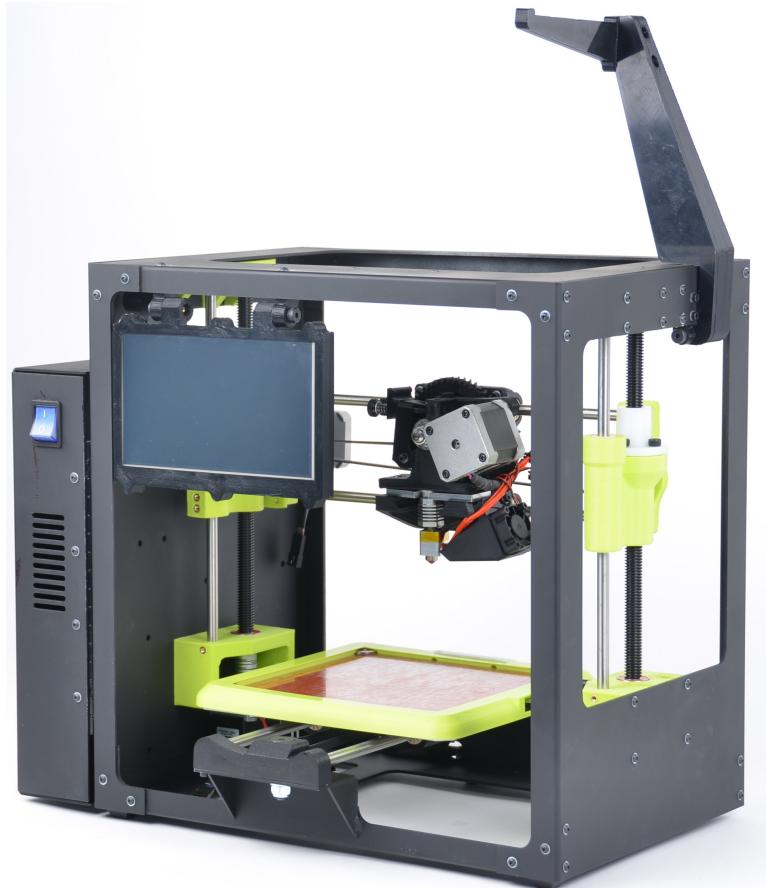


LULZBOT MINI DEVELOPER'S GUIDE



LulzBot Mini Developer's Guide

by Aleph Objects, Inc.

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For more information, call +1-970-377-1111 or visit www.alephobjects.com.

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Introduction

Welcome Aboard

Audience

This is a developer's guide to hacking on the LulzBot Mini 3D Printer. It is meant for developers, not users, of the printer.

Open Source Hardware, Free Software

Aleph Objects, Inc. is a Loveland, Colorado, USA company that manufactures Open Source Hardware using Free Software.

For more info, visit <http://www.alephobjects.com>.

LulzBot Mini

Developer Overview

1.1 LulzBot Mini

The LulzBot Mini is a 3D Printer currently under development. The abbreviated name is mini-dev.

The source files are available here:

<http://devel.lulzbot.com/mini/>

1.2 Versions

Each new version of the mini-dev has a new name, with the next letter in the alphabet.

- Azalea - First Prototype
- Begonia - Second Prototype, being built now
- Camellia - Third Prototype
- Daffodil - First Production batch

