.klipper3d.org/Resonance_Compensation.html?h=selec#selecting-max_accel
66 #####
67 [printer]
68 kinematics          : cartesian
69 max_velocity        : 400
70 max_accel           : 4500
71 max_accel_to_decel : 2250
72 max_z_velocity     : 15
73 max_z_accel         : 200
74 square_corner_velocity : 10
75 |
76 #####
77 ## Stepper
78 ## https://www.klipper3d.org/Config_Reference.html#stepper
```

Last update: 2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32

Flowtest

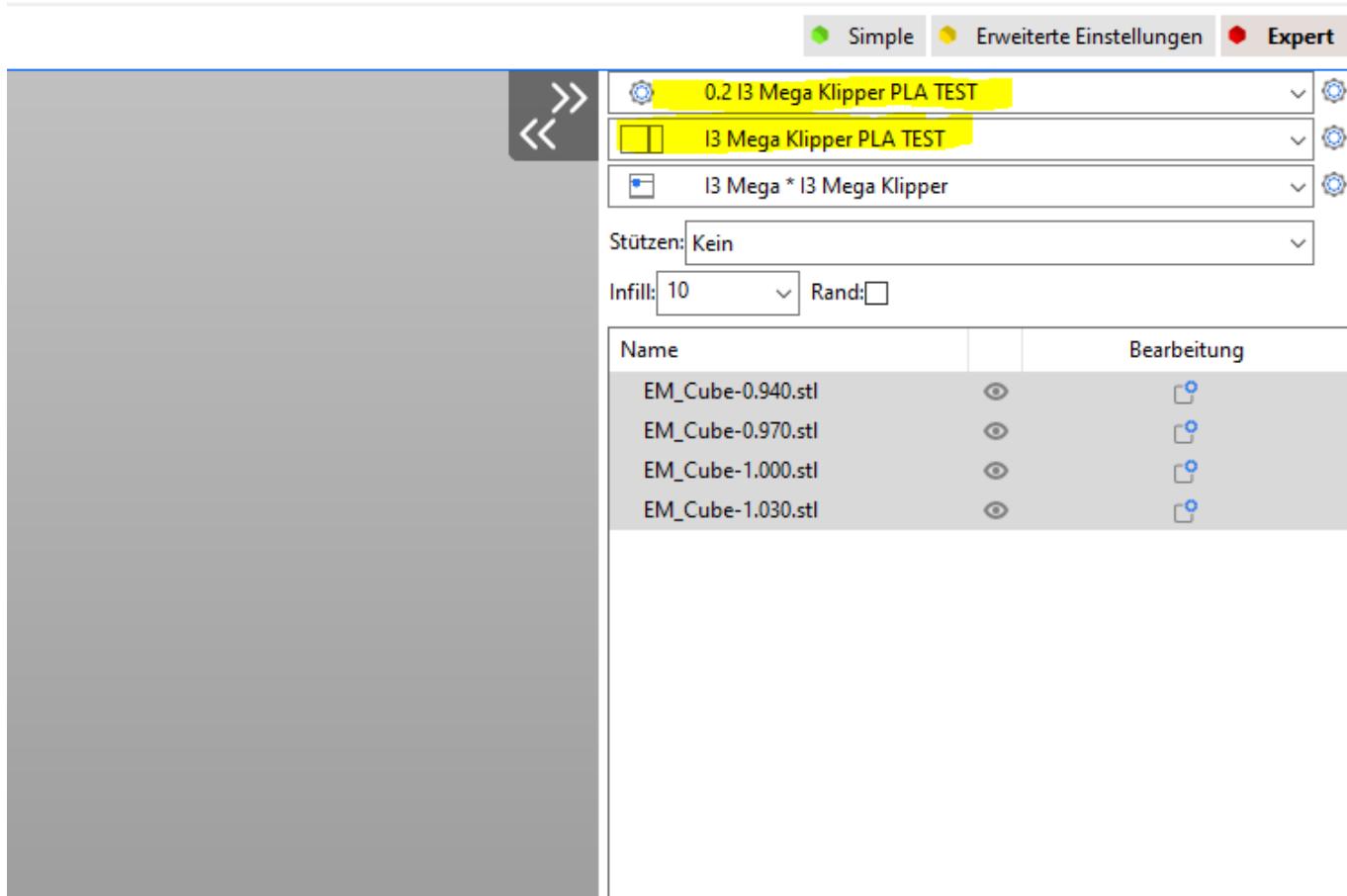
Ellis Printing Guide

<https://github.com/AndrewEllis93/Print-Tuning-Guide>

Download ZIP ⇒ und lokal Entpacken

The screenshot shows the GitHub repository page for 'Print-Tuning-Guide'. The 'Code' tab is selected. On the right side, there's an 'About' section with a 'Clone' button (HTTPS, SSH, GitHub CLI) and a 'Download ZIP' button, which is circled in blue. Below the clone section, there are sections for 'Releases', 'Packages', 'Contributors', and 'Environments'.

