



strataSys®

F123 Series®
Shared Office 3D Printers



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www.stratasys.com

Comments: c-support@stratasys.com

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A	January 2017	Initial Release
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D	December 2017	Updated User Interface, troubleshooting, and procedures
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1 SERVICE AND SUPPORT

This chapter provides information on service and support for the F123 Series as well as safety information and safety label locations.

Service

If you have a problem with your printer that is not covered in this guide, please contact Stratasys Customer Support. Contact information is available from the Stratasys website at: <http://www.stratasys.com/customer-support/contact-customer-support>.

When calling in for service, always have your printer's software version (see "Software Version" (page 32)) and hardware serial number available (see "Identifying Your Printer" (page 7)). You may also need access to GrabCAD Print to provide a configuration file from your hardware (see "Exporting System Configuration (.CFG) File" (page 6)).

Software Support

If you have a software problem that is not covered in this guide, please contact Stratasys Customer Support. Contact information is available from the Stratasys website at: <http://www.stratasys.com/customer-support/contact-customer-support>.

When calling in for service, always have your printer's software version (see "Software Version" (page 32)) and printer serial number available (see "Identifying Your Printer" (page 7)). You may also need access to GrabCAD Print to provide a configuration file from your hardware (see "Exporting System Configuration (.CFG) File" (page 6)).

Safety Instructions

The following basic safety tips are given to ensure safe installation, operation, and maintenance of Stratasys equipment and are not to be considered as comprehensive on matters of safety. The F123 Series printers are designed to be safe and reliable rapid prototyping printers. Access to areas of the printer are potentially dangerous.

Hazard Types

Stratasys recommends that all services be performed by qualified personnel. All personnel working on or around the printer should be knowledgeable of what the following hazard classifications mean throughout this guide.

- **Warnings** and **Cautions** precede the paragraph to which they pertain.

**Warning:**

Indicates a potentially hazardous situation which, if not avoided, may result in injury or death.

**Caution:**

Indicates a situation which, if not avoided, could result in damage to equipment.

- **Notes** follow the relative paragraph.



Indicates additional information relative to the current topic.

Product Safety Signs



Always read and adhere to safety statements, and be aware of the following safety signs when you see them on the printer.

Stratasys makes every effort to ensure that our printers are safe and reliable at all times. However, there will be times when you must access areas of the printer where potentially high voltages, hot temperatures, and/or moving mechanical components could cause severe injury.

Warning Symbols	Meaning	Location	Comments
	Hot surface	Oven entrance	Risk of burns. Do not touch this surface after printing.
	High voltage	Electrical panel, near the power-supply enclosures	Risk of electric shock.
	Gloves	Oven entrance	Safety gloves approved for high temperatures must be worn in locations where this symbol is displayed.
	Moving parts	Oven entrance	Risk of injury from moving parts.

Product Safety Label Locations

Figure 1: Oven safety label locations

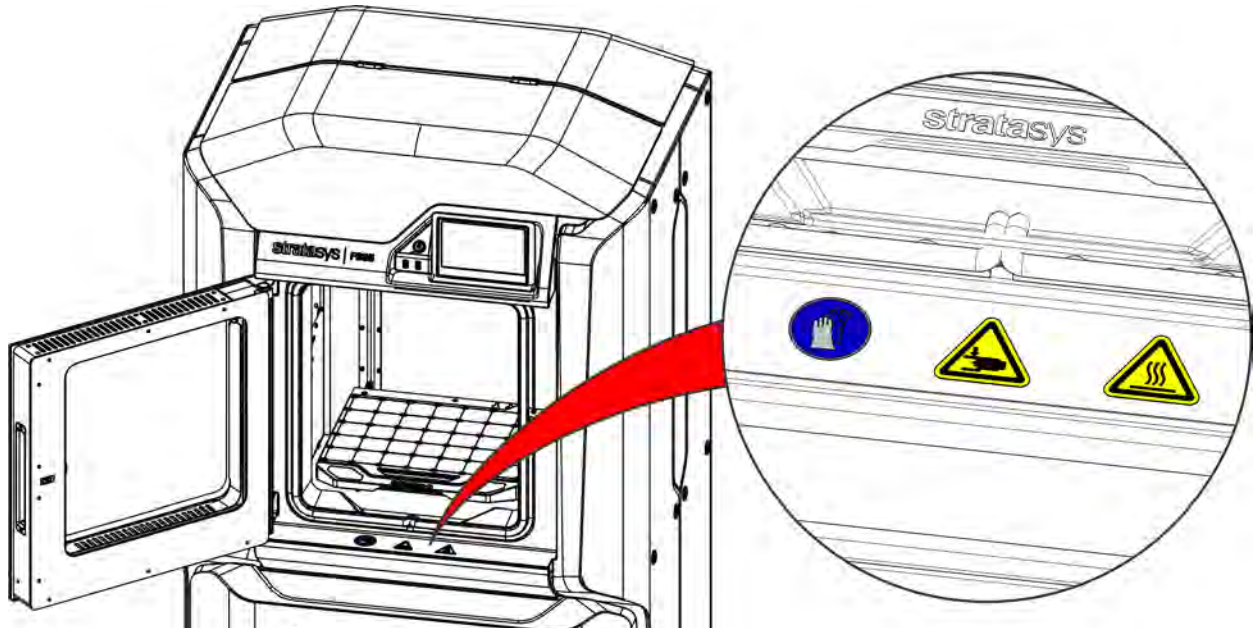
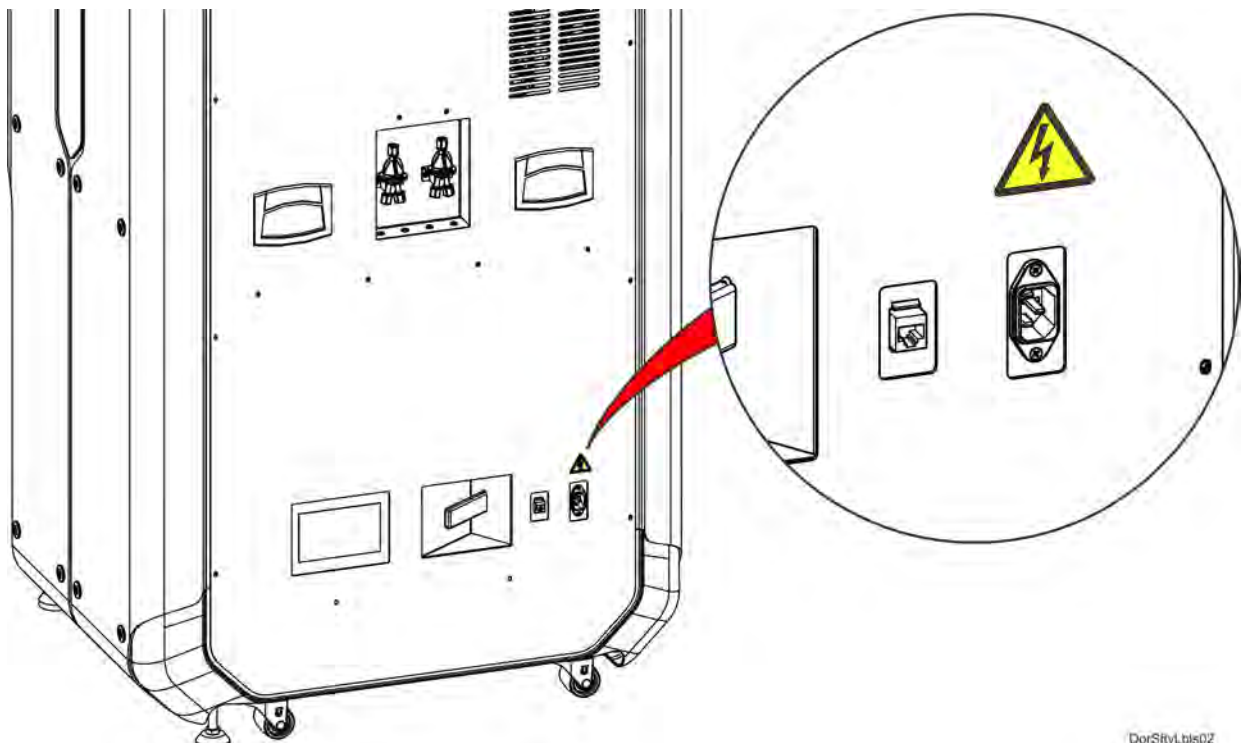
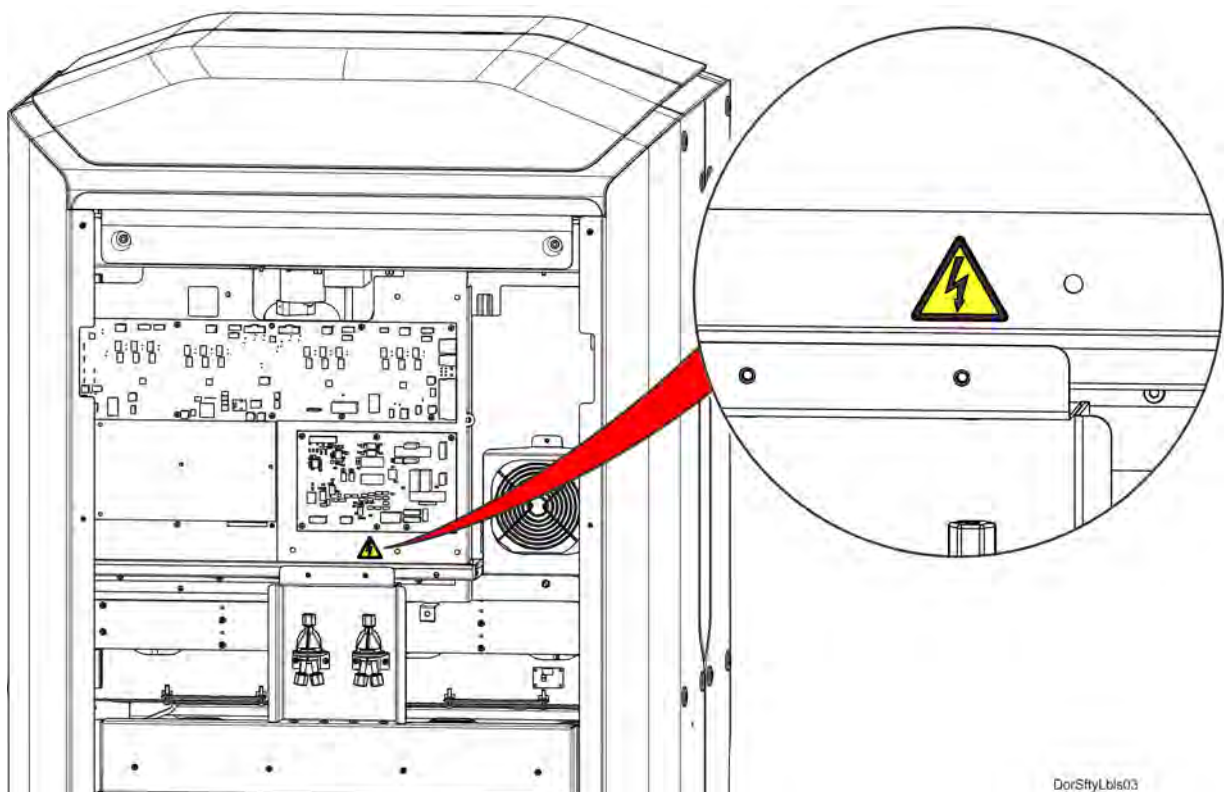


Figure 2: Rear panel safety label locations



DorStivLbts02

Figure 3: Electrical panel safety label locations



Potential Safety Hazard Areas

The following components and areas of the printer are highlighted as potential safety hazards that may cause system failure or reliability problems if proper safety procedures are not followed.

Oven

**Warning: Hot Surfaces.**

Always wear safety gloves and long sleeves when working inside the oven. Components are hot.



Opening the oven door shuts the oven heaters off.

Gantry

**Warning: Moving Parts.**

Never wear a tie, loose clothing or dangling jewelry when working around moving components of the printer.

Beneath the top cover of the printer is the gantry. This area houses the mechanical drive components of the X and Y axes. Use extreme caution whenever accessing this area of the printer.



The printer's servo motors are disabled when the oven door and/or top cover are open. The XY pinch hazard between the timing belts and pulleys is minimized by locking the oven door and top cover while building and disabling the motors when the oven door and top cover are open. The oven door and top cover automatically lock when the printer is building and cannot be opened while the printer is building. You cannot start a build if the oven door or top cover are open.

Z Stage

**Warning: Moving Parts.**

Never wear a tie, loose clothing or dangling jewelry when working around moving components of the printer.

The drive belt, pulleys and Z stage servo motor can cause severe injury. The Z stage crushing hazard is minimized by locking the oven door during Z stage moves and disabling the Z motor when the oven door is open.

Door Locks

Interlock switches are used to communicate the status of the oven door and the top cover to the printer. For safety reasons, the oven door and top cover must be closed before the X, Y, and Z motors will operate.

General Safety Practices

Abide by these general safety practices when working with this printer.

**Warning: High Voltage.**

High voltage is present in the printer.

**Warning: Falling Hazard.**

Only use an OSHA or CE approved step stool when accessing the area under the top cover of the printer.

**Warning: Hot Surfaces.**

Always wear safety gloves and long sleeves when working inside the oven. Components are hot.

Environmental Requirements

- The F123 Series printer is for indoor use only.
- Air quality conditions with excessive solid particulates (conductive or non-conductive) may result in system damage.
- Air quality conditions in which airborne oils are allowed to accumulate on or within the printer can damage the plastic components.
- System operating temperature shall be in the range of 59°F to 86°F (15°C to 30°C), with relative humidity range of 30% to 70% non-condensing.
- System storage temperature shall be in the range of 32°F to 95°F (0°C to 35°C), with relative humidity range of 20% to 90% non-condensing.
- Altitude shall not exceed 6561.68 feet (2000 m).
- Material storage shall be in the range of 55°F to 86°F (13°C to 30°C), with relative humidity less than 70%.
- Noise emission (acoustic):
 - <32dBA when idle
 - <46dBA when building

2 PRINTER SETUP

This chapter describes basic setup of the F123 Series.

General Information

Welcome Kit Contents

The printer's Welcome Kit contains the Welcome Insert document and common tools you will need to maintain the printer. Use the following figures and tables to identify the contents of the Welcome Kit.

Figure 1: Welcome Kit Contents - Documents and Cables

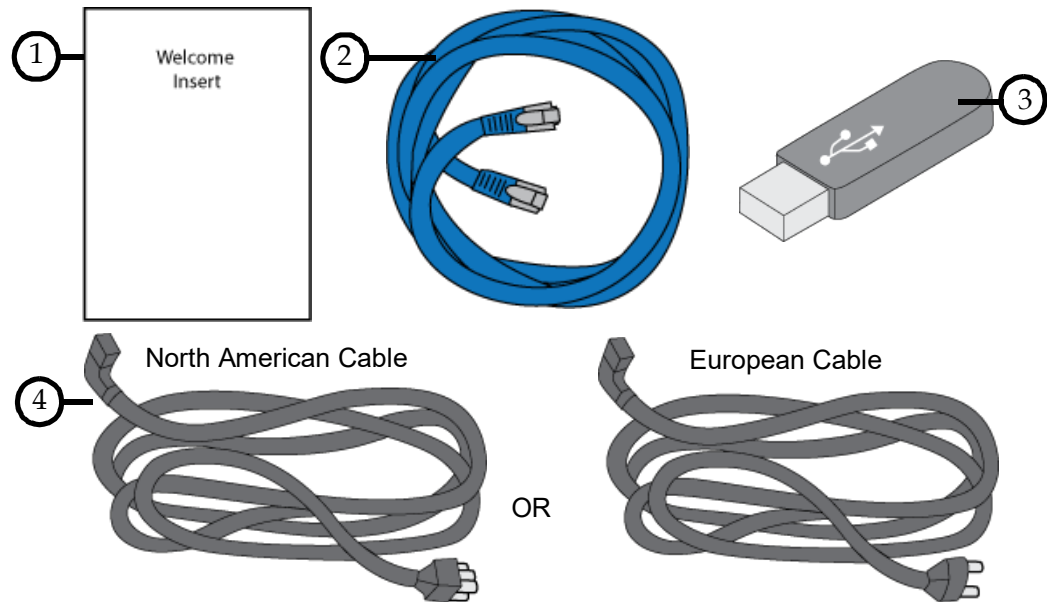


Table 1: Key for Figure 1

#	Item	Description
1	Welcome Insert Document	Contains instructions for downloading the F123 Series User Guide (this document).
2	RJ45 Cable	This cable is used to establish a network connection between the F123 Series printer and your Ethernet network. See “Making the Network Connection” (page 7).
3	USB Flash Drive	The printer features 3 USB ports (see Figure 3 (page 3) for port locations). As an alternate method to sending job files to the printer via GrabCAD Print, this flash drive can be used to store processed job files which you build frequently (see “Adding a Job to the Job Queue” (page 14)).

Table 1: Key for Figure 1 (Continued)

#	Item	Description
4	AC Cable (North American or European)	This cable provides the power connection to the printer. See “Connecting the Power Cable” (page 8) . Select the appropriate cable for your location (North American cable or European cable).

Figure 2: Welcome Kit Contents - Tools

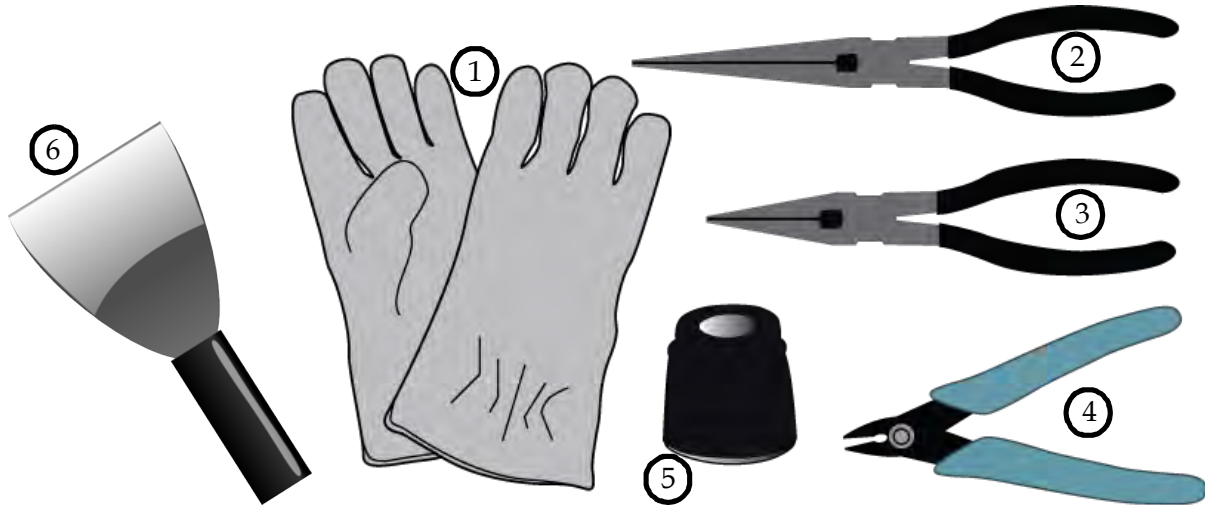


Table 2: Key for Figure 2

#	Item	Description
1	Leather Safety Gloves	Printer components may be extremely hot. To prevent burns or other injuries, these gloves should be worn any time you see the gloves safety sign throughout this document. See “Product Safety Signs” (page 2) .
2	Needle Nose Pliers (extra slim)	Occasionally, you may need to use pliers to aid in the clearing of debris which have accumulated on the head and/or tips (see “Clean/Inspect Tip Wipe Assemblies” (page 12)).
3	Needle Nose Pliers (7 ¹ / ₈ ”)	Occasionally, you may need to use pliers to aid in the clearing of debris which have accumulated on the head and/or tips (see “Clean/Inspect Tip Wipe Assemblies” (page 12)).
4	5” Cutter	These are used to cut a material spool’s filament when unloading and removing materials from the printer. See “Unloading Material” (page 7) .
5	Loupe Magnifier	This tool is included to aid you with performing a Manual Tip Calibration which requires you to view small toolpath relationships. See “Manual Tip Calibration” (page 5) .
6	Scraper	This tool is used to scrape parts or material off the substrate.

Figure 3: Welcome Kit Contents - Cleaning Supplies & Storage Materials



Table 3: Key for Figure 2-4

#	Item	Description
1	Touchscreen Cleaning Kit	From repeated use, the touchscreen may become dirty and occasionally need to be cleaned. Only use suitable LCD cleaning agents when cleaning the touchscreen. See “Cleaning the Touchscreen Display” (page 15) for cleaning instructions.
2	Microfiber Cloth	Various components of the printer may become dirty and occasionally need to be cleaned. Only use a suitable microfiber cloth to clean these components. See “Cleaning the Exterior Surface of the Printer” (page 15) for cleaning instructions using this cloth.
3	Resealable Bag (x6)	When unloaded, non-empty model and support material spools should be stored within these bags to prevent moisture from contacting the spool’s filament (see “Handling/Storing Materials” (page 11)).

The following items are not located within the Welcome Kit. Instead, they reside within the oven chamber and the storage drawer. The items found within the oven chamber must be removed before turning the printer power on.

Figure 4: Additional Components - Startup Materials

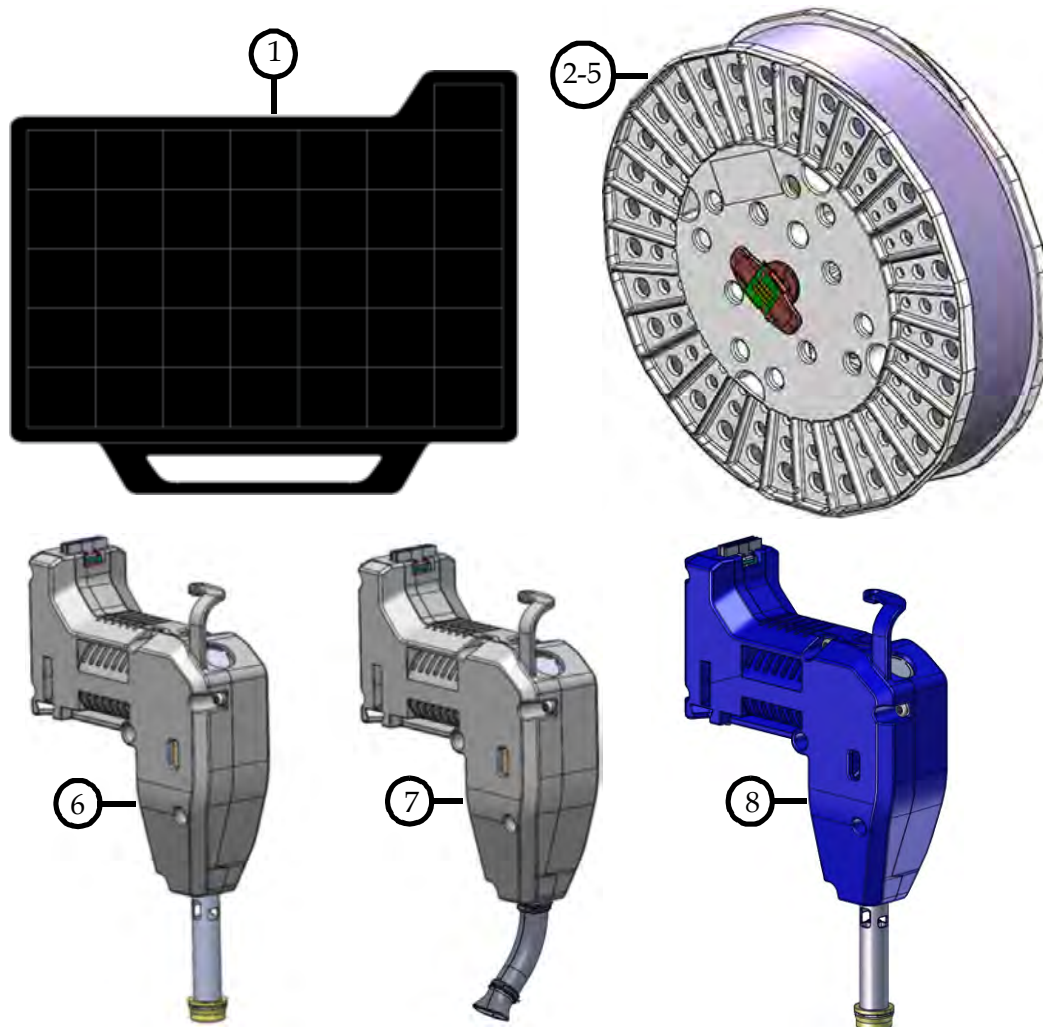


Table 4: Key for Figure 4

#	Item	Description
1	Substrate (x16)	A substrate is the surface upon which a part is built. The same substrate is used for all model materials, including PLA. See “Preparing the Printer” (page 15) for more information.
2	ABS Model Material Spool	Material spool containing 60 in ³ (984 cc) of ABS model material (see “Materials Used” (page 16)).
3	QSR Support Material Spool	Material spool containing 60 in ³ (984 cc) of QSR support material (see “Materials Used” (page 16)).

Table 4: Key for Figure 4 (Continued)

#	Item	Description
4	PLA Material Spool*	Material spool containing 60 in ³ (984 cc) of PLA material (see “Materials Used” (page 16)).
5	TPU 92A Material Spool**	Material spool containing 60 in ³ (984 cc) of TPU 92A material (see “Materials Used” (page 16)).
6	PLA Model Head*	Print head for use with PLA model material only (see “Print Heads” (page 13)).
7	PLA Cooling Module ^a	Cooling module to be used in conjunction with the PLA model head (see “Print Heads” (page 13)).
8	TPU 92A Model Head ^b	Print head for use with TPU 92A model material only (see “Print Heads” (page 13)).

^a Included with F170 and F270

^b Included with F370

Basic Setup

Follow the Site Preparation Guide to ensure that your facility is effectively and safely prepared for printer installation. Do not proceed with the following sections until the “Unpacking the Printer” section of the Site Preparation Guide has been completed. When installation is complete, perform the following setup tasks.

- Verify that the startup materials have been removed from the oven chamber. If not, remove these items. See [Figure 4 \(page 4\)](#) for details on the startup materials.
- Open the top cover and ensure that the orange clip has been removed from the X belt, and the orange tie wrap has been removed from the X motor. If not, remove the orange clip and/or orange tie wrap securing these components.

Stabilizing the Printer



Caution: Unstable Object.

The stability pads are used to stabilize the printer after it has been moved to its desired operating location. The stability pads must be set prior to printer operation.

To stabilize the printer:

1. Roll the printer to its desired operating location and verify that minimum space requirements have been met.

Table 5: Printer Clearances

Side	Clearance
Side Clearance	Minimum 4 inches (10.16 cm) on each side
Rear Clearance	Minimum 6 inches (15.24 cm)
Front Clearance	Minimum 20 inches (50.80 cm)
Overhead Clearance	Minimum 20 inches (50.80 cm)

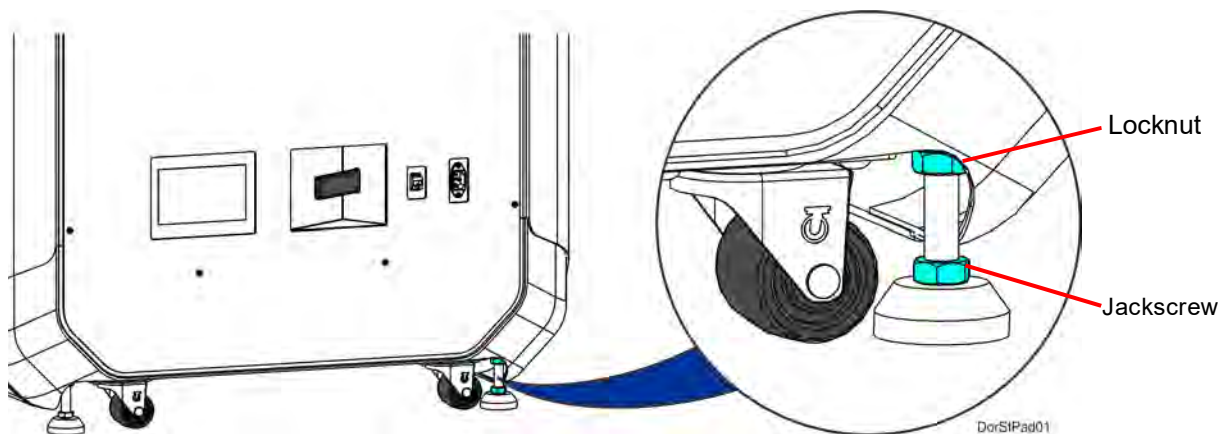
2. Thread the stability pad jackscrew downward until the stability pad makes contact with the floor (see [Figure 5](#)).
3. Turn the jackscrew an additional 1-2 turns downward and set the locknut firmly against the lower frame member (see [Figure 5](#)).



Ideally, each caster wheel will remain in slight contact with the floor and using minimal force, be able to be rotated.

4. Repeat [step 2](#) and [step 3](#) above to set all remaining stability pads.

Figure 5: Stability Pad Jackscrew Adjustment



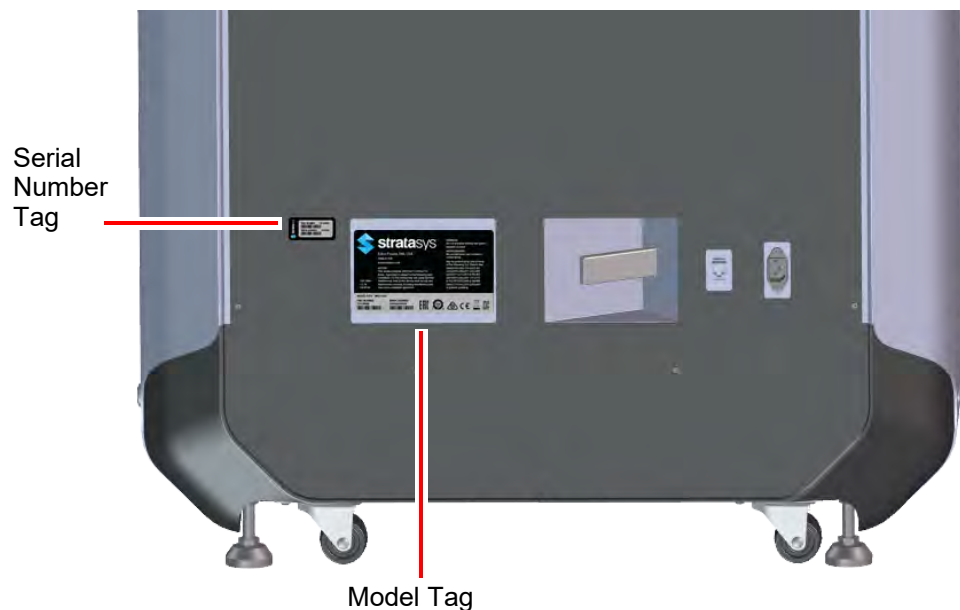
Identifying Your Printer

Use the following tags to identify your printer:

- **Serial Number Tag** - Refer to this number when requesting service. You can also locate the printer's serial number via the Maintenance page of the User Interface (see "[System Odometers](#)" (page 54) for more information).
- **Model Tag** - The printer's model number, part number and power requirements are given on this tag. This tag also lists all patent numbers associated with the printer, some FCC compliance information, voltage warnings, and the Stratasys web address.

Both tags are located on the back side of the printer near the bottom, and are typically placed near the printer's power connection. Use the information on these tags when identifying your printer with Customer Support.

Figure 6: ID Tag Locations



Making the Network Connection

Processed job files can be transferred from GrabCAD Print to the F123 Series printer through your facility's Ethernet network. An RJ45 network connector is located on the right, rear corner of the printer (as viewed from the rear). See [Figure 7](#) for the network connection location.



A 15 foot (4'.6m) network patch cable is supplied with the printer and located in the welcome kit. Facilities having network connection points further from the printer than can be reached by the supplied cable are responsible for the procurement of an appropriate cable.

Connecting the Power Cable

**Caution**

For users in Japan; A power cable is provided for connecting the printer to the AC electric source. Do not use it with other equipment.

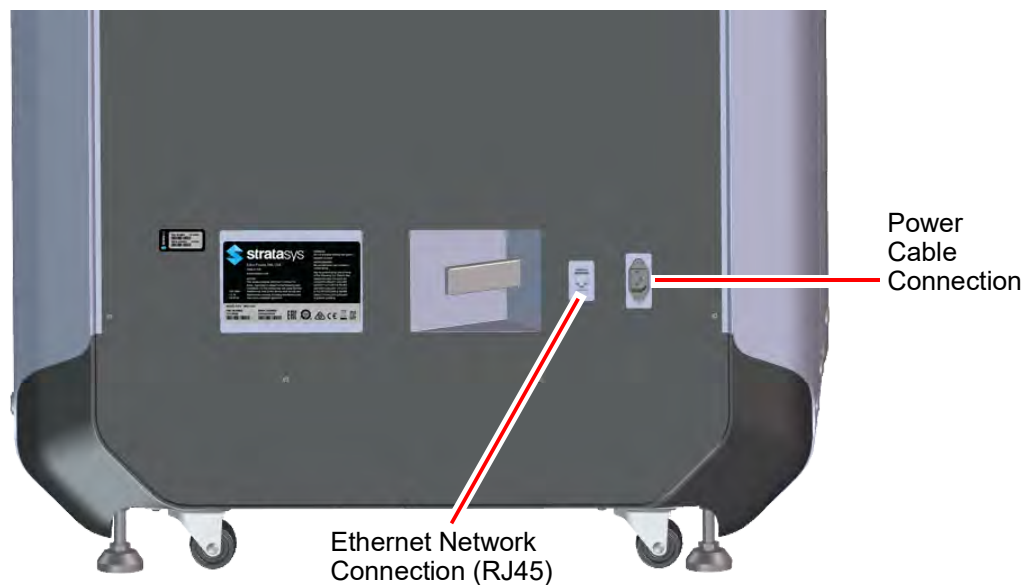
To connect the power cable:

1. Connect the male end of the supplied power cord (US or European) directly into a grounded electrical outlet.
2. Connect the female end of the power cord directly into the socket located on the back of the printer (see [Figure 7](#)).

**Warning: Electrical Shock Hazard.**

The power cord serves as the disconnect device. The socket outlet must be easily accessible.

Figure 7: Rear Connections



Configuring the Network

This section is provided in case you need to change your network settings. Within the Network page you can set your printer's address type to Static, Dynamic (DHCP), or Wi-Fi; Dynamic is selected by default.

- Static address - you must enter an IP address, subnet mask, and gateway address for the printer (provided by the system administrator). Once entered, the address will not change.

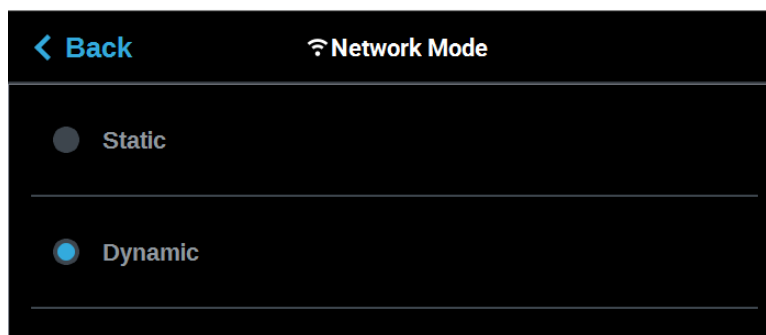
- Dynamic address (DHCP) - a network server or PC will generate an IP address for the printer. A different IP address may be generated from time to time by the server or PC.
- Wi-Fi address - the printer will scan for and allow you to connect to an available Wi-Fi network (if the Wi-Fi dongle has been installed).

Network Address Configuration

To configure your printer's network address settings:

1. Power ON the printer, see "Powering ON the Printer" (page 1).
2. Open the Tools page by pressing the **Tools** button within the Navigation Menu (see Table 1 (page 2)).
3. Open the Network page by pressing the **Network** button within the Tools page (see Figure 34 (page 38)).
4. The **Connection Type** row allows you to select between a wired or wireless network. The option selected will determine the configurable settings displayed within the Network page.
 - Selecting the **Wired** option will allow you to select between a Dynamic or Static network mode.
 - Selecting the **Wireless** option will configure the pinter to use a Wi-Fi network. You will need to scan for a wireless network and enter the security settings for the selected network (if required) to complete the configuration. Please note that the availability of the Wireless option depends upon the configuration purchased with your printer.
5. After selecting the radio button corresponding to the connection type you'd like to use (wired or wireless) press the **Back** button in the upper-left corner of the page to return to the Network page.
6. For wired networks:
 - a. The **Network Mode** row will be displayed. Press anywhere within this row.
 - b. Select either the **Static** or **Dynamic** radio button to enable that network address type. Depending on the option selected, you may need to configure additional information within the Network page.

Figure 8: Wired Network Selection



- If the **Static** option is enabled, you must manually configure the IP Address, Subnet Mask, and Gateway Address fields. To configure this information simply touch a field on the screen to select it and then use the keypad displayed to enter address information.
 - i. Touch anywhere on the screen outside of the keypad to exit and close the keypad.

Figure 9: Static Network Configuration

- ii. Scroll to the bottom of the page and press the **Apply** button when finished to save the network configuration.
- iii. Press the **Back** button in the upper-left corner of the page to return to the Network page.

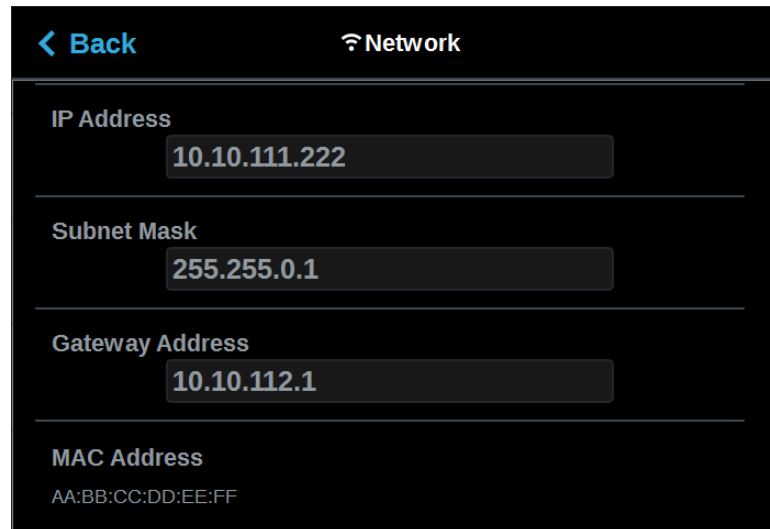
Figure 10: Apply Changes Button



- If the **Dynamic** option is enabled, no additional configuration is necessary as a network server or PC will automatically generate an IP address for the printer. A different IP address may be generated from time to time by the server or PC; the generated IP address will be displayed within the IP Address field of the Network page, and corresponding Subnet Mask and Gateway Address information will also be displayed.

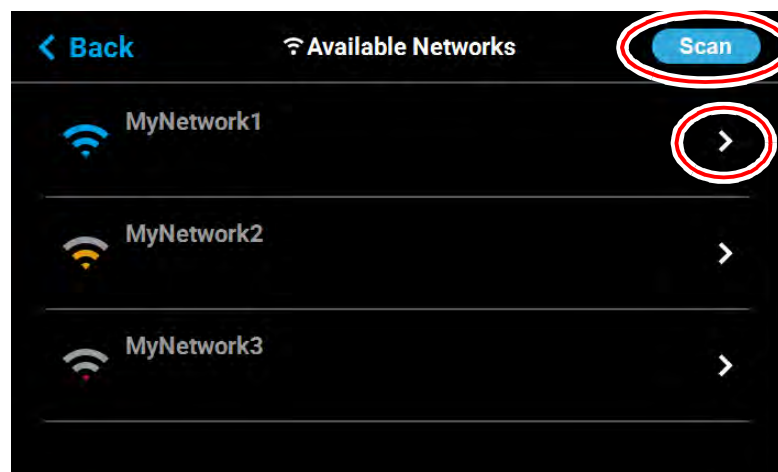
- Press the **Back** button to exit the page and return to the Tools page.

Figure 11: Dynamic Network Configuration



7. For wireless networks:
 - a. The **Available Networks** row will be displayed (Wi-Fi dongle must be installed). Press anywhere within this row.
 - b. Press the **Scan** button; the printer will scan for an available wireless (Wi-Fi) network.

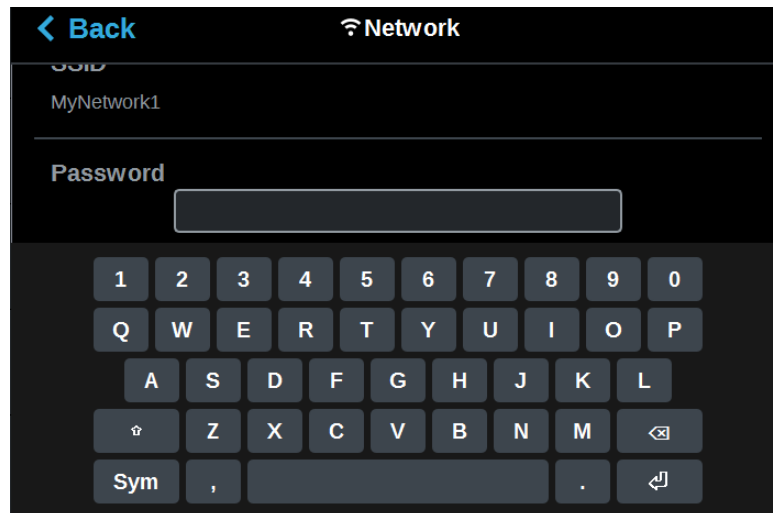
Figure 12: Scan for Wireless Network



- c. A list of available networks will be displayed; select the wireless network you'd like to connect to by pressing anywhere within the row.

- d. A page will be displayed containing the details of the selected Wi-Fi network. Within this page use the keyboard to enter the password and/or username required to connect to the network.

Figure 13: Enter Wi-Fi Network Information



The screenshot shows a mobile application interface for network configuration. At the top, there is a header bar with a blue arrow and the word 'Back' on the left, and a Wi-Fi icon followed by the word 'Network' on the right. Below the header, the SSID 'MyNetwork1' is displayed. Underneath the SSID is a 'Password' label and a text input field. A virtual keyboard is overlaid on the screen, featuring a standard QWERTY layout with additional function keys like 'Sym', 'Comma', 'Period', and 'Enter'.

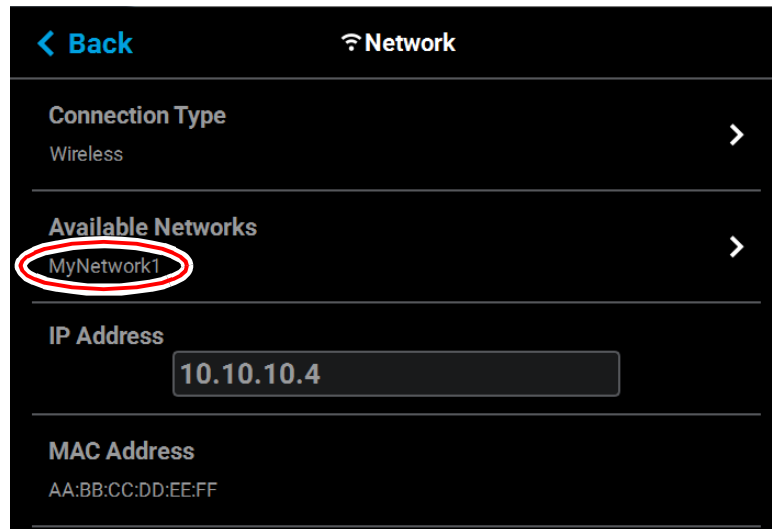
- e. When finished, touch anywhere on the screen outside of the keypad to exit and close the keypad.
- f. Scroll to the bottom of the page and press the **Connect** button to save the network configuration.

Figure 14: Connect Button



This screenshot shows the bottom portion of the network configuration screen. It features a text input field at the top, followed by a horizontal line. Below the line is a large, rounded blue button with the word 'Connect' written in white text.

- g. Press the **Back** button to exit the page and return to the Network page. The name of the selected wireless network will be displayed within the Available Networks row.



- h. Press the **Back** button to exit the page and return to the *Tools* page. The Network button will refresh and a blue indicator will be displayed indicating that the printer is configured for a Wi-Fi network.

Figure 15: Enter Network Settings Dialog



Installing GrabCAD Print

Install the GrabCAD Print software on a facility workstation. Navigate to <http://help.grabcad.com/article/197-sign-up-download-and-install> and follow the on-screen instructions.

Connecting to the F123 Series Printer

Add the F123 Series printer to the GrabCAD Print application. Navigate to <http://help.grabcad.com/article/198-connect-your-printers> and follow the on-screen instructions.

Setting the Printer's Date and Time

In order to ensure accurate build times, the printer's clock must be set correctly. If you find that your printer's date and/or time are incorrect you can update them using GrabCAD Print. To do so, navigate to <http://help.grabcad.com/article/196-printer-firmware-management> and follow the procedure for "Changing your printer's clock time".

Updating the Controller Software Version

Update the controller software if necessary. See “Updating Controller Software” (page 1).

Adjusting the Tip Wipe Height

If necessary, adjust the tip wipe height. See “Tip Wipe Height Adjustment” (page 16).

3 SYSTEM COMPONENTS

This chapter describes the components of the F123 Series. Information regarding the materials and tips that can be used by the printer is also included in this chapter.

Printer Overview

Access Doors and Panels



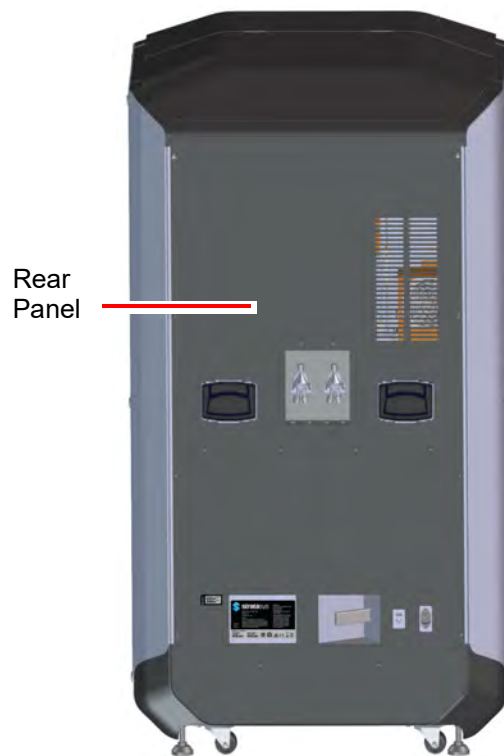
Do not energize when the rear panel is not secured in place.

This printer has been designed to allow easy access to the most frequently accessed areas on the system. Doors and panels are highlighted in Figure 1 and Figure 2.

Figure 1: Access Doors and Panels - Front View



Figure 2: Access Doors and Panels - Rear View



Top Cover

Allows access to the gantry and head assemblies.

Oven Door

Allows access to the platen, tip wipe assemblies, purge area, and completed parts for removal. The printer's camera is also housed within the oven door.

Material Bay Drawer

Allows access to the material bay components (material bays, material spools, and the material drive controllers).

Storage Drawer

Provides a built-in area which can be used for miscellaneous storage of spare parts, tools, etc., as needed.

Right & Left Side Panels

The right and left side panels provide access to the oven chamber fans.

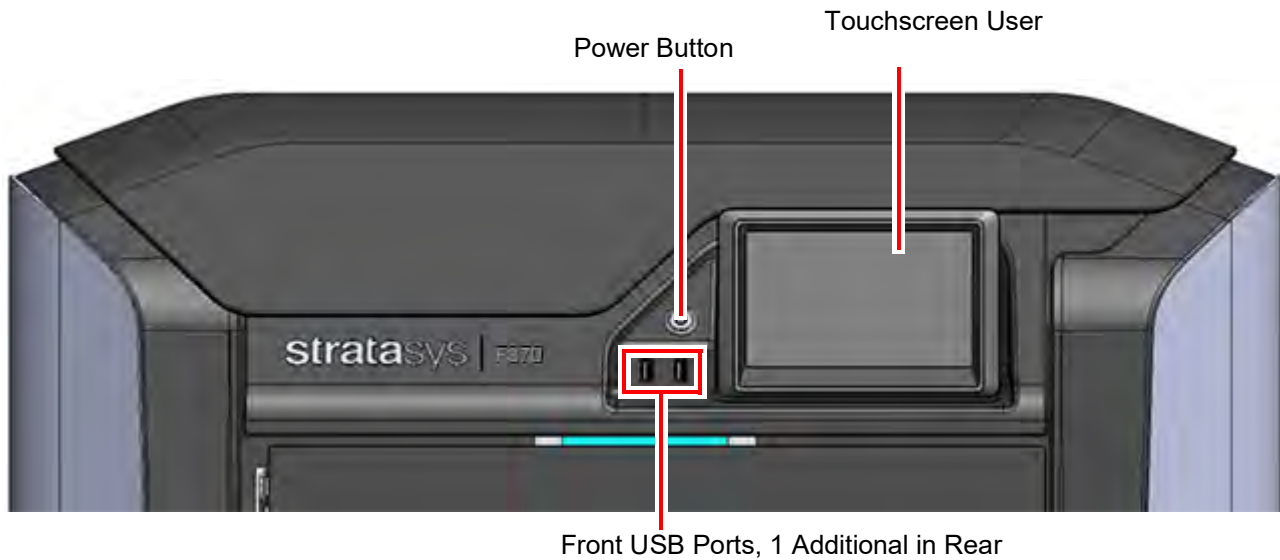
Rear Panel

The rear panel provides access to the electronics bay.

Interface Panel

The interface panel houses the printer's touchscreen user interface, power button, and USB ports.

Figure 3: Interface Panel



Touchscreen User Interface

Allows for user control of the printer. From the User Interface you can access various screens to select jobs for building, control jobs in the process of being built, change materials, perform calibrations, and configure your printer's settings and maintenance options. The touchscreen visually displays the operational state of the printer as well as any warning information available.

See [Chapter , 4 User Interface \(page 1\)](#) for detailed information on the components and pages of the user interface.

Power Button

Allows you to power the printer ON and OFF (see [“Powering ON the Printer” \(page 1\)](#) and [“Powering OFF the Printer” \(page 2\)](#) more information).

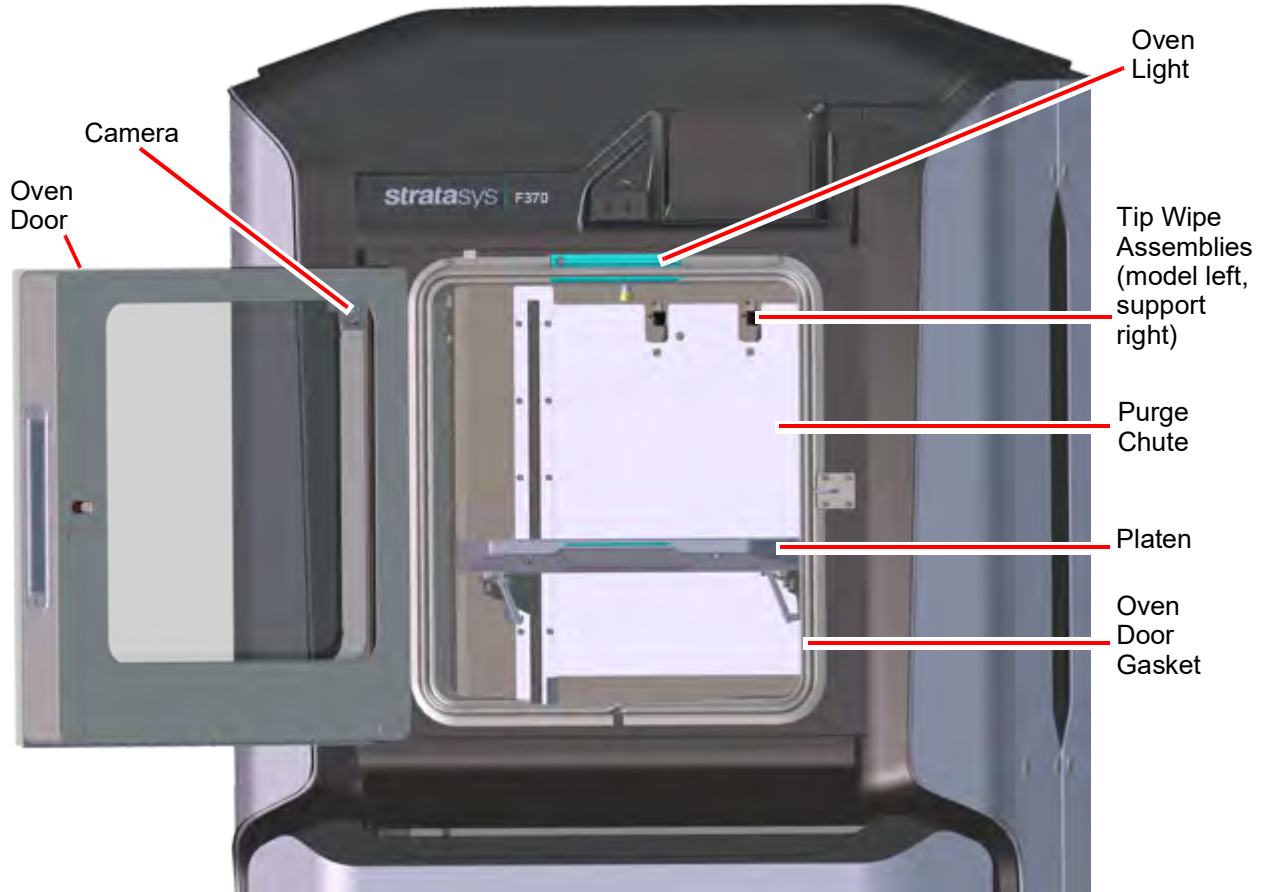
USB Ports

The printer's USB ports allow you to easily upload job files to be built. After plugging a USB flash drive into any of the USB ports you can access the flash drive's contents via the Queue page (see [“Working with the Queue Page” \(page 13\)](#) for details).

Oven Components

The oven consists of the oven door and everything that you see through the oven door window, including the platen, tip wipe assemblies, purge chute, and oven heaters. The printer's camera is housed within the frame of the oven door.

Figure 4: Oven Components



Oven Door

The oven door (see [Figure 4](#)) utilizes an electromagnetic lock along with optical sensors. The oven door remains locked while the printer is building and automatically unlocks when it is safe for you to access the components of the oven. You cannot open the oven door when the printer is building. The top cover will automatically unlock in conjunction with the oven door, allowing you to manually open the top cover. The oven door must be open prior to opening the top cover. The oven door gasket, which runs around the perimeter of the oven door frame, helps to provide an airtight seal when the oven door is closed.

The oven door window is composed of 2 panes of tempered glass.

Camera

The printer's camera is housed within the frame of the oven door and provides remote monitoring capabilities while a part is building. Using the GrabCAD Print application installed on your workstation PC, you can view the part as it is building allowing you to remotely monitor part build quality. Pictures are automatically taken at a set interval via GrabCAD Print. Please note that the camera image displayed will include some reflection as a result of the oven door's glass.

Figure 5: Camera Location

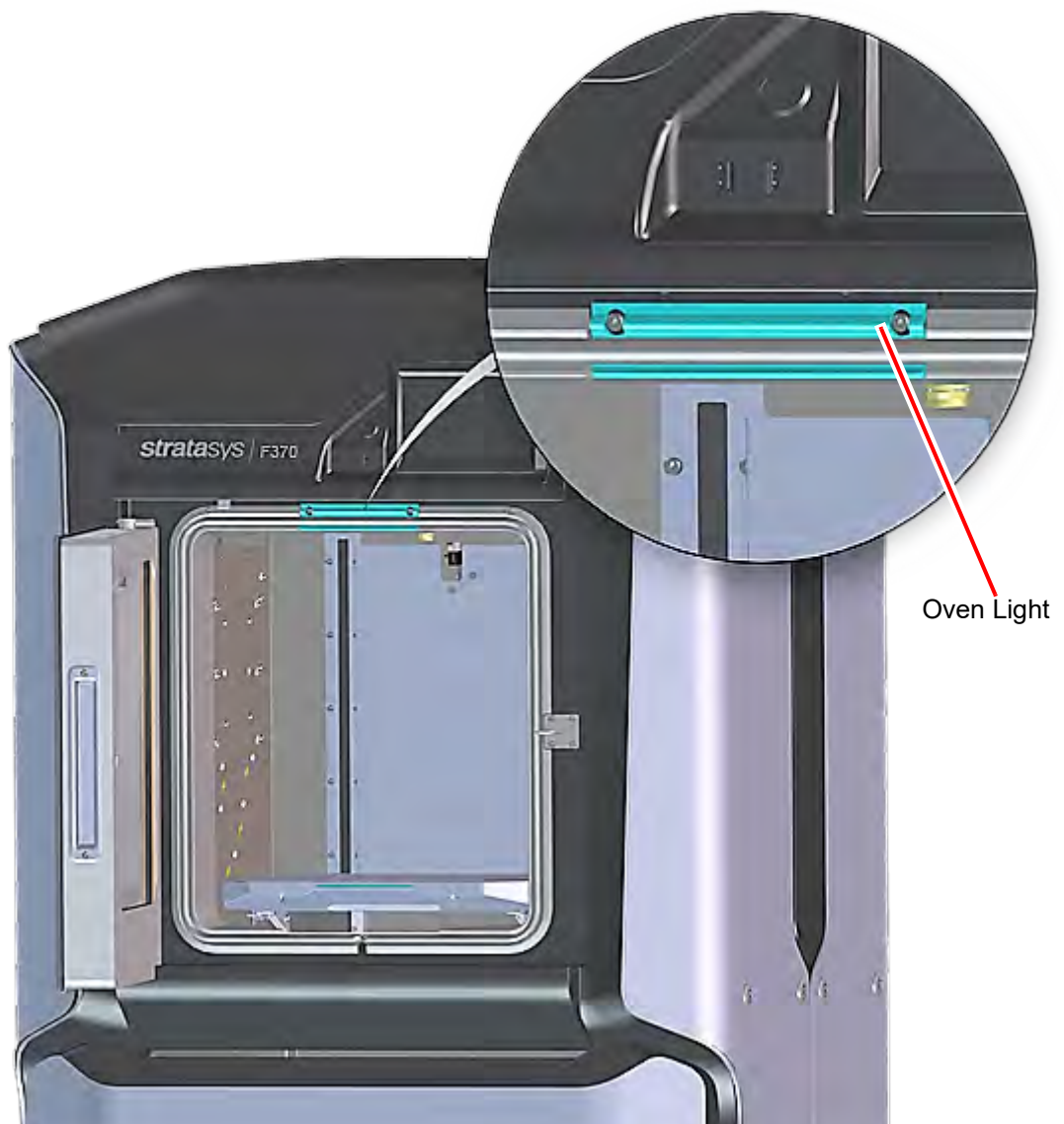


Oven Light

A single light pipe is mounted on the front upper edge of the oven and is used to illuminate the oven chamber (Figure 6). The light pipe consists of nine high-temperature LEDs; each LED is rated at 1-watt. The oven light is powered by 12 VDC.

The Light button within the Tools page indicates the current state of the oven light and allows you to manually turn the light ON or OFF (see “Light” (page 63)).

Figure 6: Oven Light Location

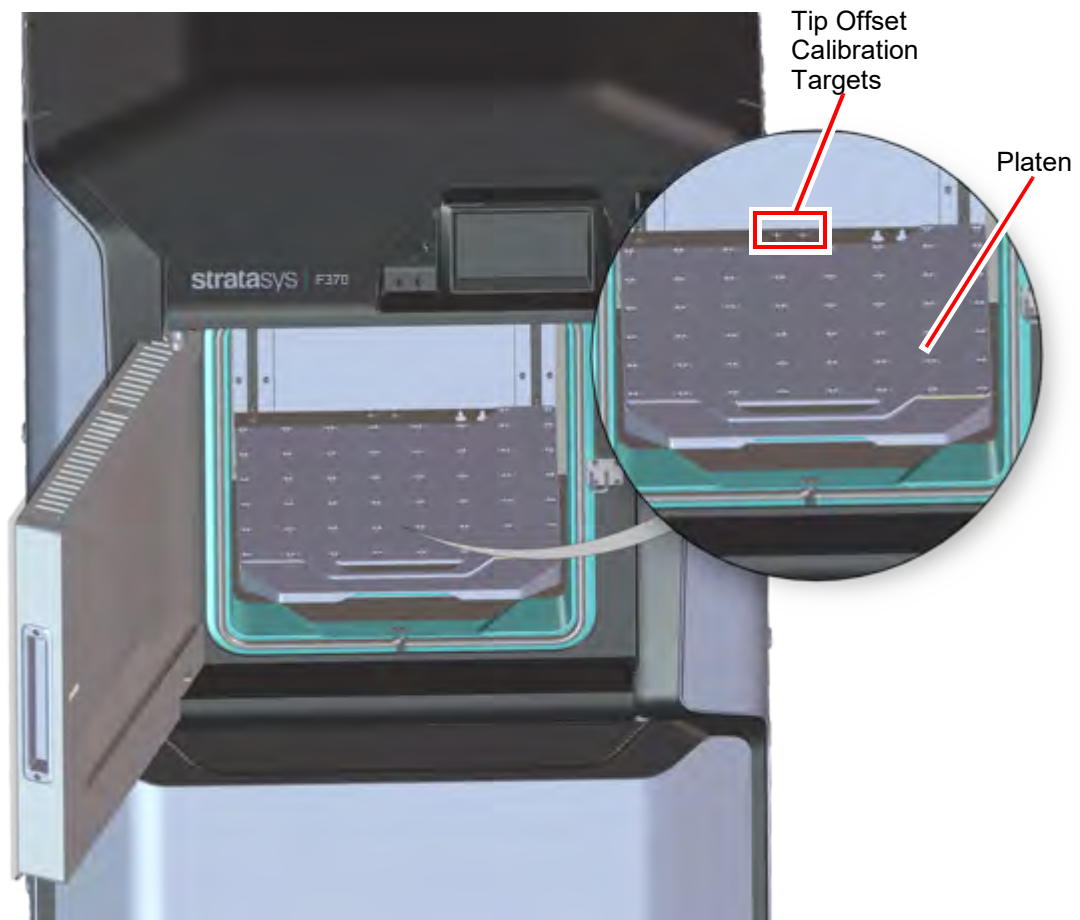


Platen

The steel platen provides the level surface on which parts are built. A substrate is securely affixed to the platen using the substrate ejection handle. After placing a substrate on the platen lifting up on the handle will lock the substrate into its build position; pressing down on the handle will release the substrate from the platen for removal.