1.3 Begonia Photos

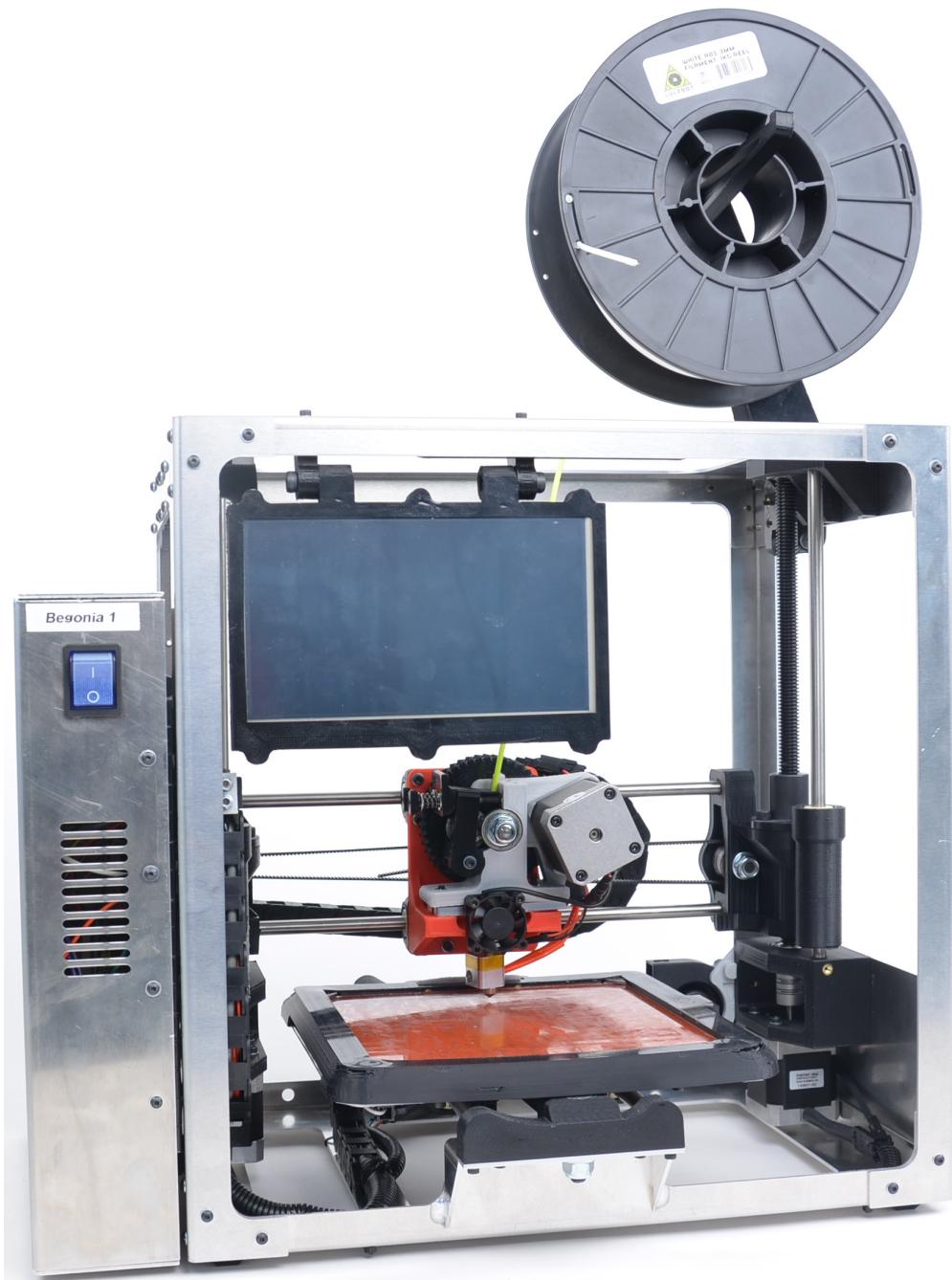


Figure 1.1: Begonia Front Photo

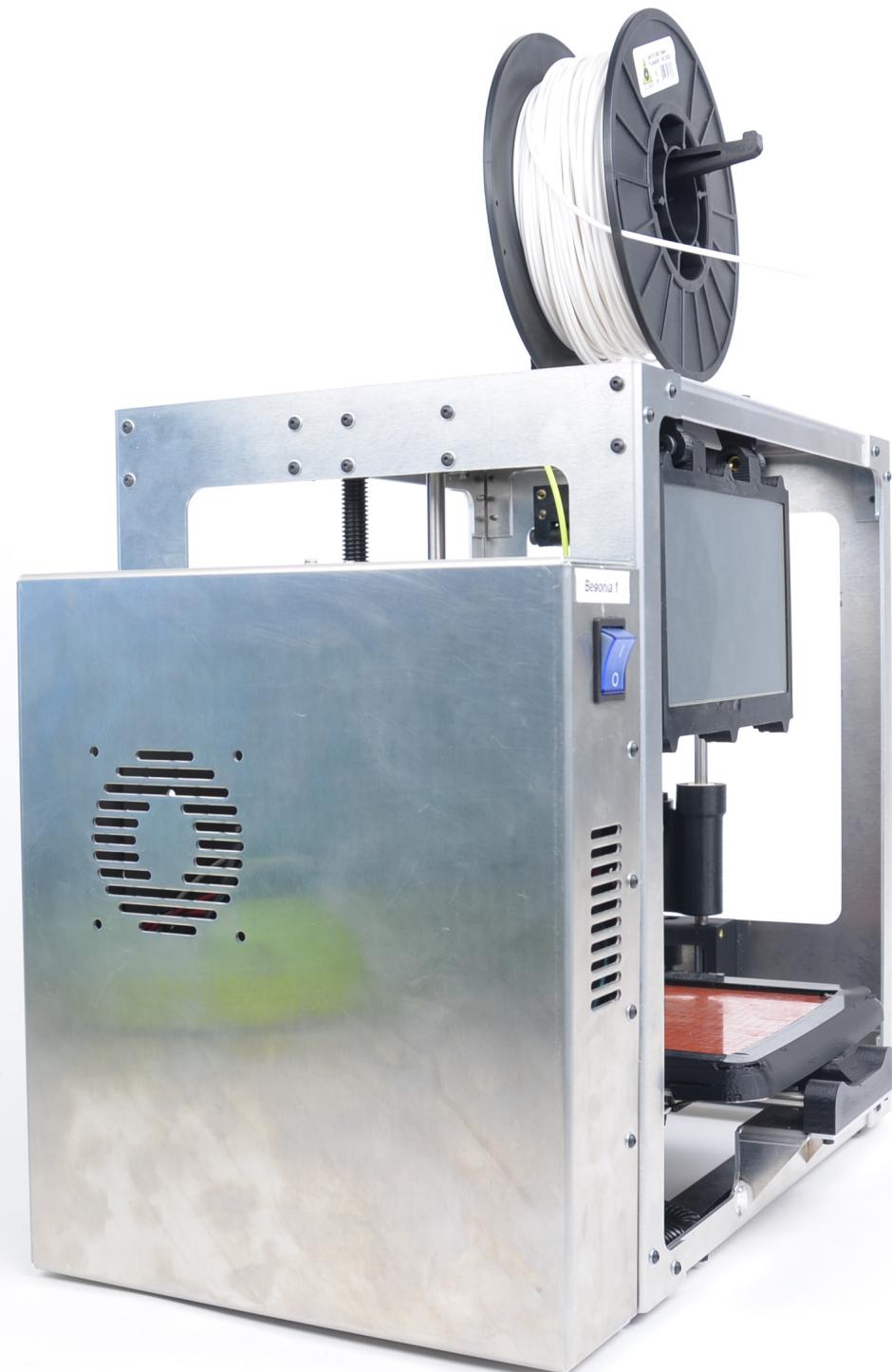


Figure 1.2: Begonia Left Photo

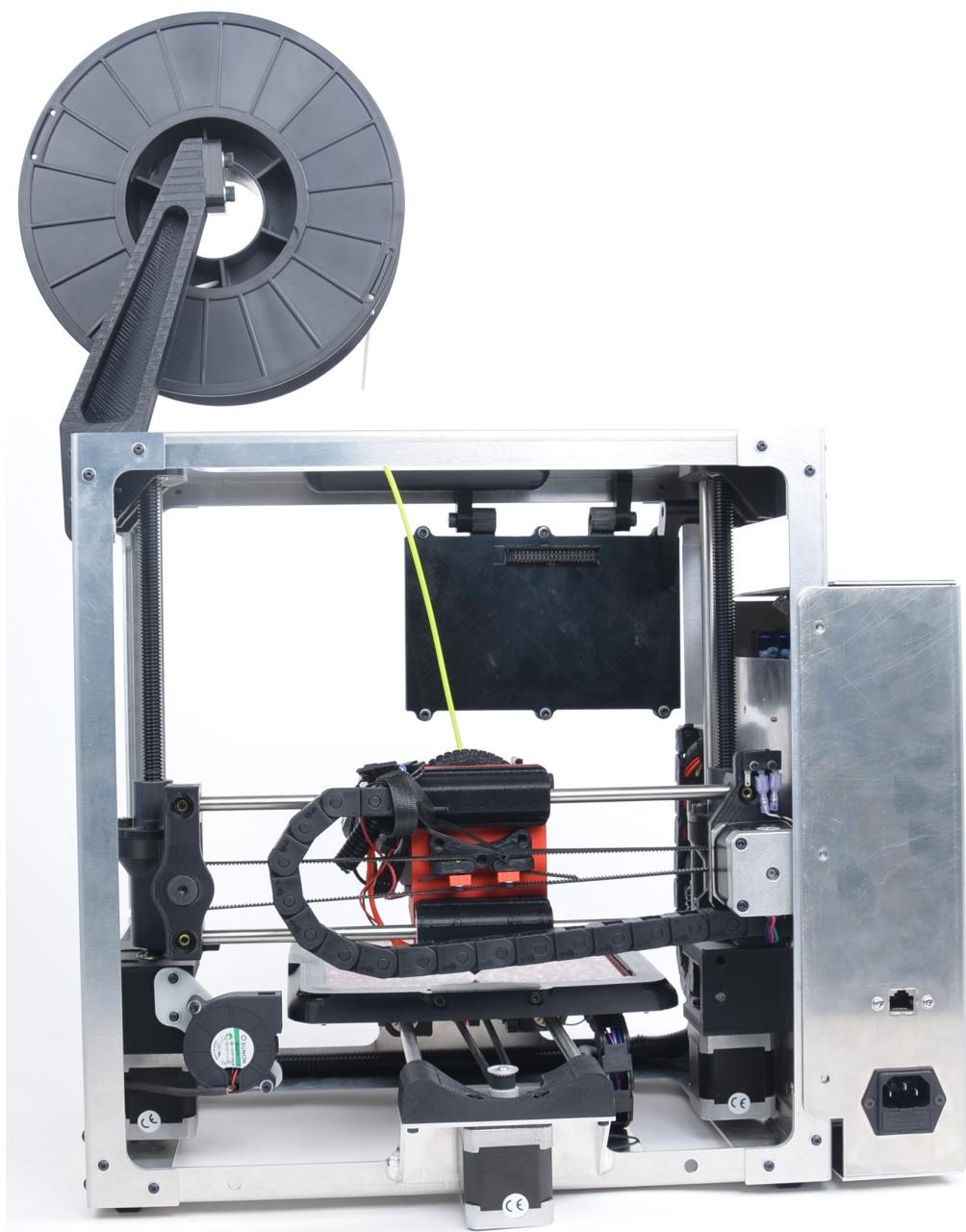


Figure 1.3: Begonia Back Photo

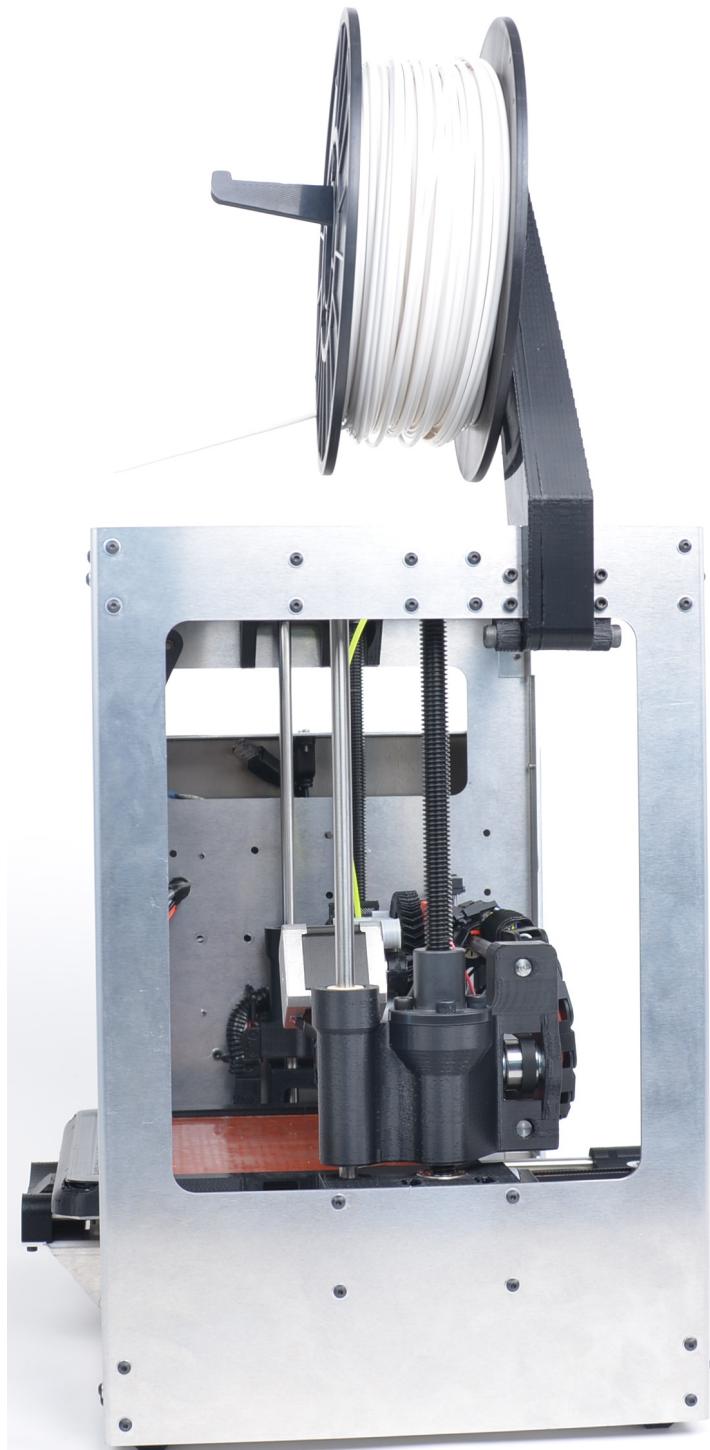


Figure 1.4: Begonia Right Photo

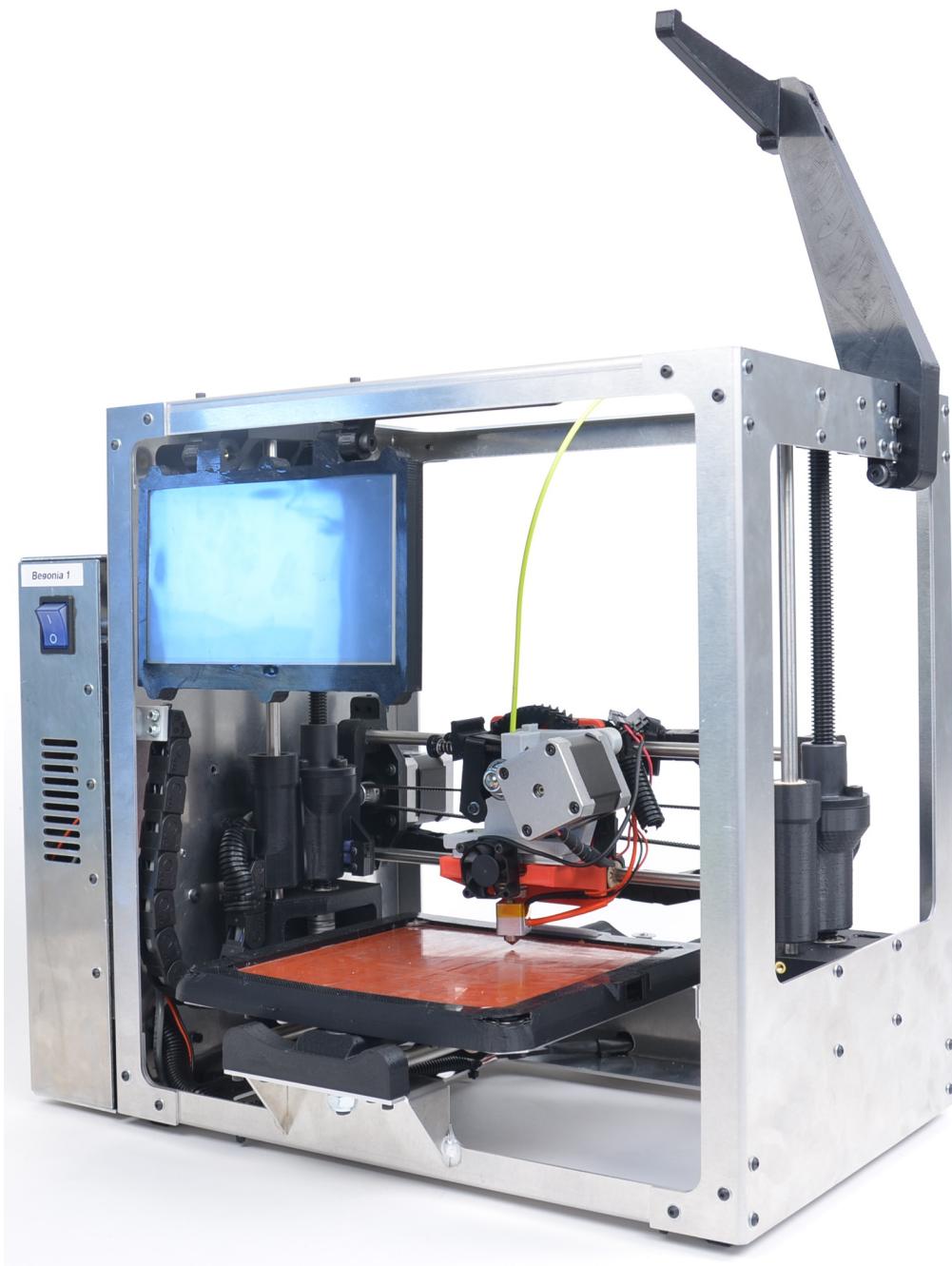


Figure 1.5: Begonia Spool Arm Up Photo

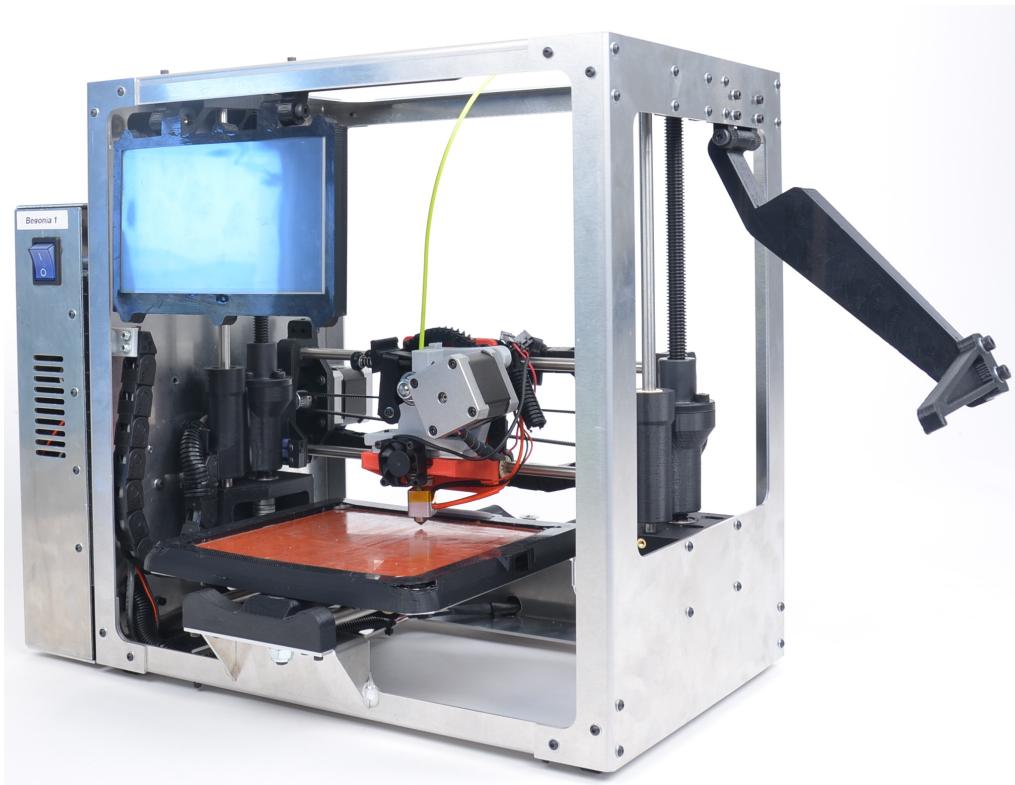


Figure 1.6: Begonia Spool Arm Down Photo



Figure 1.7: Begonia Green Color Scheme Photo

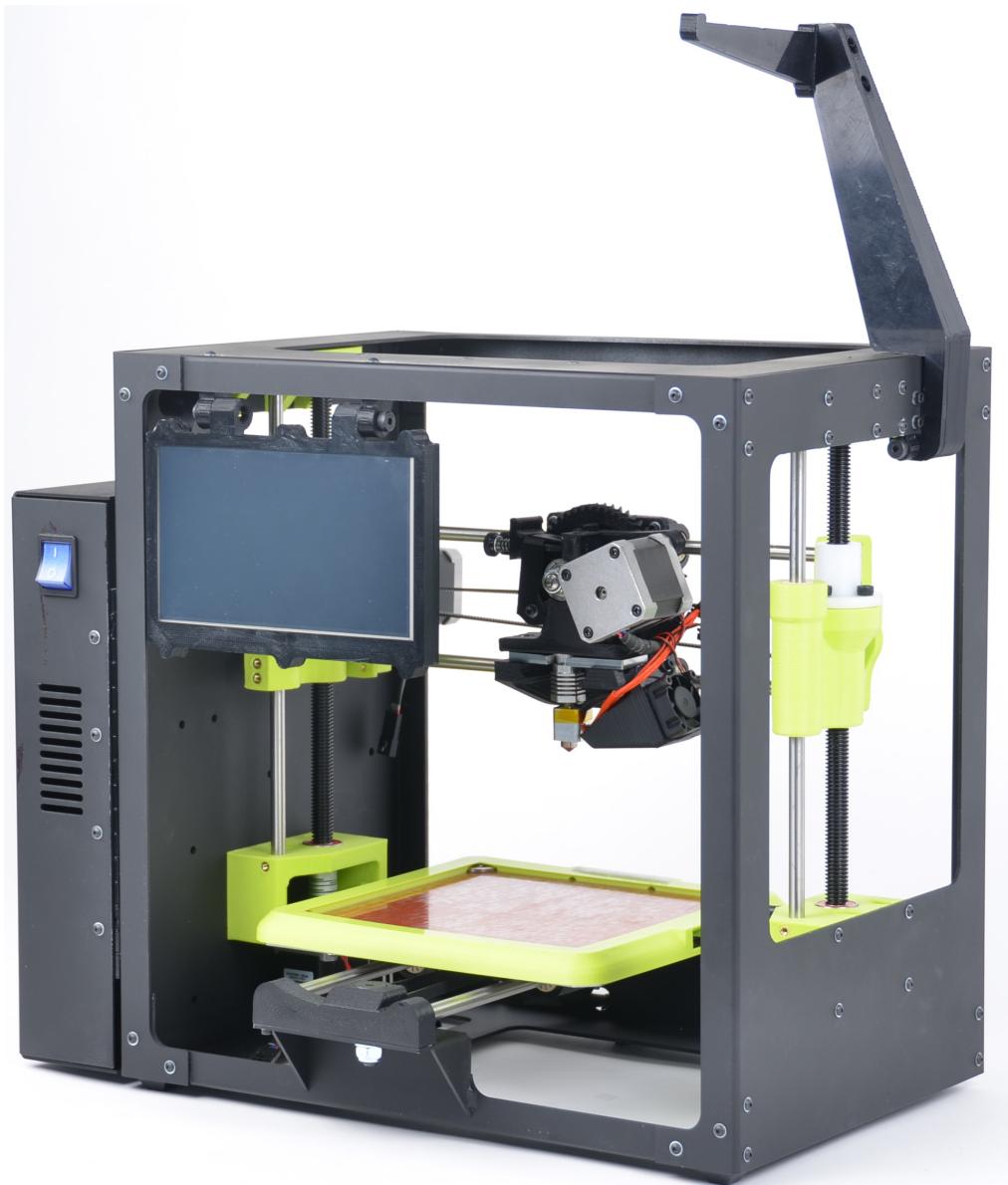


Figure 1.8: Begonia Black Green Color Scheme Photo

1.4. SCHEDULE

1.4 Schedule

The schedule is updated weekly. It is in Libre Office spreadsheet format.
The latest version is available here:

http://devel.lulzbot.com/mini/program_management/

Specs

Specifications

2.1 Specifications

Printing

- Print Surface: Heated Borosilicate glass bed covered with PEI film
- Print Area: 155mm x 155mm x 155mm (6.1in x 6.1in x 6.1in)
- Print Volume: 3,726cm³ (227.4 in³) of usable space
- Top Print Speed: 275mm/sec (10.8in/sec)
- Print Tolerance: 0.1mm (0.0039in) in X and Y axes. Z axis is dependent on layer thickness
- Layer Thickness: 0.075mm to 0.50mm (0.003in - 0.020in)
- Supported Materials: ABS, PLA, HIPS, PVA, wood filled filaments, Polyester (Tritan), PETT, filled PLA, Bronze and copper filled filaments, Polycarbonate, Nylon, PETG, Conductive PLA and ABS, UV luminescent filaments, PCTPE, PC-ABS, and more every day.
- Usable Filament Sizes: standard 3mm (0.1in)

Physical Dimensions

- Overall Dimensions: 435mm x 340mm x 385mm (17.1in x 13.4in x 15.2in)
- Weight: 8.55kg (18.85lbs)

Electrical

- Power Requirements: 100 - 240 VAC
- Power Supply: 24V 150W
- US, UK, and EU electrical plugs available

2.1. SPECIFICATIONS

Temperature

- Temperature: Maximum operating temperature (Extruder), 300C (572F)
- Temperature: Maximum operating temperature (Heated Bed), 120C (248F)

Mechanical

Cartesian Bot in X, Y, Z

3.1 Intro

Mechanical hardware specs and parts are in these subdirectories:

<http://devel.lulzbot.com/mini/>

3.2 Daffodil Bill of Materials

Daffodil is the first production run of units for retail.

Category	AO Part #	Description	Manufacturer	Manufacturer PN	Distributor	SKU	Distributor co	Advanced Antivibration co	Distributor	SKU	Qty Per	UOM	Price Per Unit	Price Total	Qty to Order	
Hardware	HD-MS054	Square Bumper									2	ea	\$0.09	\$0.35	42 Sheets of 98	
Printed	PP-GP0189	Double bearing holder v1.2, Mini	Aleph Objects								1	ea	\$3.00	\$6.02		
Printed	PP-GP0188	Upper bearing holder v1.1, Mini	Aleph Objects								1	ea	\$3.30	\$3.30		
Printed	PP-GP0187	X carriage cover v2.3, Mini	Aleph Objects								1	ea	\$1.750	\$1.75		
Printed	PP-GP0191	Herringbone Large Gear, Lulzbot green	Aleph Objects								1	ea	\$2.230	\$2.23		
Printed	PP-GP0192	Herringbone Small Gear, Lulzbot green	Aleph Objects								1	ea	\$0.290	\$0.29		
Printed	PP-GP0060	Wade Reloaded Bearing Washer	Aleph Objects								1	ea	\$0.020	\$0.02		
Printed	PP-GP0186	Wade extruder body for Hex nozzle v1.0	Aleph Objects								1	ea	\$3.790	\$3.79		
Printed	PP-GP0059	Wade Reloaded idle Block	Aleph Objects								1	ea	\$0.900	\$0.90		
Printed	PP-GP0091	extruder_latch	Aleph Objects								1	ea	\$0.260	\$0.26		
Printed	PP-GP0185	X end idler v2.3, Mini	Aleph Objects								1	ea	\$7.870	\$7.87		
Printed	PP-GP0184	Extruder mount v2.4, Mini	Aleph Objects								1	ea	\$3.690	\$3.69		
Printed	PP-GP0183	X carriage v1.0, Mini	Aleph Objects								1	ea	\$5.150	\$5.15		
Printed	PP-GP0182	X end motor v1.6, Mini	Aleph Objects								1	ea	\$8.740	\$8.74		
Printed	PP-GP0181	Beltmount v1.0, Mini	Aleph Objects								1	ea	\$1.260	\$1.26		
Printed	PP-GP0179	Z upper left v1.2, Mini	Aleph Objects								1	ea	\$3.010	\$3.01		
Printed	PP-GP0180	Z upper right v1.2, Mini	Aleph Objects								1	ea	\$3.010	\$3.01		
Printed	PP-GP0177	Z lower left v1.1, Mini, Lulzbot green	Aleph Objects								1	ea	\$5.150	\$5.15		
Printed	PP-GP0178	Z lower right v1.1, Mini, Lulzbot green	Aleph Objects								1	ea	\$7.090	\$7.09		
Printed	PP-GP0176	Bed corner v2.2, Mini	Aleph Objects								1	ea	\$1.070	\$1.07		
Printed	PP-GP0175	Bed corner v1.2, Mini	Aleph Objects								1	ea	\$2.230	\$2.23		
Printed	PP-GP0174	Y idle mount v1.1, Mini	Aleph Objects								1	ea	\$0.680	\$0.68		
Printed	PP-GP0173	Y rod mount v1.1, Mini	Aleph Objects								1	ea	\$1.170	\$1.17		
Printed	PP-GP0172	Spool hinge v1.3, Mini	Aleph Objects								1	ea	\$0.190	\$0.19		
Printed	PP-GP0171	Spool arm v1.0, Mini	Aleph Objects								1	ea	\$6.750	\$6.75		
Printed	PP-GP0170	Spool mount v1.2, Mini	Aleph Objects								1	ea	\$0.137	\$0.27		
Printed	PP-GP0176	Relief mount v1.3, Mini	Aleph Objects								1	ea	\$2.290	\$2.29		
Printed	PP-GP0169	Handle bar v2.4, Mini	Aleph Objects								1	ea	\$3.440	\$3.44		
Printed	PP-GP0168	Handle mount v1.4, Mini	Aleph Objects								1	ea	\$10.220	\$10.22		
Printed	PP-GP0167	Wiper mount v1.0, Mini	Aleph Objects								1	ea	\$2.450	\$2.45		
Mechanical	HD-MS0211	Lower relief v1.0, Mini	Alien Scientific								1	ea	\$10.190	\$10.19		
Mechanical	HD-MS0227	Bonobridge Glass Bed 170mm x 170mm	Associated Spring								1	ea	\$6.750	\$6.75		
Mechanical	HD-BL0015	Spring, Extruder, 6mm OD, 0.8mm WD, 9.7mm FL	B & B Manufacturing, Inc								1	ea	\$10.137	\$0.27		
Mechanical	HD-MS0033	G72, Single sided Neoprene Belt	IM6-CAS 5MM BORE ALL								1	ea	\$3.440	\$6.88		
Electronics	EL-PS0025	GT2 Timing Pulley, 5mm Bore Aluminum	PMC-24V150W1AA_DELTA								1	ea	\$28.600	\$28.60		
Electronics	EL-MS0143	POWER SUPPLY 150W 24V 6.25A PNL MT	22-28AWG								1	ea	\$0.077	\$0.077		
Electronics	EL-MS0205	Conn Fast Receptione 1.6 AWG - 250	WM25LT TR-ND								25	ea	\$0.038	\$0.96	2 reels	
Electronics	EL-MS0212	CONN TERM MALE 22-24AWG TIN	MOL16-02-0108								73	ea	\$0.056	\$3.26	4 reels	
Electronics	EL-MS0059	CONN PIN 24-30AWG CRIMP TIN	WM25L0TR-ND								3	ea	\$0.140	\$0.42		
Electronics	EL-MS0061	CONN TERM FEMALE 22-24AWG TIN	WM25S5-ND								8	ea	\$0.112	\$0.90		
Electronics	EL-MS0062	Connector, 4 pin Female housing with latch	Digikey								5	ea	\$0.31	\$1.00		
Electronics	PC-CN0001	CONN HOUSING 2POS 1.00 W/LATCH	TII								6	ea	\$0.60	\$0.60		
Electronics	PC-CN0003	CONN HOUSING 3POS 1.00 W/LATCH	TII								12	ea	\$0.109	\$1.31		
Electronics	EL-MS0142	CONN RECEPT FASTON 22-26AWG .110	P22-4R-M								6	ea	\$0.52	\$0.52		
Electronics	EL-MS0141	Term Ring Nins 26-22AWG #4	Heilind								2	ea	\$0.087	\$0.18		
Electronics	EL-MS0210	CONN RING UNINS 15-20AWG #43	Digikey								2	ea	\$0.090	\$0.18		
Electronics	EL-SW0022	SWITCH BASIC SPDT 3A .10QC 125V	SW768-ND	6	ea	\$3.12	\$3.12	6,000 ft								
Electronics	EL-WR0099	Shielded 4Cond 22AWG	C0762A_41.10								2470	mm	\$0.001	\$3.02	9000 ft	
Electronics	EL-WR0105	24AWG Stranded - Black	C2015A-21.01								6025	mm	\$0.000	\$1.54	22000 ft	
Electronics	EL-WR0107	24AWG Stranded - White	C2015A-21.02								1100	mm	\$0.000	\$0.28	40000 ft	
Electronics	EL-WR0109	24AWG Stranded - Yellow	C2015A-21.05								2090	mm	\$0.000	\$0.54	8000 ft	
Electronics	EL-WR0103	24AWG Stranded - Red	C2015A-21.03								3825	mm	\$0.000	\$0.98	14000 ft	
Electronics	EL-WR0104	24AWG Stranded - Orange	C2015A-21.04								480	mm	\$0.000	\$0.72	11000 ft	
Electronics	EL-WR0118	24AWG Stranded - Blue	C2015A-21.07								520	mm	\$0.000	\$0.14	20000 ft	
Electronics	EL-WR0119	24AWG Stranded - Green	C2015A-21.06								1210	mm	\$0.000	\$0.16	20000 ft	
Electronics	EL-WR0120	24AWG Stranded - Purple	C2015A-21.10								2060	mm	\$0.000	\$0.31	50000 ft	
Electronics	EL-WR0106	16AWG Stranded - Red	C206SA-21.03								400	mm	\$0.007	\$2.78	20000 ft	
Electronics	EL-WR0121	16AWG Stranded - Black	C206SA-21.01								1280	mm	\$0.007	\$8.89	40000 ft	

