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Free**Shape** 120
User Manual

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UV Light Safety

This product uses a light engine that outputs ultraviolet light in the UV-A range, with possible trace amounts in the UV-B range. This product is compliant with the international standard ISO 3059:2012 in accordance with non-destructive penetration testing of UV irradiance. This product encloses the light engine in opaque and UV-filtered material to prevent UV light exposure. However, incidental UV light may extrude from the machine due to any of the following:
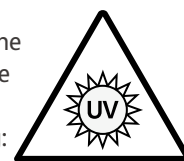
- Leaving the door open during usage
- Gaps or holes in the sides of the machine
- Transparent or translucent resins

During operation, do not stand near this product for prolonged periods of time, and do not look directly into the lighted area. Improper exposure to UV light can cause painful eye and skin injuries.

■ UV Protective Gear

Eye Protection	UV light exposure is most potentially damaging to the eyes. Wear UV-filtered glasses, goggles, or a face shield to protect your eyes from the damaging effects.
Gloves	Skin exposure is most likely on the hands, which are oftentimes closest to the product during operation. Wear thick cloth or rubber gloves to protect your hands from UV exposure.
Thick Clothing	Other areas of the skin may be exposed, especially if the product is used in cramped environments. Wear long-sleeved shirts with collars, long pants, and even cloth hats to protect your skin from incidental exposure.
Skin Protective Substances	Topical agents such as sunblock, sun cream, or similar substances can protect against the effects of UV light, but these are generally designed for outdoor use. Do not rely on such substances in lab environments, but use them as an extra layer of protection if necessary.

■ Prolonged Exposure

Eye Exposure	Direct UV-A light into the eye can lead to irritation, temporary blindness, and the forming of cataracts on the lens of the eye. UV-B light can compound the cataract-forming effect, and can also lead to photokeratitis and photoconjunctivitis.
Skin Exposure	Direct UV-A and UV-B light on the skin can cause localized tanning, burning of the skin, and can lead to skin cancer in extreme long-term situations.

Resin Safety

Resins provided by Ackuretta are non-carcinogenic acrylic-based photopolymer liquids that give off a light odor. These resins may cause skin, eyes and respiratory system irritation, and skin sensitivities or allergic reactions by skin contact. Inhalation of a high high-vapour concentration may cause headaches and nausea. Ackuretta recommends the following protective gear when handling photopolymer resins, whether from Ackuretta or from another company:

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■ Resin Protective Gear

Gloves	The hands are the most likely affected area when handling resins. Wear rubber, nitrile, polyvinyl chloride, or other chemical-resistant gloves.
Eye Protection	While using air compressors or due to usage or handling, resin may splash into the eyes. Wear protective goggles, safety glasses with side shields, or a face shield.
Face Mask or Respirator	If the room does not have sufficient ventilation, wear a respirator or medical face mask to protect against inhalation or accidental exposure to the mouth.
Thick Clothing	Prolonged exposure to resin may cause irritation or may cause allergies to develop where they previously did not seem to occur. Wear long-sleeved shirts with collars, long pants, and even cloth hats to protect your skin from incidental exposure.

■ Acute Exposure

Skin Contact	This product may cause skin irritation. Symptoms may include a slightly localized redness or rash and swelling. Repeated exposure may cause sensitization and allergic skin reaction in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking.
Eye Contact	This product may cause eye irritation. Symptoms may include excessive tearing, itching, irritation, blinking and redness.
Inhalation	This product may be a suspect slight respiratory tract irritation hazard, especially if used at elevated temperature or processes which may generate aerosols or mists. Symptoms of irritation may include coughing, headache and nausea, mucous production and shortness of breath.
Ingestion	This product may be harmful if swallowed. It may cause nausea, headache, vomiting, diarrhoea, and/or central nervous system effects. Keep all food in an area separate from storage and use locations. Prohibit eating, drinking and smoking in areas where there is a potential for significant exposure to this material. Thoroughly wash hands before eating.

■ Chronic Exposure

Skin Contact	Prolonged contact may cause sensitivities and allergic reactions. People with pre-existing skin conditions may incur more significant irritation. Repeated exposure may cause sensitization and allergic skin reactions in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking.
Eye Contact	Prolonged contact may cause redness of eye tissue.
Inhalation	Prolonged or repeated overexposure may cause irritation, headaches, and nausea.
Ingestion	Prolonged or repeated swallowing may be a slight ingestion hazard. Chronic ingestion of high doses has shown damage to testes in studies with animals.