The tip offset calibration targets are located on the rear center portion of the platen. These targets are used when determining the X and Y offset between model and support tips after either head has been replaced (during an automatic Tip Offset Calibration).

Figure 7: Platen Components

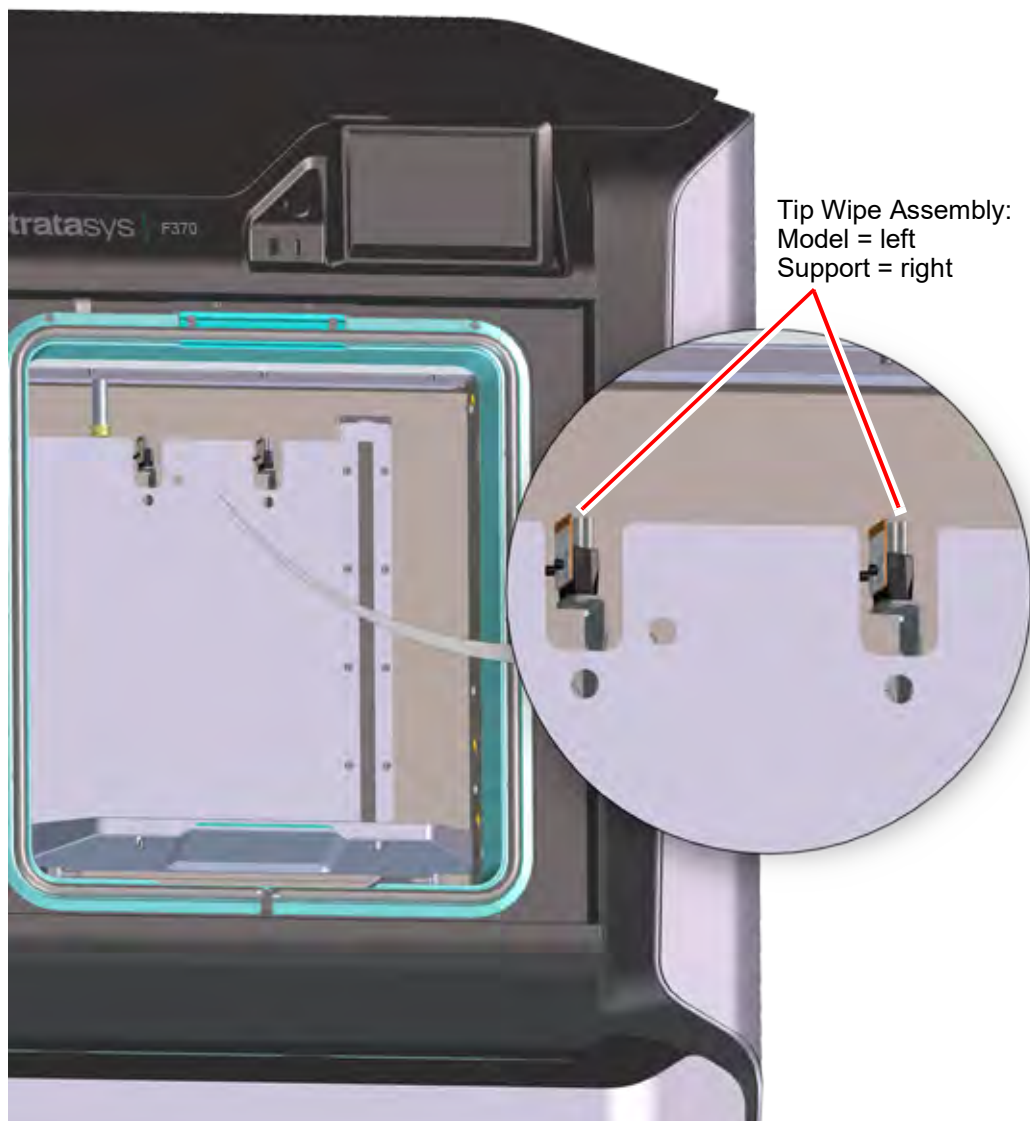


Tip Wipe Assemblies

Two tip wipe assemblies are located in the rear of the oven, one for model and one for support. Each assembly consists of a flicker and a brush. The tip wipe assemblies keep the printer's tips and tip shields free of purged material debris and material buildup. The tip wipe assemblies are mounted behind the purge chute and extend through the purge chute via two slots cut into the chute's exterior.

After material is purged from a tip, the tip passes across the tip wipe assembly. The flicker cuts the purged material from the end of the tip and knocks it into the purge chute. The brush cleans the tip and tip shield. Purged material debris is guided down from the tip wipe assemblies to the bottom of the oven chamber via the purge chute.

Figure 8: Tip Wipe Assemblies



Purge Chute

The purge chute is located in the back of the oven. Purged material debris is guided down from the tip wipe assemblies to the bottom of the oven chamber via the purge chute. Material debris exits the purge chute via an opening at the bottom of the chute and then accumulates in the bottom of the oven chamber. Accumulated material debris should always be cleaned on a weekly basis, or as needed if excessive accumulation occurs, see “Cleaning the Oven Chamber” (page 12) for instructions.

Figure 9: Purge Chute Location

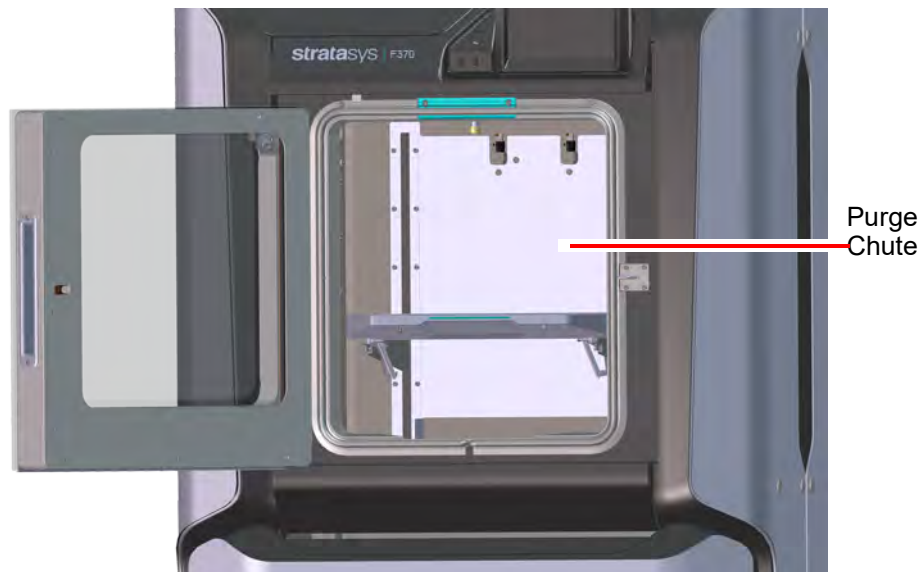


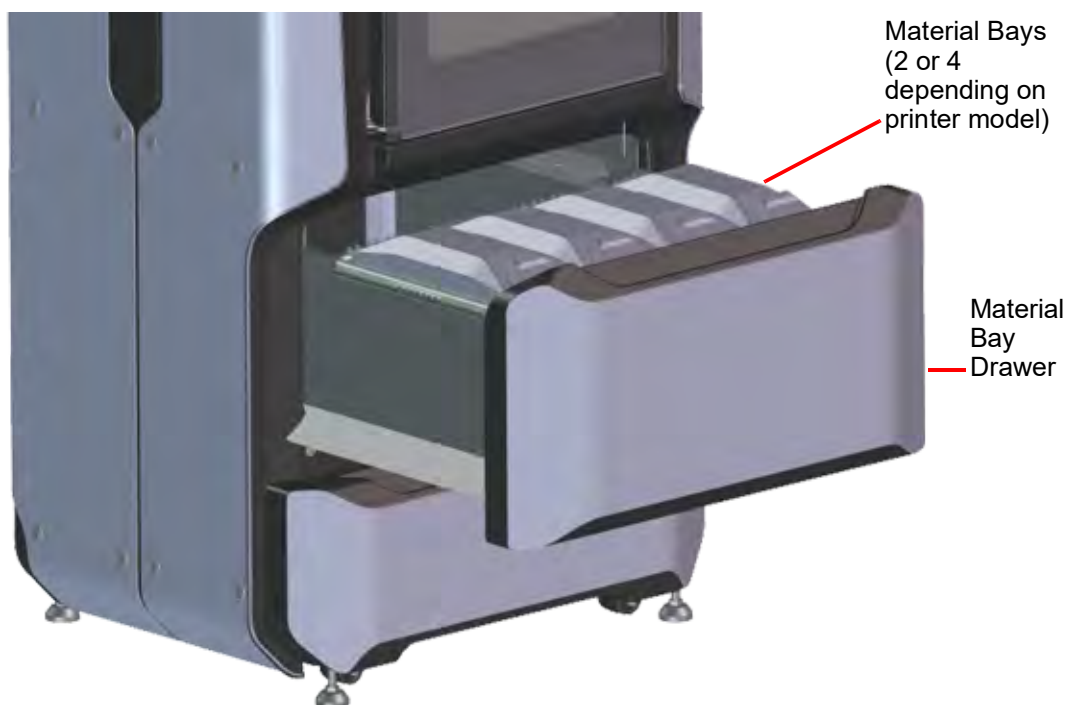
Figure 10: Oven Chamber Cleaning Location



Material Bay Drawer Components

The model and support material bays are accessible by opening the material bay drawer on the front of the printer. The material bay drawer does not contain any locking mechanisms and can be opened while the printer is building.

Figure 11: Material Bay Drawer Components



Material Bays

The F270 and F370 printers have four operating material bays - two model and two support. The two left-most bays hold model material while the two right-most bays hold support material. The F170 printer has two operating material bays - one model and one support. The left bay holds model material while the right bay holds support material.

While building, one model and one support spool will be active. An active spool has material filament loaded to the head, as indicated by a solid blue pathway between the Material Status Icon and corresponding Head Status Icon, a solid blue Head Status Icon, and a solid blue border around the Material Status Icon on the touchscreen display (see [“Materials Status”](#) (page 29) for more information). For applicable printer models, you can replace inactive spools without pausing the printer.



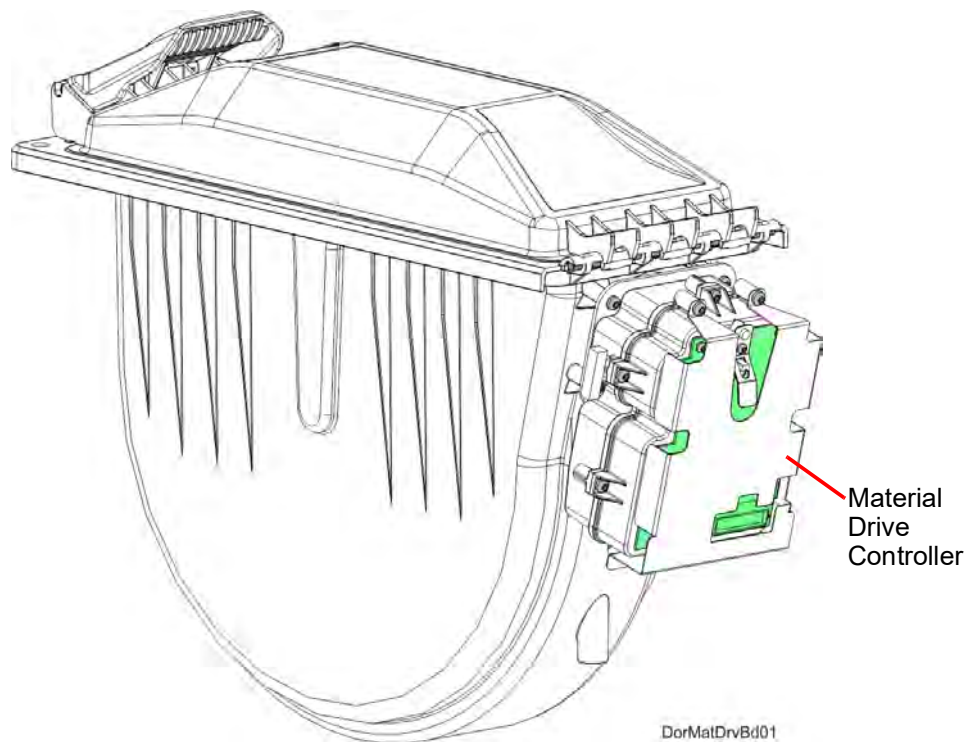
The auto changeover capability automatically loads a second spool during a build when the first spool runs out of material (see [“Material Auto Changeover”](#) (page 10)). Auto changeover is only applicable for the F270 and F370 printers.

Material Drive Controller

Each individual material bay has a material drive controller. The material drive controller feeds filament from a material bay to the head. The material drive controller is located on the back side of the material bay and contains a small 12 VDC motor which drives filament up to the head. The material drive controller is a non-serviceable item and is instead replaced along with the replacement of a material bay.

The material drive controller contains a mechanical filament present switch which detects the presence of material within the material drive during the load and unload process. This switch also detects errors. If the material drive controller detects that filament has broken within the material bay or the end of filament is reached, the printer will pause to allow for recovery.

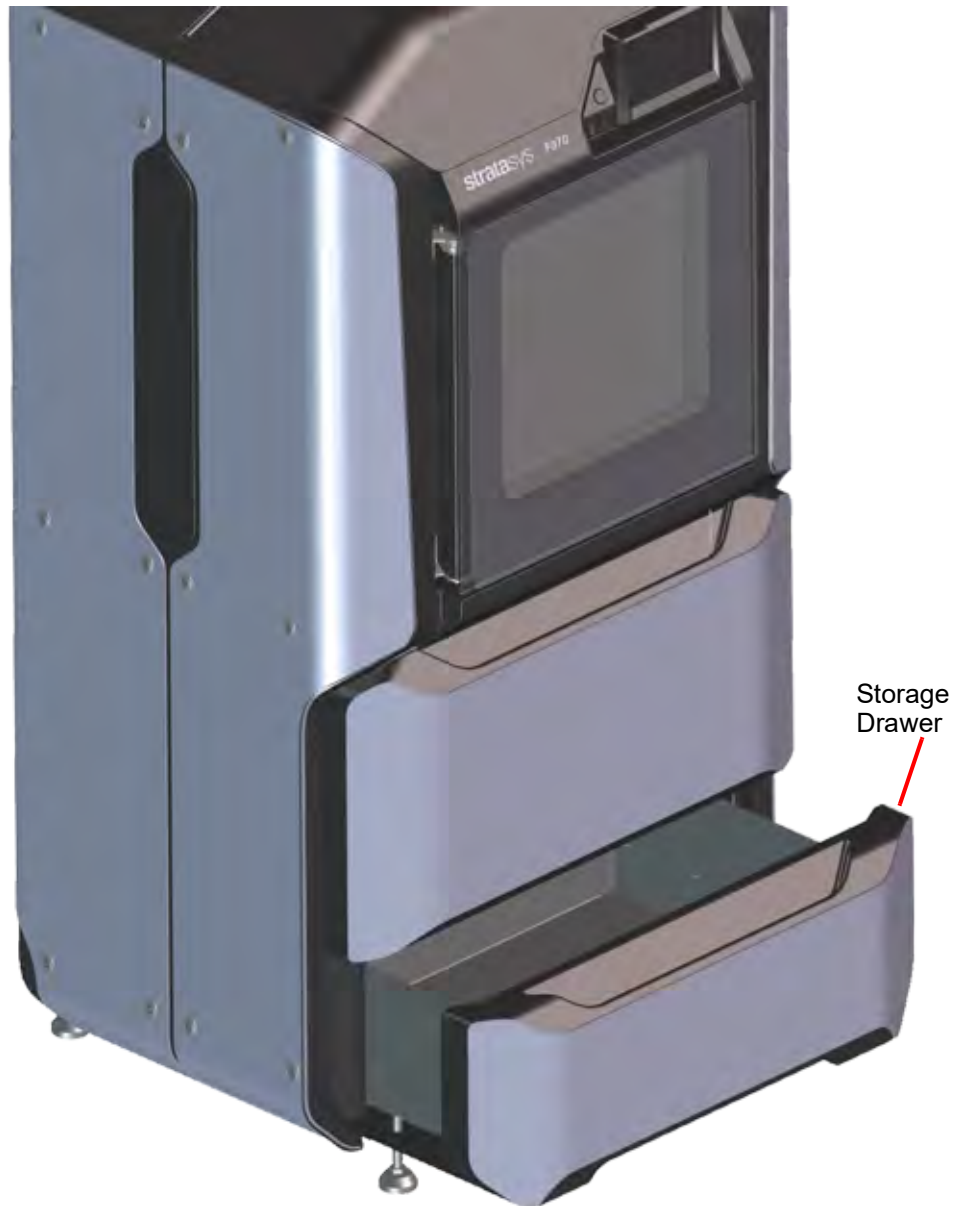
Figure 12: Material Drive Details



Storage Drawer

Directly below the material bay drawer is a storage drawer which can be used to store spare parts or tools, as needed.

Figure 13: Storage Drawer

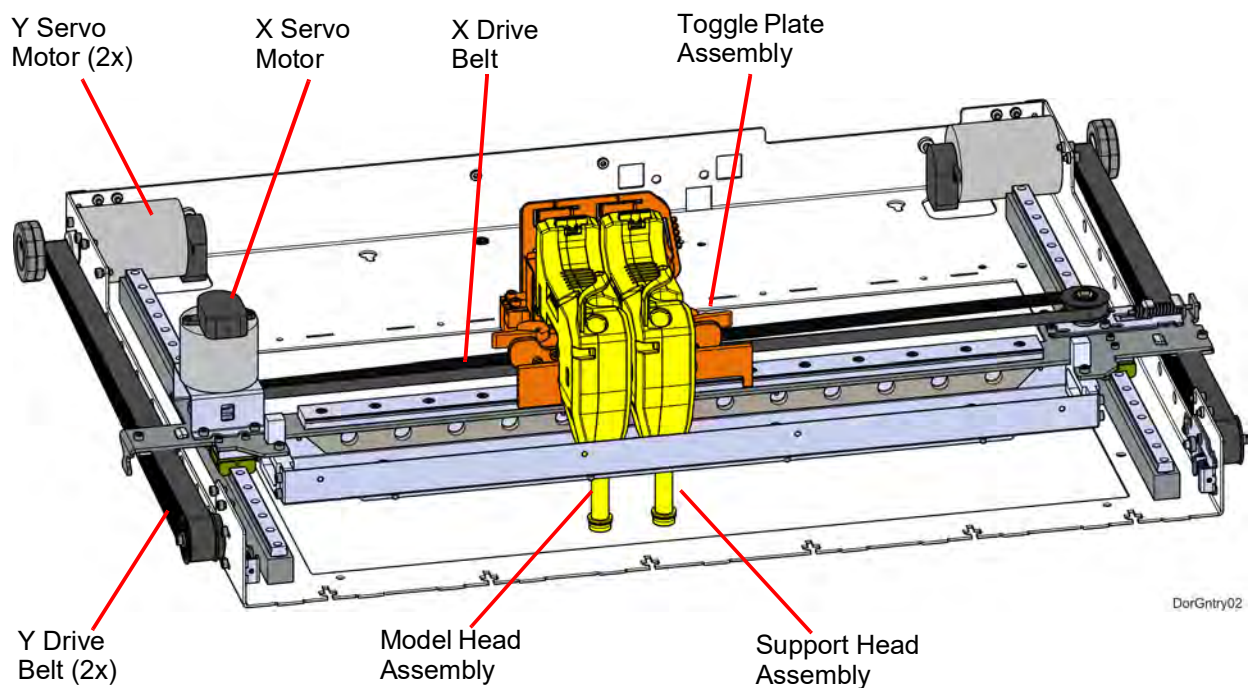


Gantry

To access the gantry or the heads, you must first open the top cover. The top cover utilizes a mechanical locking mechanism. The top cover remains locked while the printer is building and automatically unlocks when the oven door is opened. The printer cannot resume building if the top cover and/or oven door are open.

The gantry moves the head in the X and Y directions when building a part. The gantry assembly is located under the top cover. The entire gantry is outside of the oven; only the bottom of the head protrudes into the oven. The gantry and its drive motors are thermally shielded from the oven via flexible heat shields. To move the head, the gantry utilizes one X and two Y servo motors attached to timing belts.

Figure 14: Gantry Assembly



Print Heads

The F123 printer utilizes four print head assemblies, one for standard model and support material, one for TPU 92A (Elastomer), one for PLA model material and one for the PLA cooling module. The standard model and support heads are black. The TPU 92A model head is blue. The PLA head is dark gray. Once a head has been used for standard model or support, it can only be used for that designated material (model or support) thereafter. The TPU 92A head can only be used for TPU 92A material. The PLA head can only be used for PLA material. The heads are designed for use with a range of modeling materials. The heads extrude model material and support material with two identical liquefiers. A single blower fan, mounted above the tip liquefier entrances, cools the incoming material at the liquefier entrances.

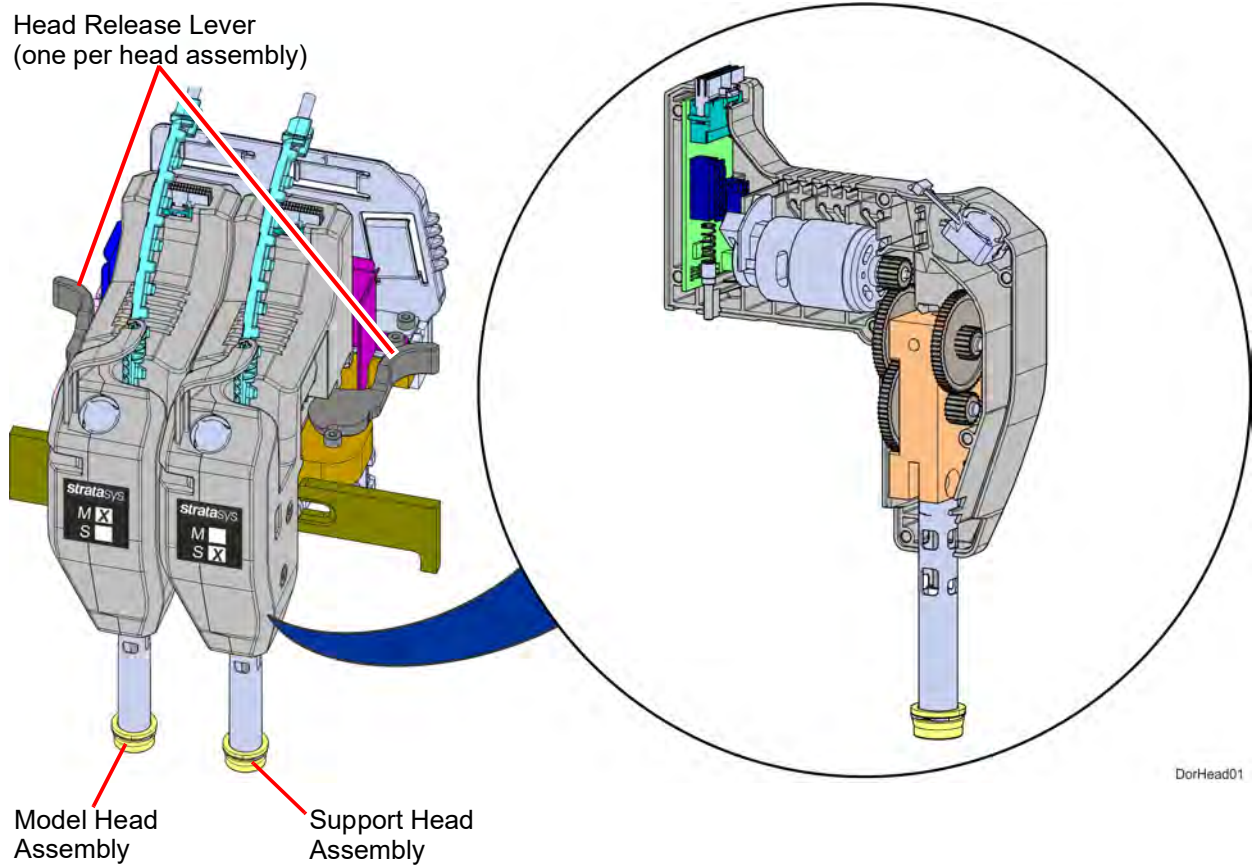
Head life is directly related to the amount of build time for the head. Heads are a replaceable consumable item and should be changed once the head's odometer reaches 1500 build hours (see [“Viewing Head Details” \(page 24\)](#) for information on head odometers). You will receive a warning when the head's odometer reaches 1350 build hours, reminding you to order a replacement head as the head is nearing its odometer limit. You can continue using a head which has exceeded its odometer limit, but it is highly recommended that you change the head as part quality will be unpredictable. The corresponding Head Status Icon will be displayed in its warning state on the User Interface (see [Table 6 \(page 22\)](#) for icon states). The entire model or support head assembly is replaced as a single unit (see [“Head Replacement” \(page 12\)](#) for instructions). The Head Release Lever locks and unlocks the associated head into or out of its seated position.

When building with PLA material, a specialized PLA head is used. The PLA head must be installed into the model head location within the gantry. A cooling module is used in conjunction with the PLA model head and must be installed into the support head location within the gantry (see [Table 4 \(page 4\)](#) for help identifying the cooling module). When building with PLA material, the PLA model head extrudes both model and support materials. (See [“Replacing a PLA Head” \(page 14\)](#) for instructions on replacing a PLA head or the associated cooling module).

Table 1: Print Head

Head Type	Head Color	Model Materials	Support Materials
Standard	Black	ABS, ASA, PLA, PC-ABS, TPU 92A, Diran™ 410MF07, ABS-ESD7™	QSR, SUP4000B ¹
TPU (Elastomer)	Blue	TPU 92A	
PLA	Light Grey	PLA	Natural, Red, Yellow, Green, Blue
PLA Cooling Module	Light Grey		Air cooling only
¹ Used with Diran™ 410MF07 only.			

Figure 15: Head Assemblies



Modeling Materials

Materials Used

The F123 Series can use a variety of model materials, in a range of colors. QSR Soluble Release support material is used in conjunction with all model materials, except for PLA. When building with PLA material, PLA is used for both model and support materials (see Table 4 (page 18) for model and support compatibility information).

Table 2 (page 16) lists the material types available for use with each printer model.

Table 3 (page 16) lists color availability by model material type.

Table 2: Available Materials

Printer Model	Available Materials
F170	ABS, ASA, PLA, TPU 92A
F270	ABS, ASA, PLA, TPU 92A
F370	ABS, ASA, PLA, PC-ABS, TPU 92A, Diran™ 410MF07, ABS-ESD7™

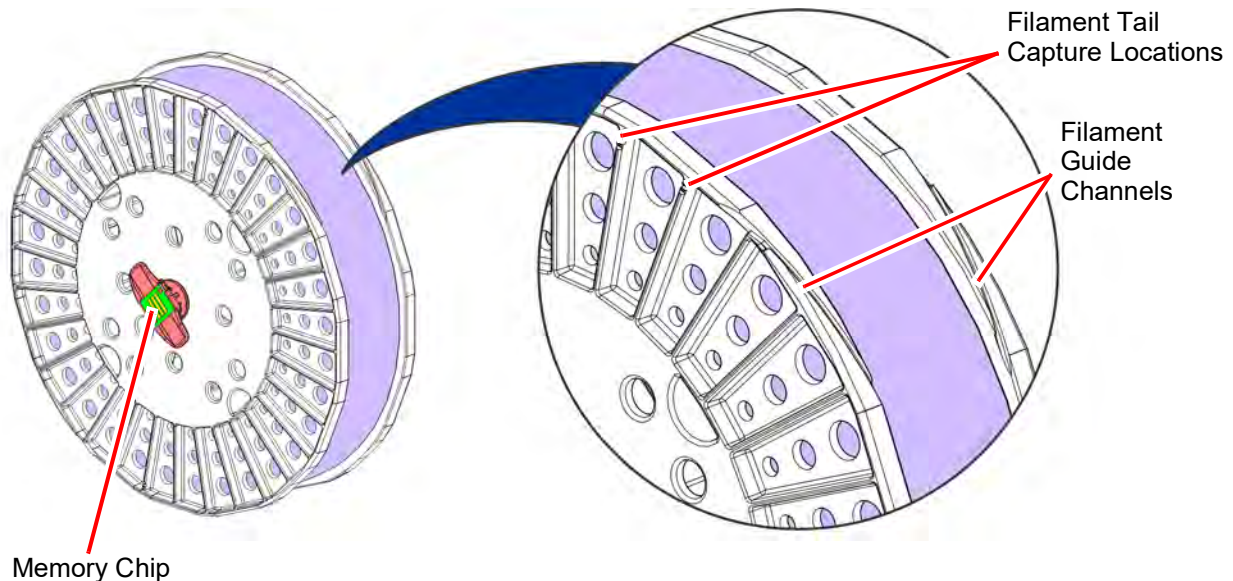
Table 3: Color Options

Material Type	Solid Color Options	Translucent Color Options
ASA	Ivory, Black, White, Dark Gray, Light Gray, Red, Blue, Orange, Green, Yellow	
ABS	Ivory, Black, White, Dark Gray, Red, Blue, Orange, Green, Yellow	
PLA	Black, White, Medium Gray, Light Gray, Red, Blue	Natural, Red, Yellow, Green, Blue
PC-ABS	Black, White	
TPU 92A	Black	
Diran™ 410MF07	Dark Gray	
ABS-ESD7™	Black	

Material Spool Memory Chip

Each material spool has an axle with a memory chip; this memory chip recognizes the spool's material type and tracks the spool's volume. The F123 Series utilizes a different memory chip than other Stratasys materials and as a result, only F123 Series compatible spools can be used to build parts on the printer.

Figure 16: Material Spool Memory Chip Location



When a spool is installed, its memory chip is read and the spool's information is reported to the printer. The spool's material type and volume are displayed within the Materials page of the User Interface (see [“Working with the Materials Page”](#) (page 21) for more information). If a non-compatible spool is installed an error will be displayed on the User Interface.

Each build file contains an estimate of the amount of model and support material required to complete the build. When initiating a build, this estimate is compared to the amount of material available on each spool. If there is not enough material available to complete the build, you will be warned and given the option to change spools or install additional spools before starting the build.



A specific prompt will only be displayed if a spool volume related issue is detected. See [“Warnings and Errors”](#) (page 1) for details.

Tips, Slice Height, and Build Sheets

The F123 Series utilizes a T14 tip for all model and support materials. Tips are a component of the associated head assembly and cannot be changed individually. Instead, the entire head assembly is replaced as a single unit.

Table 4 lists the types of model material available for use with the printer, their corresponding support material, and their corresponding build sheets.

Table 5 lists available slice heights.

Table 4: Available Material Types

Model Material	Support Material	Build Sheet
ASA	QSR	Standard
ABS	QSR	Standard
PLA	PLA	Standard
PC-ABS	QSR	Standard
TPU 92A	QSR	Standard
Diran™ 410MF07	SUP4000B	High Temp
ABS-ESD7™	QSR	Standard

Table 5: Slice Height

Model Tip	Slice Height (in)	Slice Height (mm)	Material
T14	0.005	0.127	ABS, ASA, PC-ABS
	0.007	0.178	ABS, ASA, PC-ABS, Diran™ 410MF07, ABS-ESD7™
	0.010	0.254	ABS, ASA, PC-ABS, PLA ^a , TPU 92A, Diran™ 410MF07, ABS-ESD7™
	0.013	0.330	ABS, ASA, PC-ABS, Diran™ 410MF07

^a Available in “Draft” mode only

Software

Controller Software

Controller Software is installed during the manufacturing process, and can be updated as new versions become available (see “[Updating Controller Software](#)” (page 1) for instructions). Controller Software is the software used to control the printer.

GrabCAD Print Software

The printer builds parts by processing an original CAD or STL file into a Stratasys CMB file which is then downloaded to the printer. GrabCAD Print is the software used to process files and then transfer them to the printer to be built. As part of the initial installation and setup process, you must download and install GrabCAD Print software. You must download this software before you will be able to build a part on the printer. To download GrabCAD Print navigate to <http://help.grabcad.com/article/197-sign-up-download-and-install> and follow the on-screen steps.

Jobs are sent to the printer in CMB format and placed into the Job Queue (see “[Working with the Queue Page](#)” (page 13) for information on the Job Queue.) The header of the CMB file contains the processed job’s basic information.

The GrabCAD Print Help documentation includes detailed information on how to connect to your printer, process parts, edit the Job Queue, etc. The Help file can be accessed from either the application’s Help Menu or directly from the GrabCAD website.

Insight Software

Insight is a software application used for processing STL files. Insight provides the user with the ability to utilize advanced features and manipulate numerous parameters within the file. For most applications, GrabCAD Print software will provide sufficient capabilities. However, in some cases, the advanced capabilities of Insight may be required.

When using Insight with the F123 Series, use the following process:

1. Open and process the STL file.



Insight will only process STL files.

2. When completed, save the CMB file to a known location.
3. In GrabCAD Print, navigate to **File > Import File** and select the CMB file you wish to import.
4. Continue with normal work flow using GrabCAD Print.

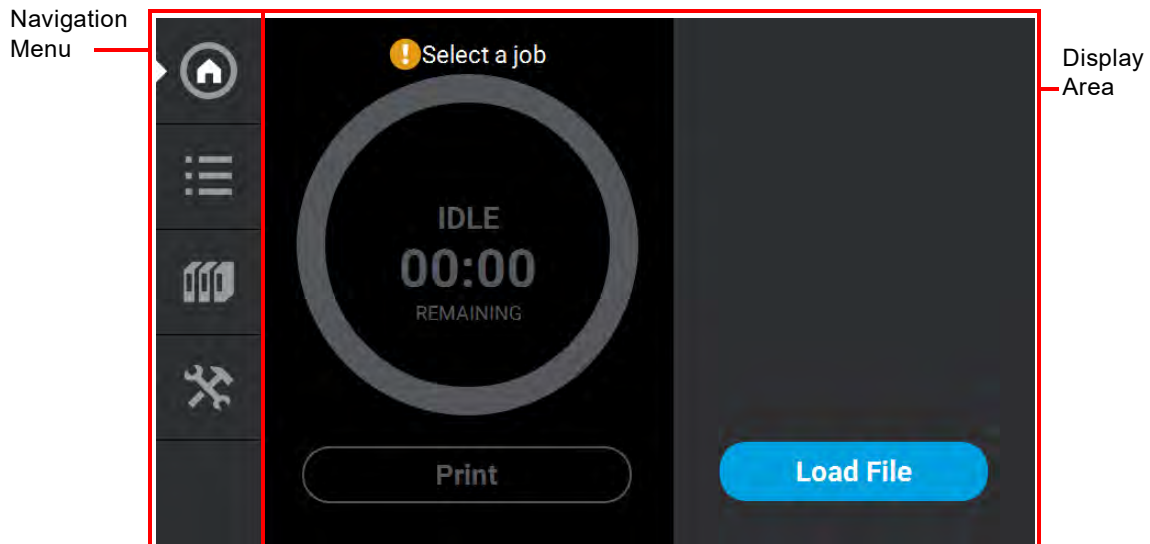
4 USER INTERFACE

This chapter provides an overview of the F123 Series User Interface (UI). Specific printer operation information and procedures can be found in [Chapter , 5 Operating the Printer](#) (page 1). You must power ON the printer prior to using the touchscreen (see “Powering ON the Printer” (page 1) for instructions).

Overview

The User Interface is composed of a touchscreen located on the front right face of the printer (see [Figure 1](#) (page 1)). Each page of the UI is composed of two main areas of functionality; these items are highlighted in [Figure 1](#).

Figure 1: User Interface Overview



The touchscreen is designed to reduce glare; therefore, it is best to view the touchscreen when standing in front of the printer with the screen to your right. Viewing the touchscreen from any other angle may inhibit a clear view of the screen's display. The touchscreen is easy to use and allows you to:

- Access material load, unload, and calibration functions.
- Monitor printer status.
- Monitor material/head statuses (types loaded/installed, spool volumes, head odometers, etc.) and change materials and/or heads when necessary.
- Monitor build progress (name of job being built, materials usage information, estimated completion time, etc.).
- Access network configuration information and change printer defaults.
- Access the Job Queue and Sample Queue (internal storage).

Navigation Menu

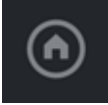
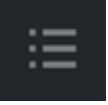
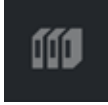
The Navigation Menu provides one-touch access to the Build, Queue, Materials, and Tools functions of the printer (see [Figure 1](#) for details). The User Interface is broken up into several pages of related functionality. Selecting a button from the Navigation Menu will open the button's corresponding page, allowing you to perform tasks within that page. If a page contains sub-pages, additional buttons corresponding to these items will be displayed within the page's Display Area.

The buttons in the Navigation Menu are mutually exclusive, meaning only one button may be selected at a time. In some cases, a notification badge will be displayed within the button indicating a warning related to the functionality of the corresponding page. Buttons can appear as follows:



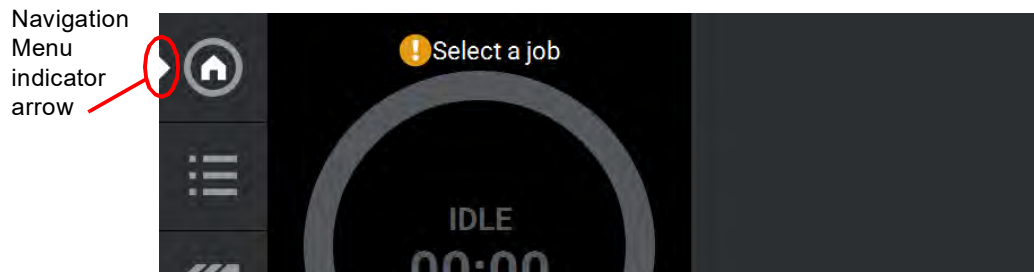
The bottom-most button in the Navigation Menu is non-functional.

Table 1: Navigation Menu - Button States

Button Name	Selected State	Unselected State	Warning State		Error State	
Build Button			 Unselected	 Selected	 Unselected	 Selected
Queue Button			N/A	N/A	N/A	N/A
Materials Button			 Unselected	 Selected	N/A	N/A
Tools Button			N/A	N/A	N/A	N/A

After selecting a button from the Navigation Menu, a white indicator arrow is displayed along the left-center edge of the button. This arrow indicates which Navigation Menu item is currently selected, making it easy for you to recognize which page of the UI you are viewing.

Figure 2: User Interface Overview



Display Area

The Display Area contains the body portion of each page of the User Interface; this is where you can select from available functions and view current status. After selecting a button from the Navigation Menu, the Display Area will refresh and the main page corresponding to the selected button will be displayed. The information and buttons/icons shown within the Display Area will vary depending on which main page of the UI was selected.

Working with the Build Page

The Build page is composed of the three main areas of functionality that are necessary for building parts on the printer; these items are highlighted in [Figure 3](#). Within the Build page you can start, pause, and abort a job, view a build time estimate for the selected job, see status and estimated action points for a job in progress, and view a visual representation of the completed part. Please note that you must load a job file to the printer and select the file to be built before the job's details will be displayed within the Build page.

The Build page also contains the Notifications Display. Depending on the state of the printer a variety of notifications/warnings will be displayed within this area of the page. Touching the text on the screen will open a dialog indicating the reason(s) for the notification, and in some cases, steps to correct the notification (see [Figure 4](#)). Once all notifications have been corrected, press the **Close** button within the dialog to exit the dialog.

To access the Build page, press the **Build** button within the Navigation Menu; a screen similar to the one in Figure 3 will be displayed.

Figure 3: Build Page

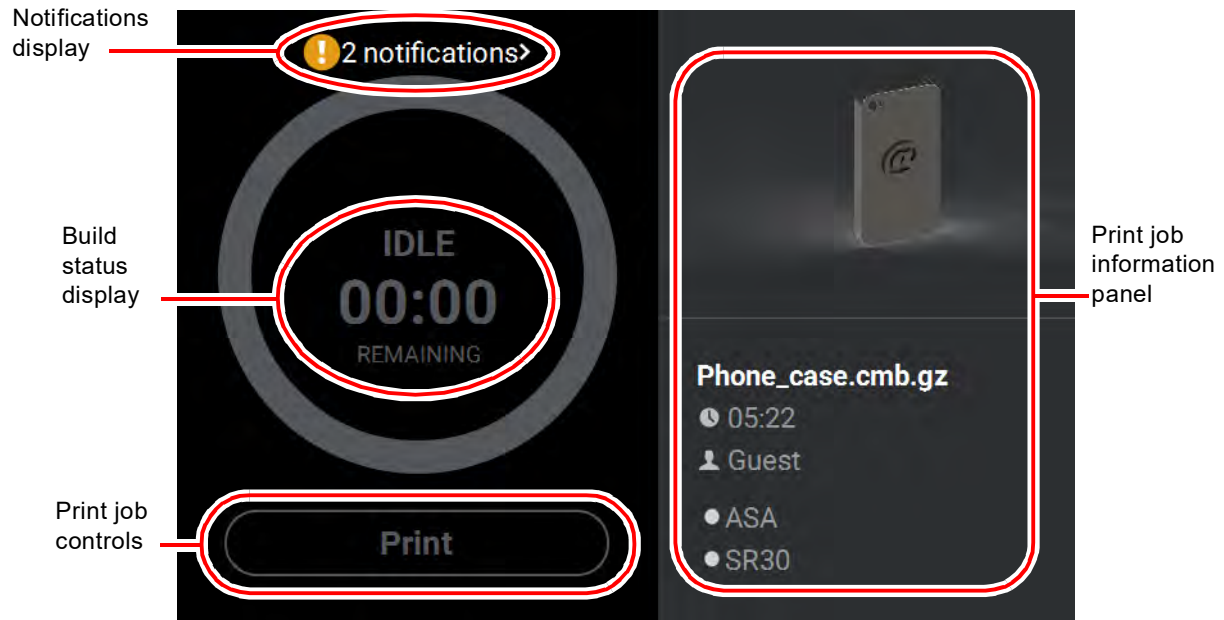
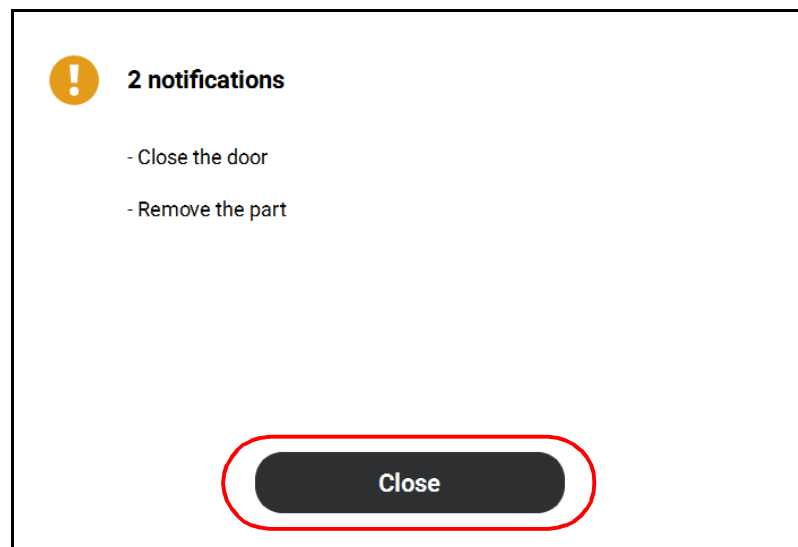


Figure 4: Notification Details



Loading a File



A job file must be loaded onto the printer and selected for building before the job's details will be displayed within the *Build* page.

The Print Job Information Panel is empty upon initial startup and the *Build Status Display* reflects its idle state. When there are no job files available within the Job Queue, the *Load File* button will be displayed within the *Build* page. Visibility of this button is dependent upon the method used to load job files to the printer.

A job must be selected for building before the job's details will be displayed within the *Build* page. In order to build a job, you must first load the job's corresponding job file to the printer. Job files can be loaded via network transfer (Ethernet or Wi-Fi) using the GrabCAD Print application on your workstation PC or by plugging a USB flash drive into one of the printer's USB ports and navigating to the job file via the *Queue* page (see [“Adding a Job to the Job Queue” \(page 14\)](#) for details). The job file you wish to build must be the first item listed in the *Job Queue*. Job files can be sorted as needed within the *Queue* page allowing you to select the job you'd like to build (see [“Editing the Job Queue” \(page 17\)](#) for details).

- If you send a single job file to the printer via network transfer using GrabCAD Print, the job's details will automatically be displayed within the *Build Status Display* once the job file is received by the printer, as this job will be the only item in the Job Queue. The *Load File* button will be hidden from view once the job file is received by the printer via network transfer.
- If you send two or more job files to the printer via network transfer using GrabCAD Print, the job details of the first file sent will automatically be displayed within the *Build Status Display* once the job file is received by the printer, as jobs are built in the order they're sent to the printer. The *Load File* button will be hidden from view once the first job file is received by the printer via network transfer.
- If you do not send files to the printer using GrabCAD Print and instead plug a USB flash drive into one of the printer's USB ports, the *Load File* button will be visible within the *Build* page. You can use this button to select a single job file you'd like to build directly from the flash drive.



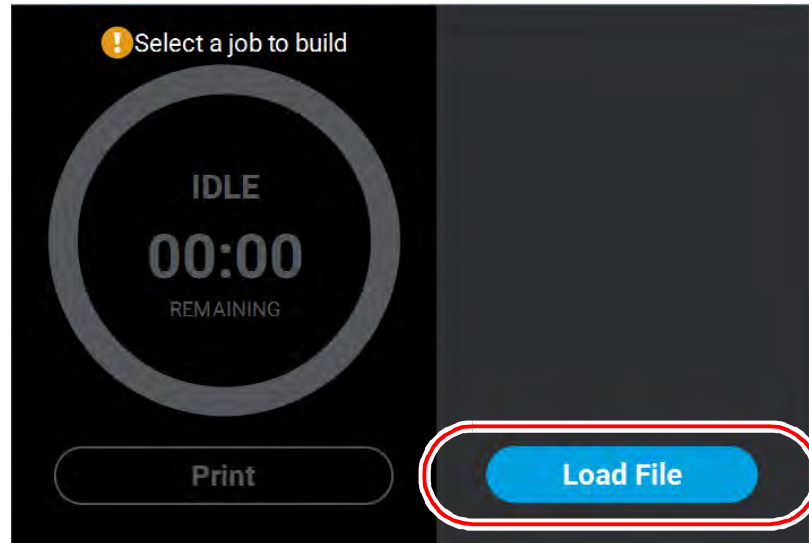
The Load File button within the Build page allows you to quickly select a single file to build off of a USB flash drive. The selected file will automatically be queued for building. If you'd like to populate the Job Queue with multiple job files, follow the instructions within [“Adding a Job to the Job Queue” \(page 14\)](#).

To load a file:

1. Plug a USB flash drive into one of the available USB ports on the front of the printer (see [Figure 3 \(page 3\)](#) for USB port locations).

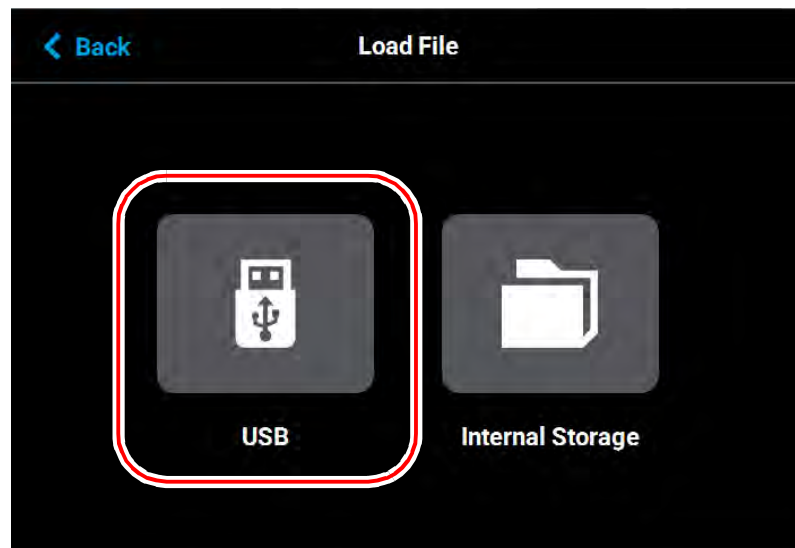
2. Press the *Load File* button within the *Build* page.

Figure 5: Load File Button



3. The *Load File* page will be displayed; press the *USB* button within this page.

Figure 6: Load File Page - USB Option



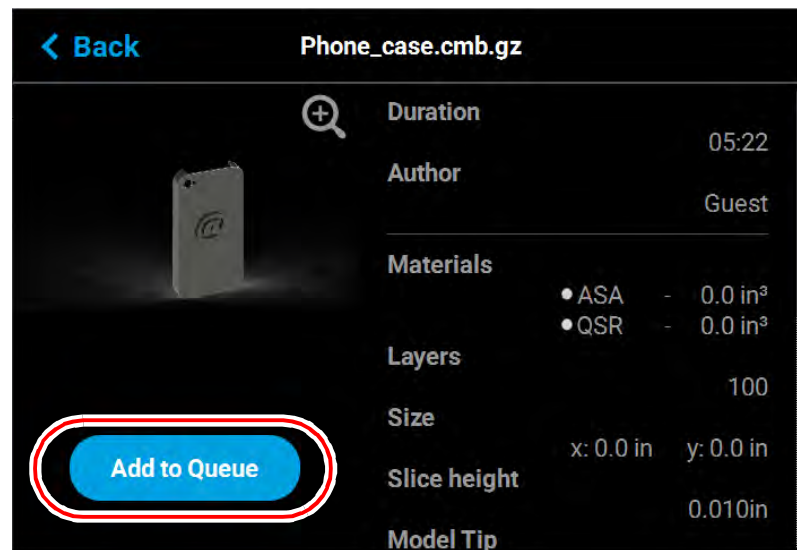
4. The *Load File* page will display the contents of the USB flash drive. Locate the desired job and select it by touching its row on the screen; doing so will open its *Job Details* page.



If both USB ports contain a flash drive individual folder graphics will be displayed on the screen representing each flash drive and its contents. Touching the folder graphic on the screen will drill down into the folder and display its contents. If a single flash drive is installed the job files located on the flash drive will be displayed in individual rows.

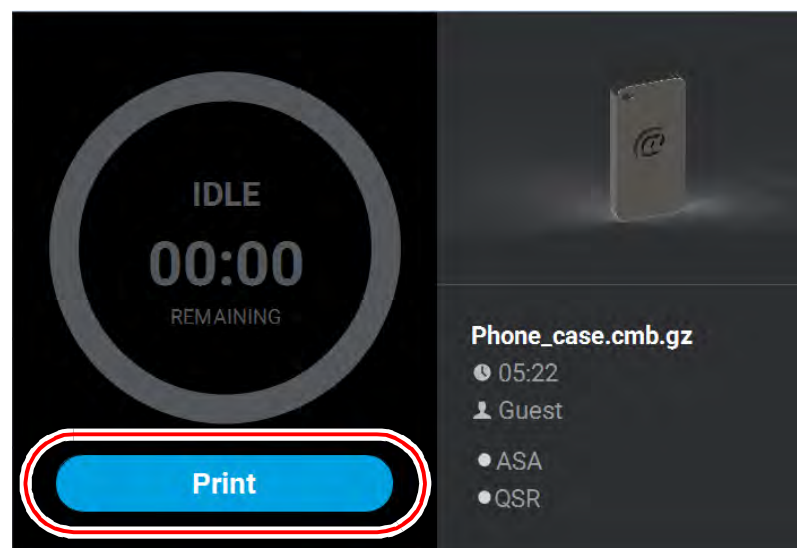
5. Within the Job Details page press the **Add to Queue** button; this will load the job into the Job Queue.

Figure 7: Add File to Queue



6. After pressing the *Add to Queue* button you will be returned to the *Build* page. The *Load File* button will no longer be visible. Instead, the details of the selected job file will be displayed within the Print Job Information Panel.
7. Pressing the *Print* button within the *Build* page will initiate the build. Build progress will be displayed within the Build Status Display, see “Build Status Display” (page 9) for details.

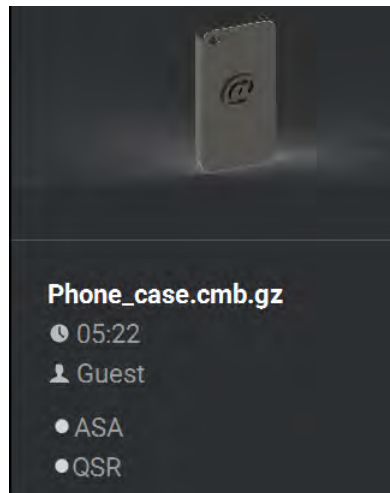
Figure 8: Build Page with Job Information



Viewing Print Job Information

Information pertaining to a selected job is displayed within the right half of the *Build* page, within the Print Job Information Panel. This information is static and represents the details of the job file.

Figure 9: Print Job Information Panel



Information displayed within this panel is divided into the two sections:

The top-most section displays a visual representation of what the selected job will look like after it is successfully built.

The bottom-most section displays a variety of information pertaining to the selected job, including:

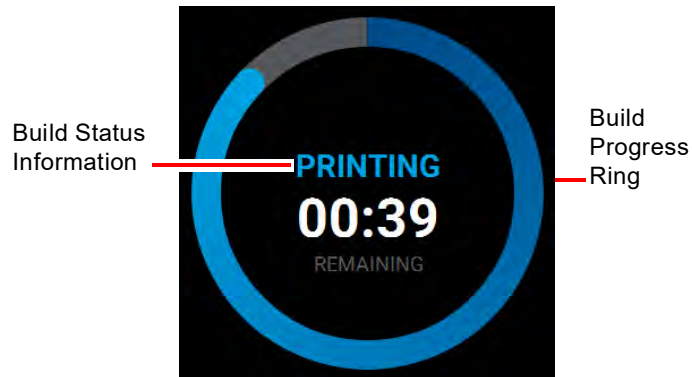
- Name of the job.
- Estimated build time for the job.
- Name of the user that submitted the job.
- Model and support materials associated with the job.

Touching anywhere within this portion of the screen will open a page displaying additional details pertaining to the selected job (see “[Viewing Job Details](#)” (page 18)).

Build Status Display

The Build Status Display section of the Build page is composed of a two-part graphic. The center portion provides information on a selected and/or building job while the outer progress ring corresponds with the build information displayed; the information displayed will vary depending on the state of the printer.

Figure 10: Build Status Display Overview



Idle

When the printer is idle, "IDLE" will be displayed within the center of the Build Status Display. This indicates that the printer is in a state where it is ready to start a build. No progress is indicated within the outer build progress ring and the time remaining is displayed as zero.

Figure 11: Build Status Display - Idle



Building

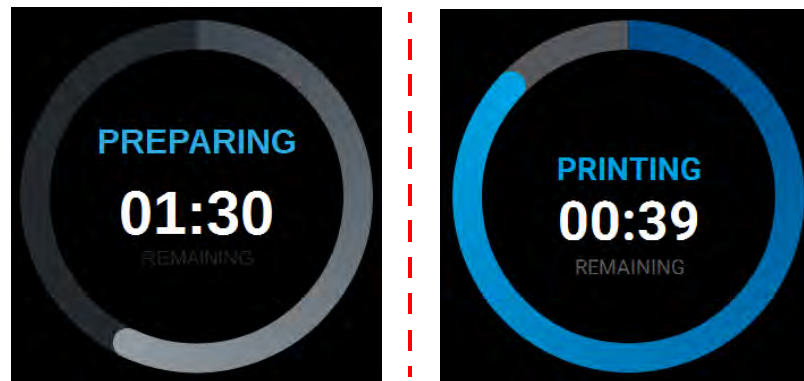


A job file must be loaded onto the printer and selected for building before build information will be displayed within the Build Status Display. See “Loading a File” (page 5) for details.

After pressing the **Print** button to start a build, "PREPARING" is briefly displayed within the Build Status Display, and the outer progress ring will fill, in gray, in a clockwise direction. This indicates the amount of time the printer requires to prepare for the start of the build, including the amount of time required for a Z Zero Calibration to occur (see “Z Zero Calibration” (page 16) for details).

Once build preparation is complete, "BUILDING" will be displayed within the center of the Build Status Display along with the amount of time remaining until the build is complete. As build progress is made, the amount of time remaining will get smaller until zero is reached, indicating that the build is complete. The build's percentage of completion is also displayed by radially filling in the outer progress ring, in blue, in a clockwise direction.

Figure 12: Build Status Display - Building

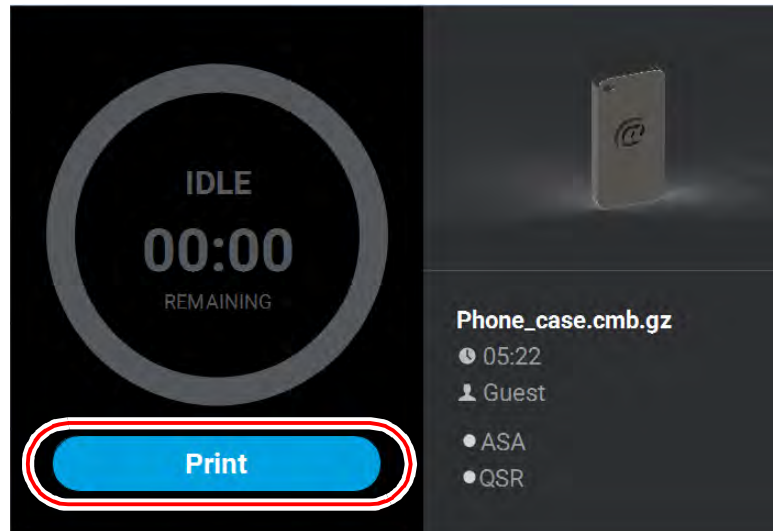


Touching the screen within the center of the Build Status Display while a part is being built will toggle the information displayed. After touching the screen the time estimation information will be hidden from view and instead the Build Status Display will show the number of completed layers as compared to the total number of layers in the build. Touching the screen again, will toggle back to the time estimation information displayed initially.

Print Job Controls

A button is displayed within the Build page, just beneath the Build Status Display. This button is used to start, pause, or abort a build, depending on the status of the printer. The Print button option will become selectable after you've performed the steps necessary to load a file (see [“Loading a File” \(page 5\)](#)) and the printer is in a state where it is ready to build a part. This button will toggle to display the Pause and Abort button options when a build is in process.

Figure 13: Print Job Controls



Print Button

The Print button allows you to start a build (see [“Selecting a Job to Build” \(page 16\)](#) for more information). The Print button can appear in the following states:

Table 2: Print Job Controls - Print Button States

Button State	Description
	- Printer is in a buildable state AND a selected job is available to build. - Selecting the Print button will begin the build.
	- Print button is disabled and not selectable. - Printer is not in a buildable state OR a job is not selected/available to build (i.e. queue is empty). - To troubleshoot this issue, touch the text displayed on the screen within the Notifications Display. This will open a dialog allowing you to view the reason(s) for the current build state, including any issues impeding your ability to start a build (i.e. no substrate, etc.). See “Warnings at Build Start” (page 2) and “Errors Preventing a Build from Starting” (page 3) for more information.

Pause Button

The Pause button allows you to pause an active build. The Pause button can appear in the following states:

Table 3: Print Job Controls - Pause Button States

Button State	Description
	- Printer is actively building. Selecting the Pause button in this state will pause the build. - When the printer is paused, "PAUSED" is displayed within the Build Status Display.
	- Pause button is disabled and not selectable. - Printer is preparing for a build, there is no job currently building on the printer.
	- Printer is paused. The Pause button toggles to display the Play button. - Selecting the Play button will resume the build. - If the build was automatically paused as the result of an error, a notification will be indicated on the screen. Touching the notification text displayed will provide additional details pertaining to the current build state. See "Build Warnings" (page 18) and "Build Pause Warnings" (page 8) for more information.

Abort Button

The Abort button allows you to abort an active build. The Abort button can appear in the following states:

Table 4: Print Job Controls - Abort Button States

Button State	Description
	- Printer is actively building. - Pressing the Abort button in this state will initiate an abort of the build and will display a prompt asking you to acknowledge the abort. - If accepted, the build will be aborted. - If canceled, the build will be unaffected (i.e. revert to its previous state).
	- Abort button is disabled and not selectable. - There is no job currently building on the printer.

Working with the Queue Page

The Queue page contains the list of files (jobs) which have been downloaded to the printer and are queued for building; this list is referred to as the Job Queue. By default, jobs are added to the Job Queue in the order they were sent to the printer via GrabCAD Print and/or transferred from a USB flash drive. Individual jobs are listed in numbered rows with row one corresponding to the first job in the Job Queue. Each row displays the name of the job, estimated build time for the job, and name of the user that submitted the job. From the Queue page you can add files to the Job Queue, select a file to build, sort jobs within the Job Queue, view additional details associated with a selected job, and access the Sample Queue.

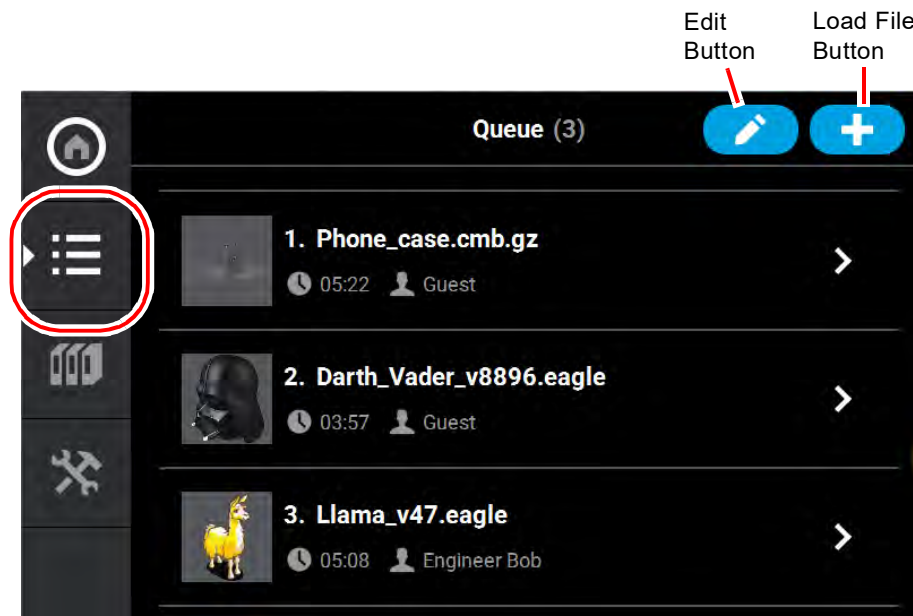
To access the Queue page, press the **Queue** button within the Navigation Menu; a screen similar to the one in

Figure 14 will be displayed. Please note that the Job Queue is empty upon initial startup.