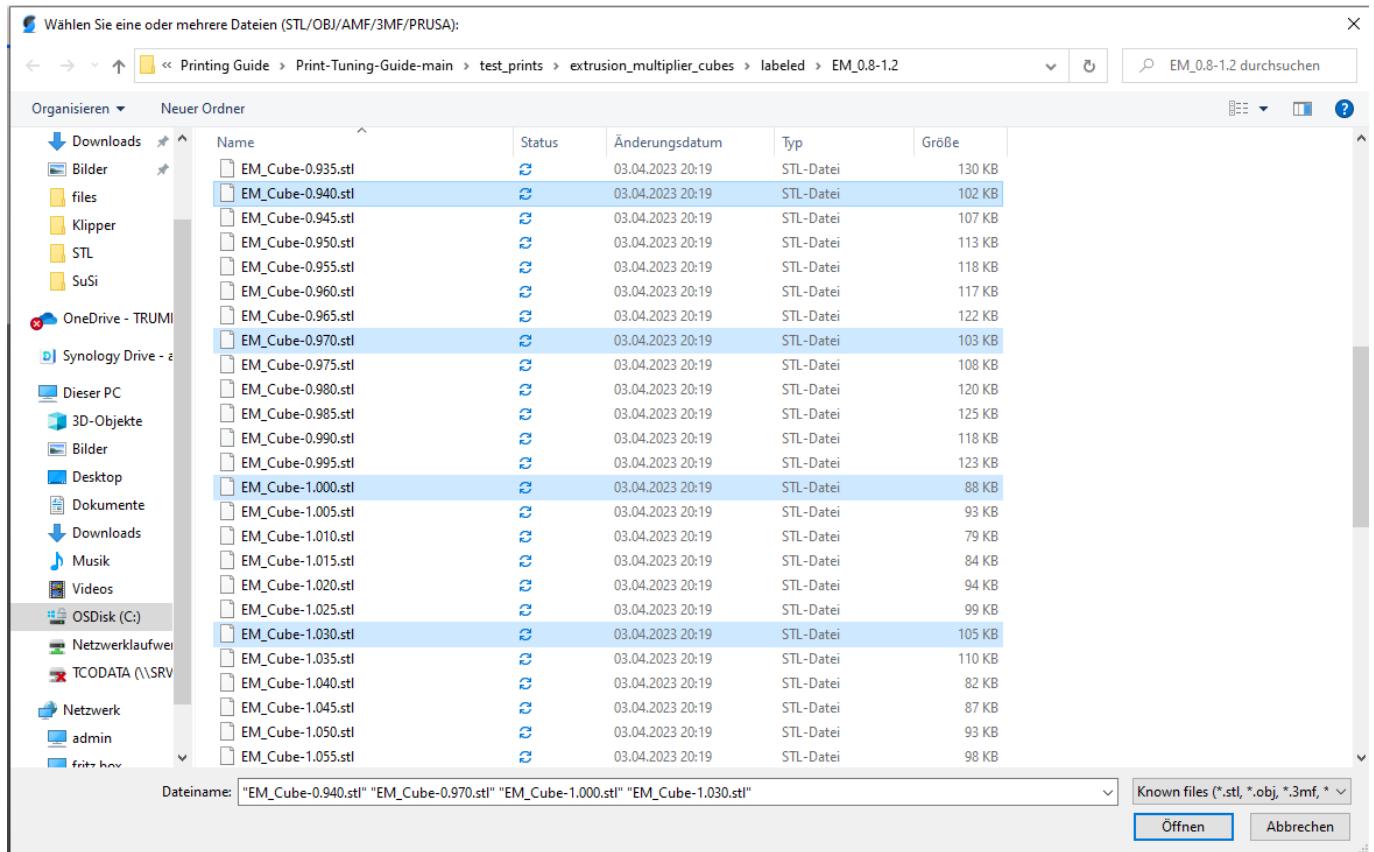
Super Slicer Profil TEST Einstellen / Temp +/- 200 Grad



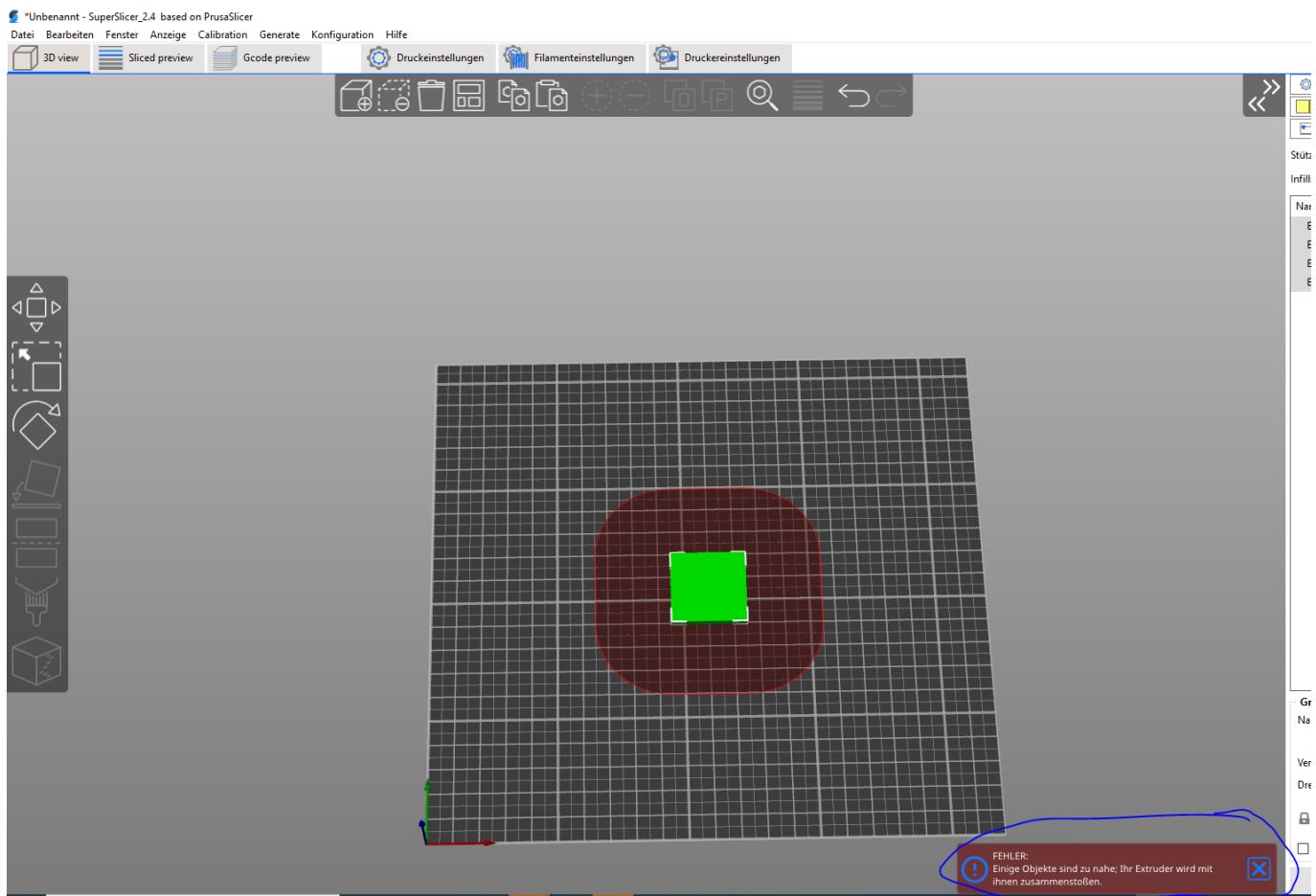
Im Ordner ##Printing Guide\Print-Tuning-Guide-main\test_prints\extrusion_multiplier_cubes\labeled\EM_0.8-1.2 DATEI - IMPORT - Importiere: folgenden Dateien herunter laden:

- 0,940
- 0,970
- 1,000
- 1,030

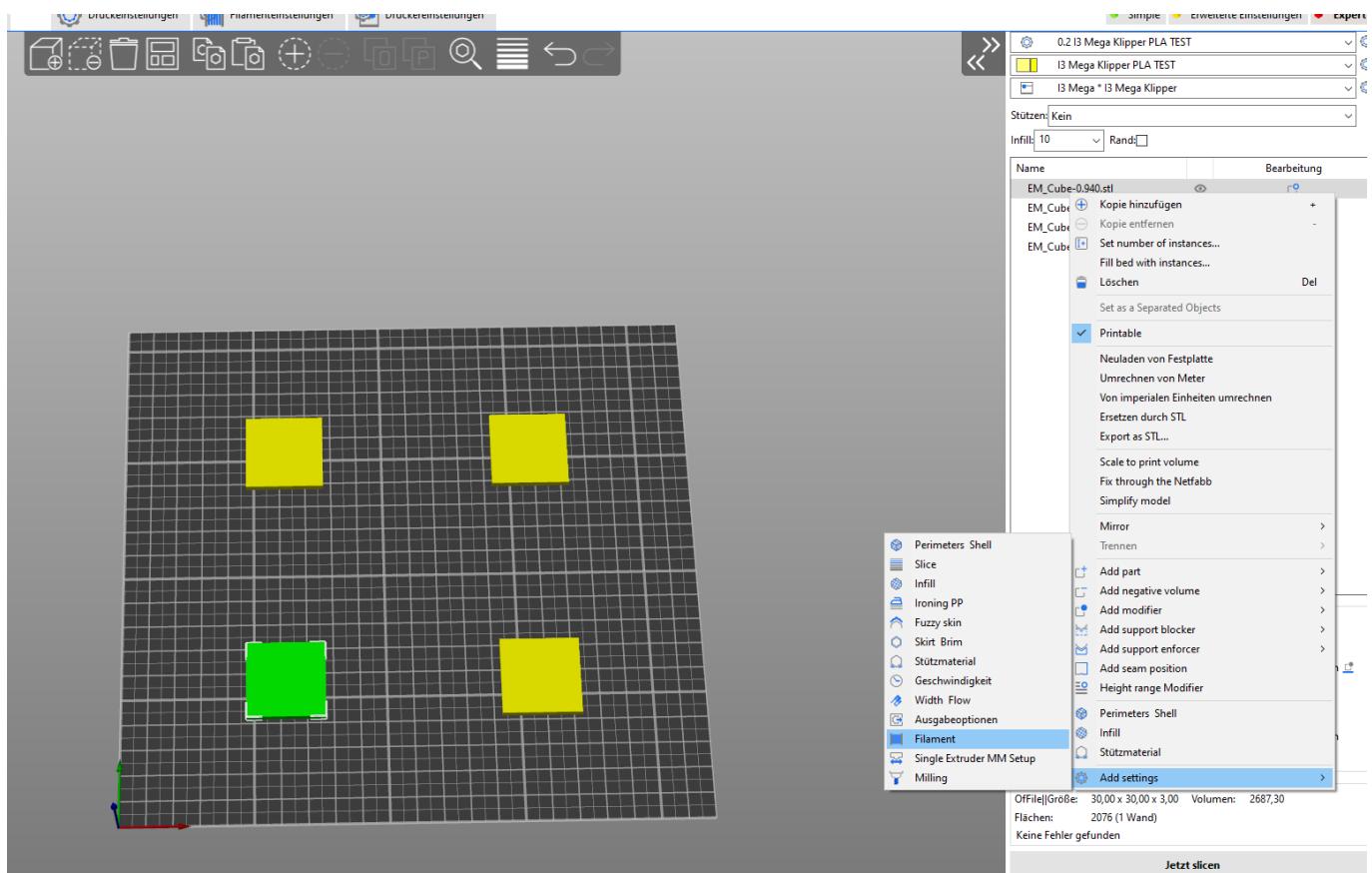
Last update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



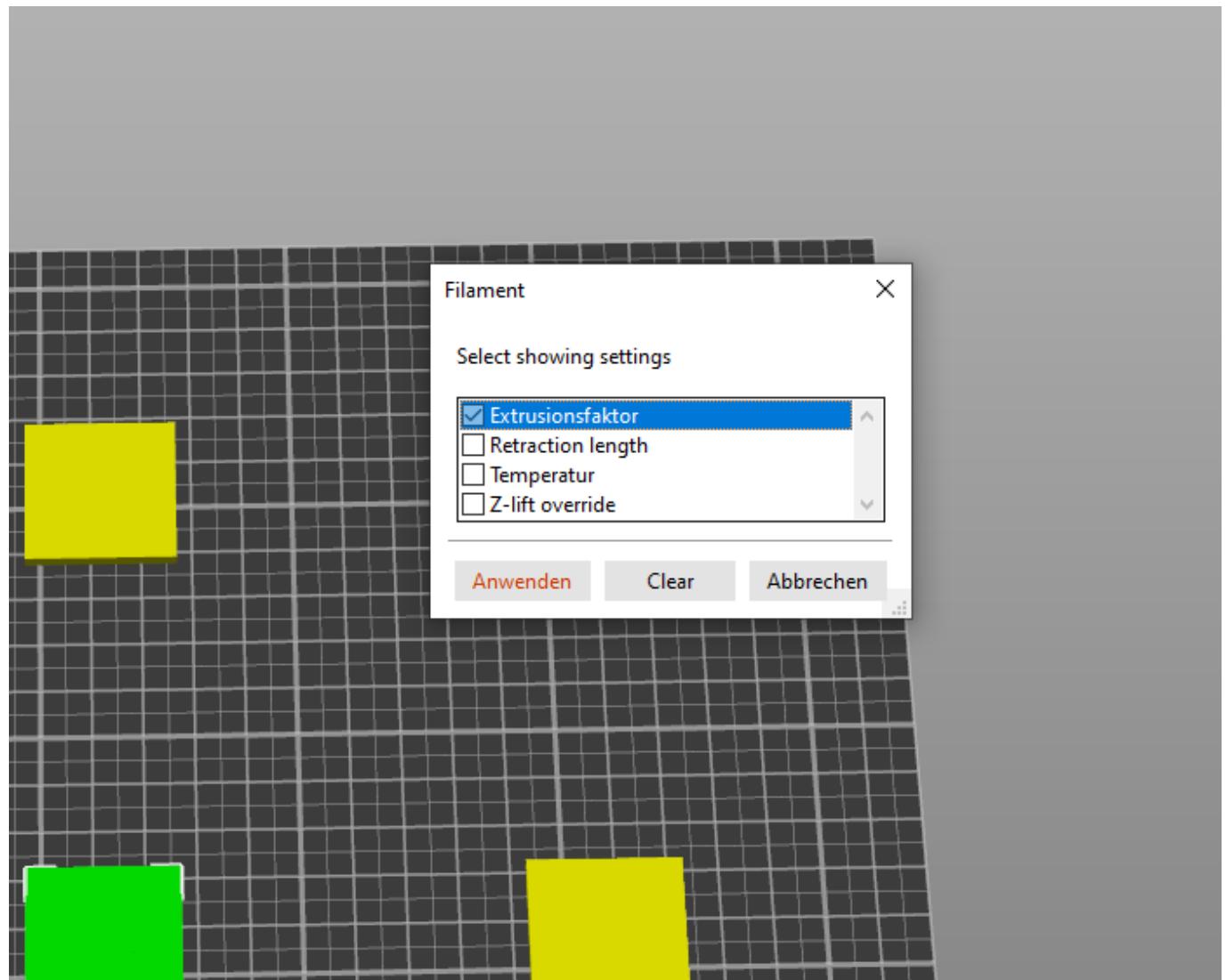
Teile liegen alle übereinander



Bei Fehlermeldung „A“ drücken ⇒ 4 Teile werden gleichmäßig verteilt Rechtsklick auf das erste Teil 0,940 ⇒ Add Settings ⇒ Filament

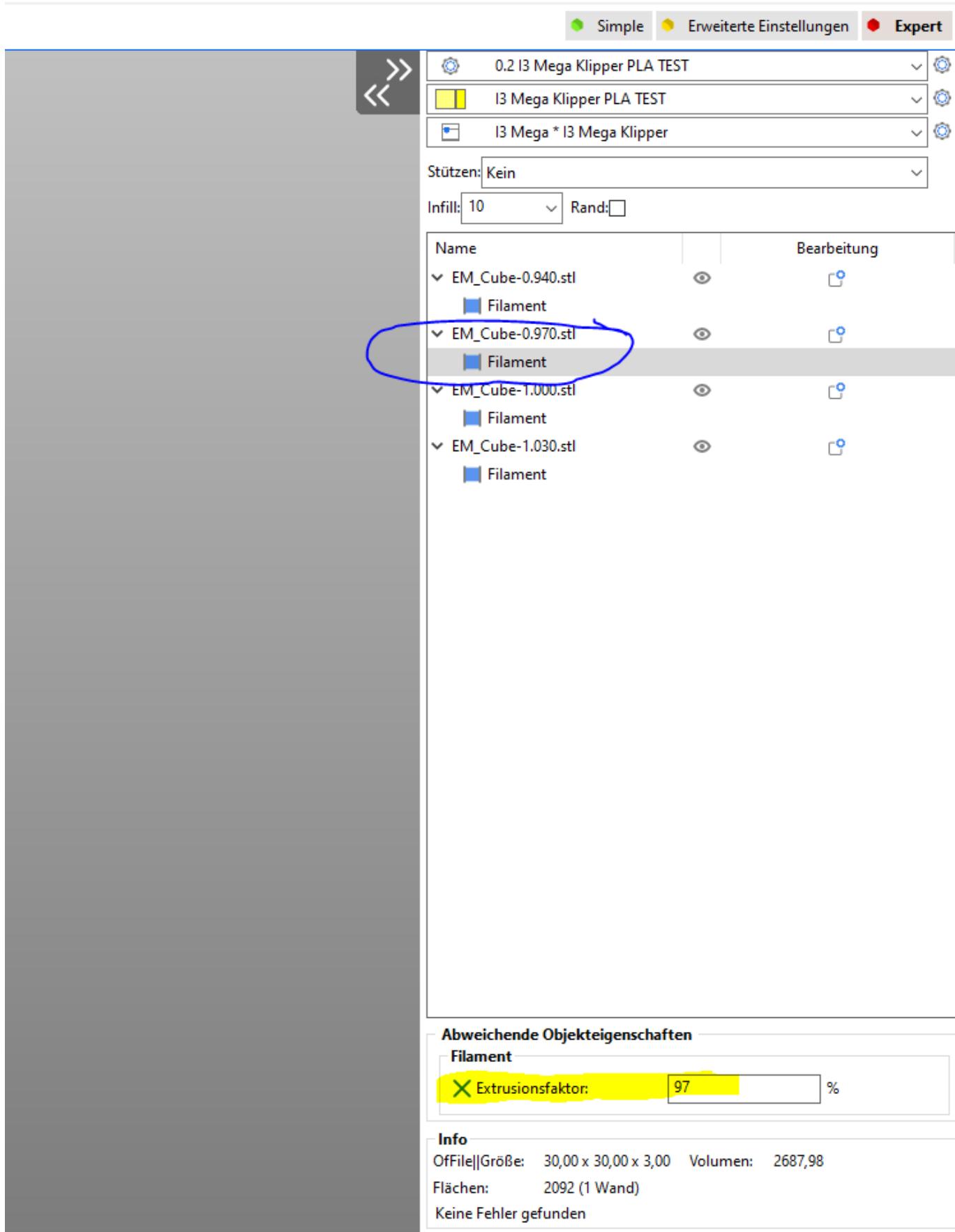


Extrusionsfactor ⇒ Anwenden / mit „strg + „C“ und „strg + V“ kann der Extrusionsfactor auf alle 4 Werkstücke angewendet werden