■ **Disposal**

Resins provided by Ackuretta are not readily biodegradable. Releasing these resins into the environment may be illegal according to the regulations in the usage area.

  * Properly dispose of resins in accordance with all applicable federal, state, and local regulations.

For more information, please refer to the Material Safety Data Sheet for your particular resin.

Cleaning Alcohol Safety

To clean prints, Ackuretta recommends using solutions of 95% ethyl alcohol or 95-99% isopropyl alcohol (IPA). Both compounds are colorless, transparent, and naturally give off strong odors. Both compounds have the following major safety concerns:

- **Highly flammable and potentially explosive.**
- Toxic and can cause adverse conditions from ingestion, inhalation, or direct contact.
- Evaporate quickly so they can become an airborne toxins.
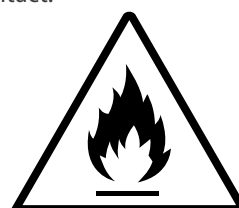
To avoid these potential issues, do the following:

- Store in cool, dry, and well-ventilated areas.
- Label containers with instructions regarding handling and storage.
- Keep away from any sources of heat, fire, and sparks.
- Keep away from strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids and isocyanates.
- Close containers tightly with a strong seal immediately after use.
- Dispose in accordance with all applicable federal, state, and local regulations.

Adverse conditions may include:

■ **Acute Exposure**

Skin Contact	This product may cause skin irritation. Symptoms may include skin discoloration, dryness, and cracking.
Eye Contact	This product may cause eye irritation. Symptoms may include excessive tearing, itching, irritation, blinking and redness.
Inhalation	This product may be a slight respiratory tract irritation hazard. Symptoms may include nose, throat, and lung irritation, coughing, and/or shortness of breath.
Ingestion	This product may be harmful if swallowed. It may cause nausea, headache, vomiting, and/or unconsciousness. It can also affect concentration and vision.

■ **Chronic Exposure**

Skin Contact	Prolonged contact may cause sensitivities and allergic reactions. Repeated exposure may cause sensitization and allergic skin reaction in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking. Alcohol can be absorbed through the skin and may result in symptoms similar to those listed under acute ingestion.
Eye Contact	Prolonged contact may cause redness of eye tissue.
Inhalation	Repeated high exposure may affect the liver and the nervous system.
Ingestion	Occupational exposure is unlikely to cause cancer, but direct and repeated ingestion may increase the risk of liver, esophagus, breast, prostate, and colorectal cancers. Pregnant women should not ingest alcohol, and repeated exposure may cause spontaneous abortions, birth defects, and other developmental problems. Repeated ingestion may also reduce fertility in males.

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Chapter 1: About the FreeShape 120

Resin-based 3D printing has advanced in several stages, starting from laser-based SLA machines to much faster DLP printers. Ackuretta brings its technical expertise into the next stage of printing with the FreeShape 120, a desktop LCD printer that delivers high-resolution, smooth surface prints at a price point that is ideal for the entry-level market.

■ Specifications

3D Printing Technology	LCD
Machine Size	25 × 23 × 38 cm
Weight	9 kg
Printing Size	120 × 68 × 140 mm
XY Resolution	47 µm
Slice Thickness	30 - 200 µm
Resin Wavelength	405 nm
Power Supply	110-240VAC, 50-60Hz

■ Features

Complete Workflow Solutions

Open Material System

High Resolution 47 µm

Smooth Surface Printing

Advanced Software

Wi-Fi Enabled

Auto Calibration

■ Package Contents

Build platform	Vat	Ethernet cable	Power cable
Wi-Fi dongle	Vat film sheets (×2)	LCD panels (×2)	Hex key

FreeShape 120

■ Machine Overview

Front Side

- Build platform
- Hood
- Vat
- Console

Back Side
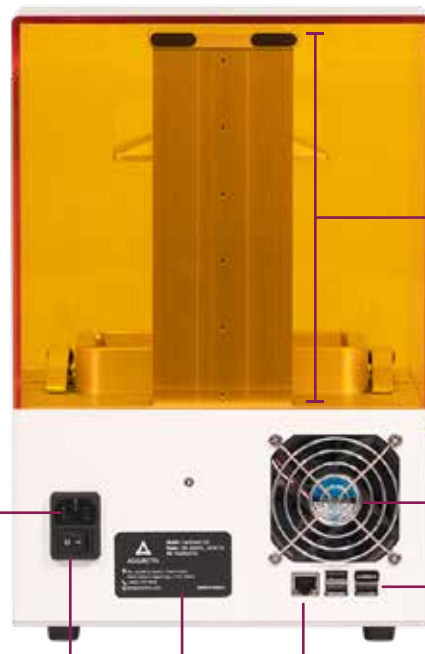
- Guideway
- Power port
- Fan
- USB ports
- Ethernet/LAN port
- Power switch
- Serial number sticker

