

Tarmo4 RC Project

By Engineering Nonsense

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Tarmo5 is out: <https://www.reddit.com/r/EngineeringNS/comments/zvellk/tarmo5/>

This document provides general direction for those attempting to build Tarmo4. To achieve the results seen in the youtube video, follow the instructions carefully and use the parts that are recommended. **If the instructions are not followed, and recommended parts are not used, results may vary.**

IF YOU NOTICE AN ISSUE, PLEASE GO TO THE UPDATE LOG (REDDIT) AND POST A COMMENT TO LET ME KNOW. Thank you :)

- Links -

Main Links:

Main Youtube Video	https://youtu.be/MKqQPTEXJpI
Build Guide	https://www.reddit.com/r/EngineeringNS/comments/ic0wqk/build_process/
Update Log	https://www.reddit.com/ <- Update post
Thingiverse Part-1	Tarmo4 Chassis (1 of 3, MAIN) by KrisCubed - Thingiverse
Thingiverse Part-2	Tarmo4 Suspension (2 of 3) by KrisCubed - Thingiverse
Thingiverse Part-3	Tarmo4 Drivetrain (3 of 3) by KrisCubed - Thingiverse
Instructable	Coming Soon (Canceled. no time..)
Original CAD Files	https://www.reddit.com/r/EngineeringNS
BOM	https://docs.google.com
3D printed Parts list	https://docs.google.com

Other links:

The subreddit	https://www.reddit.com/r/EngineeringNS/
My Instagram	https://www.instagram.com/engineeringns/
My Twitter	https://twitter.com/engineering_ns
Youtube Channel	https://www.youtube.com/channel/UCZUCwwTp5aTO6YQk2NCMZew?

- Help & Support -

USE THE PTFE LUBE ON ALL PLASTIC-PLASTIC DRIVE COMPONENT MATING SURFACES.

If it is a drive component that moves, it should have lube all over it. Thanks.

If you run into problems and need help, *please take some time and post a question to the subreddit*, use the Tarmo4 flair so that others with the same issue can see your post. I will do my best to address each person's issues thoroughly. With Tarmo3 I helped people in my instagram DM's and over email, the issue with that is that there were just too many people to individually message. My hope is that if problems are posted to reddit, and they properly use a flair, others with what issue can just read the solution and never need to ask in the first place. I've helped many people with Tarmo3 who all had the same issues.

Of course, still feel free to message me via DM's if you require more support or if you would like to talk to me directly for any other reason.

- Printed Parts List -

Each part has a part number in it's file name. For example, the Center Chassis is named

*“Center Chassis - **02A.stl**”, it's part number is **02A**, in this document, it will be referred to by it's part number to reduce confusion.*

#	PART	QTY	Part Name	Detail	Notes
1	01A	2X	Chassis	End part	Both the front and rear use this same chassis
2	02A	1X	Center Chassis	Middle part	Gearbox mounts to this part
3	03A	2X	Diff Gearbox	Front and rear	Same part used for both front and rear gearbox
4	03B	2X	Diff Box Lid	Front & Rear	Covers secures diff into part 03A
5	04A	2X	Battery Bracket	Holder Holder	Secures battery holder above front drive shaft
6	04B	1X	Battery Box	Battery Holder	Needed to hold lipo above moving parts
7	04C	1X	Battery Box	Battery holder lid	Optional
8	05A	1X	Steering Bracket		Secures steering arms from top
9	07A	1X	Gearbox	Lid	Gearbox houses main drive gears
10	07B	1X	Gearbox	Base	Gearbox houses main drive gears
11	07C	1X	Servo Mount	Mounts servo	Fixes to gearbox and chassis
12	08A	1X	Motor Mount	Mounts Motor	
13	09A	1X	Output Gear	Double Helix	Goes in main gearbox
14	09B	1X	Input Gear	Double Helix	Mounts to motor adapter
15	10A	0	Drive Shaft (Solid)	Not Recommended	Does not flex, parts will break
16	10B	2X	Drive Shaft (Flex)	Is Torque Damper	Print with Ninjabflex Cheetah
17	11A	4X	Wheel Adaptor	For wheels	Adapts output axle to standard 12MM wheel
18	11B	--		Optional	For socket head bolts
19	11C	4X		Recommended	For hex head bolts
20	12A	4X	Dog Bone	Axle	Transfers torque to wheels
21	13A	1X	Locked Diff	Crown Gear	Recommended for rear gearbox
22	13B	2X	Locked Diff	Pinion Gear	For both open and locked diff
23	13C	2X	Bell Housing (Locked Diff)	For locked diff	Connects to dogbone

24	14A	1X	Open Diff	Pinion Gear lid	
25	14B	1X	Open Diff	Pinion Gear base	Recommended for front gearbox
26	14C	2X	Bell Housing (Open Diff)	output for open diff	Connects to dogbone
27	15A	1X	Lower Control Arm Mount (Rear)		Mounts lower control arms to chassis
28	15B	2X	Knuckle (Rear)	double bearing	
29	16A	1X	Shock Mount (Rear)	v2	
30	16B	2X	Upper Control Arm (Rear)	v2	
31	17A	4X	Lower Control Arm (Front & Rear)	Front and rear	Used for all 4 lower control arms
32	18A	1X	Lower Control Arm Mount (Front)		Mounts lower control arms at 15° angle
33	18B	2X	Steering Knuckle Mount		Mounts steering knuckle to control arms
34	18C	2X	Steering Knuckle		Steering knuckle allows front wheels to turn
35	19A	1X	Shock Mount (Front)		mounted at 15° angle
36	19B	2X	Upper Control Arm (Front)	v1	Part needs improvement
37	20A	1X	Steering Center link	connects steering	
38	20B	1X	Master Steering Arm	connects servo	
39	20C	1X	Slave Steering Arm	holds center link	
40	20D	1X	Front Steering Linkage	Left Side	Straight, easier to print
41	20E	1X	Front Steering Linkage	Right Side	Straight, easier to print

- Non Printed Parts (BOM) -

It is recommended to purchase the same parts that I did. Unless you know what you are doing, your results may vary if different parts are used. The parts can be sourced from any vendor.

Check various websites to find the best price.

Websites to check:

Ebay.com

Aliexpress.com

Banggood.com

Amazon.com

Hobbyking.com

Dfrobot.com

If you navigate to the BOM link on the second page of this document, you will see links to the exact sources I used--Though the prices have probably changed.

	QTY	PART	PART #	NOTES
1	1	Drive Motor	Turnigy D3542/4	1440KV or lower Search for a D3542 motor
2	1	20KG Servo	--	Any 20kg servo, Digital is (much!) better
3	1	3S LiPo Battery	--	2,500mAh or more, 3S
4	1	Brushless ESC	--	3S 80A+, Mine was expensive, there are cheaper
5	4	Shocks	--	80MM springs with integrated shocks
6	2 - 6	rod ends	3mm for M3 screws	only 2 needed if you use 3D printed control arms
7	3oz+	PTFE Lube		MUST HAVE
8	1 - 2	Differential Gear set Traxxas	5382X	For front diff
9	4	Wheels		Any 100mm OD MAX! wheels will work (w/ 12mm hex)

10	0.25kg +	Ninjatek Cheetah Filament		for flex shaft dampers (REQUIRED)
11	1	Metal servo horn		May come with servo
12	20	10x15x4mm Ball Bearings	10x15x4	for all axles aside from diffs
13	4	15x24x5mm Ball Bearings	15x24x5	for diffs
14	1 - 3	M3 threaded rod		for steering link to servo
15	2	200mm+ M4 threaded rods		between 200mm and 220mm
16	1	Main Drive Gear Adaptor	HSP 08065	Adapts motor 5mm shaft to main gear
17	25	M4 Nylon Nuts		for chassis rods as well as to hold wheels on
18	10	M4x35 hex head bolts		to go inside part 11c
19	10	M4x 35mm Screws		for lower control arm pins
20	50	M4x 10 screws		
21	30	M4 x20 screws		
22	50	M3 nylon locking Nuts		for dog bones and other things
23	30	M3x25 Screws		
24	50	M3x12 Screws		
25	50	M3 x 16 Screw		needed for many things
26	1	Gyro	Not required	But recommended (If you want to drive fast)

- Print Settings -

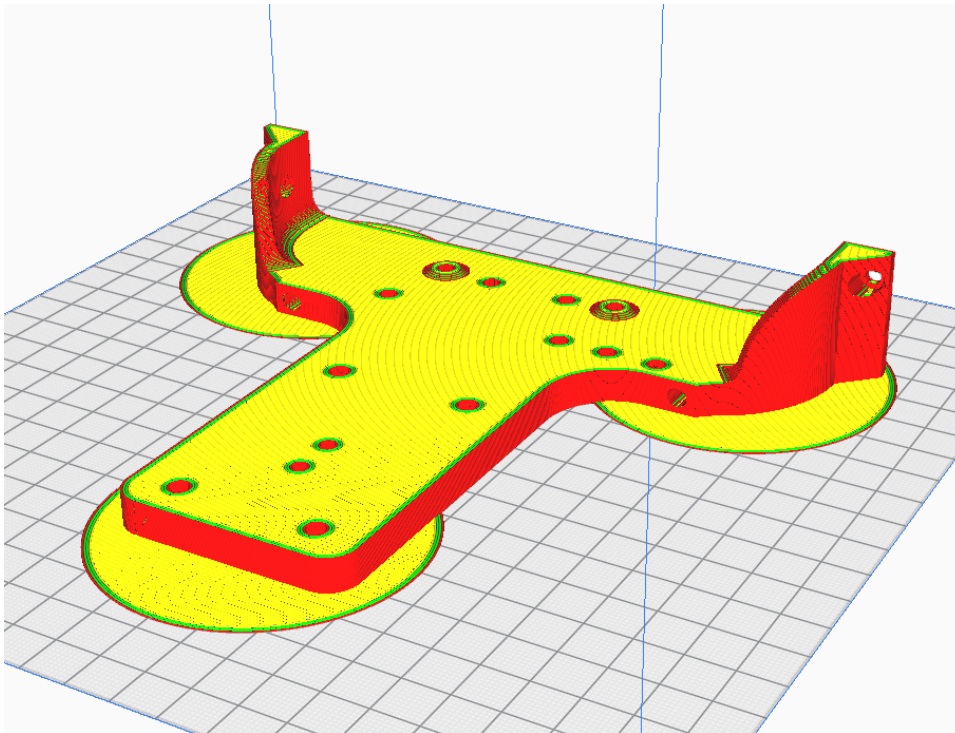
In order to ensure good durability for your Tarmo4, you *must* use the print settings detailed below--If you consider yourself a veteran at 3D printing, you may know better settings that work well for your machine, but for those who are unsure, it's safe to just follow the settings outlined below. **YOU MUST USE THE RECOMMENDED MATERIAL TO GET GOOD RESULTS. PLA is hard, so it will last longer on parts that experience friction. Do not use ABS for ANYTHING, and do not use PETg on drivetrain, though PETg may work fine on the chassis and suspension.**

PART	PART NAME	INFILL	PERIMETERS (# OF WALLS)	SUPPORT	RAFT	LAYER HEIGHT (mm)	Material
01A	Chassis	10%	4	NO	NO RAFT	0.2 - 0.5	PLA
02A	Center Chassis	10%	4	NO	NO RAFT	0.2 - 0.5	PLA
03A	Diff Gearbox	10%	4	YES	RAFT	0.2 - 0.6	PLA
03B	Diff Box Lid	10%	4	NO	RAFT	0.2 - 0.7	PLA
04A	Battery Bracket	10%	4	NO	RAFT	0.2 - 0.8	PLA
04B	Battery Box	10%	4	NO	RAFT	0.2 - 0.9	PLA
04C	Battery Box	10%	4	NO	RAFT	0.2 - 0.10	PLA
05A	Steering Bracket	10%	4	NO	RAFT	0.2 - 0.11	PLA
07A	Gearbox	10%	4	NO	RAFT	0.2 - 0.12	PLA
07B	Gearbox	10%	4	NO	RAFT	0.2 - 0.13	PLA
07C	Servo Mount	10%	4	NO	RAFT	0.2 - 0.14	PLA
08A	Motor Mount	10%	4	NO	RAFT	0.2 - 0.15	PLA
09A	Output Gear	10%	8	YES	RAFT	0.25	PLA
09B	Input Gear	10%	8	YES	RAFT	0.25	PLA
10A	Drive Shaft (Solid)	10%	12	NO	RAFT	0.25	PLA
10B	Drive Shaft (Flex)	10%	12	NO	RAFT	0.25	Cheetah
11A	Wheel Adaptor	10%	6	NO	RAFT	0.25	PLA
11B	Wheel Axle	10%	8	Optional	RAFT	0.25	PLA
11C	Wheel Axle	10%	8	Optional	RAFT	0.25	PLA
12A	Dog Bone	10%	8	YES	RAFT	0.25	PLA
13A	Locked Diff	10%	8	YES	RAFT	0.25	PLA