The heading of the Queue page lists the number of jobs currently loaded into the Job Queue. Up to three jobs are displayed within the Job Queue list at a given time. If the Job Queue contains more than three jobs, use the scrollbar (to the right of the Job Queue list) to scroll up or down through the list of available jobs.

Pressing the **Edit** button within the heading of the page will display the Job Queue Control buttons; these buttons allow you to sort and /or delete the jobs within the Job Queue as needed. Pressing the **Load File** button within the heading of the page will allow you to add additional files to the Job Queue. Touching one of the rows listed within the Job Queue will open that job's Job Details page; this page contains additional information pertaining to the selected job (material configuration, tip size, etc.). After selecting either of these buttons or opening a job's details page a "Back" button will be displayed within the heading of the page; press this button to return to the main Queue page.

Figure 14: Queue Page



Adding a Job to the Job Queue

The Job Queue is empty by default. To populate the Job Queue you must first load individual job files to the Job Queue using one of two methods:

1. Network transfer via the GrabCAD Print application on your workstation PC. See [“GrabCAD Print Method” \(page 14\)](#) for detailed instructions. This is the preferred method for adding jobs to the Job Queue.
2. USB method via a USB flash drive inserted into one of the available USB ports on the front of the printer. See [“USB Method” \(page 14\)](#) for detailed instructions. This method can be used as a backup to the GrabCAD Print method if you are unable to transfer job files to the printer via your Ethernet connection (due to poor connectivity, a network outage, etc.) or Wi-Fi connection. This method also provides a convenient option for you to reprint a common job, as you can store the processed job file on the USB flash drive and access it repeatedly.

GrabCAD Print Method

As part of the printer’s installation and setup process, you should have downloaded and installed the GrabCAD Print application onto your workstation PC (see [“GrabCAD Print Software” \(page 19\)](#) for details). GrabCAD Print is the software used to process job files and then transfer them to the printer (via your facility’s Ethernet connection or via Wi-Fi) to be built.

Jobs are sent to the printer in CMB format and are placed directly into the Job Queue. No additional steps are required to add a job to the Job Queue when sending job files directly to the printer via GrabCAD Print. After sending the job file to the printer navigate to the Queue page by pressing the **Queue** button within the Navigation Menu. The transferred job file will be displayed within the Job Queue list. Jobs will appear within the Job Queue in the order they’re sent to the printer from GrabCAD Print. To build a specific job, that job must be listed as the first item in the Job Queue. You can sort jobs within the Job Queue as needed to select the job you’d like to print (see [“Editing the Job Queue” \(page 17\)](#) for details).

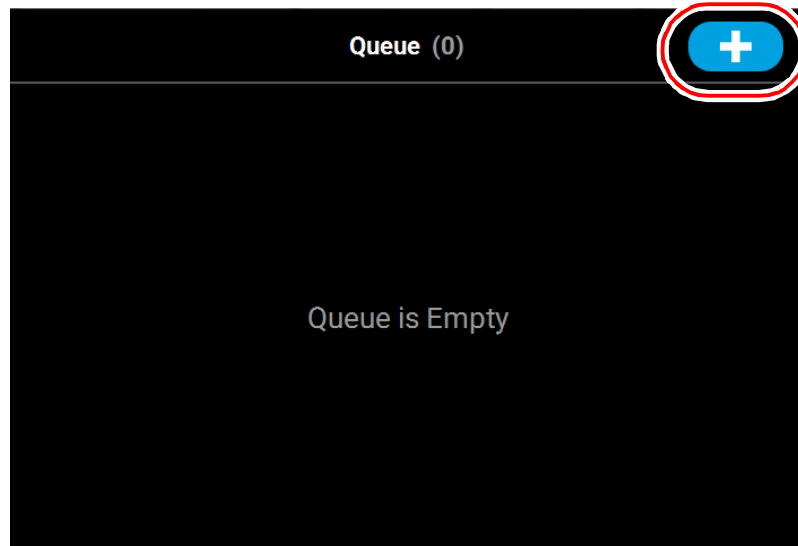
USB Method

The printer features three USB ports. A USB flash drive can be inserted into any of these ports and job files contained on the flash drive can be added to the Job Queue. Please note that job files should be processed using GrabCAD Print or Insight before they are placed onto the flash drive and subsequently added to the Job Queue. Once the flash drive is plugged into one of the printer’s USB ports, you will need to perform the following steps to add the desired job file to the Job Queue:

1. Plug a USB flash drive into one of the available USB ports on the printer (see [Figure 3 \(page 3\)](#) for USB port locations).
2. Navigate to the Queue page by pressing the **Queue** button within the Navigation Menu.

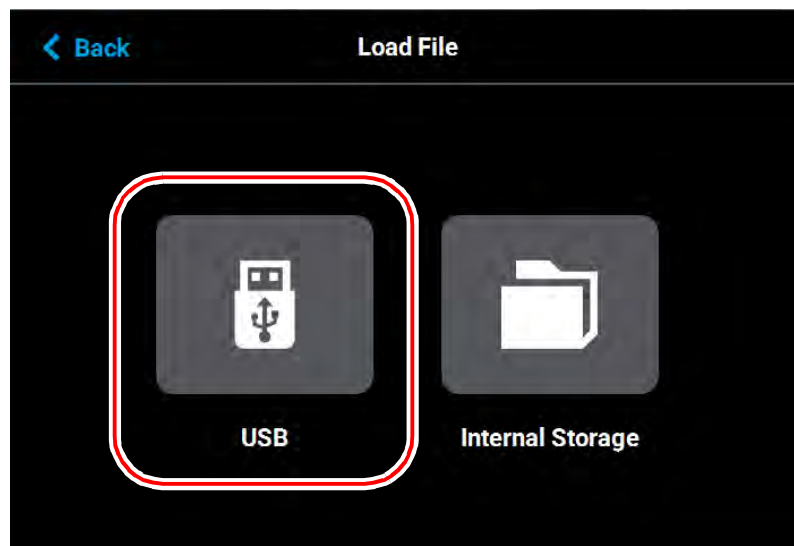
3. Press the **Load File** button in the upper-right corner of the touchscreen.

Figure 15: Load File Button Location



4. The Load File page will be displayed; press the **USB** button within this page.

Figure 16: Load File Page - USB Option

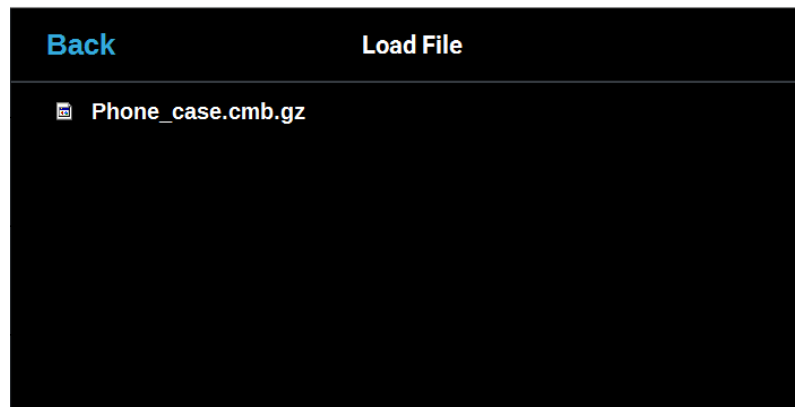


- The Load File page will display the contents of the USB flash drive. Locate the desired job and select it by touching its row on the screen; doing so will open its Job Details page.



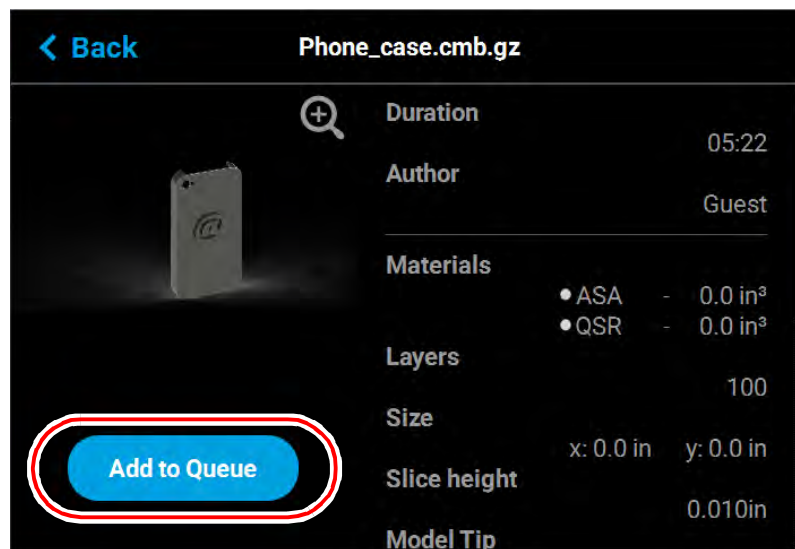
If any USB port contain a flash drive, individual folder graphics will be displayed on the screen representing each flash drive and its contents. Touching the folder graphic on the screen will drill down into the folder and display its contents. If a single flash drive is installed the job file(s) located on the flash drive will be displayed in individual rows.

Figure 17: Select File to Load



- Within the Job Details page press the **Add to Queue** button; this will load the job into the Job Queue.

Figure 18: Add File to Queue



7. The file will load into the Job Queue. Once loading is complete the file will be added to the Job Queue list.

Figure 19: File Loading to Job Queue

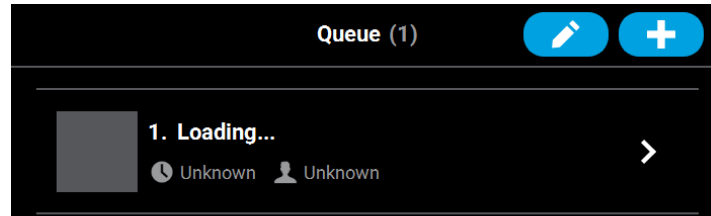
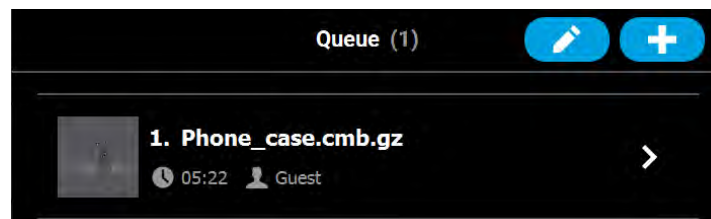


Figure 20: File In Job Queue

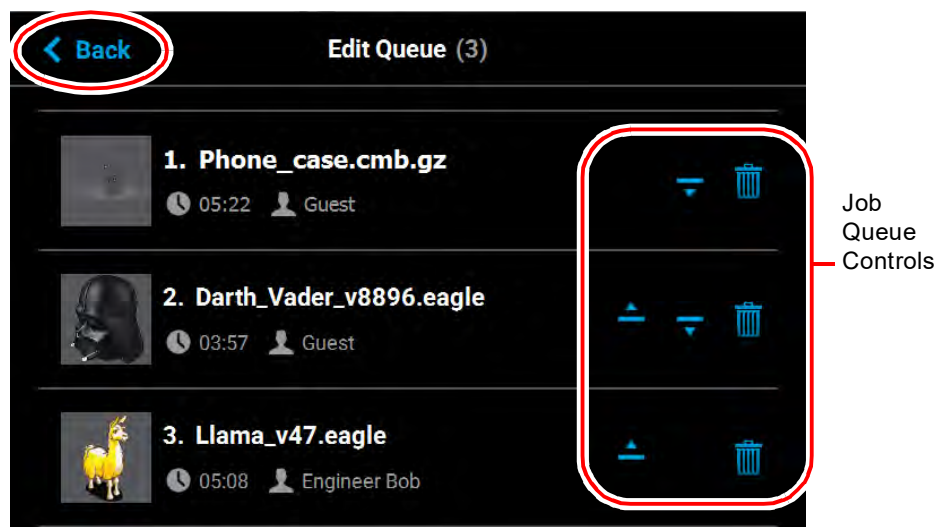


Editing the Job Queue

By default, jobs are built in the order in which they appear within the Job Queue. To build a specific job, that job must be listed as the first item in the Job Queue. Pressing the **Edit** button within the Queue page will open the Edit Queue page. Using the Job Queue Control buttons found within this page you can sort and /or delete the jobs within the Job Queue as needed, to ensure the job you wish to build is the first item listed within the Job Queue.

Pressing the **Back** button will allow you to exit the Edit Queue page and return to the main Queue page.

Figure 21: Edit Queue Page



Job Queue Controls

After opening the Edit Queue page three Job Queue Control buttons will be displayed within each row of the Job Queue list (one set of buttons per entry in the list). These buttons will allow you to rearrange the jobs in the Job Queue as needed. These buttons have the following functionality:

Table 5: Job Queue Control Buttons

Name	Button States		Description
Move Up		Selectable	When selectable, moves the selected job up one position in the job Queue list.
		Disabled	- To move a job to the top of the Job Queue list, press this button repeatedly until the job appears at the top of the list. - There is not an option to move a job directly to the top of the list.
Move Down		Selectable	When selectable, moves the selected job down one position in the Job Queue list.
		Disabled	- To move a job to the bottom of the Job Queue list, press this button repeatedly until the file appears at the bottom of the list. - There is not an option to move a job directly to the bottom of the list.
Delete		Selectable	- Removes the selected job from the Job Queue list. - You will not be asked to confirm this action prior to the job being deleted from the Job Queue.

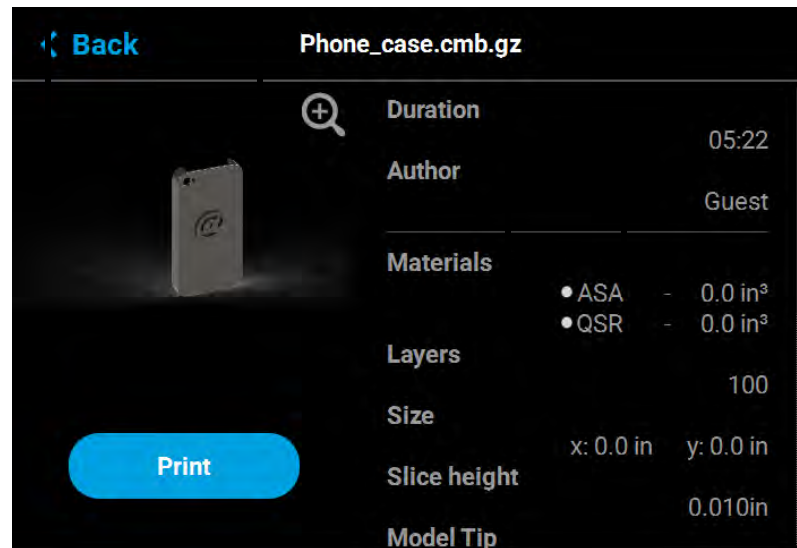
Viewing Job Details

To view additional details regarding a particular job in the Job Queue, select the desired job by touching its row on the screen. Doing so will open its Job Details page; this page displays the following:

- Duration: amount of time required to complete the build.
- Author: name of the user that submitted the job.
- Materials: model and support materials associated with the job.
- Layers: number of layers in the job.
- Slice height: slice height associated with the job.
- Version: Insight version that the part was compiled with.

Use the scrollbar (along the right side of the page) to scroll up or down within the page. To close this page and return to the main Queue page, press the **Back** button within the header of the page.

Figure 22: View Job Details



The left portion of the Job Details page displays a visual representation of what the part will look like once the build is complete.

Pressing the **Zoom In** button  within the upper-right corner of this portion of the page will hide the job details information and instead zoom in on the representation of the completed part (as shown in Figure 23).

Press the **Zoom Out** button in the upper-right corner of the expanded view display to close the expanded view and return to the Job Details page.

Figure 23: View Job Details - Expanded View

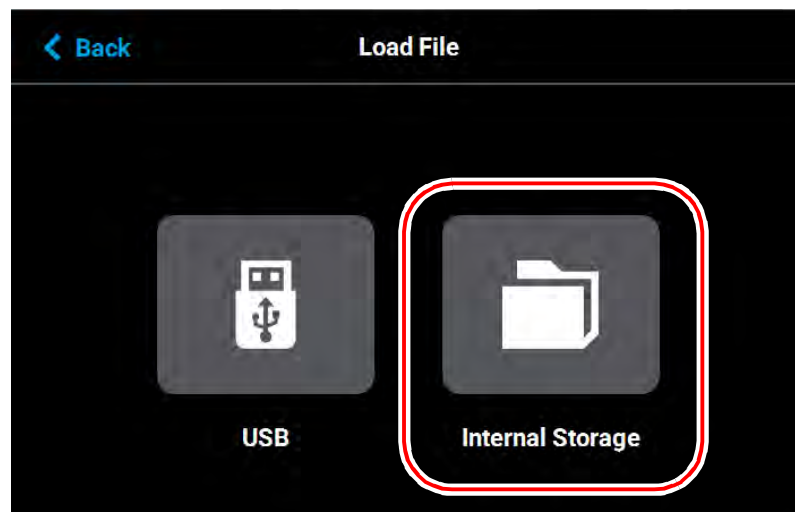


About the Sample Queue

The printer comes with several sample job files permanently installed on its hard drive. These files are accessible via the Sample Queue. This queue is composed of a few sample part files as well as a variety of other files that are helpful for testing the printer. The majority of the files within the Sample Queue will be utilized only by authorized service representatives when performing maintenance on the printer. To access the Sample Queue:

1. Navigate to the Queue page by pressing the **Queue** button within the Navigation Menu.
2. Press the **Load File** button in the upper-right corner of the touchscreen (see [Figure 15 \(page 15\)](#) for button location).
3. The Load File page will be displayed; press the **Internal Storage** button within this page. The list of sample jobs contained within the Sample Queue will be displayed.

Figure 24: Load File Page - Internal Storage Option



Overall, the functionality of the Sample Queue is the same as that of the Job Queue:

- Additional details for a job can be viewed by opening its Job Details page.
- Within the Job Details page you can view the specifics of the job including build time, author, material requirements, number of layers, slice height, and Insight version that the job was compiled with.
- Pressing the Zoom In button within the page will provide a detailed view of what the job will look like once it has been successfully built. Pressing the Zoom Out button will close this view and return you to the Job Details page.
- Pressing the Print button within the Job Details page will select the job for building.

However, the following functionality differences exist for the Sample Queue:

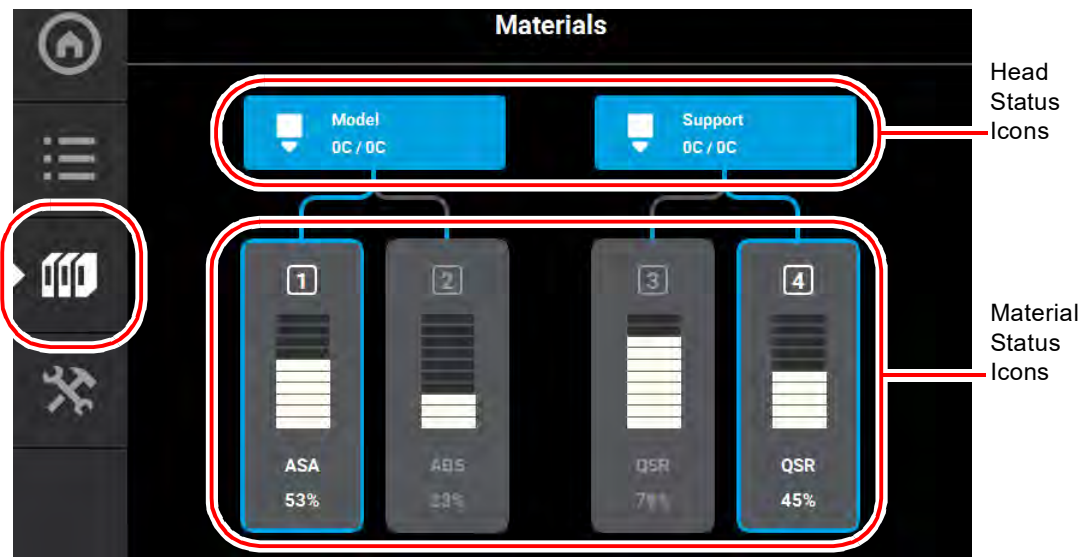
- “[Job Queue Controls](#)” ([page 18](#)) are disabled for the Sample Queue, and therefore these job files cannot be deleted.
- Jobs in the Sample Queue cannot be sorted (as described in “[Editing the Job Queue](#)” ([page 17](#))).

Working with the Materials Page

The Materials page displays a detailed representation of the printer's current materials configuration. Within this page you can view the printer's current materials configuration including material types and colors, view material spool volumes and load statuses, load and unload materials, view current and set point head temperatures, and perform a variety of head related maintenance functions.

To access the Materials page, press the **Materials** button within the Navigation Menu; a screen similar to the one in Figure 25 will be displayed.

Figure 25: Materials Page



Two “[Head Status Icons](#)” are displayed within the upper portion of the Display Area. These icons display load status information as well as the current temperature as compared to the set point temperature of each of the printer's heads (temperatures are predetermined and based on material type loaded to the head). The right-most icon pertains to the printer's support head while the left-most icon pertains to the printer's model head. Touching one of these icons on the screen will open that head's Head Details page; this page contains additional information pertaining to the selected head as well as a button for initiating a variety of head maintenance functions. Icons will be solid gray or solid blue depending on their status.

Depending on your printer's configuration, either two or four “[Material Status Icons](#)” are displayed within the lower portion of the Display Area. These icons represent the model and support materials loaded/installed within the printer. The right-most icon(s) indicate(s) the status of the printer's support material while the left-most icon(s) indicate(s) the status of the printer's model material. These icons will take on a variety of colors and highlighted states depending on their status. Material spools selected for use for building, and whose material is loaded to the head, are indicated by a blue border. Touching one of these icons on the screen will open that material's Material Details page; this page contains additional information pertaining to the selected material as well as buttons for performing a material load or unload.

After selecting any icons or opening a details page a “Back” button will be displayed within the heading of the page; press this button to return to the main Materials page.

Head Status Icons

The two Head Status Icons within the Materials page display load status information as well as the current temperature as compared to the set point temperature of each of the printer's heads. The right-most icon pertains to the printer's support head while the left-most icon pertains to the printer's model head. Touching one of these icons on the screen, unless otherwise indicated in [Table 6](#), will open that head's Head Details page. Various graphics will be displayed within the left portion of the Head Status Icons, depending on the state of the head. The Head Status Icons can appear in the following states (color usage, highlighting, and descriptions apply to both icons):

Table 6: Head Status Icons - Icon States

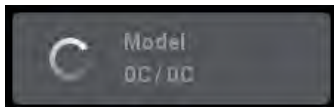
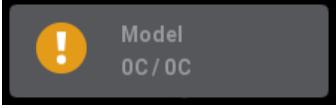
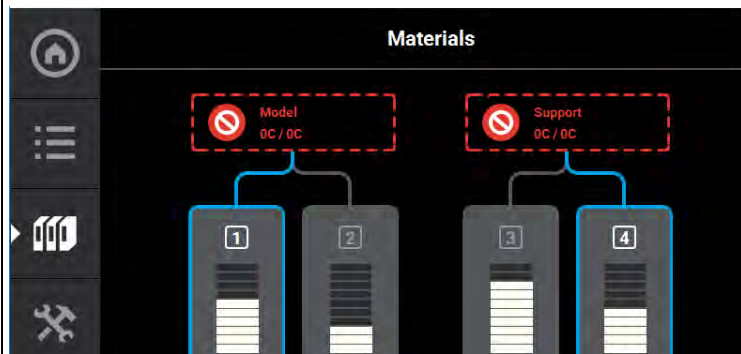
Icon State	Description
 Empty (gray dashed border)	- Indicates that the associated head is not installed. - User action required to install head. See "Head Replacement" (page 12) for instructions. - Touching the icon in this state will not display the head's Head Details page.
 Invalid (red dashed border)	- Indicates that the associated head is invalid. - User action required to replace head with a valid head. See "Head Replacement" (page 12) for instructions. - Touching the icon in this state will not display the head's Head Details page.
 Initializing	- Indicates that the printer is initializing the head. This state will be displayed until the initialization process is complete following installation of a new head. - Touching the icon in this state will not display the head's Head Details page.
 Unloaded (solid gray)	- Indicates that material is not loaded to the head. - User action required to load material. See "Loading Material" (page 3) for instructions.
 Loaded (solid blue)	- Indicates that material is loaded to the head. - If a build has been initiated, the current temperature will increase until it reaches the set point temperature for the loaded material. Once temperature is reached, the tip will purge a small amount of material and the printer will begin building.
 Active (solid blue with white border)	- Indicates that the head is actively performing a task other than building. - This state will be displayed whenever the head is purging or material is being unloaded from the head.

Table 6: Head Status Icons - Icon States (Continued)

Icon State	Description
 Warning (head unloaded)	- Yellow coloring and an associated notification badge indicates a head related warning (see “Head Warnings” (page 12)). - Additional information regarding the warning and possible correction information is displayed by opening the associated head’s Head Details page (see “Viewing Head Details” (page 24)). - When the head’s odometer reaches 1350 build hours a warning will be displayed reminding you to order a replacement head as the head is approaching its odometer limit.
 Warning (head loaded)	
 Error (head unloaded)	- Red coloring and an associated notification badge indicates a head related error (see “Head Errors” (page 12)). - Additional information regarding the error and possible correction information is displayed by opening the associated head’s Head Details page (see “Viewing Head Details” (page 24)). - When the head’s odometer reaches 1500 build hours an error will be displayed. The printer is still able to build with this head, but you will be reminded before starting each build that the head’s odometer limit has been reached and part quality may be negatively affected. User action is required to replace head. See “Head Replacement” (page 12) for instructions. - If the associated head is incompatible with the location where it is installed (i.e. if the model head is installed in the support head location), an error will be displayed. After clicking on the error icon, a message will display with instructions to replace whichever head (model or support) was incorrectly installed.
 Error (head loaded)	



Viewing Head Details

To view additional details regarding the printer's model or support head, select the desired head by touching its Head Status Icon on the screen. Doing so will open its Head Details page. If the head is in a warning or error state additional information pertaining to the warning/error will be displayed within the page (see [“Head Warnings”](#) (page 12) and [“Head Errors”](#) (page 12) for details).

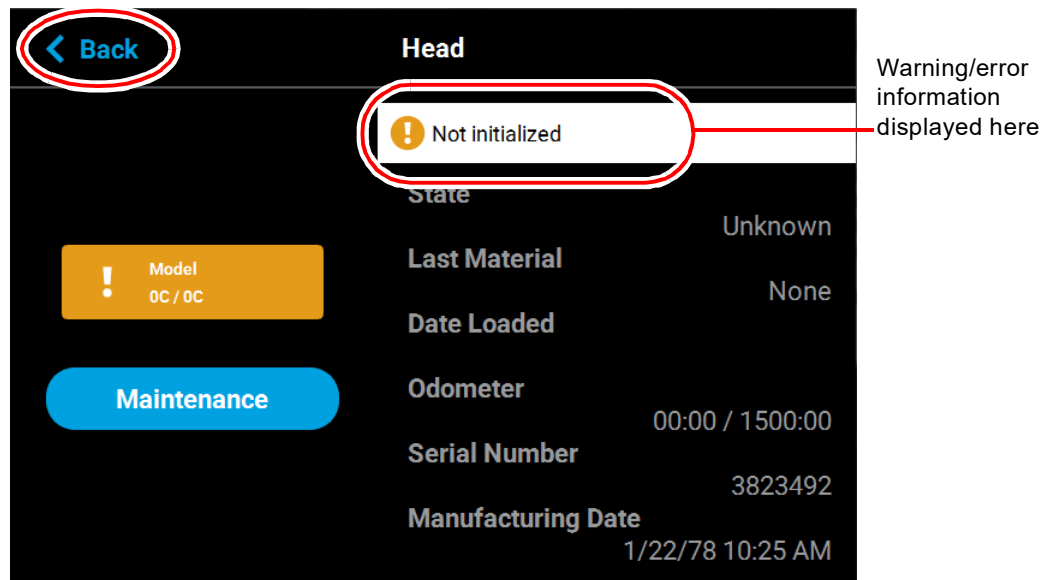
The right portion of the screen displays status information pertaining to the selected head:

- **State:** displays the load status of the corresponding head.
- **Last Material:** displays the type of material last loaded to the head.
- **Date Loaded:** displays the date that material was last loaded to the head.
- **Odometer:** displays the amount of build time for the selected head. This value is important as the printer will display different errors depending on the amount of build time for a head.
 - When a head's odometer reaches 1350 build hours (700 hours for the TPU 92A head) the Head Status Icon will be displayed in its warning state, and you will be prompted to order a replacement head.
 - When a head's odometer reaches the 1500 build hours odometer limit (800 hours for the TPU 92A head), the Head Status Icon will be displayed in its error state, and you will be prompted to replace the head. You can continue to build using the head, but part quality will be unpredictable. It is recommended that you immediately change a head which has exceeded its odometer limit (see [“Head Replacement”](#) (page 12) for instructions).
- **Serial Number:** displays the head's unique serial number.
- **Manufacturing Date:** displays the date that the head was manufactured.

The left portion of the screen displays the same Head Status Icon as is displayed on the Materials page (see [Figure 25](#) (page 21)). This icon displays the current temperature as compared to the set point temperature of the head. The Maintenance button directly below the Head Status Icon will display a menu allowing you to perform a variety of head maintenance functions.

To close this page and return to the main Materials page, press the **Back** button within the header of the page.

Figure 26: Head Details Page



Head Maintenance

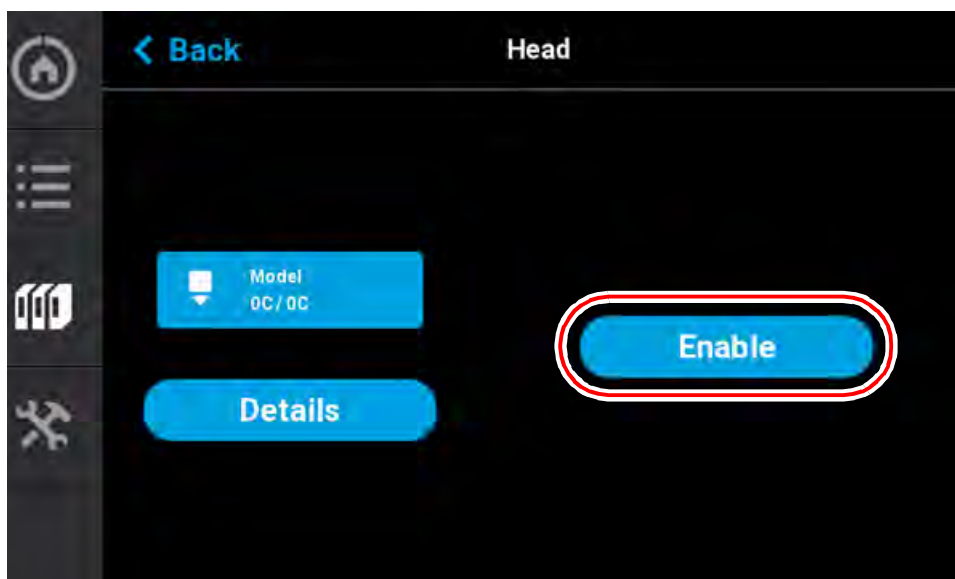
Pressing the **Maintenance** button within the Head Details page will open the Head Maintenance page. The buttons within this page will allow you perform a variety of head maintenance functions. The buttons displayed in the menu within the right half of the screen will vary depending on whether the Enable button has been pressed. After pressing the Maintenance button the button will toggle and instead display the Details button. Pressing the **Details** button will close the Head Maintenance page and return you to the Head Details page.

Enable

Pressing the Enable button puts the corresponding head into a maintenance state when the top cover has been opened. Before you can perform any of the head maintenance functions available within the Head Maintenance page, you must put the head into this state by pressing the **Enable** button. After pressing the Enable button, the menu will refresh and display buttons

corresponding to the additional head maintenance functions available within this page. The Enable button will toggle and instead display the Disable button. Pressing the **Disable** button at any time when the head is not in use will take the head out of the maintenance state.

Figure 27: Head Maintenance Page - Main View



Purge

Pressing the **Purge** button instructs the printer to perform a long purge. After pressing this button, the head will move to the purge position and will heat to a predetermined set point temperature. Once the head reaches this set point, material will be purged from the tip for about 10 seconds. When changing to or from colored material it is beneficial to perform multiple purges as this will remove all material remaining within the liquefier tips and/or tubes to ensure that color mixing doesn't occur. The Purge button is selectable (i.e. a Purge can be initiated) when the button is solid blue, and disabled (i.e. a Purge is in process or cannot be initiated) when gray. A notification badge will be displayed within the button if any preconditions exist preventing the purge from occurring.

Load Head/Unload Head

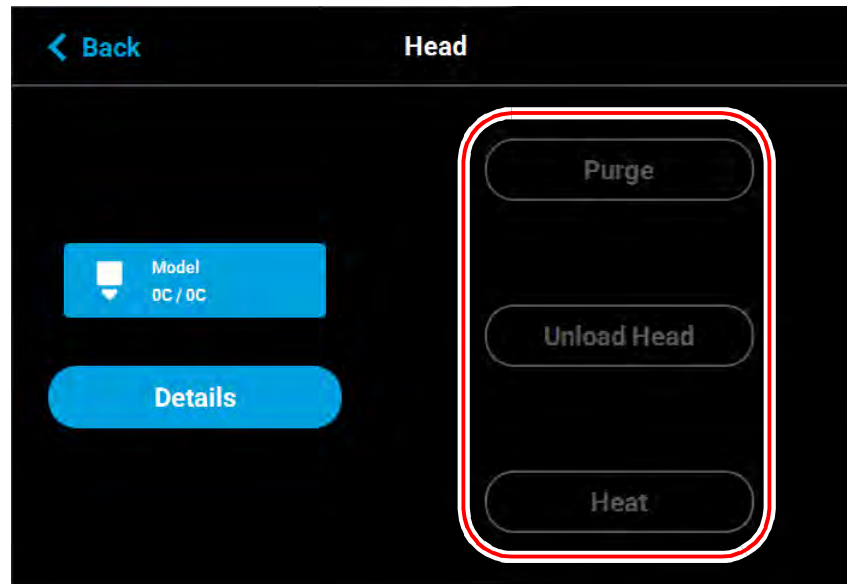
Depending on the load status of the selected head, either the Load Head or Unload Head button will be displayed. Pressing the **Load Head** button instructs the printer to load material to the corresponding head; the button will toggle to display the Unload Head button. Pressing the **Unload Head** button instructs the printer to unload material from the corresponding head; the button will toggle to display the Load Head button. A notification badge will be displayed within the button if any preconditions exist preventing the load/unload from occurring (see [“Load/Unload Errors”](#) (page 6)).

Heat/Cool

Depending on the state of the printer, either the Heat or Cool button will be displayed. Pressing the **Heat** button instructs the printer to heat the corresponding tip to 270°C for no longer than 2 minutes; the button will toggle to display the Cool button. Pressing the **Cool** button will instruct

the printer to begin cooling the corresponding tip back to the 0 set point; the button will toggle to display the Heat button. The tip will also begin to cool automatically if the heat option exceeds the 2 minute time allotment and the Cool button is not pressed.

Figure 28: Head Maintenance Page - Menu View



Material Status Icons

The Material Status Icons within the Materials page represent the model and support material spools installed/inserted in the printer. Either two or four icons will be displayed depending on your printer's configuration. Each icon displays a number corresponding to the material bay (1-4 for F270 and F370 models and 1-2 for F170 models), colored bars indicating the color of the material currently installed in that bay, the name of the material currently installed in that bay, and a percentage indicating the current volume of material on that material spool. Touching one of these icons on the screen, unless otherwise indicated in [Table 7](#), will open that material's Material Details page. Various graphics will be displayed within the center of the

Material Status Icons, depending on the state of the material bay. The Material Status Icons can appear in the following states (color usage, highlighting, and descriptions apply to all icons):

Table 7: Material Status Icons - Icon States

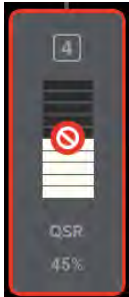
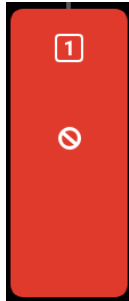
Icon State	Description
 Empty Bay (gray dashed border)	- Indicates that a material spool is not loaded in the corresponding material bay, the material bay is empty. - User action required to insert spool. See “Loading Material” (page 3) and “Material Spool Installation” (page 4) for instructions. - Touching the icon in this state will not display the material’s Material Details page.
 Unusable (semi-solid red)	- Indicates that an error occurred when checking the data on the material spool’s memory chip. The material spool is unusable. - User action required to remove the material spool and replace it with a valid spool. See “Removing Material Spools” (page 9) and “Material Spool Installation” (page 4) for instructions. - Touching the icon in this state will not display the material’s Material Details page.
 Invalid (red border)	- Indicates that the material spool is invalid. Invalid materials are materials not licensed or not compatible with the associated head type. - Material from the invalid spool cannot be loaded. User action required to remove the invalid material spool and replace it with a valid spool. See “Removing Material Spools” (page 9) and “Material Spool Installation” (page 4) for instructions.

Table 7: Material Status Icons - Icon States (Continued)

Icon State	Description
 Unloaded (gray border)	- Valid material spool loaded into bay. Material name, color, and current volume displayed. - Filament from material spool has been advanced and is in contact with the filament present switch but material from spool is not loaded to the head. See “Loading Material” (page 3) for instructions.
 Loaded (blue border)	- Valid material spool loaded into by. Material name, color, and current volume displayed. - Material from spool is loaded to the head and spool is selected to be used for building. - See “Selecting a Job to Build” (page 16) for instructions on starting a build. See “Unloading Material” (page 7) for instructions on unloading material.
 Empty Spool (solid yellow)	- Material spool is empty - a volume of 0% is displayed. - User action required to remove empty spool. See “Unloading Material” (page 7) and “Removing an Empty Material Spool” (page 9) for instructions.
 Error (solid red)	- Indicates that communication with the material bay is not possible. Please note that this state differs from the unusable state as the icon is solid red in this state and the bars within the center of the icon are not visible. - Contact Customer Support or your regional Stratasys office if you experience this icon state (see “Getting Help” (page 1) for contact information).

Viewing Material Details

To view additional details regarding a particular material, select the desired material by touching its Material Status Icon on the screen. Doing so will open its Material Details page. If the material bay/spool is in a warning or error state additional information pertaining to the warning/error will be displayed within the page (see [“Load/Unload Errors”](#) (page 6) for details).

The right portion of the screen displays detailed information about the material spool including:

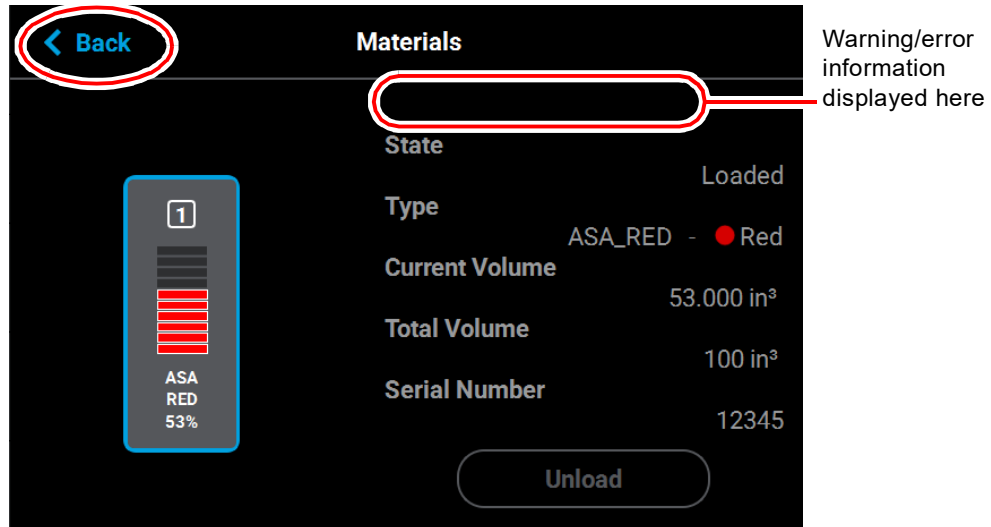
- State: load state of the material bay.
- Type: the type of material on the material spool. If applicable, material color is also indicated (material color is also indicated within the center of the Material Status Icon within the left portion of the screen).
- Current Volume: current volume of material on the material spool, in cubic inches (also indicated via the percentage displayed within the Material Status Icon within the left portion of the screen).
- Total volume: total volume of material available, in cubic inches, when the material spool was initially installed into the printer.

The buttons directly below this information allow you to load or unload a material spool as needed or cancel a load/unload in process (see [“Material Load Controls”](#) (page 31) for details). Please note that the functionality and visibility of these buttons will depend on the load status of the material spool.

The left portion of the screen displays the same Materials Status Icon as is displayed on the Materials page (see [Figure 25](#) (page 21)). The number displayed within the top of the icon indicates which material bay the material spool is installed/inserted into. The colored bars (displayed within the center of the icon) and percentage (displayed at the bottom the icon) indicate the current volume and color of the material on the spool. As material is used to build a part, the number of colored bars and the percentage will decrease to indicate the amount of material consumed. The name of the type of material on the spool is displayed at the bottom of the icon.

To close this page and return to the main Materials page, press the **Back** button within the header of the page.

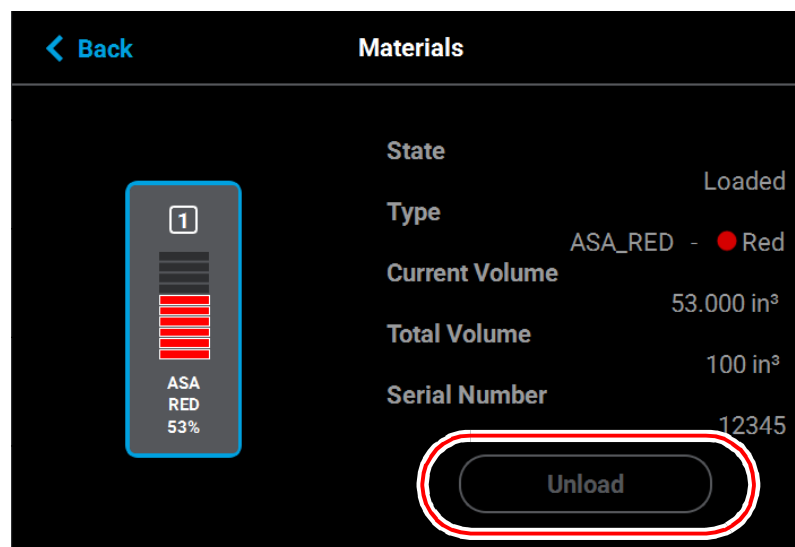
Figure 29: View Material Details



Material Load Controls

The Material Load Control buttons are used to load and unload material to the liquefier within the head, as well as cancel a material load or unload in process. The Material Load Control buttons are displayed in the lower-right portion of the Material Details page; however, the visibility of these buttons is dependent upon the spool's load status. Button states are explained within the tables below.

Figure 30: Material Load Control Buttons



The Unload button will be displayed for all material spools whose filament is loaded to the corresponding head. Pressing this button will instruct the printer to begin the process of unloading material (see “[Unloading Material](#)” (page 7) for details).

The Load button will be displayed for all material spools whose filament has contacted the filament present switch in the material drive but is not yet loaded to the head, given that material from another spool is not already loaded to the corresponding head. Pressing this button will instruct the printer to begin the process of loading material (see “[Loading Material](#)” (page 3) for details). If the corresponding head is already loaded with material, the Load button will appear in its disabled state.

The Cancel button will be displayed for a spool only after the spool’s corresponding Unload or Load button has been pressed. Pressing this button will instruct the printer to cancel the material load or unload already in process (see “[Material Load/Unload Cancellation](#)” (page 37) for details).

Table 8: Material Load Control Buttons - Load Button States

Button State	Description
	- The Load button is only selectable once a material spool’s filament has contacted the filament present switch in the material drive but is not yet loaded to the head, given that another spool’s material is not already loaded to the head. - Pressing the Load button in this state will instruct the printer to load material to the corresponding head.
	Load button is disabled and not selectable.

Table 9: Material Load Control Buttons - Unload Button States

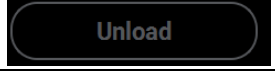
Button State	Description
	- The Unload button is only selectable once a material spool’s filament is loaded to the corresponding head. - Pressing the Unload button in this state will instruct the printer to unload material from the corresponding head.
	Unload button is disabled and not selectable.

Table 10: Material Load Control Buttons - Cancel Button States

Button State	Description
	- The Cancel button is only selectable after the Load or Unload button have been pressed. - Pressing the Cancel button will cancel the material load/unload in process.

Filament Pathway States

The pathway between the Material Status Icon and corresponding Head Status Icon will take on a variety of colors and display various graphics, depending on the load state of the associated material spool's filament. For printers with two model bays and two support bays (F270 and F370 models), only one material can be loaded to or unloaded from the corresponding head at a time. The pathway corresponding to the material bay whose material spool is not being loaded/unloaded will be solid gray or dashed gray, depending on the material's load status. Regardless of the number of model and support bays, only one material

type can be loaded/unloaded at a time (i.e. a model and support spool cannot be loaded/unloaded simultaneously). Filament pathways can appear in the following states (color usage, highlighting, and descriptions apply to both model and support):

Table 11: Filament Pathway States

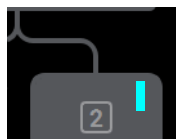
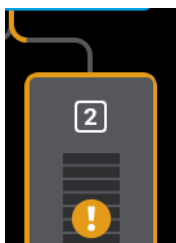
Icon State	Description
 Empty	- Indicates that a material spool is not loaded in the corresponding material bay, the material bay is empty. - After installing a material spool into the corresponding material bay, the filament pathway will refresh and indicate that filament needs to be inserted into the drive mechanism.
 Insert Filament	- Indicates that a valid material spool has been inserted into the corresponding material bay, but the spool's filament has not been detected by the filament present switch. - After advancing filament far enough into the drive mechanism for it to contact the filament present switch, the filament pathway will refresh and display in its unloaded state.
 Unloaded	Indicates that filament from the corresponding material spool has been advanced and is in contact with the filament present switch, but material from the spool is not loaded to the head.
 Loading	- Indicates that filament from the corresponding material spool is in the process of being loaded to the head. - The pathway between the Material Status Icon and the Head Status Icon will fill, in blue, in the direction that the material spool's filament is traveling (towards the head). - Once the load process is complete, the filament pathway will refresh and display in its loaded state.
 Loaded	Indicates that filament from the corresponding material spool is loaded to the head and is selected to be used for building.
 Unloading	- Indicates that filament from the corresponding material spool is in the process of being unloaded from the head. A yellow notification badge will also be displayed within the center of the corresponding Material Status Icon. - The pathway between the Material Status Icon and the Head Status Icon will fill, in yellow, in the direction that the material spool's filament is traveling (away from the head). - Once fully unloaded, the filament pathway will remain in this state until the corresponding material spool is removed from the material bay. Once the spool is removed, the filament pathway will refresh and display in its empty state.

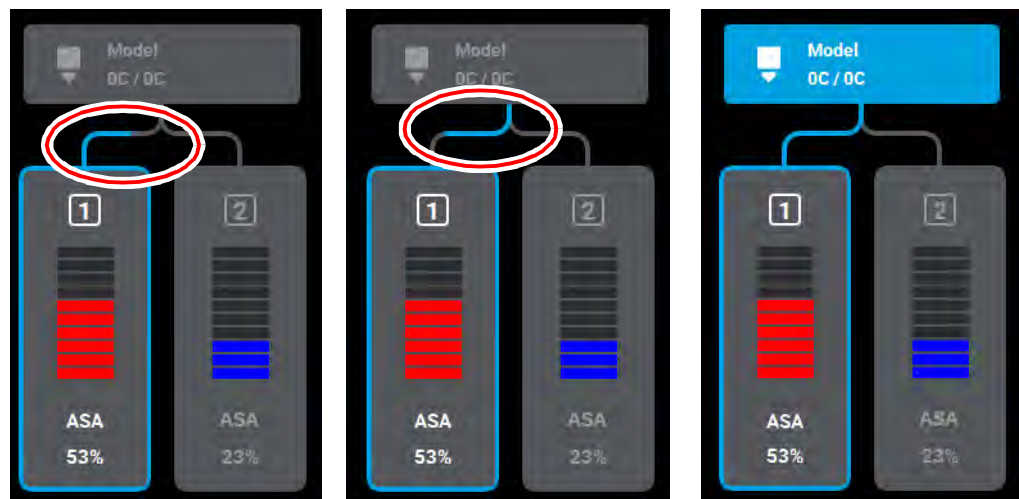
Table 11: Filament Pathway States (Continued)

Icon State	Description
 Error	- Red coloring and an associated notification badge indicates a load related error. - Opening the corresponding Material Details page will provide additional information on the error state.

As materials are loaded and unloaded, the pathway between the Material Status Icon and the Head Status Icon will become colored, and will fill in the direction that the material spool's filament is traveling (towards the head or away from the head). [Figure 31 \(page 35\)](#) depicts the functionality displayed when a spool's filament is being loaded to the head, while [Figure 32 \(page 36\)](#) depicts the functionality displayed when a spool's filament is being unloaded from the head. Opening the Material Details page for the material being loaded/unloaded will provide additional control over the load/unload. The Cancel button will be displayed within this page, giving you the option to cancel the material load/unload if necessary.

Material load progress will display the same functionality regardless of whether a model or support spool is being loaded. Once a spool's material is loaded to the head, the pathway between the Material Status Icon and the corresponding Head Status Icon will be solid blue, the Head Status Icon will turn solid blue, and the Material Status Icon will display a blue border. This indicates that the material spool is selected and in position to be used to build parts on the printer. The Unload button will be displayed within the Material Details page, indicating that the spool can be unloaded, if needed. For printers with two model bays and two support bays (F270 and F370 models) only one pathway for a material type can be highlighted at a time as only one material type can be loaded to the head at a time (i.e. only the Model 1 or 2 pathway can be highlighted at a time, not both).

Figure 31: Material Load Progress - Loading

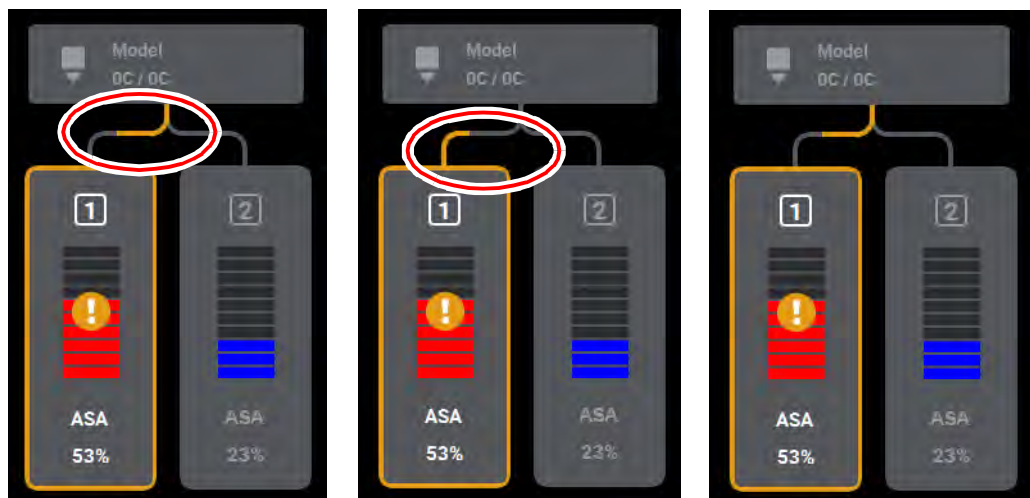


Material unload progress will display the same functionality regardless of whether a model or support spool is being unloaded. As material is being unloaded from the head, the pathway between the Head Status Icon and Material Status Icon will be highlighted in yellow and the Head Status Icon will turn solid gray indicating that material is no longer loaded to the head. A yellow notification badge will be displayed within the center of the Material Status Icon to indicate that user action is required to complete the unload process.

Opening the Material Details page for the material being unloaded will provide additional details regarding the unload process. The Load button will be displayed within the Material Details page once the spool's filament has been completely retracted indicating that the spool can be reloaded, if needed.

Once material is fully unloaded, filament pathway and Material Status Icon coloring will remain in their unloading states until the corresponding material spool is removed from the material bay. Once the spool is removed, the filament pathway and Material Status Icon will refresh and display in their empty states.

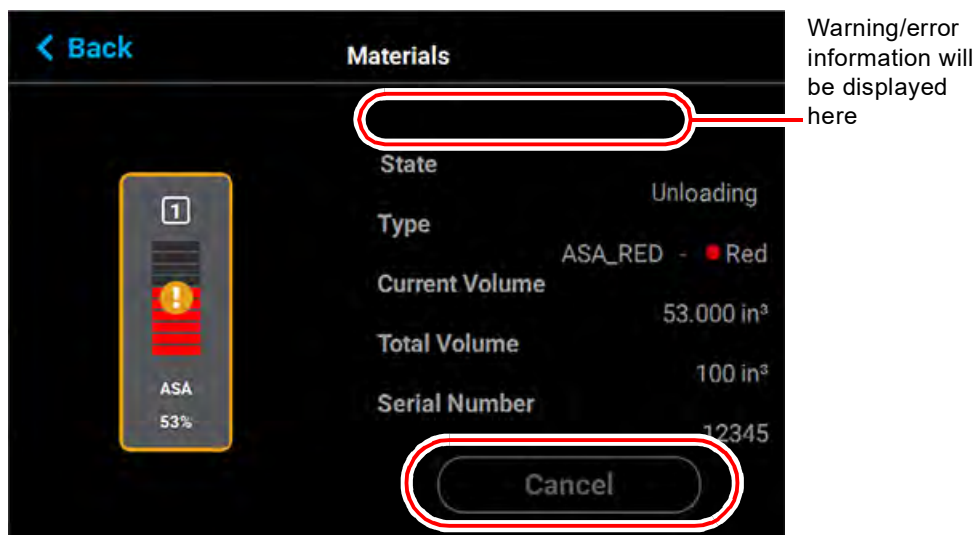
Figure 32: Material Load Progress - Unloading



Material Load/Unload Cancellation

The Cancel button will only be displayed within the Material Details page for a material that is in the process of being loaded/unloaded. This button allows you to cancel a material load or unload already in process. Depending on your printer's configuration, a warning may be generated after selecting the Cancel button. In the event of a warning, text will be displayed on the screen to indicate the cause of the warning.

Figure 33: Cancel Button



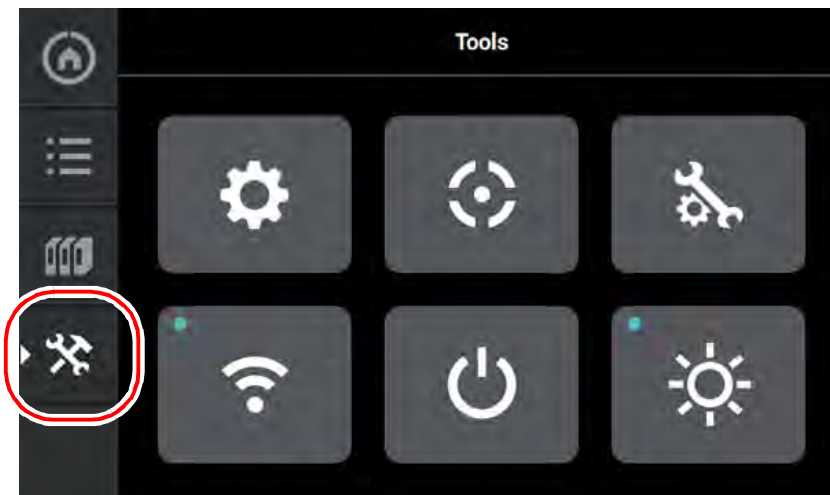
Working with the Tools Page

The options within the Tools page are organized into 6 categories: Settings, Calibration, Maintenance, Network, Power, and Light. The Display Area of the Tools page contains a button corresponding to each of these categories. With the exception of the Light button, pressing the button corresponding to each of these categories will open an individual page containing printer information that can be viewed as well as printer settings and preferences which can be configured for that particular category. After selecting any of the buttons within the Tools page a **Back** button will be displayed within the heading of the page; press this button to return to the main Tools page.

Within this page you can turn a variety of printer settings on/off (including part placement, standby mode, etc.), select your printer's address type (dynamic, static, or Wi-Fi), adjust the brightness of the touchscreen display and turn the printer or the oven light on/off. As a part of its initial installation and setup (performed by your authorized service representative) your printer's network settings will be configured within this page (as described within ["Configuring the Network" \(page 8\)](#)). Once those settings are configured you may need to occasionally access this page in order to adjust printer preferences.

To access the Tools page, press the **Tools** button within the Navigation Menu; a screen similar to the one in [Figure 34](#) will be displayed.

Figure 34: Tools Page



Tools Page Menu

The Display Area of the Tools page contains 6 buttons. With the exception of the Light button, pressing each of these buttons will open an individual page containing printer information that can be viewed as well as printer settings and preferences which can be configured.

Table 12: Filament Pathway States

Icon State	Description
 Settings	Pressing the Settings button opens the Settings page. From this page you can configure and adjust several of the printer's default settings. See “Settings” (page 41) for details.
 Calibration	Pressing the Calibration button opens the Calibration page. From this page you can perform various printer calibration procedures. See “Calibration” (page 50) for details.
 Maintenance	Pressing the Maintenance button opens the Maintenance page. From this page you can perform various printer maintenance procedures. See “Maintenance” (page 52) for details.
 Network	Pressing the Network button opens the Network page. From this page you can configure the printer's network connection. See “Network” (page 56) for details.

Table 12: Filament Pathway States

Icon State	Description
 Power	Pressing the Power button opens the Power page. From this page you can shutdown or restart the printer. See “Power” (page 62) for details.
 Light	The Light button is the only option within the Tools page that does not open a new page after being pressed. Instead, the Light button allows you to turn the oven light ON and OFF. An indicator within the upper-left corner of the button displays the current state of the oven light (ON or OFF). See “Light” (page 63) for details.

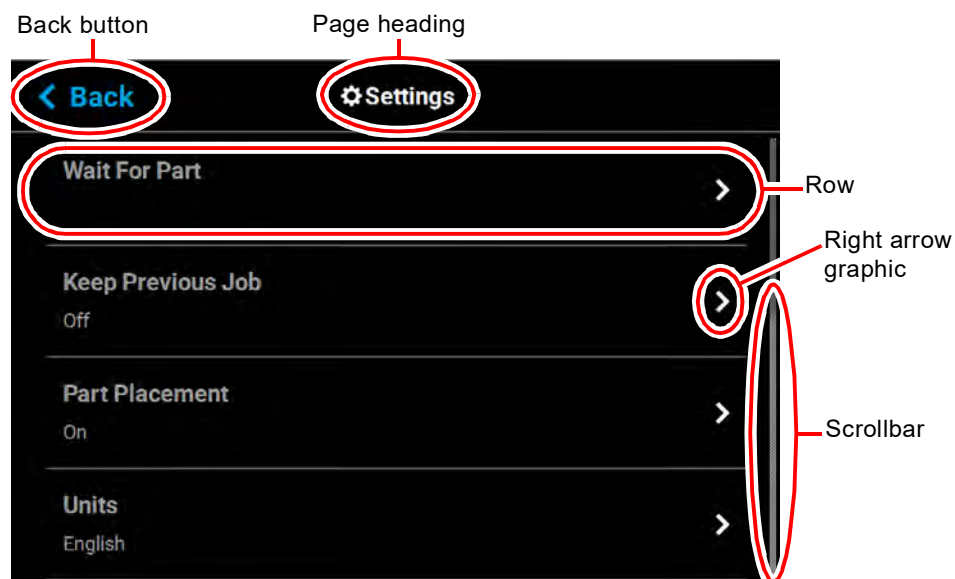
Navigation Overview

After selecting one of the buttons within the Tools page the touchscreen will refresh to display the details of the page selected (i.e. selecting the Settings button will open the Settings page). Depending on the options available for configuration within the selected page, the Display Area of the page may contain more options than can be displayed at one time. In this case, a scrollbar is displayed along the right-hand side of the page. To scroll up or down within a page simply touch the scrollbar displayed on the screen and pull the scrollbar in the direction you'd like to scroll.

A heading is displayed at the top of each page, indicating the name of the page. Each page contains a variety of settings and preferences that can be configured. Items are organized into individual rows within the Display Area of the page. The name of the setting/preference to be configured is displayed in bold within the left side of the row. For some items, current configuration information is displayed directly below the setting/preference name within the row (for reference purposes).

The graphic displayed within the right side of a row will vary depending on the configuration options available for that row. Rows containing a right arrow graphic will open a new page allowing you to configure that row's settings/preferences. Rows which do not contain a right arrow graphic do not have any configurable options. After making the necessary adjustments to a row's settings/preferences, press the **Back** button in the upper-left corner of the page to exit the page.

Figure 35: Settings Page Content List

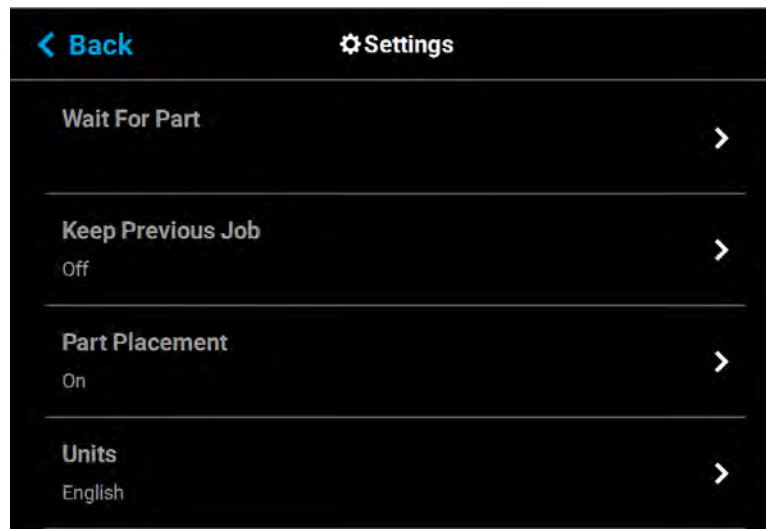


Settings

The *Settings* page allows you to turn a variety of printer settings on/off (including part placement, standby mode, etc.), configure the language and units the printer/UI is configured for, and adjust the brightness of the touchscreen display.

