

# Labbook bioprinter

---

**Project:** iGEM 2022

**Author:** Max Denter

**Entry Created On:** 25 May 2022 12:23:04 UTC

**Entry Last Modified:** 09 Oct 2022 21:23:51 UTC

**Export Generated On:** 10 Oct 2022 00:42:26 UTC

WEDNESDAY, 25/5/2022

---

Members: Yasemin

Advisor: Carroll

Task: building the Bioprinter

## How to Build the Anet 8 3D-Printer

Before you can start with the construction of the printer you have to check if all parts as described in the instructions are also there

We were missing 2 small parts that we could easily replace. We where missing two small screws and a small part which should support the belt.

Once the list has been checked, you can start removing the protective film of the individual frame parts.

The structure of the 3D printer is divided into 27 steps.

Table7		
	A	B
1	Material	Steps
2	Bottom support plate 1xTop support plate 1xSide support plate 2xM3 18 Screw 12xM3 Nut 12x	1. & 2. Construction of the framework
3	Back plate 1xY axis Motor 1xY axis motor support 1x Y axis motor fixed plate 1x Y axis Limit switch fixed plate 1xY axis Limit switch C 70CM 1xM3 12 Screw 3xM2 12 screw 2xM3 18 Screw 4xM3 Nut 4x	3.the first motor for the Y-axis is installed.
4	Step 2 1xStep 3 1xM3 18 screw 4xM3 Nut 4x	4. steps 2 and 3 are installed together.
5	Y axis belt bearing support 1xFront plate 1xM3 18 screw 2xM3 Nut	5. the beltbearingsupport for the y-axis is placed in the lower area
6	Step 4 1xStep 5 1xThreaded rod 400mm 2xM8 Nut 12xM8 Spacer 12x	6. steps 4 and 5 are connected by a threaded rod.
7	Step 6 1xY axis Guide rod 2xGuide rod back up plate 4xLinear bearing 4xM3 18 screw 4xM3 Nut 4x	7. Installation of the Guide rod
8	Hot bed fixed aluminum Plate 1xY axis belt fixation clamp 4xM4 14 screw	8.assembling of the belt fixation clamp on the hot bed aluminium plate
9	Step 7 1xStep 8 1xM4 8 Screw	9.Assambel the hot bed on to the guide rod
10	Belt 1x	10.belt for the Y axis transmitting, attaching the belt on to the hot bed aluminium plate(The belt is for the X and Y axis transmitting !! Cut the length you need )
11	Step 9 1xHot bed 1xM3 30 Screw 4xSpring 4xM3 wing nut 4x	11.fixation of the hot bed on to the hot bed aluminium plate
12	Step 10 1xZ axis Motor 2xZ axis motor fixed plate 2xZ axis motor support plate 4xZ axis limit switch fixed plate 2xZ axis Limit switch A 20 CM 1x M3 18 screw 8xM3 Nut 10xM3 12 Screw 8M2 12 screw 2xM3 30 screw 2x	12. Motor fixation for the Z axis and the guide rod positioning
13	Step 12 1xX Endstopper 1xRight Z axis nut support 1xGuide rod back up plate 2xZ axis Guide rod 380 mm 2xM3 18 Screw 2xM3 Nut 2xM2 12 screw	13. Z axis assembling
14	Step 13 1xT type lead screw 345 mm 2x	14. Lead screw assembling
15	Step 14 1xX axis Guide rod 2xLinear bearing 3x	15. X axis assembly After installation of the guide rod, you have to tighten the threaded pins

16	Extruder 1x40* 10 Fan 1x40*11 Cooling fin 1xFan Cover 1xM3 45 Screw 2xM3 Spacer 6- 8x	16. extruder preparing First step is loose M4 6 screws to separate the extruder from the L black aluminum parts and keep the screws Second step Put the cooling fin on the top of the extruder and the fan over it, cover the fan with the fan cover and use M3 45 screws instead of M3 20 screws to put all together
17	Step 15 1xL Black Aluminum part 1xM4 8 Screw	17. extruder bracket montation on the x axis guided rod
18	Z axis motor 1xLeft Z axis nut support 1xM3 20 inbuss bolts	18. Z axis motor assembling
19	Belt 1x M3 18 screw 2xM3 Nut 4x	19. X axis Belt ( the rest from the Y axis Belt) Two screws have to be attached on the L Black aluminum part the other way around these screws are attached with two nuts each one at the out looking end and the other in front of the plate between screw is left enough space to attach the belt to the screw.

