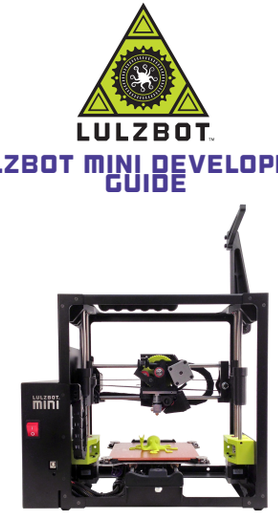

LulzBot Mini Developer's Guide

by Aleph Objects, Inc.

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

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

20141126

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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/

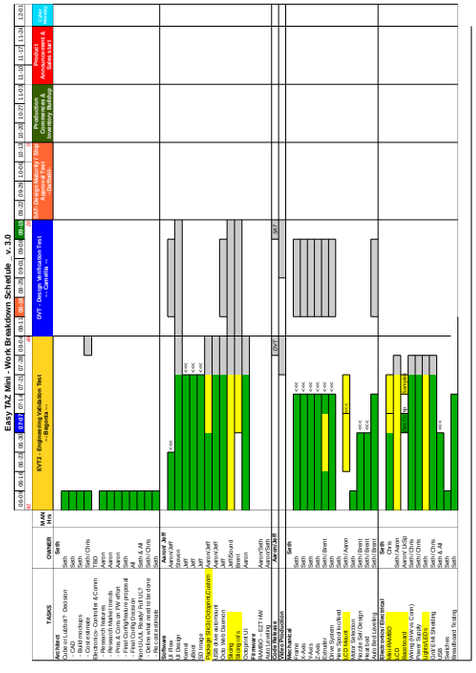
1.2 Versions

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
- Croton - Fourth Prototype
- Daffodil - First Production batch

1.3 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)

Phyiscal 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

Temperature

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

Mechanical

Cartesian Bot in X, Y, Z

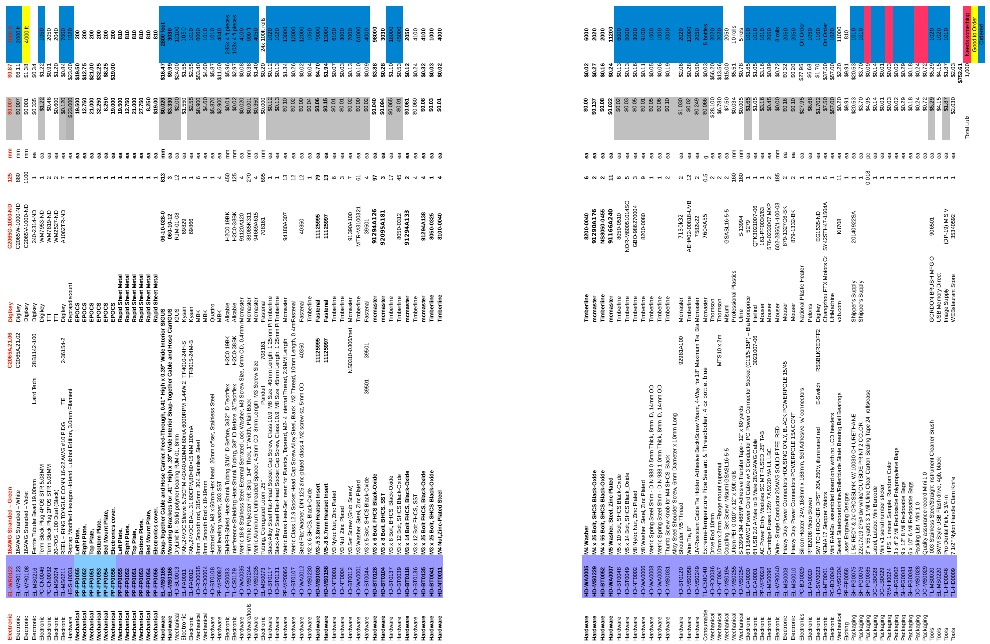
3.1 Intro

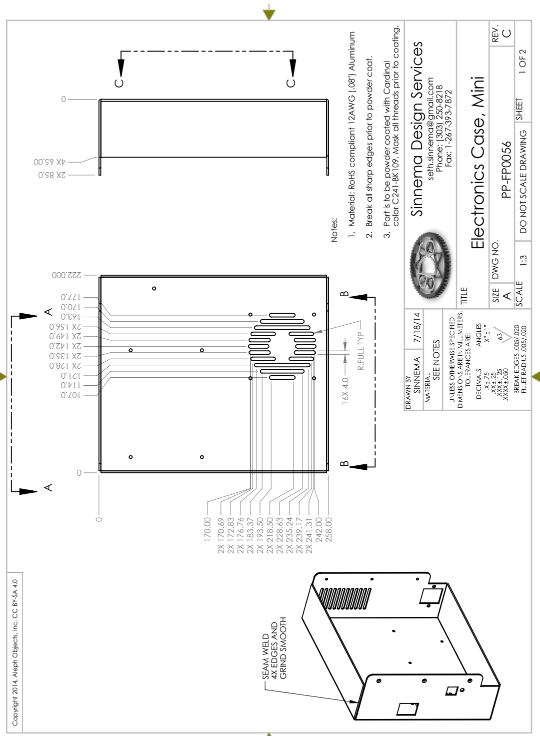
Mechanical hardware specs and parts are in these subdirectories:
http://devel.lulzbot.com/mini/