To access the *Settings* page, press the Settings button within the Tools page; a screen similar to the following will be displayed. Use the scrollbar (along the right side of the page) to scroll up or down through the list of available options.

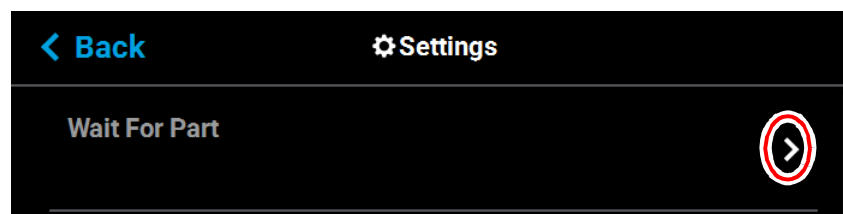
Figure 36: Settings Page



Wait for Part

After sending a job file to the printer you would typically need to navigate within the User Interface in order to select the job from the Queue and start the build. The wait for part setting will instead allow you to send a job file to the printer which will then immediately start building once received by the printer.

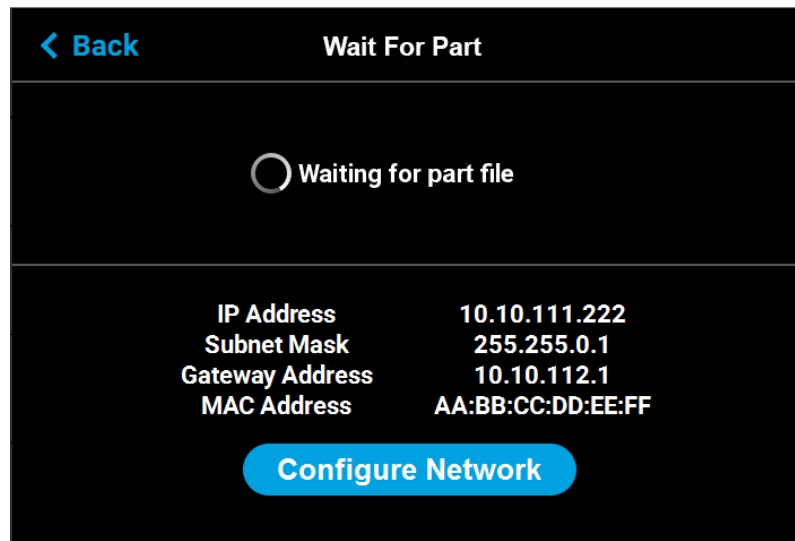
Figure 37: Wait for Part



Pressing anywhere within the row will open the Wait For Part page. Opening this page will automatically put the printer into a state where it will wait to receive a job file to build immediately. After putting the printer into this state, you must send the processed job file to the

printer via GrabCAD Print. Once the job file is received by the printer, the job will automatically start building. As such, ensure that the printer has been properly prepared for the start of a build (see “Before a Build” (page 14) and “Preparing the Printer” (page 15) for details).

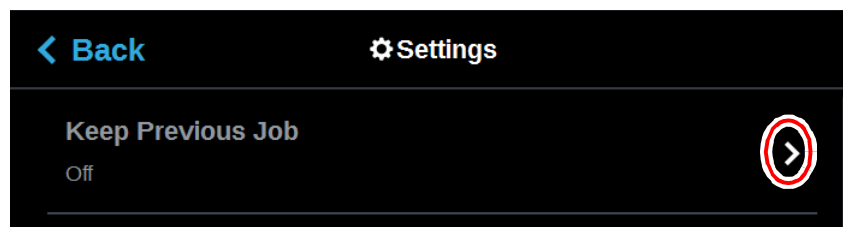
Figure 38: Waiting for Part



Keep Previous Job

For privacy reasons, you have the option of choosing whether or not the printer's previous job is stored within the Job Queue. If you're concerned about other users of your printer seeing what you've built, this setting allows you to prevent other users from accessing the printer's previous job. When this setting is set to On, the printer will store its previous job file making it available for re-selection within the Job Queue. When this setting is set to Off, the printer's previous job file will be deleted from the Job Queue upon completion of the build. The job's file will need to be resent to the printer in order to be built again.

Figure 39: Keep Previous Job



To configure this setting, press anywhere within the row; the Keep Previous Job page will be displayed. Use the radio buttons within the page to turn the setting On and Off as needed; On is selected by default.

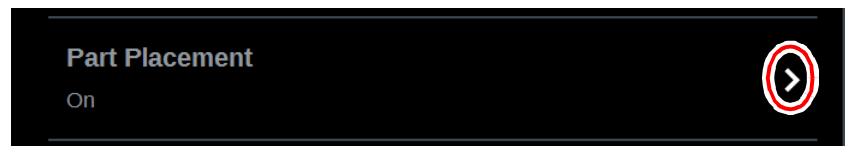
Figure 40: Configure Keep Previous Job



Part Placement

The Part Placement setting gives you the ability to select a job's placement on a substrate. By default, single part jobs are built in the center of a substrate while packs are built according to their selected placement within GrabCAD Print. Therefore, when this setting is set to Off, single part jobs will automatically be built in the center of the substrate and packs will be built according their selected placement within GrabCAD Print. To configure this setting, press anywhere within the row; the Part Placement page will be displayed. Use the radio buttons within the page to turn the setting On and Off as needed.

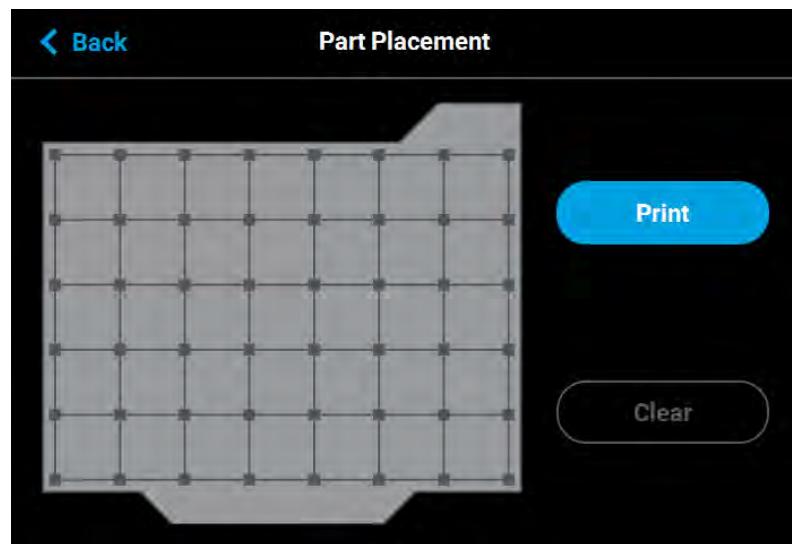
Figure 41: Part Placement



When this setting is set to On, you will be able to select a job's location on the substrate prior to starting the build (see [“Selecting a Job to Build” \(page 16\)](#)). At the start of a build a dialog will be displayed asking you to select the part's build location (see [Figure 42](#)). The dialog will contain a graphic representing your printer's platen as well as a blue bounding box graphic (the imaginary box surrounding the part).

You can select the part's build location by dragging and dropping the bounding box on the touchscreen; the bounding box cannot be placed outside the limits of the platen. Pressing the Print button will confirm your selected placement and start a build. "Ghost box" graphics are also displayed; a "ghost box" represents the location where a part was built previously. Clicking the Clear History button will clear the display, removing all "ghost box" items.

Figure 42: Part Placement Dialog



First Layer Material

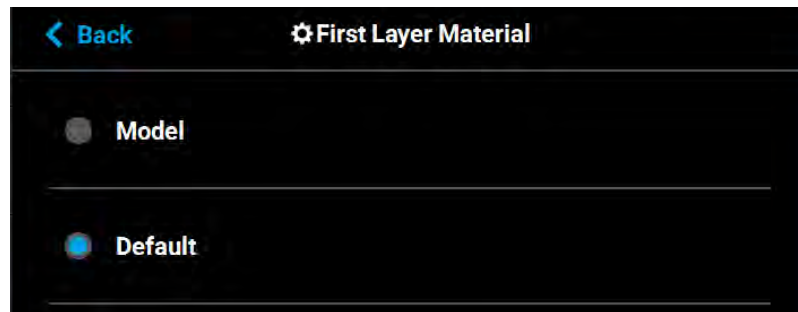
The First Layer Material row displays the material type to be used for the first build layer, Model or Default.

Figure 43: First Layer Material



To configure this setting, press anywhere within the row; the First Layer Material page will be displayed. Use the radio buttons within this page to select between Model and the Default material, which could be either model or support material. If ABS or ASA material and .005" slice height are selected, model material is automatically used for the first layer of material.

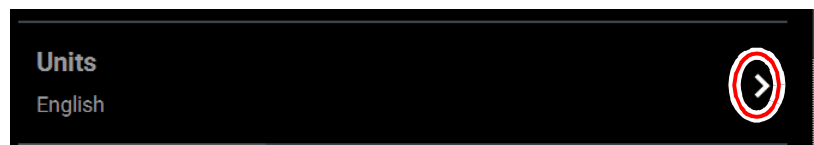
Figure 44: Configure First Layer Material



Units

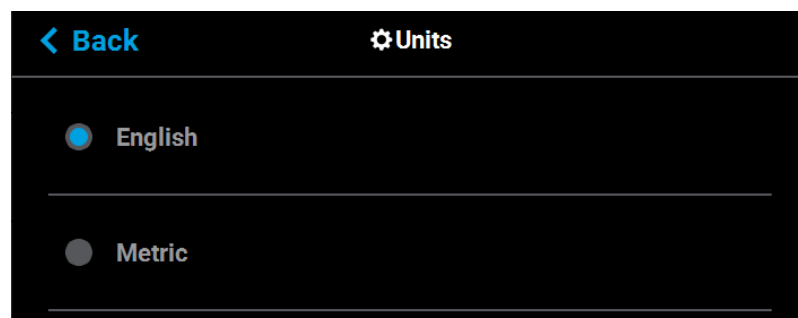
The Units row displays the type of units the printer is configured for, English (inches) or Metric.

Figure 45: Units



To configure this setting, press anywhere within the row; the Units page will be displayed. Use the radio buttons within this page to select between English and Metric units; English is selected by default.

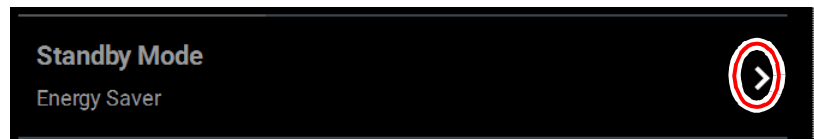
Figure 46: Configure Units



Standby Mode

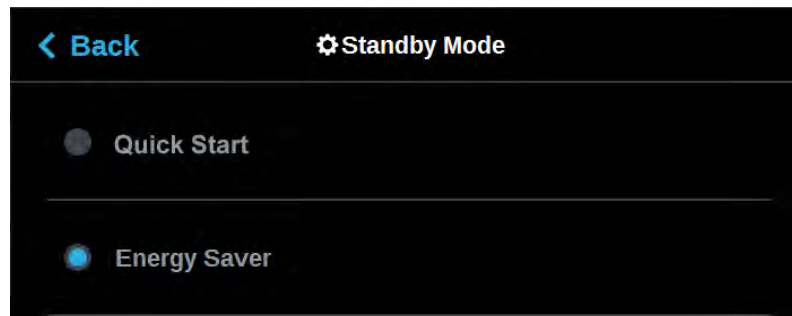
The Standby Mode setting gives you the ability to put the printer into an energy saving state after the completion of a build. When the Energy Saver radio button is selected (i.e. Standby Mode is turned On) the printer's oven will automatically shut off 2 hours after the completion of a build, thus saving energy. When the Quick Start radio button is selected (i.e. Standby Mode is turned Off) the printer's oven will remain On for 60 hours after the completion of a build and oven temperature will stay at the material's build temperature.

Figure 47: Standby Mode



To configure this setting, press anywhere within the row; the Standby Mode page will be displayed. Use the radio buttons within the page to select between the Energy Saver and Quick Start options as needed. The Quick Start radio button is selected by default (i.e. Standby Mode is set to Off by default).

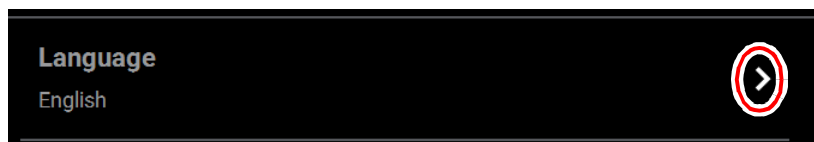
Figure 48: Configure Standby Mode



Language

The Language row displays the language that the User Interface is configured for. Language options include English (default), Spanish, French, German, Italian, Russian, Chinese (traditional or simplified), and Japanese.

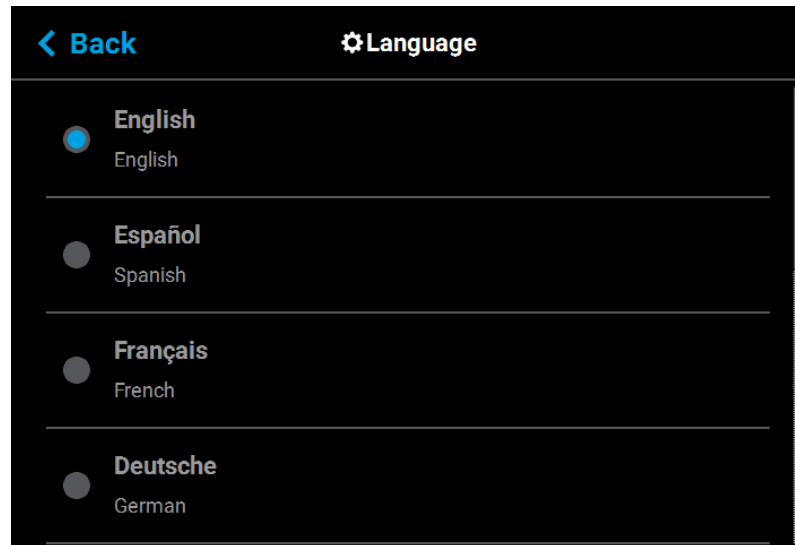
Figure 49: Language



To configure this setting, press anywhere within the row; the Language page will be displayed. Use the scrollbar (along the right side of the page) to view the list of available languages. Select the radio button corresponding to your desired language.

Additionally, the first time the printer is powered ON, a dialog will be displayed asking you to select your desired language. Once you've set your desired language following initial power up, this selection will be retained and can only be changed by navigating to the Language page and adjusting your language selection.

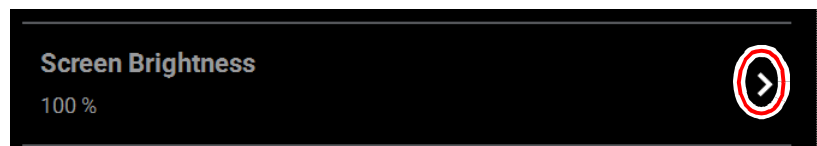
Figure 50: Configure Language



Screen Brightness

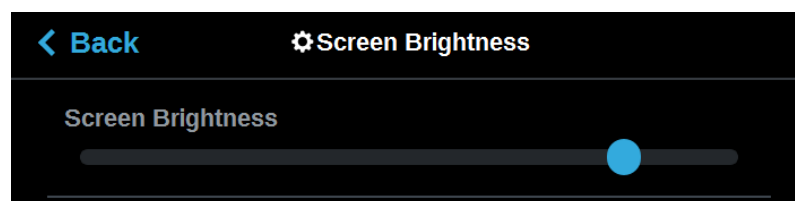
The Screen Brightness setting allows you to adjust the brightness of the touchscreen display. This setting is displayed as a percentage with 100% percent representing the greatest amount of brightness available.

Figure 51: Screen Brightness



To configure this setting, press anywhere within the row; the Screen Brightness page will be displayed. Within this page use the slider graphic to adjust brightness as needed. Sliding to the right will increase brightness while sliding to the left will dim brightness. Please note that you cannot set screen brightness to 0% (completely dim).

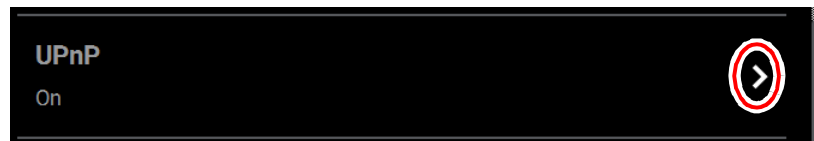
Figure 52: Configure Screen Brightness



UPnP

UPnP allows the printer to broadcast its Unique Device Name (UDN) address across the network. When this setting is set to On, the printer will broadcast its UDN across the network allowing GrabCAD Print to automatically detect the IP address of the printer for communication. When this setting is set to Off, the printer will not broadcast its IP address across the network and GrabCAD Print will need to be manually configured to communicate with the printer.

Figure 53: UPnP



To configure this setting, press anywhere within the row; the UPnP page will be displayed. Use the radio buttons within the page to turn the setting On and Off as needed; On is selected by default.

Figure 54: Configure UPnP



Wifi

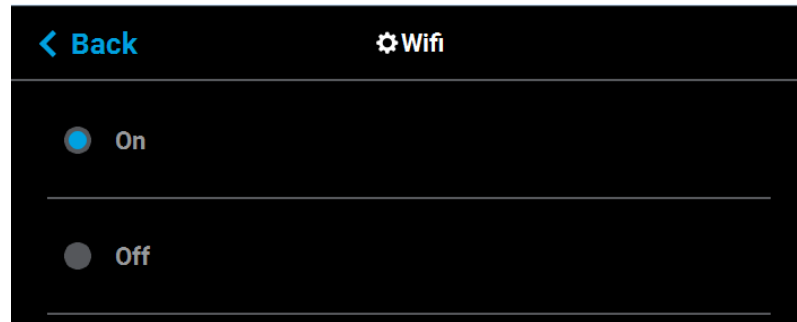
The Wifi setting gives you control over the printer's Wi-Fi capabilities. Please note that the functionality of this setting is dependent upon the use of a Wi-Fi dongle purchased for use with the printer. When this setting is set to On, you will be able to configure the printer to scan for and connect to an available Wi-Fi network. You will then be able to send part files to the printer via this network. When set to Off, Wi-Fi capabilities will be disabled and you will instead need to send part files to the printer via your facility's Ethernet connection or through the use of a USB flash drive (see "Configuring the Network" (page 8) for details).

Figure 55: Wifi



To configure this setting, press anywhere within the row; the Wifi page will be displayed. Use the radio buttons within the page to turn the setting On and Off as needed; On is selected by default.

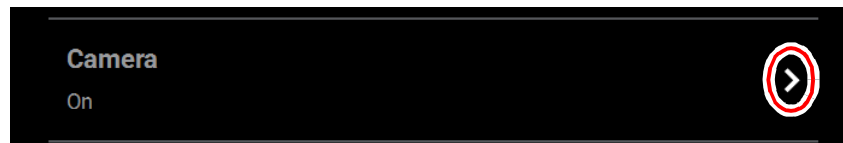
Figure 56: Configure Wifi



Camera

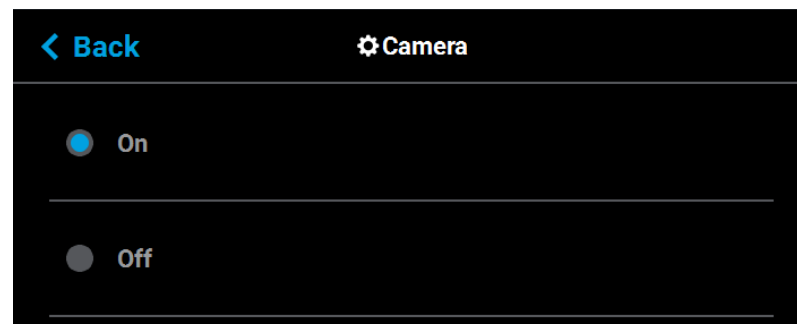
The Camera setting gives you control over the printer's camera. When this setting is set to On, the printer's camera will automatically provide remote monitoring capabilities while a part is being built. When this setting is set to Off, the camera will be turned off and remote monitoring capabilities will be disabled.

Figure 57: Camera



To configure this setting, press anywhere within the row; the Camera page will be displayed. Use the radio buttons within the page to turn the setting On and Off as needed; On is selected by default.

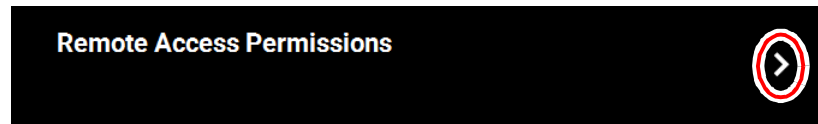
Figure 58: Configure Camera



Remote Access Permissions

This feature is not currently supported by GrabCAD.

Figure 59: Remote Access Permissions



Calibration



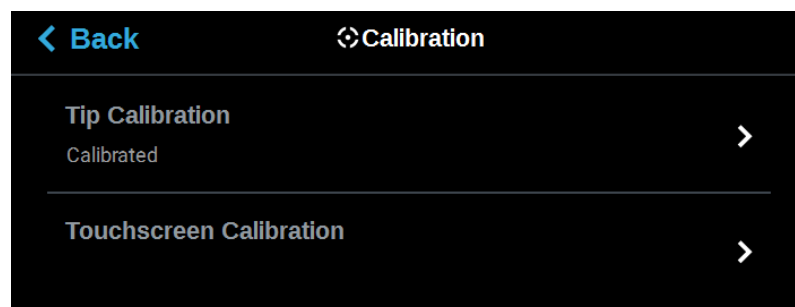
This section provides an overview of the Calibration page and its features, but does not go into detail regarding calibration procedures. See “6 Calibration and Adjustments” (page 1) for detailed calibration procedure information and instructions.

The Calibration page allows you to perform a variety of calibration procedures on the printer, including:

- Tip Calibration
- Touchscreen Calibration

To access the Calibration page, press the **Calibration** button within the Tools page; a screen similar to the following will be displayed.

Figure 60: Calibration Page

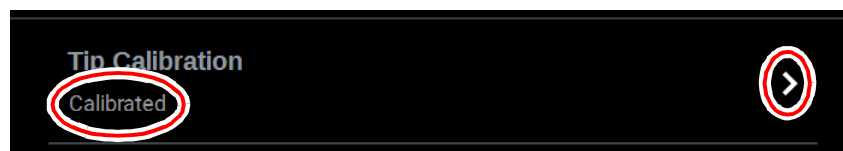


Tip Calibration

The printer's calibration status will be displayed within the Tip Calibration row. Calibrated or Not Calibrated will be displayed depending on the printer's Calibration status.

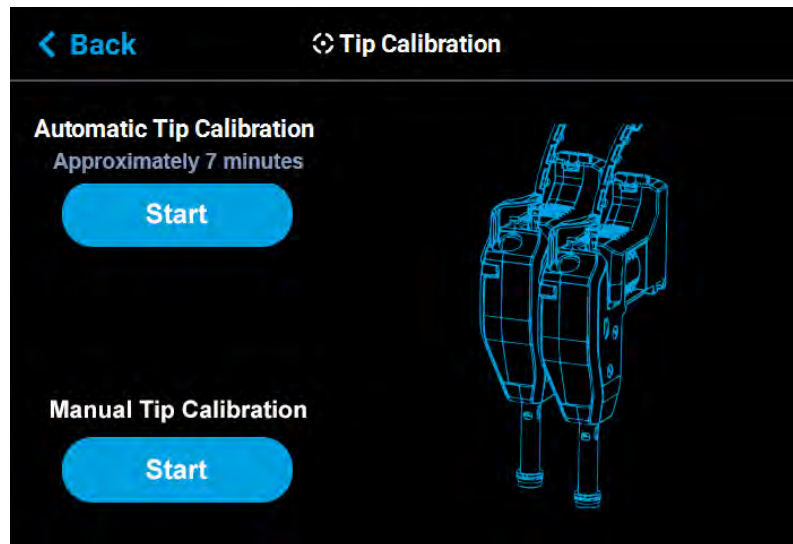
Pressing anywhere within the Tip Calibration row will open a page allowing you to select from a variety of tip calibration options.

Figure 61: Tip Calibration



The Tip Calibration page contains an option for performing an Automatic Tip Calibration as well as a Manual Tip Calibration. Pressing the **Start** button associated with either of these options will allow you to perform that particular calibration procedure. Each calibration procedure is delivered in the form of a wizard which will guide you through the process of performing the calibration procedure. See “Automatic Tip Calibration” (page 2) and “Manual Tip Calibration” (page 5) for detailed instructions.

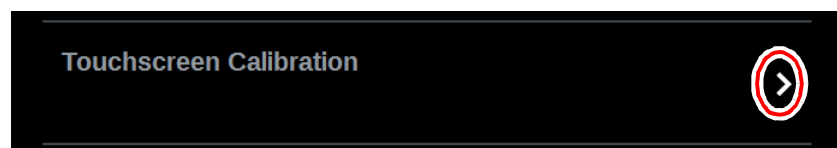
Figure 62: Tip Calibration Options



Touchscreen Calibration

Pressing anywhere within the Touchscreen Calibration row will open a dialog allowing you to recalibrate the touchscreen display. See “Touchscreen Calibration” (page 13) for detailed instructions.

Figure 63: Touchscreen Calibration



Maintenance

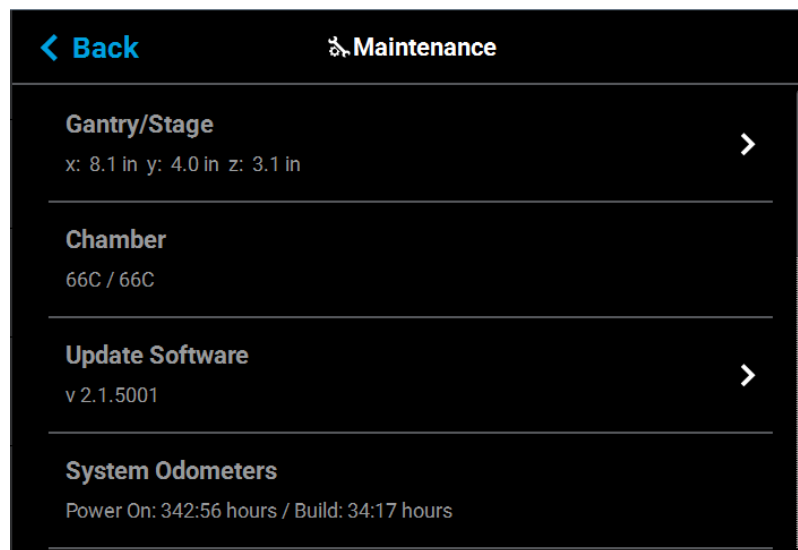


This section provides an overview of the Maintenance page and its features, but does not go into detail regarding printer maintenance procedures. See [Chapter , 7 Maintenance \(page 1\)](#) for detailed maintenance information.

From this page you can perform a variety of maintenance procedures on the printer, and view diagnostic/printer state information. Please note that advanced maintenance must be performed by an authorized service representative only.

To access the Maintenance page, press the Maintenance button within the Tools page; a screen similar to the following will be displayed.

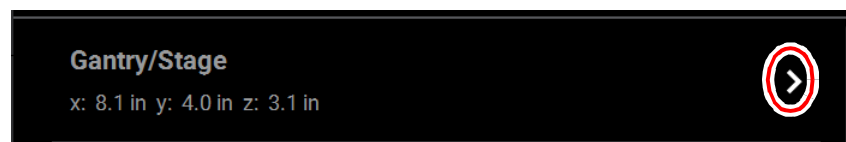
Figure 64: Maintenance Page



Gantry/Stage

Position information for the X, Y and Z axes is displayed within the Gantry/Stage row. Pressing anywhere within the Gantry/Stage row will open the Gantry/Stage page.

Figure 65: X, Y, Z Position



The single directional arrow button within the Gantry: section allows you to move the head in

the X and Y axis. Pressing  moves the head assembly to the front of the gantry.

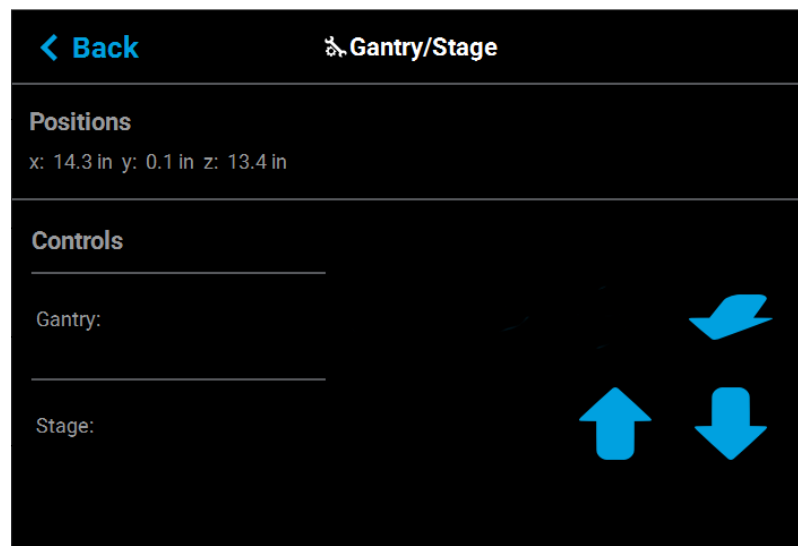
The two directional arrow buttons within the Stage: section allow you to move the platen (Z) up or down.

- Up: pressing  moves the Z stage to the mid-Z position.

- Down: pressing  moves the Z stage to the lower-Z position.

The information displayed within the Positions portion of the page will update to reflect X, Y, and Z positioning changes made using the directional arrow buttons.

Figure 66: Gantry/Stage Page



Chamber

The Chamber row displays the current temperature as compared to the set point temperature of the oven chamber.

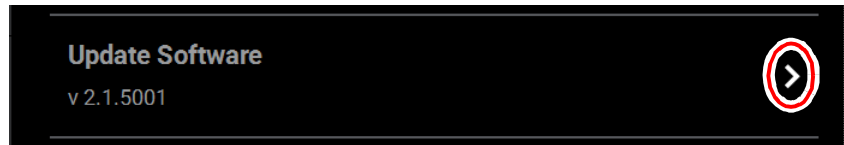
Figure 67: Chamber Temperature



Update Software

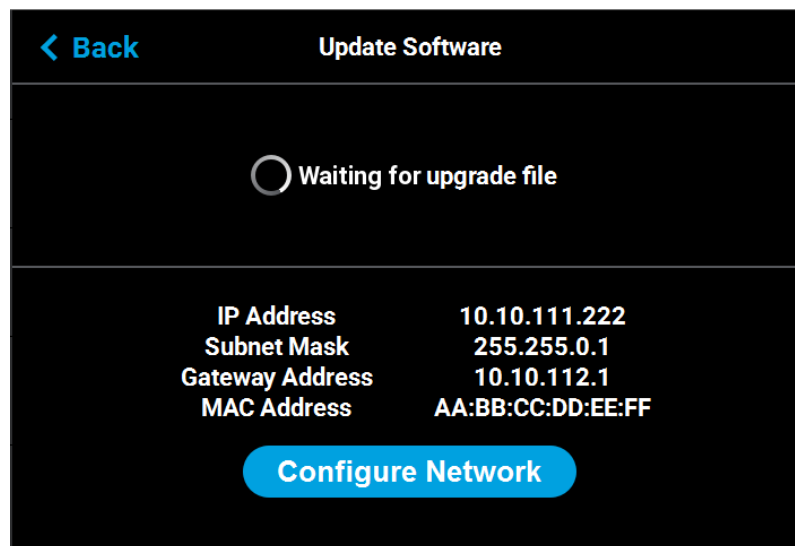
The Update Software row displays the version of Controller Software installed on the printer.

Figure 68: Update Software



Pressing anywhere within the Update Software row will open a page allowing you to upgrade the printer's Controller Software version (see "Updating Controller Software" (page 1) for details).

Figure 69: Update Controller Software Page



System Odometers

The System Odometers row displays the number of hours in which the printer has been building.

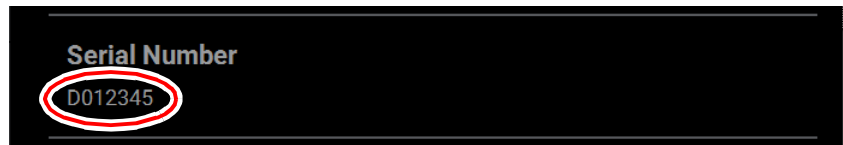
Figure 70: System Odometers



Serial Number

The Serial Number row displays the printer's unique serial number. This number can also be found on the label on the exterior surface of the printer (see Figure 6 (page 7) for serial number tag label placement).

Figure 71: Serial Number



Open Source Licenses

Pressing anywhere within the Open Source Licenses row will open a page displaying legal information pertaining to the open source software running on the printer. The files displayed are read-only.

Figure 72: Open Source Licenses



System Type

The System Type row displays the printer's model type information (F170, F270, or F370).

Figure 73: System Type



USB Tools

Pressing anywhere within the USB Tools row will open a page allowing you to:

- upgrade the printer's Controller Software version from an installed USB Flash drive (see "Updating Controller Software" (page 1) for details).
- export the system configuration file to an installed USB Flash drive (see "Exporting System Configuration (.CFG) File" (page 6) for details).

Figure 74: Update Software



Network

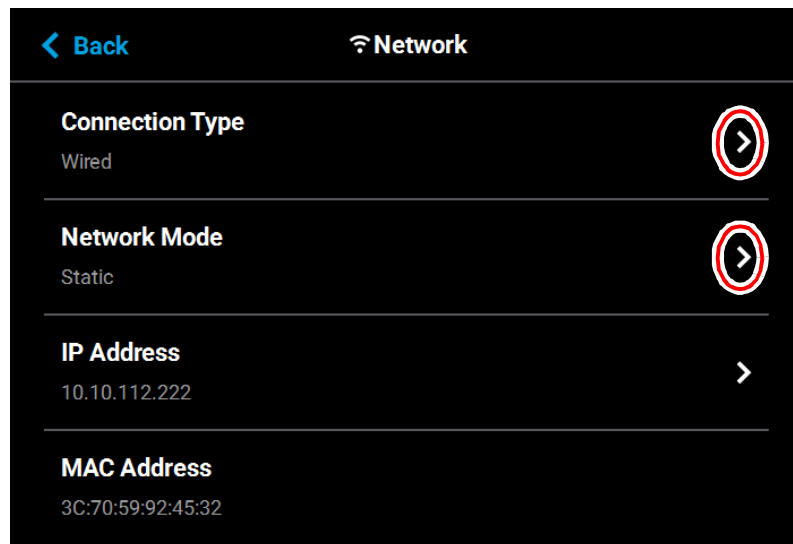


Your printer was configured for your network as a part of its initial installation and setup (see “Configuring the Network” (page 8)). The information within this section is provided to help you understand the functionality of the Network portion of the Settings page.

Within the Network page you can configure your printer’s network connection, options include Static, Dynamic (default), or Wi-Fi. The network type selected will determine the rows and configurable settings displayed within the Network page.

To access the Network page, press the **Network** button within the Tools page; a screen similar to the following will be displayed.

Figure 75: Network Page



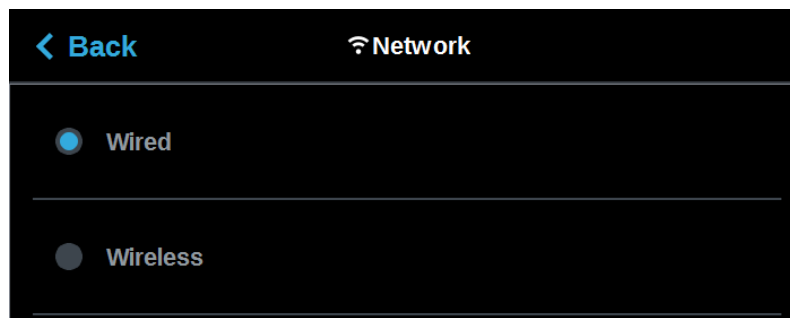
Pressing anywhere within the Connection Type row will allow you to select between a wired (Static or Dynamic) or wireless (Wi-Fi) network; Wired is selected by default. Use the **Wired** and **Wireless** radio buttons to select a connection type. After selecting a connection type press

the **Back** button to exit and return to the Network page; the selected connection type will be indicated within the Connection Type row (see [Figure 77 \(page 58\)](#) and [Figure 78 \(page 58\)](#) as a reference).



The Wireless connection type option will only be displayed if a Wi-Fi dongle has been installed and the printer's Wifi setting is set to On (see "Wifi" (page 48) for details). If a dongle has not been installed, or if a dongle has been installed but the printer's Wifi setting is set to Off, this row will be hidden from view and you will not have the option of configuring a Wi-Fi network.

Figure 76: Select Connection Type



Depending on the Connection Type selected (Wired or Wireless) the second row displayed within the Network page will vary.

- If the Wired connection type is selected, the Network Mode row will be displayed.
- If the Wireless connection type is selected, the Available Networks row will be displayed.

See the detailed information in the sections below for specific information on the available connection types.

Figure 77: Network Page - Network Mode Row

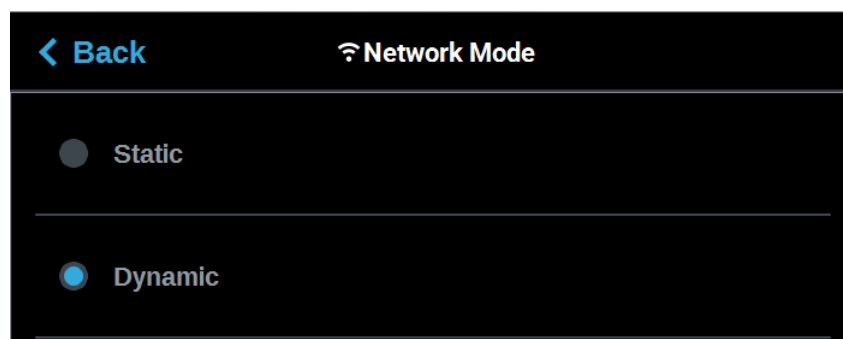


Figure 78: Network Page - Available Networks Row



If the Wired connection type is selected, the Network Mode row will be displayed (see [Figure 77 \(page 58\)](#) as a reference). Pressing anywhere within this row will allow you to select between a Static or Dynamic network mode; Dynamic is selected by default. Use the **Static** and **Dynamic** radio buttons to select a network mode. After selecting a network mode press the **Back** button to exit and return to the Network page; the selected network mode will be indicated within the Connection Type row.

Figure 79: Select Wired Network Mode



If the Wireless connection type is selected, the Available Networks row will be displayed (see [Figure 78 \(page 58\)](#) as a reference). Pressing anywhere within this row will open a page allowing you to scan for and connect to an available Wi-Fi network. After selecting an available

network, entering the password and/or username required to connect to the network (if applicable), and saving the network configuration, press the **Back** button to exit and return to the Network page; the name of the selected wireless network will be indicated within the Available Networks row.

Figure 80: Select Wireless Network Mode

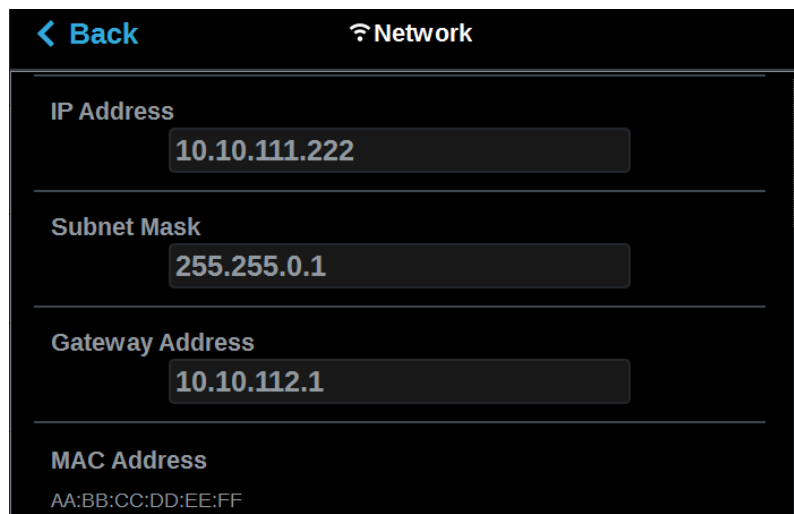


Dynamic Network Configuration

When the **Dynamic** (DHCP) wired network option is enabled a network server or PC will generate an IP address for the printer. A different IP address may be generated from time to time by the server or PC. The generated IP address will be displayed within the IP Address field, and corresponding Subnet Mask, Gateway Address, and MAC Address information will also be displayed.

When finished, press the **Back** button to exit and return to the Tools page.

Figure 81: Dynamic Network Configuration



Static Network Configuration

When the **Static** wired network option is enabled you must manually configure the IP Address, Subnet Mask, and Gateway Address fields for the printer (provided by the system administrator). Use the keypad to configure this information; simply touch a field on the screen to select it and then use the keypad displayed to enter network information. Touch anywhere on the screen outside of the keypad to exit and close the keypad. Press the **Apply** button to save the network information configured. Once the Apply button has been pressed and network information is saved, network information will not change.



See your system administrator if you do not know the IP address, Subnet Mask, or Gateway Address.

When finished, press the **Back** button to exit and return to the Tools page.

Figure 82: Static Network Configuration

Static Network Configuration screen showing the following fields:

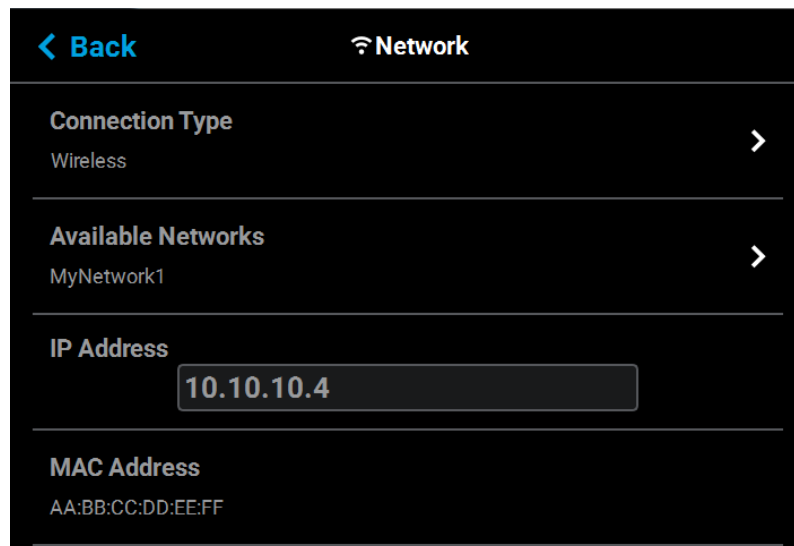
- IP Address: 10.10.112.222
- Subnet Mask: 255.255.255.0
- Gateway Address: 10.10.112.1

Wi-Fi Network Configuration

When the wireless network option is enabled you can scan for and connect to the printer via your local **Wi-Fi network** (see [Figure 80 \(page 59\)](#)). Depending on the network's security requirements you may need to enter a password and/or username in order to connect to the network. Use the keypad to configure this information; simply touch a field on the screen to select it and then use the keypad to enter network security information. Touch anywhere on the screen outside of the keypad to exit and close the keypad. Press the **Connect** button to save the network information configured. Once the Connect button has been pressed and network information is saved, network information will not change.

Press the **Back** button to exit the page and return to the Network page; the The name of the selected wireless network will be displayed within the Available Networks row.

Figure 83: Wi-Fi Network Page

A screenshot of a mobile application interface for Wi-Fi settings. At the top, there is a header bar with a blue back arrow and the text 'Back' on the left, and a Wi-Fi icon followed by the text 'Network' on the right. Below the header, the interface is divided into sections. The first section is titled 'Connection Type' and shows 'Wireless' with a right-pointing chevron. The second section is titled 'Available Networks' and shows 'MyNetwork1' with a right-pointing chevron. The third section is titled 'IP Address' and shows a text input field containing '10.10.10.4'. The fourth section is titled 'MAC Address' and shows 'AA:BB:CC:DD:EE:FF'.

Press the **Back** button to exit the page and return to the Tools page. The Network button will refresh and a blue indicator will be displayed indicating that the printer is configured for a Wi-Fi network.

Figure 84: Enter Network Settings Dialog

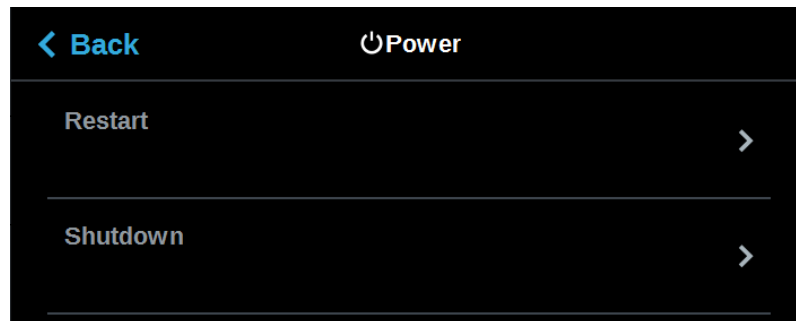


Power

Within the Power page you can restart or shutdown the printer. It is recommended that you use the Shutdown option within this page to power the printer Off, rather than simply pressing the Power ON/OFF button located on the front of the printer.

To access the Power page, press the **Power** button within the Tools page; a screen similar to the following will be displayed.

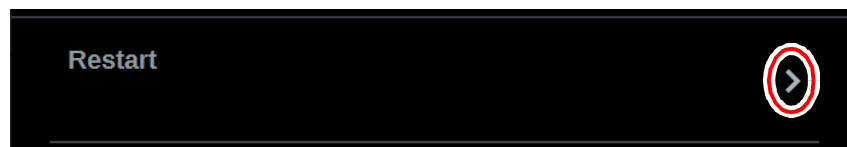
Figure 85: Power Page



Restart

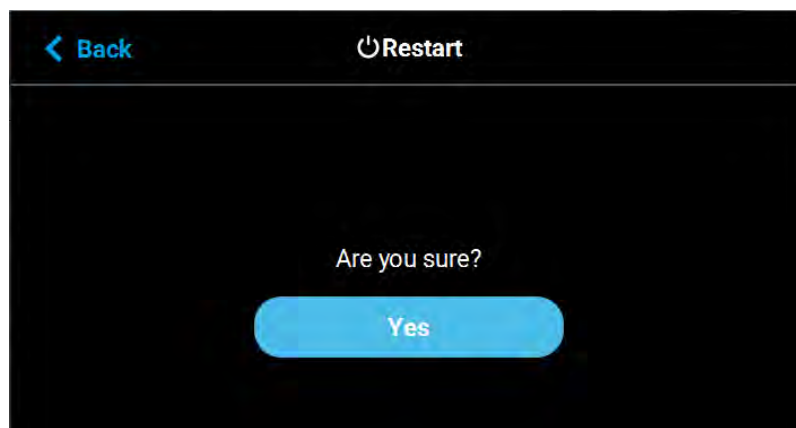
Pressing anywhere within the Restart row will open a dialog allowing you to manually restart the printer.

Figure 86: Restart



Pressing the **Yes** button within this dialog will cause the printer to restart automatically. Press the **Back** button to exit the page and return to the Power page.

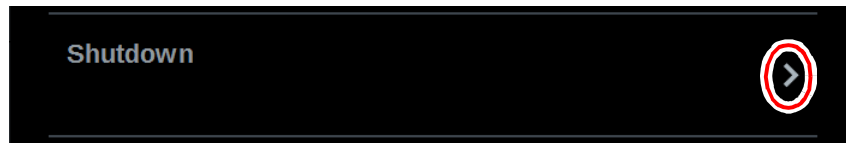
Figure 87: Restart Confirmation Dialog



Shutdown

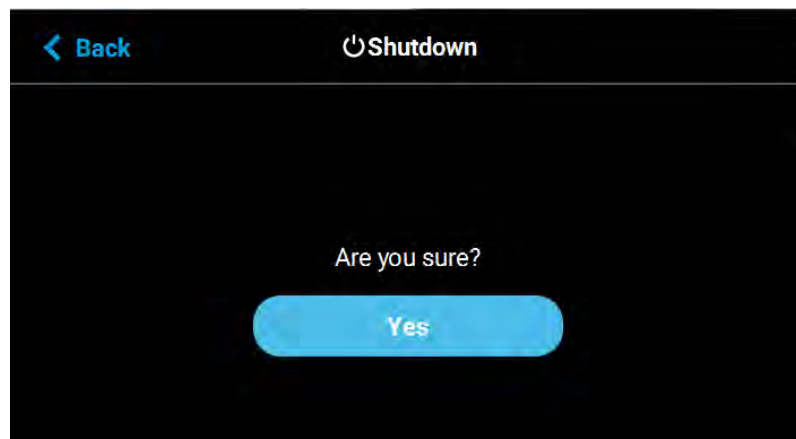
Pressing anywhere within the Shutdown row will open a dialog allowing you to power the printer down.

Figure 88: Shutdown



Pressing the **Yes** button within this dialog will cause the printer to power down. Press the **Back** button to exit the page and return to the Power page.

Figure 89: Restart Confirmation Dialog



Light

The light button is the only option within the Tools page that does not open a new page after being pressed. Instead, the light button allows you to turn the oven light ON and OFF. An indicator within the upper-left corner of the button displays the current state of the oven light (ON or OFF). The light button can appear in the following states:

Table 13: Light Button - Button States

Button State	Description
	Oven light is ON. Selecting the light button in this state will turn the oven light OFF.
	Oven light is OFF. Selecting the light button in this state will turn the oven light ON.

5 OPERATING THE PRINTER

This chapter explains basic steps in operating the F123 Series

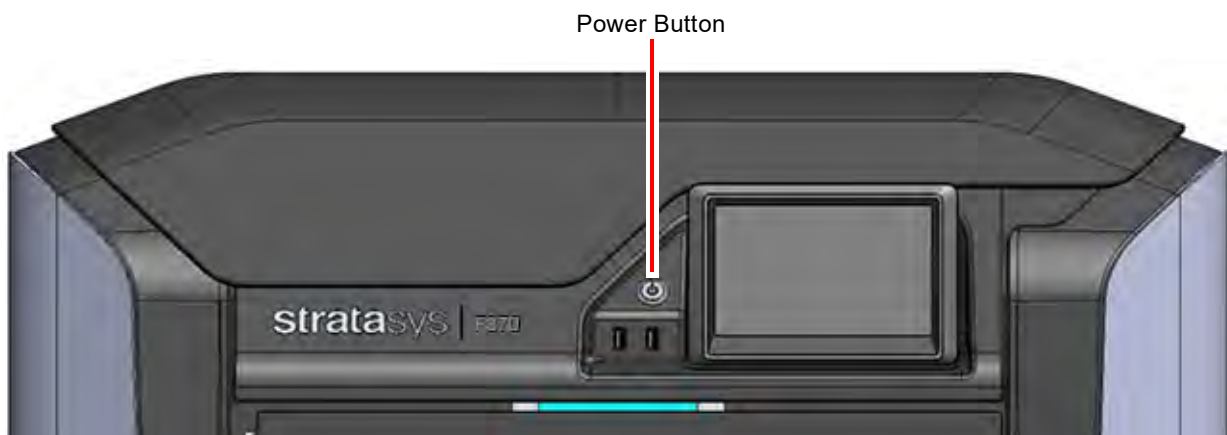
Basic User Operations

Powering ON the Printer

To power the printer ON:

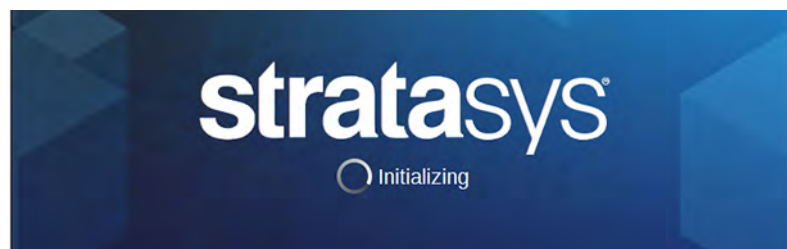
1. Connect the male end of the supplied power cord directly into a grounded electrical outlet.
2. Connect the female end of the power cord directly into the socket located on the back of the printer (see [Figure 7 \(page 8\)](#) for location).
3. Press the power button located on the front of the printer.

Figure 1: Power Button Location



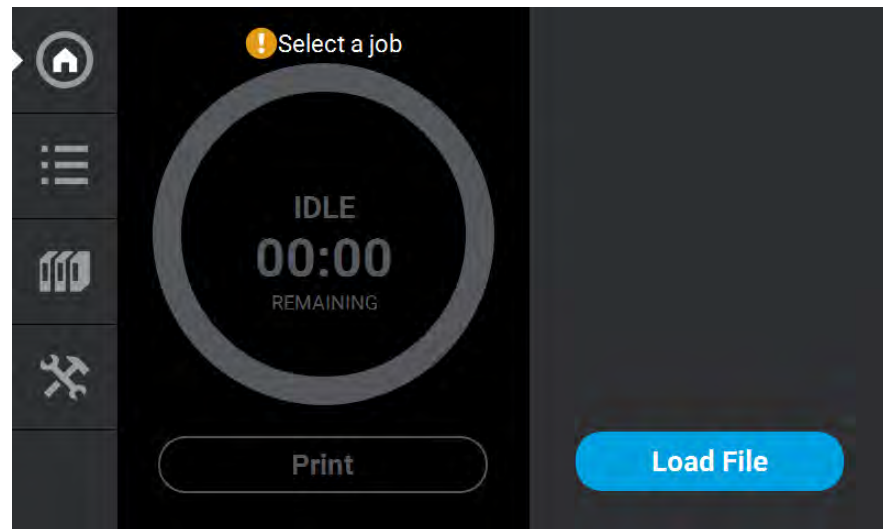
4. The printer will begin to boot. The touchscreen will turn on and begin initializing.
5. The first time the printer is powered ON a dialog will be displayed asking you to select your desired language. Select the radio button corresponding to your desired language by touching its row on the screen, then confirm your selection.

Figure 2: Initializing Start Up Screen



6. After the initialization and start up process is complete, the touchscreen will refresh to display the Build page and the printer will automatically perform an XY Gantry Calibration (see “XY Gantry Calibration” (page 15) for details).

Figure 3: Build Page

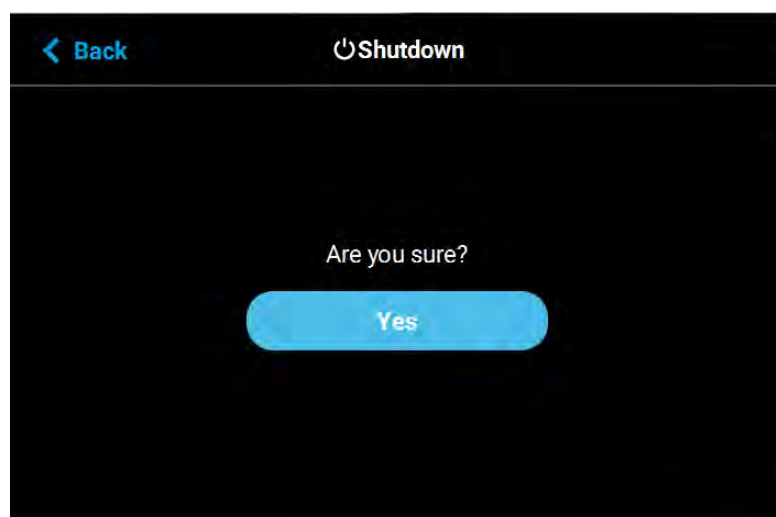


Powering OFF the Printer

To power the printer OFF:

1. Ensure that the printer is stopped (idle) and is not building.
2. Press the power button located on the front of the printer (see Figure 1 for button location).
3. A dialog will be displayed asking you to confirm the power OFF; press **Yes** to power OFF.

Figure 4: Power OFF Confirmation



4. After a couple of minutes the printer will shutdown.

Please note that this procedure only powers down the electronics. To completely disengage power to the printer, you must unplug the power cord located at the rear of the printer.



For extended non-use periods greater than 72 hours, unload the material, store the material in an air tight bag and power OFF the system.

Loading Material

The information within this section will walk you through the process of loading material to the model and support heads. As you complete the required steps, be sure to observe the status information displayed on the touchscreen.



Caution:

If the printer remains idle for more than 72 hours (48 hours with TPU 92A material), leaving material in the filament tubes could result in a part quality issues due to wet filament. failed build. To prevent this:

- Remove filament from the tubes.

Or

- Unload filament and cut six feet of material from the spool.



Loading material can only be done when the printer is stopped (idle) and is not building.

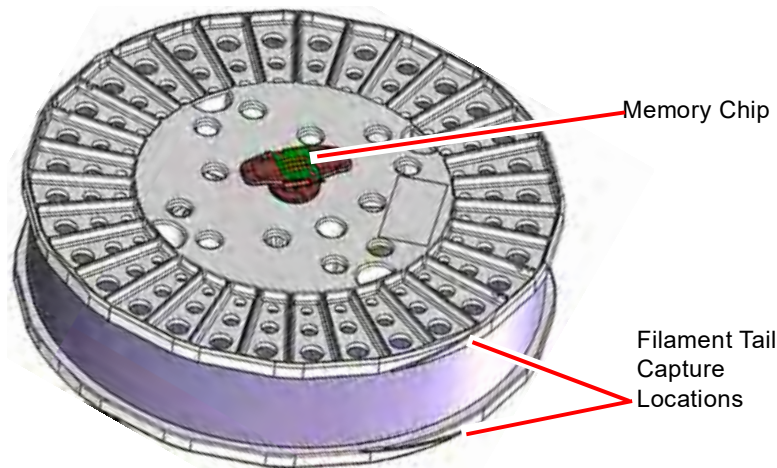
The “[Material Spool Preparation](#)” (page 4) section describes the steps necessary to prepare a material spool for insertion into a material bay, and highlights the components of the material spool. Once a material spool has been prepared for use, the steps within the “[Material Spool Installation](#)” (page 4) section will guide you through the process of installing a material spool and loading material to the head.

The F270 and F370 utilize four material bays - two model and two support, while the F170 utilizes two material bays - one model and one support. In order to build, at least one model and one support spool must be installed. If you know that a job will require more material than what is available on a single spool, you can install a second model and/or support spool into the corresponding vacant material bay in order to utilize the auto changeover feature, as applicable (see “[Material Auto Changeover](#)” (page 10) for details). However, it is recommended that you properly store spools (see “[Handling/Storing Materials](#)” (page 11)) that are not in use in order to safeguard against moisture exposure.

Material Spool Preparation

The process for preparing a new, unopened material spool varies slightly from the process for preparing a previously used material spool. When preparing a new (unopened) spool you will first need to remove the spool from its Stratasys packaging. When preparing a previously opened spool you will need to remove the spool from its storage bag. Once removed, pull the tail end of the spool's filament out of the filament tail capture location. Inspect the filament tail to ensure filament is not bent. If bent, cut the filament tail flush (using the 5" cutter included in the Welcome Kit). Refer to [Figure 5](#) for material spool details.

Figure 5: Material Spool Details



The material spool is ready to be installed into the material bay. Follow the steps within “Material Spool Installation” to install the material spool and load material to the head.

Material Spool Installation

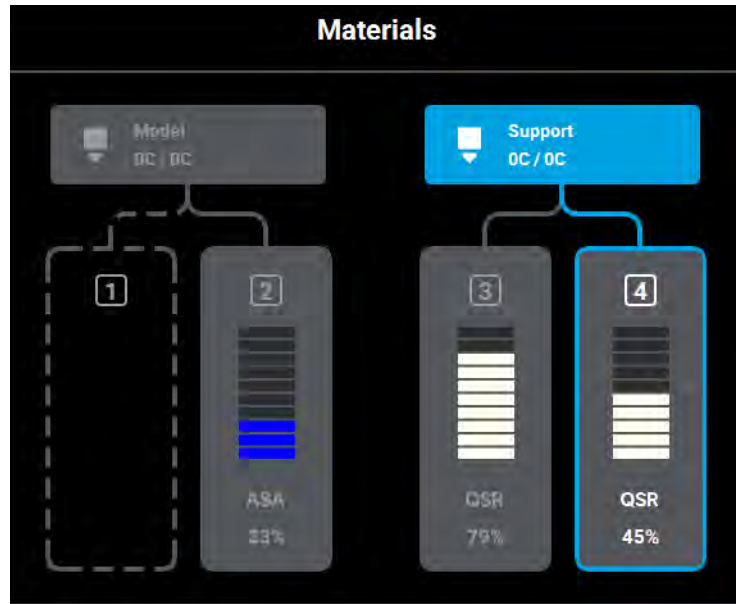
Once you've properly prepared a material spool, you can begin the process of loading material. Pre-loading filament to the drive wheels places a spool's filament into position to be loaded to the liquefier tip within the head. Once filament is detected by the filament present switch, it can be completely loaded to the liquefier tip.

To install and load a material spool:

1. Ensure that the printer is stopped (idle) and is not building.
2. Select the **Materials** button from the Navigation Menu; a screen similar to [Figure 6 \(page 5\)](#) will be displayed. The information displayed represents the current configuration of your printer.

3. Observe the status information displayed for each of the Materials Status Icons. A Material Status Icon with a dashed gray border indicates that a material spool is not present in the material's corresponding material bay. A completely gray Head Status Icon indicates that material is not loaded to that head.