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■ Machine Console Interface
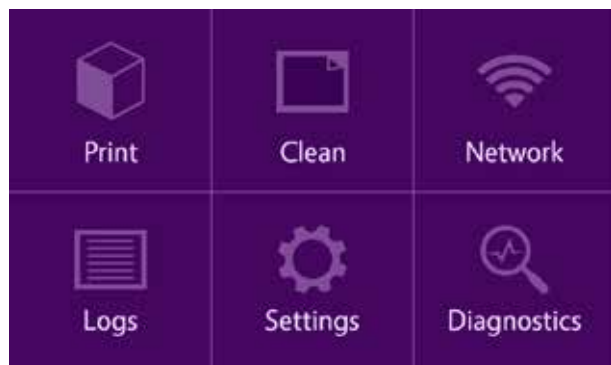
When you turn on your FreeShape 120, the machine will spend a few seconds loading, and then will arrive on the home screen. The home screen has the following functions:

Print	The Print screen is your main center for uploading files and getting your printer started. For more information, see **Printing**.
Clean	If your print fails, use the Clean function to remove pieces of prints that did not stick to the build platform during printing. The Clean function cures one layer of resin at the bottom of the vat, and then you can easily remove that cured layer and throw away any lingering debris with it. For more information, see **Using the Clean Vat Function**.
Network	Connect to a Wi-Fi network or a static IP address. For instructions on how to set up a network connection, go to **Connecting to a LAN or Wi-Fi Network**.
Log History	View the FreeShape 120 print, system, and error logs.
Settings	Configure your FreeShape 120 system settings, or update your printer firmware. For more information, see **Configuring Your Printer**.
Diagnostics	If your printer encounters a problem, use the Diagnostics functions to determine the source of the issue. For more information about FreeShape 120 diagnostics, send a request email with your FreeShape 120 serial number to **support@ackuretta.com**.

■ Web Console Interface

The web console is very similar to the machine console interface, with the functions arranged in a browser-friendly format. To access the web console, you will need to connect to a LAN or Wi-Fi network. For details, see **Connecting to Your Network**.

Chapter 2: Getting Started

After you receive your FreeShape 120 printer, you will need to do a little bit of work to get your printer up-and-running. This section describes all of the setup you need to do for your machine, so you can go from package to printing as soon as possible.

The topics covered in this section are as follows:

• **Unboxing Your Machine**
• **What You Need**
• **Setup Environment**
• **Connecting to Your Wi-Fi Network**
• **Attach Your Vat**
• **Fill Your Vat With Resin**
• **Attach Your Build Platform**

Unboxing Your Machine

1. Open the printer box.

The FreeShape 120 is visible with attached handles, and 4 smaller boxes are to the side of it.

2. Lift the printer out of the box by the handles.

Place the printer on a sturdy table to make it easier to remove the other parts of the packaging.

3. Remove the additional accessory boxes from the main box.

4. Lift the hood off of the printer and place it to the side.

5. Remove the machine from the rest of the packaging.

When moving the machine, hold the bottom and the build platform guideway. Be careful not to put your fingers on the vat while moving. Keep the machine vertical, without tilting it backwards, so as to not bend or displace critical components.

6. Remove the vat film package from the hood, and store it in a safe place.

The vat film package is taped to the front of the hood over the plastic wrapping. It is covered with paper on both sides. You can touch the paper by hand, but do not touch the vat film directly. Be careful not to bend the vat film while moving it.
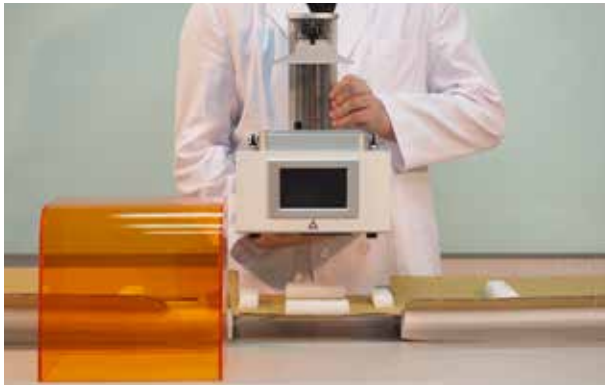
7. Put the hood back on the printer. You may remove the plastic wrap or leave it on.