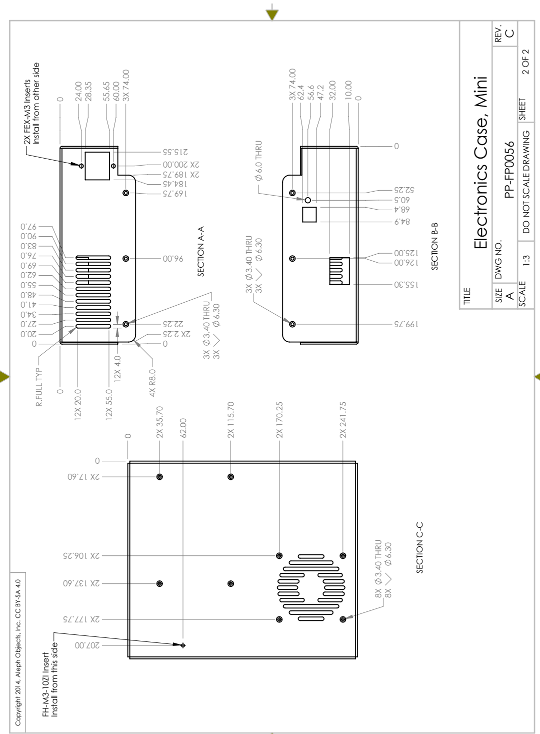
3.2 Bill of Materials

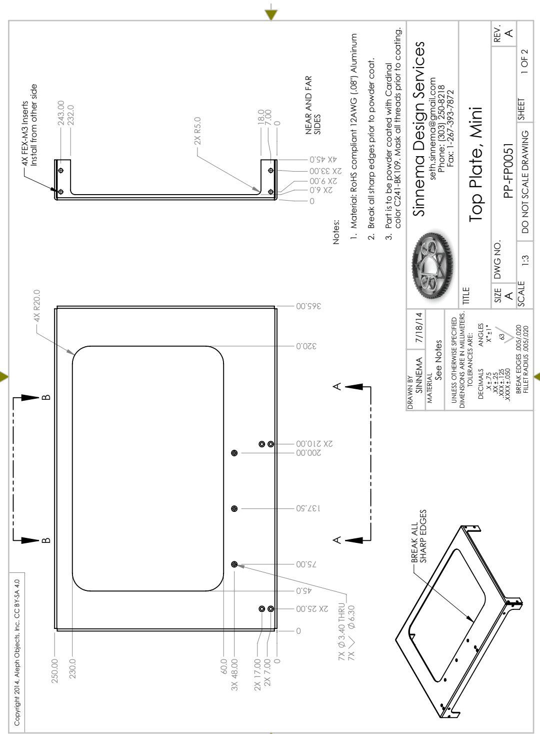
Category	AO Part #	Description	Manufacturer	Manufacturer PN	Distributor	Distributor SKU	Qty Per	UOM	Price Per Unit	Price Total	Qty to Order
Hardware	HD-MS0054	Square Bumper			Advanced Antivibration co	V10R87-B08130	4	ea	$0.09	$0.35	42 Sheets of 98
Printed	PP-GP0189	Double bearing holder v1.2, Mini			Aleph Objects		2	ea	$3.010	$6.02	
Printed	PP-GP0188	Upper bearing holder v1.1, Mini			Aleph Objects		1	ea	$3.300	$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 Idler 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	Belt mount v1.0, Mini			Aleph Objects		2	ea	$1.260	$2.52	
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	$5.150	$5.15	
Printed	PP-GP0176	Bed corner v2.2, Mini			Aleph Objects		4	ea	$0.290	$1.16	
Printed	PP-GP0175	Y idler mount v1.2, Mini			Aleph Objects		1	ea	$2.230	$2.23	
Printed	PP-GP0174	Y rod mount v1.1, Mini			Aleph Objects		1	ea	$3.010	$3.01	
Printed	PP-GP0173	Spool hinge v1.3, Mini			Aleph Objects		1	ea	$0.870	$0.87	
Printed	PP-GP0172	Spool arm v1.0, Mini			Aleph Objects		1	ea	$1.550	$1.55	
Printed	PP-GP0171	Spool mount v1.2, Mini			Aleph Objects		1	ea	$7.090	$7.09	
Printed	PP-GP0170	Relief mount v1.3, Mini			Aleph Objects		1	ea	$1.070	$1.07	
Printed	PP-GP0169	Handle bar v2.4, Mini			Aleph Objects		1	ea	$2.040	$2.04	
Printed	PP-GP0168	Wiper mount v1.0, Mini			Aleph Objects		1	ea	$0.680	$0.68	
Printed	PP-GP0167	Fan Mount v1.3, Mini			Aleph Objects		1	ea	$1.170	$1.17	
Printed	PP-GP0190	Lower relief v1.0 Mini			Aleph Objects		1	ea	$0.190	$0.19	
Mechanical	HD-MS0211	Borosilicate Glass Bed 170mm x 170mm			Allen Scientific		1	ea	$6.750	$6.75	1020
Hardware	HD-MS0027	Spring, Extruder, 6mm OD, 0.8mm WD, 9.7mm FL			Associated Spring	C0240-032-0380-M	2	ea	$0.137	$0.27	2100
Mechanical	HD-BL0015	GT2, Single sided Neoprene Belt			B & B Manufacturing, Inc	744-2P-06 (2MR-744-06)	2	ea	$2.290	$4.58	1020
Mechanical	HD-MS0033	GT2 Timing Pulley, 5mm Bore Aluminum			B & B Manufacturing, Inc	M6CA5 5MM BORE ALU	2	ea	$3.440	$6.88	1020
Electronic	EL-PS0025	POWER SUP 150W 24V 6.25A PNL MT	Delta	PMC-24V150W1AA	DELTA	PMC-24V150W1AA	1	ea	$28.600	$28.60	1020
Electronic	EL-MS0143	Conn Fast Receptacle14-16 AWG .250			TTI	22-26AWG .110	7	ea	$0.077	$0.54	7100
Electronic	EL-MS0205	CONN TERM MALE 22-24AWG TIN	Molex		Digikey	WM2517TR-ND	25	ea	$0.038	$0.96	2 reels