Electronic	EL-WR0122	16AWG Stranded - Green	C2065A21.06	Digikey	C2065A21.02	\$6.11	\$0.87	1000 ft
Electronic	EL-WR0123	16AWG Stranded - White		Digikey		\$0.007		
Electronic	EL-WR0108	16AWG Stranded - Violet		Digikey		\$0.001		
Electronic	EL-MS0216	Ferrite Tubular Bead 19.0mm		Digikey				
Electronic	PC-CN0046	Term Block Plug 4PQS STR 5.08MM		TII	240-2314-ND	1		
Electronic	PC-CN0032	Term Block Plug 2PQS STR 5.08MM		TII	WN7953-ND	1		
Electronic	EL-MS0074	20-POS_1.00 Dual (Black)		TII	WN7819-ND	2		
Electronic	EL-MS0211	REEL - RING TONGUE CONN 16-22 AWG 410 PIDS	TE	Digikey	WN2527-ND	2		
Hardware	HE-SH0031	Repli-Modifed Hexagon Holed, Luzbot Edition, 3.0mm Filament		Repli-discount	A1062TR-ND	7		
Mechanical	PP-FP0055	Left Plate,	EPOCS					
Mechanical	PP-FP0052	Right Plate,	EPOCS					
Mechanical	PP-FP0051	Top Plate,	EPOCS					
Mechanical	PP-FP0053	Bottom Plate,	EPOCS					
Mechanical	PP-FP0054	Bed Mount Plate,	EPOCS					
Mechanical	PP-FP0056	Electronics cover,	Rapid Sheet Metal					
Mechanical	PP-FP0055	Left Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0052	Right Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0051	Top Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0053	Bottom Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0054	Bed Mount Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0056	Electronics cover,	Rapid Sheet Metal					
Hardware	EL-MS0165	Snaps-Together Cable and Hose Carrier, Feed-Through, 0.41" High x 0.39" Wide Interior SIGS	Rapid Sheet Metal					
Hardware	EL-MS0166	Mounting Brackets for .41" High x .39" Wide Interior Snap-Together Cable and Hose Carriers	Rapid Sheet Metal					
Mechanical	HD-BU00143	EMI/RFI-Shield Heat-Shrink Tubing - Solid polymer bearing R/W:0L_8mm	IGUM					
Electronic	EL-FA0011	FAN 24VDC, Sleeve 5.75CFM, 10x40x10MM, 60mA 6000RPM, 1.44W/2	Kysan					
Electronic	EL-FA0012	FAN 24VDC, BAL 31.60CFM, 80x80x15 MM, 100mA	TF8015-24M-B					
Mechanical	HD-RB0035	8mm Smooth Rod, 31.5mm	Kyocera					
Mechanical	HD-RB0044	304 Stainless Steel	MBK					
Hardware	HD-BT0108	Holurbed Bolt, M8 x 50mm Hex Head, 26mm offset, Stainless Steel	Quattro					
Hardware	PP-MF0082	Bed leveling washer, 2013 SST	MBK					
Electronics	TL-CS0083	EMI/RFI-Shield Heat-Shrink Tubing, 3/16" ID Before, 3/32" ID After, 3/16" ID Before, 3/16" ID After	TECflex					
Electronics	TL-CS0129	Interference-Shielding Heat-Shrink Tubing, 3/8" ID Before, 3/8" ID After	TECflex					
Hardware	HD-WA0035	Metric 18-8 Stainless Steel External Serrated Loc. Washer, M3 Screw Size, 6mm OD, 0.4mm ID	McMaster					
Hardware/tools	HD-MS0244	Firm White Polyester Felt Strip, 1/4" Thick, 1" Width, Plain Back	McMaster					
Hardware	HD-MS0235	Metric Aluminum Unthreaded Spacer, 4.5mm OD, 8mm Length	McMaster					
Electronics	EL-MS0273	Tubing, Corrugated Loom, 25"	Fastenal					
Hardware	HD-BT0117	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 40mm Length	Timberline					
Hardware	HD-BT0131	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 45mm Length	Timberline					
Hardware	PP-MF0066	Metric Brass Heat-Set-Inserter for Plastics, Tapered, M2-4 Internal Thread, 2.96MM Length	McMaster					
Hardware	HD-BT0107	Metric Class 12.9 Socket Head Cap Screw Alloy Steel, Black, M2 Thread, 10mm Length, 0.4mm Fastener	McMaster					
Hardware	HD-WA0012	Steel Flat Washer, DIN 125 zinc-plated class 4/N2 screw sz, 5mm OD, 40350	Fastenal					
Hardware	HD-MS0230	M2 x 6 SHCS, Black-Oxide	Timberline					
Hardware	HD-MS0030	M3-.5 3.8mm Heatset Insert	Fastenal					
Hardware	HD-MS0158	M5-.8 6.7mm Heatset Insert	Fastenal					
Hardware	HD-NT0004	M3 Nyloc Nut, Zinc Plated	Timberline					
Hardware	HD-NT0004	M3 Nut, Zinc Plated	Timberline					
Hardware	HD-BT0012	M3 Set Screw (Grub Screw)	Timberline					
Hardware	HD-WA0001	M3 Washer, Steel, Zinc Plated	Timberline					
Hardware	HD-BT0044	M3 x 5 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-BT0128	M3 x 6 Bolt, FHCS Black-Oxide	Timberline					
Hardware	HD-BT0104	M3 x 8 Bolt, BHCS SST	Timberline					
Hardware	HD-BT0137	M3 x 8 Bolt, BHCS, Black-Oxide	Timberline					
Hardware	HD-BT0039	M3 x 12 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-BT0118	M3 x 14 Bolt FHCS, Black-Oxide	Timberline					
Hardware	HD-BT0136	M3 x 12 Bolt FHCS, SST	Timberline					
Hardware	HD-BT0135	M3 x 8 Bolt FHCS, Black-Oxide	Timberline					
Hardware	HD-BT0041	M3 x 25 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-NT0011	M4 Nut, Zinc-Plated Steel	Timberline					
Electronic	C2065G-1000-ND	16AWG Stranded - Green	C2065A21.06	Digikey	C2065W-100-ND	880	\$0.007	1000 ft
Electronic	EL-WR0123	16AWG Stranded - White		Digikey	C2065V-100-ND	1100		
Electronic	EL-WR0108	16AWG Stranded - Violet		Digikey	240-2314-ND	1		
Electronic	EL-MS0216	Ferrite Tubular Bead 19.0mm		Digikey	WN7953-ND	1		
Electronic	PC-CN0046	Term Block Plug 4PQS STR 5.08MM		TII	WN7819-ND	2		
Electronic	PC-CN0032	Term Block Plug 2PQS STR 5.08MM		TII	WN2527-ND	2		
Electronic	EL-MS0074	20-POS_1.00 Dual (Black)		TII	A1062TR-ND	7		
Hardware	HE-SH0031	Repli-Modifed Hexagon Holed, Luzbot Edition, 3.0mm Filament		Repli-discount				
Mechanical	PP-FP0055	Left Plate,	EPOCS					
Mechanical	PP-FP0052	Right Plate,	EPOCS					
Mechanical	PP-FP0051	Top Plate,	EPOCS					
Mechanical	PP-FP0053	Bottom Plate,	EPOCS					
Mechanical	PP-FP0054	Bed Mount Plate,	EPOCS					
Mechanical	PP-FP0056	Electronics cover,	EPOCS					
Mechanical	PP-FP0055	Left Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0052	Right Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0051	Top Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0053	Bottom Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0054	Bed Mount Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0056	Electronics cover,	Rapid Sheet Metal					
Hardware	EL-MS0165	Snaps-Together Cable and Hose Carrier, Feed-Through, 0.41" High x 0.39" Wide Interior SIGS	Rapid Sheet Metal					
Hardware	EL-MS0166	Mounting Brackets for .41" High x .39" Wide Interior Snap-Together Cable and Hose Carriers	Rapid Sheet Metal					
Mechanical	HD-BU00143	EMI/RFI-Shield Heat-Shrink Tubing - Solid polymer bearing R/W:0L_8mm	IGUM					
Electronic	EL-FA0011	FAN 24VDC, Sleeve 5.75CFM, 10x40x10MM, 60mA 6000RPM, 1.44W/2	Kysan					
Electronic	EL-FA0012	FAN 24VDC, BAL 31.60CFM, 80x80x15 MM, 100mA	TF8015-24M-B					
Mechanical	HD-RB0035	8mm Smooth Rod, 31.5mm	Kyocera					
Mechanical	HD-RB0044	304 Stainless Steel	MBK					
Hardware	HD-BT0108	Holbed Bolt, M8 x 50mm Hex Head, 26mm offset, Stainless Steel	Quattro					
Hardware	PP-MF0082	Bed leveling washer, 2013 SST	MBK					
Electronics	TL-CS0083	EMI/RFI-Shield Heat-Shrink Tubing, 3/16" ID Before, 3/32" ID After, 3/16" ID Before, 3/16" ID After	TECflex					
Electronics	TL-CS0129	Interference-Shielding Heat-Shrink Tubing, 3/8" ID Before, 3/8" ID After	TECflex					
Hardware	HD-WA0035	Metric 18-8 Stainless Steel External Serrated Loc. Washer, M3 Screw Size, 6mm OD, 0.4mm ID	McMaster					
Hardware/tools	HD-MS0244	Firm White Polyester Felt Strip, 1/4" Thick, 1" Width, Plain Back	McMaster					
Hardware	HD-MS0235	Metric Aluminum Unthreaded Spacer, 4.5mm OD, 8mm Length	McMaster					
Electronics	EL-MS0273	Tubing, Corrugated Loom, 25"	Fastenal					
Hardware	HD-BT0117	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 40mm Length	Timberline					
Hardware	HD-BT0131	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 45mm Length	Timberline					
Hardware	PP-MF0066	Metric Brass Heat-Set-Inserter for Plastics, Tapered, M2-4 Internal Thread, 2.96MM Length	McMaster					
Hardware	HD-BT0107	Metric Class 12.9 Socket Head Cap Screw Alloy Steel, Black, M2 Thread, 10mm Length, 0.4mm Fastener	McMaster					
Hardware	HD-WA0012	Steel Flat Washer, DIN 125 zinc-plated class 4/N2 screw sz, 5mm OD, 40350	Fastenal					
Hardware	HD-MS0230	M2 x 6 SHCS, Black-Oxide	Timberline					
Hardware	HD-MS0030	M3-.5 3.8mm Heatset Insert	Fastenal					
Hardware	HD-MS0158	M5-.8 6.7mm Heatset Insert	Fastenal					
Hardware	HD-BT0004	M3 Nyloc Nut, Zinc Plated	Timberline					
Hardware	HD-NT0004	M3 Nut, Zinc Plated	Timberline					
Hardware	HD-BT0012	M3 Set Screw (Grub Screw)	Timberline					
Hardware	HD-WA0001	M3 Washer, Steel, Zinc Plated	Timberline					
Hardware	HD-BT0044	M3 x 5 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-BT0128	M3 x 6 Bolt, FHCS Black-Oxide	Timberline					
Hardware	HD-BT0104	M3 x 8 Bolt, BHCS SST	Timberline					
Hardware	HD-BT0137	M3 x 8 Bolt, BHCS, Black-Oxide	Timberline					
Hardware	HD-BT0039	M3 x 12 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-BT0118	M3 x 14 Bolt FHCS, Black-Oxide	Timberline					
Hardware	HD-BT0136	M3 x 12 Bolt FHCS, SST	Timberline					
Hardware	HD-BT0135	M3 x 6 Bolt, FHCS, Black-Oxide	Timberline					
Hardware	HD-BT0041	M3 x 25 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-NT0011	M4 Nut, Zinc-Plated Steel	Timberline					
Electronic	C2065G-1000-ND	16AWG Stranded - Green	C2065A21.06	Digikey	C2065W-100-ND	880	\$0.007	1000 ft
Electronic	EL-WR0123	16AWG Stranded - White		Digikey	C2065V-100-ND	1100		
Electronic	EL-WR0108	16AWG Stranded - Violet		Digikey	240-2314-ND	1		
Electronic	EL-MS0216	Ferrite Tubular Bead 19.0mm		Digikey	WN7953-ND	1		
Electronic	PC-CN0046	Term Block Plug 4PQS STR 5.08MM		TII	WN7819-ND	2		
Electronic	PC-CN0032	Term Block Plug 2PQS STR 5.08MM		TII	WN2527-ND	2		
Electronic	EL-MS0074	20-POS_1.00 Dual (Black)		TII	A1062TR-ND	7		
Hardware	HE-SH0031	Repli-Modifed Hexagon Holed, Luzbot Edition, 3.0mm Filament		Repli-discount				
Mechanical	PP-FP0055	Left Plate,	EPOCS					
Mechanical	PP-FP0052	Right Plate,	EPOCS					
Mechanical	PP-FP0051	Top Plate,	EPOCS					
Mechanical	PP-FP0053	Bottom Plate,	EPOCS					
Mechanical	PP-FP0054	Bed Mount Plate,	EPOCS					
Mechanical	PP-FP0056	Electronics cover,	EPOCS					
Mechanical	PP-FP0055	Left Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0052	Right Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0051	Top Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0053	Bottom Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0054	Bed Mount Plate,	Rapid Sheet Metal					
Mechanical	PP-FP0056	Electronics cover,	Rapid Sheet Metal					
Hardware	EL-MS0165	Snaps-Together Cable and Hose Carrier, Feed-Through, 0.41" High x 0.39" Wide Interior SIGS	Rapid Sheet Metal					
Hardware	EL-MS0166	Mounting Brackets for .41" High x .39" Wide Interior Snap-Together Cable and Hose Carriers	Rapid Sheet Metal					
Mechanical	HD-BU00143	EMI/RFI-Shield Heat-Shrink Tubing - Solid polymer bearing R/W:0L_8mm	IGUM					
Electronic	EL-FA0011	FAN 24VDC, Sleeve 5.75CFM, 10x40x10MM, 60mA 6000RPM, 1.44W/2	Kysan					
Electronic	EL-FA0012	FAN 24VDC, BAL 31.60CFM, 80x80x15 MM, 100mA	TF8015-24M-B					
Mechanical	HD-RB0035	8mm Smooth Rod, 31.5mm	Kyocera					
Mechanical	HD-RB0044	304 Stainless Steel	MBK					
Hardware	HD-BT0108	Holbed Bolt, M8 x 50mm Hex Head, 26mm offset, Stainless Steel	Quattro					
Hardware	PP-MF0082	Bed leveling washer, 2013 SST	MBK					
Electronics	TL-CS0083	EMI/RFI-Shield Heat-Shrink Tubing, 3/16" ID Before, 3/32" ID After	TECflex					
Electronics	TL-CS0129	Interference-Shielding Heat-Shrink Tubing, 3/8" ID Before, 3/8" ID After	TECflex					
Hardware	HD-WA0035	Metric 18-8 Stainless Steel External Serrated Loc. Washer, M3 Screw Size, 6mm OD, 0.4mm ID	McMaster					
Hardware/tools	HD-MS0244	Firm White Polyester Felt Strip, 1/4" Thick, 1" Width, Plain Back	McMaster					
Hardware	HD-MS0235	Metric Aluminum Unthreaded Spacer, 4.5mm OD, 8mm Length	McMaster					
Electronics	EL-MS0273	Tubing, Corrugated Loom, 25"	Fastenal					
Hardware	HD-BT0117	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 40mm Length	Timberline					
Hardware	HD-BT0131	Black Alloy Steel Flat-Head Socket Cap Screw, Class 10.9, M8 Size, 45mm Length	Timberline					
Hardware	PP-MF0066	Metric Brass Heat-Set-Inserter for Plastics, Tapered, M2-4 Internal Thread, 2.96MM Length	McMaster					
Hardware	HD-BT0107	Metric Class 12.9 Socket Head Cap Screw Alloy Steel, Black, M2 Thread, 10mm Length, 0.4mm Fastener	McMaster					
Hardware	HD-WA0012	Steel Flat Washer, DIN 125 zinc-plated class 4/N2 screw sz, 5mm OD, 40350	Fastenal					
Hardware	HD-MS0230	M2 x 6 SHCS, Black-Oxide	Timberline					
Hardware	HD-MS0030	M3-.5 3.8mm Heatset Insert	Fastenal					
Hardware	HD-MS0158	M5-.8 6.7mm Heatset Insert	Fastenal					
Hardware	HD-BT0004	M3 Nyloc Nut, Zinc Plated	Timberline					
Hardware	HD-NT0004	M3 Nut, Zinc Plated	Timberline					
Hardware	HD-BT0012	M3 Set Screw (Grub Screw)	Timberline					
Hardware	HD-WA0001	M3 Washer, Steel, Zinc Plated	Timberline					
Hardware	HD-BT0044	M3 x 5 Bolt, SHCS Black-Oxide	Timberline					
Hardware	HD-BT0128	M3 x 6 Bolt, FHCS Black-Oxide	Timberline					
Hardware	HD-BT0104	M3 x 8 Bolt, BHCS SST	Timberline					
Hardware	HD-BT0137	M3 x 8 Bolt, BHCS, Black-Oxide	Timberline					
Hardware	HD-BT0039	M3 x 12 Bolt, SHCS Black-Oxide						