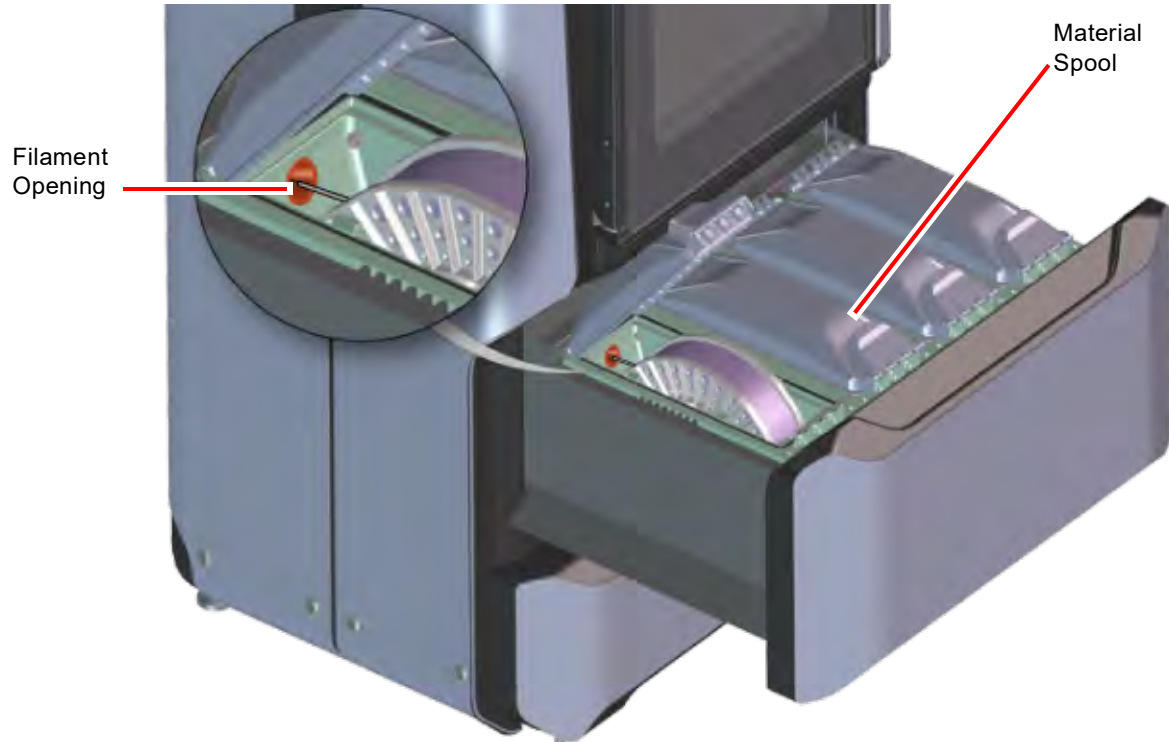
Figure 6: Current Configuration - Load Material



4. Open the material bay drawer.
5. Insert the material spool you'd like to load into its appropriate slot within the material bay.
 - Pull up on the latch securing the lid corresponding to the material bay you want to load, this will unlock the lid.
 - Open the lid to expose the slot where the material spool will be inserted.
 - Place the material spool into the slot making sure the filament tail is facing the back wall of the material bay.
 - Once the spool is inserted, the Material Status Icon will refresh and display a solid yellow border with a notification badge directly above the icon.
6. Open the Material Details page corresponding to the material bay for which you'd like to load material by touching its Material Status Icon on the screen.
7. Slowly turn the material spool and feed filament through the filament opening and into the drive mechanism. Turn the spool and feed filament until the Load button refreshes and is displayed in its selectable state.
 - Filament needs to be advanced approximately 2 inches (50.8 mm) to reach the filament present switch.
 - When feeding filament, ensure that filament does not fall over the edge of the material spool to avoid cross-winding and/or load errors.

- The Material Status Icon will refresh and display in its solid gray unloaded state (see Table 7 (page 28)).

Figure 7: Insert Material Spool



8. Once filament is detected by the filament present switch press the **Load** button within the Material Details page.

Figure 8: Load Button



Only one material can be loaded at a time.

9. Press the **Back** button within the Material Details page to exit and return to the Materials page.

10. Material begins to load to the liquefier tip within the head. The pathway displayed between the Material Status Icon and the corresponding Head Status Icon becomes highlighted to indicate load progress (see [Figure 31 \(page 35\)](#)).
 - The material drive controller starts to push filament to the liquefier tip.
 - When filament reaches the head, it enters the liquefier tip and begins to warm to the material operating temperature (automatic - based on material spool memory chip data). This step also sets the oven temperature to the correct value for the material being loaded
 - Once the tip is within three degrees of the set point temperature the head moves to the purge area and the tip purges a small amount of material.
11. Once material is loaded, the filament pathway between the Material Status Icon and the corresponding Head Status Icon will be solid blue, the Head Status Icon will turn from gray to blue, and the Material Status Icon will display a solid blue border.
12. Once the material load is complete, close the lid corresponding to the loaded material bay and then close the material bay drawer.

You are now ready to select a job to build, see “[Basic Job Build Tasks](#)” ([page 14](#)) for information on selecting and starting a job.

Unloading Material

Caution:



If the printer remains idle for more than 72 hours (48 hours with TPU 92A material), leaving material in the filament tubes could result in a part quality issues due to wet filament. To prevent this:

- Remove filament from the tubes.

Or

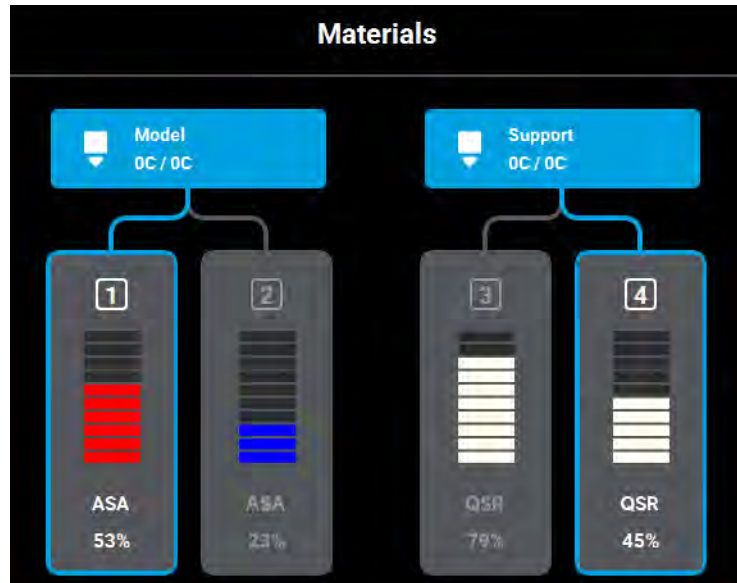
- Unload filament and cut six feet of material from the spool.

Perform the following steps to unload material:

1. Ensure that the printer is stopped (idle) and is not building.
2. Select the **Materials** button from the Navigation Menu; a screen similar to [Figure 9 \(page 8\)](#) will be displayed. The information displayed represents the current configuration of your printer.

3. Observe the status information displayed for each of the Materials Status Icons. For a loaded material, the pathway between the material's Material Status Icon and corresponding Head Status Icon will be solid blue, the Head Status Icon will be blue, and the Material Status Icon will display a solid blue border.

Figure 9: Current Configuration - Unload Material



4. Open the Material Details page corresponding to the material bay you want to unload by touching its Material Status Icon on the screen.
5. Press the **Unload** button within the Material Details page.

Figure 10: Unload Button



Only one material can be unloaded at a time.

6. Material begins to unload from the head. The unload process will take several minutes; please be patient.
 - The pathway displayed between the Material Status Icon and the corresponding Head Status Icon becomes highlighted to indicate unload progress (see Figure 31 (page 35)).
 - The Head Status Icon will refresh and become solid gray, indicating that material is no longer loaded to the head.
 - The Material Status Icon will refresh and display a solid yellow border with a notification badge over the center of the icon. The icon will remain in this state until the material spool is reloaded or completely removed.

At this point you have the option of reloading the material spool you just unloaded (see “Loading Material” (page 3) for detailed instructions) or removing the material spool from the material bay (see “Removing Material Spools” (page 9) for detailed instructions).

Removing Material Spools

The process for removing an empty material spool as opposed to a partially used spool varies slightly.

Removing an Empty Material Spool

1. Ensure that the material bay drawer is open.
2. Pull up on the latch securing the lid corresponding to the material bay containing the empty spool; open the lid to expose the empty material spool.
3. Lift the material spool out of its slot within the material bay. Once the material spool is removed from the material bay the Material Status Icon will refresh to display a dashed gray border, indicating that the corresponding material bay is empty.



Empty spools may have a small, unusable volume of material remaining. The leftover material allows for manufacturing tolerances and ensures that auto changeover works properly.

4. There will be a piece of filament, approximately 2 inches (50.8 mm) in length that extends beyond the filament exit hole.
5. Discard the empty spool as it is no longer usable.

Removing a Partially Used Material Spool

1. Unload filament from the head (see “Unloading Material” (page 7)).
2. Once unloaded, the material’s Material Status Icon will display a solid yellow border with a notification badge over the center of the icon.
3. Ensure that the material bay drawer is open.
4. Pull up on the latch securing the lid corresponding to the material bay containing the material spool you’d like to remove; open the lid to expose the material spool.
5. Slowly turn the material spool to remove filament from the drive mechanism. Filament will be re-wound onto the spool. Turn the spool until the filament’s tail exits the filament opening.



When turning the spool ensure that filament is re-wound tightly onto the spool. If filament falls over the sides of the spool cross-winding can occur.

6. Lift the material spool out of its slot within the material bay. Once the material spool is removed from the material bay the Material Status Icon will refresh to display a dashed gray border, indicating that the corresponding material bay is empty.
7. Using the 5” cutters (included in the Welcome Kit) cut the filament so that the filament’s tail is flush.

8. Snap the filament tail into place within one of the capture locations along the edge of the material spool (see [Figure 5 \(page 4\)](#) for capture locations).
9. Place the material spool into a storage bag (included in the Welcome Kit) and ensure that the bag is tightly sealed. (See [“Handling/Storing Materials” \(page 11\)](#) for storage specifications).
10. Install another material spool as needed, see [“Material Spool Installation” \(page 4\)](#) for instructions.

Material Auto Changeover

Auto changeover allows you to leave a long build unattended. When you know that a build will require more material than is available on a single material spool, you can pre-load the material from a second spool to utilize the auto changeover feature. Auto changeover is available on the F270 and F370 models only.



You must pre-load material from the auto changeover material spool prior to auto changeover occurring (i.e. the spool's Material Status Icon must be in the unloaded state, and exhibit a solid gray border). If material is not pre-loaded, auto changeover will not occur and the printer will pause.

When an active material spool becomes empty:

1. The printer is paused and the drive motor automatically withdraws residual material from the printer.
2. Material from the changeover material spool is loaded to the head. The job is automatically resumed.



If the material to be loaded is not the same as the material it is replacing, a material mis-match load error will occur (see [“Warnings and Errors” \(page 1\)](#) for details). Auto changeover will not occur and the printer will pause.

3. While the changeover is taking place, the User Interface will update and indicate that this process is occurring. No user interaction is required.
4. If you press the **Pause** button during an auto changeover, the printer will remain paused after the changeover is complete.
 - After pressing the Pause button, the User Interface will update to indicate the reason for the pause condition.
 - Press **Accept** within the dialog on the screen to return to the Build page.
 - From the Build page, press the **Play** button to resume building.
5. If an error occurs during the auto changeover process, the printer will remain paused.
 - Navigate to the Materials page by pressing the **Materials** button within the Navigation Menu.
 - Observe the load status for each material. The Material Status Icon corresponding to the material spool experiencing the load error will display a red border. A notification badge icon within the filament pathway will also be displayed; press this icon on the screen to open the corresponding material's Material Details page.

- Within the Material Details page text will be displayed indicating the cause of the load error. Touching this text on the screen may display a dialog with additional information pertaining to the error. “[Load/Unload Errors](#)” (page 6) provides detailed descriptions of the various load errors you may encounter, as well as instructions for correcting the error condition.
- Once the error is resolved, return to the Build page.
- Press the **Play** button to resume building or press the **Abort** button to cancel the build.

Handling/Storing Materials

Stratasys FDM thermoplastic materials will maintain proper product performance over an extended period of time, when handled and stored according to recommended procedures. Like other thermoplastics, the filament can absorb moisture when exposed to ambient humidity. Stratasys material spools are designed to minimize moisture exposure while unopened and opened. When a spool's filament absorbs moisture a finished part's surface quality, seam quality, and overall part aesthetics can be affected. Care should be taken to ensure filament remains dry.

**Caution:**

Material storage shall be in the range of 55°F to 86°F (13°C to 30°C), with relative humidity less than 70%.

Two model material spool sizes are available. Standard model material spools hold 60 in³ (984 cc) of filament while large spools hold 90 in³ (1475 cc). One support material spool size is available. Support material spools hold 60 in³ (984 cc) of filament.

**Caution:**

A material spool should not remain outside of a sealed container for longer than 1 minute. A foil bag or a material bay are examples of acceptable containers.

Material spools also contain desiccant material; the desiccant is designed to maintain proper moisture levels for an unopened spool. Once the desiccant is exposed to ambient air, it can become saturated and ineffective for moisture control. Proper handling of the spool after it has been opened is essential to maximizing material life. A plastic bag provides an airtight seal to keep moisture from entering the material spool while stored.

If a material spool with material remaining on the spool is removed from the printer, it should be stored within one of the airtight bags provided within the Welcome Kit. Prior to placing the material spool into the bag, ensure that the spool's filament is securely snapped into place within one of the filament tail capture locations on the edge of the spool.

Head Replacement

When a head reaches the 1500 build hours odometer limit (800 hours for the TPU 92A head), a warning will be displayed on the User Interface and the head's Head Status Icon will be highlighted in red on the Materials page. You can continue using a head which has exceeded its odometer limit, but it is highly recommended that you change the head as part quality will be unpredictable.

Replacing a Head

The information within this section is meant to guide you through the process of changing a head. Although the instructions below depict the replacement of the model head, the same procedure applies to the TPU 92A, standard model and support head. The process for replacing a PLA head varies slightly from the process for replacing a standard head; “Replacing a PLA Head” (page 14) highlights the differences between these replacement procedures.

1. Unload material from the head that will be replaced (see “[Unloading Material](#)” (page 7) for instructions).
2. With the printer powered ON, open the top cover (see [Figure 1](#) (page 1)).

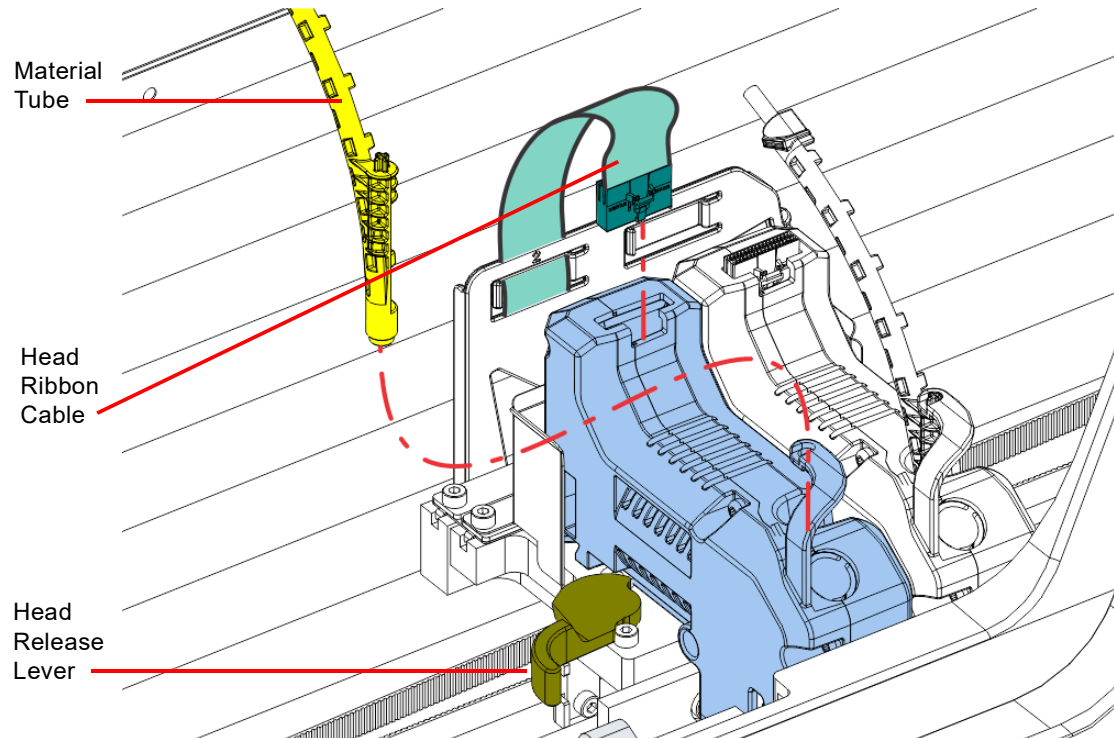


Replacing a head while the printer is powered ON will ensure that an Automatic Tip Calibration is performed after the replacement process is complete. Power is automatically removed from the head and all motors when the top cover is opened.

3. Depress the release tab and unclip the head ribbon cable for the head that will be replaced.
4. Disconnect the material tube for the head that will be replaced.

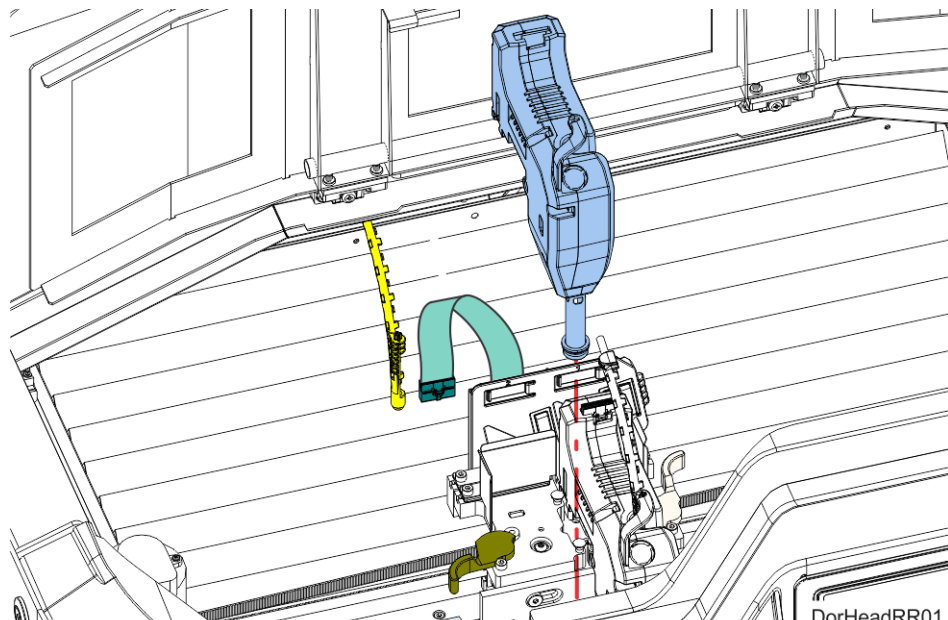
5. Unlock the head release lever for the head that will be replaced.

Figure 11: Head Connections



6. Pull the head assembly out of its position within the gantry and remove it from the printer.

Figure 12: Remove Head



7. Insert a new head assembly into the vacant location within the printer.
8. Lock the head into place using the head release lever. Press the lever securely closed to ensure that the head is properly seated.
9. Connect the material tube to the new head assembly.
10. Insert the head ribbon cable connector into the new head assembly ensuring it is fully seated in the head and the connector retention latch engages.
11. Close the top cover.
12. Perform an Automatic Tip Calibration. See “[Automatic Tip Calibration](#)” (page 2) for details. Please note that the printer must be powered ON before calibration can occur.
13. Perform a Manual Tip Calibration. See “[Manual Tip Calibration](#)” (page 5).

Replacing a PLA Head

The process for replacing a PLA head varies slightly from the process for replacing a standard head. The PLA head must be installed into the model head location within the gantry. A cooling module is used in conjunction with the PLA model head and must be installed into the support head location. The PLA head extrudes both model and support structures.

To replace a PLA head or the associated cooling module, perform [step 1](#) through [step 11](#) above. Automatic Tip Calibration is not performed during PLA head replacement. When performing [step 3](#) and [step 7](#) above remember that the PLA head must be installed into the model head location (on the left) and the cooling module must be installed into the support head location (on the right).

Basic Job Build Tasks

Before a Build

To build a job, you must first download job files to the printer and then load individual job files to the Job Queue using one of two methods:

1. Network transfer via the GrabCAD Print application on your workstation PC. This is the preferred method for adding jobs to the Job Queue. See “[GrabCAD Print Method](#)” (page 14) for detailed instructions.
2. USB method via a USB flash drive inserted into one of the available USB ports. See “[USB Method](#)” (page 14) for detailed instructions.

The GrabCAD Print option allows you to select a job which was processed and sent to the printer (via your facility's Ethernet connection or via Wi-Fi) using the GrabCAD Print application on your workstation PC. Jobs are sent in CMB format and placed directly into the Job Queue (stored on the printer's hard drive). The CMB file contains the processed job's basic information; this information is used to verify job compatibility with the printer's existing configuration. For information on using GrabCAD Print, see the associated Help file within the GrabCAD Print application.

The USB option allows you to select a job file which is stored on a USB flash drive inserted into one of the available USB ports (see [Figure 3 \(page 3\)](#) for port locations). This method can be used as a backup to the GrabCAD Print method if you are unable to transfer job files to the printer via your network connection (due to poor connectivity, a network outage, etc.) and provides a convenient option for you to reprint a common job. Alternatively, you have the option of selecting a single job file off of a USB flash drive and printing it directly within the Build page. This option is only available if the Job Queue is empty. See [“Loading a File” \(page 5\)](#) for details.

Preparing the Printer

To prepare the printer for a build:

1. Power ON the printer (see [“Powering ON the Printer” \(page 1\)](#) for instructions).

**Warning: Hot Surface Hazard**

Always wear proper heat protective gloves and clothing when handling items inside the oven, as surfaces within the oven can be very hot.

2. Open the oven door.
3. Place a new substrate onto the platen and lock the substrate into its build position by lifting up on the substrate ejection handle.

**Caution:**

Always wear gloves when installing the substrate. Hand oils on the substrate surface will result in poor part adhesion.



Never print in the same location more than once on a substrate when building a job.

Using substrates not provided by Stratasys may impact part quality and printer reliability.

4. Make sure that the tip wipe assembly's brushes as well as the printer's tips are clean and that the purge area is free of purged material debris.

Selecting a Job to Build

1. Populate the Job Queue as described within “Before a Build” (page 14).
2. Select the **Queue** button within the Navigation Menu; the Queue page will open to display the Job Queue.
3. Within the Job Queue list, locate the job you’d like to build and select it by touching its row on the screen; doing so will open its Job Details page.



Jobs are built in the order in which they appear within the Job Queue. To build a specific job, that job must be listed as the first item in the Job Queue. Use the Job Queue Control buttons to sort job files as needed (see “Editing the Job Queue” (page 17) for details).

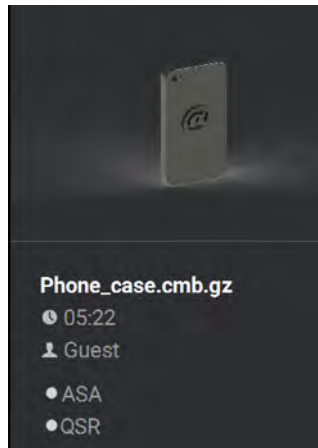
4. Within the Job Details page press the **Print** button; this will queue the job for printing. Depending on your printer’s part placement setting configuration a dialog may be displayed (see “Part Placement” (page 43)).
 - If the Enable Part Placement setting is set to Off (default setting), a dialog will not be displayed and the job will automatically be built in the center of the substrate.
 - If you set the Enable Part Placement setting to On, a dialog will be displayed allowing you to select the job’s build location (see Figure 21 (page 26)). The dialog contains a graphic representing your printer’s platen as well as a blue bounding box graphic (the imaginary box surrounding the part). Select the job’s build location by dragging and dropping the bounding box on the touchscreen. When finished, press the **Print** button within the dialog to confirm your selected placement and start the build.
5. The Build page will open and the oven will begin to heat to a set point temperature determined by the material types specified for the job. Please be patient.
6. After the oven and liquefier tips reach temperature the printer performs a Z Zero Calibration. "PREPARING" is displayed within the Build Status Display while this calibration occurs.
7. Once Z Zero Calibration is complete the printer begins building the job. "BUILDING" is displayed within the Build Status Display as the part is being built (see “Information Available During a Build” (page 17)).
8. When finished, text is displayed on the touchscreen indicating that the completed part can be removed from the printer (see “After a Build is Complete” (page 22)).

Information Available During a Build

During a build, information pertaining to that build is displayed within two areas of the Build page:

The Print Job Information Panel displays the details of a job, as submitted to the printer from the workstation PC. This information is static and is for reference purposes only. See “[Viewing Print Job Information](#)” (page 8) for detailed information.

Figure 13: Print Job Information Panel - Building



Information displayed within this panel for a selected job includes:

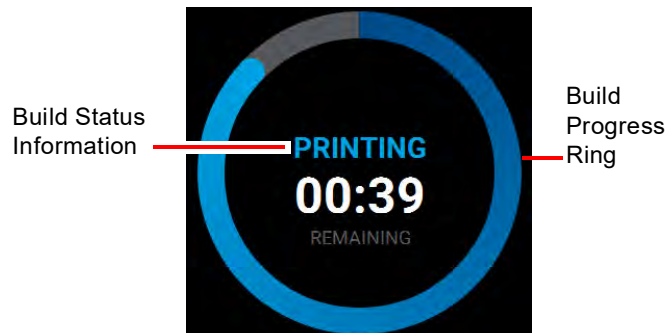
- Name of the job.
- Estimated build time for the job.
- Name of the user that submitted the job.
- Model and support materials associated with the job.

The Build Status Display section of the Build page is composed of a two-part graphic which provides information on a building job. See “[Build Status Display](#)” (page 9) for detailed information.

- The Build Status Information portion of this graphic provides information on a selected and/or building job. Text pertaining to the current status of the build is displayed within the upper portion of the graphic, while the amount of build time remaining is displayed within the lower portion of the graphic.
- The outer Build Progress Ring corresponds with the build information displayed. As build progress is made, the build’s percentage of completion is also displayed by radially filling in the outer progress ring, in blue, in a clockwise direction.

- Touching the screen within the center of the Build Status Display while a part is being built will toggle the information displayed. After touching the screen the time estimation information will be hidden from view and instead the Build Status Display will show the number of completed layers as compared to the total number of layers in the build. Touching the screen again, will toggle back to the time estimation information displayed initially.

Figure 14: Print Job Status Overview



Build Warnings

If the printer detects an issue that may affect a build, it will be indicated within the Notifications Display portion of the “Build Page” (page 4). A yellow or red notification badge icon will be displayed, depending on the severity of the warning/error, along with text indicating the reason(s) for the warning. Touching the text on the screen will open a dialog indicating the reason(s) for the notification, and in some cases, steps to correct the notification (see Figure 4 (page 4)).

Depending on the type of warning, a notification badge icon may also be displayed within the “Material Status Icons” (page 27) of the “Materials Page” (page 21). Touching the notification badge icon on the screen will open the corresponding material’s Materials Details page and provide information indicating the cause of a warning/error.

- When loading and unloading materials you may encounter load related warnings which need to be resolved prior to starting a build.
- When starting a build you may encounter a variety of warnings pertaining to the printer’s current materials configuration. If the printer has not been calibrated, the materials installed within the printer do not match the requirements of the build, or the printer does not contain enough material to complete the build, you will receive a warning instructing you to resolve this issue.



You can choose to ignore the warning and continue the build, but part build quality will be unpredictable. A warning generated from a mis-match of model/support material cannot be bypassed.

- In some cases, the warning will prevent you from starting a build and will need to be corrected before the printer can build a part.

- While the printer is building, various pause and abort related warnings may be displayed. Some of these warnings may be due to a manual pause or abort, while others may be the result of the printer automatically pausing or aborting a build. Depending on the severity of the warning you may or may not be able to resume building.

See “[Warnings and Errors](#)” (page 1) for a detailed list of the warnings you may encounter, and instructions on how to correct them.

Pausing a Build

During a build the Pause button within the Build page becomes selectable (see “[Pause Button](#)” (page 12) for details). The printer can pause automatically, or be manually paused using this button:

- An automatic pause occurs when a material spool runs out of material, a failure is detected, etc.
- A manual pause occurs whenever the **Pause** button is pressed.

When the printer is directed to pause:

1. The current toolpath is completed, the Z stage is lowered slightly, and then the head assembly is parked. "PAUSED" is displayed within the Build Status Display (see [Figure 15](#)).

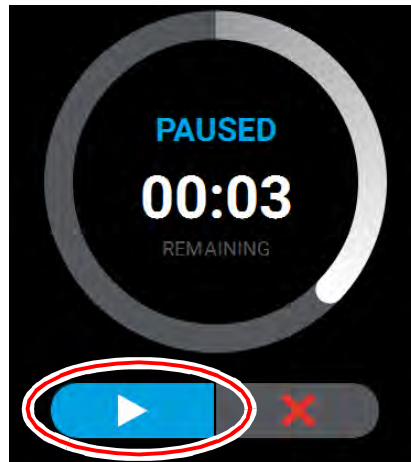
If an automatic pause occurs, text will be displayed within the Notifications Display portion of the Build Page. Touching the text on the screen will open a dialog indicating the reason for the pause condition (i.e. empty material spool). Correct this condition and then press the **Close** button to exit the dialog. (See “[Build Pause Warnings](#)” (page 8) for a list of pause related warnings/errors and resolution instructions.)

2. The Pause button will toggle and instead display the Play button. To resume building, press the **Play** button. A resume command will be sent to the printer instructing it to resume the build (see [Figure 15](#)).



The printer will not resume building instantaneously, please be patient. If the oven door is open the part will not resume building immediately. Touch the text displayed within the Notifications Display portion of the Build page to check for any errors in order to troubleshoot this situation.

Figure 15: Build Paused



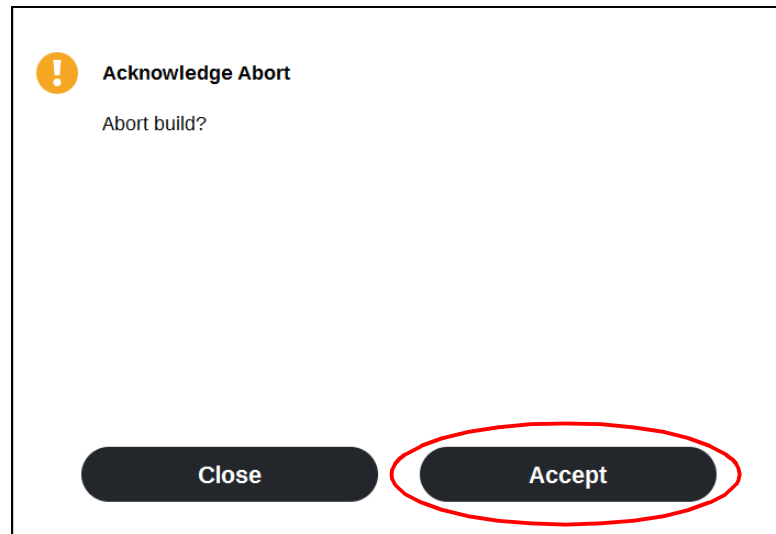
3. Once the build resumes, "BUILDING" will be displayed within the Build Status Display and the Pause button will be displayed in its unselected state (see [Table 3 \(page 12\)](#)).

Aborting a Build

When the printer is building, you have the option of directly aborting the build. To do so:

1. The Abort button within the Build page will be selectable (see “Abort Button” (page 12) for details), press the **Abort** button.
2. A dialog will be displayed allowing you to confirm or cancel the abort; press the **Accept** button within the dialog to confirm the abort.

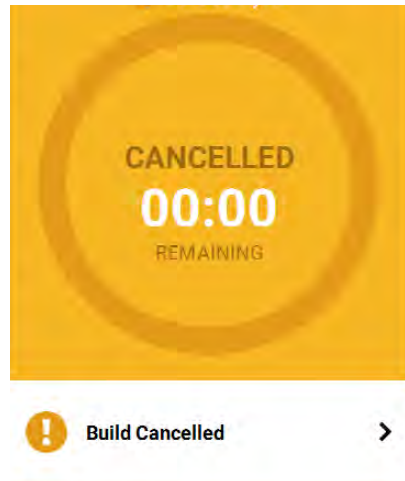
Figure 16: Abort Confirmation Dialog



3. An abort command will be sent to the printer and the confirmation dialog will close.
4. The Z stage will move to its end of travel. Once the Z stage reaches its end of travel the Build page will refresh and display a confirmation of the aborted build; "CANCELLED" will be displayed within the Build Status Display (see Figure 17 (page 22)).

5. The Print Job Control buttons will be hidden and instead "Build Cancelled" will be displayed within this portion of the Build page. Touching this text on the screen will open a dialog with instructions on how to remove the aborted build and prepare for your next build (see Figure 17).

Figure 17: Build Page Build Canceled



After a Build is Complete

After the completion of a build, the printer performs the following actions:

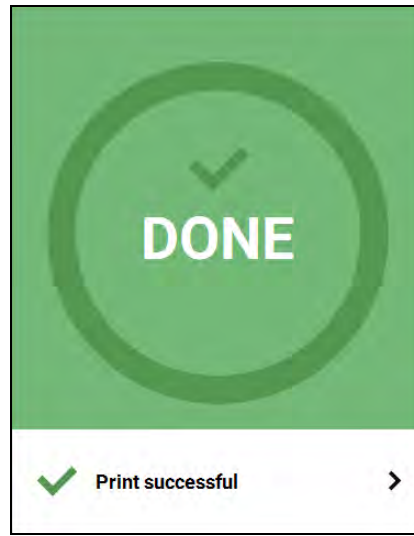
- The Z stage is lowered and the head assembly is parked.
- "DONE" is displayed within the Build Status Display (Figure 18 (page 23)).
- The Print Job Control buttons will be hidden and instead "Print successful" will be displayed within this portion of the Build page. Touching this text on the screen will open a dialog with instructions on how to prepare for your next build.

- The Build button will display a green checkmark icon indicating that the build completed successfully.



If the build was terminated abnormally, a warning indicator will be displayed on the screen. See “Build Abort Errors” (page 10) for a list of abort related warnings/errors and resolution instructions.

Figure 18: Print Successful Dialog



Removing a Part from the Printer



Warning: Hot Surface Hazard

Always wear proper heat protective gloves and clothing when handling items inside the oven, as surfaces within the oven can be very hot.

To remove a part from the printer:

1. Open the oven door.
2. Push down on the substrate ejection handle to release the substrate.



Caution:

Do not attempt to remove a part from the substrate while the substrate is on the platen. Damage to the platen or platen level may occur.

3. Remove the substrate from the platen.
4. Carefully remove the part from the substrate.

Changing Printer Defaults

Several factory presets can be changed via the options within the Tools page. To access this page, press the **Tools** button within the Navigation Menu.

The options within the Tools page are organized into 6 categories: Settings, Calibration, Maintenance, Network, Power, and Light. The defaults specified within the following instructions are accessible via the Settings page. To open this page press the **Settings** button within the Tools page.

After making the necessary adjustments to a default setting, press the **Back** button in the upper-left corner of the page to exit and return to the main Settings page.

Job Storage

The Keep Previous Job setting determines whether or not the printer's previous job is stored within the Job Queue once a build is complete (see ["Wait for Part" \(page 41\)](#)). If you're concerned about other users of your printer seeing what you've built, this setting will prevent the printer's previous job from being accessible after the build is complete. By default this setting is set to On, meaning that the printer's previous job file is stored within the Job Queue making it available for re-selection upon completion of the build.

When this setting is set to Off, the printer's previous job file will be deleted from the Job Queue upon completion of the build. The job's file will need to be resent to the printer in order to be built again.

To configure this setting, press anywhere within the Keep Previous Job row; the Keep Previous Job page will be displayed. Use the radio buttons within this page to turn the setting On and Off as needed.

Figure 19: Keep Previous Job



Part Build Location

The Part Placement setting determines whether or not you can select a job's placement on a substrate prior to starting the build (see "Part Placement" (page 43)).

To configure this setting, press anywhere within the Part Placement row; the Part Placement page will be displayed. Use the radio buttons within this page to turn the setting On and Off as needed.

Figure 20: Configure Part Placement

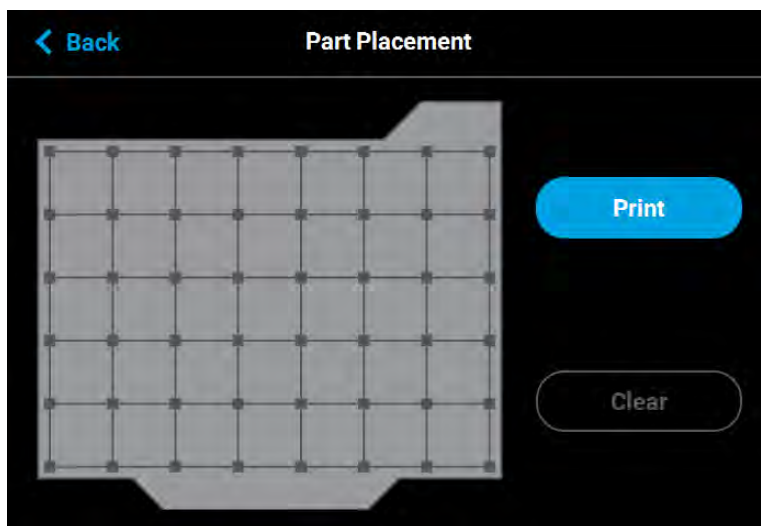


By default this setting is set to On, meaning you will be able to select a job's location on the substrate prior to starting the build (see "Selecting a Job to Build" (page 16)). At the start of a build the Part Placement dialog will be displayed asking you to select the part's build location (see Figure 21 (page 26)). The dialog will contain a graphic representing your printer's platen as well as a blue bounding box graphic (the imaginary box surrounding the part). You can select the part's build location by dragging and dropping the bounding box on the touchscreen; the bounding box cannot be placed outside the limits of the platen. Pressing the **Print** button will confirm your selected placement and start a build.

"Ghost box" graphics are also displayed; a "ghost box" represents the location where a part was built previously. Pressing the **Clear History** button will clear the display, removing all "ghost box" items.

When this setting is set to Off the Part Placement dialog will not be displayed prior to the start of a build. Single part jobs will be built in the center of a substrate while packs will be built according their selected placement within GrabCAD Print.

Figure 21: Part Placement Dialog

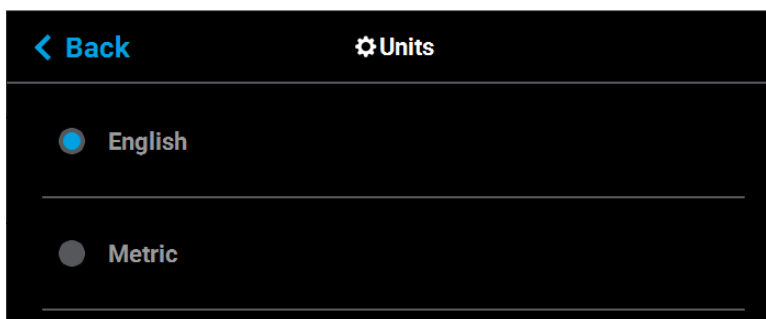


Display Units

By default the UI is configured to display English units (inches). However, you can adjust this setting as needed to have the UI display metric units.

The Units setting determines the type of units that the printer is configured for, English or Metric. To configure this setting, press anywhere within the Units row; the Units page will be displayed. Use the radio buttons within this page to select between English and Metric units.

Figure 22: Configure Units



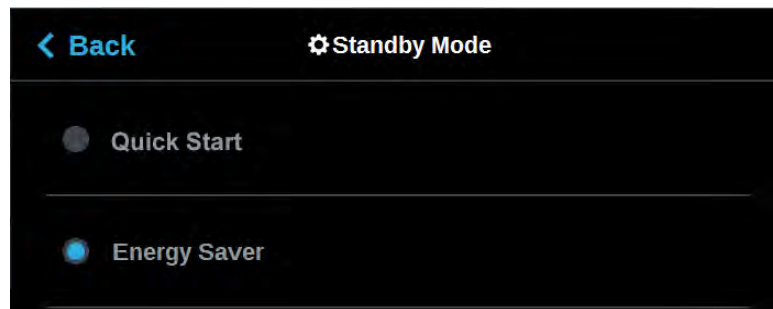
Oven Temperature Control

Oven modeling temperature is determined by the material type (model and support) loaded within the printer. It is controlled by the printer's software and cannot be modified; however, you do have control of some oven temperature functions.

The Standby Mode setting gives the ability to put the printer into an energy saving state after the completion of a build (see [“Standby Mode” \(page 46\)](#)). When the Energy Saver option is selected (i.e. Standby Mode is turned On) the printer's oven will automatically shut off 2 hours after the completion of a build, thus saving energy. When the Quick Start radio button is selected (i.e. Standby Modes is turned Off) the printer's oven will remain On for 60 hours after the completion of a build and oven temperature will stay at the material's build temperature.

To configure this setting, press anywhere within the Standby Mode row; the Standby Mode page will be displayed. Use the radio buttons within this page to turn the Energy Saver option On and Off.

Figure 23: Configure Standby Mode

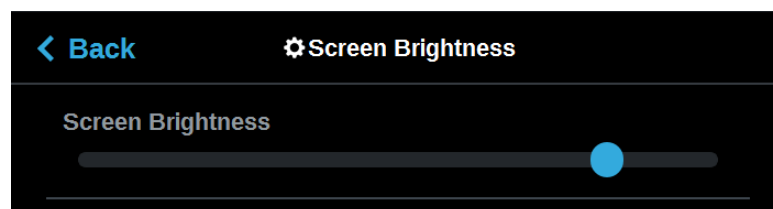


Touchscreen Display Brightness

The Screen Brightness setting allows you to adjust the brightness of the touchscreen display (see [“Screen Brightness” \(page 47\)](#)). By default, the touchscreen display is configured to be at approximately 80% brightness.

To configure this setting, press anywhere within the Screen Brightness row; the Screen Brightness page will be displayed. Use the slider graphic to adjust brightness as needed; sliding to the right will increase brightness, while sliding to the left will dim brightness. Please note that you cannot set screen brightness to 0% (completely dim). After exiting the Screen Brightness page the configured brightness will be displayed as a percentage within the Screen Brightness row.

Figure 24: Adjust Screen Brightness

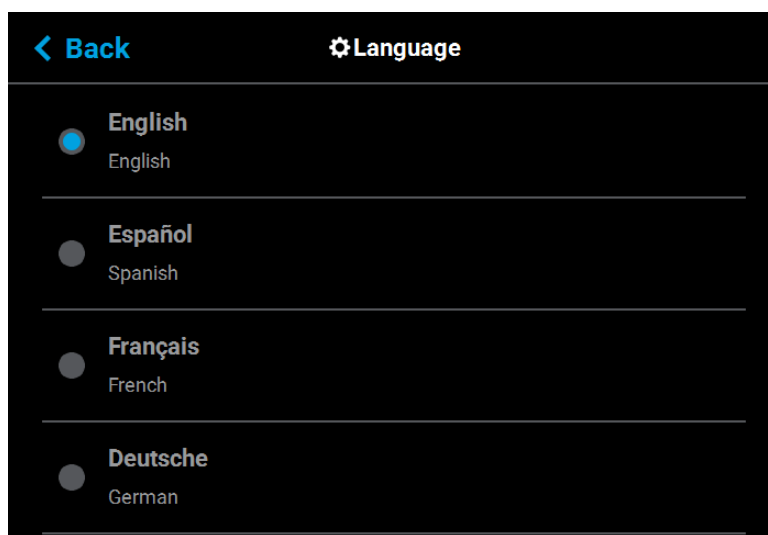


Display Language

By default the text within the UI is displayed in English. However, you can adjust this setting as needed to have the UI exhibit a different language. In addition to English the display language can be set to Spanish, French, German, Italian, Russian, Chinese, and Japanese.

The Language setting determines the language that the UI is configured for. To configure this setting, press anywhere within the Language row; the Language page will be displayed. Use the scrollbar (along the right side of the page) to view the list of available languages. Select the radio button corresponding to your desired language.

Figure 25: Configure Language



Printer Status

The various pages of the User Interface display each of the following:

- Head odometer status
- Material status
- Temperature status
- Controller Software version
- Other printer information

Head Odometer Status

The printer tracks and displays the total amount of material extruded through a head since it was last replaced. Head odometer values can be determined via the head's Head Details page. To locate this information press the **Materials** button within the Navigation Menu, the Materials page will be displayed. Two “[Head Status Icons](#)” (page 22), one corresponding to the model head and the other corresponding to the support head, are displayed within the upper

portion of the Display Area of the page. Touching one of these icons on the screen will open that head's Head Details page (see [“Viewing Head Details” \(page 24\)](#)). Odometer information for the selected head is displayed within the right half of the Head Details page (see [Figure 26 \(page 25\)](#)).

The Head Status Icons can become yellow or red based on the head's odometer (see [Table 6 \(page 22\)](#)). An accompanying warning/error notification will be displayed within the Materials page when a head is in a warning or error state resulting from odometer related information (see [“Head Warnings” \(page 12\)](#) and [“Head Errors” \(page 12\)](#)). An icon with yellow coloring indicates a warning, reminding you that the head is reaching its odometer limit. An icon with red coloring indicates an error, reminding you that the head has exceeded its odometer limit. You can continue using a head which has exceeded its odometer limit, but it is highly recommended that you change the head as part quality will be unpredictable. Warning and error states will be indicated on the User Interface until the head is replaced, and you will be required to acknowledge the notification associated with these states prior to the start of each build.

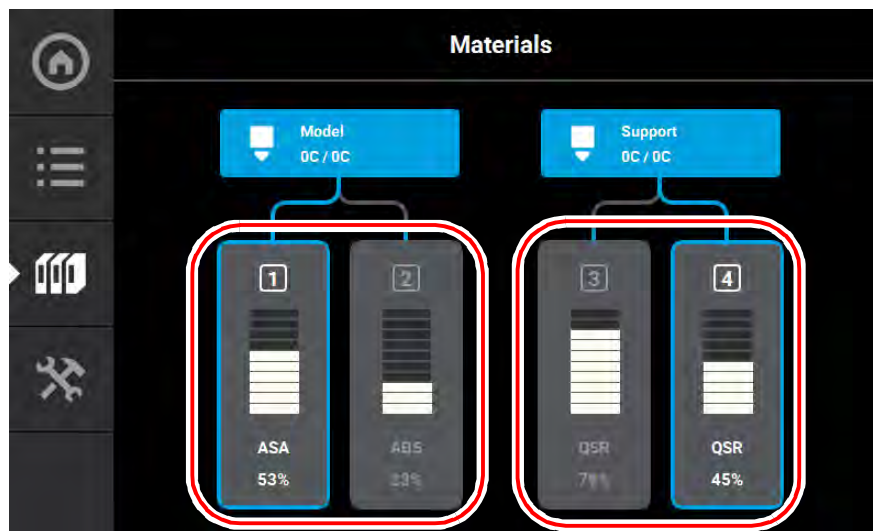
Materials Status

The current status of each of the material spools installed/inserted into the printer can be viewed via the Materials page. To locate this information:

1. Press the **Materials** button within the Navigation Menu; the Materials page will be displayed.
2. The Display Area of this page contains two or four [“Material Status Icons” \(page 27\)](#) depending on printer model.
 - For F170 printers two icons will be displayed. The left icon pertains to the printer's model material while the right icon pertains to the printer's support material. The number displayed within the top of the icon indicates which material bay the material spool is installed/inserted into (1 or 2). The colored bars (displayed within the center of the icon) and percentage (displayed at the bottom the icon) indicate the current volume of material on the spool. The name of the type of material on the spool is displayed at the bottom of the icon.
 - For F270 and F370 printers four icons will be displayed. The two left-most icons pertain to the printer's model material while the two right-most icons pertain to the printer's support material. The number displayed within the top of the icon indicates which material bay the material spool is installed/inserted into (1 through 4, from left to right). The colored bars (displayed within the center of the icon) and percentage (displayed at the bottom the icon) indicate the current volume of material on the spool. The name of the type of material on the spool is displayed at the bottom of the icon.

3. Touching one of these icons on the screen will open that material's Material Details page (see "Viewing Material Details" (page 30)).

Figure 26: Materials Status Locations



Icons and filament pathways will take on a variety of colors and highlighted states, depending on their status (see [Table 7 \(page 28\)](#) for detailed status explanations). Coloring pertains to both model and support Material Status Icons:

- Blue border - indicates that a valid material spool is inserted into the corresponding material bay, the blue filament pathway indicates that material from the spool is loaded to the head and is selected to be used for building.
- Gray (no border) - a solid gray icon indicates that a valid material spool is inserted into the corresponding material bay, the gray filament pathway indicates that material from the spool is not loaded to the head.
- Gray (dashed border) - an icon that is blank in the center with a gray dashed border and gray dashed filament pathway indicates an empty material bay.
- Yellow - an icon with yellow coloring indicates an issue/warning (see "[Warnings and Errors](#)" (page 1) for more information).
 - A volume of 0% accompanied by solid yellow coloring indicates an empty material spool.
 - A yellow border with a notification badge within the filament pathway indicates that a valid material spool has been inserted into the corresponding material bay, but the spool's filament has not been detected by the filament present switch.
 - A yellow border with a notification badge in the center of the icon and an animated filament pathway indicates that filament from the corresponding material spool is in the process of being unloaded from the head.
- Red - an icon with red coloring indicates an error (see "[Warnings and Errors](#)" (page 1) for more information).

- A red border with a notification badge in the center of the icon indicates that the material spool is invalid (i.e. not licensed or not compatible with the associated head type).
- A red border with a notification badge within the center of the filament pathway indicates a load related error.
- A semi-solid red icon indicates that an error occurred when checking the data on the material spool's memory chip and the spool is unusable.
- A solid red icon indicates that communication with the material bay is not possible.

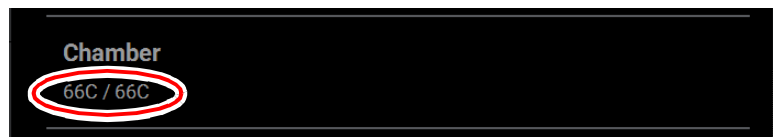
Temperature Status

Oven Temperature

The oven's temperature can be viewed via the Maintenance page. To locate this information:

1. Press the **Tools** button within the Navigation Menu; the Tools page will be displayed.
2. Press the **Maintenance** button within the Tools page; the Maintenance page will be displayed.
3. Locate the Chamber row within the page. The printer's current and set point oven chamber temperatures are displayed within this row.

Figure 27: Maintenance Page Oven Chamber Temperature



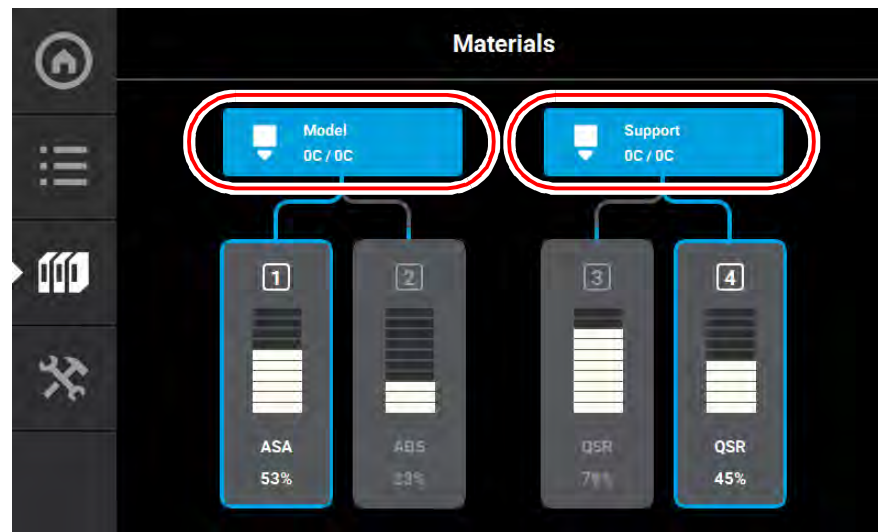
Head Temperature

To view temperature information pertaining to the model and support heads within the Materials page:

1. Press the **Materials** button within the Navigation Menu; the Materials page will be displayed.
2. The Display Area of this page contains two Head Status Icons, one corresponding to the model head and the other corresponding to the support head. (See "[Head Status Icons](#)" (page 22) for details). The head's current temperature as compared to its set point temperature is displayed within the lower portion of the icon.

3. Touching one of these icons on the screen will open that head's Head Details page. The same temperature information is displayed within this page for both the model and support heads.

Figure 28: Materials Page Head Temperatures



Software Version

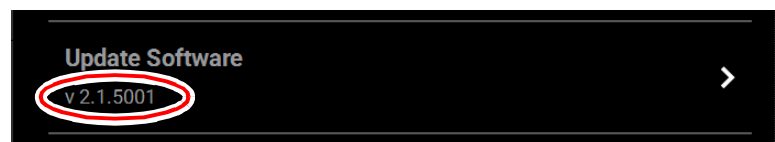
Version information for the software used to control the printer (Controller Software) can be accessed via the Maintenance page:



Controller Software is installed on a flash device located on the Controller board and should not be confused with GrabCAD Print software, which is installed on the workstation PC.

1. To access the Maintenance page, press the **Maintenance** button within the Tools page (see "Working with the Tools Page" (page 37)).
2. Locate the Update Software row within the page (see "Maintenance" (page 52)).
3. The printer's Controller Software version information is displayed within the Update Software row.

Figure 29: Controller Software Version Information

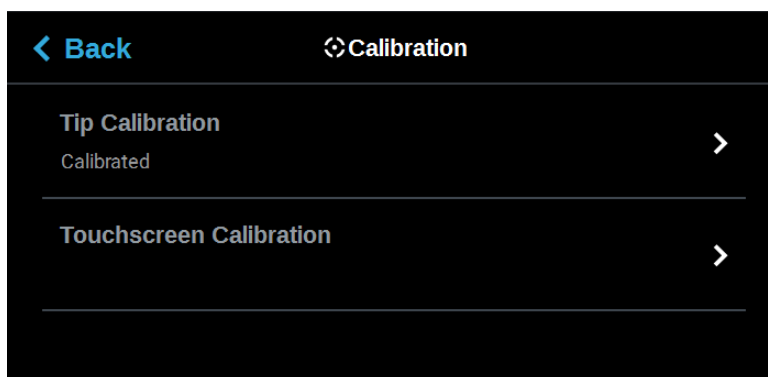


6 CALIBRATION AND ADJUSTMENTS

This chapter describes basic calibration and adjustment procedures for the F123 Series. The buttons/pages described within this chapter are accessible via the *Calibration* page.

To open the Calibration page, press the **Tools** button within the *Navigation Menu*; the *Tools* page will be displayed (see “Working with the Tools Page” (page 37)). Within the *Tools* page select the **Calibration** button; the *Calibration* page will be displayed.

Figure 1: *Calibration* page

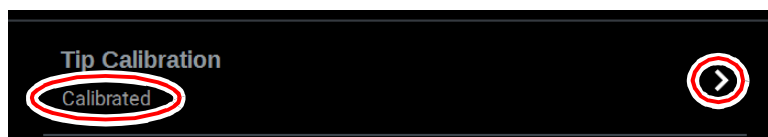


Tip Calibration

The printer's calibration status will be displayed within the *Tip Calibration* row. **Calibrated** or **Not Calibrated** will be displayed depending on the printer's calibration status.

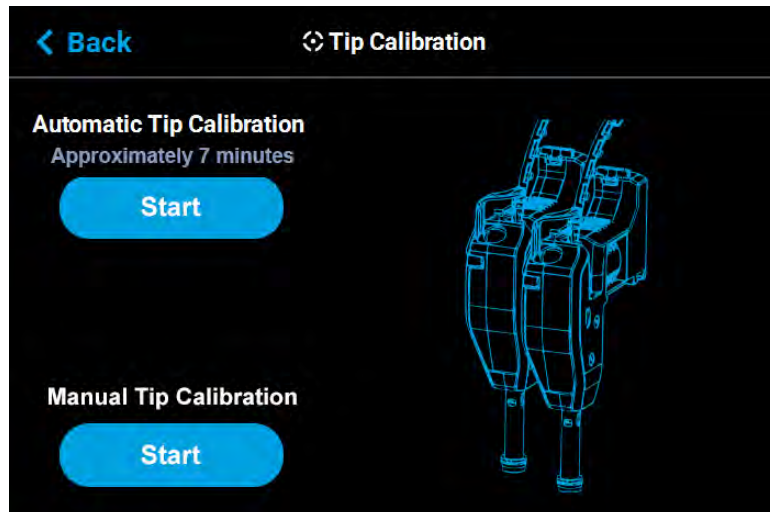
Pressing anywhere within the *Tip Calibration* row will open a page allowing you to select from a variety of tip calibration options. You cannot build parts on the printer until the printer's tips are calibrated.

Figure 2: *Tip Calibration*



The *Tip Calibration* page contains an option for performing an Automatic Tip Calibration as well as a Manual Tip Calibration. Pressing the **Start** button associated with either of these options will allow you to perform that particular calibration procedure. Each calibration procedure is delivered in the form of a wizard which will guide you through the process of performing the calibration procedure.

Figure 3: Tip Calibration Options



Automatic Tip Calibration

Tip offset values are the distance between the model and support tips in the X, Y and Z directions. Accurate tip offset values ensure that support toolpaths are accurately located in reference to model toolpaths. Inaccurate tip offset values can cause part quality issues, such as support material embedded in a part or improperly supported parts.

Automatic Tip Calibration registers the support tip relative to the model tip, ensuring that positioning of the head and Z axis is correct when changing between model and support material during a build. This calibration is automatically performed whenever either of the printer's heads is replaced; please note that the printer must be powered ON before calibration can occur. Calibration will occur prior to the start of the next build following the head replacement. If either head cable is unclipped and fully detached from the corresponding head, this will trigger the occurrence of an Automatic Tip Calibration. Calibration will occur following the reattachment of the cable to the head and prior to the start of the next build.

To Perform an Automatic Tip Calibration:

1. Place a new substrate onto the platen and lock the substrate into its build position by lifting up on the substrate ejection handle.

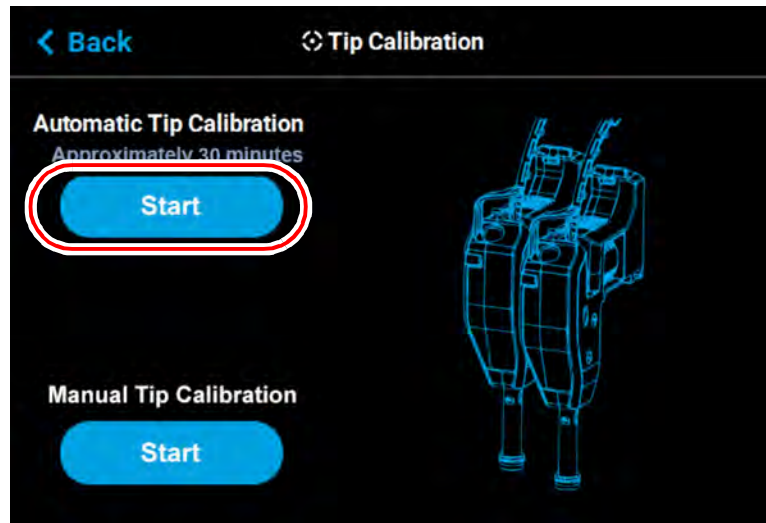


Caution:

Always wear gloves when installing the substrate. Hand oils on the substrate surface will result in poor part adhesion.

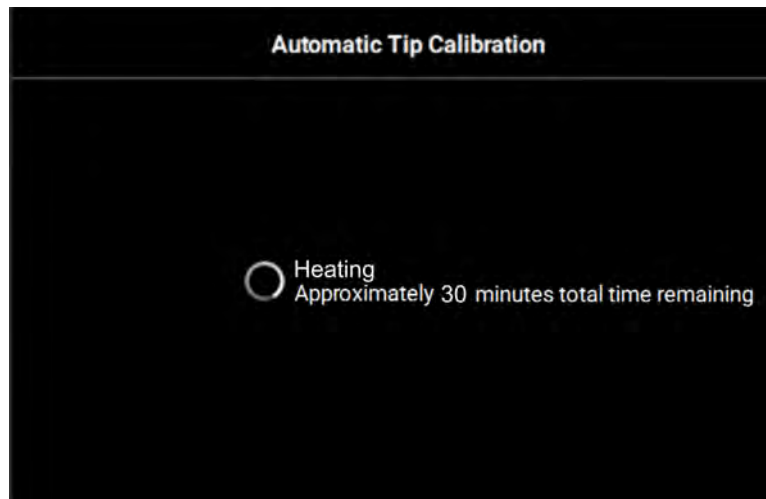
2. Open the Tip Calibration page by navigating to *Tools > Calibration > Tip Calibration*. A page similar to Figure 4 will be displayed.
3. Press the **Start** button for the Automatic Tip Calibration option.

Figure 4: Automatic Tip Calibration Option



4. The printer will perform an Automatic Tip Calibration. This process includes heating up or cooling down the oven to reach the required calibration temperature. Completion times will vary depending on the material used and the initial chamber temperature. The status and time remaining will continually update on the screen.

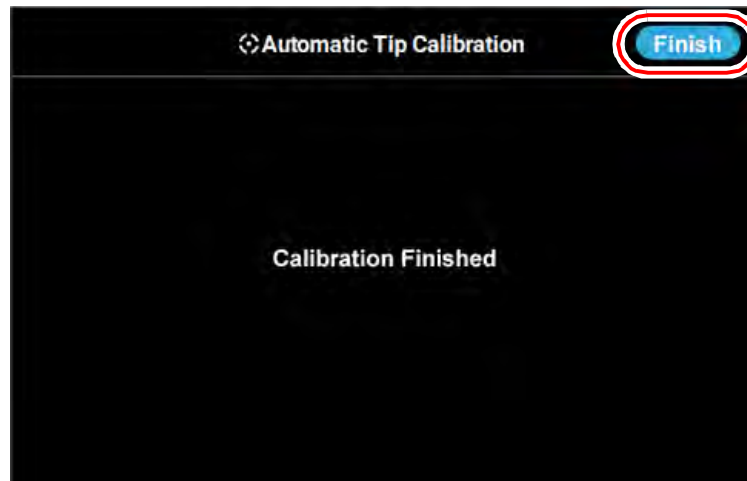
Figure 5: Calibrating Tip Offsets



5. Completion of the calibration process will be indicated on the screen; press the **Finish** button within the header of the page when complete.

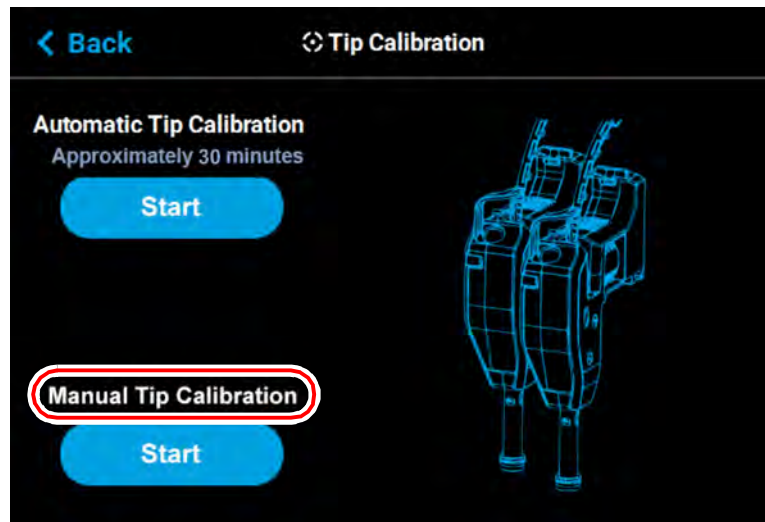
 If calibration fails, "Failed to calibrate tip offsets" will be displayed on the screen. You cannot build a part on the printer until the tips have been calibrated. Ensure that nothing is blocking the tip or covering the calibration targets and reattempt the Automatic Tip Calibration. If calibration fails again, perform a Manual Tip Calibration (see "Manual Tip Calibration" (page 5) for instructions).