Electronic	EL-MS0212	CONN PIN 24-30AWG CRIMP TIN	Molex	16-02-0108	Heilind	MOL16-02-0108	2	ea	$0.056	$0.11	2500
Electronic	EL-MS0059	CONN TERM FEMALE 22-24AWG TIN	Molex Inc.	16-02-0102	Digikey	WM2510TR-ND	73	ea	$0.032	$2.36	4 reels
Electronic	EL-MS0061	Connector, 4 pin Male housing with latch	Molex	701070003	Digikey	WM2535-ND	3	ea	$0.140	$0.42	4050
Electronic	EL-MS0062	Connector, 4 pin Female housing with latch	Molex	50579404	Digikey	WM2902-ND	8	ea	$0.112	$0.90	9100
Electronic	PC-CN0001	CONN HOUSING 2POS .100 W/LATCH			TTI	WM2900-ND	5	ea	$0.062	$0.31	6100
Electronic	PC-CN0003	Connector Housing 3POS .100 W/Latch			TTI	WM2901-ND	6	ea	$0.060	$0.36	6100
Electronic	EL-MS0142	CONN RECEPT FASTON 22-26AWG .110			TTI	A27793-ND	12	ea	$0.109	$1.31	12100
Electronic	EL-MS0141	Term Ring Non Ins 26-22AWG #4		P22-4R-M	Heilind	P22-4R-M	6	ea	$0.087	$0.52	8200
Electronic	EL-MS0210	CONN RING UNINS 15-20AWG #M3			Digikey	A107160CT-ND	2	ea	$0.090	$0.18	**2050**
Electronic	**EL-SW0022**	**SWITCH BASIC SPDT 3A .110QC 125V**			**Digikey**	**SW766-ND**	**6**	**ea**	**$0.520**	**$3.12**	**6100**
Electronic	EL-WR0099	Shielded 4Cond 22AWG		C0762A.41.10	Digikey	W504-1000-ND	2470	mm	$0.001	$3.02	9000 ft
Electronic	**EL-WR0105**	**24AWG Stranded – Black**		**C2015A.21.01**	**Digikey**	**C2015B-1000-ND**	**6025**	**mm**	**$0.000**	**$1.54**	**22000 ft**
Electronic	EL-WR0107	24AWG Stranded – White		C2015A.21.02	Digikey	C2015W-1000-ND	1100	mm	$0.000	$0.28	4000 ft
Electronic	**EL-WR0109**	**24AWG Stranded – Yellow**		**C2015A.21.05**	**Digikey**	**C2015Y-1000-ND**	**2090**	**mm**	$0.000	**$0.54**	**8000 ft**
Electronic	EL-WR0103	24AWG Stranded – Red		C2015A.21.03	Digikey	C2015R-1000-ND	3825	mm	$0.000	$0.98	14000 ft
Electronic	**EL-WR0104**	**24AWG Stranded – Orange**		**C2015A.21.04**	**Digikey**	**C2015A-1000-ND**	**2820**	**mm**	$0.000	**$0.72**	**11000 ft**
Electronic	EL-WR0118	24AWG Stranded – Blue		C2015A.21.07	Digikey	C2015L-1000-ND	460	mm	$0.000	$0.14	2000 ft
Electronic	EL-WR0119	24AWG Stranded – Green		C2015A.21.06	Digikey	C2015G-1000-ND	520	mm	$0.000	$0.16	2000 ft
Electronic	EL-WR0120	24AWG Stranded – Purple		C2015A.21.19	Digikey	C2015V-1000-ND	1210	mm	$0.000	$0.31	5000 ft
Electronic	EL-WR0106	16AWG Stranded – Red		C2065A.21.03	Digikey	C2065R-1000-ND	400	mm	$0.007	$2.78	2000 ft
Electronic	**EL-WR0121**	**16AWG Stranded – Black**		**C2065A.21.01**	**Digikey**	**C2065B-1000-ND**	**1280**	**mm**	**$0.007**	**$8.89**	**4000 ft**