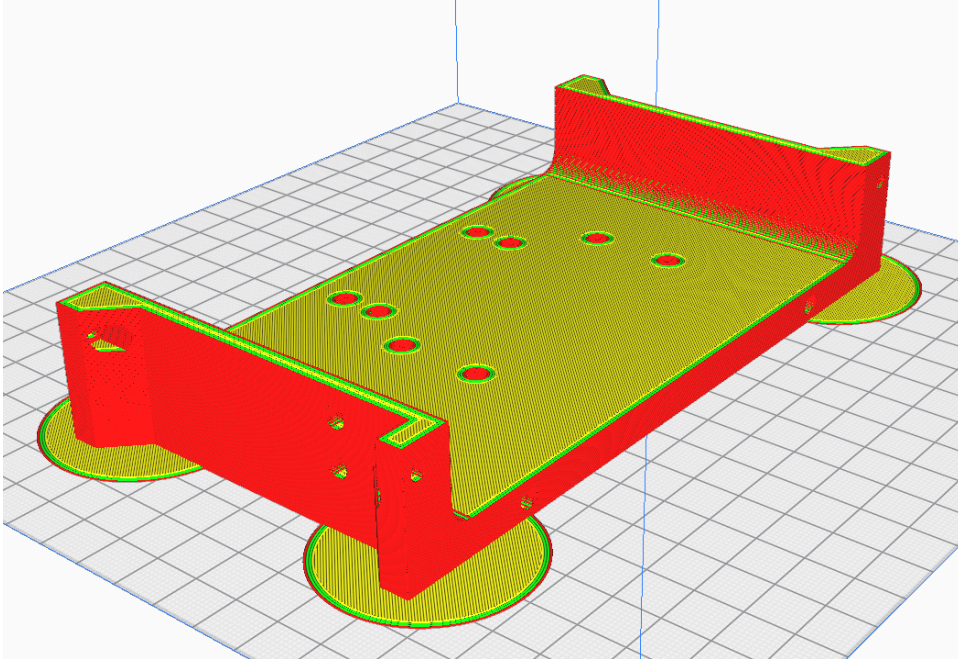
13B	Locked Diff	10%	8	YES	RAFT	0.25	PLA
13C	Bell Housing (Locked Diff)	10%	8	Optional	RAFT	0.25	PLA
14A	Open Diff	10%	8	NO	RAFT	0.25	PLA
14B	Open Diff	10%	8	YES	RAFT	0.25	PLA
14C	Bell Housing (Open Diff)	10%	8	NO	RAFT	0.25	PLA
15A	Lower Control Arm Mount (Rear)	10%	6	YES	RAFT	0.25	PLA
15B	Knuckle (Rear)	10%	6	YES	RAFT	0.25	PLA
16A	Shock Mount (Rear)	10%	6	NO	RAFT	0.25	PLA
16B	Upper Control Arm (Rear)	10%	6	NO	RAFT	0.25	PLA
17A	Lower Control Arm (Front & Rear)	10%	6	NO	RAFT	0.25	PLA
18A	Lower Control Arm Mount (Front)	10%	6	YES	RAFT	0.25	Cheetah
18B	Steering Knuckle Mount	10%	6	YES	RAFT	0.25	PLA
18C	Steering Knuckle	10%	6	YES	RAFT	0.25	PLA
19A	Shock Mount (Front)	10%	6	NO	RAFT	0.25	PLA
19B	Upper Control Arm (Front)	10%	6	NO	RAFT	0.25	PLA
20A	Steering Center link	10%	6	NO	RAFT	0.25	PLA
20B	Master Steering Arm	10%	6	YES	RAFT	0.25	PLA
20C	Slave Steering Arm	10%	6	YES	RAFT	0.25	PLA
20D	Front Steering Linkage	10%	6	YES	RAFT	0.25	PLA
20E	Front Steering Linkage	10%	6	YES	RAFT	0.25	PLA
20F	Front Steering Linkage	10%	6	YES	RAFT	0.25	PLA
20G	Front Steering Linkage	10%	6	YES	RAFT	0.25	PLA

- Printing Orientations -

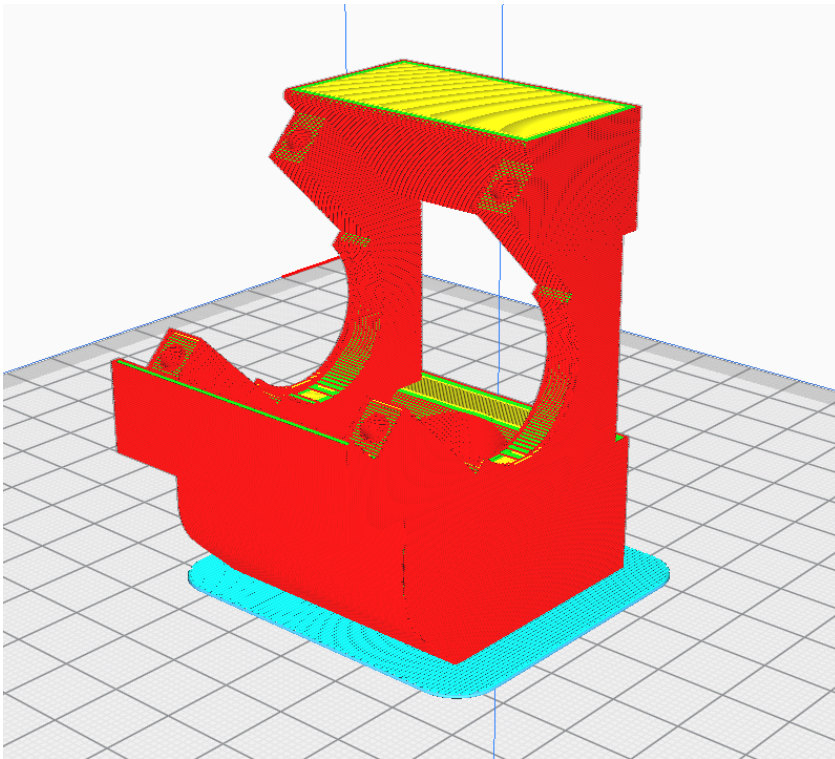
Every part of Tarmo4 is designed to be printed in a specific orientation to maximize material strength in the relevant dimensions for each parts specific loadings. It is recommended that each part is printed in the orientations shown below.