Hardware	HD-WA0005	M4 Washer	Timberline	8200-0040	\$0.00	6	ea	\$0.02	6000		
Hardware	HD-MS0229	M4 x 25 Bolt, SHCS Black-Oxide	mcmaster	91290A176	\$0.137	2	ea	\$0.16	2020		
Hardware	HD-BT0052	M4 x 55 Bolt, SHCS Black-Oxide	mcmaster	NS050-055	\$0.08	2	ea	\$0.24	11200		
Hardware	HD-WA0007	M5 Washer, Steel, Zinc Plated	mcmaster	91166A240	\$0.022	11	ea	\$0.02	6000		
Hardware	HD-BT0048	M5 x 10 Bolt, SHCS Black-Oxide	Timberline	8050-0510	\$0.02	6	ea	\$0.13	5000		
Hardware	HD-BT0049	M5 x 14 Bolt, SHCS Black_Oxide	Timberline	NOR-M600510145O	\$0.03	3	ea	\$0.16	3000		
Hardware	HD-NT0002	M8 Nyloc Nut, Zinc Plated	Timberline	GBO-946270004	\$0.05	9	ea	\$0.11	9100		
Hardware	HD-WA0006	M8 Washer, Steel, Zinc Plated	Timberline	8200-0080	\$0.01	1	ea	\$0.05	1000		
Hardware	HD-WA0008	Metric Spring Steel Shim - DIN 988 0.5mm Thick, 8mm ID, 14mm OD	Timberline	1	ea	\$0.06	1000	\$0.06	1000		
Hardware	HD-WA0009	Metric Spring Steel Shim - DIN 988 1.0mm Thick, 8mm ID, 14mm OD	Timberline	1	ea	\$0.10	2000	\$0.19	2000		
Hardware	HD-MS0381	Thumb Screw Knob for M4 SHCS, Black	McMaster	7130k32	\$1.030	2	ea	\$2.06	2020		
Hardware	HD-BT0120	Alloy Steel Shoulder Screw, 6mm Diameter x 10mm Long	McMaster	AEH#02-00818-UVB	\$0.02	12	ea	\$0.28	12000		
Hardware	HD-MS058	Shoulder, M5 Thread	Timberline	75282c22	\$0.249	2	ea	\$0.50	2050		
Hardware	HD-MS0249	Wire Tie, 8"	McMaster	7604A55	\$0.066	0.5	g	\$0.03	5 bottles		
Hardware	TL-CS0040	UV-Resistant Cable Tie Holder, Adhesive Back/Screw Mount, 4-Way, for 4.8" Maximum Tie, Blk	McMaster	7604A55	\$0.066	2	ea	\$23.00	2020		
Consumable	HD-RB0036	Extreme-Temperature Pipe Sealant & Threadlocker, 4 oz bottle, blue	Thomson	767.80	\$7.50	10	500ml	\$13.56	2050		
Mechanical	HD-NT0047	Drive Rod 10mm	MTS10 x 2m	GSASL16-5-5	160	mm	mm	\$0.034	10 rolls		
Mechanical	HD-MS0194	10mm x 2mm Flange mount supermount	McMaster	S-139394	160	mm	mm	\$0.78	51 rolls		
Mechanical	HD-MS0255	Coupling, Set Screw, Misumi GSASL16-5-5	Professional Plastics	5279	1	ea	\$1.65	\$1.65	1010		
Mechanical	HD-MS0254	Ultim PEI 0.010" x 12" x 30ft rolls	Uline	QTK21007-06	1	ea	\$1.05	\$1.05	1010		
Electrical	EL-CA0030	S-139394 3M 468MP Adhesive Transfer Tape - 12" x 60 yards	Ba Monoprice	161-PF003063	1	ea	\$3.16	\$3.16	1010		
Electrical	EL-CA0001	6t 18AWG Power Cord Cable w/ 3 Conductor PC Power Connector Socket (C1345-1SP) – Blk	Heilind	576-023007.MXP	2	ea	\$0.45	\$0.89	2050		
Electronics	PP-MP0028	6ft USB 2.0 A-Male to B Male 28/24AWG Cable	Mooser	602-29561-100-03	185	mm	mm	\$0.00	8 rolls		
Electronics	EL-MS0096	AC Power Entry Modules SC MT FUSED 25' TAB	Mooser	879-1327G5-BK	2	ea	\$0.16	\$0.32	2050		
Electronics	EL-WP0240	Cartridge Fuses 125V 7A 6X20 MA UL BC	National Plastic Heater	879-1332-BK	2	ea	\$0.10	\$0.20	2050		
Electronics	EL-MS0098	Wire - Single Conductor 20AWG SOLID PTFE, RED	Peltons	KLT08	1	ea	\$27.95	\$27.95	On Order		
Electronics	EL-MS0010	Heavy Duty Power Connectors POWERPOL 15A CONT	Digkey	EG1535-ND	1	ea	\$6.68	\$6.68	1050		
Electronics	PC-BD0029	Silicon Heater, 24V, 168mm x 168mm, Self Adhesive, w/ connectors	Changzhou FTX Motors Cr	SY425TH7-1504A	5	ea	\$1.702	\$1.702	1100		
Electronics	EL-FP0020	RFB200 Micro flower	UltiMachine	vbx.com	\$7.50	1020	On Order	\$7.50	\$7.50	On Order	
Electronics	EL-SW0023	SWITCH H ROCKER DPST 20A 250V, illuminated red	Shipper's Supply	20140922SA	1	ea	\$6.68	\$6.68	1050		
Electronics	EL-MT0001	NEEMA 17 Stepper Motors	Shipper's Supply	0.018	pc	\$4.95	\$0.09	\$4.95	\$4.95	1010	
Mechanical	HD-MS0204	PC-BB0049	Min-FAMBo, assembled board only with no LCD headers	1	ea	\$7.00	\$7.00	\$7.00	\$7.00	11000	
Mechanical	PP-FP0058	Sealed Skateboardline/Rollerblade Skate Bearing Ball Bearings	1	ea	\$20.53	\$20.53	\$20.53	\$20.53	\$20.53	1010	
Etching	SH-P60075	Laser Engraving Designs	1	ea	\$3.70	\$3.70	\$3.70	\$3.70	\$3.70	1010	
Packaging	SH-P60076	1.5# RECYCLING	1	ea	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	1010	
Packaging	SH-P60083	22x17x4.275ft dw/ OUTSIDE PRINT 2 COLOR	1	ea	\$0.29	\$0.29	\$0.29	\$0.29	\$0.29	1010	
Packaging	SH-P60085	3" x 55 yards 3.1 Mil Uline Clear Carton Sealing Tape 24 rolls/case	1	ea	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	1010	
Packaging	DC-LB0028	Label Labelbot Mini Barcode	1	ea	\$0.24	\$0.24	\$0.24	\$0.24	\$0.24	1010	
Packaging	DC-LB0029	Min 1/1 serial number sticker	1	ea	\$0.14	\$0.14	\$0.14	\$0.14	\$0.14	1010	
Packaging	RW-HB0024	HIPS, 1 meier Sample, Random Color	1	ea	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	1010	
Packaging	SH-P60002	3 x 4" 2 MIL Redlosable Polypropylene Bags	1	ea	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	1010	
Packaging	SH-P60083	9 x 12" 3 MIL Redlosable Polypropylene Bags	1	ea	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	1010	
Packaging	SH-P60084	6 x 10" 6 MIL Redlosable Polypropylene Bags	1	ea	\$1.15	\$1.15	\$1.15	\$1.15	\$1.15	1010	
Packaging	DC-M50028	Packing List, Mini 1.0	1	ea	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	1010	
Packaging	DC-M50029	Quality Assurance Record Mini 1.0	1	ea	\$2.03	\$2.03	\$2.03	\$2.03	\$2.03	1010	
Tools	TLM-NS0020	.003 Stainless Steel/Straight Instrument Cleaner Brush	GORDON BRUSH MFG C	906501	\$0.72	\$0.72	\$0.72	\$0.72	\$0.72	1020	
Tools	EL-NS0220	SWM Style USB Flash drive, 4gb, black	USB Memory Direct	1	ea	\$4.15	\$4.15	\$4.15	\$4.15	\$4.15	1020
Tools	TL-HD0046	Pro Dental Pick, 5 3/4 in	Image Supply	35340592	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	1010	
Tools	TL-HD0009	7 1/2" Nylon Handle Clam Knife	WEBstaurant Store								