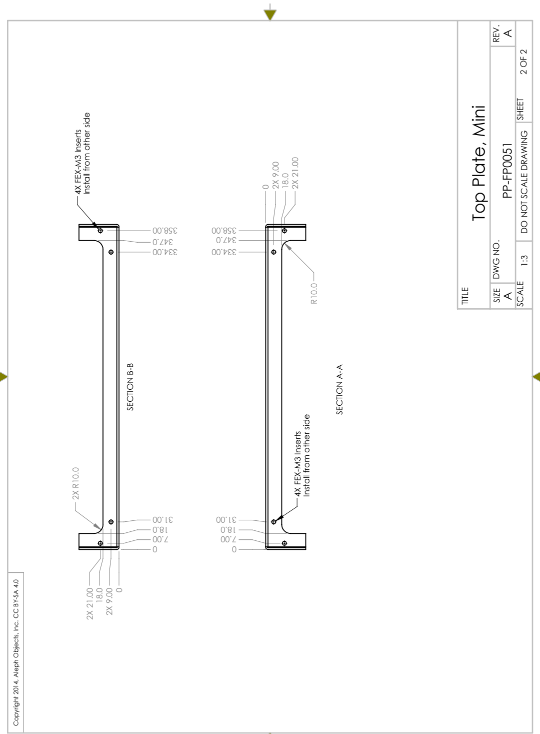
3.3 Drawings

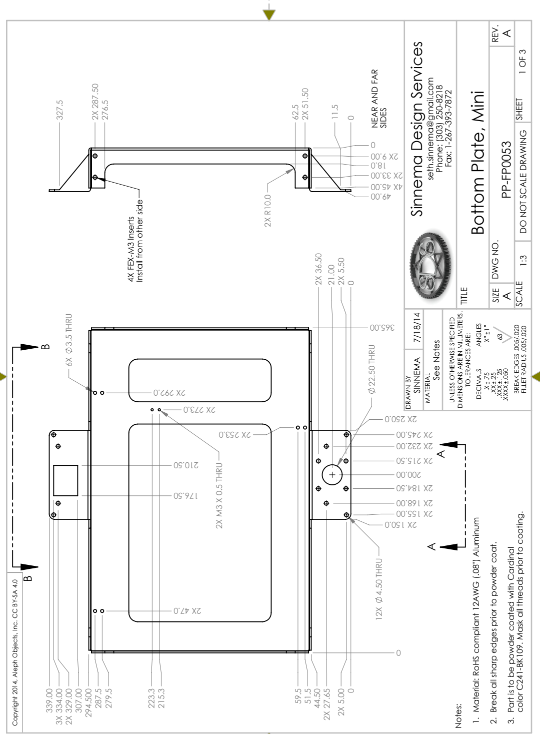


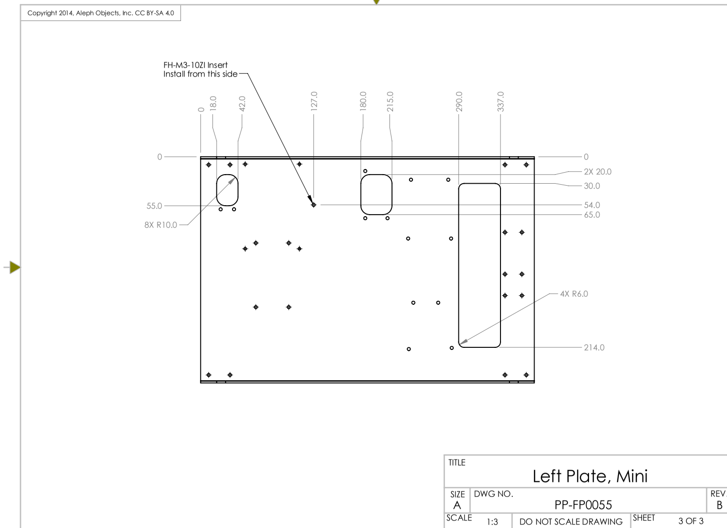


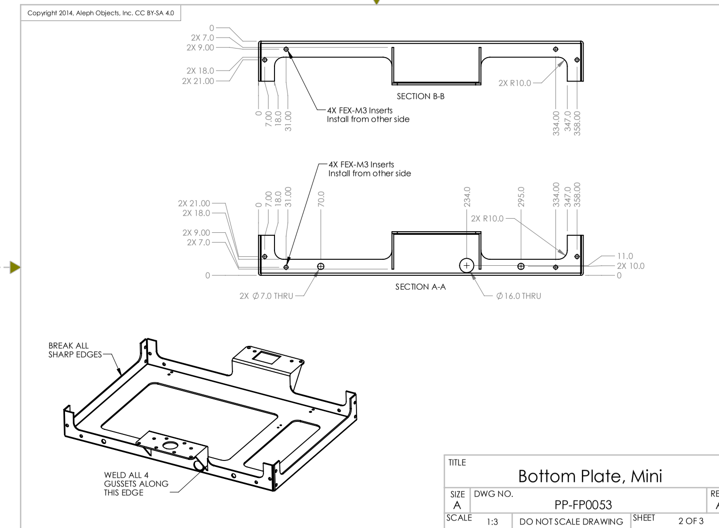


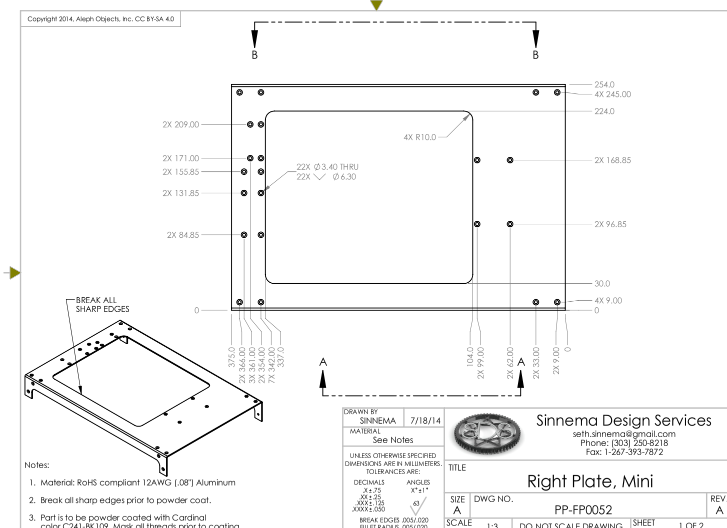


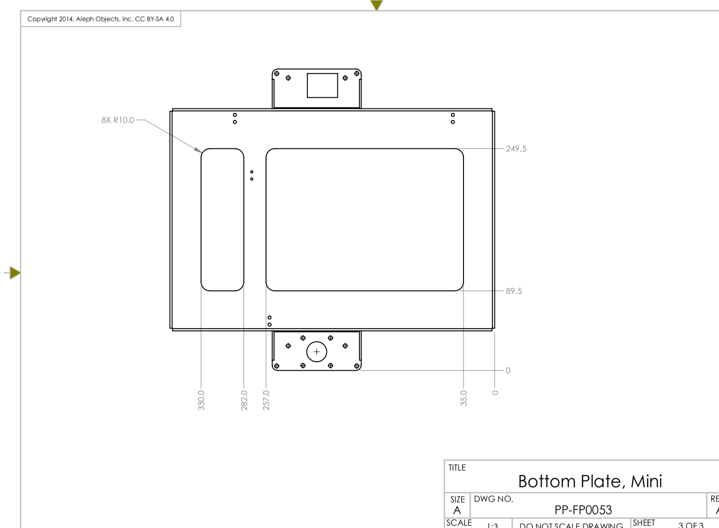





Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
FH-M3-10ZI Insert
Install from this side
8X R10.0
4X R6.0
TITLE
Left Plate, Mini
SIZE A
DWG NO. PP-FP0055
REV. B
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 3 OF 3


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
4X FEX-M3 Inserts
Install from other side
SECTION B-B
2X R10.0
4X FEX-M3 Inserts
Install from other side
SECTION A-A
2X Ø7.0 THRU
Ø16.0 THRU
BREAK ALL
SHARP EDGES
WELD ALL 4
GUSSETS ALONG
THIS EDGE
TITLE
Bottom Plate, Mini
SIZE A
DWG NO. PP-FP0053
REV. A
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 2 OF 3


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
4X R10.0
22X Ø3.40 THRU
22X ⌵ Ø6.30
BREAK ALL
SHARP EDGES
Notes:
1. Material: RoHS compliant 12AWG (.08") Aluminum
2. Break all sharp edges prior to powder coat.
3. Part is to be powder coated with Cardinal color C241-BK109. Mask all threads prior to coating.
DRAWN BY SINNEMA 7/18/14
MATERIAL See Notes
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE:
DECIMALS .X ±.75 .XX ±.25 .XXX ±.125 .XXXX ±.050
ANGLES X°±1°
BREAK EDGES .005/.020
FILLET RADIUS .005/.020
Sinnema Design Services
seth.sinnema@gmail.com
Phone: (303) 250-8218
Fax: 1-267-393-7872
TITLE
Right Plate, Mini
SIZE A
DWG NO. PP-FP0052
REV. A
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 1 OF 2