 Anet A8 3D Printer.docx

---

TUESDAY, 23/8/2022

Member: Yasemin  
Advisor: Carroll

First Try to Print with comercial Alginate and cellulose

flow 999  
babystep -0,500  
1ml syringes

---

TUESDAY, 27/9/2022

Preparations for working with the printer  
Member: Yasemin Timo

Größe Schrauben

Table1

	A	B	C
1		Größen in [cm]	Notizen [cm]
2	little screws M310 12x		1 Gewinde + Kopf
3	mid screws M318/M316	1,9	1,5 Gewinde
4	big screws	2,8	
5	nut screw		
6	metal rods		20
7	threaded moud	2,4	
8	threaded rod		20
9	Stepper motor		
10	Gentry CosMic		
11	Train + nut screw		
12	Syringe holder small 2x (big screws needed)		
13	Syringe holder large 2x		
14	Printer adapter 1x		
15	Liner actuator		
16	Syringe tightener + round thing		

1. Put spring on to stepper motor
2. Put threaded rod on spring and stepper motor (Adapter)
3. Line Actuator on stepper motor
4. Screw Syringe Holder on train (mid screws)
5. Screw metal rods on side of line actuator (small screws, fixed!)
6. Put Train and stepper motor together, Motor threaded rod needs to be turned for screwing the nut screw on the train, until all rods stick out of the holes until train is in the middle of the threaded rod. Take care that it is the right way around!
7. Screw Gentry CosMic on 3D-Printer up to the upper outer screws
8. Screw printer adapter on Gentry CosMic with two mid screws and nut screw to outer positions
9. Attach Stepper motor etc. to Printer Adapter (turn threaded rod)
10. Push rods until stop and fix with mid screws
11. Attach Belt to Gentry
12. Last step: Attach Syringe Adapter, Can be screwed (big screws) doesn't have to be.

TUESDAY, 4/10/2022

Members: Yasemin

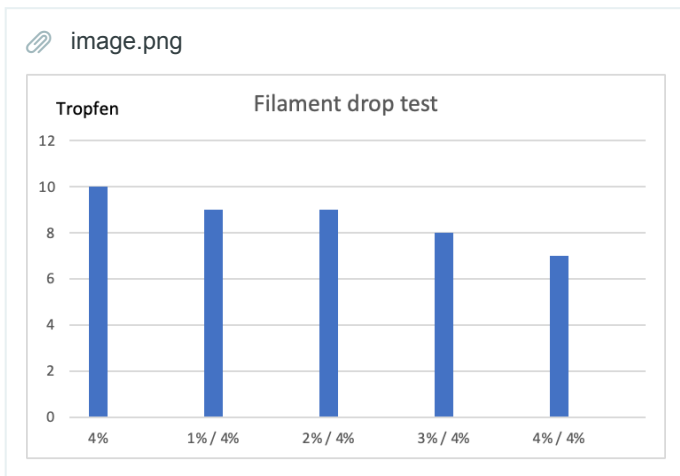
Filament messurment

diffrent Filament concentrations:

	A	B	C	D	E
1	Alginat	Alginat - Cellulose	Alginat - Cellulose	Alginat - Cellulose	Alginat - Cellulose
2					
3	4%	4%- 1%	4% -2%	4% - 3%	4%- 4%
4	0,4g alginat	0,4g alginat	0,4g alginat	0,4g alginat	0,4g alginat
5	9,6g H20	9,5g H21	9,4g H22	9,3g H23	9,2g H24
6		0,1g Cellulose	0,2g Cellulose	0,3g Cellulose	0,4g Cellulose

Consistency and dryness checked from all 5 Concentrations every 10 min in one hour