01A

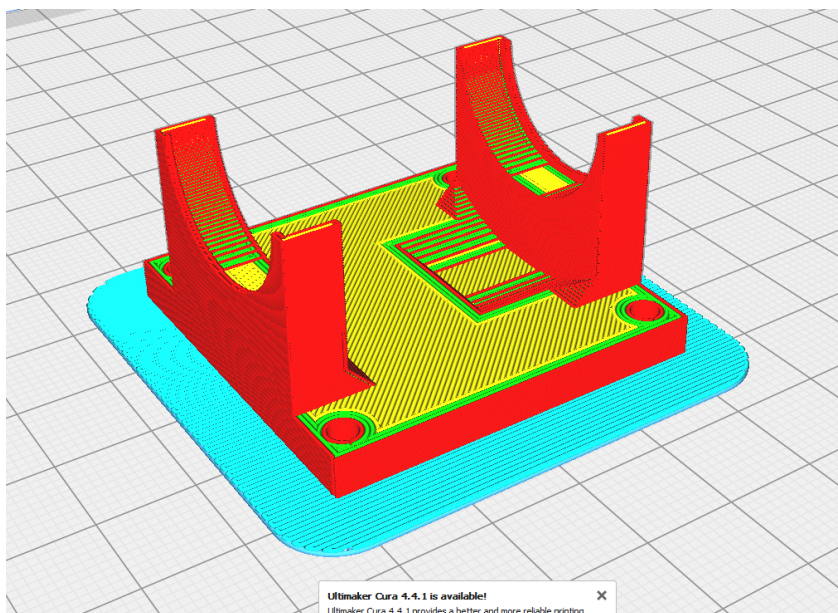


02A

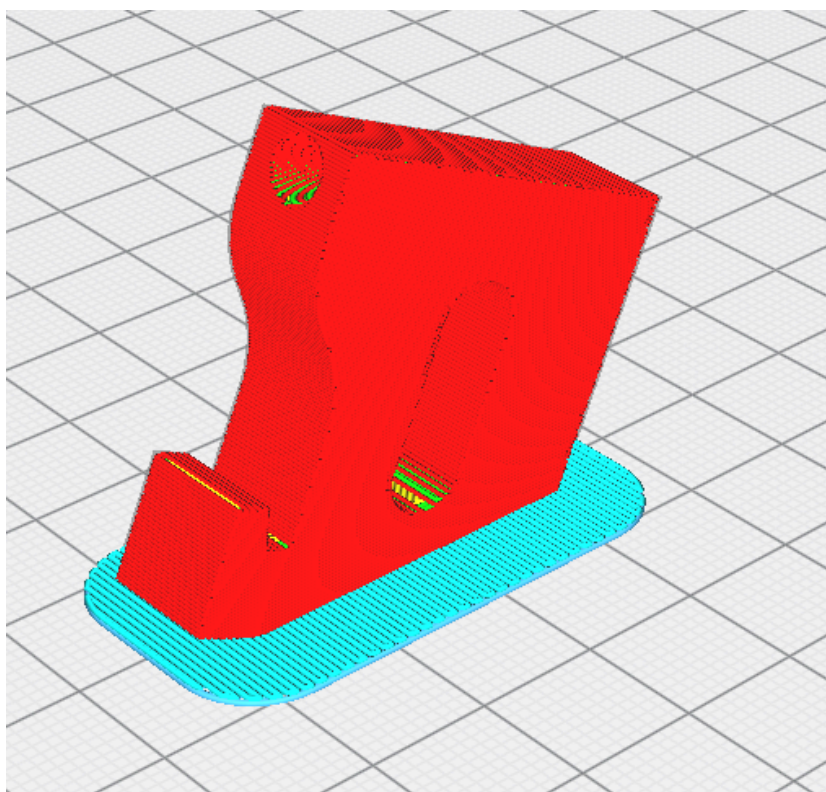


03A

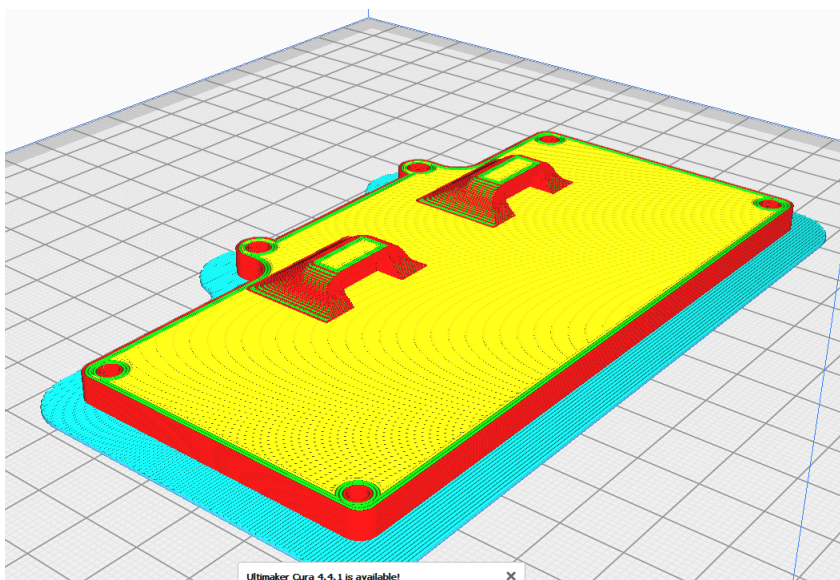
03B



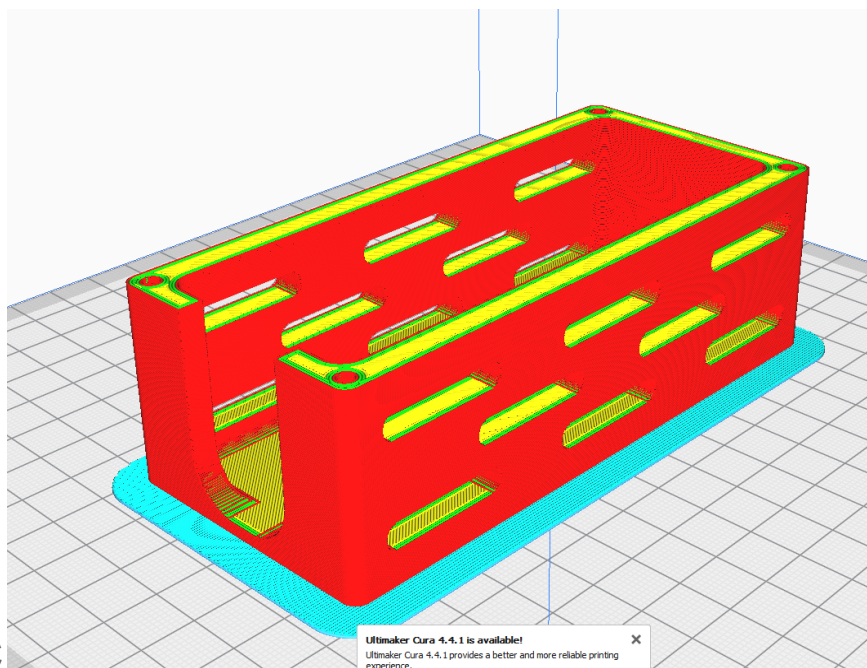
04A



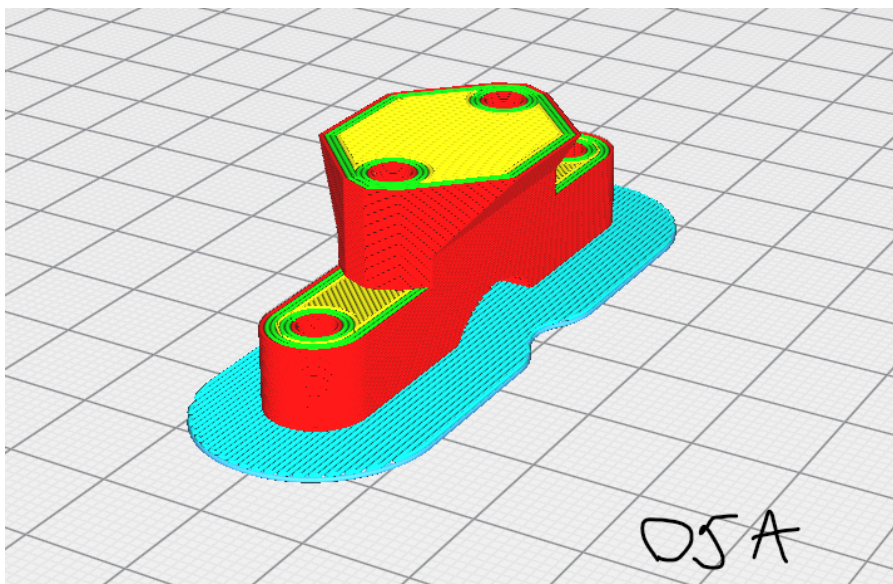
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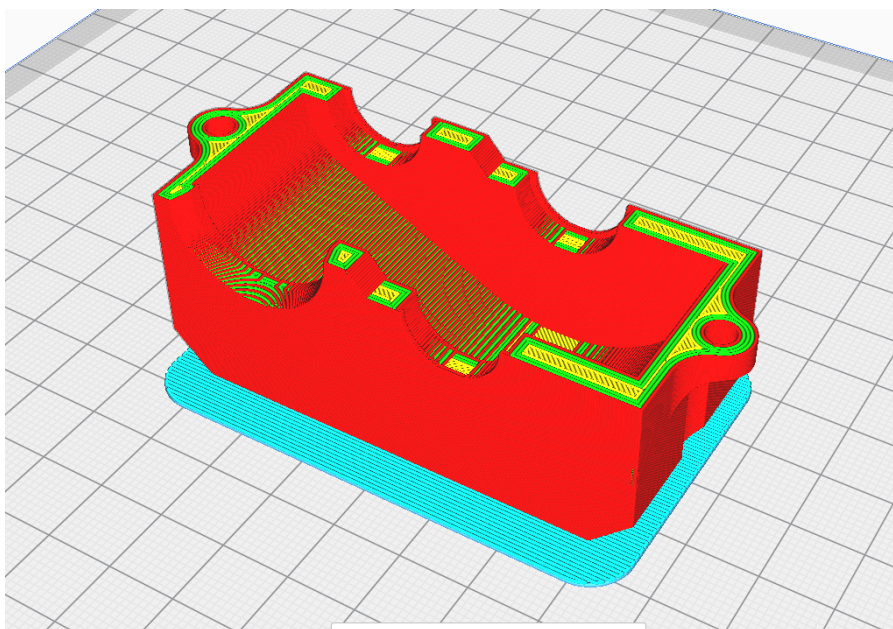
04C