Total Lutz

\$732.61

1.00 Needs something

Good to Order

Ordered

3.3 Begonia Renders

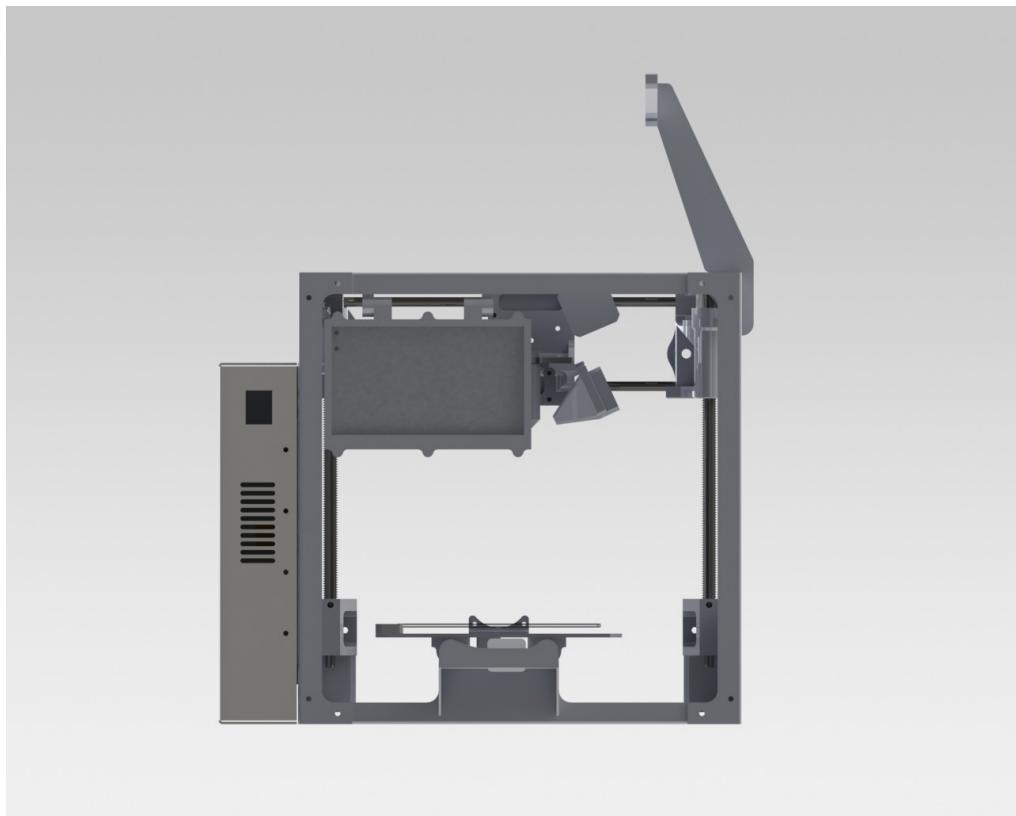


Figure 3.2: Begonia Front Render

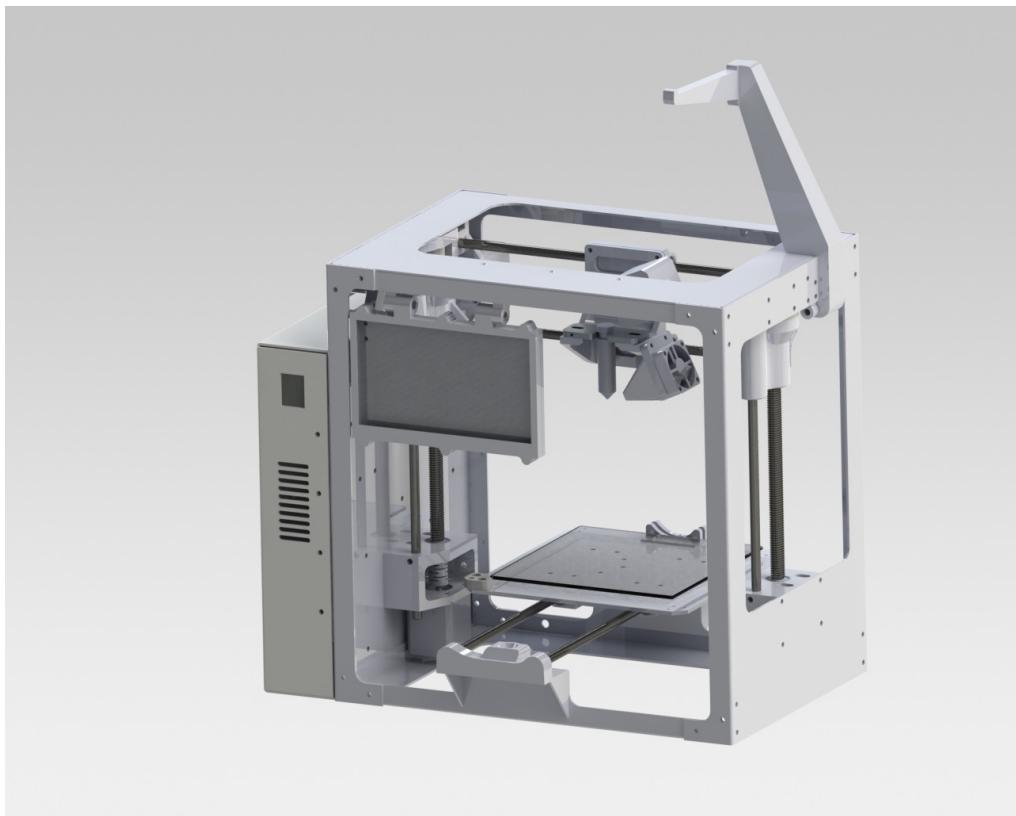


Figure 3.3: Begonia ISO Render

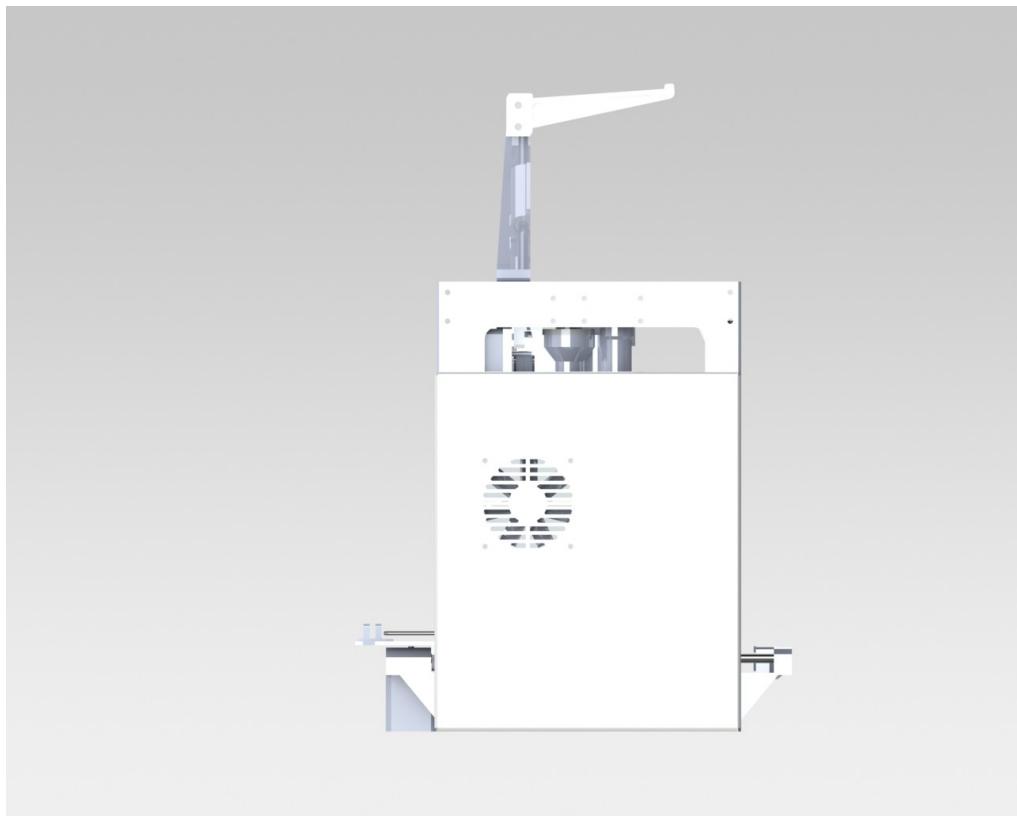


Figure 3.4: Begonia Left Render

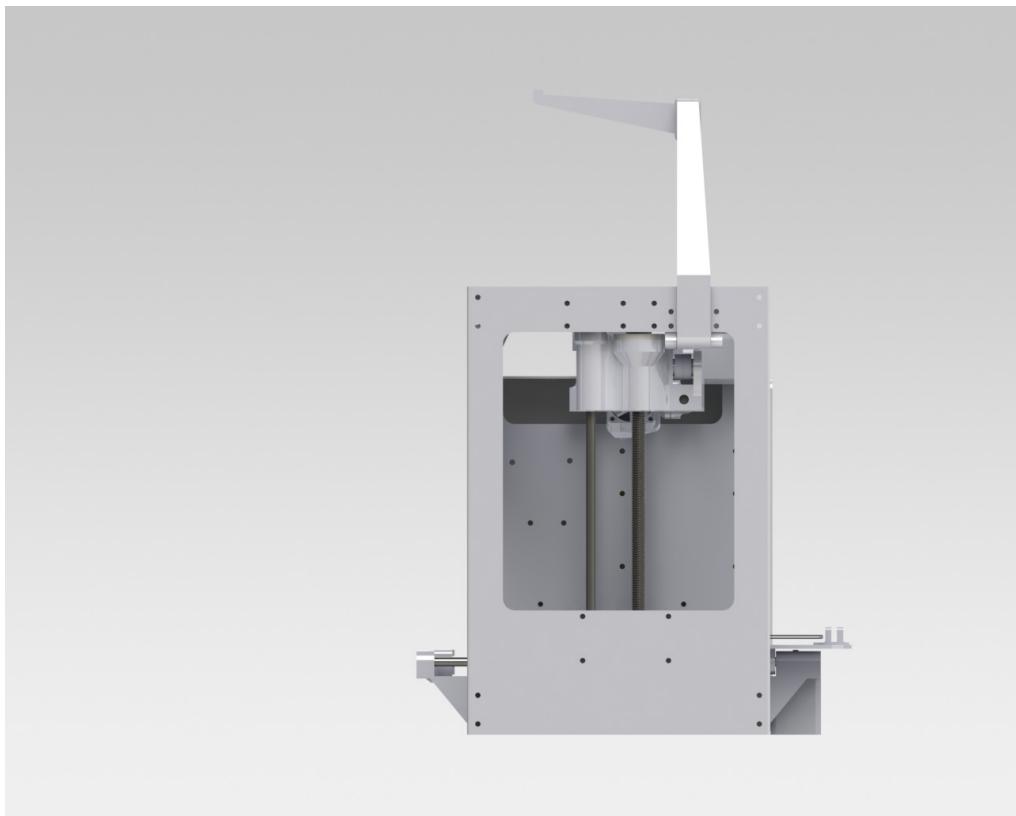


Figure 3.5: Begonia Right Render

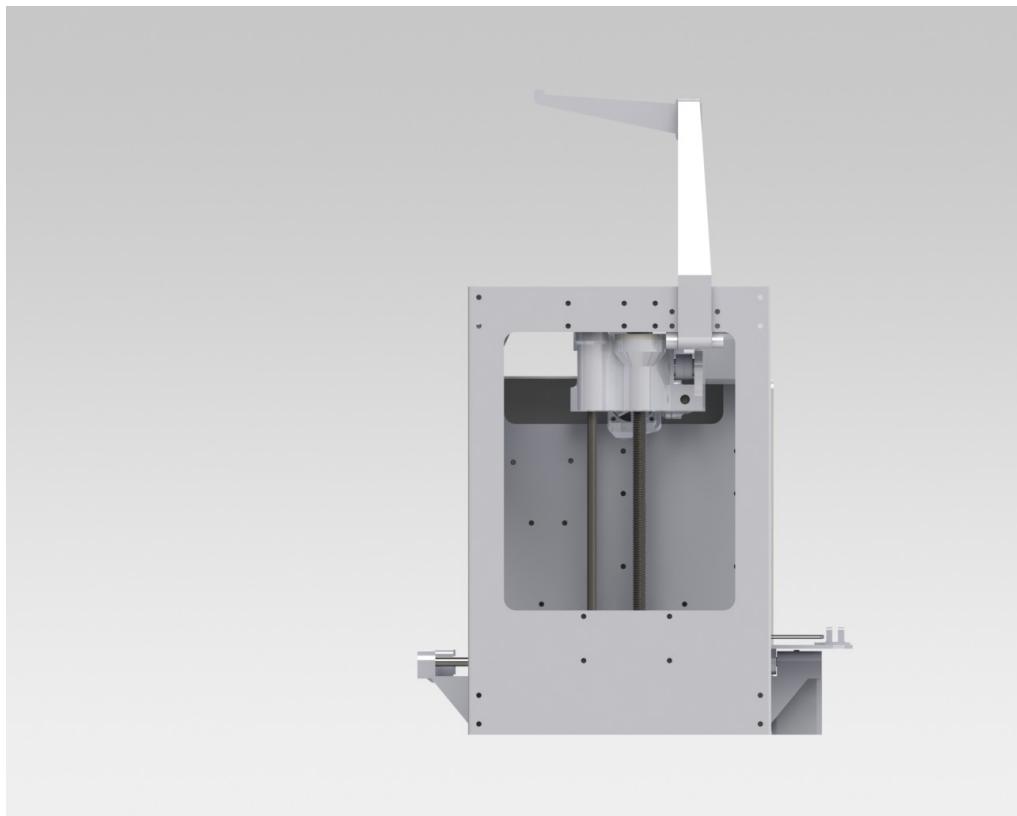


Figure 3.6: Begonia Right Render

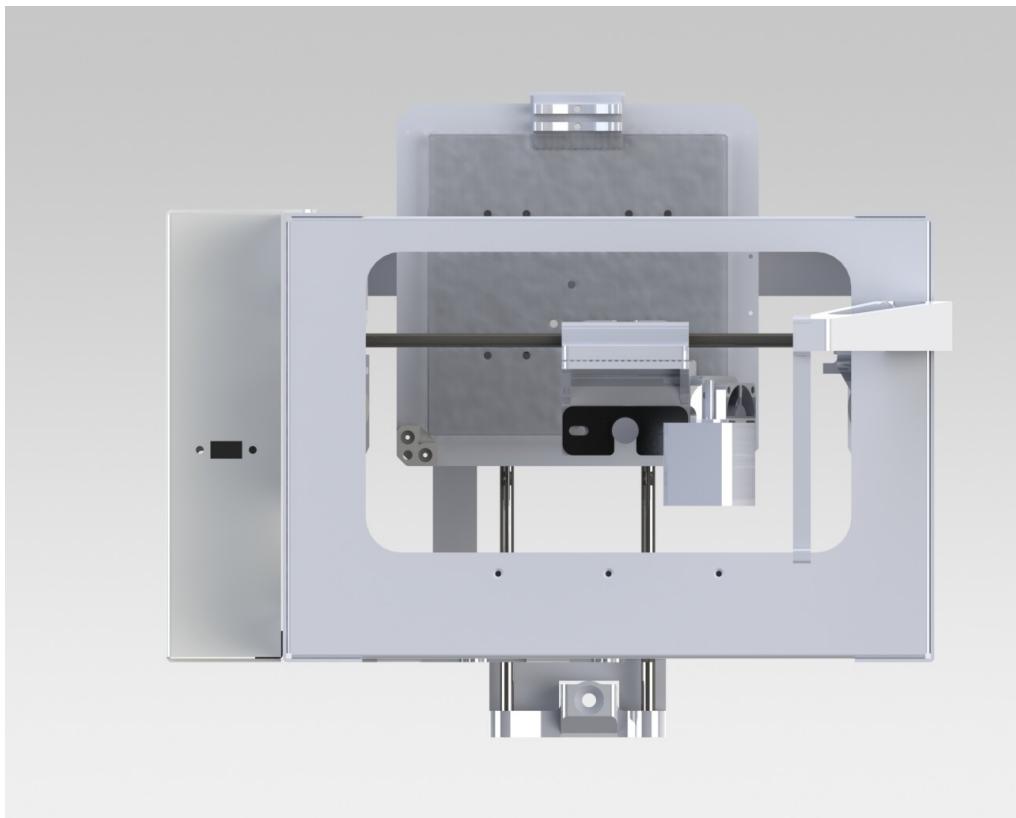


Figure 3.7: Begonia Top Render

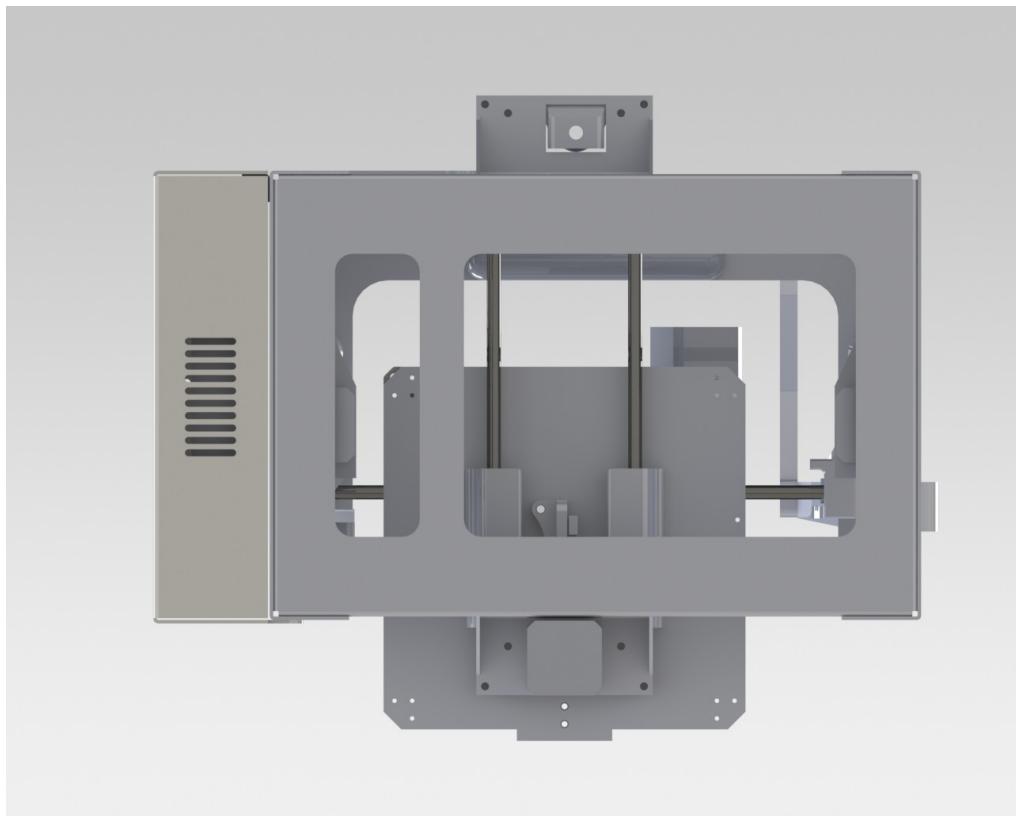


Figure 3.8: Begonia Bottom Render

3.4 Begonia 3D Printed Parts

3.5 Begonia Bed

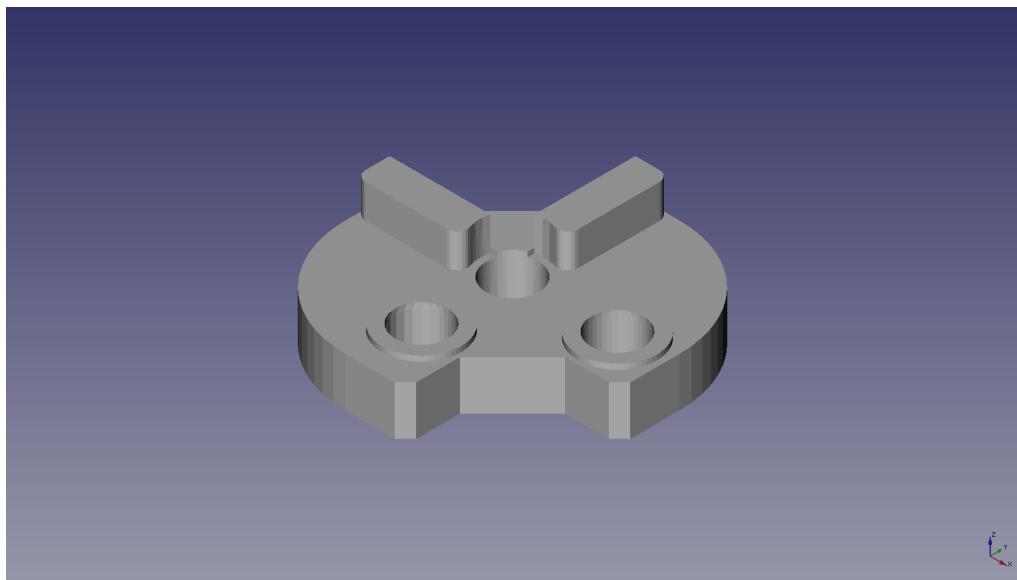


Figure 3.9: Begonia 3D Printed Bed Corner Render

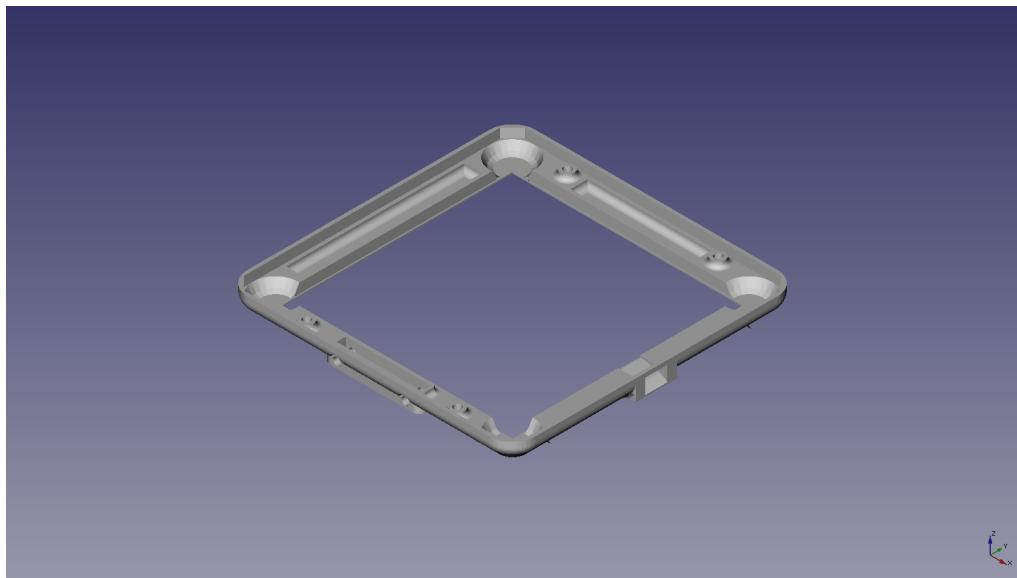


Figure 3.10: Begonia 3D Printed Bed Cover Render

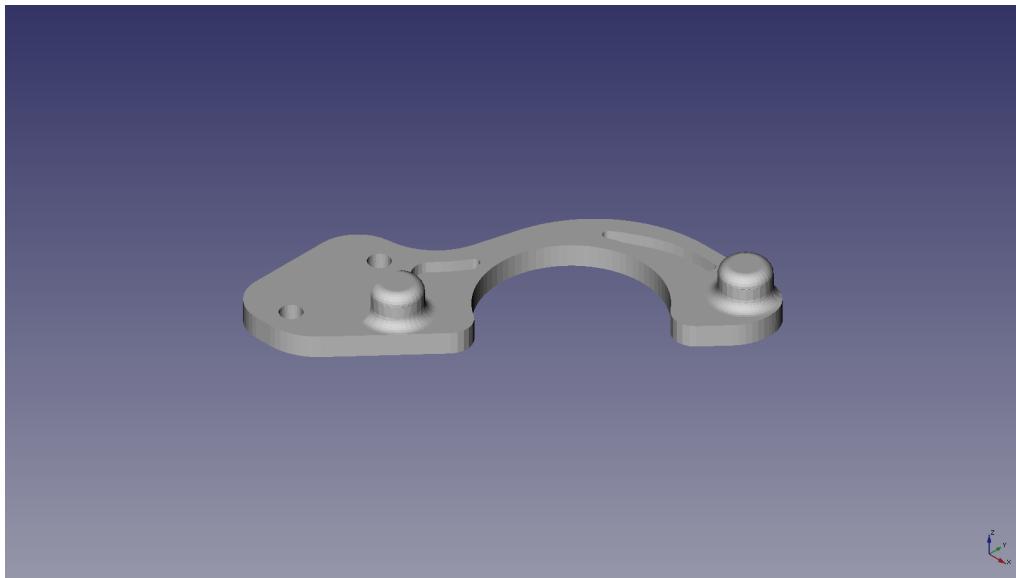


Figure 3.11: Begonia 3D Printed Bed Fan Mount Render

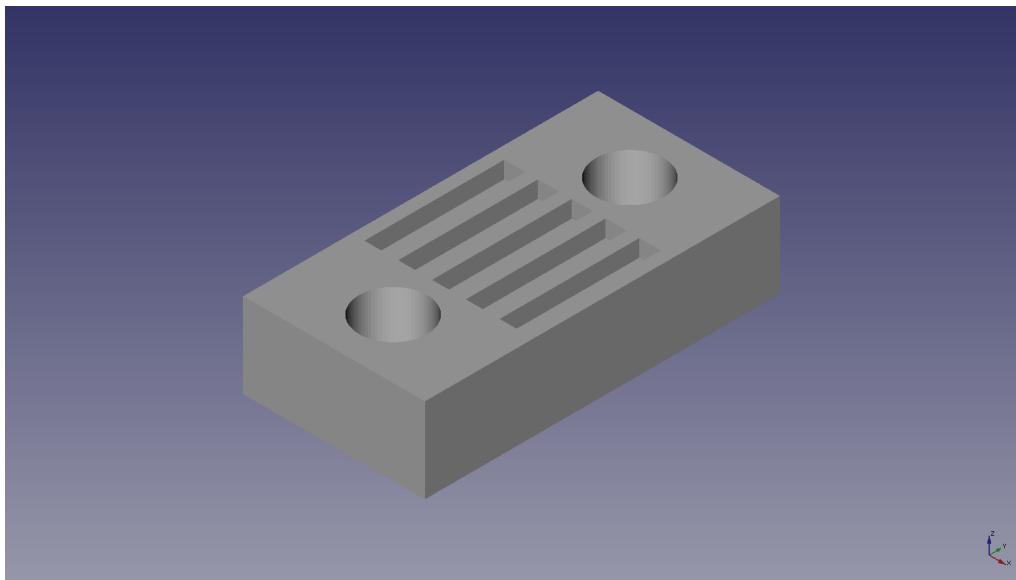


Figure 3.12: Begonia 3D Printed Belt Clamp Render

3.6. BEGONIA EXTRUDER

3.6 Begonia Extruder

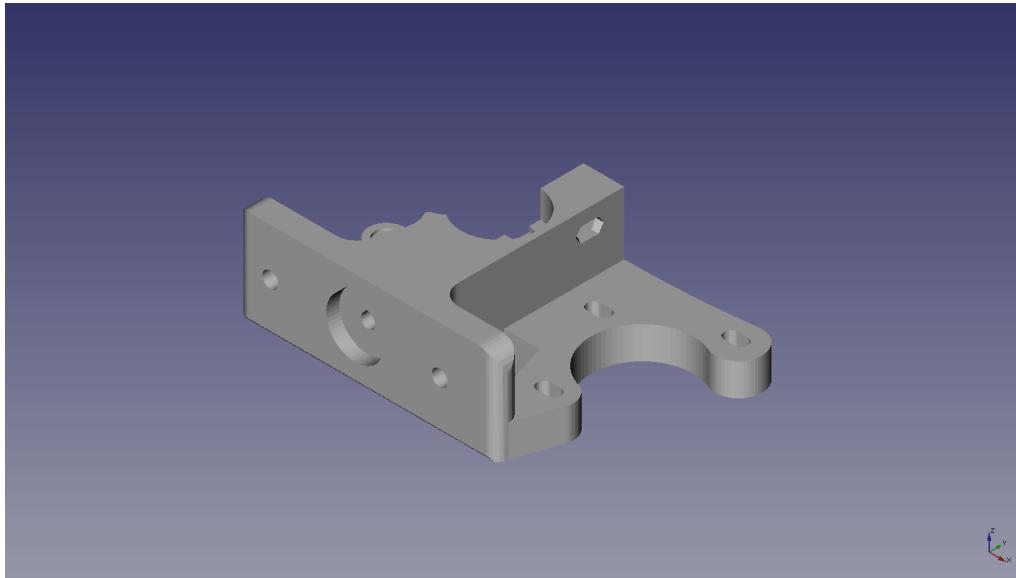


Figure 3.13: Begonia 3D Printed Extruder Body Hex Render

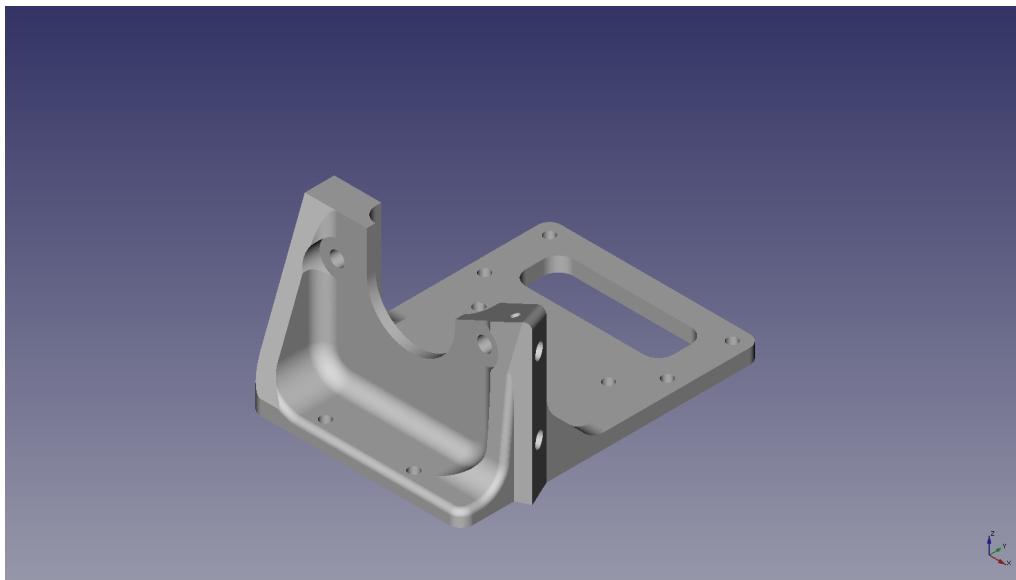


Figure 3.14: Begonia 3D Printed Extruder Mount Render

3.7 Begonia LCD

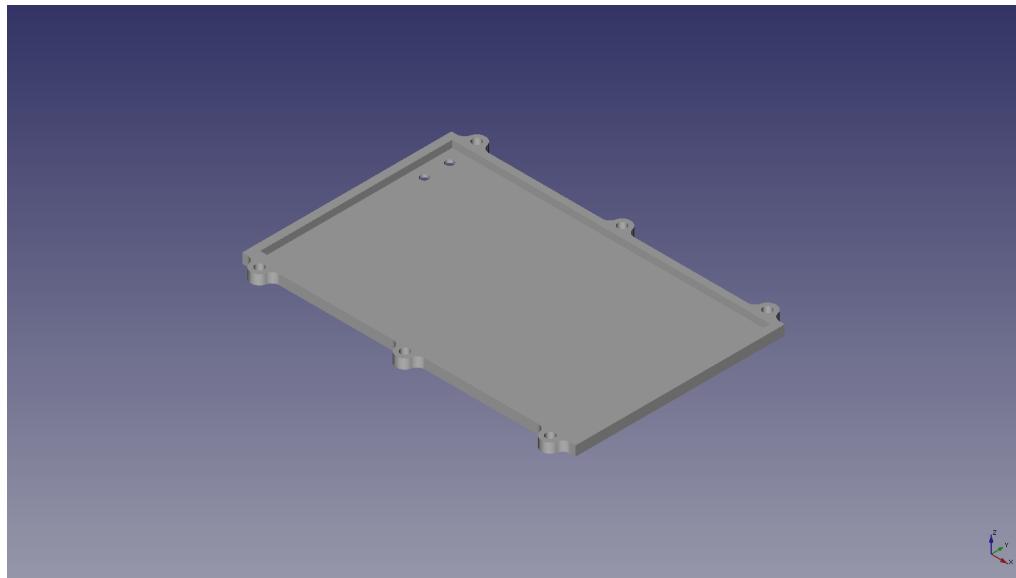


Figure 3.15: Begonia 3D Printed LCD Back Cover Render

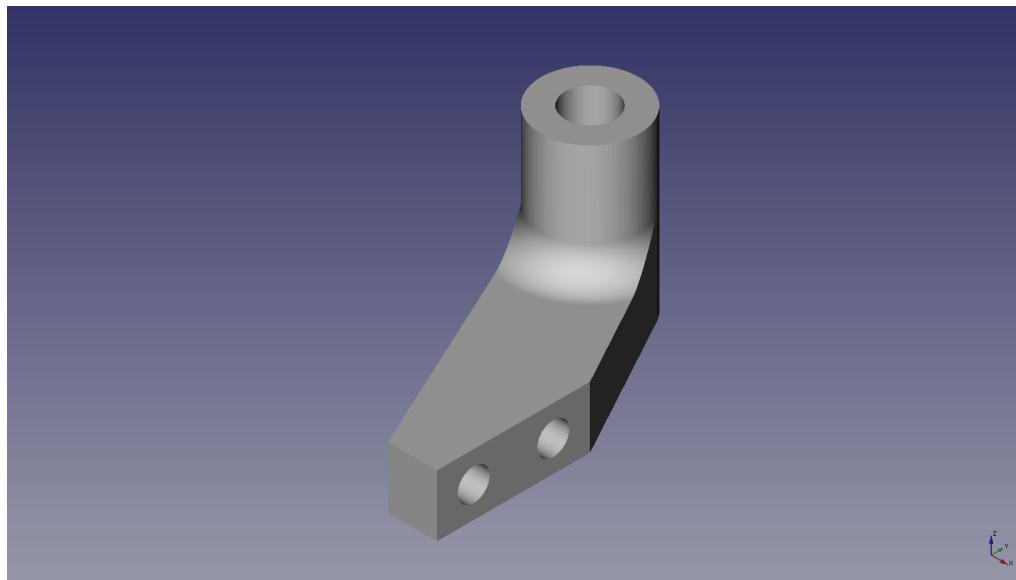


Figure 3.16: Begonia 3D Printed LCD Catch Render

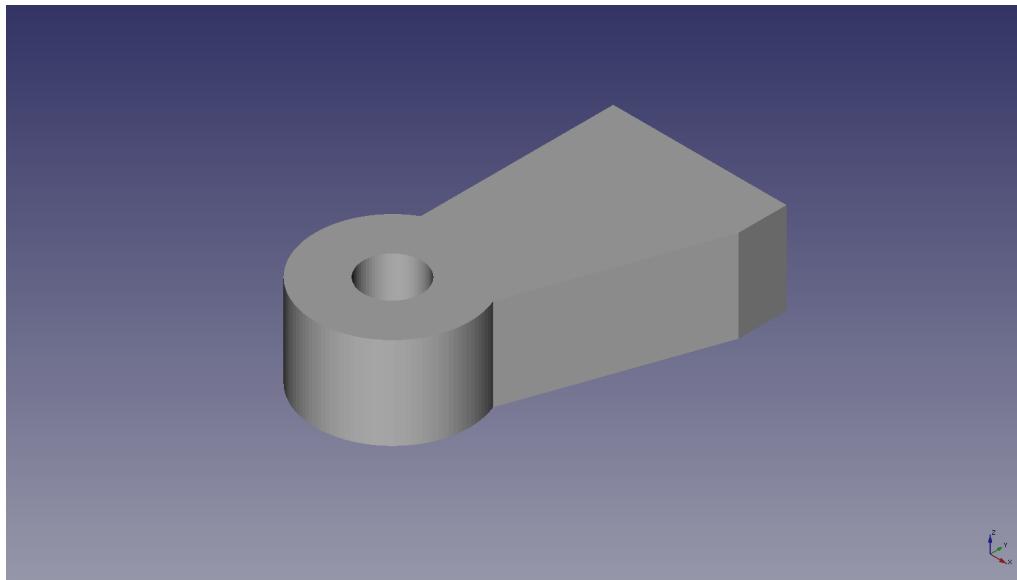


Figure 3.17: Begonia 3D Printed LCD Hinge Render

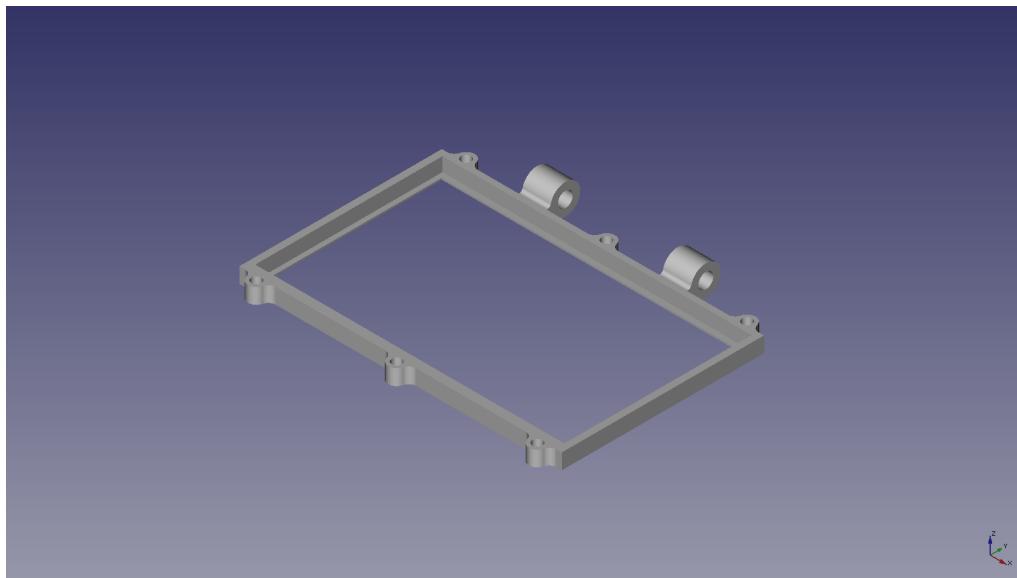


Figure 3.18: Begonia 3D Printed LCD Mount Render

3.8 Begonia Spool

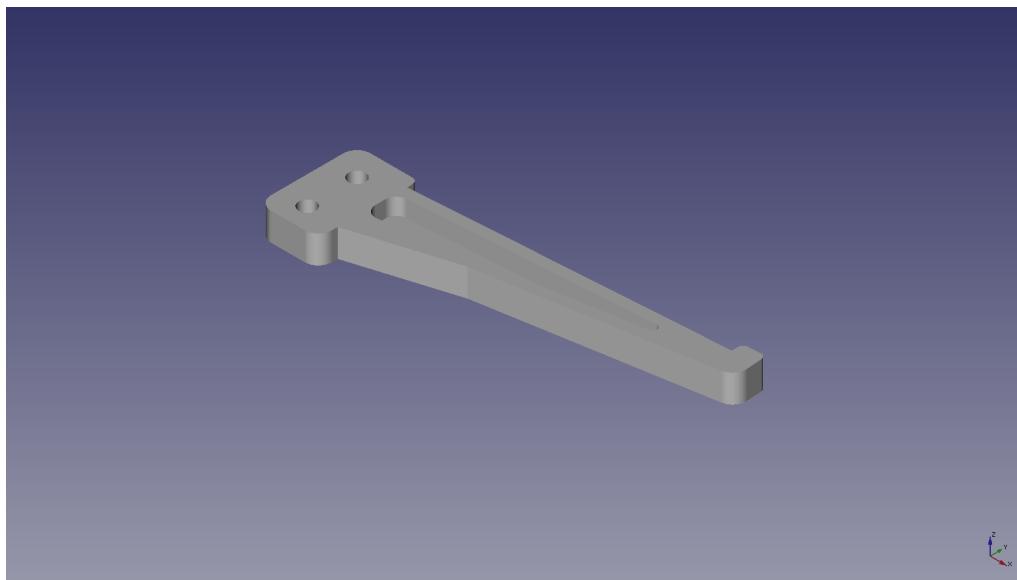


Figure 3.19: Begonia 3D Printed Spool Arm Render

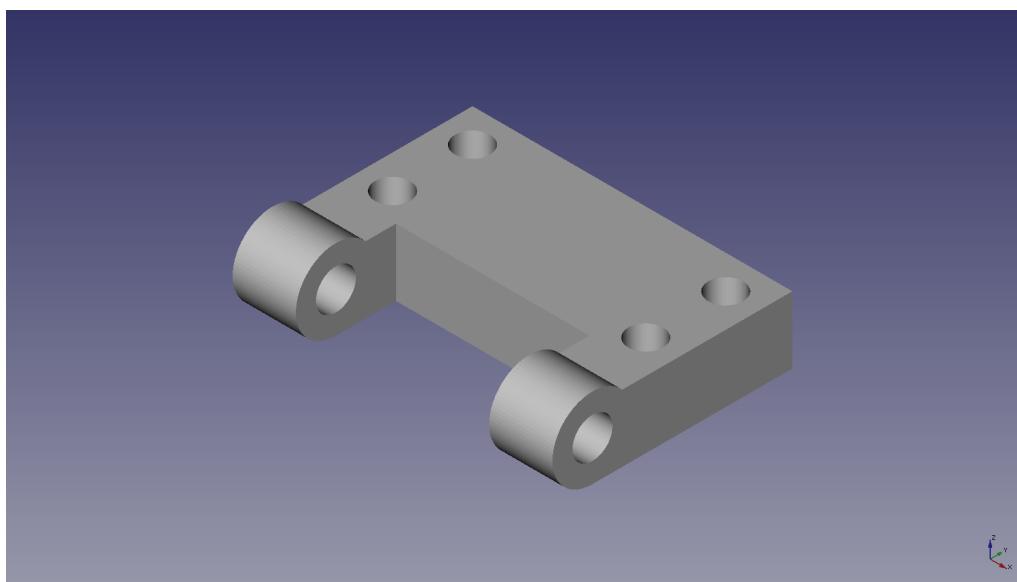


Figure 3.20: Begonia 3D Printed Spool Hinge Render

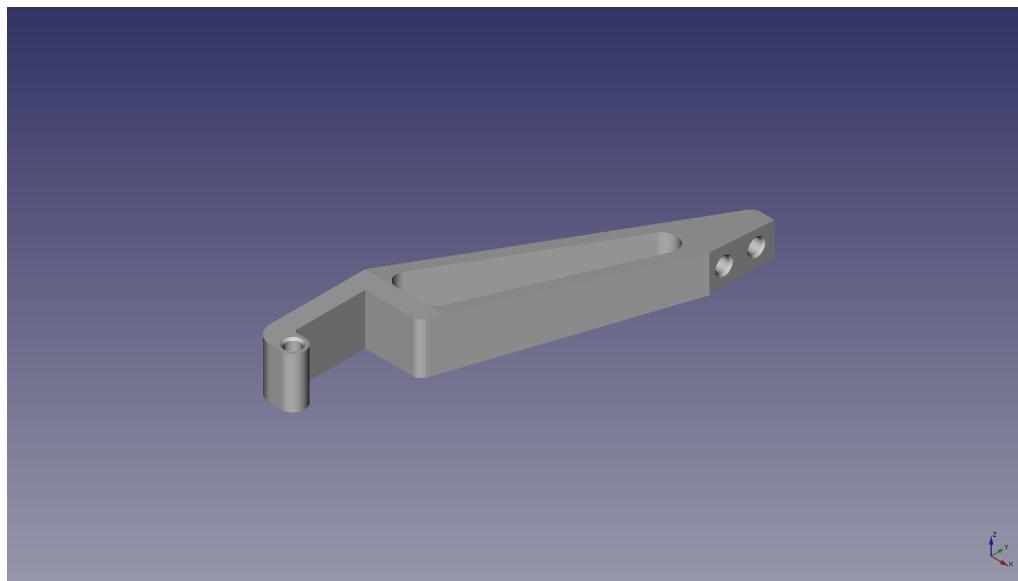


Figure 3.21: Begonia 3D Printed Spool Mount Render

3.9 Begonia X

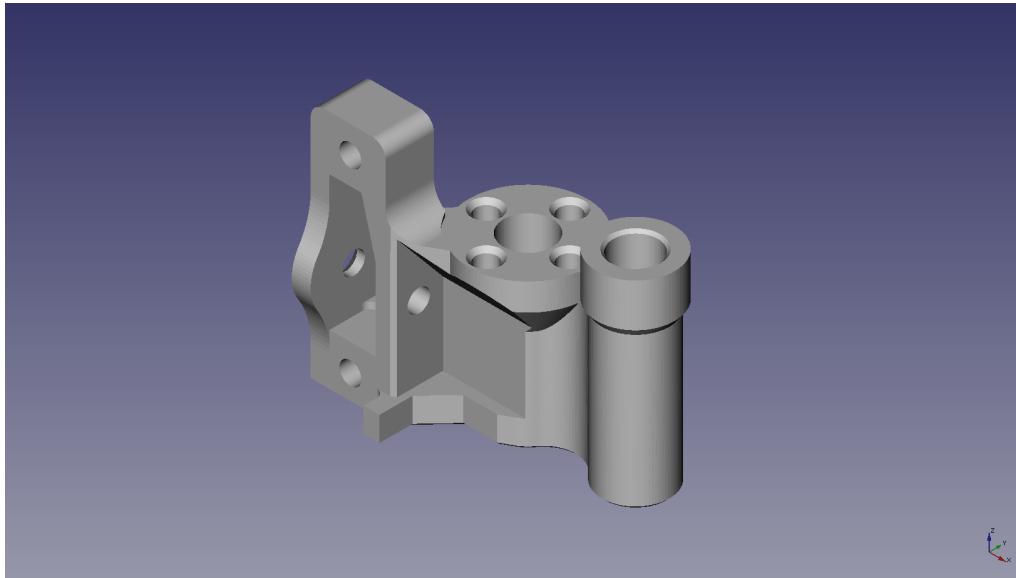


Figure 3.22: Begonia 3D Printed X End Idler Render

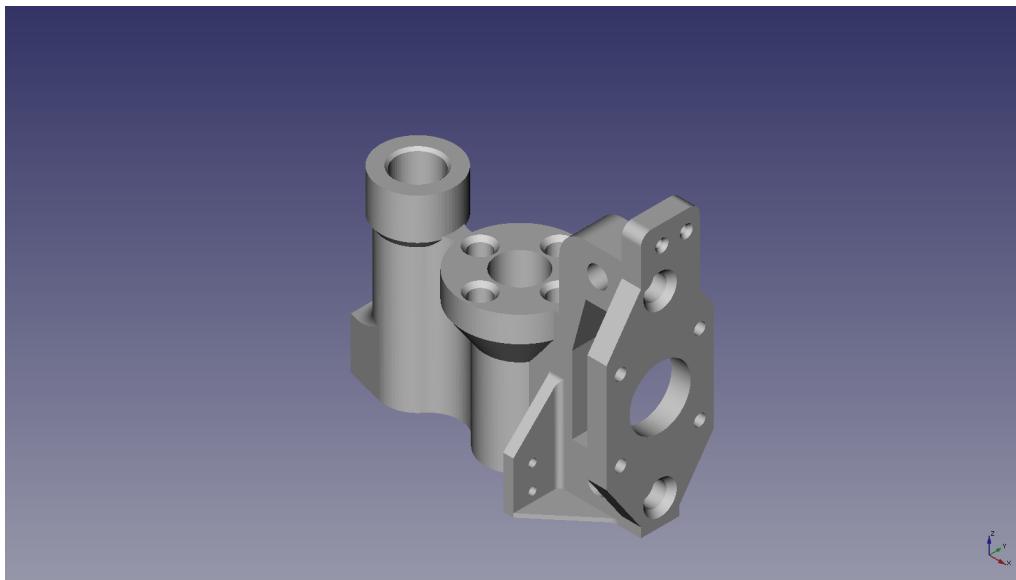


Figure 3.23: Begonia 3D Printed X End Motor Render

3.10 Begonia Y

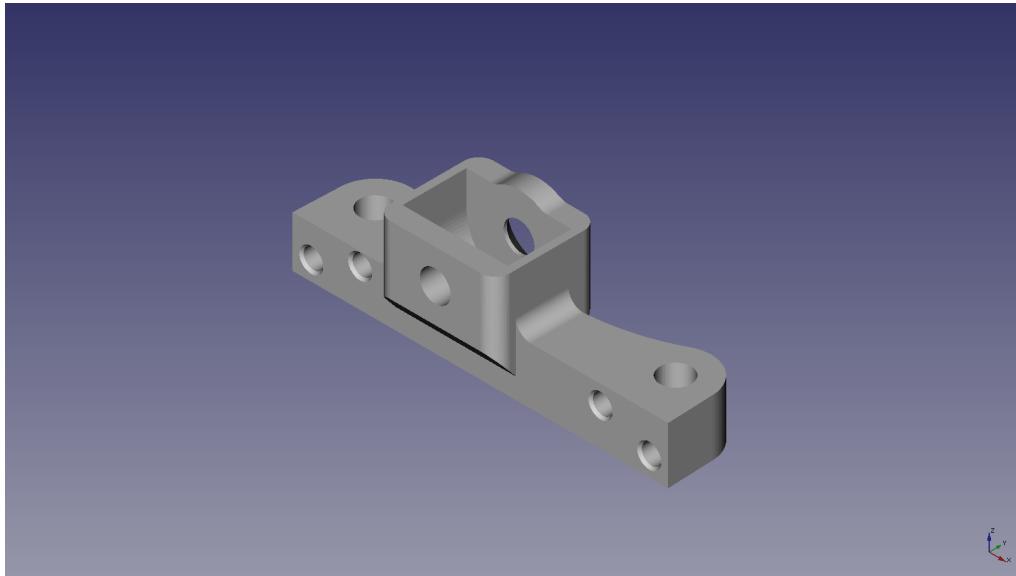


Figure 3.24: Begonia 3D Printed Y End Idler Render

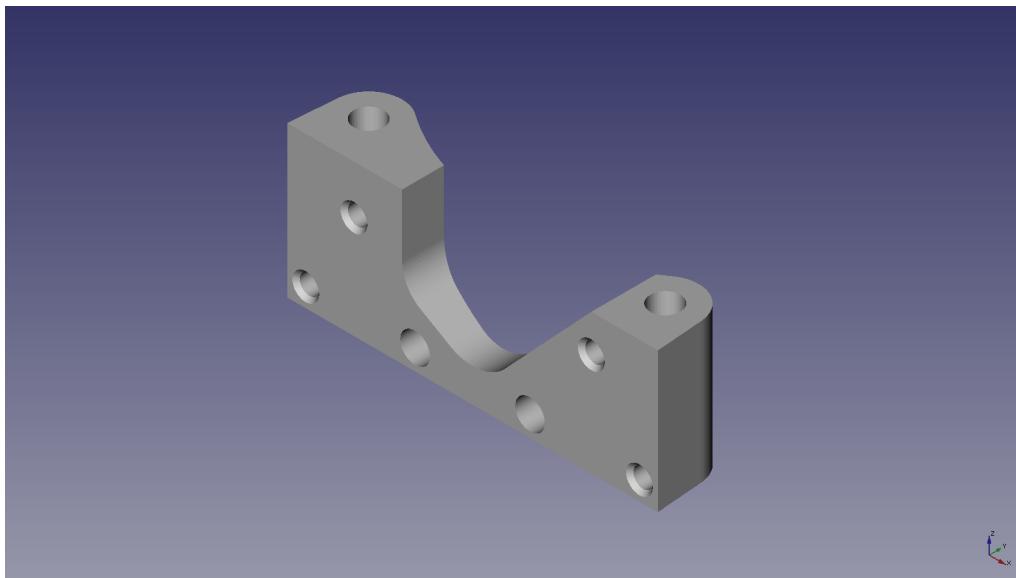


Figure 3.25: Begonia 3D Printed Y Rod Mount Render

3.11 Begonia Z

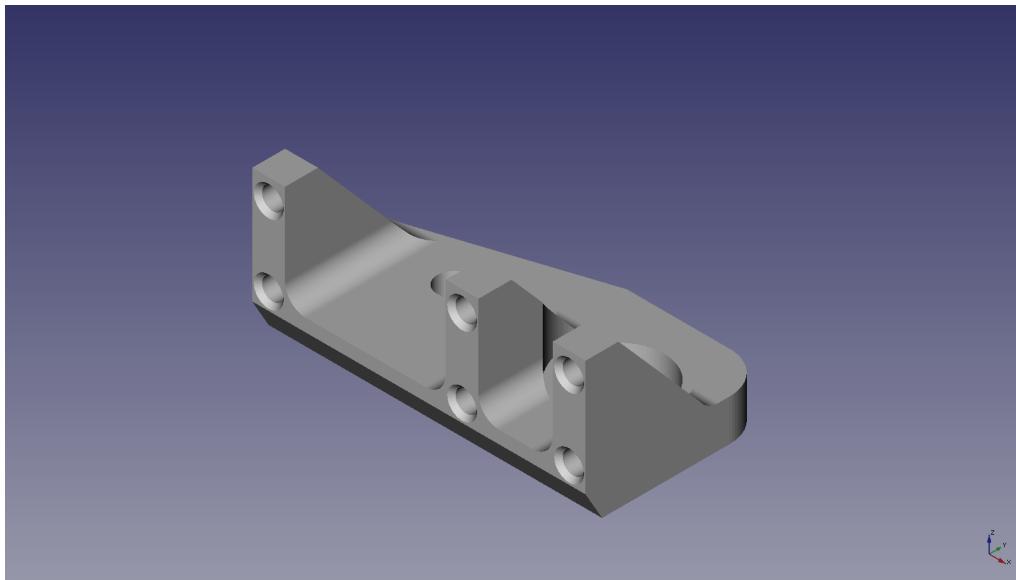


Figure 3.26: Begonia 3D Printed Upper Z Left Render

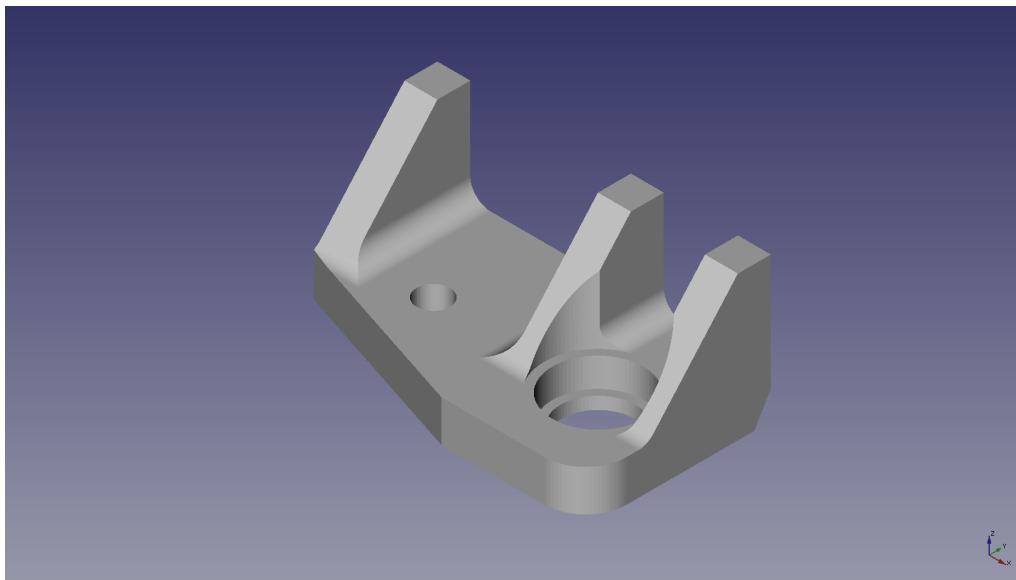


Figure 3.27: Begonia 3D Printed Upper Z Right Render

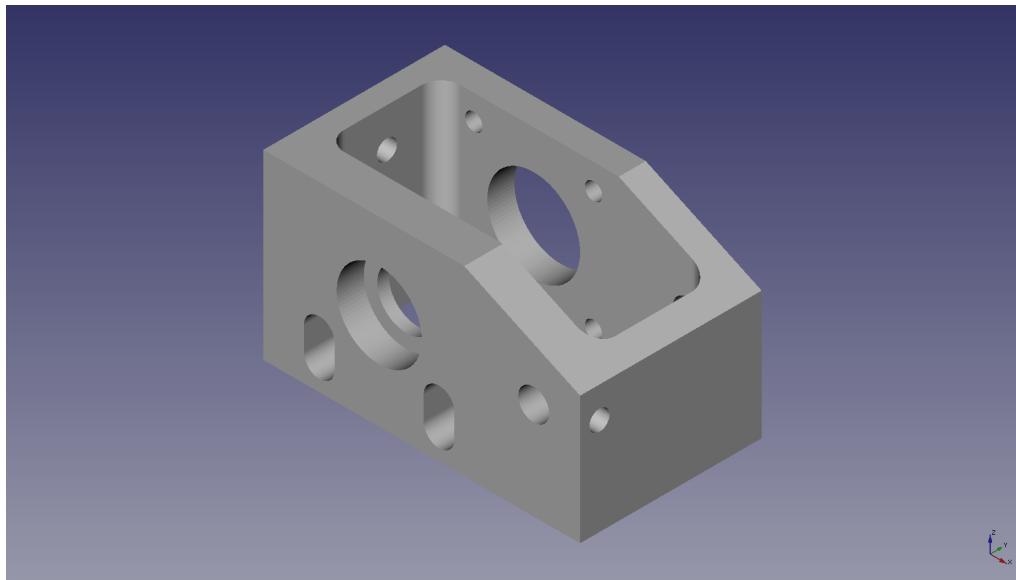


Figure 3.28: Begonia 3D Printed Lower Z Left Render

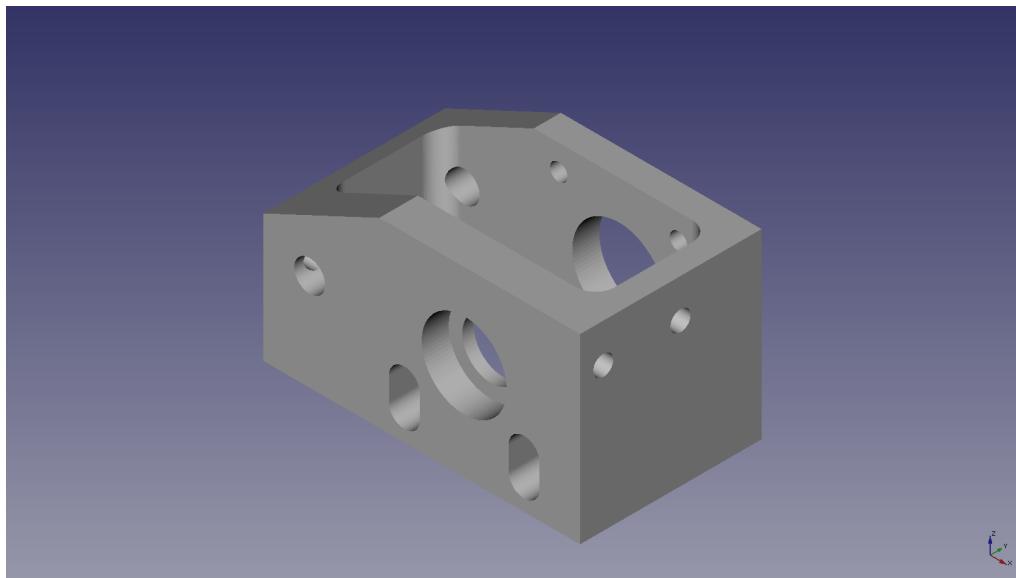


Figure 3.29: Begonia 3D Printed Lower Z Right Render

3.12 Begonia Misc