jetzt unter "Extrusionsfactor die Werte anpassen z.b. für 0,940 = 94%; für 0,970 = 97%....

Slicen und Drucken



https://ellis3dp.com/Print-Tuning-Guide/articles/extrusion_multiplier.html#examples

auf Ellis Seite Samples vergleichen

You will get better at this through experience.

2% Intervals

Here you'll narrow down a general range to work in.

I usually start from 92% to 98%. Most filaments will fall in this range, **but not all**.

Click the image to open. Ctrl + scroll up / down to zoom.

The center cube is looking pretty close.

0.5% Intervals

Now you can fine-tune in 0.5% intervals.

Click the image to open. Ctrl + scroll up / down to zoom.

Blättchen sind auf der Rückseite gekennzeichnet z. B. bestest Ergebnis 94%-97% ⇒ nächster Test 94.5⇒96.5%



Extrusionfactor im Super Slicer eintragen= 0,96

Filament

- Farbe: (Color) - yellow
- Durchmesser: (Diameter) - 1.75 mm
- Extrusionsfaktor: (Extrusion Factor) - 0.96
- Dichte: (Density) - 1.24 g/cm³
- Kosten: (Cost) - 25,4 Kosten/kg
- Gewicht der Spule: (Spool Weight) - 1000 g

Temperatur °C

Extruder	Erste Schicht: 170 °C	Andere Schichten: 155 °C
Druckbett	Erste Schicht: 65 °C	Andere Schichten: 55 °C
Chamber:	0 °C	

Filament Eigenschaften

- Filament Typ: PLA
- Lösliches Material: None
- Shrinkage: 100 %
- Max line overlap: 100 %

Korrektur der Druckgeschwindigkeit

- Max speed: 0 mm/s
- Maximale Volumengeschwindigkeit: 0 mm³/s

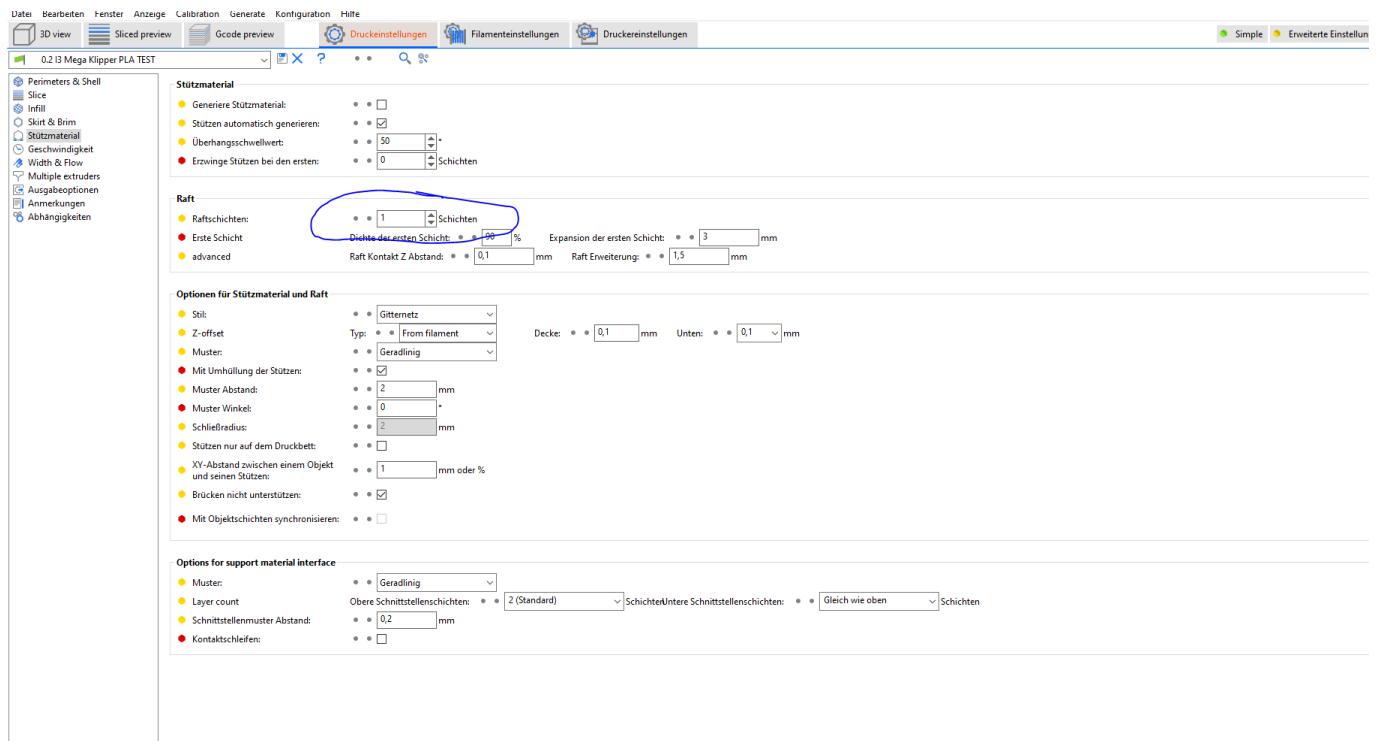
Volumenparameter der ersten Schicht flow rate is maximized when printing Infill with a volumetric rate of 3.87 mm³/s at filament speed 1.61 mm/s.