Figure 6: Automatic Tip Calibration Complete



6. The main Tip Calibration page will display again. Proceed with the Manual Tip Calibration as described in "Manual Tip Calibration" (page 5).

Figure 7: Automatic Tip Calibration Option



Manual Tip Calibration

Tip offset values are the distance between the model and support tips in the X, Y and Z directions. Accurate tip offset values ensure that support toolpaths are accurately located in reference to model toolpaths. Inaccurate tip offset values can cause part quality issues, such as support material embedded in a part or improperly supported parts.

Manual Tip Calibration sets the X, Y and Z distance between the model and support tips. This calibration requires you to analyze a calibration part once it's built, and manually supply the printer with correction values, as needed, in order to calibrate the printer.



It is recommended to use ABS or ASA material for the manual calibration part. (PC-ABS may be difficult to remove from tray to measure the Z height). Z calibration is not needed when using TPU 92A material. The Auto Tip Calibration Z values are sufficient.

To Perform a Manual Tip Calibration:

1. Print a calibration part; you will analyze this part in order to determine correction values.
 - a. Place a new substrate onto the platen and lock the substrate into its build position by lifting up on the substrate ejection handle.

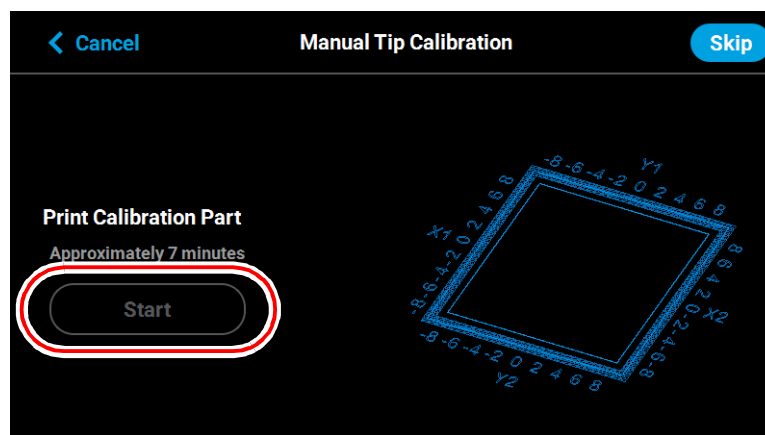


Caution:

Always wear gloves when installing the substrate. Hand oils on the substrate surface will result in poor part adhesion.

- b. Navigate to *Tools > Calibration > Tip Calibration*. Press the **Start** button for the Manual Tip Calibration option (see Figure 3 (page 2) for button location).
 - c. The Print Calibration Part page will be displayed (as shown in Figure 8) and the printer will automatically select the calibration part. Press the **Start** button.

Figure 8: Print Calibration Part Page



- d. If your printer's part placement setting is On (see "Part Placement" (page 43)), the Part Placement page will display. The calibration part location is fixed and can not be moved. Press the **Print** button (pressing the **Clear** button will clear the display, removing all "ghost box" items).

- e. The calibration part will begin the print process and display the current status on the User Interface. "HEATING" or "COOLING" is followed by "PREPARING" and then "PRINTING".
 - The Heating/Cooling status displays the current temperature as well as the target set point.



The amount of time that the printer remains in the Heating/Cooling stage may vary depending on the current oven chamber temperature.

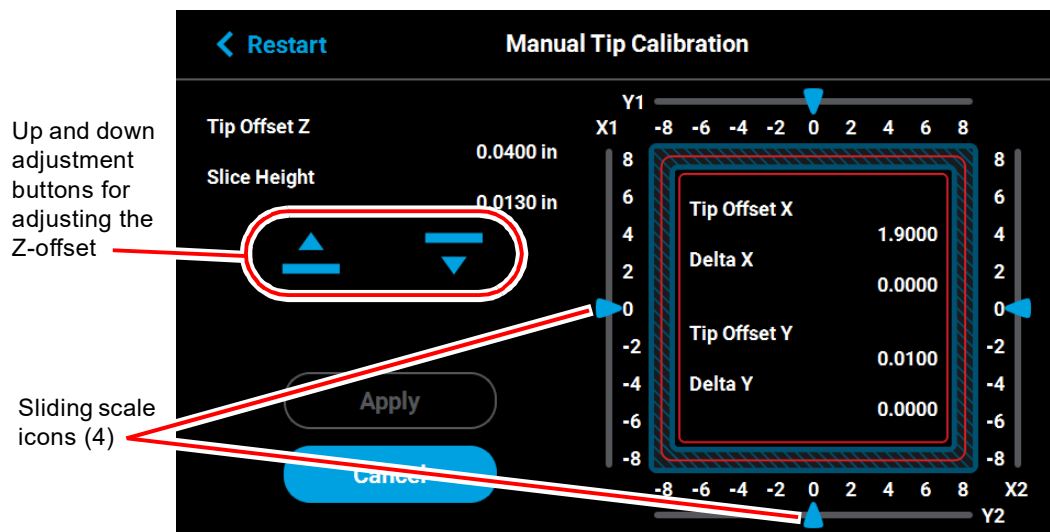
- The Preparing status will display as the system purges material and detects the tray level.
 - The Printing status displays the number of build layers complete or the amount of time remaining. Tap the screen to toggle between layers or time.
- f. Once the calibration part is complete "DONE" will be displayed on the User Interface. Remove the substrate from the platen. You will analyze the part on the substrate to determine correction values.



After removing the substrate containing the calibration part and closing the oven door, a message is displayed stating "**Is the tray ready for another job?**". Press **No** to return to the *Manual Tip Calibration* screen.

- g. Press the **Next** button in the upper-right corner of the page; the Manual Tip Calibration page will be displayed.

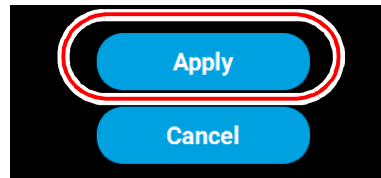
Figure 9: Manual Tip Calibration Page





The **Apply** button will become active when you modify an offset value by dragging the sliding scale icons or pressing the up and down adjustment buttons.

Figure 10: *Apply* button active



2. Determine the XY Offset Adjustment needed for your printer.
 - a. Using a magnifier (included in the Welcome Kit), view the relationship between the support calibration toolpath and the alignment indicators to determine the X and Y axis calibration.
 - b. Determine where on each side (X1, X2, Y1, and Y2) the support toolpath is most centered between the X-Y alignment indicators (see [Figure 11](#) or [Figure 12](#)). The numbers on the calibration part represent thousandths of an inch (e.g., 4 = 0.004 in.).

Figure 11: Calibration Part

Magnified single side of a calibration part with a reading of 0.

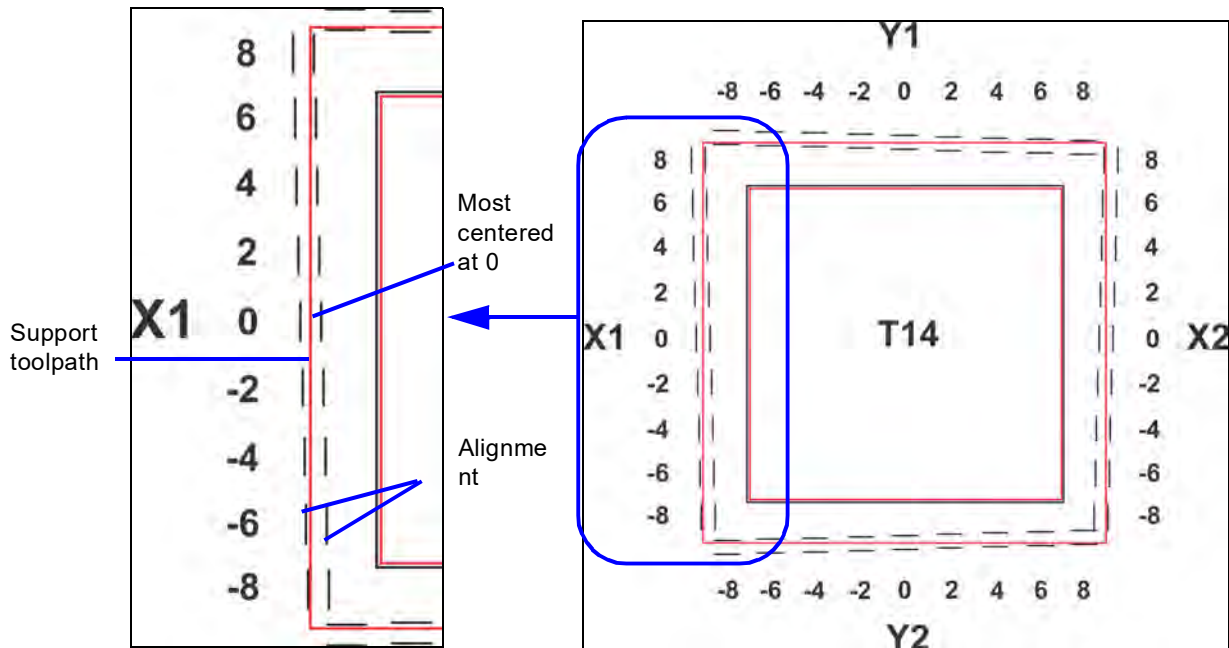
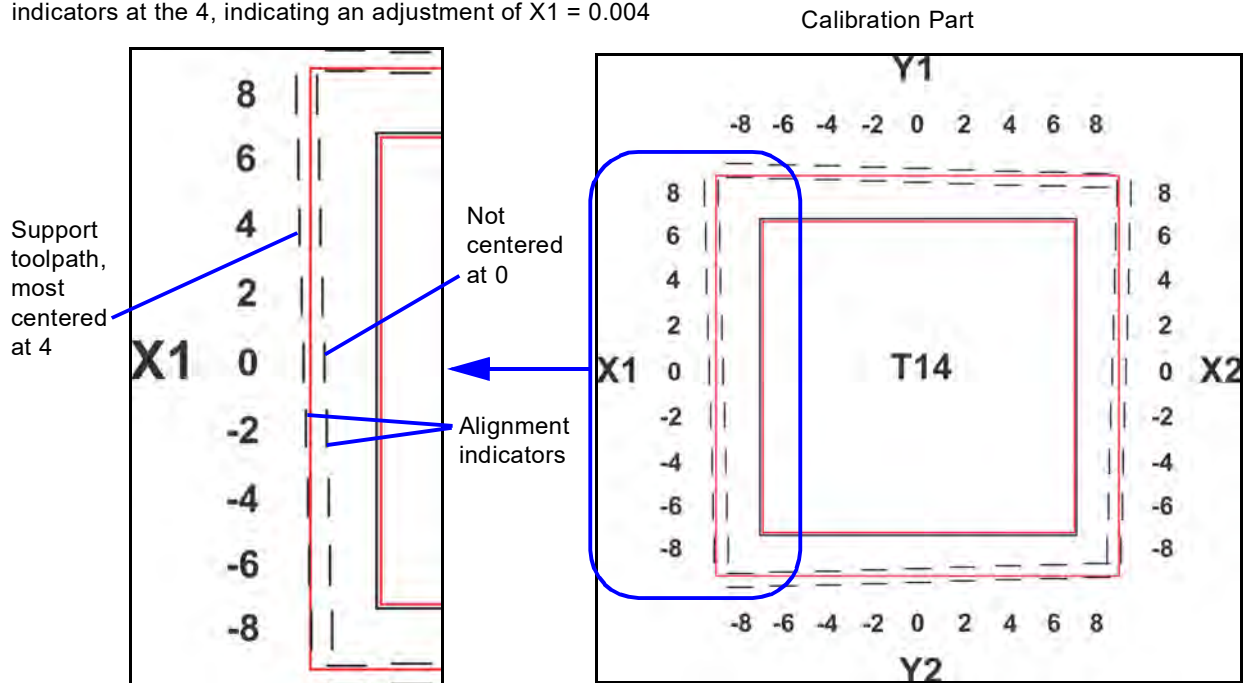


Figure 12: Calibration Part

Support toolpath is most centered between the alignment indicators at the 4, indicating an adjustment of $X1 = 0.004$



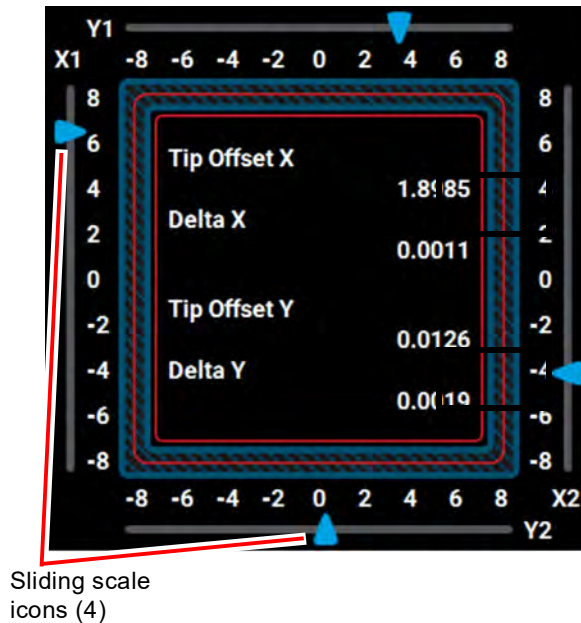
- c. Within the Manual Tip Calibration page, slide all four of the scale icons on the screen to match where the support toolpath is most centered between the alignment indicators. The Delta X and Delta Y fields will change to reflect adjustments made.



One offset value must be selected for each side (X1, X2, Y1, and Y2).

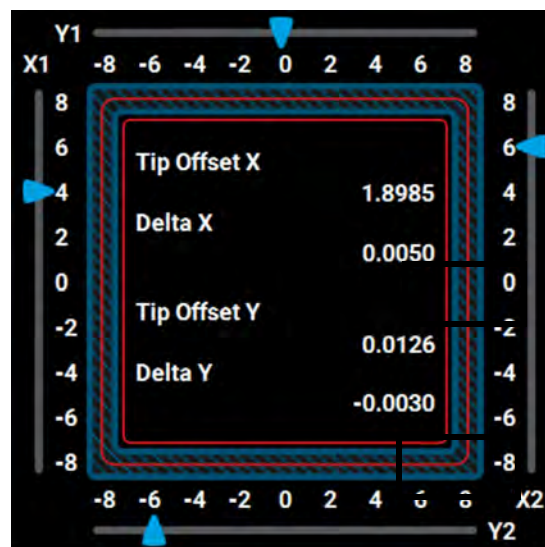
- If the Delta X and the Delta Y values are both within the range of -0.002 to +0.002 in., the printer is calibrated and an adjustment is not required. The following figure shows an XY offset within tolerance, requiring no adjustments. Proceed to step 3.

Figure 13: XY Offset - No Adjustment Required



- If either of the Delta X or Delta Y values are outside the range of -0.002 to +0.002 in., the printer requires an adjustment. The following figure shows the Delta X value of 0.0050 in. and the Delta Y value of -0.0030 in. are both outside of the acceptable range.

Figure 14: XY Offset - Adjustment Required



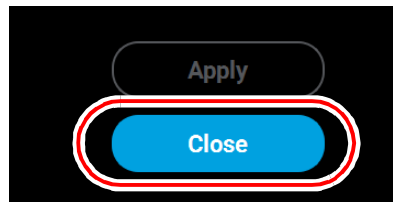
- d. If an adjustment is required, you will need to rebuild the calibration part. To do so:
- After entering your adjustment value(s) press the **Apply** button within the Manual Tip Calibration page (see [Figure 9 \(page 6\)](#) for button location). Your calibration adjustment(s) will be saved. If you continue to change the adjustment values, you must press the **Apply** button again to save the changes.



The *Cancel* button can be used to reset an adjustment value entered prior to pressing the **Apply** button. Once the **Apply** button is pressed, values will be saved and the printer's calibration settings will reflect the adjustment value entered. Use caution when entering an adjustment value to ensure it is correct prior to pressing the **Apply** button.

- After pressing the **Apply** button, the **Close** button will appear. Press the **Close** button to return to the initial Tip Calibration page.

Figure 15: Close Button Location



- Repeat [step 1](#) above to build a calibration part.
 - Repeat the instructions in [step 2](#). Continue to check and adjust for XY offset. Readjust until both of the Delta X and Delta Y values are within tolerance, which is within -0.002 to +0.002 in.
- e. Proceed to the Z offset adjustment ([step 3](#) below) once the calibration toolpath for X and Y is within tolerance.
3. Determine the Z Offset Adjustment.

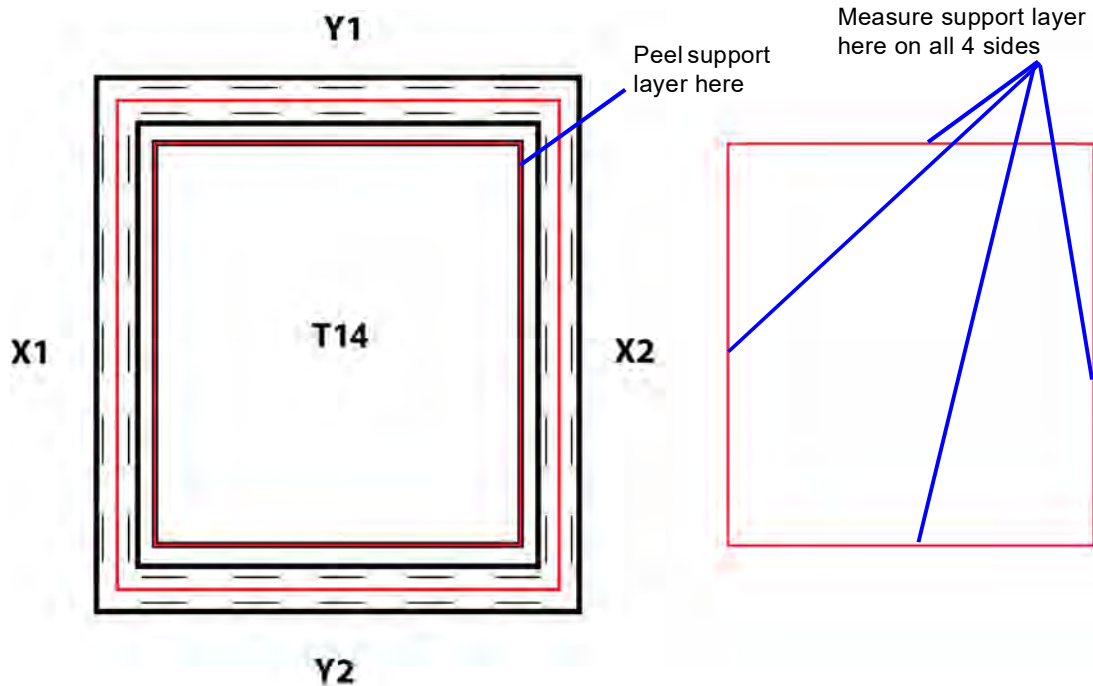


The Z Offset Adjustment is not needed when using TPU 92A material.

- Peel the support layer from the inner square of the calibration part.
- Measure the thickness of the support layer on each side of the square with a caliper or micrometer. Measure in the center of each side; measuring near the corners will result in inaccurate values.

- c. Take the average value of the four measurements. This is the number you will enter for the Z offset adjustment.

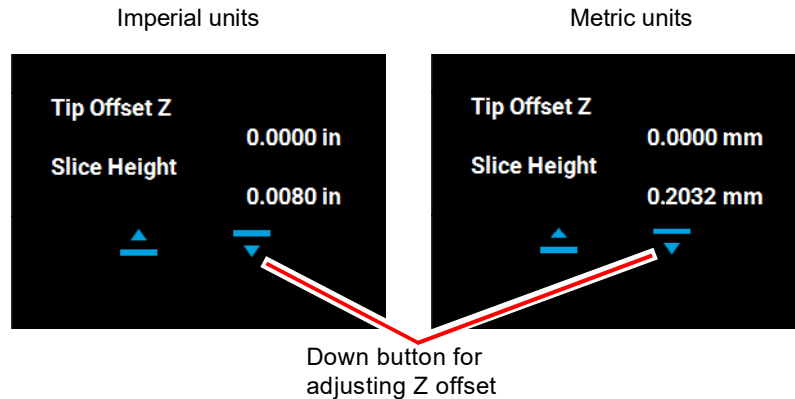
Figure 16: Remove and Measure Support Layer



- d. If the value measured in [step c](#) above is within ± 0.0005 in. (0.01 mm) of the model tip's slice height of 0.010 in. (0.254 mm), the printer is calibrated for the Z axis and an adjustment is not required. Proceed to [step 4](#).
- e. If the value measured in [step c](#) above is not within ± 0.0005 in. (0.01 mm) of the model tip's slice height you will need to enter a Z offset adjustment using the **Up** and **Down** buttons within the Manual Tip Calibration page. Each button press equates to one ten thousandths of an inch.

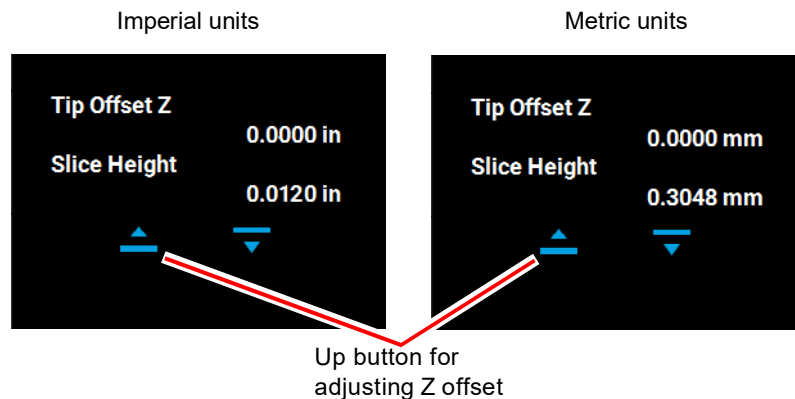
- Use the **Down** button to enter the value obtained in [step c](#) above if this value is less than the tip's slice height. For example, if you measured an average of 0.0080 in. (0.2032 mm) for a tip with a slice height of 0.010 in. (0.254 mm), press the **Down** button until 0.0080 (0.2032) is displayed within the *Slice Height* field.

Figure 17: Z Offset Adjustment



- Use the **Up** button to enter the value obtained in [step c](#) above if this value is greater than the tip's slice height. For example, if you measured an average of 0.0120 in. (0.3048 mm) for a tip with a slice height of 0.010 in. (0.254 mm), press the **Up** button until 0.0120 (0.3048) is displayed within the *Slice Height* field.

Figure 18: Z Offset Adjustment



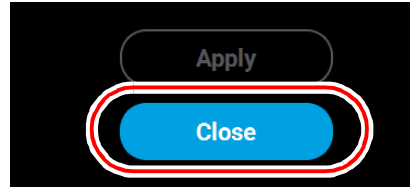
- If a Z offset adjustment is required you will need to rebuild the calibration part. To do so:
 - After entering your Z offset adjustment press the **Apply** button within the Manual Tip Calibration page (see [Figure 9 \(page 6\)](#) for button location). Your calibration adjustment(s) will be saved. If you continue to change the adjustment values, you must press the **Apply** button again to save the changes.



The **Cancel** button can be used to reset an adjustment value entered prior to pressing the **Apply** button. Once the **Apply** button is pressed, values will be saved and the printer's calibration settings will reflect the adjustment value entered. Use caution when entering an adjustment value to ensure it is correct prior to pressing the **Apply** button.

- After pressing the **Apply** button, the **Close** button will appear. Press the **Close** button to return to the initial Tip Calibration page.

Figure 19: Close Button Location



- Repeat [step 1](#) above to build a calibration part.
 - Repeat the instructions in [step 3](#) above. Continue to check and adjust for Z offset until the support layer matches the model tip slice height ± 0.0005 in. (0.01 mm).
4. Once you're finished adjusting for XY and Z, press the **Apply** button within the *Manual Tip Calibration* page and your calibration adjustment(s) will be saved. Press the **Close** button to exit the page.

Touchscreen Calibration



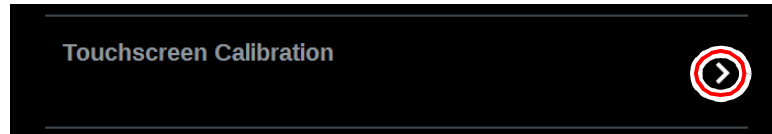
A stylus pen should be used when performing this calibration to ensure precise calibration. Do not use your fingertip to perform this calibration. If a stylus pen is not available, a pencil eraser may be used.

You have the option of recalibrating the printer's touchscreen display. Extreme care must be taken when performing this calibration as an improperly calibrated touchscreen can lead to button accuracy issues.

To recalibrate the touchscreen:

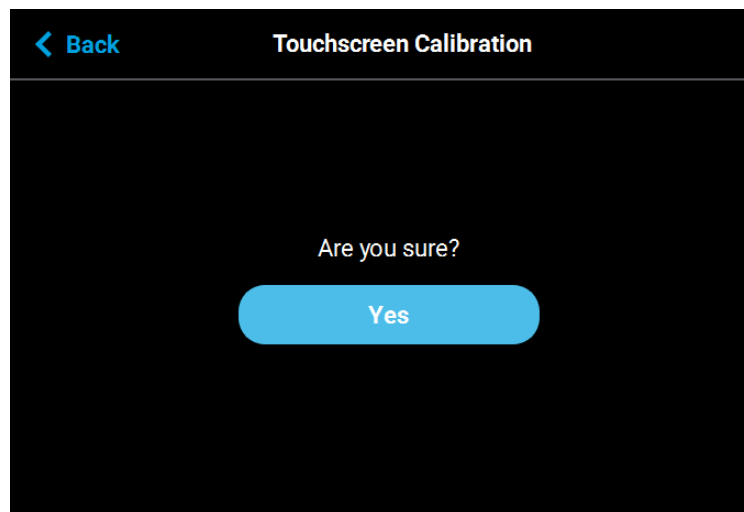
1. Open the Calibration page by selecting the **Calibration** button within the *Tools* page.
2. Press anywhere within the Touchscreen Calibration row.

Figure 20: Touchscreen Calibration Row



3. A dialog will be displayed asking you if you want to recalibrate the touchscreen, press the **Yes** button to confirm.

Figure 21: Recalibrate Touchscreen Confirmation Page



4. A dialog is displayed with instructions for recalibrating the touchscreen. Using a stylus, touch the screen in the center of the calibration point displayed. Repeat this process for the remaining calibration points (1 point for each of the 4 corners of the screen).

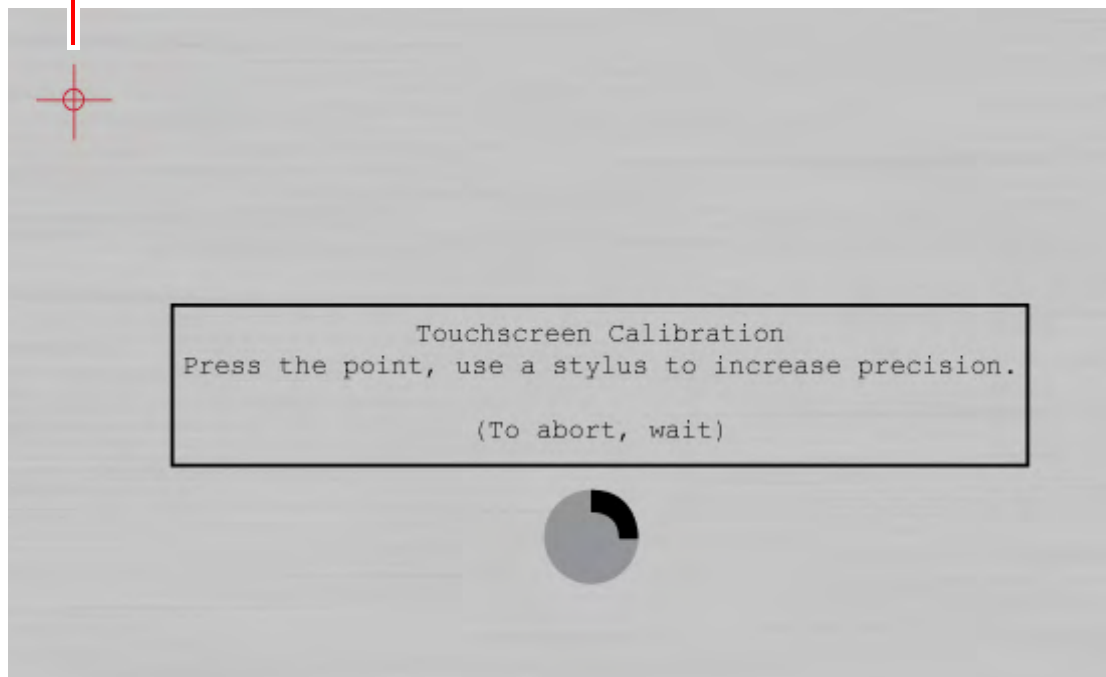


The graphic displayed within the center of the dialog represents the time remaining before the touchscreen calibration times out. The black portion will fill the perimeter of the gray circle in a clockwise direction. You must touch the calibration point displayed within the screen before the black portion of the graphic completes a full circle. The timer will reset for each of the 4 calibration points displayed. If you wish to exit the page without calibrating the screen simply wait until the black portion of the graphic completes a full circle; the dialog will close and you will be returned to the *Calibration* page.

5. Once finished, your calibration settings will be saved and the dialog will close. You will be returned to the *Calibration* page.

Figure 22: Touchscreen Calibration procedure

Calibration point



XY Gantry Calibration

The printer is designed to automatically perform an XY Gantry Calibration as part of its initialization and startup process. This calibration moves the gantry to ensure it can travel properly throughout the build envelope and determines the gantry's reference in relation to the platen. Each time the printer is powered ON, it will automatically perform this calibration. The XY Gantry Calibration is responsible for finding the home position for the X and Y axes. The home position is a set location the printer references for all movements.

When performing the XY Gantry Calibration the printer will move the head at a low velocity to the full extents of travel in the X and Y axis. The homing process uses mechanical hard stops in conjunction with commanded motion control while actively monitoring servo motor following error. After XY gantry homing has completed, the extent of travel in X and Y is compared against an upper and lower limit, and an error is generated if travel is outside of those limits.

The commanded motion used to determine all four gantry hard stop locations is identical. The controller sets upper time and distance limits for each hard stop location. These limits are used to ensure hard stop engagement occurs within expected parameters.

Z Zero Calibration

The printer automatically initiates a Z Zero Calibration before each job is built; "PREPARING" will be displayed within the Build Status Display of the User Interface while this process is occurring (see "Build Status Display" (page 9)). Z Zero Calibration must complete successfully before a build will begin. This calibration requires no user interaction and sets the reference point between the model tip and the substrate to ensure proper positioning for the first layer of a build.

When performing the Z Zero Calibration a purge of the model tip will be performed. The head will then be positioned over the back of the platen and the Z stage will move upward until the model tip is deflected; this deflection is used to calibrate the toggle sensor. The printer will then cool the model tip to a temperature below 200°C (392°F). Once cooled, the printer will perform four tip touches, one per each of the four quadrants of the build tray, by moving the Z stage upward within that quadrant until the model tip is deflected. Z Zero positioning is then determined based on the average Z stage position of the four tip touches; the printer will set the Z Zero position.



If any of the four tip touches used to determine Z Zero is greater than 0.01" away from the average, homing will fail and the build will be aborted with a "Substrate Not Level" error.

Tip Wipe Height Adjustment

Required Tools

- 3 mm hex wrench

Adjusting Tip Wipe Height



Always wear gloves when performing maintenance within the oven enclosure or other high temperature areas.

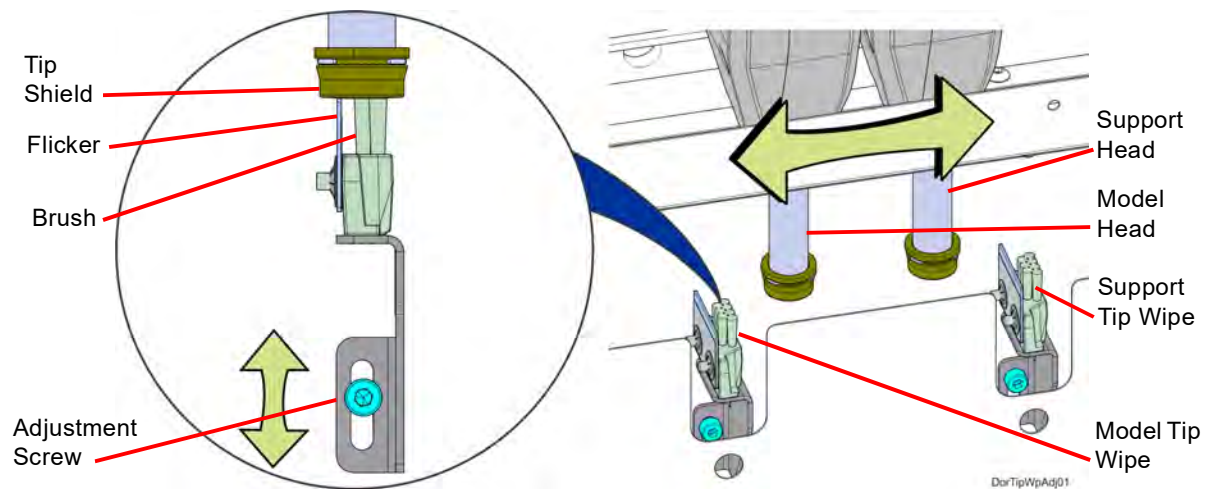
1. Power OFF the printer. See "Powering Off" (page 17).
2. Open the front top cover.
3. Open the oven door.
4. Manually move the model head (left side) back and forth above the model tip wipe assembly (left side). Verify that the brush and flicker both make contact with the tip shield.
5. If necessary, adjust the tip wipe height.
 - a. Using a 3mm hex wrench, loosen the tip wipe mounting screw at the back of the oven enclosure. See [Figure 23](#)
 - b. Adjust the height of the tip wipe so that the tops of the brush and flicker just contact the bottom of the head tip shield.

- c. Tighten the tip wipe assembly mounting screw.
- d. Manually move the head back and forth to verify that the brush and flicker are contacting the tip shield without extreme resistance.
6. Repeat [step 4](#) and [step 5](#) above for the support head (right side) and support tip wipe assembly (right side).



Make sure that the toggle bar is in the lower position when verifying/adjusting the height of the support tip wipe assembly.

Figure 23: Tip Wipe Detail



7 MAINTENANCE

This chapter describes various maintenance tasks that will routinely need to be performed on the F123 Series.

Updating Controller Software

Controller Software can be updated using one of the following three methods:

- Installing from a USB Flash drive that contains the software update file
- Navigating to the update file on your workstation PC with the Insight software application; After placing the printer into upgrade mode (see “[Update Software](#)” (page 54)), navigate to and install the upgrade file from its saved location on your workstation PC.
- Selecting push notifications automatically sent via GrabCAD Print; After receiving a notification from GrabCAD Print that a software upgrade is available, follow the on-screen prompts and instructions to install the upgrade.

You have the option of updating Controller Software via any of these methods; however, the USB Flash drive method is the preferred method.



Updating Controller Software will erase all job files from the Job Queue (files within the Sample Queue (Internal Storage) will be retained). After completing the software upgrade, you will need to resend jobs to the printer.

USB Flash Drive Method

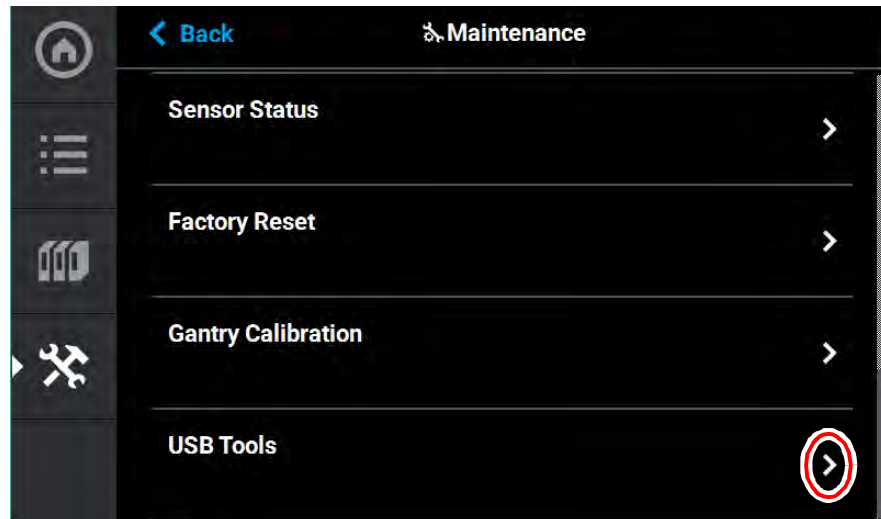
1. Save the software upgrade file to a USB flash drive.
2. Insert the USB flash drive into one of the available USB ports on the F123 Series printer.
3. On the printer touchscreen, open the Tools page by pressing the **Tools** button within the Navigation Menu.

Figure 1: Tools Page



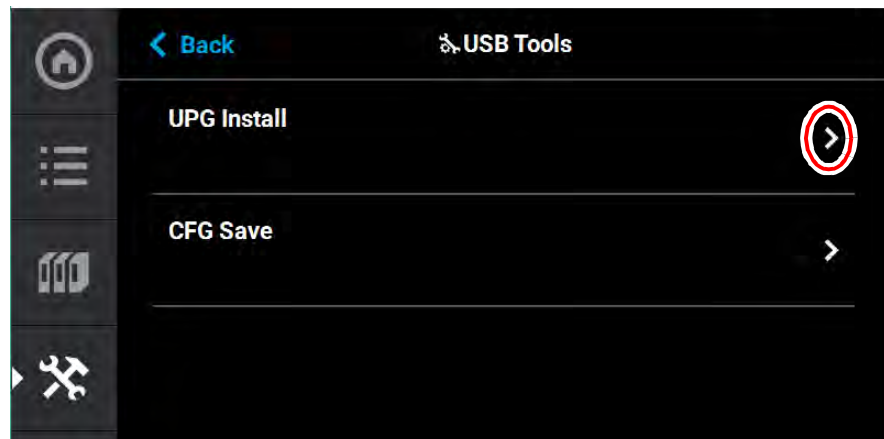
4. Open the Maintenance page by pressing the **Maintenance** button within the Tools page.

Figure 2: Maintenance Page



5. From the Maintenance Page, select **USB Tools** and then select **UPG Install**.

Figure 3: USB Tools



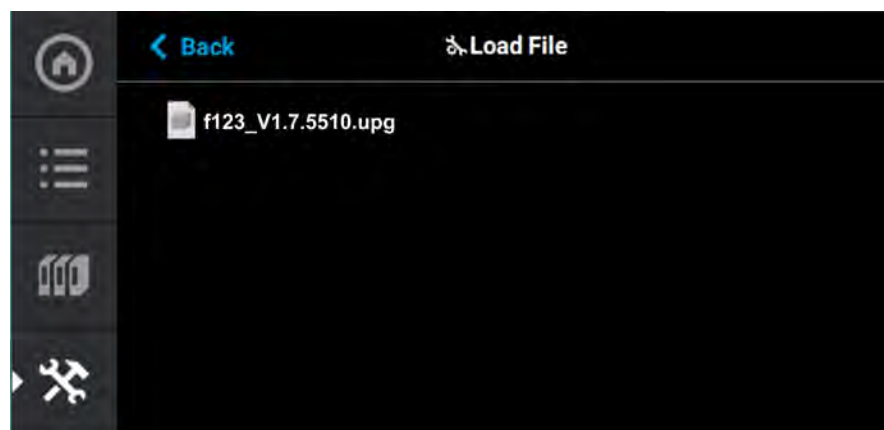
6. Select **USB**.

Figure 4: Load File



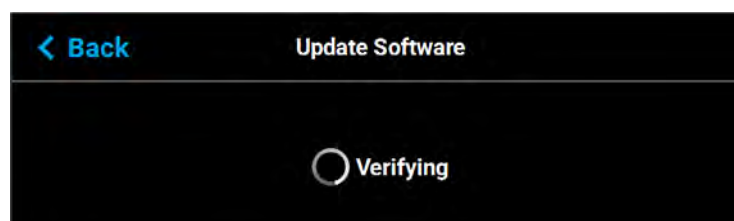
7. Navigate to and select the upgrade file from its saved location on the USB drive.

Figure 5: Upgrade File Location



8. The upgrade file will install. The screen will display the status until the upgrade is complete.

Figure 6: Upgrade Status



Updating Controller Software will erase all job files from the Job Queue (files within the Internal Storage will be retained). After completing the software upgrade, you will need to resend jobs to the printer.

GrabCAD Print Method

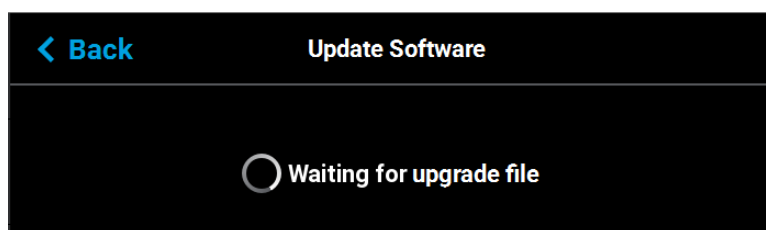
To update Controller Software via GrabCAD Print, navigate to <http://help.grabcad.com/article/196-printer-firmware-management> and follow the procedure for “Updating the printer’s firmware”.

Insight Software Method (F370 only)

If the printer has a weak network connection or does not allow for automatic updates, you can manually download Controller Software updates by performing the following steps:

1. Open the Maintenance page by pressing the **Maintenance** button within the Tools page (see Figure 34 (page 38)).
2. Locate the Update Software row within the page. Press anywhere within the row to open the Update Software page (see Figure 68 (page 54)).
3. The Update Software page will open and the printer will automatically be put into software upgrade mode, allowing it to receive the software upgrade. The following is displayed on the touchscreen while the printer is in software upgrade mode.

Figure 7: Printer In Software Upgrade Mode

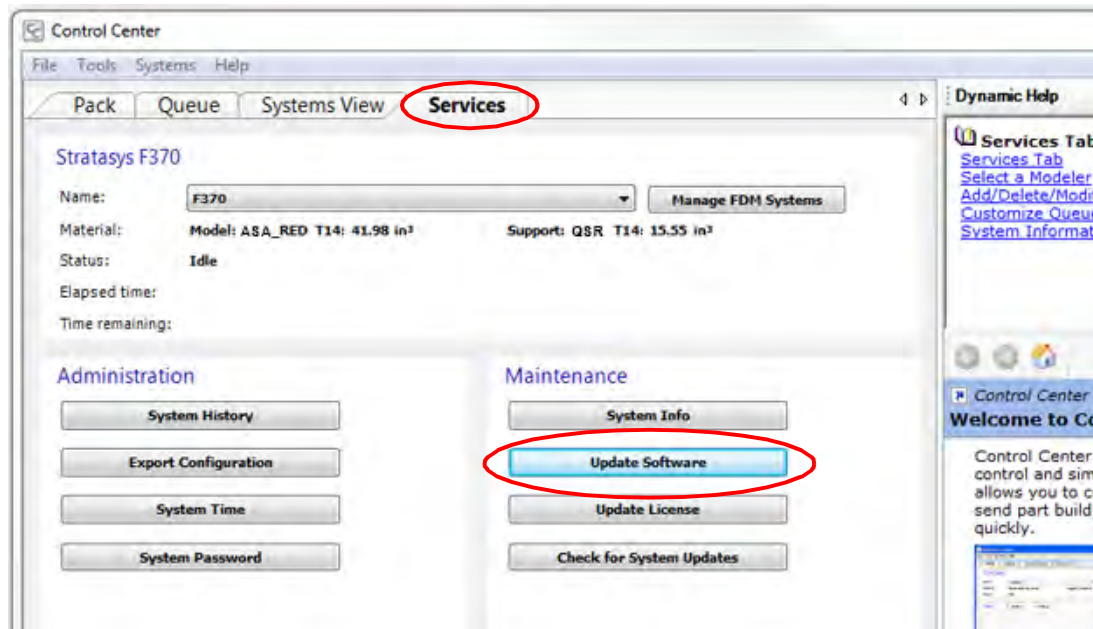


All recent calibration data (i.e. tip offset values) as well as printer settings and configurations are automatically retained during the software upgrade process. Files sent to the Job Queue via Ethernet or Wi-Fi connection or transferred to the printer from a USB flash drive are not retained.

4. From your workstation PC's Start Menu, navigate to *All Programs > Insight (installed version) > Control Center (installed version)* or double-click the Control Center shortcut (if available).

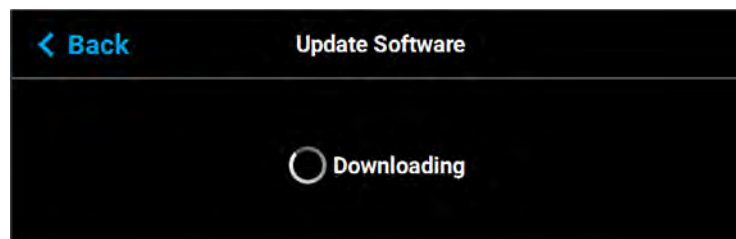
5. Within Control Center, select the **Services** tab. Ensure that your F370 Series printer is selected from the drop-down menu then click the **Update Software** button.

Figure 8: Control Center Update Software



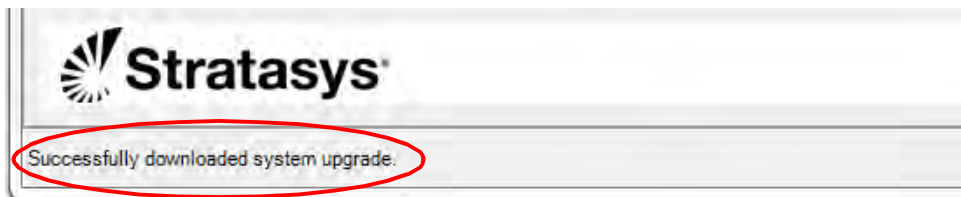
6. Control Center will begin establishing a connection with the printer. Once a connection is established, the workstation PC's file explorer will open.
7. Browse to the location of the .upg software upgrade file.
8. Select the *.upg file to be downloaded and then click **Open**. Control Center will begin sending software to the printer. Progress is indicated within the bottom of the Control Center window as well as on the touchscreen.

Figure 9: Software Download Progress



9. Once the software upgrade is successfully downloaded to the printer an indicator will be displayed within the bottom of the Control Center window.

Figure 10: Software Upgrade Successfully Downloaded



10. The touchscreen will refresh to indicate that the printer is verifying the upgrade file.

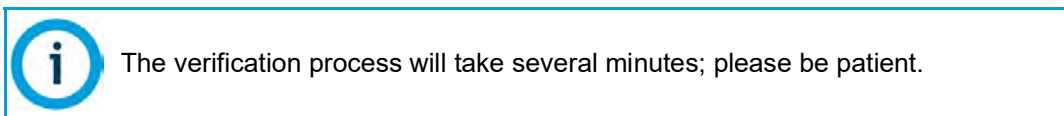
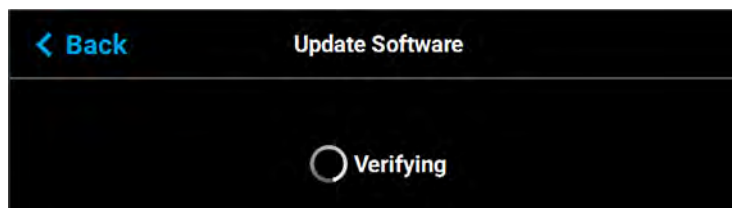
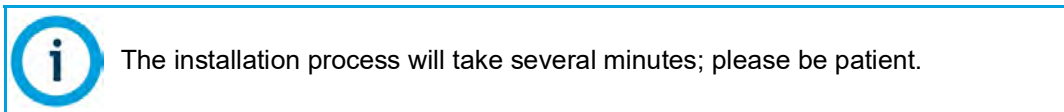


Figure 11: Verifying Software Upgrade



11. Once the verification process is complete, the printer will automatically reboot and begin installing the upgrade file. A variety of output will be displayed on the touchscreen during the installation process.



12. Once the Controller Software upgrade is installed the printer will conduct its regular startup process and automatically perform an XY Gantry Calibration (see "Powering ON the Printer" (page 1) for details).

Exporting System Configuration (.CFG) File

If your system is receiving fault determination codes, you may need to export a configuration (.cfg) file from your system to send to Customer Support. System configuration files can be exported using one of the following three methods:

- Saving to a USB Flash drive directly from the F123 Series printer
- Saving to a location on your workstation PC using the Insight software application
- Saving via GrabCAD Print

You have the option of exporting system configuration files via any of these methods; however, the USB Flash drive method is the preferred method.

USB Flash Drive Method

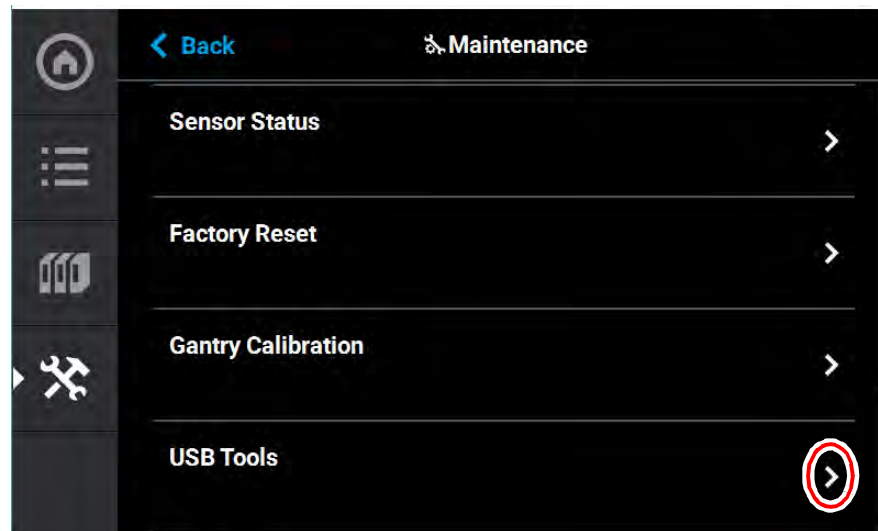
1. Insert the USB flash drive into one of the available USB ports on the F123 Series printer.
2. On the printer touchscreen, open the Tools page by pressing the **Tools** button within the Navigation Menu.

Figure 12: Tools Page



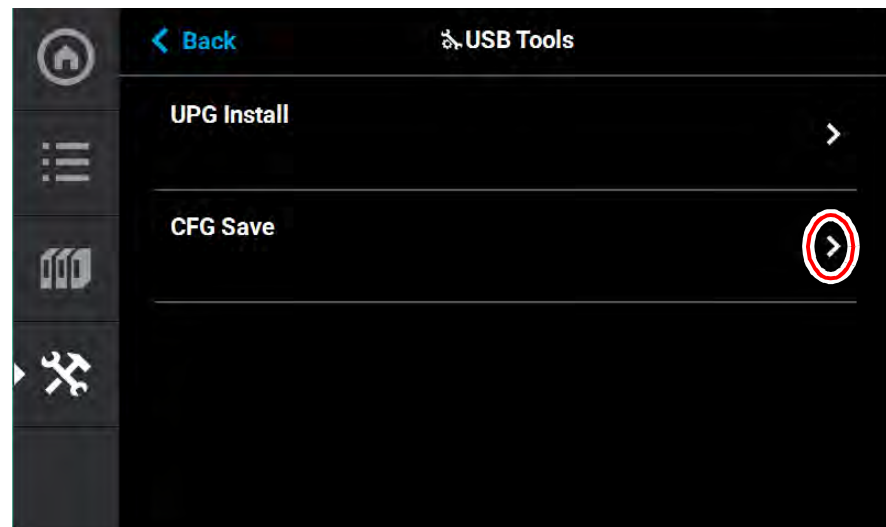
3. Open the Maintenance page by pressing the **Maintenance** button within the Tools page.

Figure 13: Maintenance Page



- From the Maintenance Page, select **USB Tools** and then select **CFG Save**.

Figure 14: USB Tools



- Select **USB**.

Figure 15: CFG Save



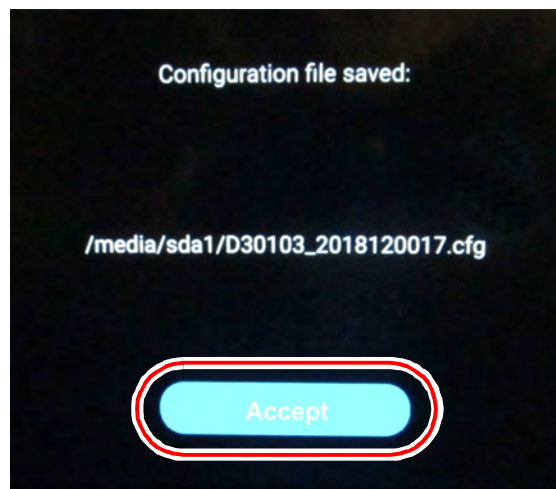
6. Navigate to a save file location on the USB drive and select the **Download** button.

Figure 16: Save File Location



7. The configuration file will download to the USB flash drive. Select **Accept** when the file download is complete.

Figure 17: Configuration File Saved



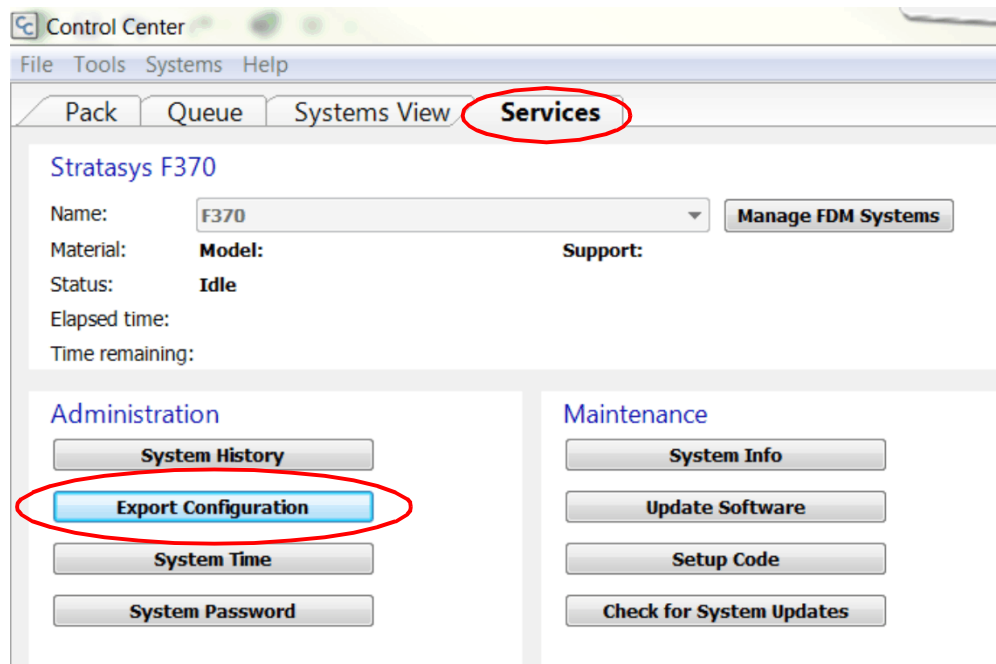
GrabCAD Print Method

For detailed instructions on exporting a system configuration file navigate to: <http://help.grabcad.com/article/196-printer-firmware-management> and follow the procedure for 'Exporting the printer configuration'.

Insight Software Method (F370 Only)

1. From your workstation PC's Start Menu, navigate to **All Programs > Insight (installed version) > Control Center (installed version)** or double-click the Control Center shortcut (if available).
2. Within Control Center, select the **Services** tab. Ensure that your F370 Series printer is selected from the drop-down menu then click the **Export Configuration** button.

Figure 18: Control Center Export Configuration



3. Browse to the directory where you wish to save the configuration file.
4. Click on the **Save** button.
5. Close Control Center.

Maintenance Schedule



Warning: Hot Surface Hazard

Always wear proper heat protective gloves and clothing when handling items inside the oven, as surfaces within the oven can be very hot.

Maintenance tasks must be performed on a regular basis in order to maintain optimal system operation. [Table 1](#) outlines the general maintenance schedule for the F123 Series. Detailed instructions for each task make up the rest of this chapter.

[Table 2](#) lists part numbers for various replacement consumable items. Use the part numbers listed in this table when ordering replacement parts from Stratasys or your regional Stratasys office.

Table 1: Maintenance Schedule

Weekly	Monthly	As Needed	Maintenance Task
X			"Cleaning the Oven Chamber" (page 12)
X			"Cleaning the Platen" (page 12)
	X		"Clean/Inspect Tip Wipe Assemblies" (page 12)
		X	"Cleaning the Exterior Surface of the Printer" (page 15)
		X	"Cleaning the Touchscreen Display" (page 15)

Table 2: Replacement Consumables

Part Number	Description
123-00300	Model Head (standard)
123-00300	Support Head (standard)
123-00307	PLA Model Head
123-00301	PLA Cooling Module
123-00320-S	TPU 92A Model Head
123-00302	F170 substrate 1 box of 16
123-00303	F270 substrate 1 box of 16
123-00304	F370 substrate 1 box of 16
123-00305	Tip shield kit - 4 sets
123-00306	2-pack of tip wipe assemblies (see "Clean/Inspect Tip Wipe Assemblies" (page 12)).

Weekly Maintenance

Cleaning the Oven Chamber

**Warning: Hot Surface Hazard**

Always wear proper heat protective gloves and clothing when handling items inside the oven, as surfaces within the oven can be very hot.

The purge chute is designed to guide purged material debris from the tip wipe assemblies to the bottom of the oven chamber for disposal. Purged material debris then collects within the bottom of the oven chamber, beneath the platen. Do not allow excess material debris to accumulate in the oven chamber as this could cause damage to the printer. Clean the oven chamber on a weekly basis to remove build material debris and dust. A standard vacuum can be used to clean this area if needed. If excessive accumulation occurs vacuum the oven chamber as needed.

Cleaning the Platen

The steel platen provides the level surface on which parts are built (see [Figure 7 \(page 7\)](#) for platen overview). A substrate is securely affixed to the platen by the substrate ejection handle. If debris collects on the platen, it can adversely affect substrate adhesion.

1. Remove the substrate from the platen.
 - Push down on the substrate ejection handle to release it from the platen.
 - Slide the substrate from the platen.
2. Carefully remove purged material debris that have fallen into the openings of the platen.
 - A standard vacuum can be used to clean the platen.

Monthly Maintenance

Clean/Inspect Tip Wipe Assemblies

The tip wipe assemblies should be cleaned once a month. While cleaning the assemblies, inspect the flicker/brush assemblies for wear and replace as necessary when wear is detected.

Once material is purged from a tip, the flicker portion of the tip wipe assembly passes across the tip's opening, cutting purged material off in small segments. The brush portion of the tip wipe assembly then passes across the tip's opening cleaning the tip and its tip shield. As a result, the flicker will wear at the location where the tip contacts its surface and eventually develop a notch large enough for the tip to completely pass through the flicker; a notched flicker cannot properly cut purging material. Similarly, material can become embedded within the bristles of the brush resulting in clumping; clumped bristles cannot properly clean a tip or its tip shield. The tip wipe assembly should be replaced once a significant notch develops within

the flicker portion of the assembly or whenever bristle clumping (which cannot be removed with a brush) is apparent within the brush portion of the assembly. The tip wipe assembly is replaced as a single unit.

To clean the tip wipe assembly and inspect its components:

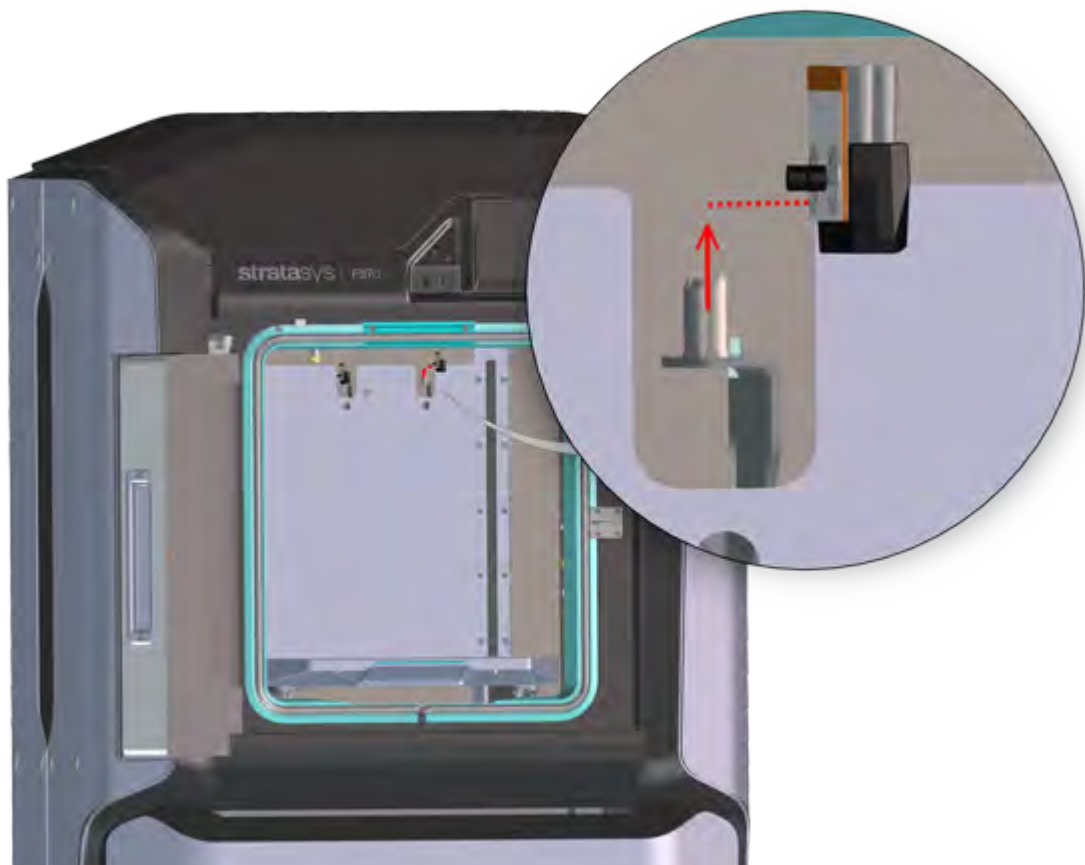
1. Ensure that the printer is stopped (idle) and is not building.
2. Open the oven door.