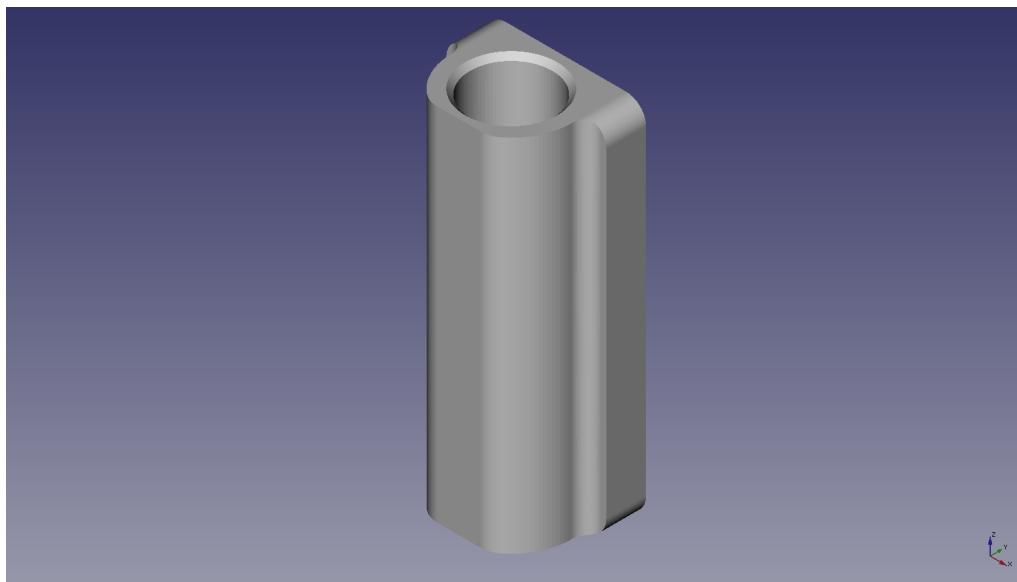


Figure 3.30: Begonia 3D Printed Double Bearing Holder Render

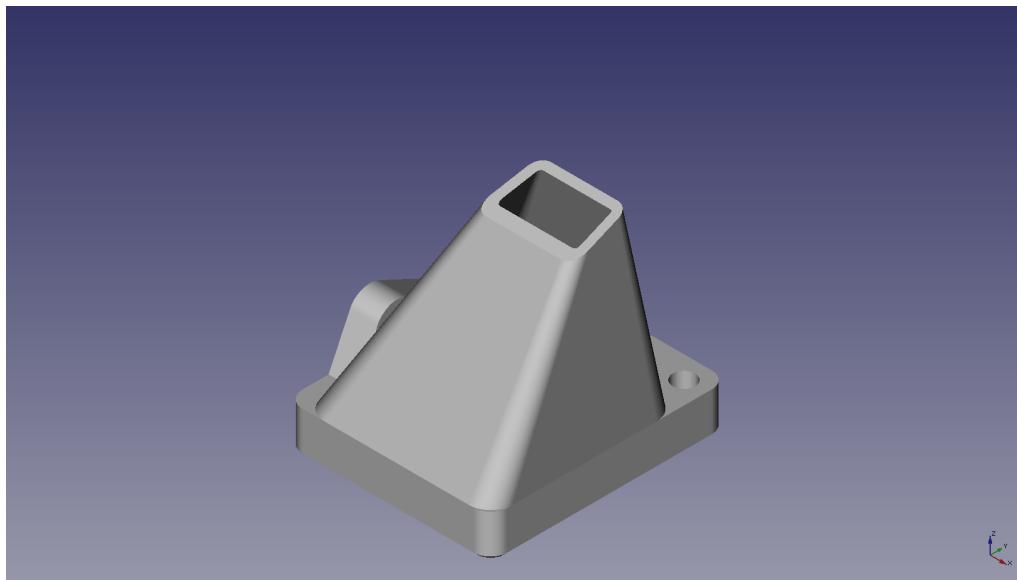


Figure 3.31: Begonia 3D Printed Fan Mount Render

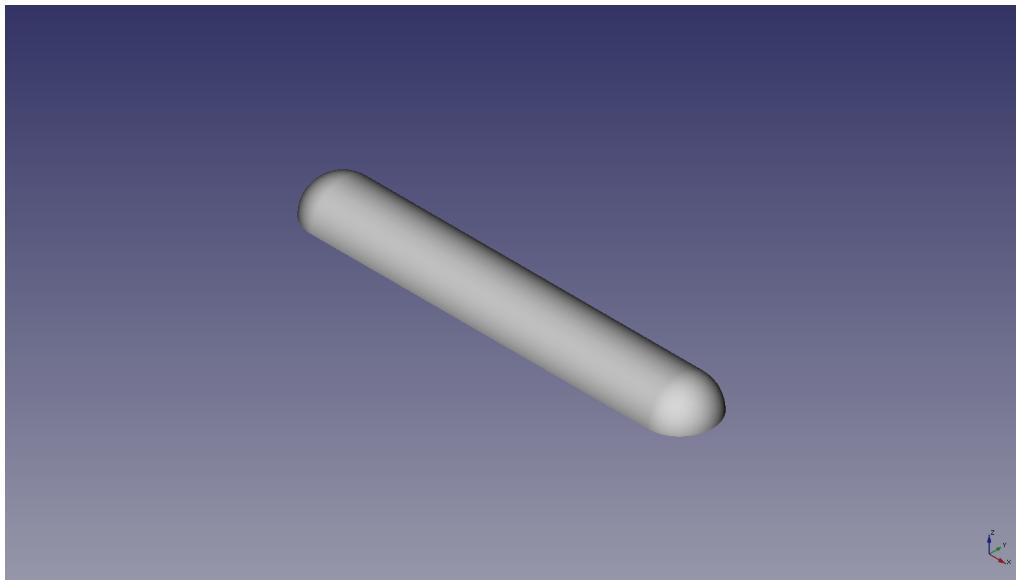


Figure 3.32: Begonia 3D Printed Handle Bar Render

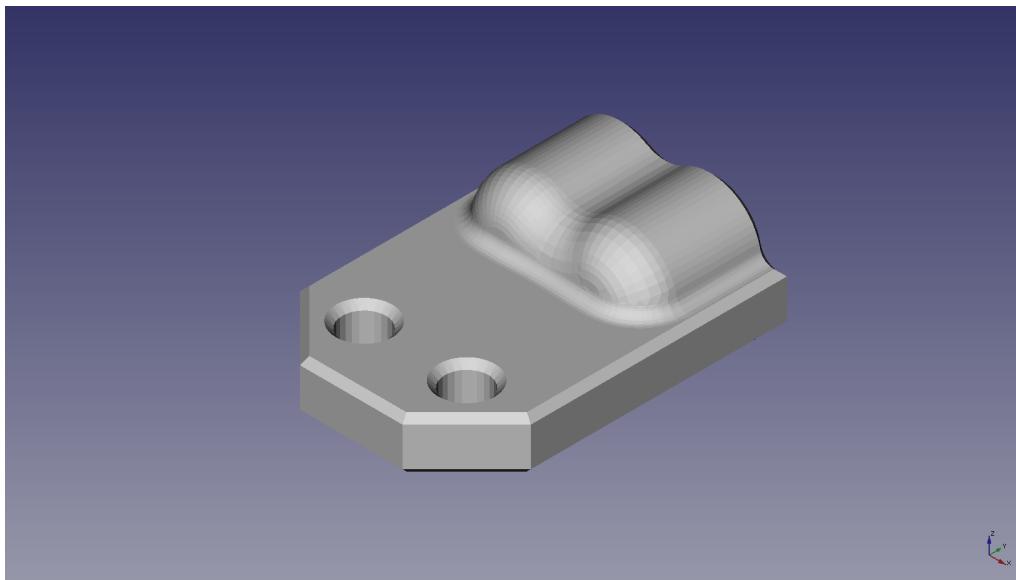


Figure 3.33: Begonia 3D Printed Cable Carrier Mount Render

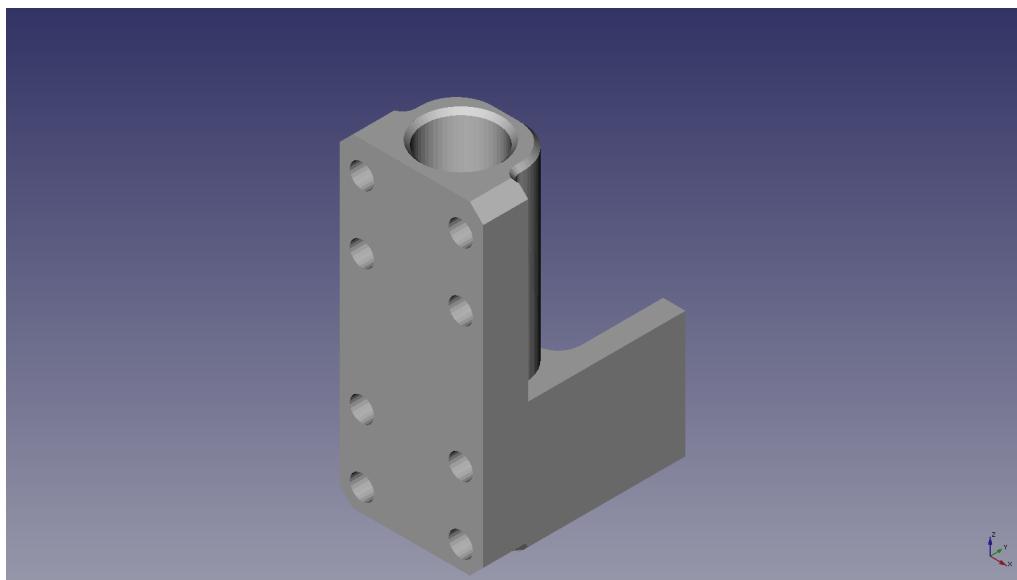


Figure 3.34: Begonia 3D Printed Extruder Mt Top Double Bearing Holder Render

3.13 Begonia Drawings

3.14 Camillia Drawings

Electrical

Power Supply, wiring

4.1 Electrical Layout

4.2 Wire Harness List

Camellia Wire List - V1.0

Harness	Program #	Type	Length	Strip Left	Strip Right	Quantity	Notes
X/Extruder Harness		Blue 24 AWG	500	6	4	1	upped from 460 for better reach
		Black 24 AWG	500	6	4	1	upped from 460 for better reach
		Grey 4 cond	500	50	30	1	upped from 470 for better reach
		Green 24 AWG	550	6	4	1	upped from 520
		Black 24 AWG	550	6	4	1	upped from 520
		Orange 24 AWG	650	6	4	1	upped from 620
		Black 24 AWG	650	6	4	1	upped from 620
		Grey 4 cond	1080	50	30	1	
		Red 24 AWG	1100	6	4	2	
		Orange 24 AWG	1100	4	4	2	
		Yellow 24 AWG	1100	4	4	1	
		Black 24 AWG	1100	4	4	1	
		White 24 AWG	1100	4	4	1	
		Black 24 AWG	1100	4	4	1	
		Purple 24 AWG	1100	4	4	1	
		Black 24 AWG	1100	4	4	1	
		Red 24 AWG	1125	4	4	1	upped from 1100
Bed Harness		Black 24 AWG	525	6	4	3	
		Red 24 AWG	525	6	4	1	
		Yellow 24 AWG	500	4	4	2	upped from 495
		Black 24 AWG	500	4	4	1	upped from 490
		Purple 16 AWG	550	6	6	2	upped from 525
Hexagon Hotend wires		Cartridge wires	180	4	4	2	
		Thermistor wires	180	4	4	2	
		5V nozzle lead	200	4	4	1	
X-max switch		Purple 24 AWG	160	6	4	1	
		Black 24 AWG	160	6	4	1	
Fans		Mini 5V blower	180	blower attached	4	2	
		40mm extrusion fan	120	fan attached	4	2	
		Case fan	160	fan attached	4	2	
Motors		Z-left motor	220	motor	4	4	200mm small shielding, 30mm large shielding
		Ext motor	200	motor	4	4	70mm small shielding
		X motor	120	motor	4	4	105mm small shielding, 30mm large shielding
		Z-right, Ymotor	60	motor	4	8	45 small shielding, 35 large shielding
Motor Extensions							
Z-right motor		Grey 4 cond	500	Trim shielding 20mm, all wires 4mm	Trim shielding 55 with lug, all wires 4mm	1	390 conduit wrap
Y-motor		Grey 4 cond	410	Trim shielding 20mm, all wires 4mm	Trim shielding 55 with lug, all wires 4mm	1	305 conduit wrap
Power Box							
		Red 16 AWG	200	6	6	2	PS to rambo
		Black 16 AWG	200	6	6	2	PS to rambo
		Green 16 AWG	80	6	4	1	Ground plug to post
		Green 16 AWG	50	6	4	1	Post to PS ground
		Black 16 AWG	320	6	6	1	Plug to switch
		White 16 AWG	320	6	6	1	Plug to switch
		Black 16 AWG	250	6	6	1	Switch to PS
		White 16 AWG	250	6	6	1	Switch to PS

3D Printer Controller

Mini-RAMBo

5.1 Intro

The printer controller will be the RAMBo-Mini.

Quality Assurance

Quality Assurance