Volumetrisch flow rate is maximized when printing Infill with a volumetric rate of 16.28 mm³/s at filament speed 6.77 mm/s.
Überbrückungsvolumen flow rate is maximized when printing Außenkonturen with a volumetric rate of 7.16 mm³/s at filament speed 2.98 mm/s.

Temp Tower + Retract

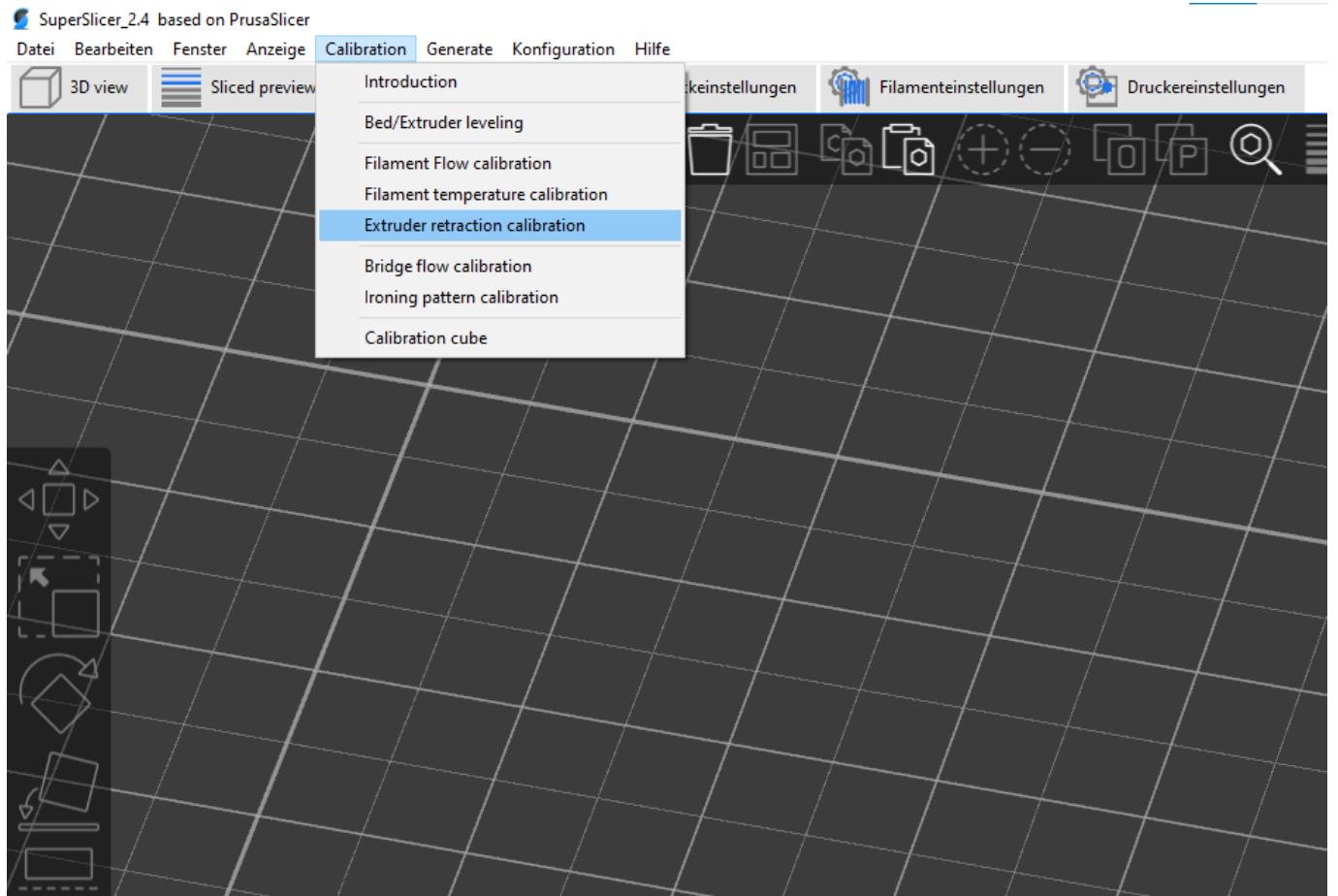
Ungefähr Temperaturen PLA 200 Grad / PETG 230 Grad / ASA 240 Grad

Falls Tower nicht auf der Base halten ⇒ unter Druckeinstellungen ⇒ Raftsichten: 1 einstragen

Last
update:
2023/04/04 playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
16:32



Super Slicer ⇒ Calibration ⇒ Extruder retraction calibration



für PLA folgende Einstellung:

- * Step: 0,1
- * Höhe: 15

* Start: Temp 205

* Temp decr 5x5

auf Generate drucken

SuperSlicer - Retraction calibration
and each other ones with 10C less temperature.