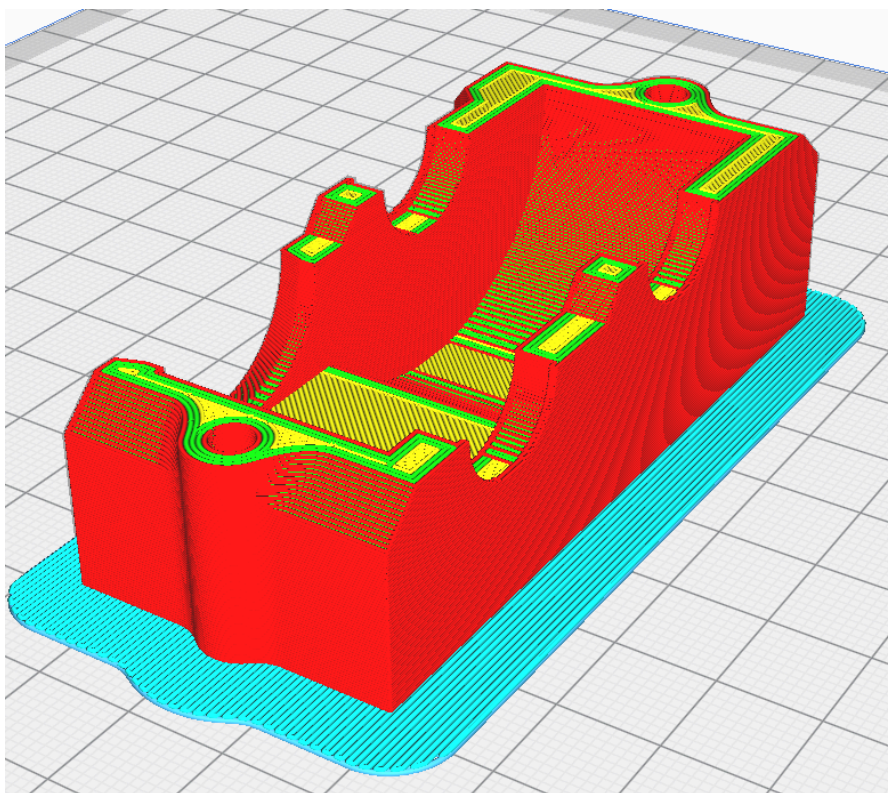


05A

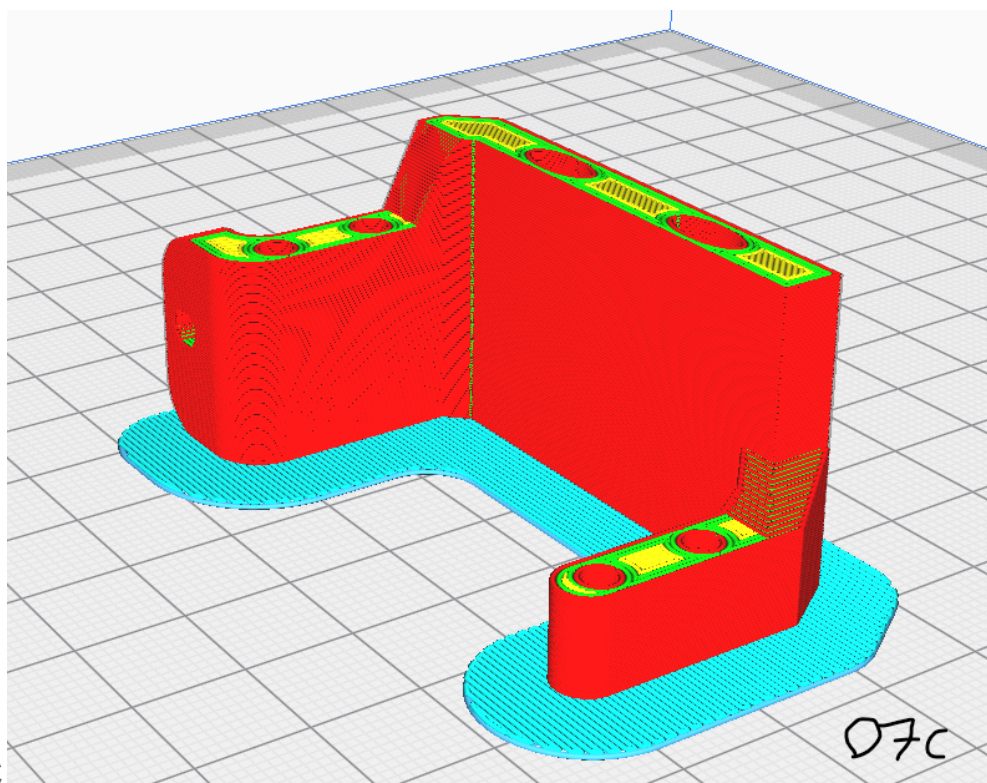


07A





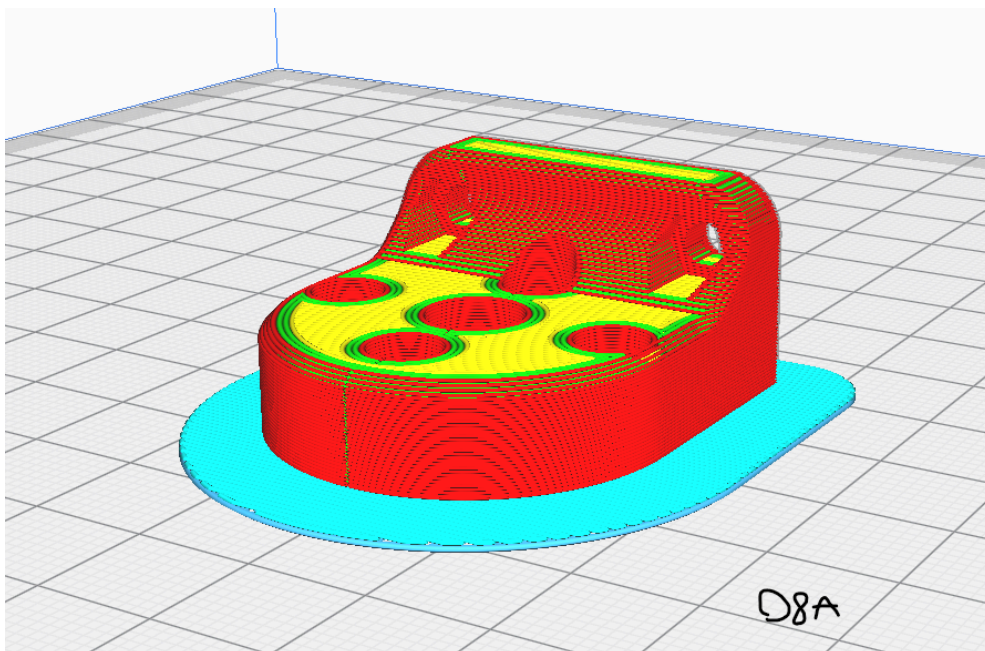
07B



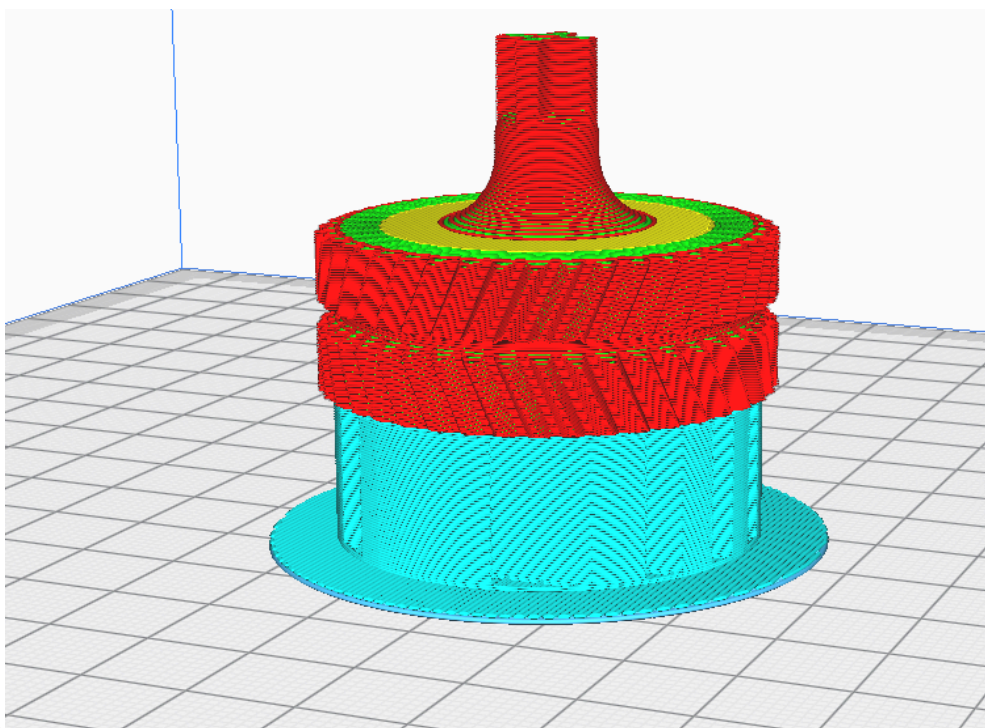
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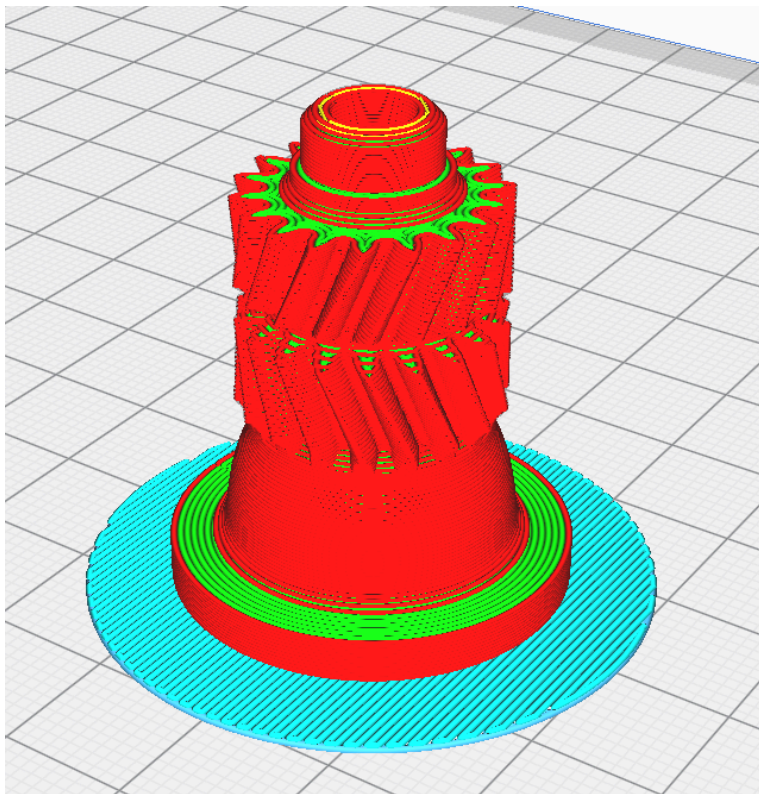
07c

08A

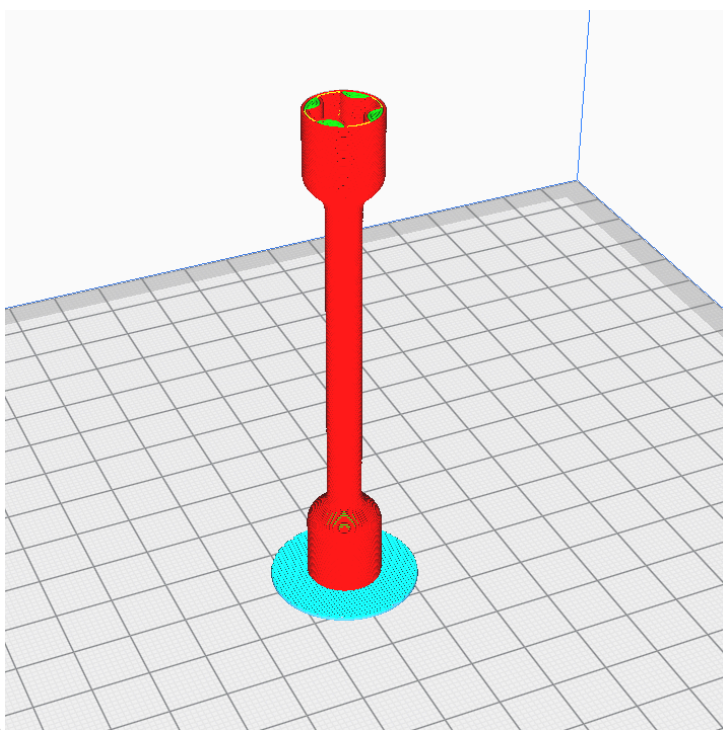