**Caution:**

Depending on how long the oven has been allowed to cool, components may be hot. Wear the safety gloves provided in the Welcome Kit to perform all remaining steps.

3. Remove the model side tip wipe assembly by lifting it upward until it clears its locating pins.

Figure 19: Tip Wipe Assembly Removal



4. Repeat [step 3](#) above to remove the support side tip wipe assembly.



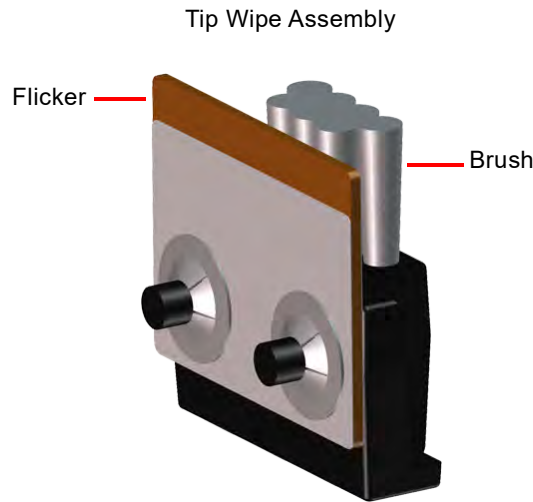
If the head is positioned above the purge area it may impede your ability to remove the tip wipe assemblies. Open the top cover and manually move the head away from the purge area.

5. Clean and inspect the surface around the locating pins. Make sure that the tip wipe assemblies can sit flush on the surface.
6. Inspect the flicker portion of the tip wipe assemblies. The top edge of the flicker should be straight and must not contain excessive notching/wear.
7. Inspect the brush portion of the tip wipe assemblies. Brush bristles must not show evidence of wear (i.e. no notches in bristle pattern) and should not contain significant bristle clumping. Frayed bristles are acceptable as long as the top edge is even across all of the bristles.
8. Replace one or both of the tip wipe assemblies if excessive wear is present. See [Table 2 \(page 11\)](#) for information on ordering replacement assemblies.



The components of the assembly cannot be replaced individually. The entire tip wipe assembly must be replaced if excessive wear is present on the flicker or the brush.

Figure 20: Tip Wipe Assembly Details



9. Reinstall the support side tip wipe assembly by placing the assembly onto its locating pins and sliding the assembly downward.
10. Repeat [step 9](#) above to reinstall the model side tip wipe assembly.

As Needed Maintenance

Cleaning the Exterior Surface of the Printer

The printer's exterior surfaces (doors and panels) may accumulate dust and periodically require cleaning. Exterior doors and panels, with the exception of the touchscreen display, can be cleaned using a slightly damp microfiber cloth (supplied in the Welcome Kit). The cloth should be only slightly damp to ensure that water does not enter the printer. Excess water can cause damage to interior components.

Cleaning the Touchscreen Display

**Caution:**

Using a cleaner which contains ammonia and/or alcohol can damage the touchscreen. Only a suitable LCD cleaning solution and microfiber cloth (included in the Welcome Kit) should be used to clean the touchscreen display.

As needed, to remove smudge marks and buildup, clean the touchscreen display using the LCD cleaner and microfiber cloth provided in the Welcome Kit.

Apply an adequate amount of LCD cleaning solution to the provided microfiber cloth and then gently wipe the exterior surface of the touchscreen display to clean its surface. It is recommended that you apply LCD cleaner to the microfiber cloth rather than applying cleaner directly to the touchscreen display, as excess moisture may damage the display.

Inspecting and Cleaning the Tip Shields

The tip shields may accumulate purged material or debris. As required, this material can be removed by manually wiping the tip shields with a clean cloth.



When printing with TPU 92A material, it is recommended to make sure that the tips and tip wipes are clean and free of debris before starting a part build.

Cleaning the Oven Door Glass Surfaces

Required Tools

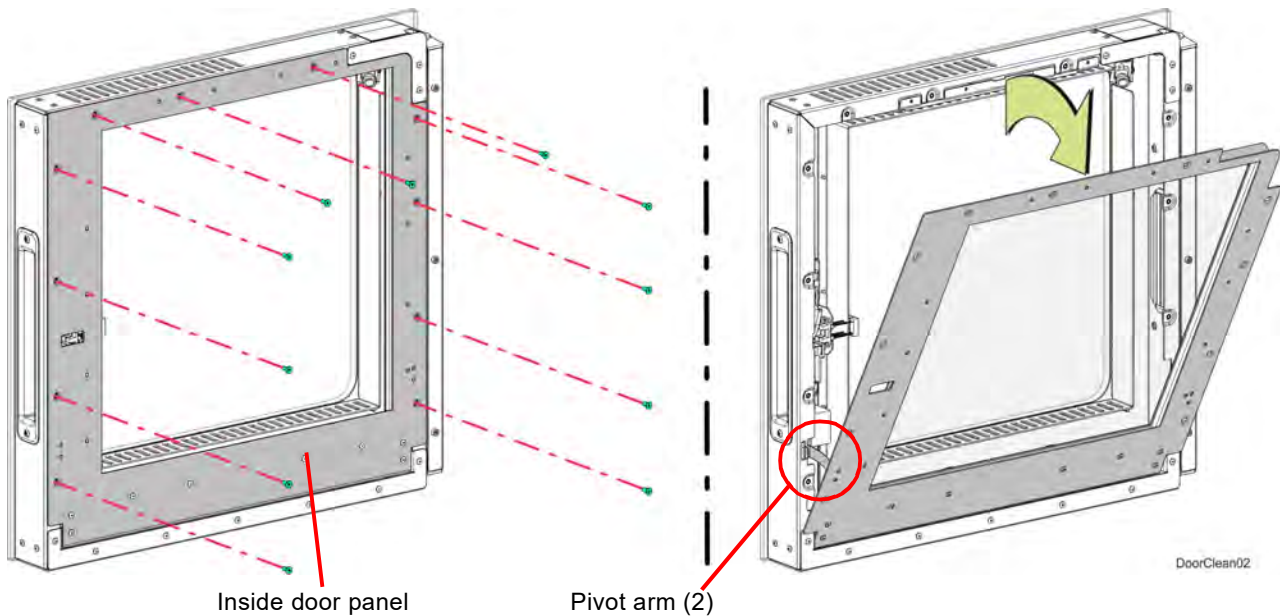
- 2.5 mm hex wrench

Accessing the Oven Door Glass

1. Power off the printer. See "Powering Off" (page 17).
2. Allow the oven to cool.
3. Open the oven door.

4. Using a 2.5 mm hex wrench, remove the inside door panel mounting screws (11). See Figure 50 (page 43).

Figure 21: Inside door panel mounting screw locations



5. Pivot the inside door panel away from the door assembly. The pivot arms will prevent the door panel from fully separating. See Figure 21.
6. Clean the glass surfaces with a commercial glass cleaner.

Installing the Door Panel

1. Push the top of the door panel toward the door assembly.
2. Close the door panel and make sure that the panel and frame mounting holes are aligned.
3. Using a 2.5 mm hex wrench, install the inside door panel mounting screws (11). See Figure 21.



Do not over-tighten the inside door panel mounting screws.

4. Close the oven door.

Customer Replaceable Units

The following service procedures outline the replacement instructions for the customer replaceable units of the F123 Series printers.

Powering Off

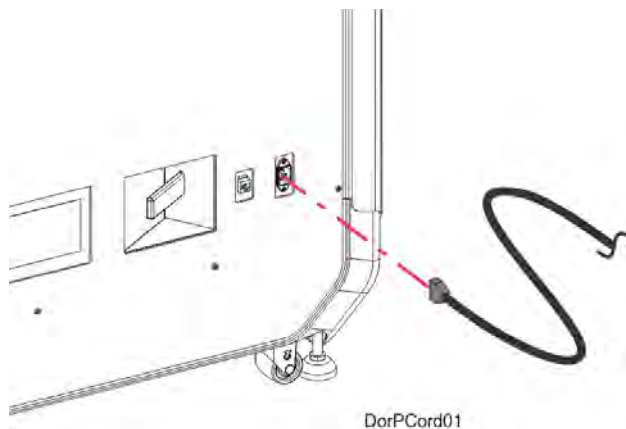
**Warning: Electrical Shock Hazard.**

Power OFF the printer and disconnect the power cord before replacing any of the customer replacement units.

Powering OFF the Printer

1. Depress the Power button (see [Figure 1 \(page 1\)](#) for button location).
2. Press **Accept** on the touchscreen display.
3. Wait approximately 25 seconds for the printer to power down.
4. Remove the AC power cord from the rear of the system.

Figure 22: AC power cord location



Rear Panel

Required Tools

- 3 mm hex wrench

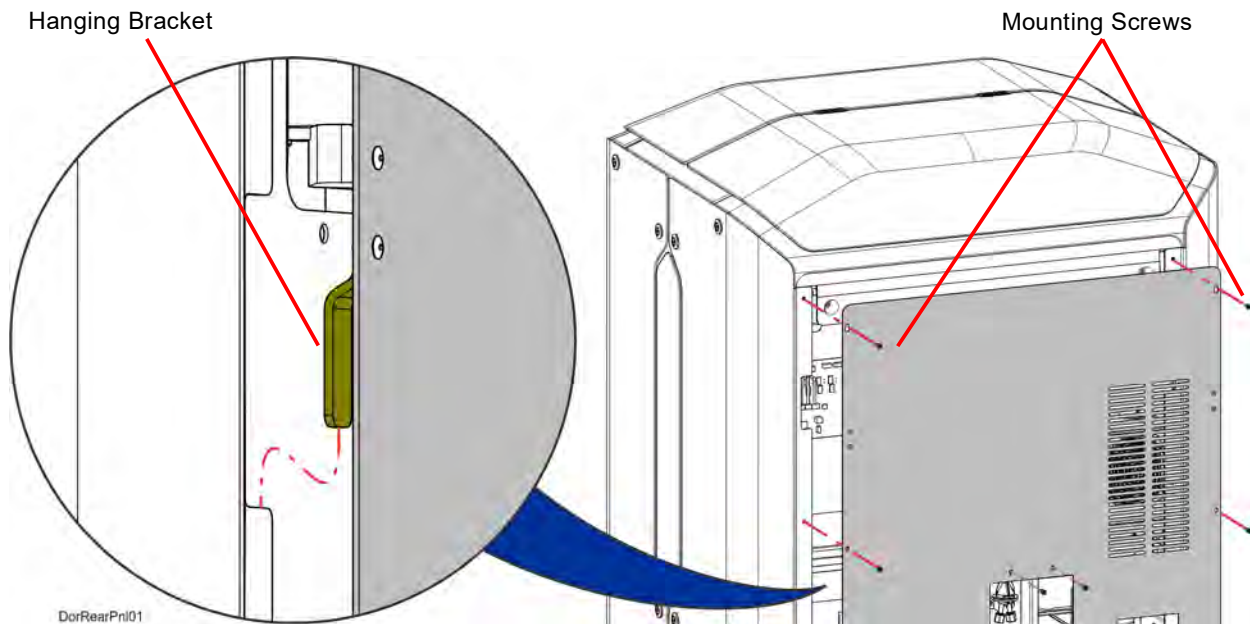
Removing the Rear Panel



Removal of the rear panel requires the removal of the AC power cord. Do not install the AC power cord with the back panel removed.

1. Power OFF the printer, see “Powering Off” (page 17).
2. Using a 3 mm hex wrench, remove the rear panel mounting screws (16). See Figure 23.
3. The rear panel has brackets that allow it to hang on the printer frame. Remove the rear panel by lifting upward and pulling away from the printer.

Figure 23: Rear Panel Mounting Screw Locations



DorRearPnl01

Installing the Rear Panel

1. Insert the rear panel hanger brackets into the notches in the side panels. See Figure 23.
2. Align the rear panel with the mounting holes in the frame. See Figure 23.
3. Using a 3 mm hex wrench, loosely install the rear panel mounting screws (16). See Figure 23.
4. Tighten the rear panel mounting screws (16).

Right and Left Side Panels

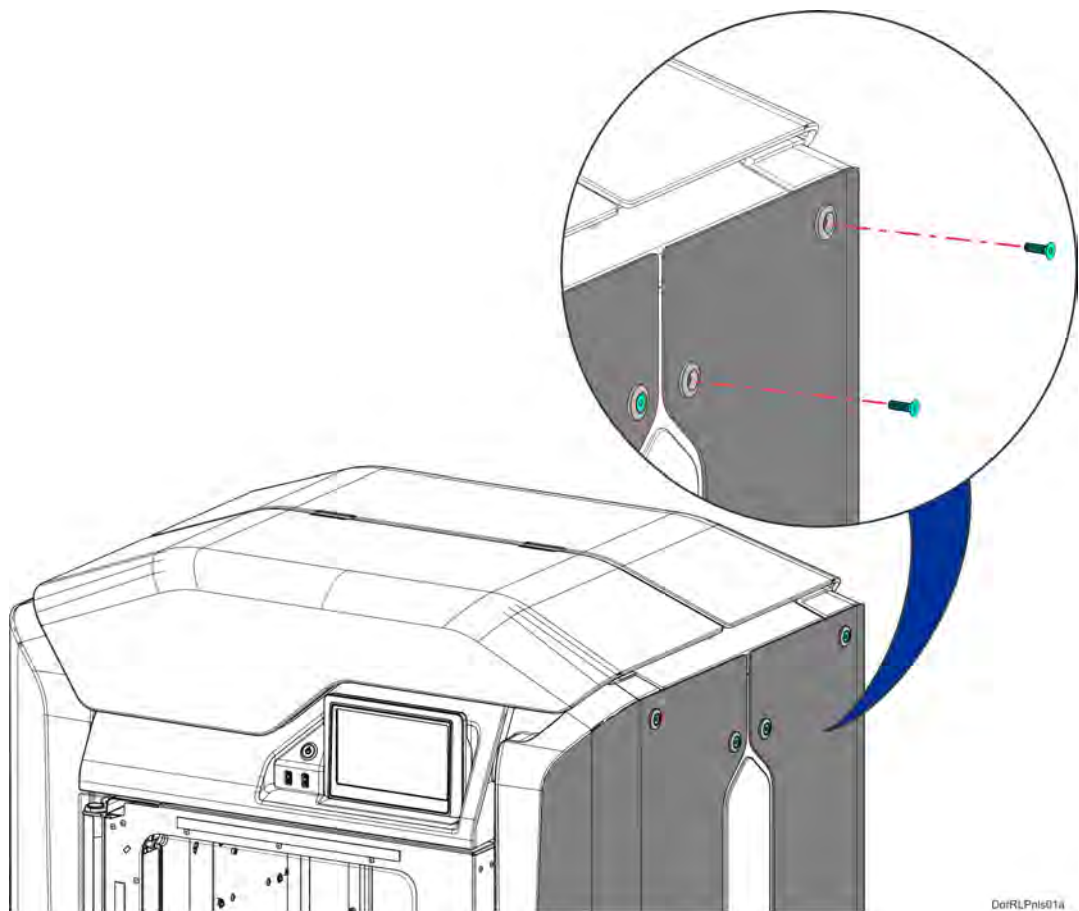
Required Tools

- 5 mm hex wrench

Removing the Side Panels

1. Power OFF the printer, see “Powering Off” (page 17).
2. Remove the rear panel. See “Removing the Rear Panel” (page 18).
3. Using a 5 mm hex wrench, remove the side panel mounting screws (6 on each panel). See Figure 24.

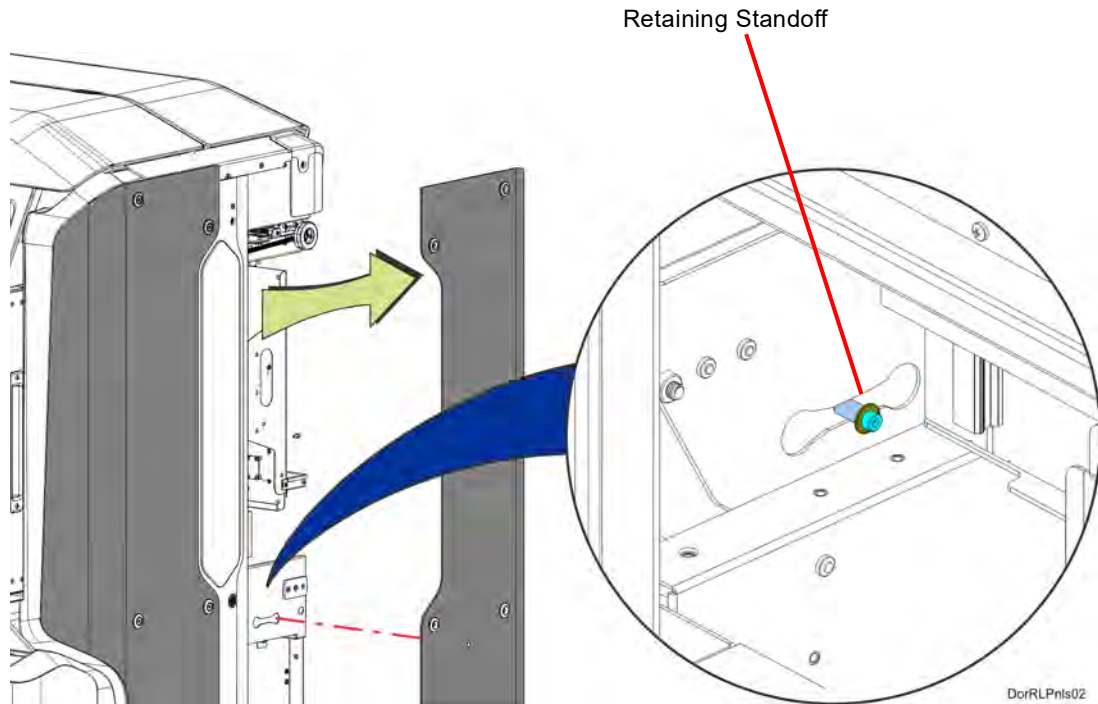
Figure 24: Side Panel Mounting Screw Locations



DocRtLPnt01a

4. **Rear side panels only:** The rear side panels are held in place by a standoff that is retained inside the printer frame. Slide the panel away from the printer to disengage the retaining standoff. See Figure 25.

Figure 25: Rear Side Panel Retaining Standoff Detail



5. Remove the side panel from the printer.

Installing the Side Panels

1. Insert the side panel retaining standoff into the hole in the printer frame and slide the panel into place until it aligns with the mounting screw holes. See Figure 25.
2. Use a 5 mm hex wrench to reinstall the mounting screws (6). See Figure 24.

Front Top Cover

Required Tools

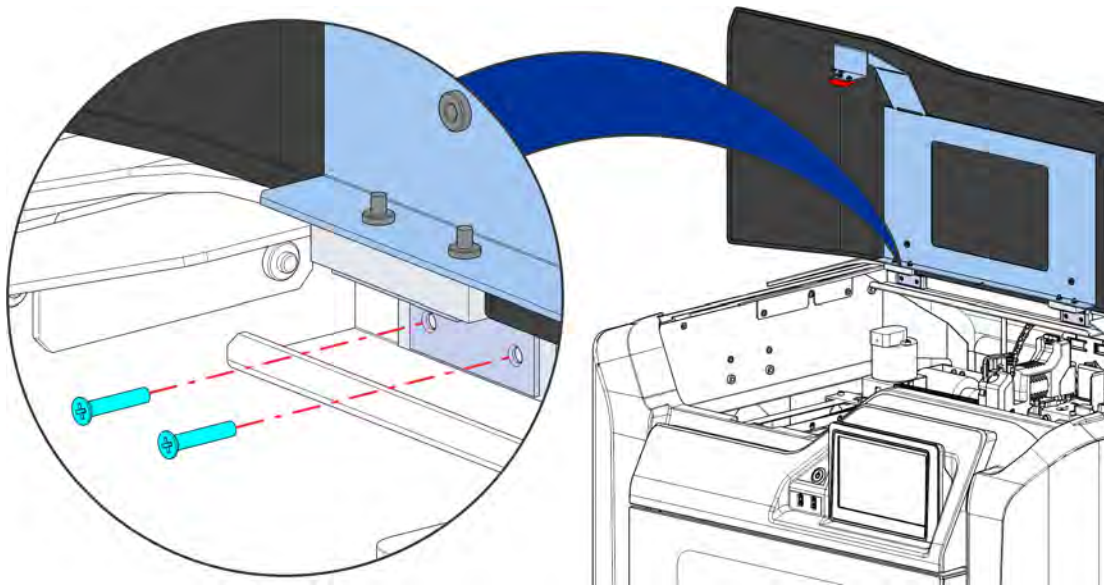
- 2 mm hex wrench

Removing the Front Top Cover

1. Power OFF the printer. See “Powering Off” (page 17).
2. Open the oven door to release the front top cover latch.
3. Open the front top cover.

4. Using a 2 mm hex wrench, remove the hinge mounting screws (4) from the crossbar. See Figure 26.

Figure 26: Front Top Cover Hinge Mounting Screw Locations



5. Lift the front top cover up and away from printer to remove.

Installing the Front Top Cover

1. Align the front top cover hinges with the mounting locations on the crossbar. See Figure 26.
2. Using a 2mm hex wrench, reinstall the hinge mounting screws (4). See Figure 26.
3. Close the front top cover.

Rear Top Cover

Required Tools

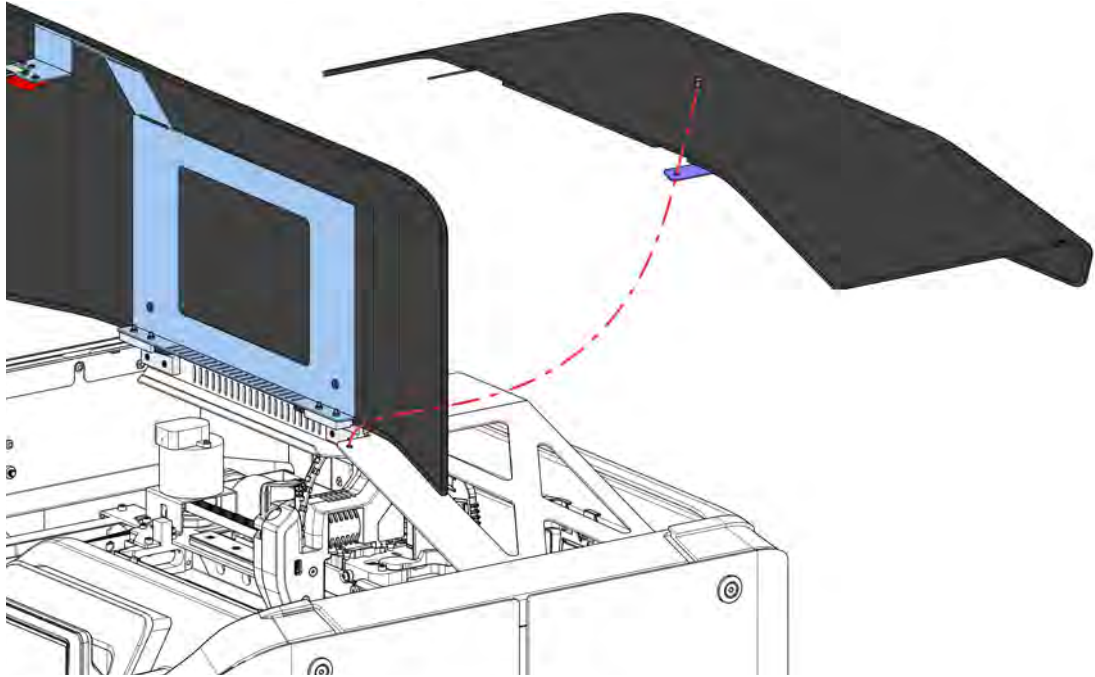
- 2.5 mm hex wrench

Removing the Rear Top Cover

1. Power OFF the printer. See “Powering Off” (page 17).
2. Open the oven door to release the top cover latch.
3. Open the front top cover.
4. Using a 2.5 mm hex wrench, remove the screws (2) that secure the rear top cover to the cross bar.

5. Slide the rear top cover back and remove it from the printer. See Figure 27.

Figure 27: Rear top cover removal



Installing the Rear Top Cover

1. Align the rear top cover with its mounting holes (2) in the cross bar.
2. Using a 2.5 mm hex wrench, install the screws (2) that secure the rear top cover to the cross bar. See Figure 27.
3. Close the front top cover.
4. Close the oven door.

3.3/5/12 VDC ATX Power Supply

Required Tools

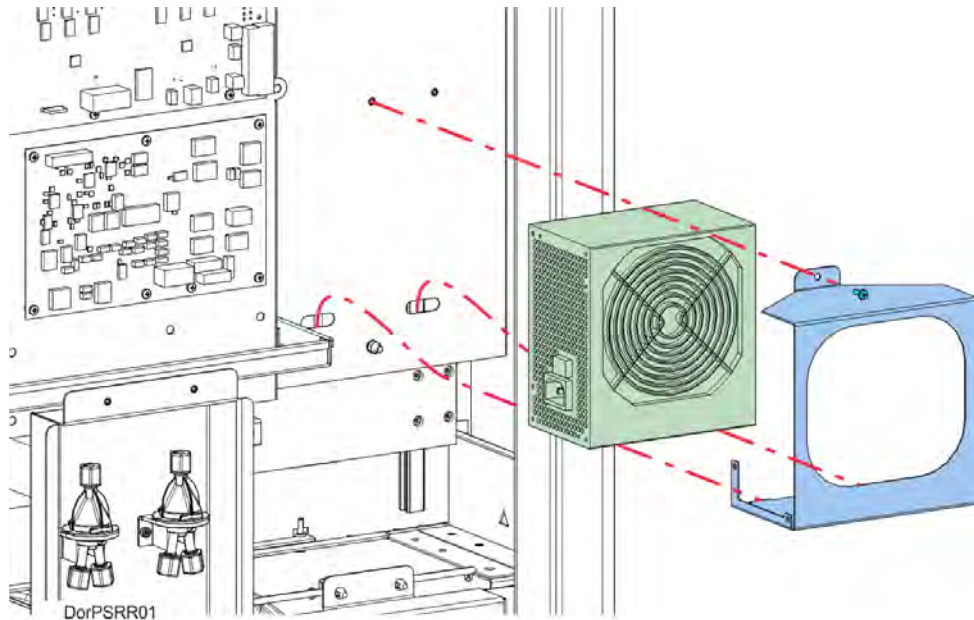
- 3mm hex wrench

Removing the 3.3/5/12 VDC ATX Power Supply

1. Power OFF the printer, see “Powering Off” (page 17).
2. Remove the rear panel, see “Removing the Rear Panel” (page 18).
3. Disconnect the input power cable from the power supply.
4. Disconnect the power supply cables from the I/O board (J16, J19, J20, J29).
5. Using a 3mm hex wrench, remove the power supply bracket mounting screw. See Figure 28.
6. Pivot and lift the bracket slightly to remove the power supply from the electronics bay.

7. Remove the power supply from the bracket.

Figure 28: 3.3/5/12 VDC ATX Power Supply Mounting Location



Installing the 3.3/5/12 VDC ATX Power Supply

1. Transfer the mounting bracket to the new power supply.
2. Insert the bottom tabs of the power supply bracket into the slotted holes of the electronics bay panel. Pivot the power supply to its mounting orientation.
3. Use a 3mm hex wrench to reinstall the single mounting screw on top of the power supply bracket.
4. Connect the power supply cables to the I/O board (J16, J19, J20, J29).
5. Reconnect the input power cable to the 3.3/5/12 VDC ATX power supply.
6. Make sure that the switch on the power supply is in the ON position.
7. Reinstall the rear panel. See [“Installing the Rear Panel”](#) (page 18).

Oven Thermistor

Required Tools

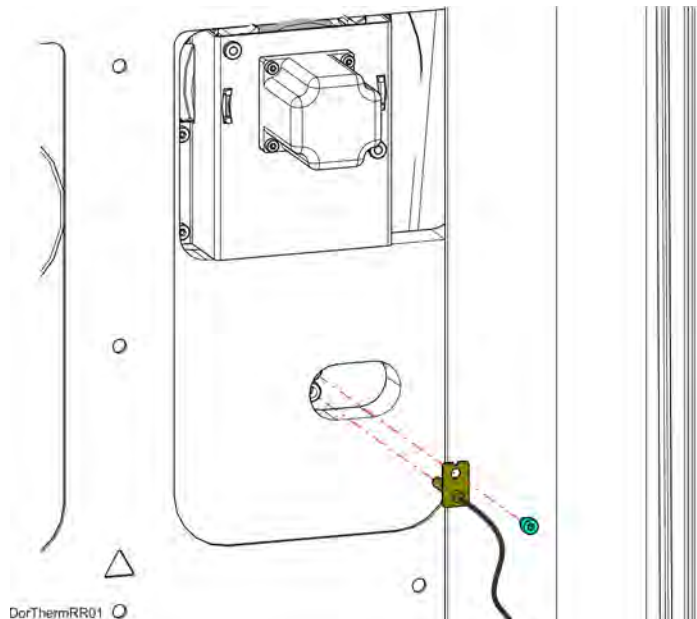
- 3 mm hex wrench

Removing the Oven Thermistor

1. Power OFF the printer. See [“Powering Off”](#) (page 17).
2. Remove the rear panel. See [“Removing the Rear Panel”](#) (page 18).
3. Remove the right rear side panel. See [“Right and Left Side Panels”](#) (page 19).
4. Disconnect the thermistor cable from the I/O board (J36).

5. Use a 3mm hex wrench to remove the mounting screw (1) that secures the thermistor to the oven wall. See [Figure 29](#).
6. Remove the thermistor from the printer. See [Figure 29](#).

Figure 29: Thermistor Detail



Installing the Oven Thermistor

1. Align the oven thermistor with its mounting location and use a 3 mm hex wrench to reinstall the mounting screw (1). See [Figure 29](#).
2. Route the oven thermistor wire through the printer and reconnect it to the I/O board (J36).
3. Reinstall the right rear side panel. See [“Installing the Side Panels”](#) (page 20).
4. Reinstall the rear panel. See [“Installing the Rear Panel”](#) (page 18).

Material Bays

Required Tools

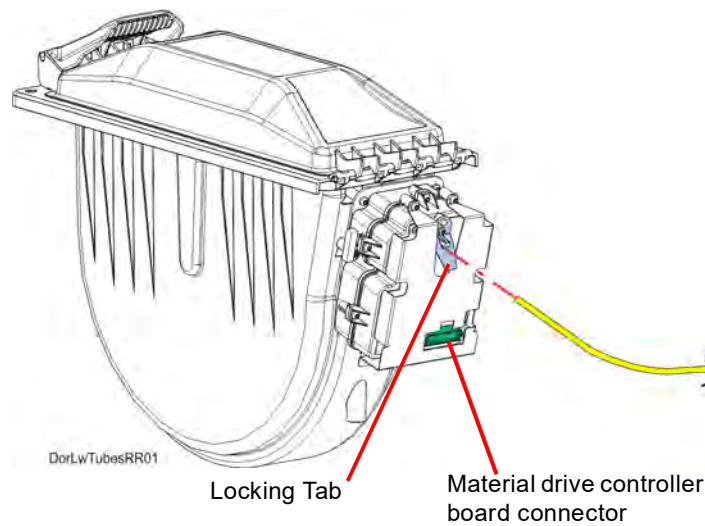
- 2.5 mm hex wrench
- 3 mm hex wrench

Removing the Material Bay

1. Unload material. See [“Unloading Material”](#) (page 7).
2. Open the material bay drawer.
3. Unlatch and open the material bay lid.
4. Remove the existing material spool from the material bay.
5. Place the used material spool into an airtight bag and seal it.

6. Close the material bay lid.
7. Close the material bay drawer.
8. Power OFF the printer. See “Powering Off” (page 17).
9. Remove the rear panel. See “Removing the Rear Panel” (page 18).
10. From the rear of the corresponding material bay, press and hold the locking tab to release the material tube.
11. Disconnect the material tube from the material bay and release the locking tab. See Figure 30.

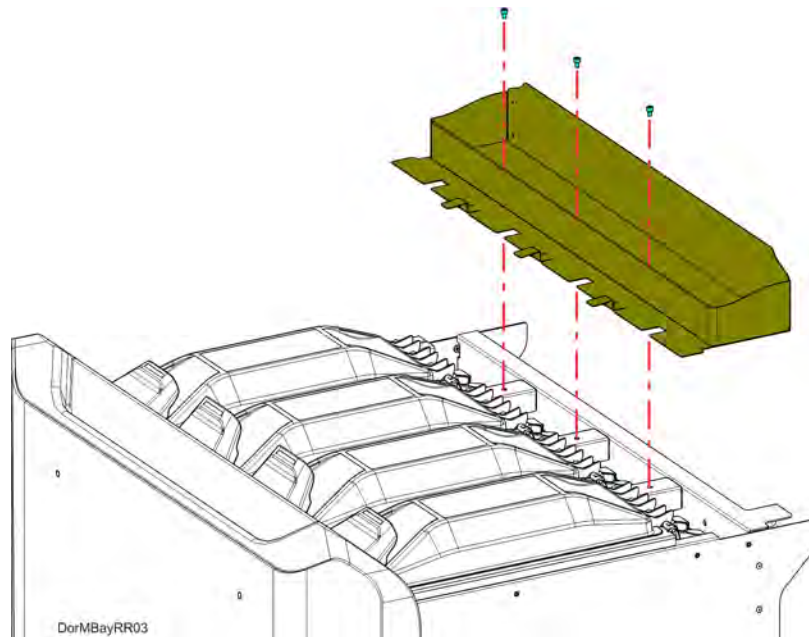
Figure 30: Disconnecting material tube



12. Disconnect the cable from the material drive controller board connector. See Figure 30.
13. Open the material bay drawer.

14. Using a 3mm hex wrench, remove the screws (3) that secure the rear tool tray. Remove the rear tool tray.

Figure 31: Rear tool tray

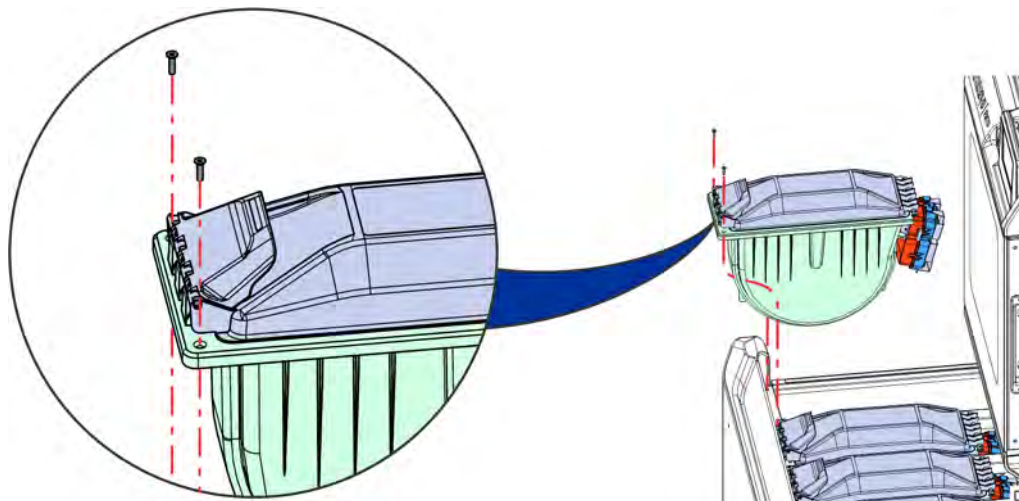


15. Using a 2.5mm hex wrench, remove the material bay mounting screws (2). See Figure 32.
16. Gently tilt and lift the material bay to remove it from the open drawer. See Figure 32.

**Caution:**

Be careful not to damage the spool interface board on the side of the material bay.

Figure 32: Material Bay Removal



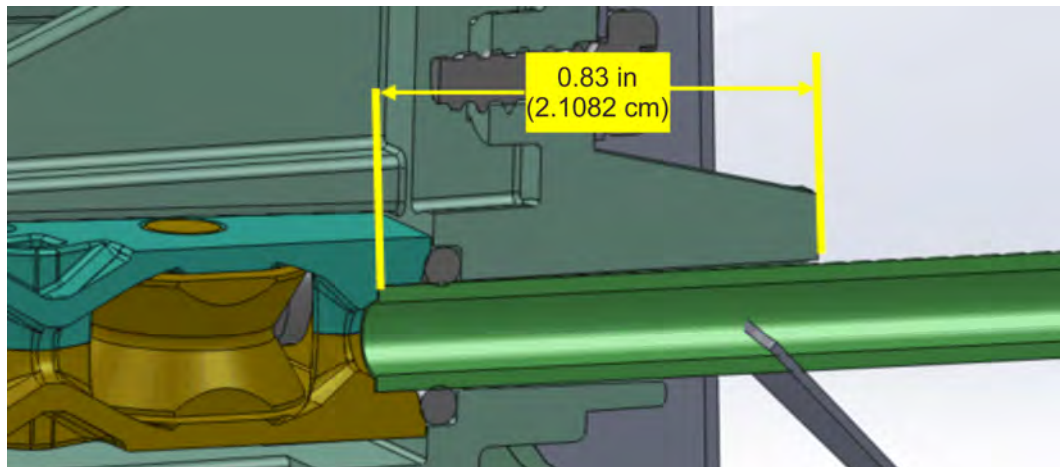
Installing the Material Bay

1. Gently install the material bay to the open drawer. See [Figure 32](#).
2. Using a 2.5mm hex wrench, fasten the mounting screws securing the material bay to the top of the drawer. See [Figure 32](#).
3. Close the material bay drawer.
4. From the back of the printer, connect the cable to the material drive controller board connector. See [Figure 30 \(page 25\)](#).
5. Press and hold the locking tab to install the filament tube to the rear of the material bay. See [Figure 30 \(page 25\)](#).



Make sure that there is 0.83 inch of tube from the tube support finger to the bottom of the switch block assembly. See [Figure 33](#).

Figure 33: Correct material bay material tube installation



6. Open the material bay drawer and view the filament tube from the rear of the printer. Make sure that the filament tube is routed properly with no interference.
7. Install the rear tool tray.
8. Install the material spool to the material bay.
9. Close and latch the material bay.
10. Close the material bay drawer.
11. Install the rear panel. See [“Installing the Rear Panel” \(page 18\)](#).
12. Power ON the printer. See [“Powering ON the Printer” \(page 1\)](#).
13. Load material. See [“Loading Material” \(page 3\)](#).

Replacing a Head

When a head reaches the 1500 build hour odometer limit (800 hours for a TPU 92A head), a warning will be displayed on the User Interface and the head's Head Status Icon will be highlighted in red on the Materials page. You can continue using a head which has exceeded its odometer limit, but it is highly recommended that you change the head as part quality will be unpredictable. See [“Replacing a Head” \(page 12\)](#) for instructions on replacing a head.

The process for replacing a PLA head varies slightly from the process for replacing a standard head. When building with PLA material a specialized PLA head is used. The PLA head must be installed into the model head location within the gantry. A cooling module is used in conjunction with the PLA model head and must be installed into the support head location within the gantry. The PLA model head extrudes both model and support materials. See [“Replacing a PLA Head” \(page 14\)](#) for instructions on replacing a PLA head or the associated cooling module.

Head Ribbon Cables

Required Tools

- 3 mm hex wrench

Removing the Head Ribbon Cables

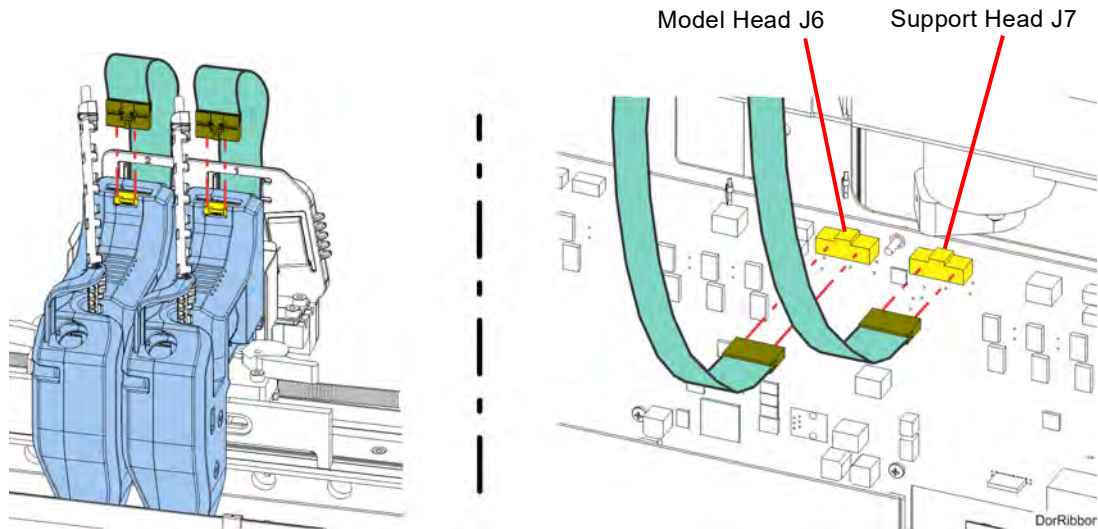


Make sure to disconnect the head ribbon cables while the printer is powered ON to ensure that auto-calibration occurs after re-installation.

1. With the printer powered ON, open the top cover.
2. Move the X bridge to the front of the gantry enclosure.
3. Disconnect the head ribbon cable connectors (2) from the tops of the material and support heads. See [Figure 34 \(page 29\)](#).
4. Power OFF the printer.
5. Remove the rear panel. See [“Removing the Rear Panel” \(page 18\)](#).

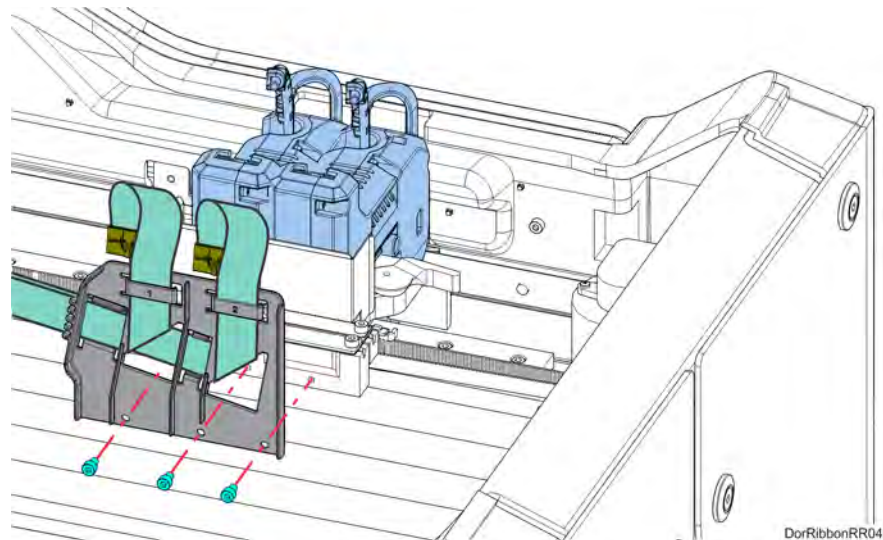
6. Disconnect the head ribbon cable connectors (2) from the I/O board (J6 and J7). See Figure 34.

Figure 34: Head Ribbon Cable Connections



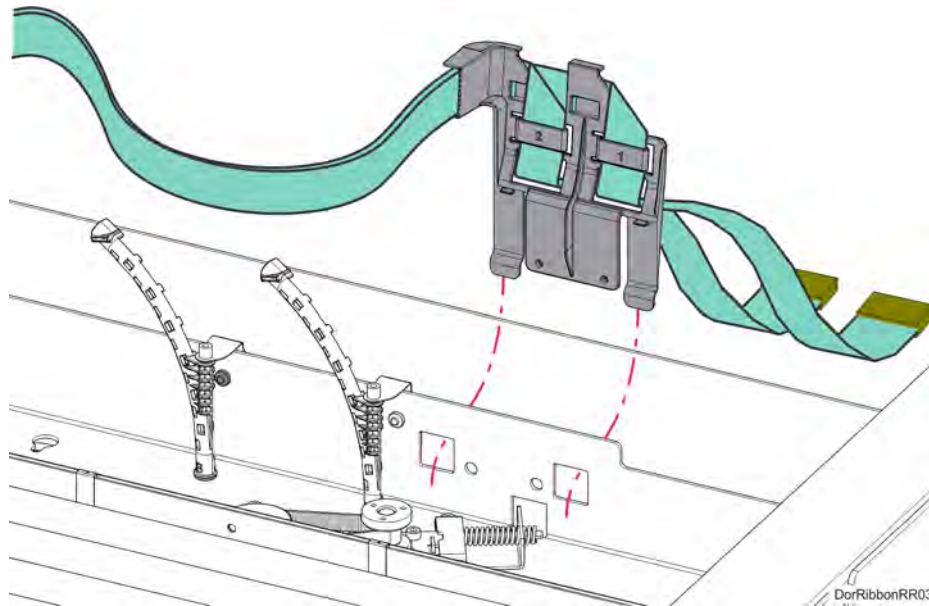
7. Using a 3 mm hex wrench, remove the front ribbon cable bracket mounting screws (3) on the back of the toggle assembly. Retain the screws for re-installation. See Figure 35.

Figure 35: Front Ribbon Cable Bracket Mounting Screw Locations



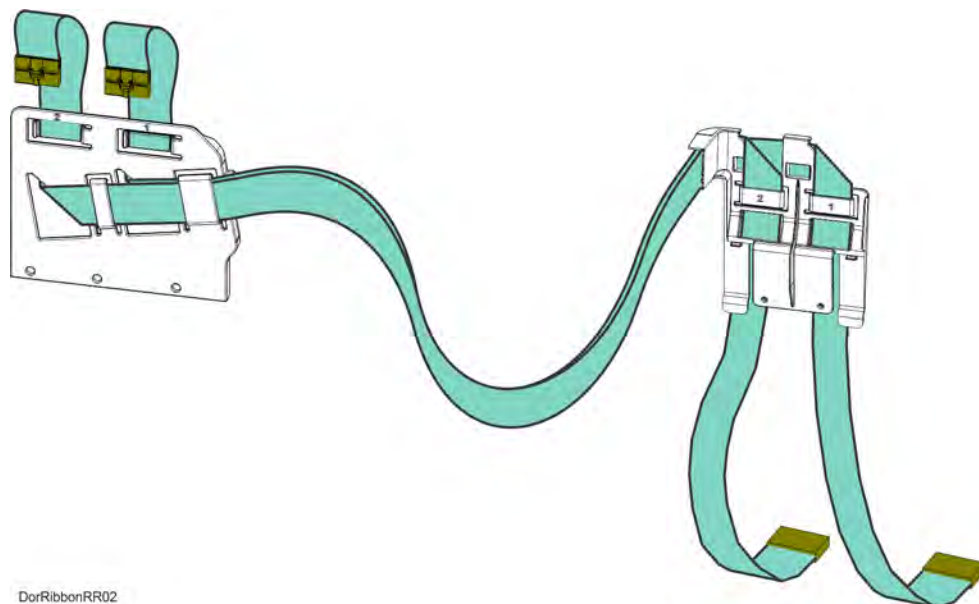
8. Lift and disengage the rear ribbon cable bracket from the back, top of the printer frame. See Figure 36.

Figure 36: Rear Ribbon Cable Bracket Mounting Detail



9. Remove the head ribbon cables and cable brackets from the printer. See Figure 37.

Figure 37: Head Ribbon Cables and Brackets



Installing the Head Ribbon Cables

1. Install the rear ribbon cable bracket to cutouts at the back, top of the printer frame. See [Figure 36 \(page 30\)](#).
2. Using a 3 mm hex wrench install the mounting screws (3) to fasten the front ribbon cable bracket to the back of the toggle assembly. See [Figure 35 \(page 29\)](#).
3. Connect the rear head ribbon cable connectors (2) to the I/O board (J6 and J7). See [Figure 34 \(page 29\)](#).
4. Connect the front head ribbon cable connectors (2) to the material and support heads. See [Figure 34 \(page 29\)](#).
5. Install the rear panel. See “Installing the Rear Panel” (page 18).
6. Close the top cover.

Touchscreen Display

Required Tools

- 3 mm hex wrench

Removing the Touchscreen Display

**Caution:**

The connectors and cables of the touchscreen display are fragile. Excessive force may cause damage to connector pins or wiring.

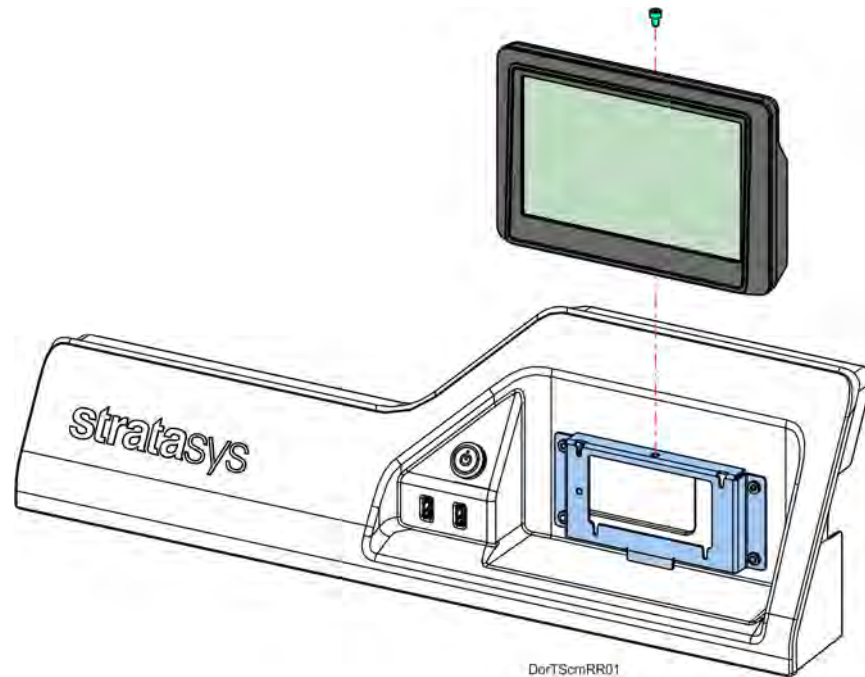
1. Power OFF the printer. See “Powering Off” (page 17).
2. Using a 3 mm hex wrench, remove the mounting screw (1) that secures the touchscreen to the display panel bracket. See [Figure 38 \(page 32\)](#).
3. Gently lift the touchscreen slightly to disengage the standoff fasteners (4) from the display panel bracket. See [Figure 38 \(page 32\)](#).
4. While supporting the touchscreen, tilt it away from the bracket to disconnect the touch extender cable and the display cable from the back of the display.



The flat display cable connector is fragile. Simultaneously pull both corners of the connector straight out, without rocking back and forth.

5. Gently move the touchscreen away to remove it from the printer. See Figure 38.

Figure 38: Touchscreen Mounting Screw Location



Installing the Touchscreen Display

1. Reconnect the touch extender cable and the display cable to the back of the touchscreen display.



Orient the shiny side of the connector away from the display.

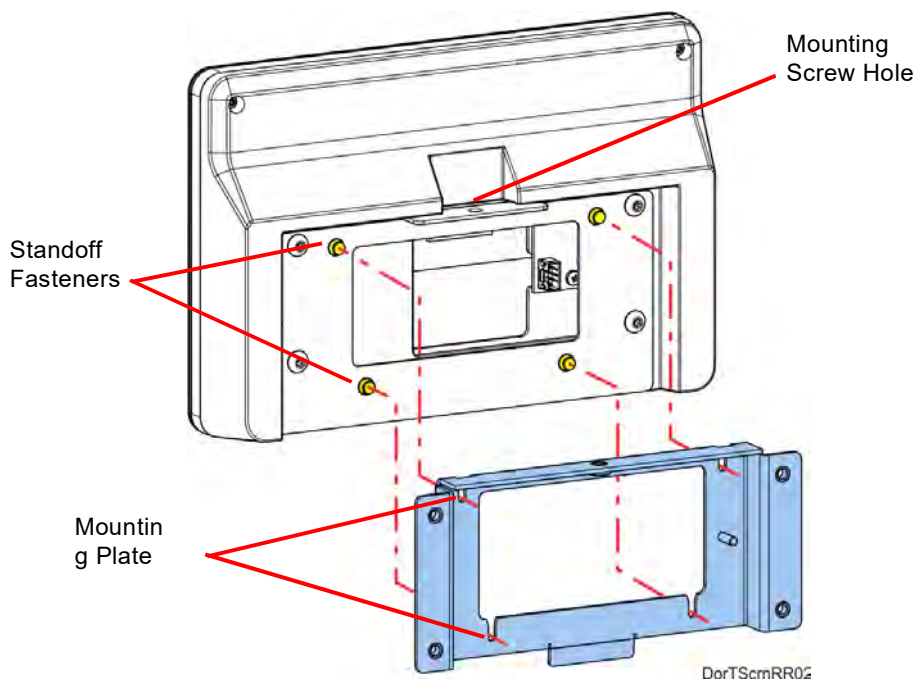
The flat display cable connector is fragile. Simultaneously push both corners of the connector straight in, without rocking back and forth.

- Align the touchscreen's standoff fasteners (4) with the corresponding slots in the mounting plate and gently press it down until it is fully seated. See Figure 39.



If all four of the standoff fasteners are not properly installed, the mounting screw holes on top of the brackets will not align.

Figure 39: Mounting Plate Slots and Alignment



- Use a 3 mm hex wrench to reinstall the touchscreen mounting screw (1). See Figure 38.



Touchscreen calibration should be performed after proper touchscreen operation is confirmed. See "Touchscreen Calibration" (page 13).

Right and Left Side Oven Blowers

Required Tools

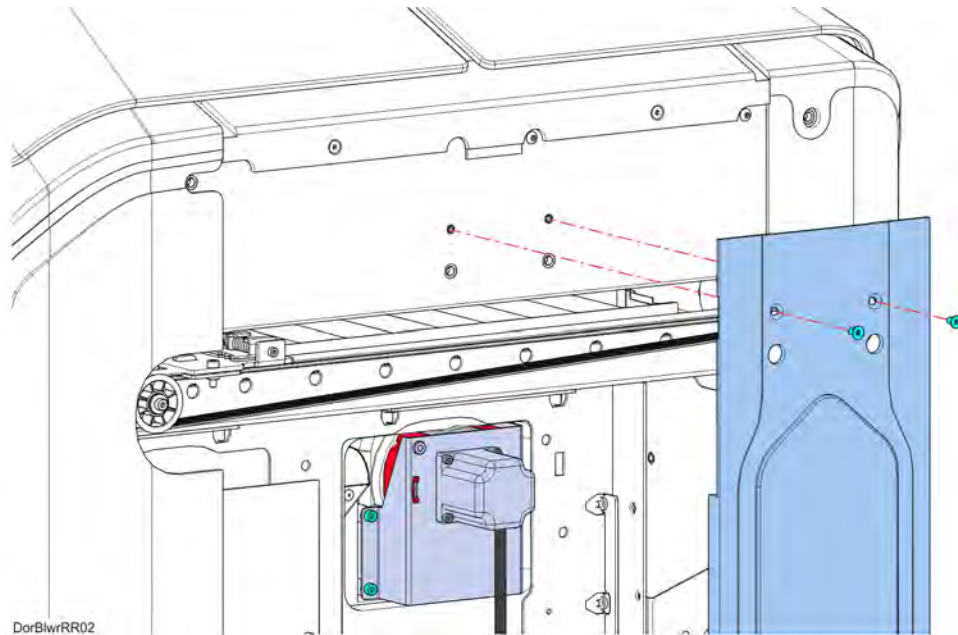
- 2.5 mm hex wrench
- 3 mm hex wrench

Removing the Oven Blower

- Power OFF the printer. See "Powering Off" (page 17).
- Remove the rear panel. See "Removing the Rear Panel" (page 18).
- Remove the side panels. See "Right and Left Side Panels" (page 19).

4. **Right-side oven blower only:** Using a 2.5 mm hex wrench, remove the mounting screws (2) that secure the center side bezel and remove it from the printer.

Figure 40: Center Side Bezel Mounting Screw Locations



5. Disconnect the oven blower motor connector from the I/O board (J39 - right blower, J37 - left blower).



Take note of the wire routing configuration for ease of installation.

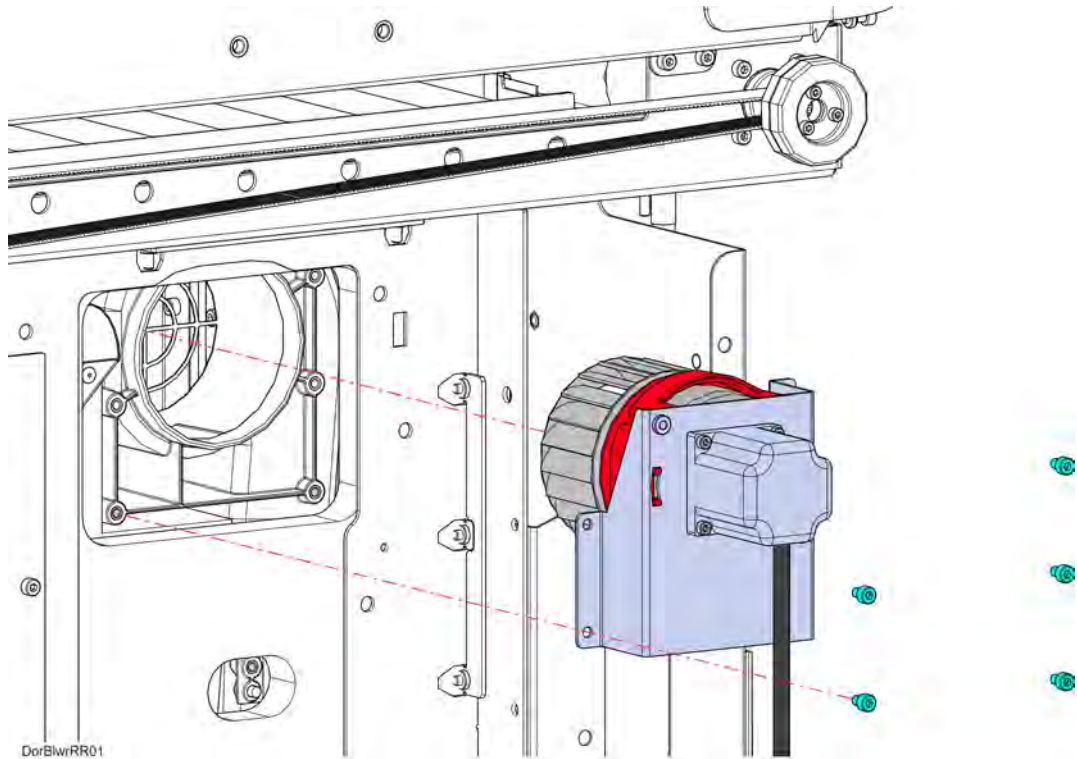
6. Using a 3 mm hex wrench, remove the mounting screws (5) that secure the blower assembly to the oven frame, see [Figure 41](#).

7. Remove the blower assembly from the printer. See Figure 41.



Right side oven blower shown only. The left side blower procedure is identical to the right.

Figure 41: Right Side Blower Assembly Mounting Screw Locations



Installing the Oven Blower Assembly

1. Using a 3 mm hex wrench, reinstall the blower assembly mounting screws (5). See Figure 41.
2. Make sure the blower motor cable is routed properly and secured with tie wraps.
3. Reconnect the fan blower motor cable connector to the I/O board (J39 - right blower, J37 - left blower).
4. **Right-side oven blower only:** Using a 2.5 mm hex wrench, reinstall the mounting screws (2) that secure the side bezel to the printer.
5. Reinstall the side panels. See “Installing the Side Panels” (page 20).
6. Reinstall the rear panel. See “Installing the Rear Panel” (page 18).

Oven Door Gasket

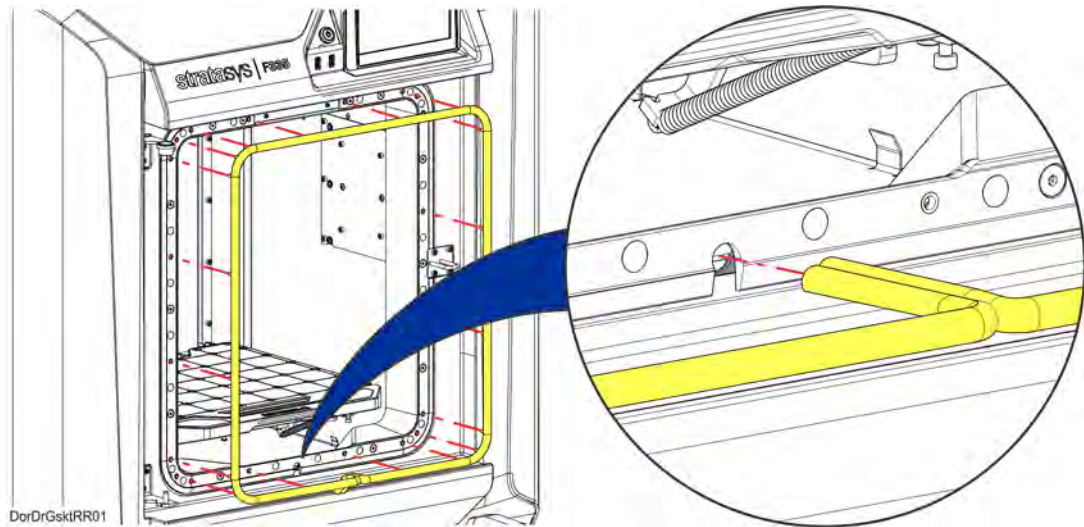
Required Tools

- Screwdriver or similar instrument

Removing the Oven Door Gasket

1. Power OFF the printer. See “Powering Off” (page 17).
2. Open the oven door.
3. Extract the gasket pins out of the holes around the entrance to the oven enclosure. See Figure 42.
4. Pull the ends of the gasket out of the hole below the entrance to the oven enclosure. See Figure 42.
5. Remove the oven gasket from the printer.