Remove filament slowdown

This button will change your settings in filament/cooling to disable all features that trigger when a layer is too small to be able to cool down in time. With these algorithms disabled, your print will be more challenging in terms of retraction, so it's a good stress test. To re-enable them, remove all modifications from the filament tab (the little orange "back arrow").

Results

When the test pieces are printed, you can count the millimetre with the ridges on the sides of the print towers. I count them with my nail. When you're at the height where there are no more strings, you can write down the millimetre number. Multiply it by your step parameter (0.1, 0.2, 0.5 or 1) and you have your retraction length number. You can add 20% more length to have a little margin.

If you have multiple prints with different temperatures, you need to choose the best print, the one with the least amount of stringing, unless the decrease in stringing isn't big enough to warrant the decrease in temperature.

Example

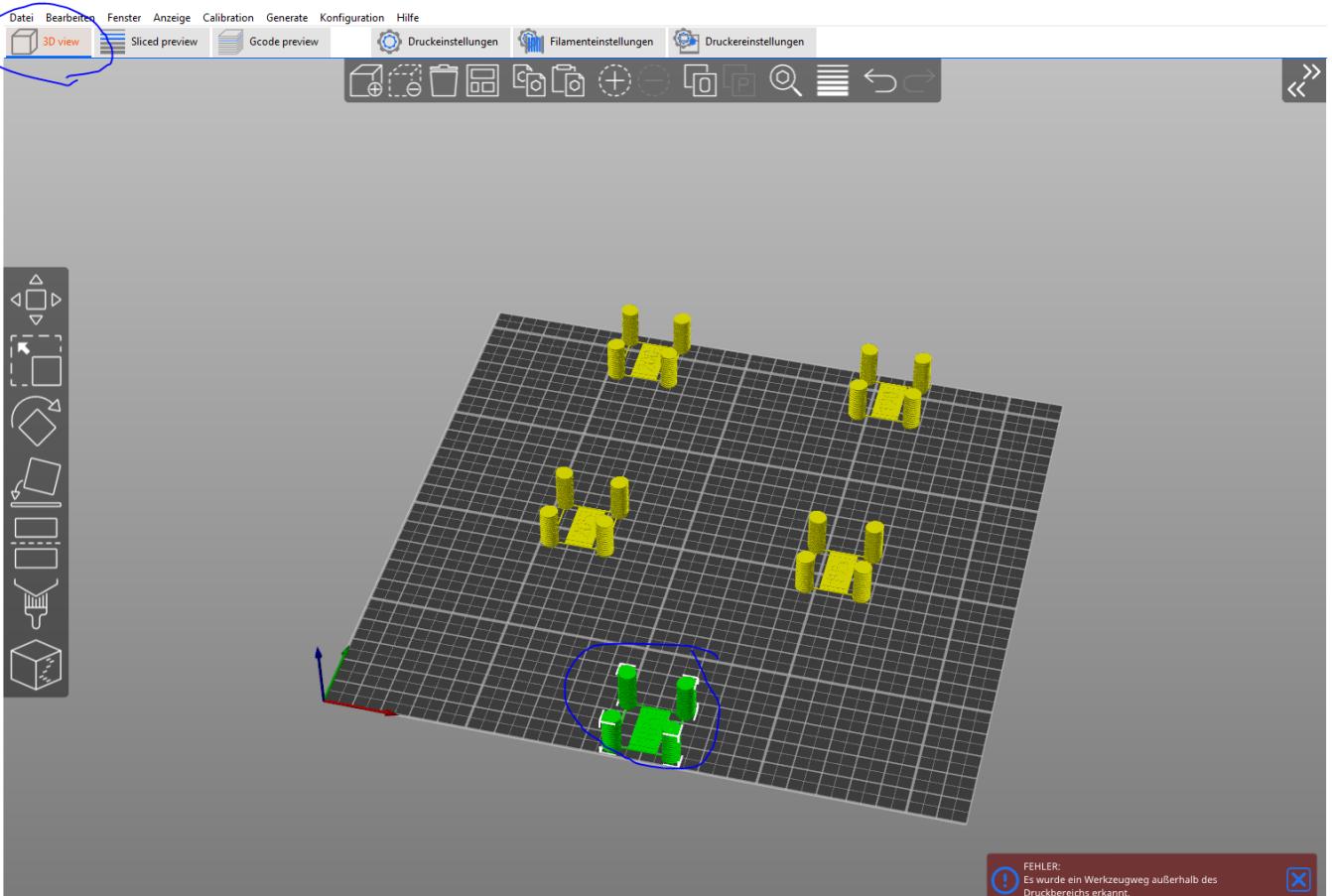
In this print, the last little string happens at the height of ~10. As I've used a 0.5 step, it means that I need at least 5mm of retraction, but I'll set it to 6 to be sure to remove almost all stringing.

The retraction speed should be set to the maximum value your extruder/drivers/firmware can reliably support, with a safety margin. 50mm/s for retraction and 20mm/s for unretraction is a good start for PLA.