09A

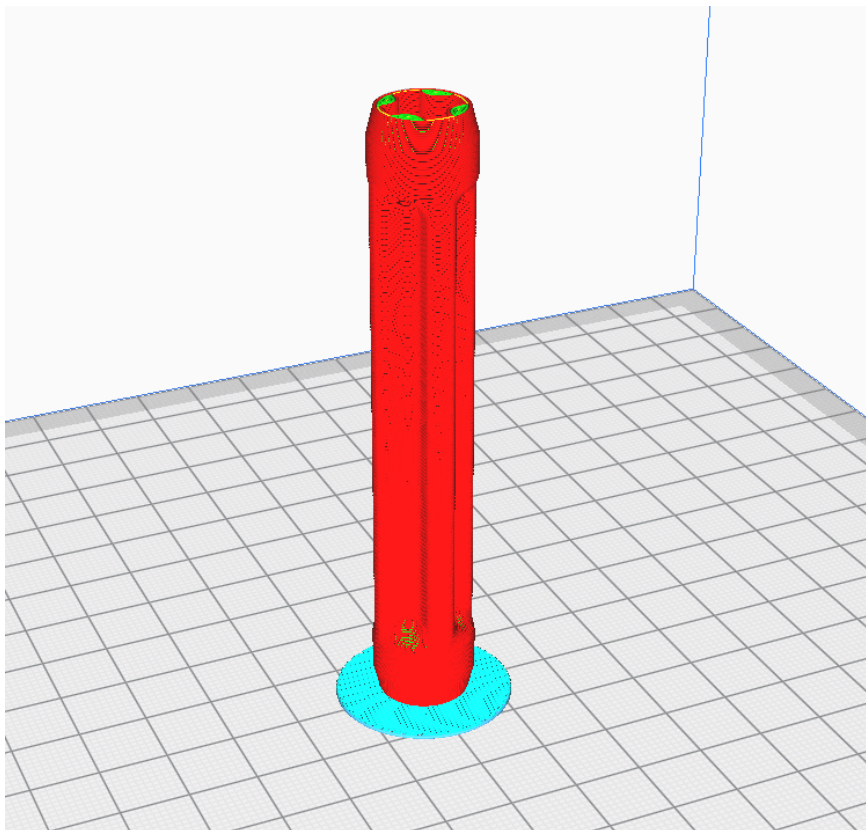




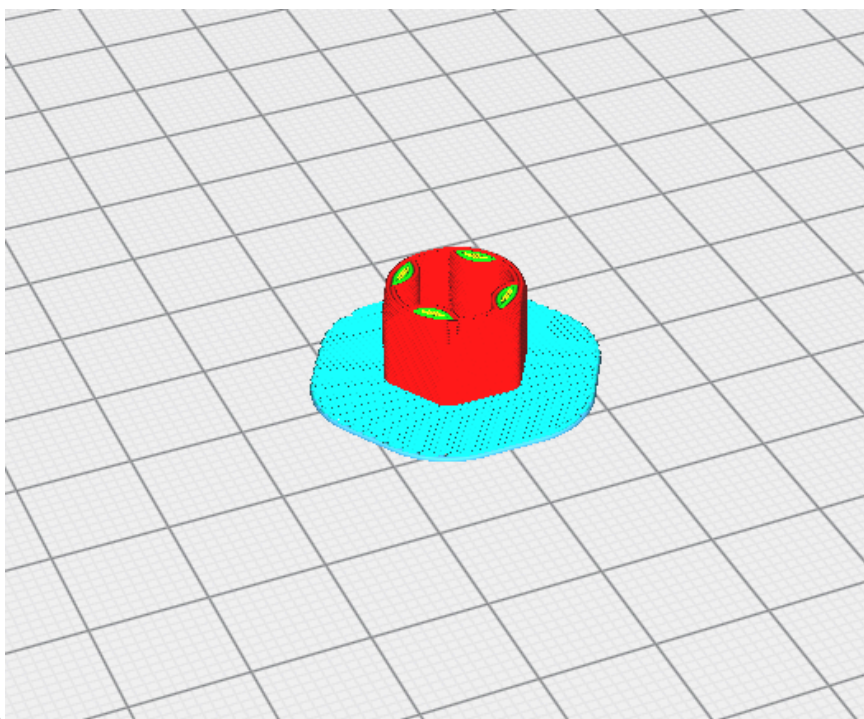
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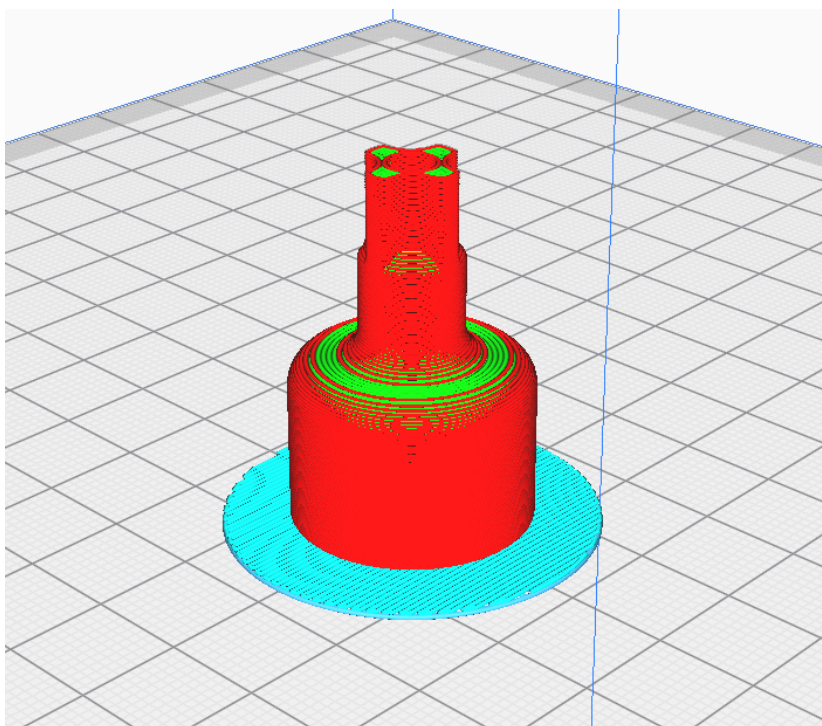
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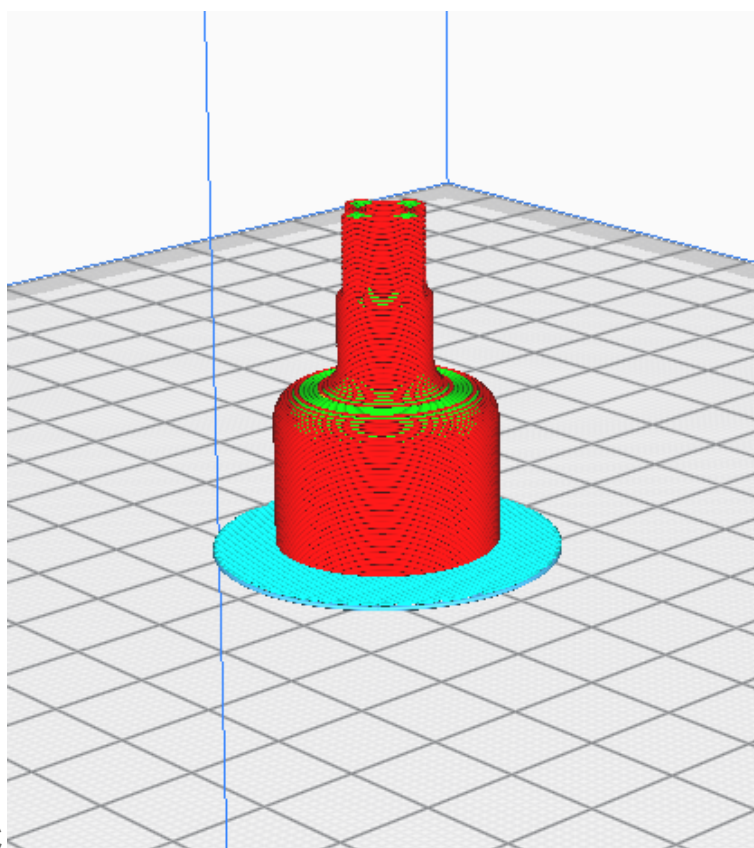
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11A