6.1 Quality Assurance



QUALITY ASSURANCE RECORD

Model: LulzBot Mini 1.0 3D Printer

Page 1 of 3

Serial Number: _____

Date Completed: _____
Tested by: _____

Configuration:

Electronics: Mini-RAMBo 1.0a

Firmware: Marlin for Mini 2014-Q4

Nozzle: 0.5mm diameter nozzle

Settings:

Stepper Motor	Steps/mm	Max Length	Microstep Mode	Digipot
X	100.5	155	16	175
Y	100.5	155	16	175
Z	1600	155	16	220
E0	833	NA	16	135

General:

- Are all the screws and zip ties tight?
- Are the current version of parts being used?
- Is the Spool Mount properly mounted so it flips up and sits securely?
- Is the Finger Clip properly mounted with the taller side on the left?
- Are the switches tight? They shouldn't wiggle side to side.
- Are all 4 rubber feet installed?
- Is the PEI tape free of bubbles and wrinkles?
- Is the heat bed adhesive smooth and consistent with no finger prints?

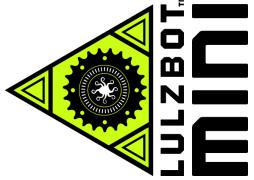
Y Axis:

- Does the Y bed move freely back and forth?
- Is the belt mounted in the correct orientation?
- Is the Y bed tight side to side from motion and twisting?
- Are all the screws on the bearing holders tight?
- Does the Y belt rub the bottom of the y-idler by the bearings?
- Is the Y pulley tight?
- Is one of the set screws on the Y pulley aligned with the flat on the motor shaft?
- Are both pulley set screws tightened?
- Is the level of the Y pulley at the same height as where the belt mounts on the belt holder?
- Is the Y belt tight?
- Are the four bed leveling washers tight?
- Are the belts trimmed far enough to not interfere with the pulley or bearing?



Aleph Objects, Inc.
626 West 66th Street
Loveland, Colorado 80538 USA

www.alephobjects.com
www.lulzbot.com
+1-970-377-1111



QUALITY ASSURANCE RECORD

X Axis:

- Is the X pulley tight?
- Is one of the set screws on the X pulley aligned with the flat on the motor shaft?
- Are both pulley set screws tightened?
- Is the belt mounted in the correct orientation?
- Is the belt free from rubbing anywhere during motion?
- Is the X belt tight?
- Does the X axis move freely end to end?
- Are the X bars flush with the right side?
- Are the set screws that hold the X bars tight?
- Are the belts trimmed far enough to not interfere with the pulley or bearing?

Z Axis:

- Do the Z drive rods rotate smoothly with no up and down movement between the bearings?
- Are the set screws that hold the Z bars tight?
- Are the coupler set screws tight?
- Are the drive rods and motor shafts aligned so the couplers are not bent?

Extruder:

- Can you adjust the extruder springs?
- Are the V grooves on the extruder gears lined up?
- Is the extruder mount secure on the X carriage?
- Is the extrusion fan mounted correctly?
- Is the extruder blower mounted correctly?
- Does the idler bearing stick out of the idler block?
- Is the hobbing aligned to the hole in the extruder?