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
8X R10.0
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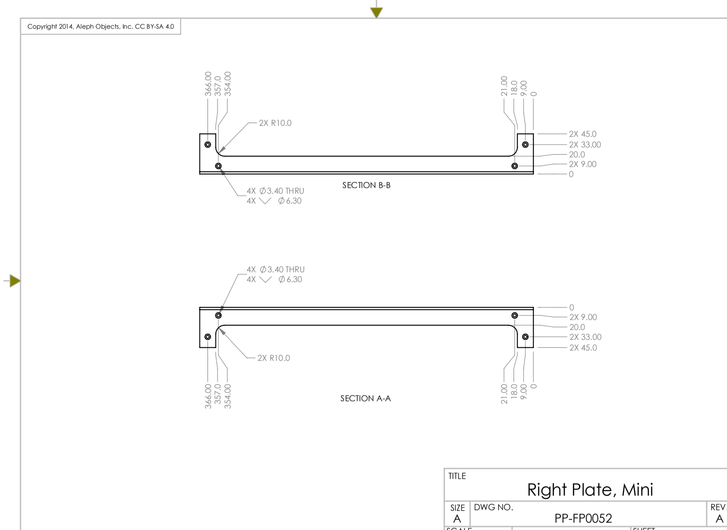
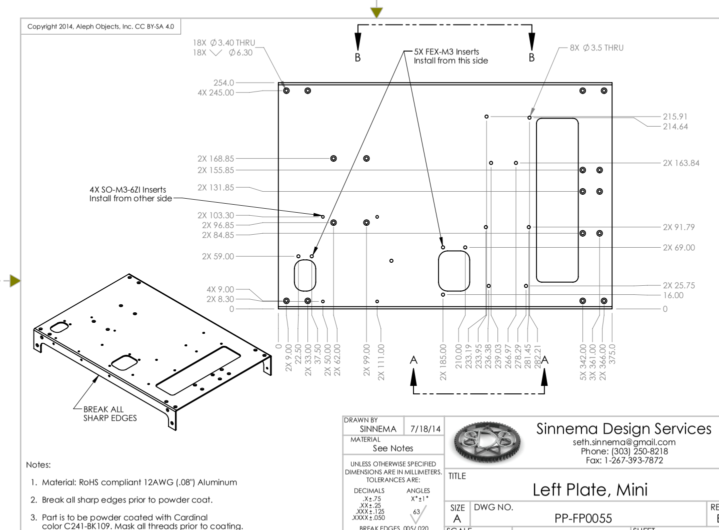
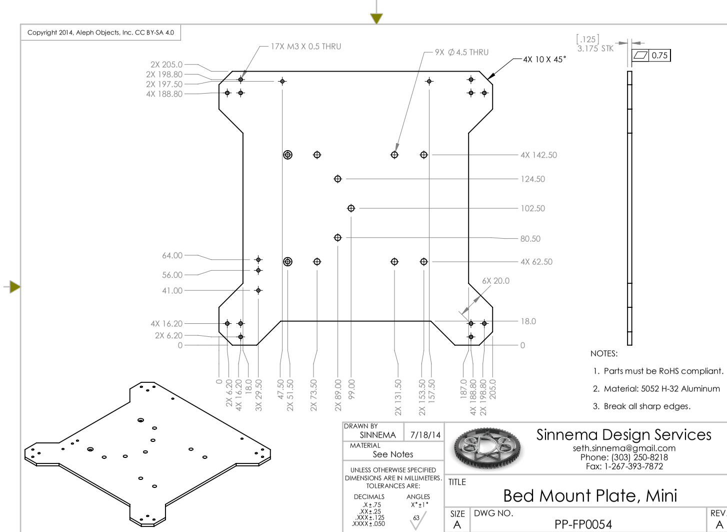
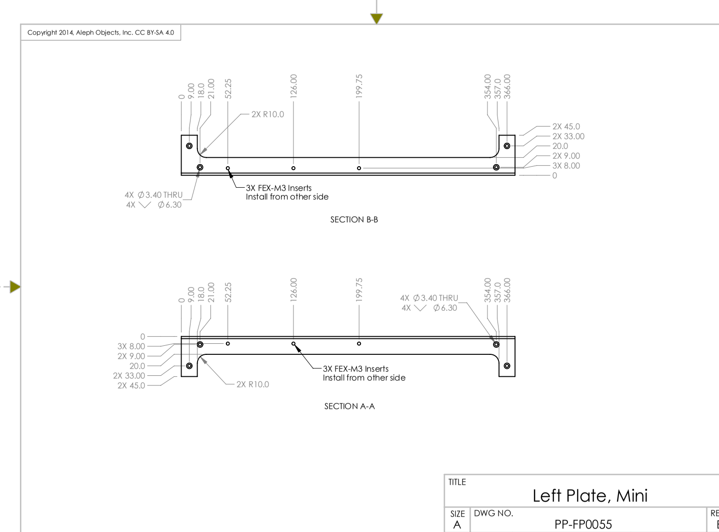
SIZE A
DWG NO. PP-FP0053
REV. A
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 3 OF 3


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
2X R10.0
4X Ø3.40 THRU
4X ⌵ Ø6.30
SECTION B-B
SECTION A-A
TITLE
Right Plate, Mini
SIZE A
DWG NO. PP-FP0052
REV. A
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 2 OF 2


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
18X Ø3.40 THRU
18X ⌵ Ø6.30
5X FEX-M3 Inserts
Install from this side
8X Ø3.5 THRU
4X SO-M3-6ZI Inserts
Install from other side
BREAK ALL
SHARP EDGES
Notes:
1. Material: RoHS compliant 12AWG (.08") Aluminum
2. Break all sharp edges prior to powder coat.
3. Part is to be powder coated with Cardinal color C241-BK109. Mask all threads prior to coating.
DRAWN BY SINNEMA 7/18/14
MATERIAL See Notes
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE:
DECIMALS .X ±.75 .XX ±.25 .XXX ±.125 .XXXX ±.050
ANGLES X°±1°
BREAK EDGES .005/.020
FILLET RADIUS .005/.020
Sinnema Design Services
seth.sinnema@gmail.com
Phone: (303) 250-8218
Fax: 1-267-393-7872
TITLE
Left Plate, Mini
SIZE A
DWG NO. PP-FP0055
REV. B
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 1 OF 3