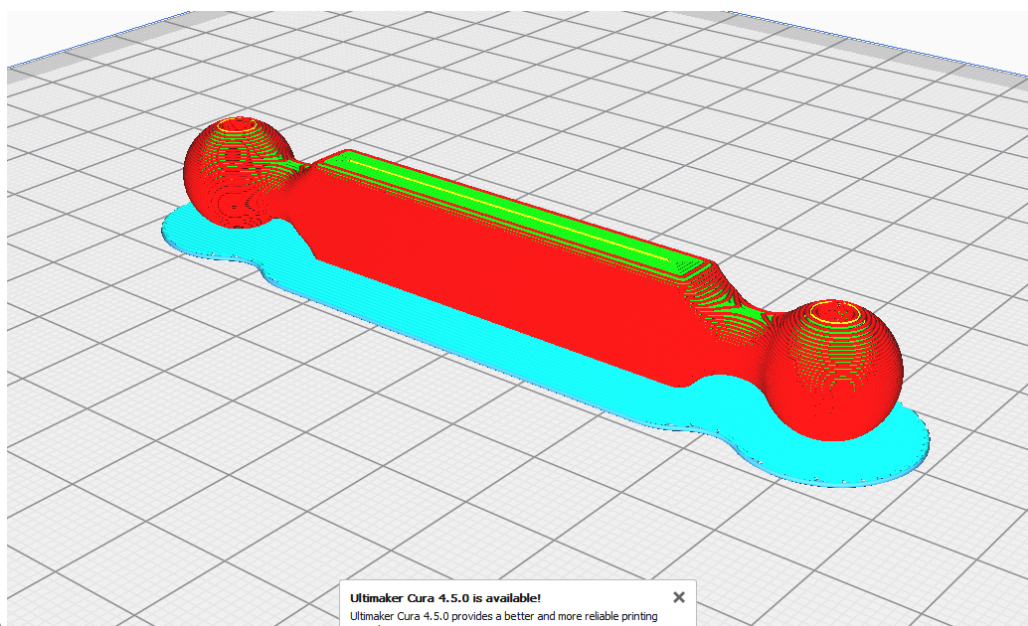


11B

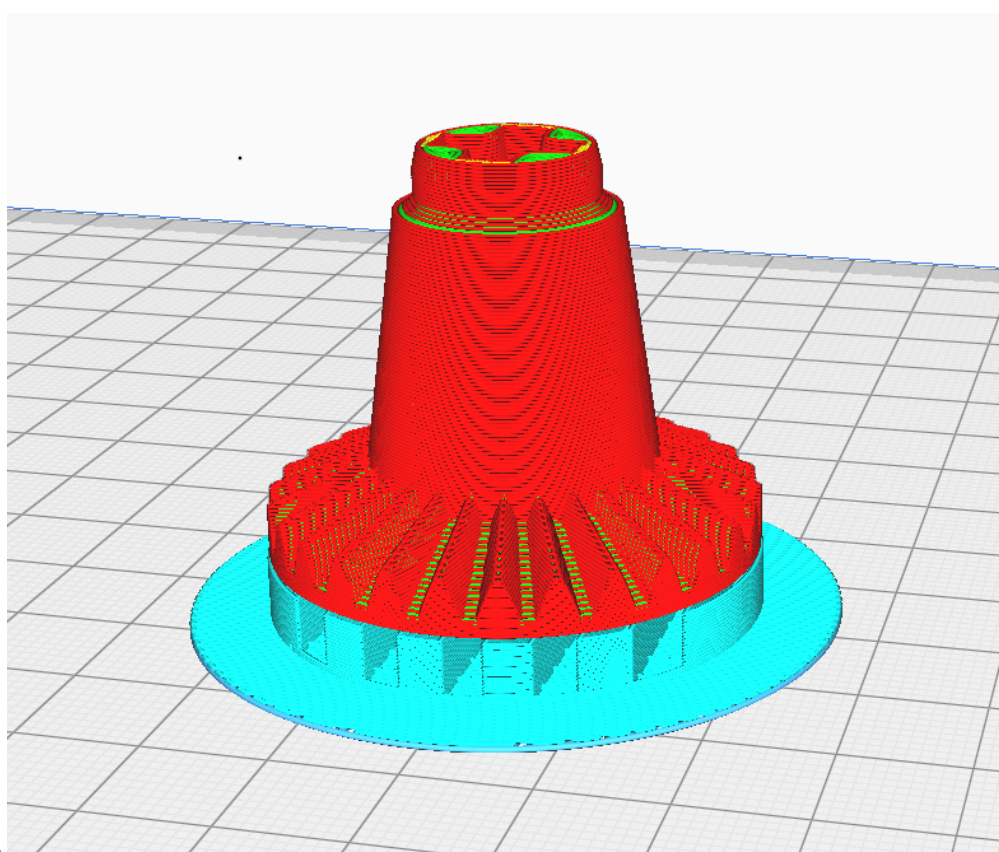


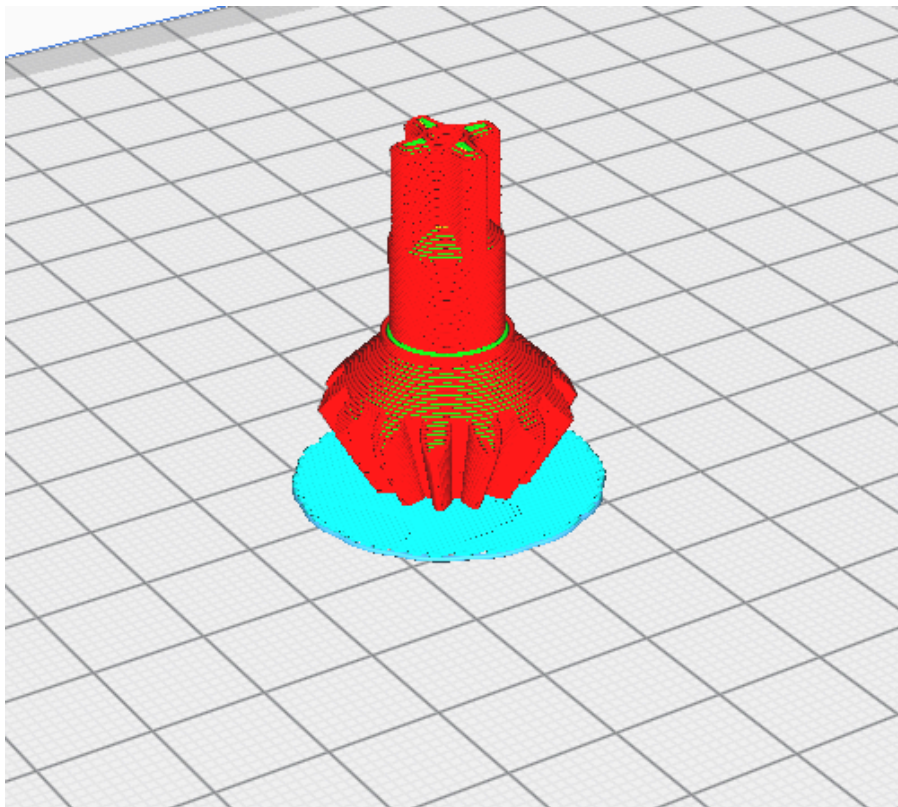
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12A

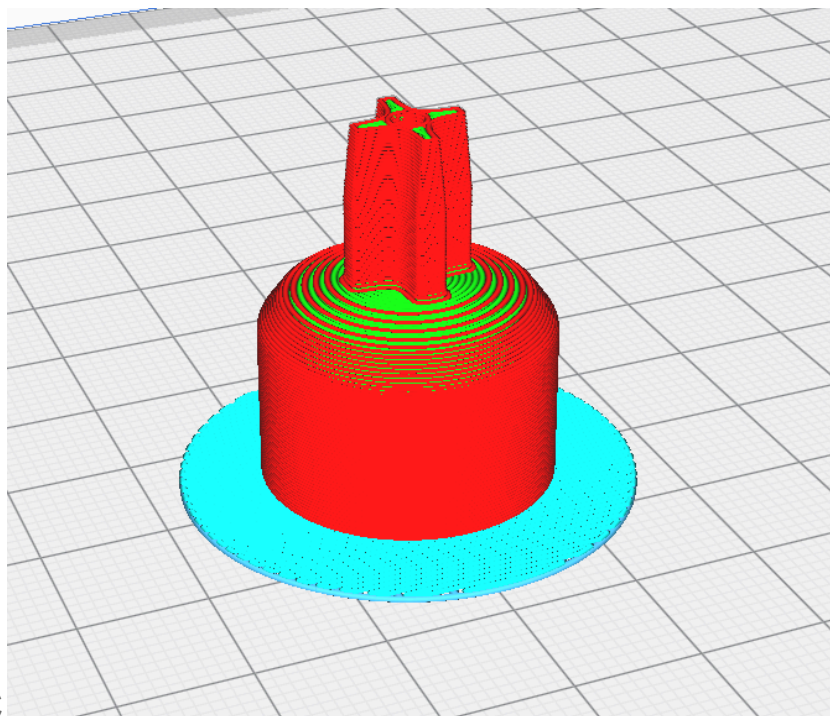


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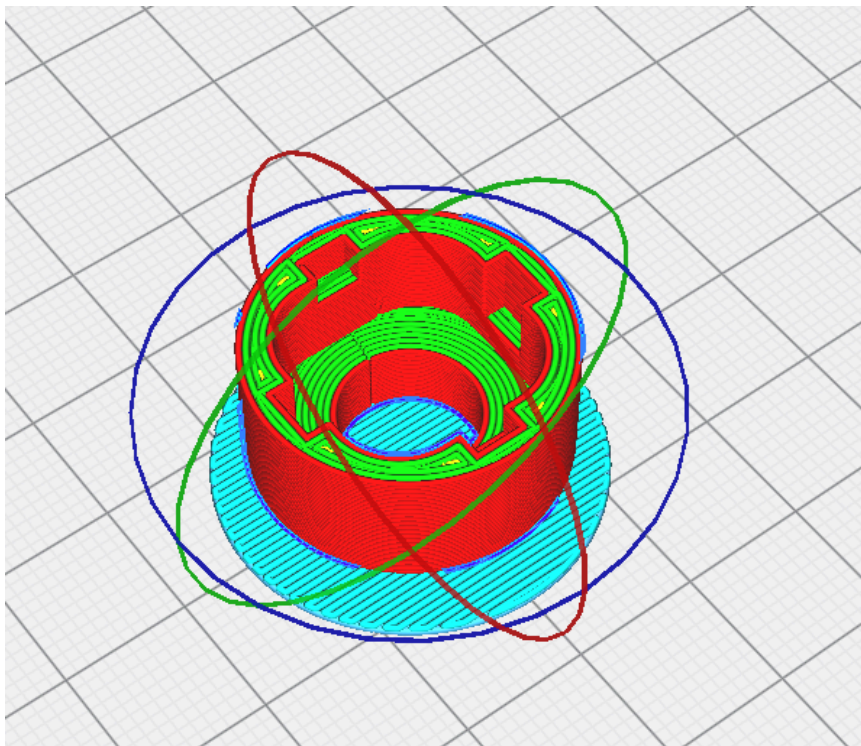