- Is the set screw in the small gear tight and on the flat of the motor shaft?
- Can you feed filament about 100mm from the top of the extruder?
- Are the gears tight with no back-lash?
- Do the extruder gears turn smoothly for several rotations?

Electronics:

- Are all connections to the Mini-Rambo plugged in correctly?
- Can you plug in USB cable from the outside of the enclosure?
- Is the case fan plugged in?
- Are all cables free from contacting any moving parts?



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QUALITY ASSURANCE RECORD

Test and Verification Results:

- Verify case fan is running.
- Verify extruder blower is running.
- Verify control of the extrusion fan.
- Nozzle temperature control verified.
- Nozzle re-tightened during first heat cycle.
- Extruder control verified.
- X, Y, and Z min and max stop switches verified.
- X and Y homing are making contact with bed leveling washer.
- Bed leveling is functioning properly.
- Bed temperature control verified.
- Bearing conditioning complete.
- X, Y, and Z motion smooth over full range and speeds.
- Test print (Rocktopus*) successful.
- Print head moved to shipping position.

Page 3 of 3

*Rocktopus by Kent Johnson is licensed under CC BY-SA 4.0 and derived from work by dietzl and yeoldebrarian - lulzbot.com/rocktopus



Aleph Objects, Inc.
6226 West 66th Street
Loveland, Colorado 80538 USA

www.alephobjects.com
www.lulzbot.com
+1-970-377-1111

Packing

If It Shakes It Breaks

7.1 Packing List

Pack it well.



PACKING LIST

Page 1 of 1

Model: LulzBot Mini 1.0 3D Printer

Serial Number: _____
Date Completed: _____
Completed by: _____

Items to include:

Printer and Cables:

- LulzBot Mini 1.0 3D printer
- 6ft 18AWG Power Cord Cable (5279)
- 6ft 18AWG England Power Cord Cable (7691) (If applicable)
- 6ft 18AWG European Power Cord Cable (7692) (If applicable)
- USB cable

Supplies:

- USB drive with source files
- 3 meter sample of LulzBot HIPS 3D printer filament
- Dental pick
- Brush
- Clam knife
- 5x replacement wiping pads

Final Print:

- Rocktopus* printed by this LulzBot Mini 3D Printer

Documentation:

- Quick Start Guide
- Quality Assurance Record document
- Packing List document

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www.alephobjects.com
www.lulzbot.com
+1-970-377-1111

Aleph Objects, Inc.
626 West 66th Street
Loveland, Colorado 80538 USA

Contact

Phone, Email, Web, Location

8.1 Support

Email: support@alephobjects.com

Phone: +1-970-377-1111 x610

LulzBot Forum

<http://forum.lulzbot.com>

8.2 Sales

Email: sales@alephobjects.com

Phone: +1-970-377-1111 x600

8.3 Websites

Aleph Objects, Inc.

<http://www.alephobjects.com>

LulzBot 3D Printers

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Colophon

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