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
17X M3 X 0.5 THRU
9X Ø4.5 THRU
4X 10 X 45°
6X 20.0
[.125]
3.175 STK
0.75
NOTES:
1. Parts must be RoHS compliant.
2. Material: 5052 H-32 Aluminum
3. Break all sharp edges.
DRAWN BY SINNEMA 7/18/14
MATERIAL See Notes
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE:
DECIMALS .X ±.75 .XX ±.25 .XXX ±.125 .XXXX ±.050
ANGLES X°±1°
BREAK EDGES .005/.020
FILLET RADIUS .005/.020
Sinnema Design Services
seth.sinnema@gmail.com
Phone: (303) 250-8218
Fax: 1-267-393-7872
TITLE
Bed Mount Plate, Mini
SIZE A
DWG NO. PP-FP0054
REV. A
SCALE 1:2
DO NOT SCALE DRAWING
SHEET 1 OF 1


Copyright 2014, Aleph Objects, Inc. CC BY-SA 4.0
2X R10.0
4X Ø3.40 THRU
4X ⌵ Ø6.30
3X FEX-M3 Inserts
Install from other side
SECTION B-B
SECTION A-A
TITLE
Left Plate, Mini
SIZE A
DWG NO. PP-FP0055
REV. B
SCALE 1:3
DO NOT SCALE DRAWING
SHEET 2 OF 3

3.4 3D Printed Parts

3.5 Bed

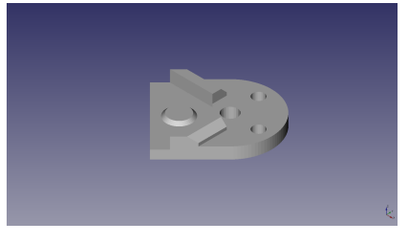
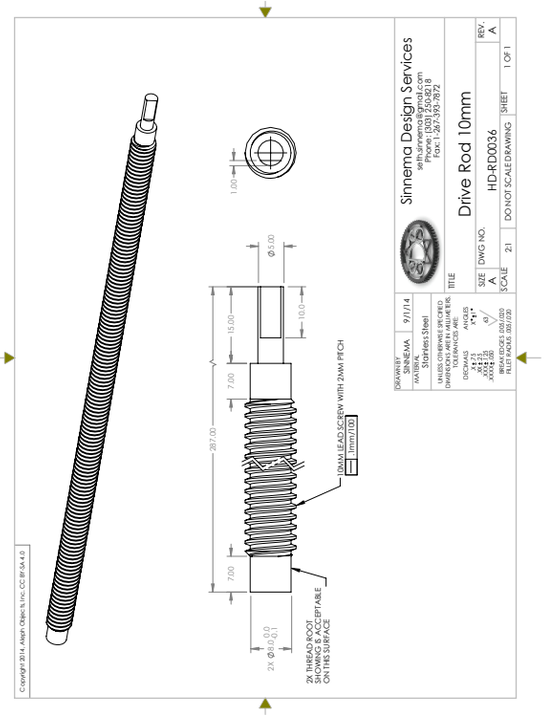