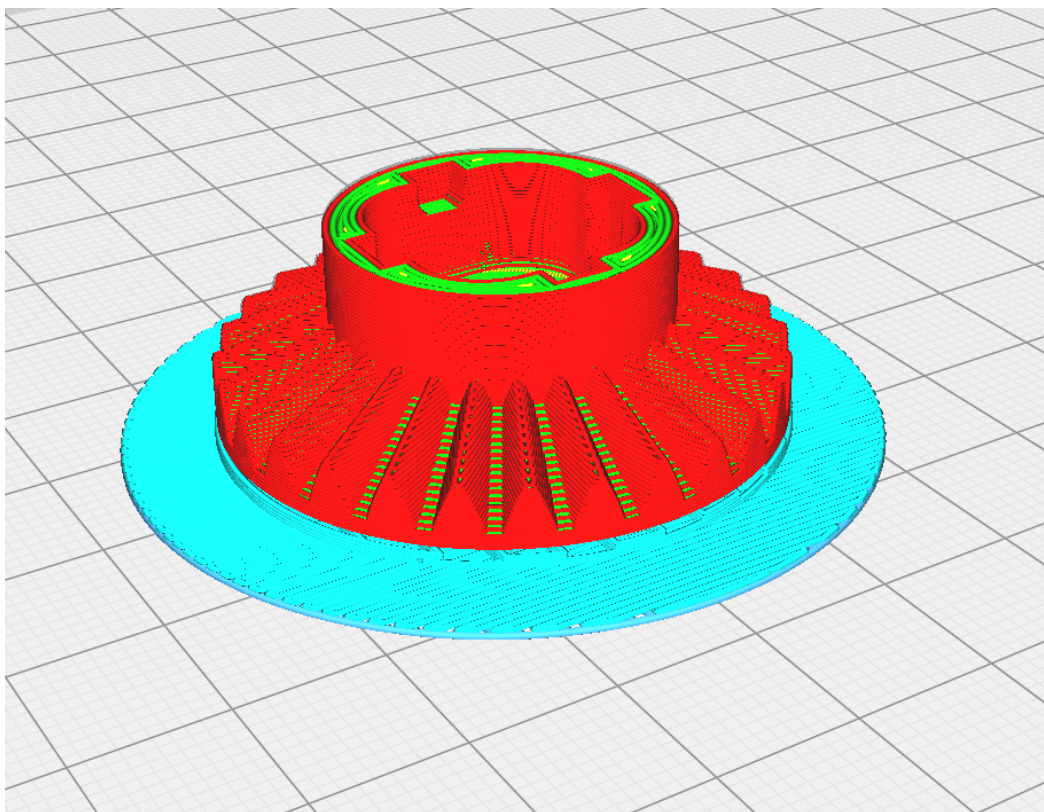
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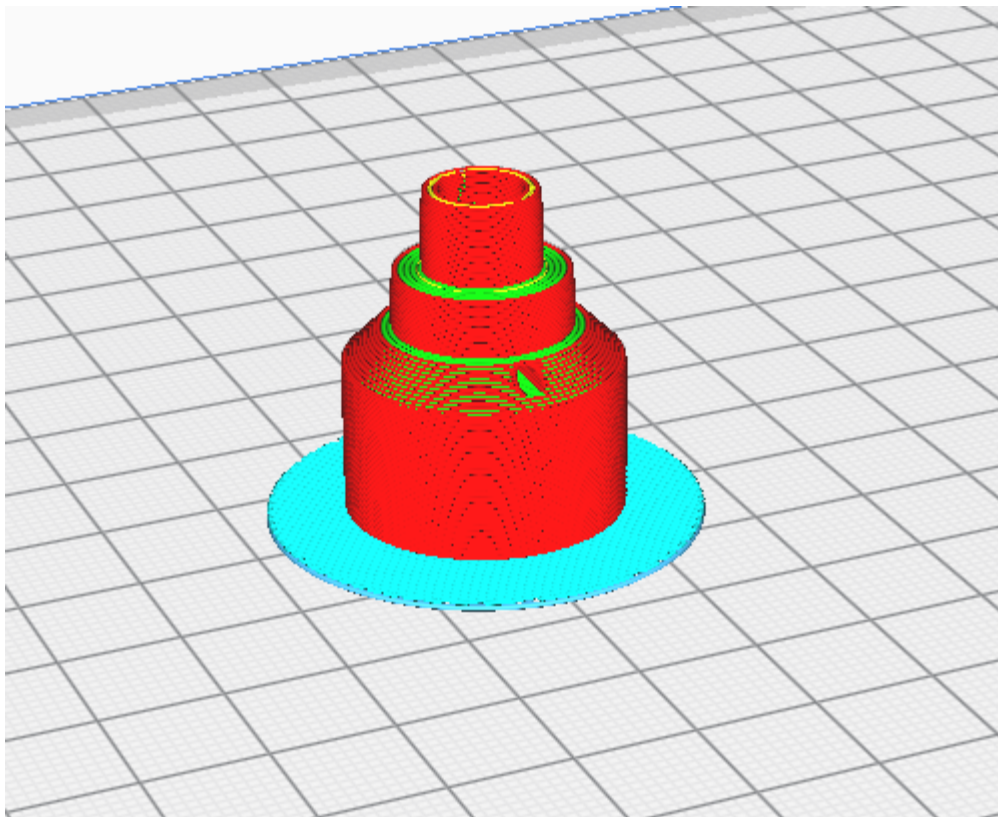
13C



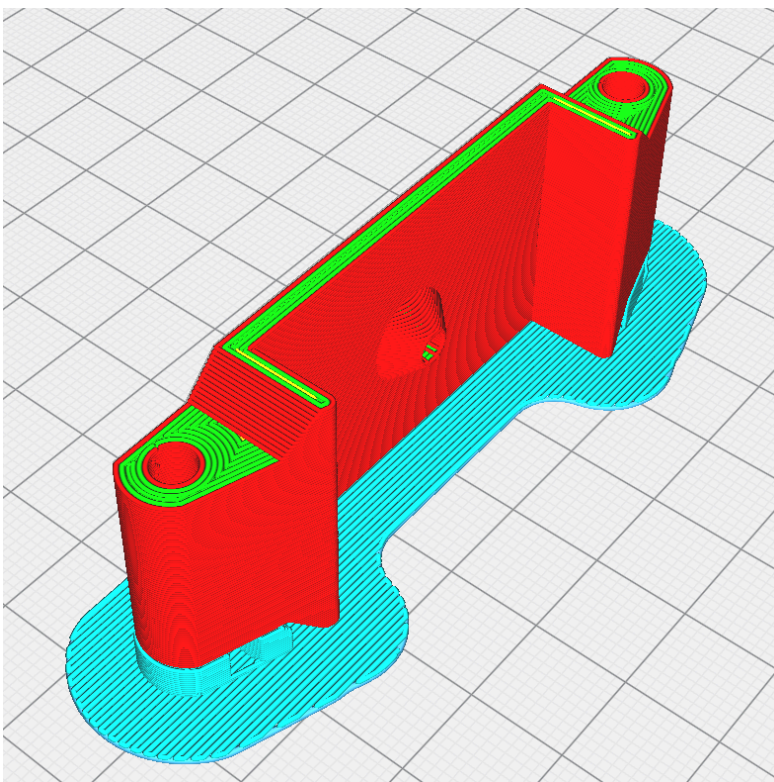
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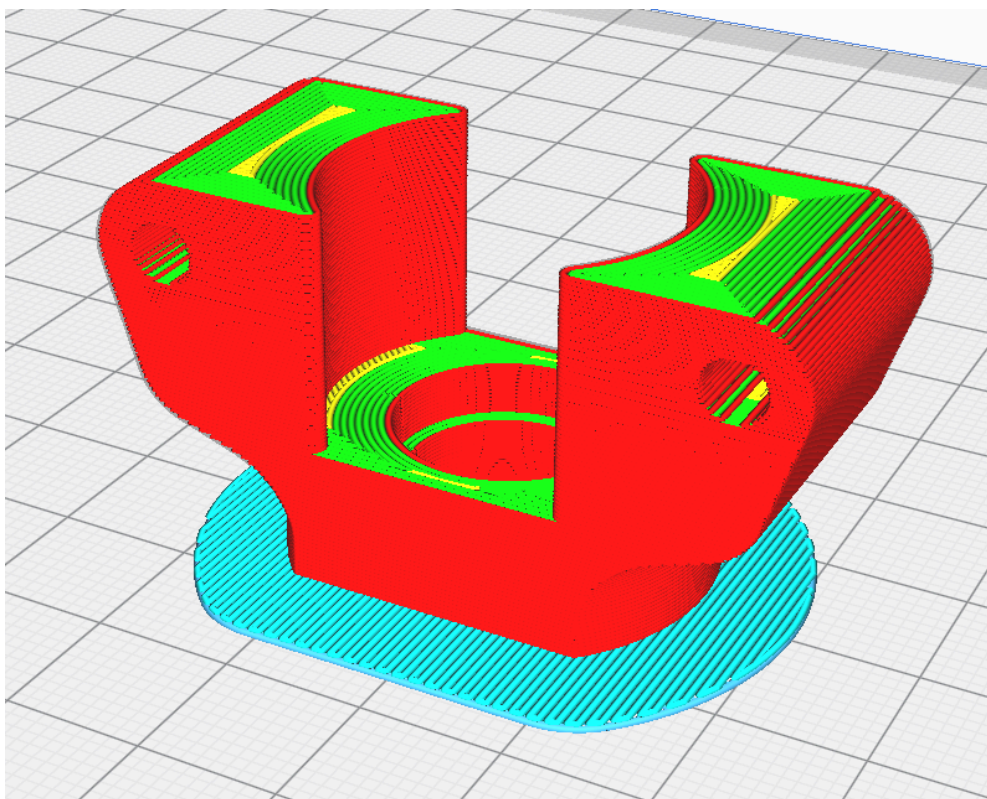
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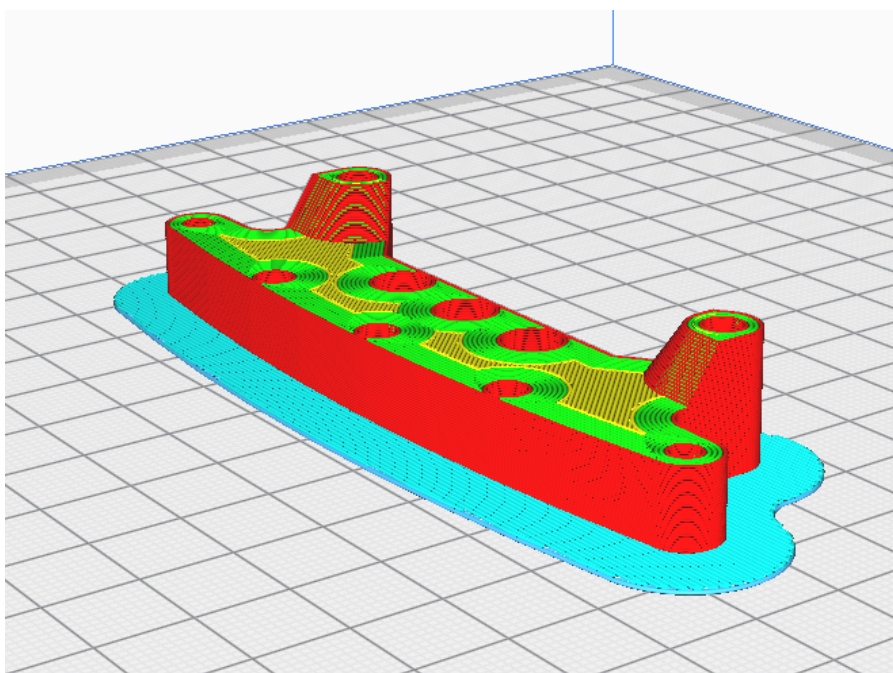
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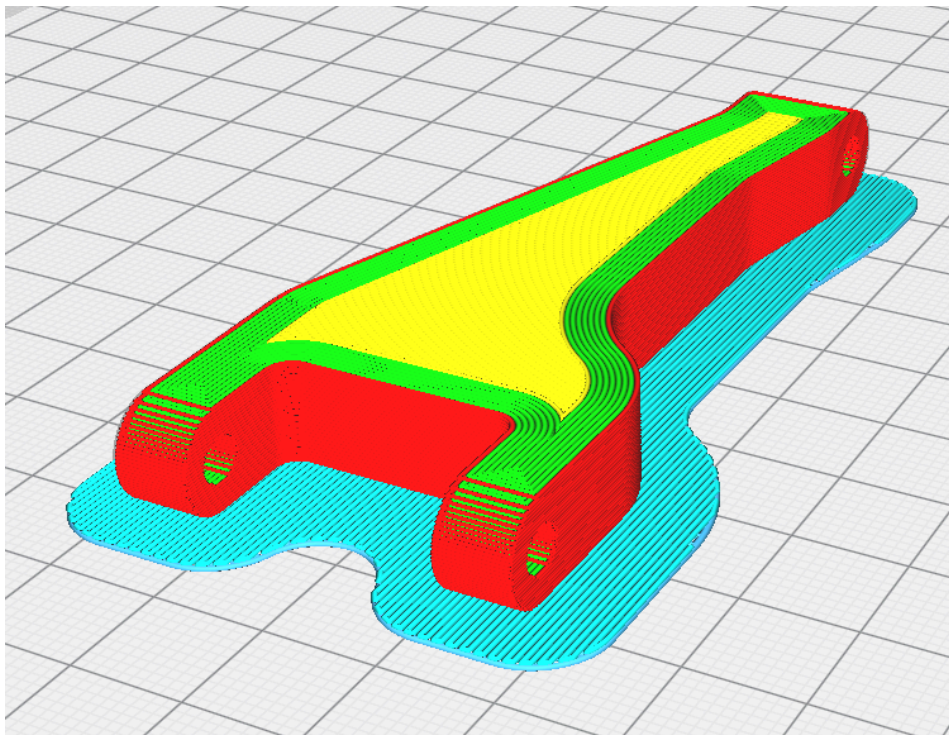
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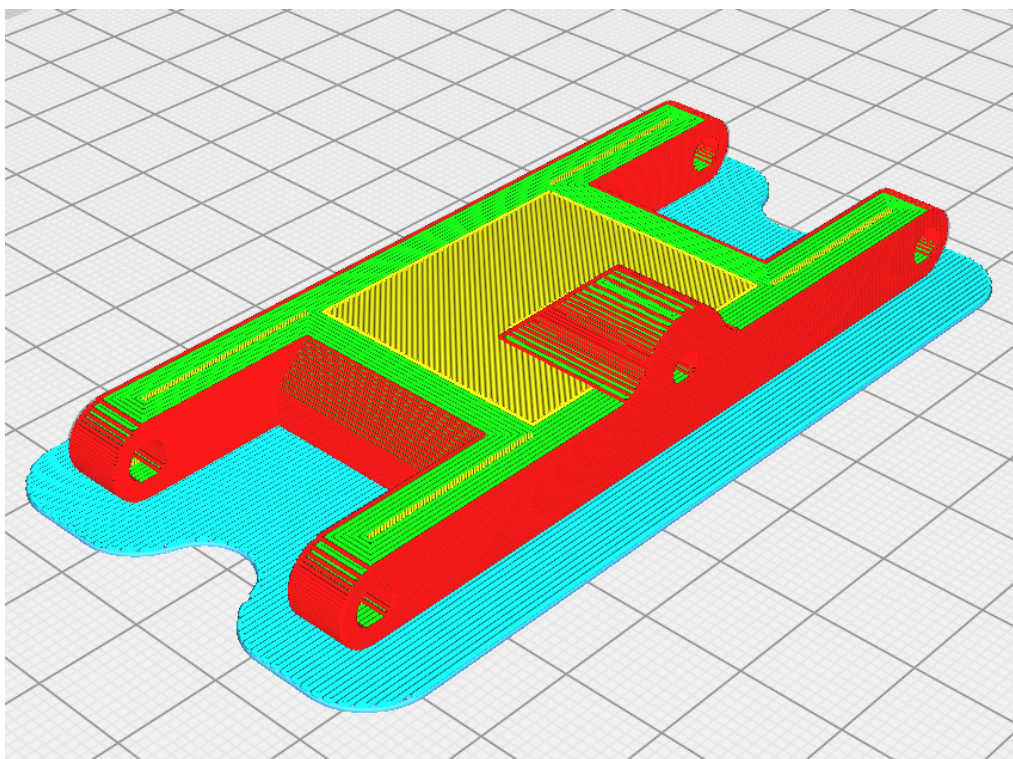
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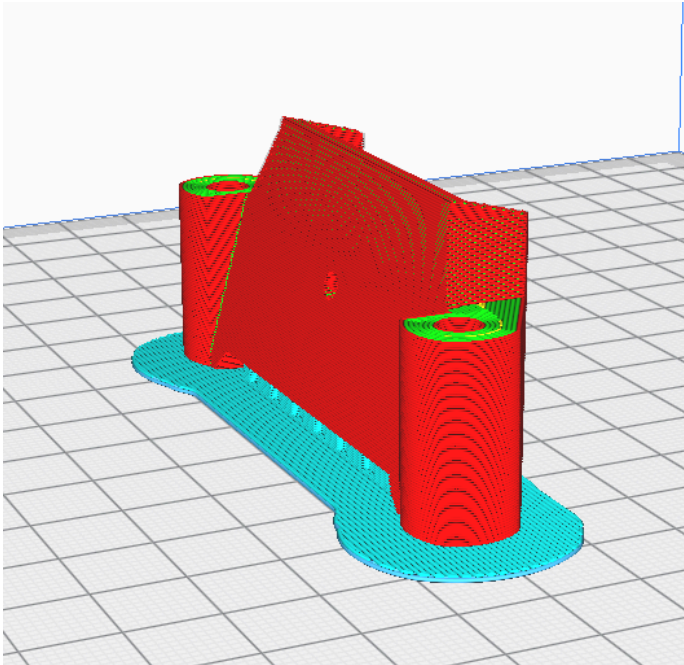
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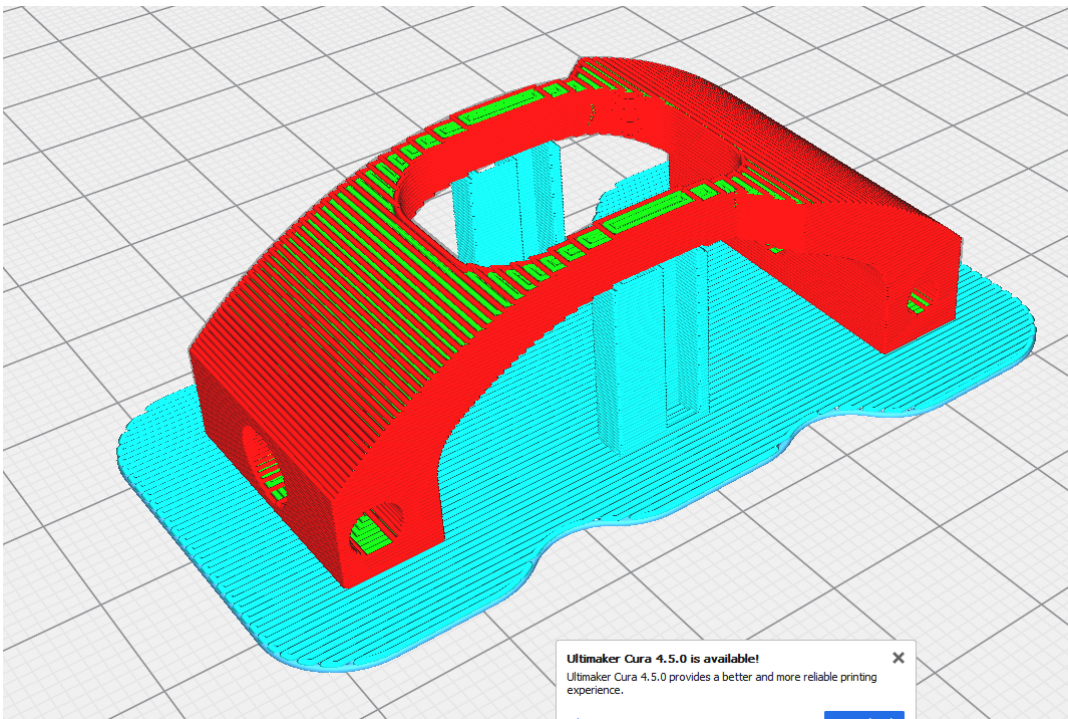
16B