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	dry test															
2		4%		4% 1%		4% 2%		4% 3%				4% 4%				
3		clear, runs when hold at angle		whitish, turbid, runs		white, clear edges, bumpy, runs a bit		white, clear edges, smooth surface, sticks, doesn't run				white, clear edges, smooth surface, sticks, doesn't run				
4	10min	clear, runs when hold at angle		whitish, turbid, runs		white, clear edges, bumpy, runs a bit		white, clear edges, smooth surface, sticks, doesn't run				white, clear edges, smooth surface, sticks, doesn't run				
5	20min	gets turbid and runs		whitish, turbid, runs		white, clear edges, bumpy, doesn't run						white, clear edges, smooth surface, sticks, doesn't run				
6	30min	gets turbid and runs		whitish, turbid, doesn't run		white, clear edges, bumpy, doesn't run						white, clear edges, smooth surface, sticks, doesn't run				
7	40min	doesn't run		whitish, turbid, doesn't run		white, clear edges, bumpy, doesn't run						white, clear edges, smooth surface, sticks, doesn't run				
8	50min	doesn't run		whitish, turbid, doesn't run		white, clear edges, bumpy, doesn't run						white, clear edges, smooth surface, sticks, doesn't run				
9	60min	doesn't run		whitish, turbid, doesn't run		white, clear edges, bumpy, doesn't run						white, clear edges, smooth surface, sticks, doesn't run				
10	turn around	sticks		sticks		sticks		sticks				sticks				
11	consistency	wet/fluid		wet/fluid		wet/fluid		wet/gel				wet/gel				
12																
13																
14	drop test	10		9		9		8				7				1 Round
15	3ml cannula															
16	same file, always															
17	distance to PD 8cm															
18	Flow 100															
19	Speed 100															



Next step:

is to do more rounds of the drop test to see which concentration is the firmest.  
Also the Filament fusion test and the filament Collapstest

How to use the Printer:

1. Plug into the socket
2. push the button in the middel
3. go to movement
4. go to home (setup)
5. go to movement
6. go to axis
7. go to extruder
8. put in the sryings
9. go to print
10. go to bio 6 file
11. let it print

THURSDAY, 6/10/2022

Member: Vallery, Yasemin

Filament fusion Drop test  
Messurements for all concentrations

	A	B	C	D	E	F	G	H	I	J
1	Runden	4%		1% / 4%		2% / 4%		3% / 4%		4% / 4%
2	1	10		9		9		8		7
3	2	10		10		7		9		7
4	3	10		10		5		8		7
5	4	9		10		7		8		8
6	5	10		10		7		10		8
7	6	9		9		8		9		8
8	7	9		10		7		9		8
9	8	10		10		7		9		6
10	9	8		10		7		8		7
11	10	9		10		7		7		6
12	MW	9,4		9,8		7,1		8,5		7,2

Filament Collapstest  
Messurements for all concentraitions

	A	B	C	D	E
1	MW				
2	c	0,5 cm	1 cm	2 cm	3 cm
3	4%	0,125	0	0	0
4	4% / 1%	0,5	0,375	0	0
5	4% / 2%	1,75	0,75	0	0
6	4% / 3%	1,75	1	0,25	0
7	4% / 4%	2	2	1	0,25

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	c	0,5 cm	1 cm	2 cm	3 cm		c	0,5	1	2	3						
2	4%	1	0	0	0		4% / 1%	1	1	0	0						
3		0	0	0	0			1	1	0	0						
4		0	0	0	0			1	1	0	0						
5		0	0	0	0			1	0	0	0						
6		0	0	0	0			0	0	0	0						
7		0	0	0	0			0	0	0	0						
8		0	0	0	0			0	0	0	0						
9		0	0	0	0			0	0	0	0						
10	MW	0,125	0	0	0			0,5	0,375	0	0						
11																	
12																	
13																	
14																	
15																	
16																	
17	c	0,5	1	2	3		c	0,5	1	2	3		c	0,5	1	2	3
18	4% / 2%	0	1	0	0		4% / 3%	2	1	1	0		4% / 4%	2	2	1	0
19		2	1	0	0			2	1	1	0			2	2	1	0
20		2	1	0	0			2	1	0	0			2	2	1	0
21		2	1	0	0			2	1	0	0			2	2	1	0
22		2	1	0	0			2	1	0	0			2	2	1	0
23		2	1	0	0			2	1	0	0			2	2	1	0
24		2	0	0	0			1	1	0	0			2	2	1	1
25		2	0	0	0			1	1	0	0			2	2	1	1
26	MW	1,75	0,75	0	0			1,75	1	0,25	0			2	2	1	0,25

Printing:

4% concentration injected into a petri dish overhead and store overhead until Monday and allow to dry to check stability and adhesion.

Multi-layer examples injected and stored for drying until Monday.