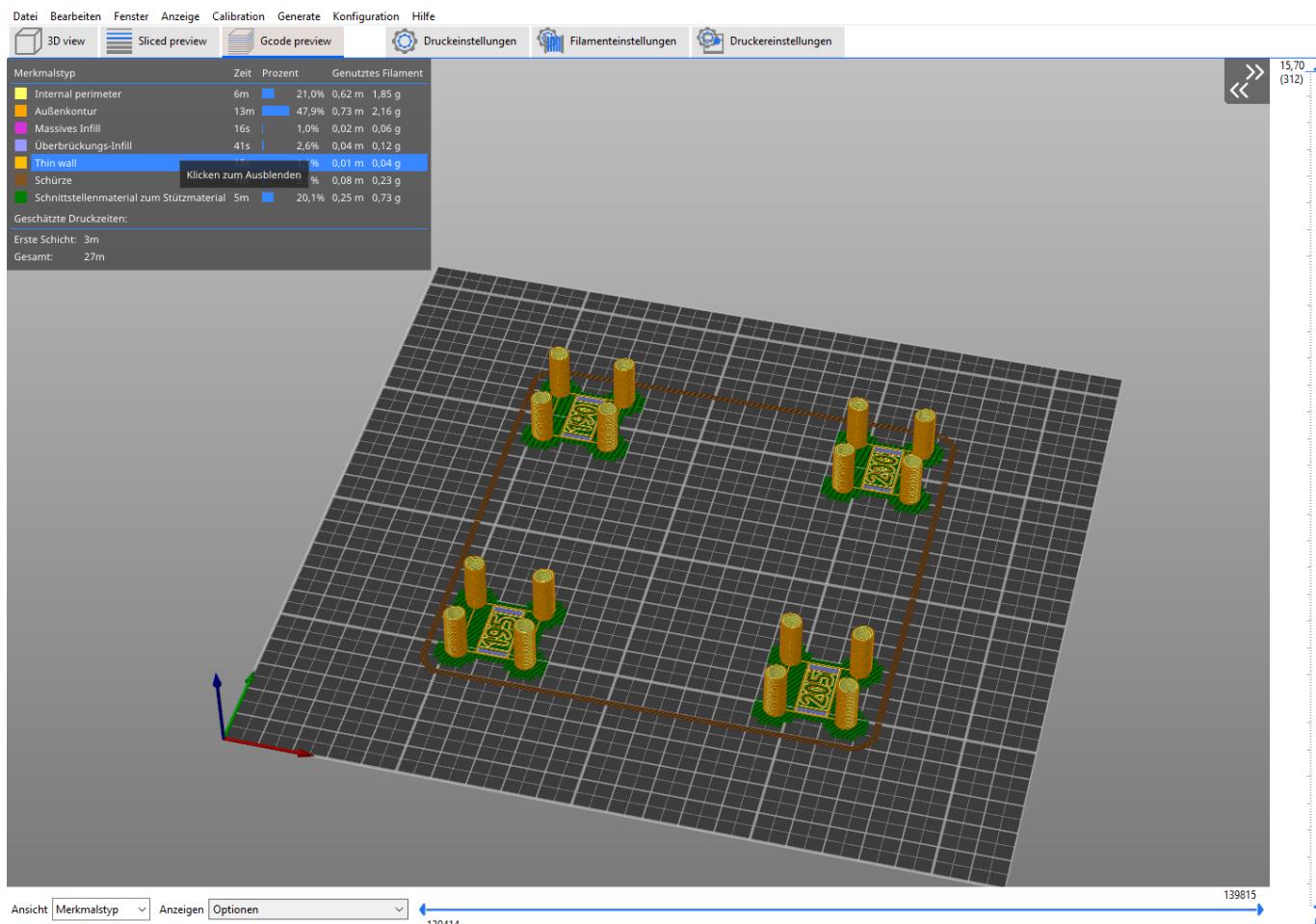
Step: 0.1 Höh: 15 Start temp: 205 Temp decr: 5x5 Remove fil. slowdown Generate Schließen

auf 3D View gehen und Test 185 entfernen und anschliessend „a“ für neu Anordnen drücken

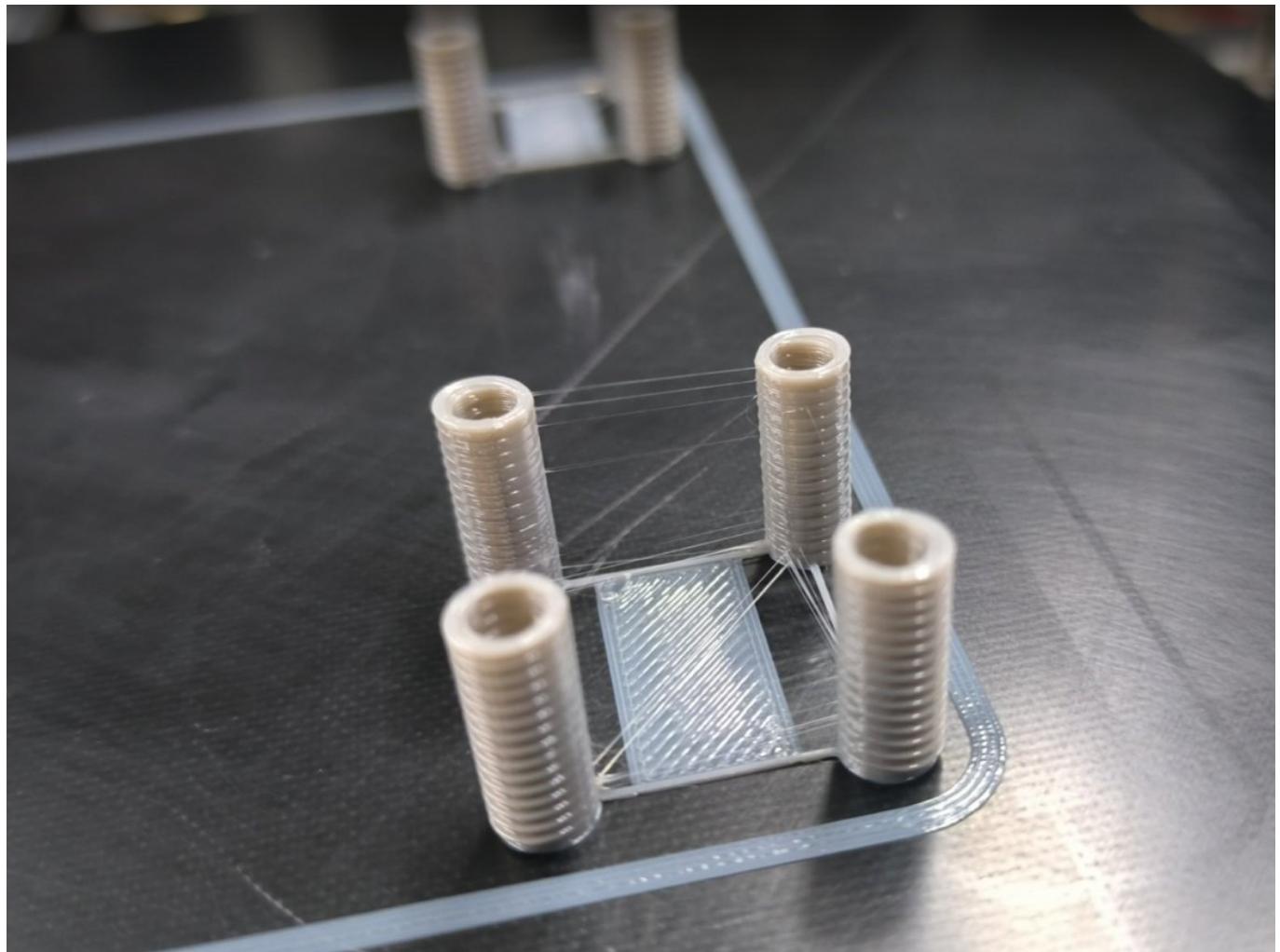
Last update: playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
2023/04/04 16:32



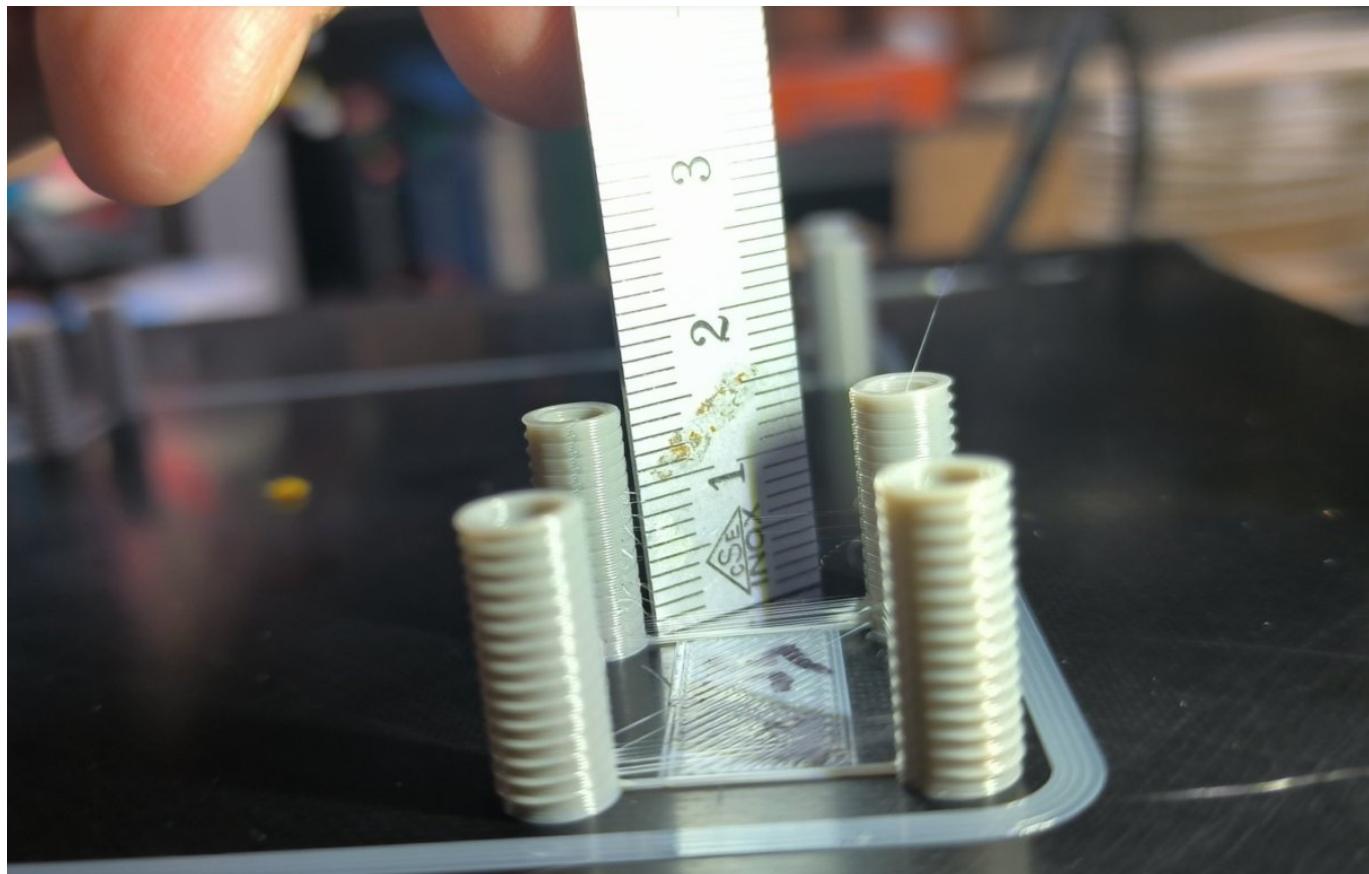
Sclichen und Drucken



Temp Tower mit den geringsten Stringing wählen ⇒ dieser Temptower ist schlecht!



Dieser Temptower ist ab 1,1 mm Stringing frei $\Rightarrow 0.1 * 11 \text{ mm} \Rightarrow$ Retract ist 1,1mm



Einzug unter Druckereinstellungen ⇒ Einzug ⇒ Länge eingeben und abspeicher

Screenshot of the Super Slicer software interface, specifically the 'Druckereinstellungen' (Printer Settings) tab.

Name and Size

- Tool name: []
- Düsendurchmesser: 0,4 mm

Schichthöhen Grenzen

- Min: 5% mm oder %
- Max: 0,36 mm oder %

Offsets (for multi-extruder printers)

- Extruder Offset: x: 0 mm, y: 0 mm
- Extruder temp offset: 0 °C
- Extruder fan offset: 0 %

Einzug

- Länge: 1,1 mm (Null zum Deaktivieren)
- Z Hebung: 0,2 mm
- Nur Z anheben
- Lift z enforcement
- Einzugs geschwindigkeit
- Extra Länge bei Neustart: 0 mm
- Minimalbewegung nach Einziehen: 1,5 mm
- Bei Schichtwechsel einziehen: checked

Retraction wipe

- Während Einzug reinigen: checked
- Wipe speed: 0 mm/s
- Einzugs länge vor einer Reinigung: 60 %
- Wipe only when crossing perimeters: checked

General wipe

- Wipe inside: At start: checked, At end: unchecked
- Extra Wipe for external perimeters: 0 mm
- Seam gap: 15% oder %