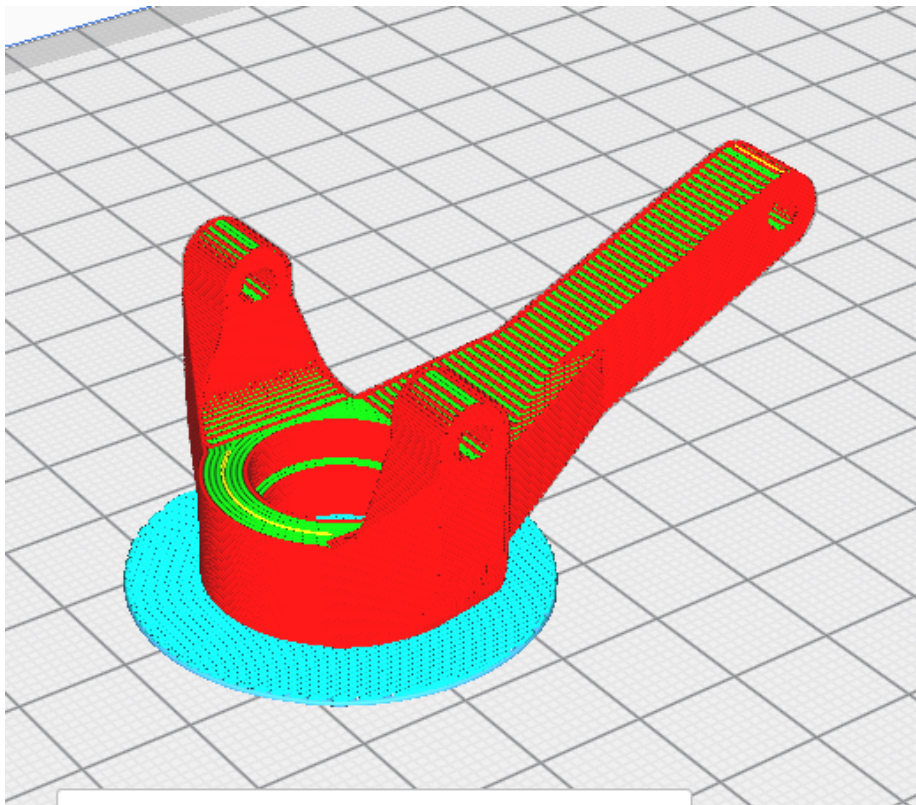
17A



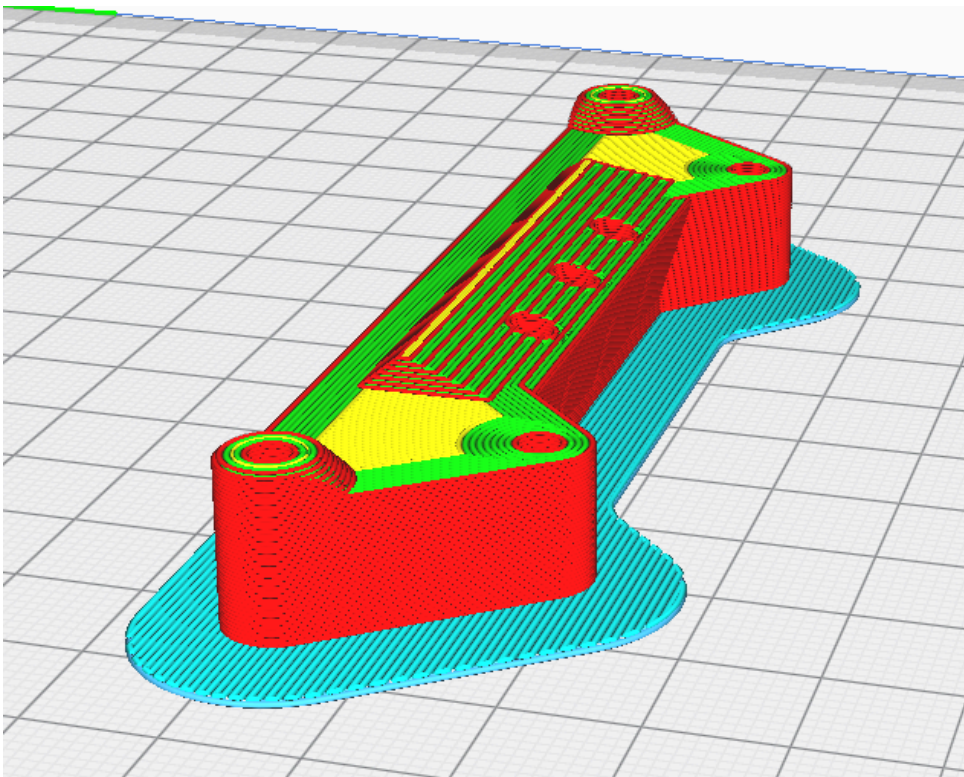
18A



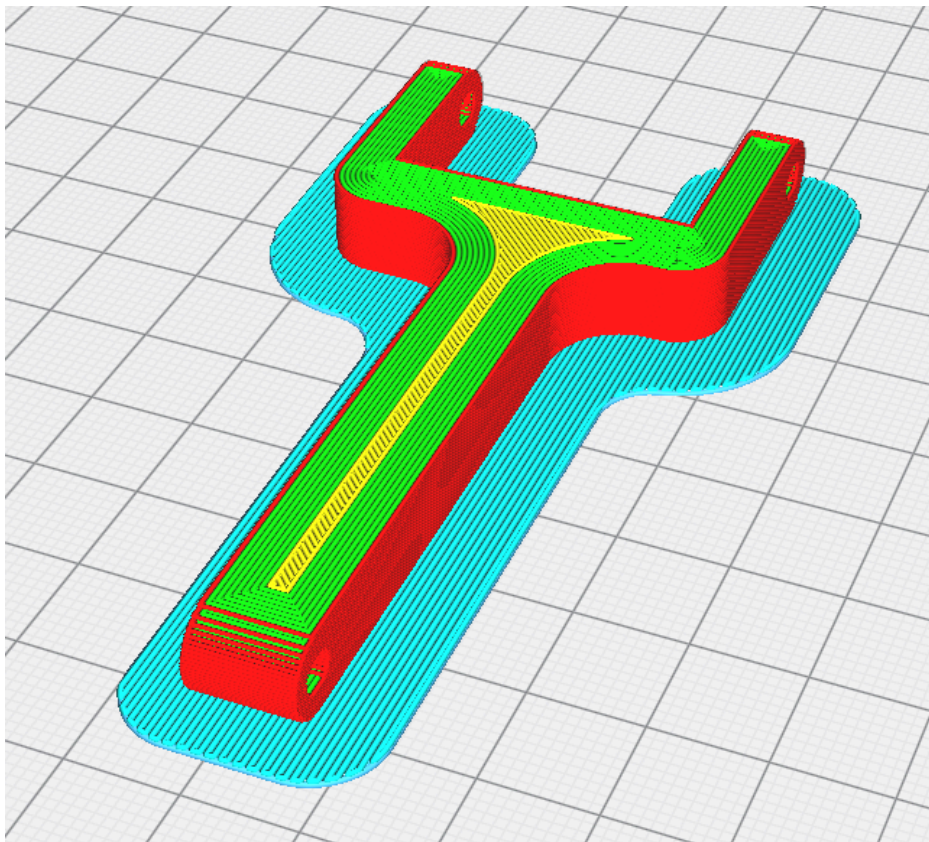
18B



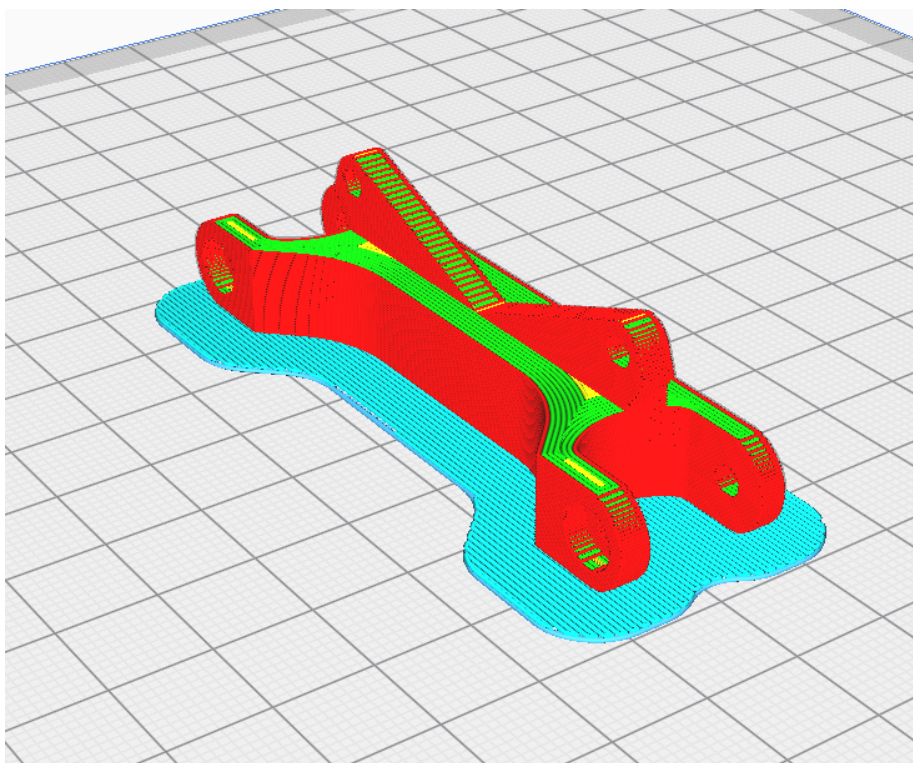
18C



19A

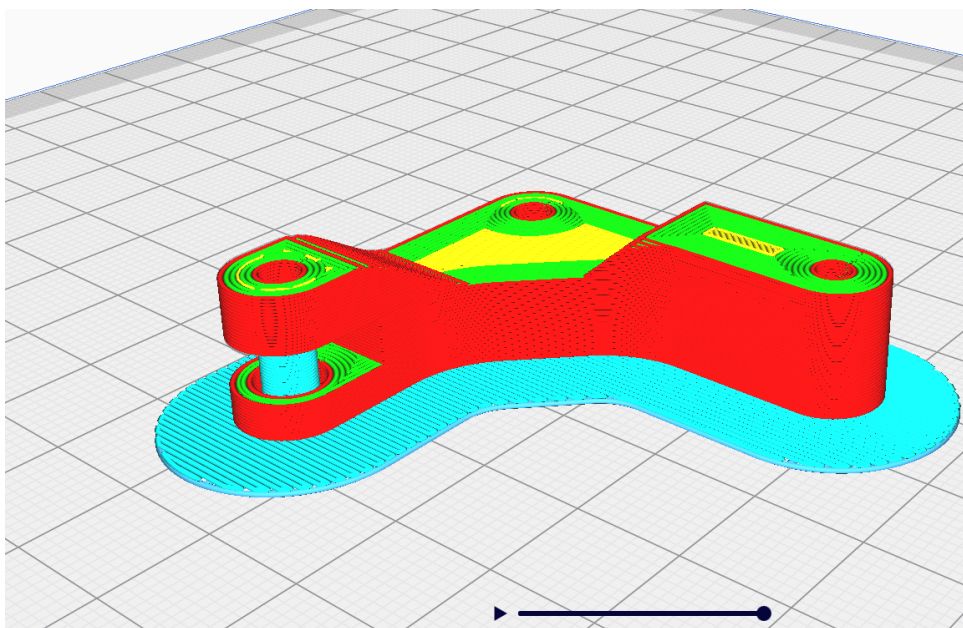


19B

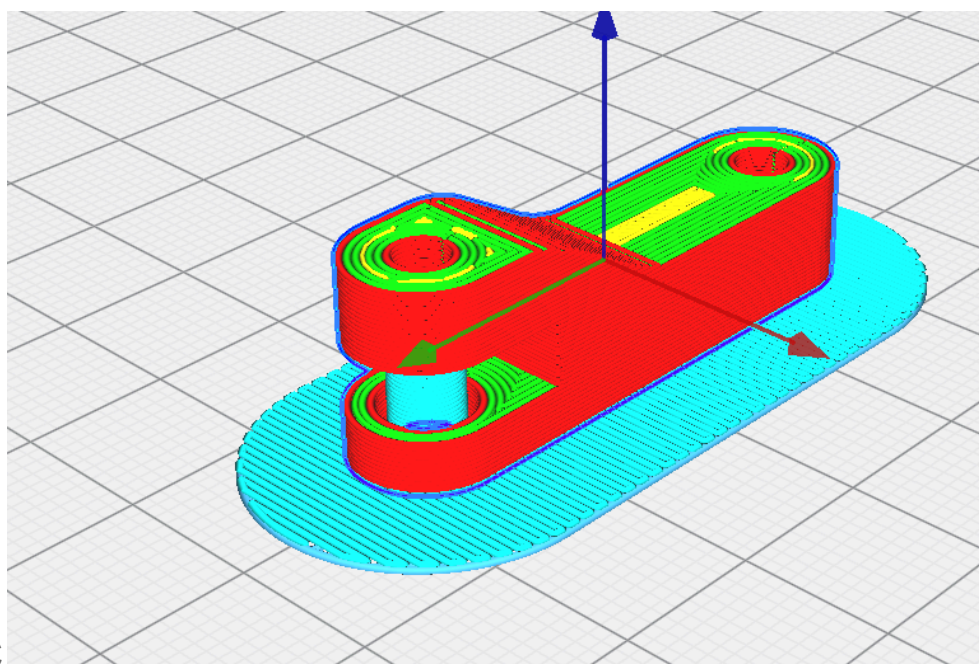


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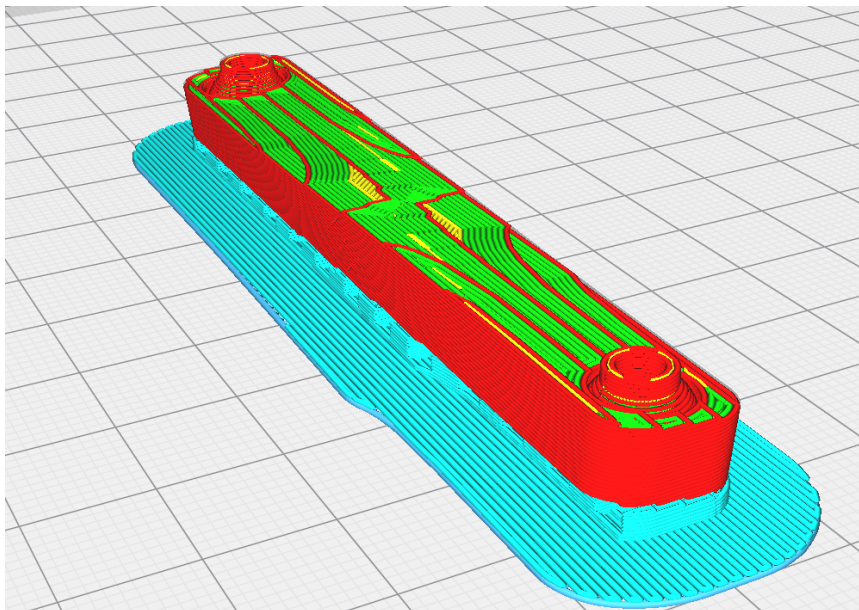
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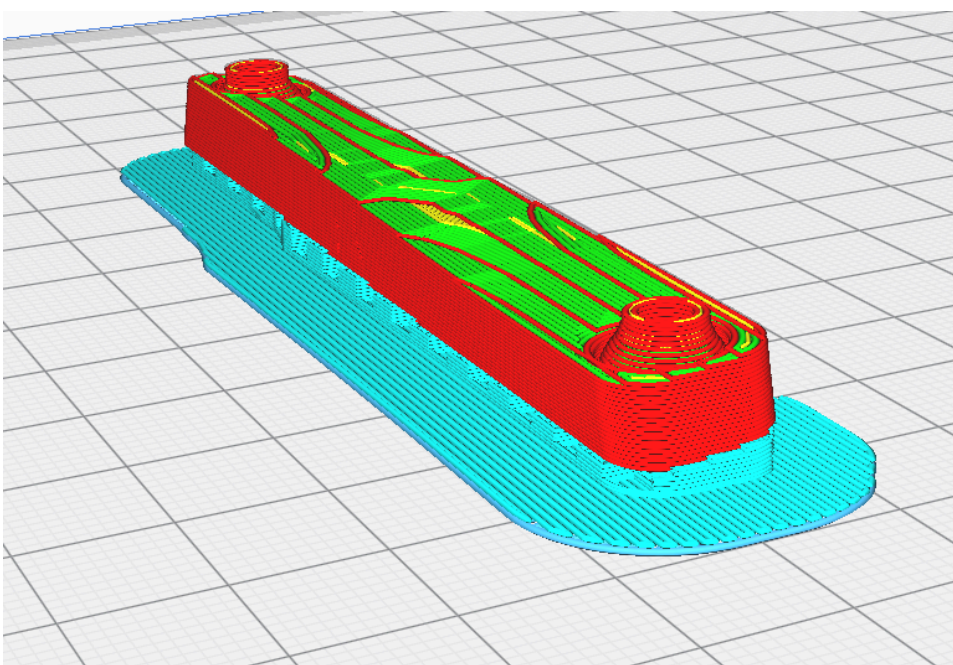
20C



20D



20E



- Alternative File Sharing Sites -

Thingiverse has started to suck... It's super slow and unreliable. Hopefully they fix that, but in the meantime, here are some alternatives where I uploaded the files.

Website	Link	Note
MyMiniFactory	https://www.myminifactory.com/users/EngineeringNS	Cool Site design
Cults3D	https://cults3d.com/en/users/EngineeringNS/creations	Cool site design
Pinshape (no good)	https://pinshape.com/users/112013-kriscubed#designs-tab-open	Files won't upload---Will try again
GrabCad	https://grabcad.com/engineeringns-1	Reliable, Good Community
YouMagine	https://www.youmagine.com/engineeringns/designs	Works Well, Good community