Figure 42: Oven Door Gasket Detail (door removed for clarity)



Installing the Oven Door Gasket

1. Insert the gasket pins into the holes around the perimeter of the entrance to the oven enclosure.
2. Use a screwdriver or similar instrument to poke the ends of the gasket into the hole below the entrance to the oven enclosure.
3. Close the oven door.

Z Drive Belt

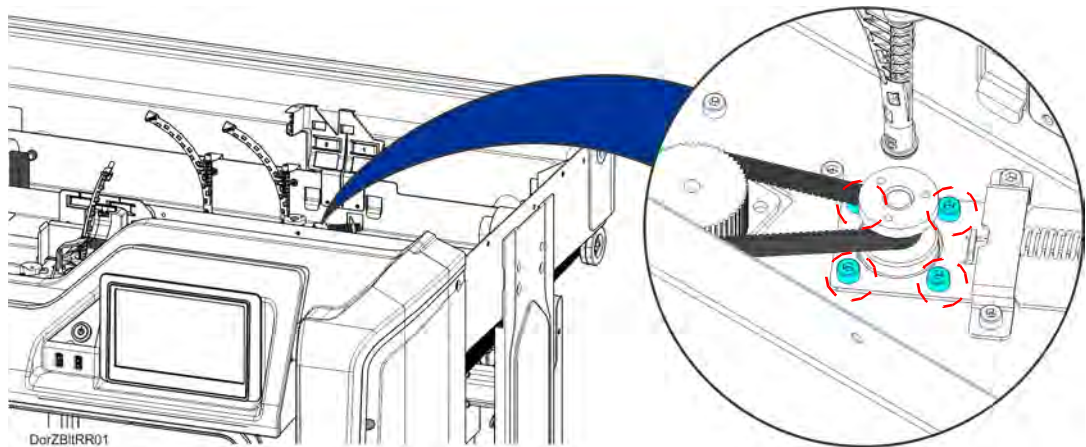
Required Tools

- 3 mm hex wrench
- Small flat head screwdriver

Removing the Z Drive Belt

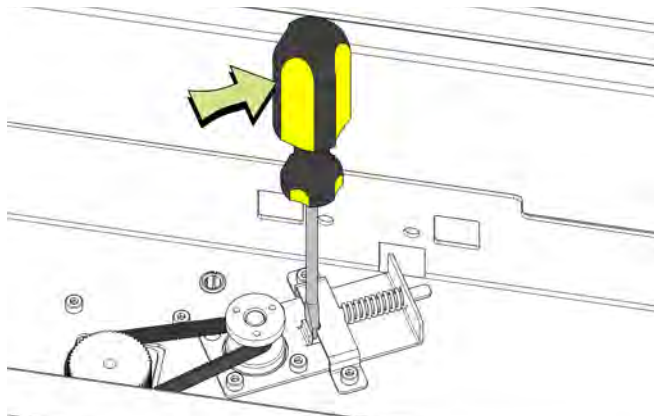
1. Power OFF the Printer. See “Powering Off” (page 17).
2. Remove the rear top cover. See “Removing the Rear Top Cover” (page 21).
3. From inside the gantry enclosure, Use a 3 mm hex wrench to loosen the Z motor mounting screws (4). See Figure 43.

Figure 43: Z Motor Mounting Screw Locations



4. Using a small flat head screwdriver, relax the belt tension by gently prying the Z motor tension bracket away from the compression spring. See Figure 44.

Figure 44: Relaxing Z Belt Tension



5. While the belt tension is relaxed, remove the Z drive belt from its pulleys and extract it from the printer.

Installing the Z Drive Belt

1. Using a small flat head screwdriver, relax the belt tension by gently prying the Z motor tension bracket away from the compression spring. See [Figure 44 \(page 37\)](#).
2. Install the Z drive belt to the Z motor pulley.
3. Install the Z drive belt to the Z axis lead screw pulley.
4. Remove the flat head screwdriver from the tension bracket to restore proper tension to the Z belt.
5. Rotate the lead screw pulley two revolutions to align the Z drive belt on both pulleys.
6. Using a 3mm hex wrench, tighten the Z motor mounting screws (4). See [Figure 43 \(page 37\)](#).
7. Reinstall the rear top cover. See "Installing the Rear Top Cover" (page 22).
8. Close the front top cover.

Y Bellows

Required Tools

- 3 mm hex wrench

Removing the Y Bellows

1. Power OFF the printer.
2. Open the front top cover.

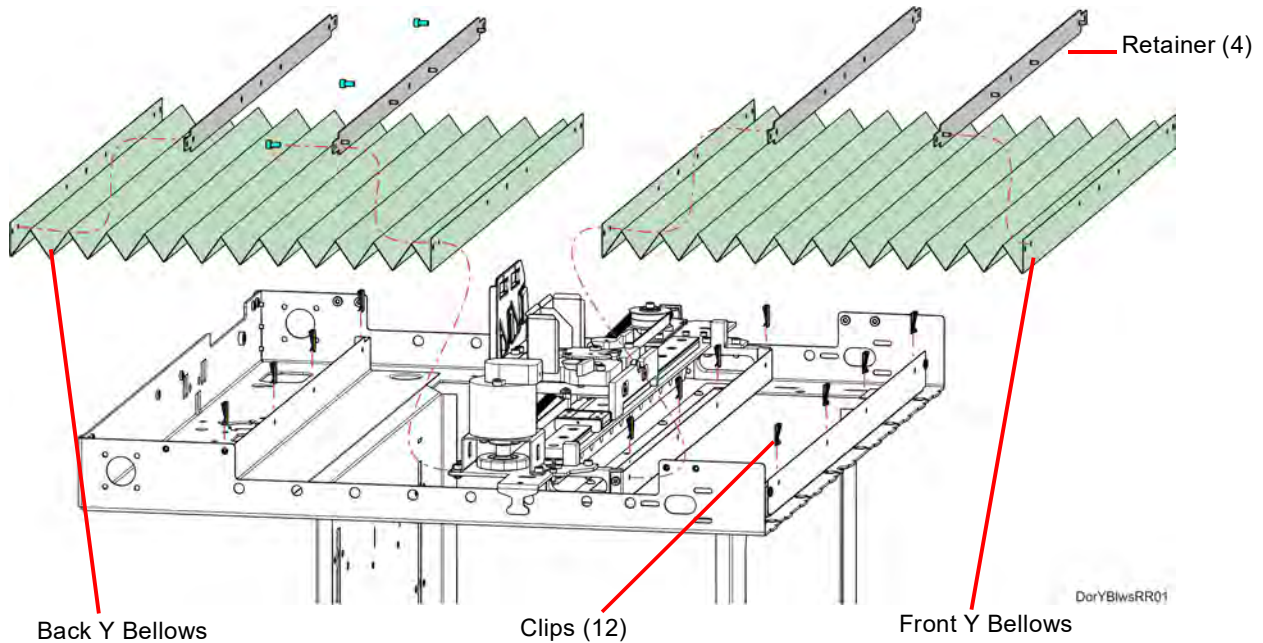


Move the X bridge as necessary to access Y bellows mounting clips and screws.

3. Remove the front Y bellows assembly. See [Figure 45 \(page 39\)](#).
 - a. Remove the clips (4) that secure the front bellows retainer to the front of the oven frame.
 - b. Remove the clips (4) that secure the front bellows retainer to the front of the X bridge assembly tray.
 - c. Remove the front Y bellows and retainers from the gantry enclosure.
 - d. Retain the Y bellows retainers for re-installation.
4. Remove the back Y bellows assembly. See [Figure 45 \(page 39\)](#).
 - a. Remove the clips (4) that secure the back bellows retainer to the rear of the oven frame.
 - b. Using a 3 mm hex wrench, remove the screws (3) that secure the back bellows retainer to the back of the X bridge assembly tray.
 - c. Remove the back Y bellows and retainers from the gantry enclosure.

- d. Retain the Y bellows retainers for re-installation.

Figure 45: Y Bellows Detail



Installing the Y Bellows

1. Transfer the Y bellows retainers to the new Y bellows.
2. Move the X bridge to the front of the gantry enclosure.
3. Install the front and rear clips (8) that secure the front Y bellows assembly to the X bridge and oven frame. See [Figure 45](#).
4. Install the rear clips (4) that secure the back Y bellows assembly to the rear of the oven frame. See [Figure 45](#).
5. Using a 3 mm hex wrench, install the screws (3) that secure the back bellows retainer to the back of the X bridge assembly tray. See [Figure 45](#).

Oven Light

Required Tools

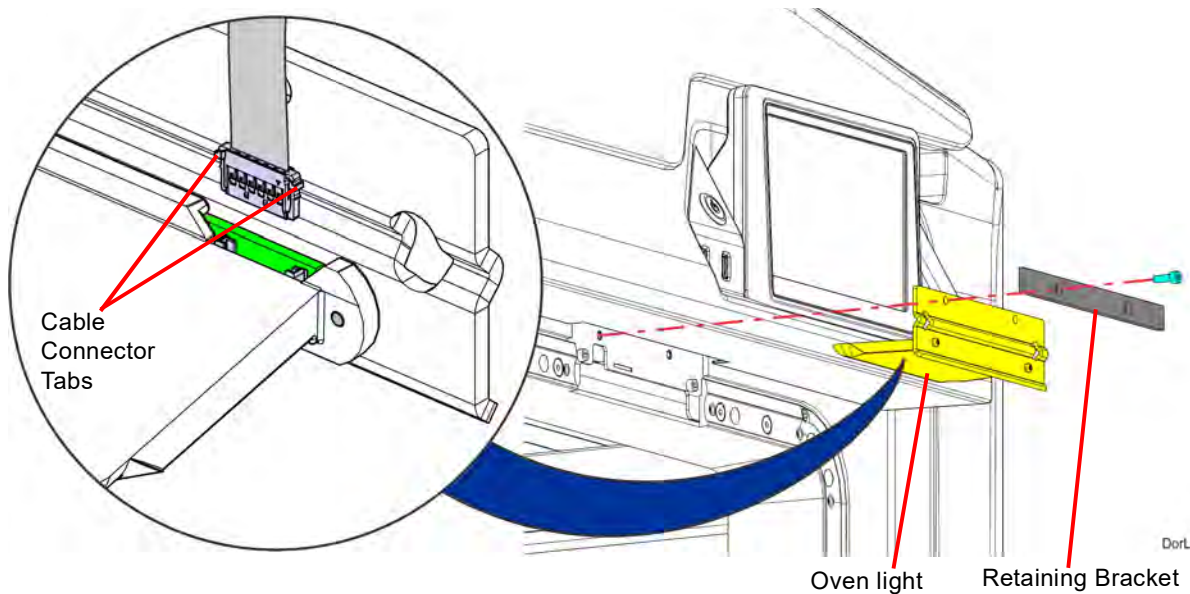
- 3 mm hex wrench
- Small flathead screwdriver

Removing the Oven Light

1. Power OFF the printer. See [“Powering Off”](#) (page 17).
2. Open the oven door.
3. Remove the top gasket pins on both sides of the oven light above the oven enclosure. Temporarily displace the top of the oven door gasket to access the oven light.

4. Using a 3mm hex wrench, remove the oven light mounting screws (2) and the retaining bracket. See [Figure 46](#).
5. Move the oven light out a small distance to access the oven light cable connector.
6. Disconnect the oven light cable connector and remove it from the printer. If necessary, use a small flathead screwdriver to disengage the cable connector tabs. See [Figure 46](#).

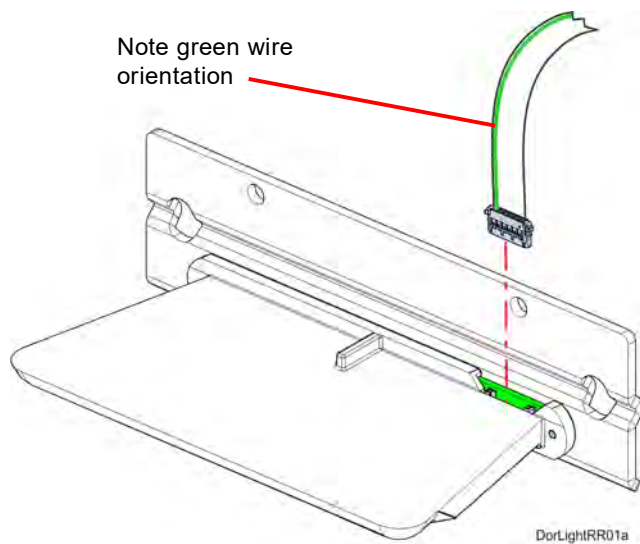
Figure 46: Oven Light Detail



Installing the Oven Light

1. Connect the loose cable connector to the oven light. Orient the cable with the green wire toward the center of the light. See [Figure 47](#).

Figure 47: Oven Light Cable Detail



2. Tuck the excess cable into the bezel opening and push the oven light into its mounting position. If necessary, pull the cable from inside the gantry to remove slack.
3. Insert the oven light into the opening above the oven enclosure.
4. Using a 3mm hex wrench, install the retaining bracket and oven light mounting screws (2). See [Figure 46 \(page 40\)](#).
5. Reinstall the top gasket pins on both sides of the oven light.
6. Close the oven door.
7. Power ON the printer.

Oven Door Camera

Required Tools

- 3 mm hex wrench

Removing the Oven Door Camera

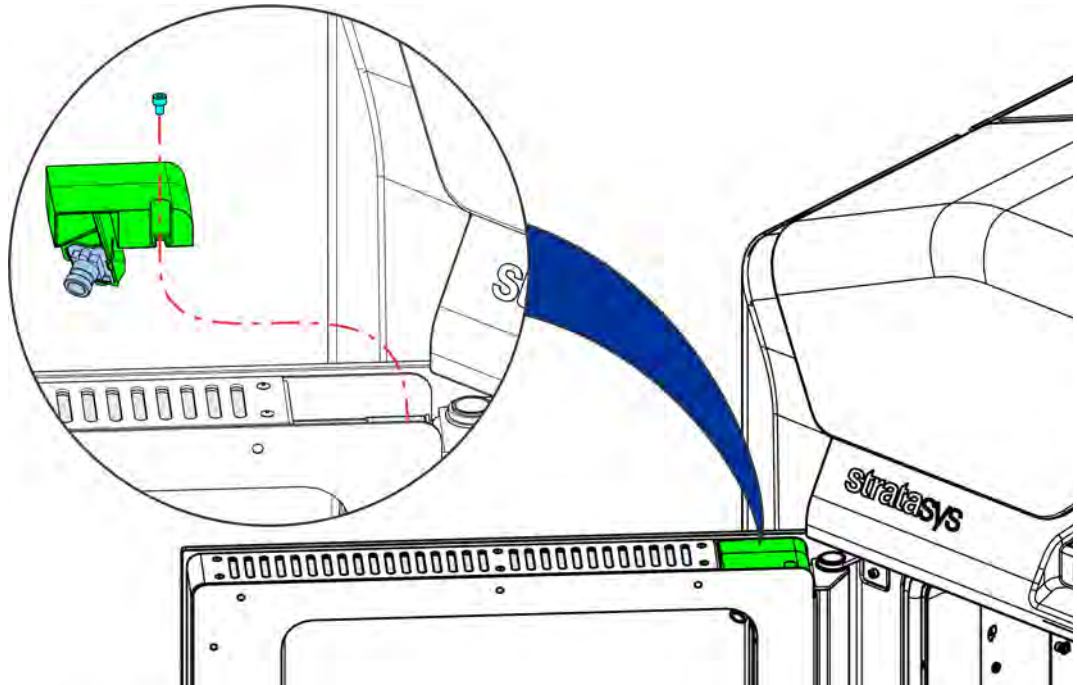


Do not touch the camera lens. If necessary, wipe the camera lens with a clean microfiber cloth.

1. Power OFF the printer. See [“Powering Off” \(page 17\)](#).
2. Open the oven door.
3. Using a 3mm hex wrench, remove the camera assembly mounting screw (1) through the hole in the top of the oven door. See [Figure 48 \(page 42\)](#).
4. Gently move the camera assembly out a small distance and disconnect the cable on the back of the camera.

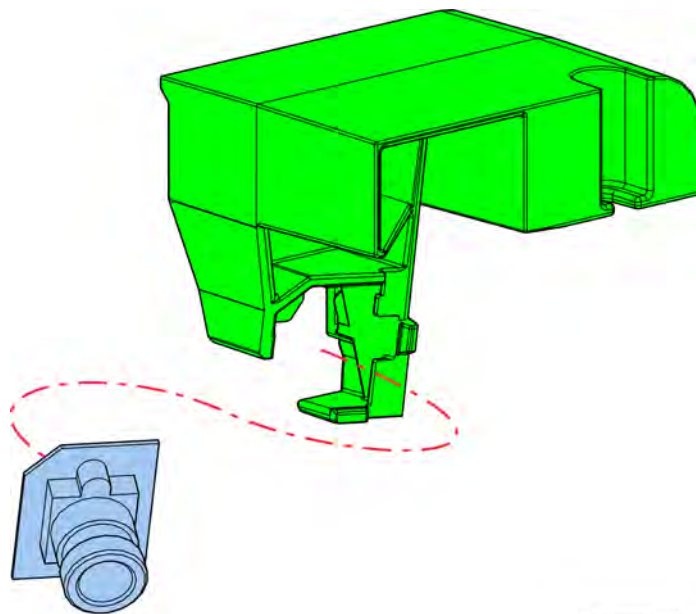
5. Remove the camera assembly from printer. See Figure 48.

Figure 48: Camera Assembly Mounting Screw Location



6. Carefully remove the camera from the mounting bracket. Retain the mounting bracket. See Figure 49.

Figure 49: Camera Detail



DorCameraRR02

Installing the Oven Door Camera



Do not touch the camera lens. If necessary, wipe the camera lens with a clean microfiber cloth.

1. Install the camera to the mounting bracket. See [Figure 49 \(page 42\)](#).
2. Connect the camera cable to the connector on the back of the camera.
3. Using a 3mm hex wrench, install the mounting screw through the hole in the top of the oven door to secure the camera assembly. See [Figure 48 \(page 42\)](#).

Oven Door Latch

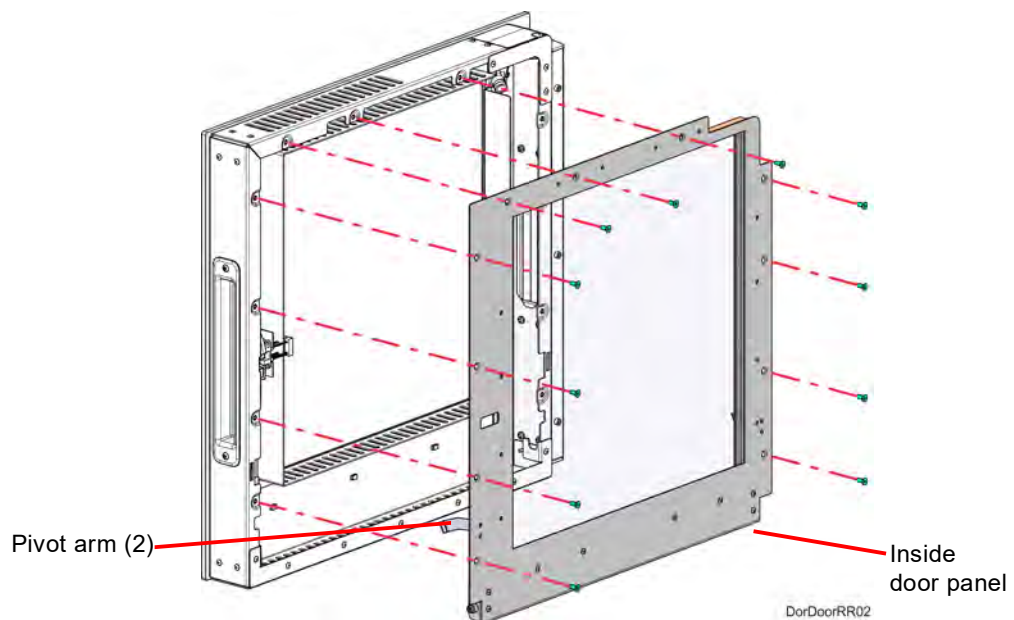
Required Tools

- 2.5 mm hex wrench
- 4 mm socket wrench

Removing the Oven Door Latch

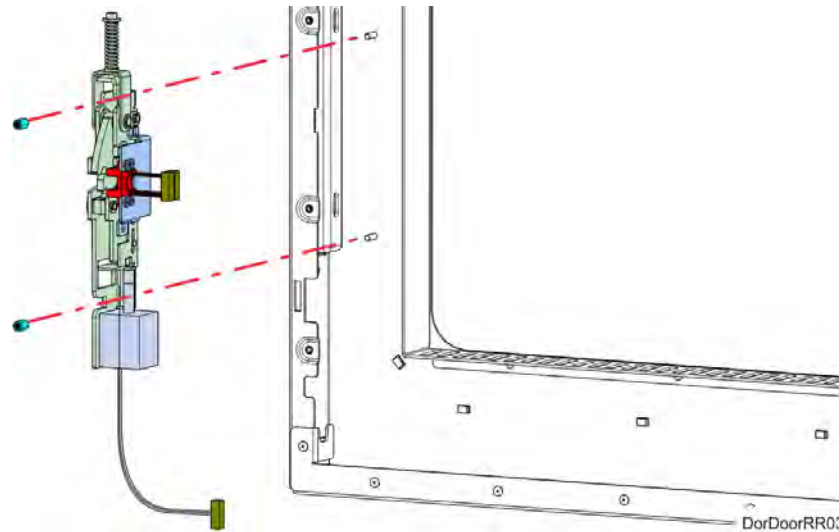
1. Power off the printer. See [“Powering Off” \(page 17\)](#).
2. Open the oven door.
3. Using a 2.5 mm hex wrench, remove the inside door panel mounting screws (11). See [Figure 50](#).
4. Pivot and remove the inside door panel from the door assembly. Gently press on the pivot arms to disengage them from the door assembly. See [Figure 50](#).

Figure 50: Inside door panel mounting screw locations



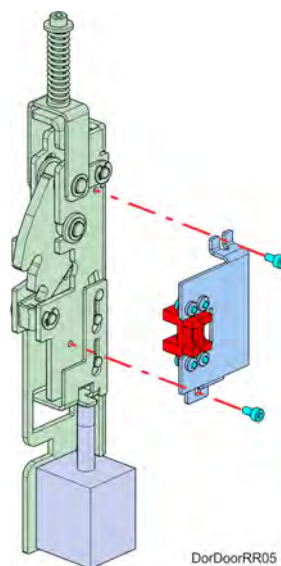
5. Disconnect the door latch assembly solenoid cable connector.
6. Disconnect the door latch assembly sensor cable connectors (2).
7. Using a 4 mm socket wrench, remove the door latch assembly mounting nuts (2). See Figure 51.
8. Remove the door latch assembly from the oven door. See Figure 51.

Figure 51: Door latch assembly mounting nut locations



9. Using a 2.5 mm hex wrench, remove the sensor bracket mounting screws (2). See Figure 52.
10. Remove the sensor and bracket from the latch assembly and retain them for re-installation. See Figure 52.

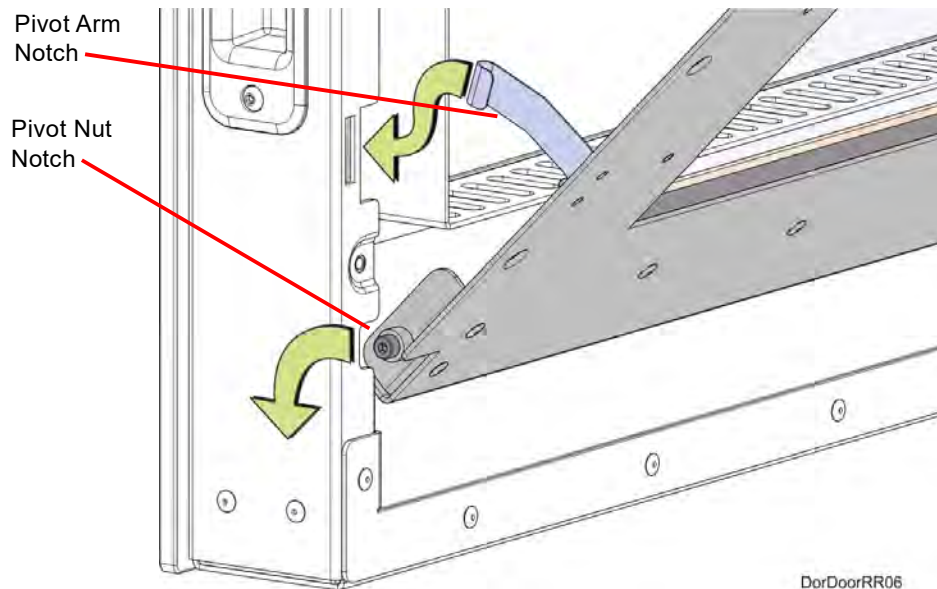
Figure 52: Door latch sensor mounting bracket detail



Installing the Oven Door Latch

1. Using a 2.5 mm hex wrench, install the sensor bracket mounting screws (2) to secure the sensor mounting bracket to the oven door latch assembly. See [Figure 52 \(page 44\)](#).
2. Using a 4 mm socket wrench, install the door latch assembly mounting nuts (2) to secure the door latch assembly inside the oven door assembly. See [Figure 51 \(page 44\)](#).
3. Connect the door latch assembly sensor cable connectors (2).
4. Install the inside door panel into the door assembly. See [Figure 53](#).
 - a. Angle the inside door panel slightly and insert the pivot nuts into the lower notches on both sides of the door frame.
 - b. Gently press down on the door panel until the pivot nuts are fully seated inside the door frame.
 - c. Rotate the top of door panel toward the door assembly. Gently press in the pivot arms to insert them into the upper notches on both sides of the door frame.
 - d. Close the door panel and make sure that the panel and frame mounting holes are aligned.

Figure 53: Inside oven door panel detail



5. Using a 2.5 mm hex wrench, install the inside door panel mounting screws (11). See [Figure 50 \(page 43\)](#).
6. Close the oven door.

Y Blocks

Required Tools

- 3 mm hex wrench

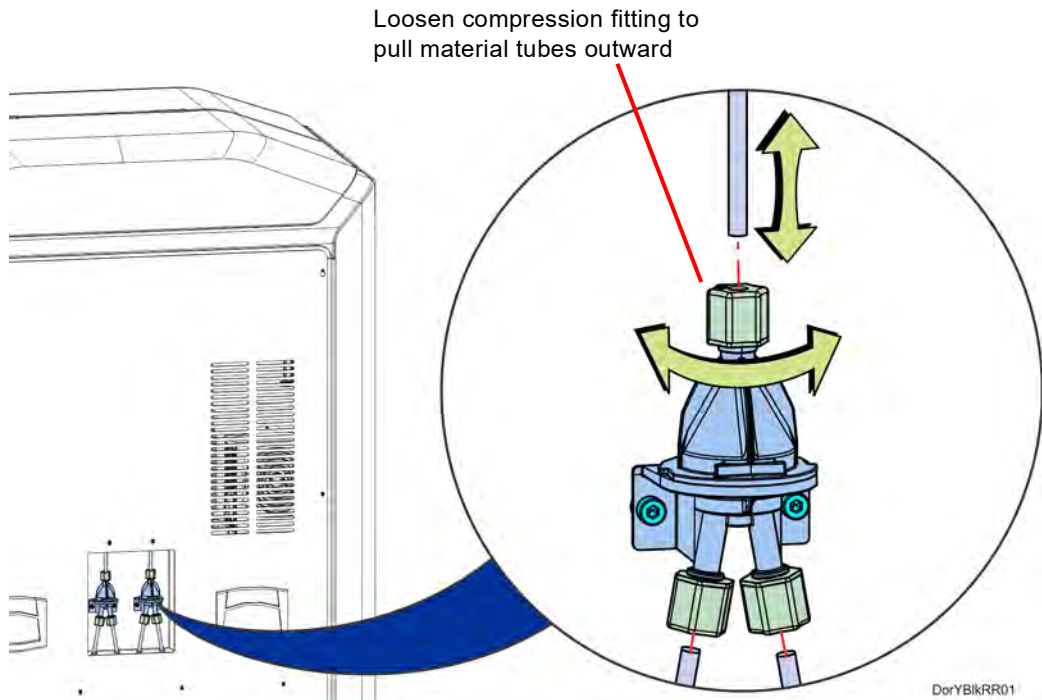
Removal Procedure



Y block removal is the same for both Y blocks. Removal of the model material Y block is depicted in this procedure.

1. Unload material.
2. Power OFF the printer, see “Powering Off” (page 17).
3. Disconnect material tubes at Y block by loosening the compression fittings and pulling the tubes outward. See Figure 54.

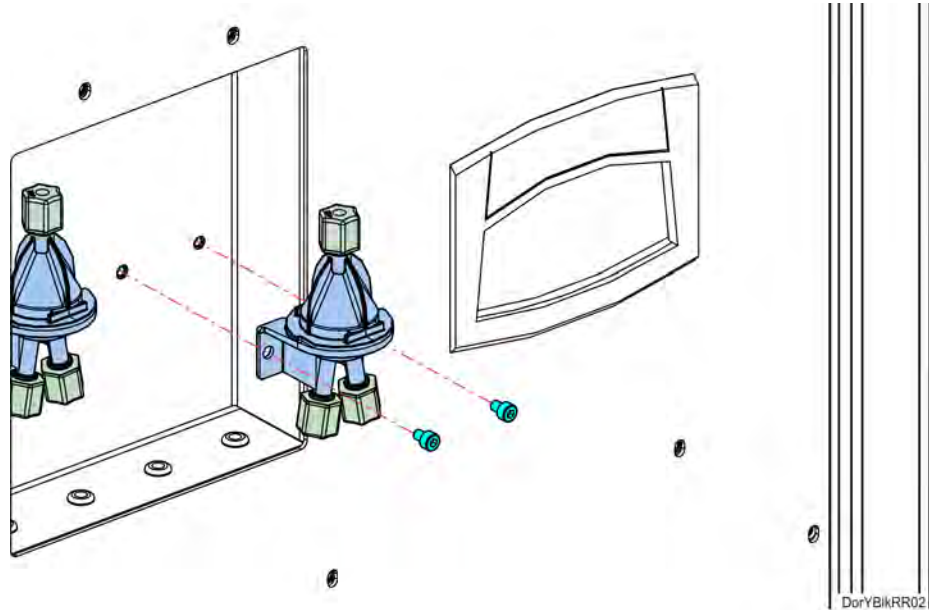
Figure 54: Disconnecting Material Tubes from Y Block



4. Using a 3 mm hex wrench, remove the Y block mounting screws (2). See Figure 55 (page 47).

5. Remove the Y block.

Figure 55: Y Block Mounting Screw Locations



Installing the Y Blocks

1. Align Y block with the mounts and use a 3 mm hex wrench to reinstall the mounting screws (2). See [Figure 55](#).
2. Reconnect the material tubes to the Y block by pushing them through the loose compression fittings until they bottom out. Tighten the compression fittings with the tubes fully seated. See [Figure 54 \(page 46\)](#).



Verify that tubes are going to correct model and support connections.

3. Power ON the printer.
4. Load material to the head from the first model and support material bays.
5. Unload material from the head.
6. Load material to the head from the second model and support material bays.

Top Cover Interlock Sensor and Actuator

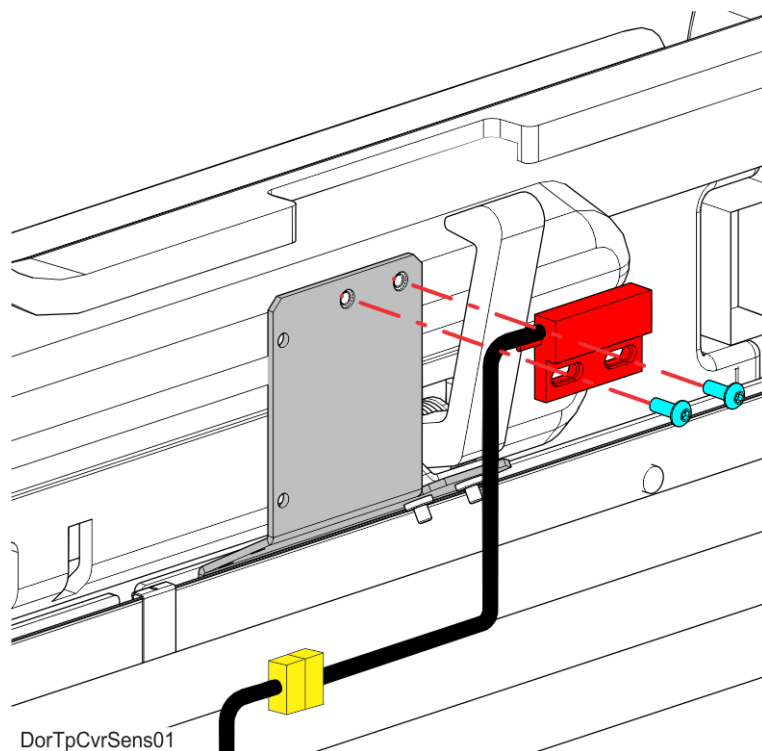
Required Tools

- 2 mm hex wrench
- 2.5 mm hex wrench

Removing Top Cover Interlock Sensor

1. Power OFF the printer. See “Powering Off” (page 17).
2. Open the front top cover.
3. Disconnect the top cover sensor cable at the quick disconnect.
4. Remove the three cable ties that secure the cable to the sensor mounting bracket.
5. Use a 2 mm hex wrench to remove the sensor mounting screws (2). See Figure 56.
6. Remove the top cover sensor from the mounting bracket.

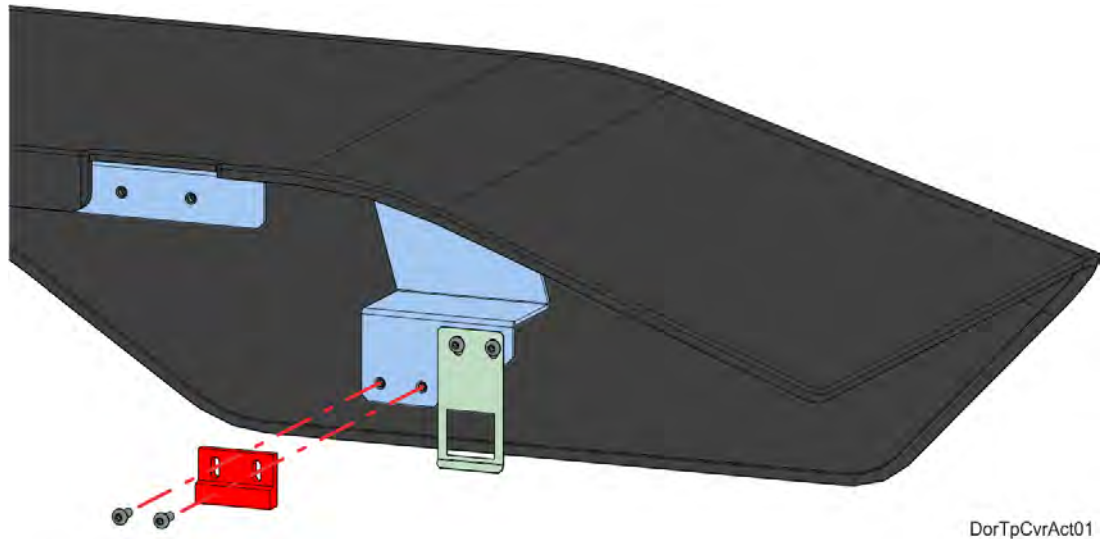
Figure 56: Top Cover Sensor Mounting Screw Locations



7. Use a 2.5 mm hex wrench to remove the top cover actuator mounting screws (2). See Figure 57 (page 49).

8. Remove the top cover actuator.

Figure 57: Top Cover Actuator Mounting Screw Locations



Installing the Top Cover Interlock Sensor

1. Use a 2 mm hex wrench to reinstall the mounting screws (2) that secure the interlock sensor to the mounting bracket. See [Figure 56 \(page 48\)](#).
2. Reconnect the top cover sensor cable at the quick disconnect connector.
3. Install three cable ties to secure the sensor cable to the mounting bracket.
4. Use a 2.5 mm hex wrench to reinstall the mounting screws (2) that secure the interlock actuator to the top cover. See [Figure 57](#).
5. Close the top cover.
6. Power ON the printer.
7. Verify operation by opening and closing the top cover.
8. If the touchscreen displays errors indicating that the cover is not closed, adjust the position of the actuator.

8 TROUBLESHOOTING

This chapter describes troubleshooting steps that can be performed to correct basic problems with the F123 Series.

Getting Help

If you have a problem with your printer or the printer's materials that is not covered in this guide, or if you need to order replacement parts, please contact Customer Support for your region. Contact information is available from the Stratasys website at:
<http://www.stratasys.com/customer-support/contact-customer-support>.

If needed, you can write to Customer Support North America at:

Stratasys, Inc.
Customer Support
7665 Commerce Way
Eden Prairie, MN 55344 USA

Before calling for service or supplies, always have the following information ready:

- Your printer's software version (see [“Software Version”](#) (page 32) for instructions on obtaining this information).
- Your printer's serial number (see [Figure 6](#) (page 7) or [“System Odometers”](#) (page 54) for information on locating the printer's serial number).
- Access to your GrabCAD Print workstation in order to provide a configuration file, if necessary (see [“Exporting System Configuration \(.CFG\) File”](#) (page 6) for instructions on obtaining this information).

Warnings and Errors

If the printer detects an issue that may affect a build, it will be indicated within the Notifications Display portion of the [“Build Page”](#) (page 4). A yellow or red notification badge icon will be displayed, depending on the severity of the warning/error, along with text indicating the reason(s) for the warning. Touching the text on the screen will open a dialog indicating the reason(s) for the notification, and in some cases, steps to correct the notification (see [Figure 4](#) (page 4)).

Depending on the type of warning/error, a notification badge icon may also be displayed within the [“Materials Page”](#) (page 21). The Materials button will be displayed in its warning state within the Navigation Menu to indicate the warning (see [Table 1](#) (page 2)). Within the Materials page a notification badge icon will be displayed over the center of the Material Status Icon experiencing the warning/ error (see [Table 7](#) (page 28)). Touching the notification badge icon on the screen will open the corresponding material's Materials Details page and provide information indicating the cause of a warning/error (see [Figure 29](#) (page 31)).

Warnings at Build Start

Model material does not match selected job

- The model material currently installed does not match the model material configuration of the selected job.
- Correct condition - unload incorrect model material and load the correct model material for the selected job. See [“Unloading Material” \(page 7\)](#) and [“Loading Material” \(page 3\)](#) for instructions.

Support material does not match selected job

- The support material currently installed does not match the support material configuration of the selected job.
- Correct condition - unload incorrect support material and load the correct support material for the selected job. See [“Unloading Material” \(page 7\)](#) and [“Loading Material” \(page 3\)](#) for instructions.

Insufficient model material for part build

- The amount of model material currently installed in the printer is not sufficient for the selected build.
- Correct condition - install additional model material into the printer, see [“Loading Material” \(page 3\)](#) for instructions. When installing additional material you can install a second material spool in order to utilize the auto changeover feature or install an entirely new spool containing enough material to complete the build. Please note that auto changeover is only applicable for the F270 and F370 printers.

Insufficient support material for part build

- The amount of support material currently installed in the printer is not sufficient for the selected build.
- Correct condition - install additional support material into the printer, see [“Loading Material” \(page 3\)](#) for instructions. When installing additional material you can install a second material spool in order to utilize the auto changeover feature or install an entirely new spool containing enough material to complete the build. Please note that auto changeover is only applicable for the F270 and F370 printers.

Order new model head

- The model head has reached 1350 build hours, and is near its odometer limit. Build hours are available within the head's Head Details page (see [“Viewing Head Details” \(page 24\)](#)).
- Correct condition - you are still able to build using this head, but part quality may be affected. Once the head's odometer limit is reached, you will be prompted to change the head (see [“Head Replacement” \(page 12\)](#)).

Order new support head

- The support head has reached 1350 build hours, and is near its odometer limit. Build hours are available within the head's Head Details page (see [“Viewing Head Details” \(page 24\)](#)).
- Correct condition - you are still able to build using this head, but part quality may be affected. Once the head's odometer limit is reached, you will be prompted to change the head (see [“Head Replacement” \(page 12\)](#)).

Replace model head

- The model head has reached 1500 build hours (odometer limit). Build hours are available within the head's Head Details page (see [“Viewing Head Details”](#) (page 24)).
- Correct condition - you are able to continue building using this head but it is recommended that you change the head prior to starting a new build (see [“Head Replacement”](#) (page 12)).

Replace support head

- The support head has reached 1500 build hours (odometer limit). Build hours are available within the head's Head Details page (see [“Viewing Head Details”](#) (page 24)).
- Correct condition - you are able to continue building using this head but it is recommended that you change the head prior to starting a new build (see [“Head Replacement”](#) (page 12)).

Errors Preventing a Build from Starting

Printer busy

- Indicates that the printer is in the process of completing another task and a build cannot be started until the task is complete.
- Correct condition - wait a couple of minutes and then attempt to restart the build.

Close the door

- Indicates that the oven door is open.
- Correct condition - close the oven door.

Close the cover

- Indicates that the top cover is open.
- Correct condition - close the top cover.

Remove the part

- Indicates that the completed part from the previously built job is still in the printer's oven chamber.
- Correct condition - open the oven door and remove the completed part. See [“Removing a Part from the Printer”](#) (page 23) for instructions.

Select a job

- Indicates that a job has not been selected for building.
- Correct condition - select the job you'd like to build from the Job Queue. See [“Selecting a Job to Build”](#) (page 16) for instructions.

Insert a model head

- Indicates that a model head has not been installed into the printer.
- Correct condition - install model head. See [“Head Replacement”](#) (page 12) for instructions.

Insert a support head

- Indicates that a support head has not been installed into the printer.
- Correct condition - install support head. See [“Head Replacement” \(page 12\)](#) for instructions.

Model head not communicating

- Indicates that model head is not enabled/communicating. This will only be displayed when the top cover is closed.
- Correct condition - open the top cover and unclip the head cable from the model head. Wait a few seconds and then reconnect the head cable to the model head and close the top cover (see [“Head Replacement” \(page 12\)](#) for details). If the error persists there is likely a problem with either the head or the head cable; please contact Stratasys Customer Support or your regional Stratasys office for further assistance (see [“Getting Help” \(page 1\)](#) for contact information).

Support head not communicating

- Indicates that support head is not enabled/communicating. This will only be displayed when the top cover is closed.
- Correct condition - open the top cover and unclip the head cable from the support head. Wait a few seconds and then reconnect the head cable to the support head and close the top cover (see [“Head Replacement” \(page 12\)](#) for details). If the error persists there is likely a problem with either the head or the head cable; please contact Stratasys Customer Support or your regional Stratasys office for further assistance (see [“Getting Help” \(page 1\)](#) for contact information).

Model head not initialized

- Indicates that head data is not ready. This is only displayed when the printer is initializing a newly installed head, or if the initialization process failed.
- Correct condition - wait at least 60 seconds after the error is first displayed. If the error persists, open the top cover and unclip the head cable from the model head. Wait a few seconds and then reconnect the head cable to the model head and close the top cover (see [“Head Replacement” \(page 12\)](#) for details). If the error persists there is likely a problem with either the head or the head cable; please contact Stratasys Customer Support or your regional Stratasys office for further assistance (see [“Getting Help” \(page 1\)](#) for contact information).

Support head not initialized

- Indicates that head data is not ready. This is only displayed when the printer is initializing a newly installed head, or if the initialization process failed.
- Correct condition - wait at least 60 seconds after the error is first displayed. If the error persists, open the top cover and unclip the head cable from the support head. Wait a few seconds and then reconnect the head cable to the support head and close the top cover (see [“Head Replacement” \(page 12\)](#) for details). If the error persists there is likely a problem with either the head or the head cable; please contact Stratasys Customer Support or your regional Stratasys office for further assistance (see [“Getting Help” \(page 1\)](#) for contact information).

Invalid Material Combination

- Indicates that the model material and support material are incompatible with each other.
- Correct condition - Install either the correct model material or support material based on the desired build scenario. See [Table 4 \(page 18\)](#) for valid model material and support material combinations

Load model material

- Indicates that model material has not been loaded into the printer.
- Correct condition - load model material. See [“Loading Material” \(page 3\)](#) for instructions.

Load support material

- Indicates that support material has not been loaded into the printer.
- Correct condition - load support material. See [“Loading Material” \(page 3\)](#) for instructions.

Replace invalid model spool

- Indicates that the material spool is invalid. Invalid materials are materials not licensed or not compatible with the associated head type.
- Correct condition - remove the invalid material spool and replace it with a valid spool. See [“Removing Material Spools” \(page 9\)](#) and [“Material Spool Installation” \(page 4\)](#) for instructions.

Replace invalid support spool

- Indicates that the material spool is invalid. Invalid materials are materials not licensed or not compatible with the associated head type.
- Correct condition - remove the invalid material spool and replace it with a valid spool. See [“Removing Material Spools” \(page 9\)](#) and [“Material Spool Installation” \(page 4\)](#) for instructions.

Replace empty model spool

- Indicates that the material spool has run out of material.
- Correct condition - remove the empty material spool and replace with a new spool. See [“Removing an Empty Material Spool” \(page 9\)](#) and [“Material Spool Installation” \(page 4\)](#) for instructions.

Replace empty support spool

- Indicates that the material spool has run out of material.
- Correct condition - remove the empty material spool and replace with a new spool. See [“Removing an Empty Material Spool” \(page 9\)](#) and [“Material Spool Installation” \(page 4\)](#) for instructions.

End of model filament detected

- Indicates that filament from the material spool has not been detected by the filament present switch in the material drive.
- Correct condition - slowly turn the material spool and feed filament into the drive mechanism. Filament needs to be advanced approximately 2 inches (50.8 mm) to reach the filament present switch. See [“Loading Material” \(page 3\)](#) for instructions.

End of support filament detected

- Indicates that filament from the material spool has not been detected by the filament present switch in the material drive.
- Correct condition - slowly turn the material spool and feed filament into the drive mechanism. Filament needs to be advanced approximately 2 inches (50.8 mm) to reach the filament present switch. See [“Loading Material” \(page 3\)](#) for instructions.

Cooler module not installed

- Indicates that the bead cooler has not been installed with the associated PLA material head.
- Correct condition - install the bead cooler.

Load/Unload Errors

Timed out

- Indicates that filament was not detected at the head within 5 minutes of a load's initiation.
- Correct condition - remove the material spool and ensure that it is properly prepared for installation and load. See [“Removing Material Spools” \(page 9\)](#) and [“Material Spool Installation” \(page 4\)](#) for details. Reload the material spool (see [“Loading Material” \(page 3\)](#)).

Purge failed

- Indicates that filament is currently in the head, but the load failed.
- Correct condition - unload model and support material (see [“Unloading Material” \(page 7\)](#)) and then reload these materials (see [“Loading Material” \(page 3\)](#)). Once loaded, verify that material purges from the tips by performing a manual purge of each tip using the purge buttons within the Tip Maintenance page (see [“Head Maintenance” \(page 25\)](#)).

Resource not available

- Indicates that the printer is in the process of completing another task and a load/unload cannot be started until the task is complete.
- Correct condition - wait a couple of minutes and then attempt to load/unload material.

Task already running

- Indicates that the printer is in the process of loading or unloading another bay. Only one material bay can be loaded or unloaded at a time.
- Correct condition - wait until the load/unload in process is complete before attempting to load material to or unload material from another material bay.

Insert filament

- Indicates that the sensor in the material drive controller is not detecting filament. This could indicate that the material spool is empty or filament became broken during the load process.
- Correct condition - remove the material spool and clear all filament from the filament tubes (see [“Removing Material Spools” \(page 9\)](#)). Reload the material spool (see [“Loading Material” \(page 3\)](#)). If the error persists, contact Stratasys Customer Support or your regional Stratasys office (see [“Getting Help” \(page 1\)](#) for contact information).

Insert spool

- Indicates that a material spool has not be installed into the material bay for which you are attempting to load material.
- Correct condition - install a material spool. See [“Material Spool Installation” \(page 4\)](#) for instructions.

Invalid material

- Indicates that the installed material is not licensed for use with the printer.
- Correct condition - to adjust your printer’s material license please contact Stratasys Customer Support or your regional Stratasys office (see [“Getting Help” \(page 1\)](#) for contact information).

Cannot load model in to support head

- Indicates that you have installed a model spool into the wrong location within the material bay.
- Correct condition - Remove the model spool from its current location within the material bay and insert it into a model material bay. For printers with two operating material bays, the model bay is the left bay. For printers with four operating material bays, the model bays are the two left-most bays. See [Figure 11 \(page 10\)](#) for details.

Cannot load support in to model head

- Indicates that you have installed a support spool into the wrong location within the material bay.
- Correct condition - Remove the support spool from its current location within the material bay and insert it into a support material bay. For printers with two operating material bays, the support bay is the right bay. For printers with four operating material bays, the support bays are the two right-most bays. See [Figure 11 \(page 10\)](#) for details.

Cannot change material type during build

- Indicates that the printer is currently in the process of building and you are attempting to change model or support material during the build.
- Correct condition - you cannot change material types while the printer is in the process of building a part. Wait until the build is complete before changing materials.

Build Pause Warnings



Any pause not initiated by the operator will display a warning which must be acknowledged on the User Interface before the printer can resume building.

User requested

- Indicates that a pause was initiated by the operator or inserted within the job's file.
- Correct condition - resume the build by pressing the **Play** button within the Build page (see [Table 3 \(page 12\)](#) for button details).

Failed to change material

- Indicates that the load or unload process failed during auto changeover.
- Correct condition - remove the material spool (see ["Removing Material Spools" \(page 9\)](#)) and check to see if material can move freely on the spool by pulling out a few inches of material.
 - If material can move freely, reinstall and reload the material spool (see ["Loading Material" \(page 3\)](#) for instructions). Contact Stratasys Customer Support or your regional Stratasys office if material load fails again (see ["Service" \(page 1\)](#) for contact information).
 - If material cannot move freely, contact Stratasys Customer Support or your regional Stratasys office (see ["Getting Help" \(page 1\)](#) for contact information).

Out of model material

- The printer has run out of model material. If 2 model material spools are installed, this warning indicates that both spools are empty.
- Correct condition - remove the empty material spool(s) and replace as needed. See ["Removing an Empty Material Spool" \(page 9\)](#) and ["Material Spool Installation" \(page 4\)](#) for instructions.

Out of support material

- The printer has run out of support material. If 2 support material spools are installed, this warning indicates that both spools are empty.
- Correct condition - remove the empty material spool(s) and replace as needed. See ["Removing an Empty Material Spool" \(page 9\)](#) and ["Material Spool Installation" \(page 4\)](#) for instructions.

Active model spool removed

- Indicates that the printer lost contact with the material spool's memory chip or the material drive controller inadvertently lifted.
- Correct condition - ensure that the material spool is seated correctly within the material drive. If so, remove the spool and then reinstall it (see ["Removing Material Spools" \(page 9\)](#) and ["Material Spool Installation" \(page 4\)](#)). If this does not correct the error, remove the spool and install a new spool.

Active support spool removed

- Indicates that the printer lost contact with the model material spool's memory chip or the material drive controller inadvertently lifted.
- Correct condition - ensure that the material spool is seated correctly within the material drive. If so, remove the spool and then reinstall it (see ["Removing Material Spools"](#) (page 9) and ["Material Spool Installation"](#) (page 4)). If this does not correct the error, remove the spool and install a new spool.

Model head removed

- Indicates that the printer lost contact with the model head.
- Correct condition - ensure that the head is seated correctly within the gantry. If so, remove the head and then reinstall it (see ["Head Replacement"](#) (page 12)). If this does not correct the error, remove the head and install a new head.

Support head removed

- Indicates that the printer lost contact with the support head.
- Correct condition - ensure that the head is seated correctly within the gantry. If so, remove the head and then reinstall it (see ["Head Replacement"](#) (page 12)). If this does not correct the error, remove the head and install a new head.

Model filament broken

- Indicates that the sensor in the material drive controller is not detecting the model filament and the material volume on the spool is large enough that the filament probably broke rather than ran out. This can also be caused by spool axles being interchanged between different spools or by the system improperly calculating used filament volume.
- Correct condition - remove the material spool and clear all filament from the filament tubes (see ["Removing Material Spools"](#) (page 9)). If the spool is not empty, the filament present switch in the material bay may be defective. Replace the material bay (see ["Material Bays"](#) (page 24)). If the spool is empty, replace it with another spool (see ["Loading Material"](#) (page 3)). If the error is not resolved, check the job log for any zero volume jobs and reboot the printer. If the error persists, contact Stratasys Customer Support or your regional Stratasys office (see ["Getting Help"](#) (page 1) for contact information).

Support filament broken

- Indicates that the sensor in the material drive controller is not detecting the support filament and the material volume on the spool is large enough that the filament probably broke rather than ran out. This can also be caused by spool axles being interchanged between different spools or by the system improperly calculating used filament volume.
- Correct condition - remove the material spool and clear all filament from the filament tubes (see ["Removing Material Spools"](#) (page 9)). If the spool is not empty, the filament present switch in the material bay may be defective. Replace the material bay (see ["Material Bays"](#) (page 24)). If the spool is empty, replace it with another spool (see ["Loading Material"](#) (page 3)). If the error is not resolved, check the job log for any zero volume jobs and reboot the printer. If the error persists, contact Stratasys Customer Support or your regional Stratasys office (see ["Getting Help"](#) (page 1) for contact information).

Build Abort Errors



All abort related errors must be acknowledged on the User Interface before the printer is put into an aborted state.

Aborted by user

- Indicates that the abort was initiated by the operator.
- Correct condition - remove the aborted build from the printer, see [“Removing a Part from the Printer” \(page 23\)](#) for instructions.

Failed to find Z zero

- Indicates that the Z stage failed to find its home position.
- Correct condition - verify that there is nothing obstructing the calibration targets on the platen, see [“Cleaning the Platen” \(page 12\)](#) for instructions.

Failed to process the part

- An error occurred when attempting to translate the CMB file into commands for the printer.
- Correct condition - often the result of a corrupted or outdated CMB file. Ensure that your printer’s software version is up to date (see [“Updating Controller Software” \(page 1\)](#)) and that you are using the correct version of GrabCAD Print software. Reprocess, reorient, and resend the job file to the printer using GrabCAD Print (see [“GrabCAD Print Software” \(page 19\)](#)) and then restart the build (see [“Basic Job Build Tasks” \(page 14\)](#) for instructions).

Failed to load toolpaths

- Printer unexpectedly lost job information during the build.
- Correct condition - reprocess, reorient, and resend the job file to the printer using GrabCAD Print (see [“GrabCAD Print Software” \(page 19\)](#)). If you encounter the same error when rebuilding with the reprocessed file, attempt to build a different file to see if the error occurs again. If so, contact Stratasys Customer Support or your regional Stratasys office (see [“Getting Help” \(page 1\)](#) for contact information).

Failed to calibrate tip offsets

- Indicates that the printer failed to calibrate tip offsets.
- Correct condition - perform an automatic tip calibration ([“Automatic Tip Calibration” \(page 2\)](#)). If calibration fails, perform a manual tip calibration ([“Manual Tip Calibration” \(page 5\)](#)). If calibration fails again, contact Stratasys Customer Support or your regional Stratasys office (see [“Getting Help” \(page 1\)](#) for contact information).

Active spool removed

- Indicates that the active material spool was removed. This is only displayed when the printer is preparing for a build.
- Correct condition - install a material spool and load model material. See [“Material Spool Installation” \(page 4\)](#) and [“Loading Material” \(page 3\)](#) for instructions.

Model head removed

- Indicates that the printer lost contact with the model material spool's memory chip or the material drive controller inadvertently lifted.
- Correct condition - ensure that the material spool is seated correctly within the material drive. If so, remove the spool and then reinstall it (see ["Removing Material Spools"](#) (page 9) and ["Material Spool Installation"](#) (page 4)). If this does not correct the error, remove the spool and install a new spool.

Support head removed

- Indicates that the printer lost contact with the support material spool's memory chip or the material drive controller inadvertently lifted.
- Correct condition - ensure that the material spool is seated correctly within the material drive. If so, remove the spool and then reinstall it (see ["Removing Material Spools"](#) (page 9) and ["Material Spool Installation"](#) (page 4)). If this does not correct the error, remove the spool and install a new spool.

File not found

- Indicates that the printer was unable to locate the job file that was selected for building. This error pertains to job files loaded via USB flash drive only.
- Correct condition - ensure that the USB flash drive containing the selected job file is securely inserted into one of the USB ports within the interface panel (see [Figure 3](#) (page 3) for port locations). Once the flash drive is securely inserted into one of the printer's USB ports select the file you'd like to build by loading it to the Job Queue (see ["USB Method"](#) (page 14)).

Unknown error

- An unexpected error occurred in which the printer was unable to map the cause of the error to a known abort reason.
- Correct condition - attempt to restart the build, see ["Basic Job Build Tasks"](#) (page 14) for instructions. If the error persists, contact Stratasys Customer Support or your regional Stratasys office (see ["Getting Help"](#) (page 1) for contact information).



The warnings and errors listed below are displayed within the notifications area of the Head Details page. See ["Viewing Head Details"](#) (page 24) for details.

Head Warnings

Not initialized

- Indicates that head data is not ready. This is only displayed when the printer is initializing a newly installed head, or if the initialization process failed.
- Correct condition - wait at least 60 seconds after the error is first displayed. If the error persists, open the top cover and unclip the head cable connected to the corresponding head. Wait a few seconds and then reconnect the head cable to the head and close the top cover (see [“Head Replacement” \(page 12\)](#) for details). If the error persists there is likely a problem with either the head or the head cable; please contact Stratasys Customer Support or your regional Stratasys office for further assistance (see [“Getting Help” \(page 1\)](#) for contact information).

Order new model head

- Indicates that the model head is near its odometer limit. This warning is displayed as a reminder to order a replacement head for the one that is approaching its odometer limit. Build hours are available within the head’s Head Details page (see [“Viewing Head Details” \(page 24\)](#)).
- Correct condition - you are still able to build using this head, but part quality may be affected. Once the head’s odometer limit is reached, you will be prompted to change the head (see [“Head Replacement” \(page 12\)](#)).

Order new support head

- Indicates that the support head is near its odometer limit. This warning is displayed as a reminder to order a replacement head for the one that is approaching its odometer limit. Build hours are available within the head’s Head Details page (see [“Viewing Head Details” \(page 24\)](#)).
- Correct condition - you are still able to build using this head, but part quality may be affected. Once the head’s odometer limit is reached, you will be prompted to change the head (see [“Head Replacement” \(page 12\)](#)).

Head Errors

Replace model head

- Indicates that the model head has reached its build hour odometer limit. This error message is displayed as a reminder that you should replace the head before starting another build. Build hours are available within the head’s Head Details page (see [“Viewing Head Details” \(page 24\)](#)).
- Correct condition - you are able to continue building using this head but it is recommended that you change the head prior to starting a new build (see [“Head Replacement” \(page 12\)](#)).

Replace support head

- Indicates that the support head has reached its build hour odometer limit. This error message is displayed as a reminder that you should replace the head before starting another build. Build hours are available within the head's Head Details page (see [“Viewing Head Details”](#) (page 24)).
- Correct condition - you are able to continue building using this head but it is recommended that you change the head prior to starting a new build (see [“Head Replacement”](#) (page 12)).

Finding a Remedy

The following table lists various troubleshooting scenarios you may encounter when operating the printer and methods for resolving these scenarios.

Condition	Possible Cause	Remedy
Material spool will not load	Empty material spool (zero volume).	Remove and replace empty material spool (see “Removing Material Spools” (page 9) and “Material Spool Installation” (page 4)).
	Incorrect material spool type installed.	The F123 Series utilizes a different material spool memory chip than other Stratasys printers. As a result, only F123 Series material spools can be used to build parts on the printer. Ensure that an F123 Series material spool is installed.
	Material spool memory chip circuit failed.	View the spool's associated Material Status Icon within the Materials page. If the icon is red, there may be an issue with the material spool's memory chip. Unload and then reload the spool. If the error persists, replace the spool with a new one. See “Unloading Material” (page 7), “Removing Material Spools” (page 9), and “Loading Material” (page 3).
	Filament does not reach head (load time-out reached)	Remove material spool and replace with a new spool (see “Removing Material Spools” (page 9) and “Loading Material” (page 3)). If the error persists, contact Customer Support or your regional Stratasys office (see “Getting Help” (page 1) for contact information).
Loss of extrusion (head will not extrude material)	Plugged Tips	Verify that material purges by initiating a purge using the model and/or support purge buttons. See “Head Maintenance” (page 25). Replace head with new head and recalibrate. See “Head Replacement” (page 12).
	Printer not calibrated	Perform a Tip Offset Calibration. See “Tip Calibration” (page 1).

Condition	Possible Cause	Remedy
Support material is difficult to remove from part	Support material is embedded in the vertical surfaces of the part.	Adjust the Tip Offset Calibration. See “Manual Tip Calibration” (page 5).
Model material surface finish is poor on downward facing surfaces Support material removes too easily	The tip to tip calibration is not set correctly.	Repeat Tip Offset Calibration. See “Manual Tip Calibration” (page 5).
Material oozing	Moisture in the material spool.	Contact Customer Support or your regional Stratasys office (see “Getting Help” (page 1) for contact information).
Oven not maintaining temperatures	Heater failure.	Contact Customer Support or your regional Stratasys office (see “Getting Help” (page 1) for contact information).
	Oven door open.	Close the oven door; the heater turns off while the door is open.
	Oven door not sealing.	Check oven door seal and verify that it is securely affixed to oven door frame and does not exhibit cuts/tears. If excessive wear is visible, Contact Customer Support or your regional Stratasys office (see “Getting Help” (page 1) for contact information).

9 SUPPLEMENTARY INFO

Declaration of Conformity

Declaration of Conformity information is available from the Stratasys website at: <http://articles.stratasys.com/additional-support-documentation/declaration-of-conformity/f170-f270-f370-ec-declaration-of-conformity>.

Regulatory and Environmental Information

EMC Class A Warning

**Warning:**

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Statements (U.S.A.)

The U.S. Federal Communications Commission (in 47 cfr1 5.105) has specified that the following notices be brought to the attention of users of this product.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Caution:**

Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this equipment not expressly approved by Stratasys, Ltd. may cause harmful interference and void the FCC authorization to operate this equipment.



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Canada Electromagnetic compatibility (EMC)

Normes de Sécurité (Canada)

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

DOC Statement (Canada)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

MSDS (Material Safety Data Sheet)

You can obtain current Material Safety Data Sheets for printer materials from the Stratasys website at: <http://www.stratasys.com/materials/material-safety-data-sheets>.

Disposal of Waste Equipment by Users in Private Households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.



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