Figure 3.9: 3D Printed Bed Corner Render

3.6 Extruder



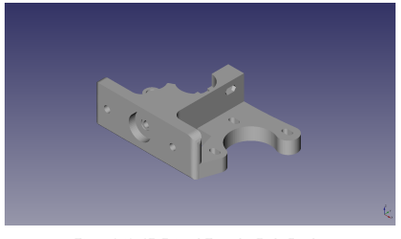


Figure 3.10: 3D Printed Extruder Body Render

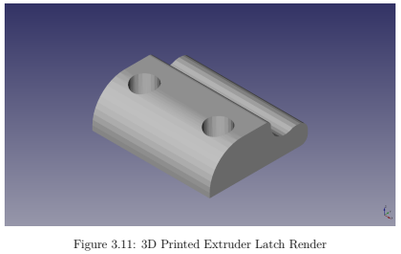


Figure 3.11: 3D Printed Extruder Latch Render

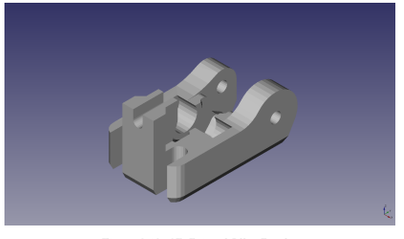


Figure 3.12: 3D Printed Idler Render

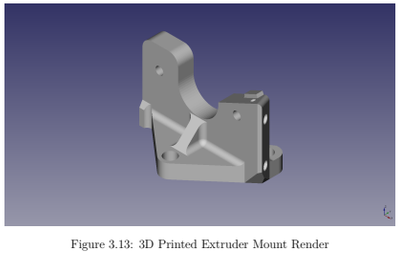


Figure 3.13: 3D Printed Extruder Mount Render

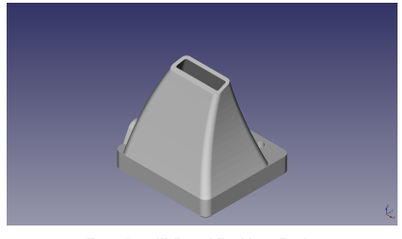


Figure 3.14: 3D Printed Fan Mount Render

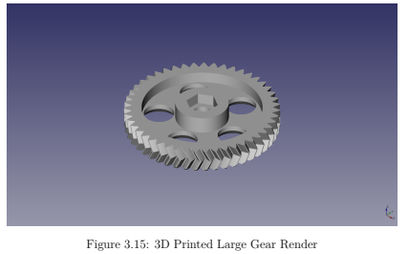


Figure 3.15: 3D Printed Large Gear Render

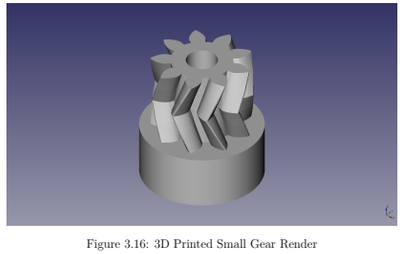


Figure 3.16: 3D Printed Small Gear Render

3.7 Spool

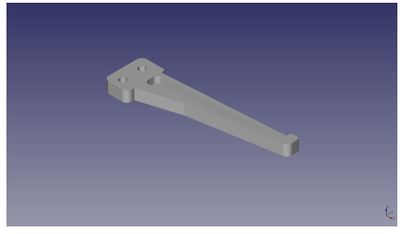


Figure 3.17: 3D Printed Spool Arm Render

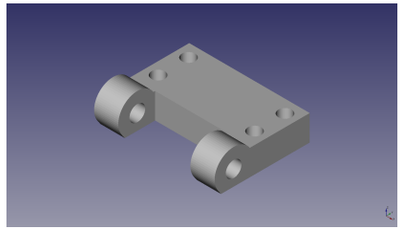


Figure 3.18: 3D Printed Spool Hinge Render

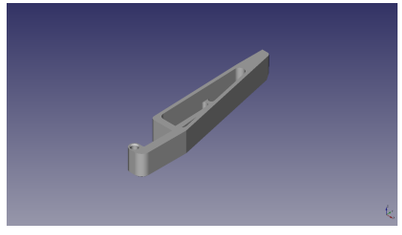


Figure 3.19: 3D Printed Spool Mount Render

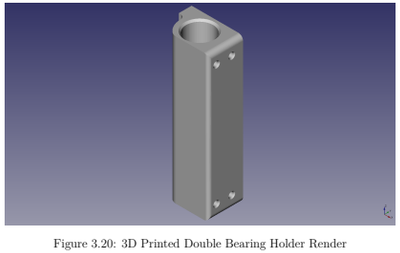


Figure 3.20: 3D Printed Double Bearing Holder Render

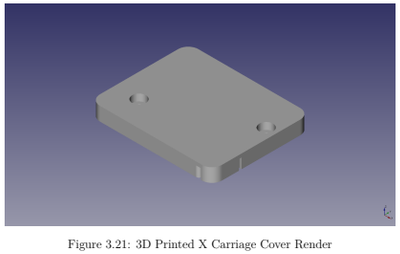


Figure 3.21: 3D Printed X Carriage Cover Render

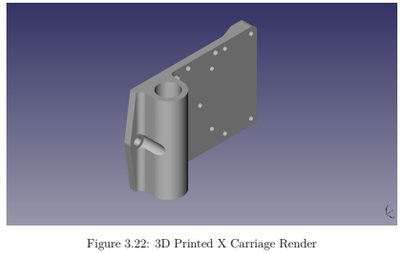


Figure 3.22: 3D Printed X Carriage Render

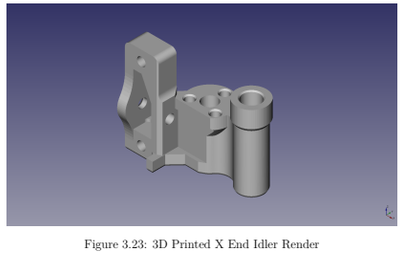


Figure 3.23: 3D Printed X End Idler Render

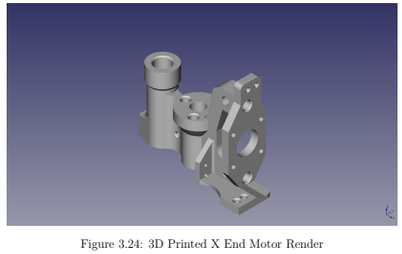


Figure 3.24: 3D Printed X End Motor Render

3.8 X

3.9 Y

3.10 Z

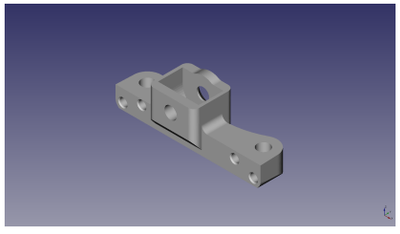


Figure 3.25: 3D Printed Y End Idler Render

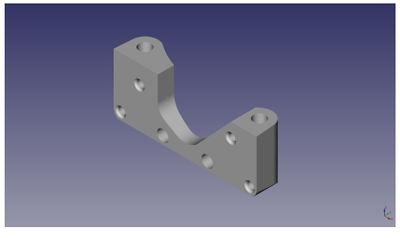


Figure 3.26: 3D Printed Y End Rod Mount Render

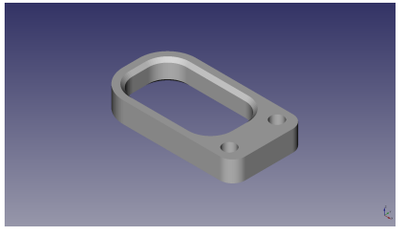


Figure 3.27: 3D Printed Lower Relief Render

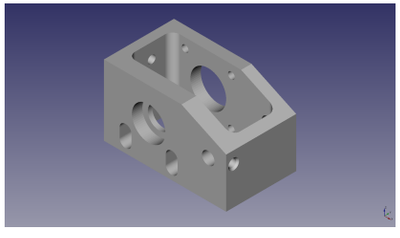


Figure 3.28: 3D Printed Lower Z Left Render

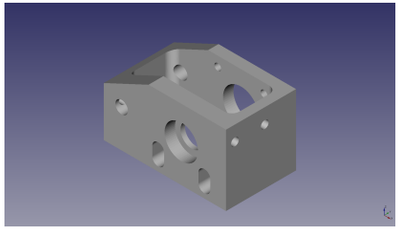


Figure 3.29: 3D Printed Lower Z Right Render

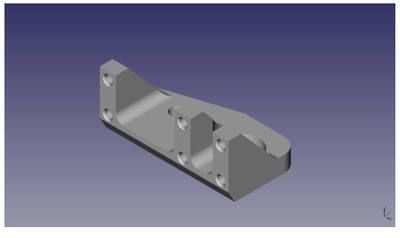


Figure 3.30: 3D Printed Upper Z Left Render

3.11 Misc