Ermittelte Temperatur unter Filamenteinstellungen ⇒ Temperatur einstragen (Erste schicht ist immer 5-10 höher)

Last update: playground:you_tube:video_14_klipper_kalibrierung http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung
2023/04/04 16:32

*Retraction calibration - SuperSlicer_2.4 based on PrusaSlicer

Datei Bearbeiten Fenster Anzeige Calibration Generate Konfiguration Hilfe

3D view Sliced preview Gcode preview Druckeinstellungen Filamenteinstellungen Druckereinstellungen

I3 Mega Klipper PLA TEST

Filament

- Farbe:
- Durchmesser: 1,75 mm
- Extrusionsfaktor: 0,96
- Dichte: 1,24 g/cm³
- Kosten: 25,4 Kosten/kg
- Gewicht der Spule: 1000 g

Temperatur °C

- Extruder: Erste Schicht: 205 °C, Andere Schichten: 200 °C
- Druckbett: Erste Schicht: 65 °C, Andere Schichten: 55 °C
- Chamber: 0 °C

Filament Eigenschaften

- Filament Typ: PLA
- Lösliches Material:
- Shrinkage: 100 %
- Max line overlap: 100 %

Korrektur der Druckgeschwindigkeit

- Max speed: 0 mm/s
- Maximale Volumengeschwindigkeit: 0 mm³/s

Volumenparameter der ersten Schicht flow rate is maximized when printing Infill with a volumetric rate of 3.87 mm³/s at filament speed 1.61 mm/s.
Volumetrisch flow rate is maximized when printing Infill with a volumetric rate of 16.28 mm³/s at filament speed 6.77 mm/s.
Überbrückungsvolumen flow rate is maximized when printing Außenkonturen with a volumetric rate of 7.16 mm³/s at filament speed 2.98 mm/s.

From:

<http://192.168.178.50/dokuwiki/> - Jan

Permanent link:

http://192.168.178.50/dokuwiki/doku.php?id=playground:you_tube:video_14_klipper_kalibrierung

Last update: 2023/04/04 16:32