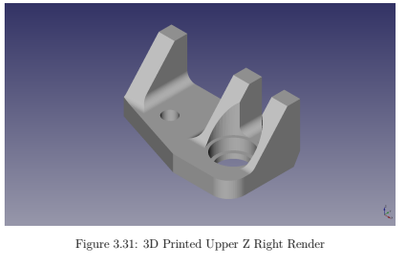


Figure 3.31: 3D Printed Upper Z Right Render

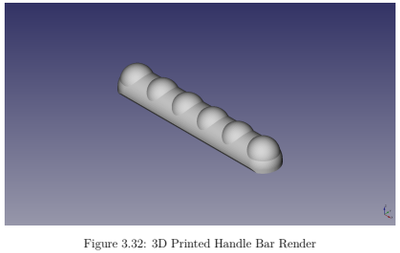


Figure 3.32: 3D Printed Handle Bar Render

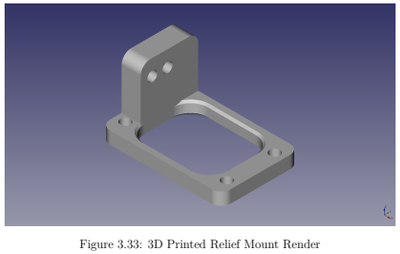


Figure 3.33: 3D Printed Relief Mount Render

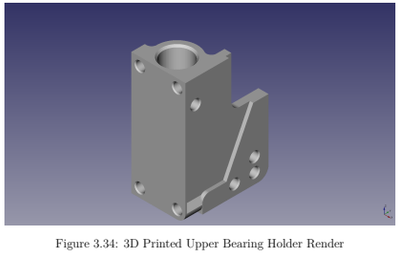


Figure 3.34: 3D Printed Upper Bearing Holder Render

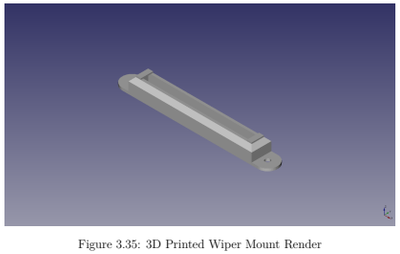


Figure 3.35: 3D Printed Wiper Mount Render

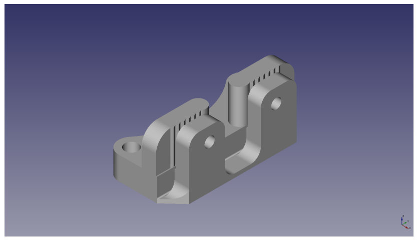


Figure 3.36: 3D Printed Belt Mount Render

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 panduit wrap
Y-motor		Grey 4 cond	410	Trim shielding 20mm, all wires 4mm	Trim shielding 55 with lug, all wires 4mm	1	305 panduit 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

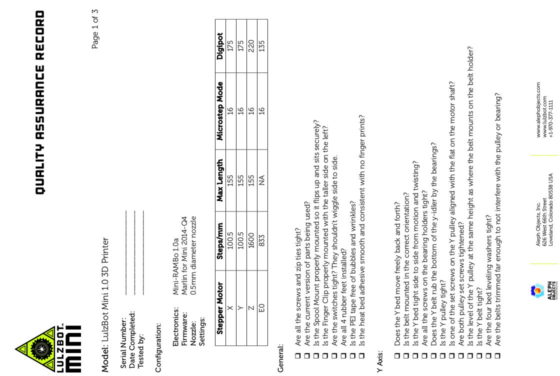
5.1 Intro

The printer controller will be the RAMBo-Mini.

Quality Assurance

Quality Assurance

6.1 Quality Assurance


QUALITY ASSURANCE RECORD

LULZBOT. MINI

Page 1 of 3

Model: LulzBot Mini 1.0 3D Printer

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?

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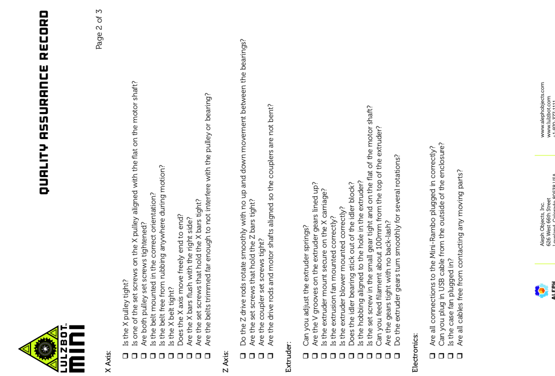
QUALITY ASSURANCE RECORD

LULZBOT. MINI

Page 2 of 3

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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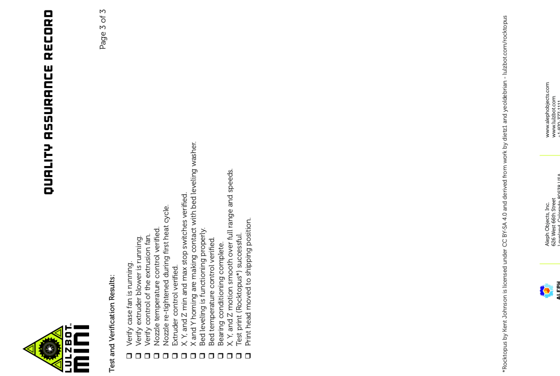
QUALITY ASSURANCE RECORD

LULZBOT. MINI

Page 3 of 3

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.

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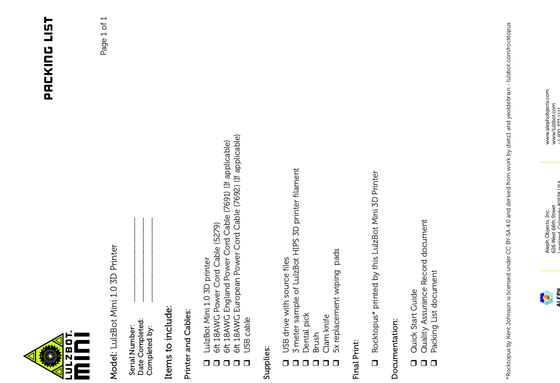
Packing

If It Shakes It Breaks

7.1 Packing List

Pack it well.


PACKING LIST

LULZBOT. MINI

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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Contact

Phone, Email, Web, Location

Colophon

Created with 100% Free Software
GNU/Linux
LaTeX Memoir

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
http://www.lulzbot.com