8. Remove and store the contents of the 4 accessory boxes.

CABLE: 1 Ethernet cable and 1 power cable

TOOLS: 1 Hex key

PANEL: 2 LCD panels, packaged in bubble wrap

One box is unmarked, and is usually empty.

What You Need

Beyond the printer, you need several other items in order to make a complete print and use your printer effectively. This section outlines the items that you need to acquire in addition to the items shipped with the printer.

1. Computer – In order to run the Alpha 3D or Omega 3D print software, you will need a computer that meets the following minimum requirements.

	Minimum	Recommended
CPU	Intel i3 2.0 GHz dual-core AMD Athalon 2.0 GHz dual-core	Intel i7 2.6 GHz quad-core AMD Phenom II X4/ X6 at 2.6 GHz quad-core
GPU	Dedicated GPU with 1 GB RAM	NVidia GeForce 830 AMD Radeon R7 M340
Memory (RAM)	4 GB	8 GB
Disk Space	1 GB	2 GB
Operating system	Windows 7 SP1, 8.1, or 10	Windows 7 SP1, 8.1, or 10
Display	1600 $\times$ 900	1920 $\times$ 1080

2. Safety equipment – You should always wear chemical-resistant gloves when dealing with photopolymer resins. Ackuretta also recommends wearing a respirator or face mask, and when dealing with the internal components of the machine, wear UV-protective glasses. When removing prints from a build platform, you may also want cut-resistant gloves in case your knife slips.

3. Cleaning alcohol – Most resins require isopropyl alcohol (99% solution) or ethyl alcohol (95% solution) for cleaning. Consult your resin distributor regarding the proper cleaning alcohol to use. In addition, you may want an alcohol bath, such as an ultrasonic cleaner.

4. Resin – the FreeShape 120 is tested with all Ackuretta Qura- resins, but you may use any 405 nm resin.

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5. **UV oven** – Ackuretta resins are all tested with the Ackuretta UV oven. Other resin suppliers may recommend other UV ovens.

6. **Knife or scraper** – Sharper tools are better for removing prints from the build platform. Dull scrapers may damage the build platform.

7. **Wire cutters or scissors** – These are standard tools for cutting supports off of prints. You may also want to use an ultrasonic cutter or a rotary tool for this purpose.

8. **Cleaning and drying tools** – Remove resin thoroughly with an air compressor or air blower. You can use tissues or small brushes to remove resin in hard-to-dry places. Keep a safe disposal space to throw away unused resin in a legally safe manner.

Setup Environment

Consider the following when choosing where to set up your FreeShape 120 and your printing work space.

1. Temperature: 18° - 25° C

Keep your printer and your resins in a dry, temperature-controlled room around 22° C (72° F).

Resins become more viscous when they are too cold. If the environment is around 15° C (59° F), Ackuretta recommends increasing all curing times by 15%. Even colder temperatures may require increasing curing times further or may cause print failures.

Similarly, resins may become very thin in hot temperatures. If the environment is hotter than 35° C (95° F), resins may overcure or may melt during the print process.
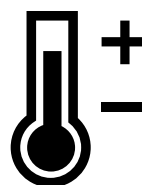
18°-25° C

2. UV-Filtered Lighting

The UV-protected hood of the FreeShape 120 protects the resin from outside lighting while the hood is on the printer. As you use the printer, the door will be opened many times, and the resin will be exposed to outside light.

To protect the resin, set up the printer in a place where the lighting is controllable or covered by a UV filter. Similarly, use the same UV filtering in your finishing space and your resin storage location.

3. Ventilation

Resins and cleaning alcohol evaporate over time like all liquids. These substances can be corrosive to other equipment and may be harmful if inhaled over a long time.

Keep your printer, resins, and your cleaning work space well ventilated at all times. Avoid lingering in the same room with uncovered resins for a long period of time.
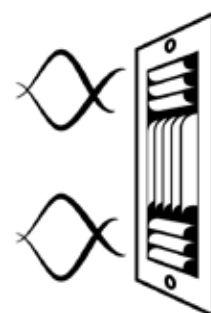
4. Wi-Fi Connection

If you intend to use a Wi-Fi connection, consider the placement of the printer. Do not place the printer in an enclosed area such as a cabinet or garage where the signal may be disconnected. Instead, place the printer in a clean, open area. Avoid having any thick walls or barriers between the router and the FreeShape 120.

Connecting to Your Wi-Fi Network

Connect to a Wi-Fi network that you can access the printer web console and start up prints from your internet browser.

> **Note:**
>
> If your environment uses a LAN connection, follow the instructions in **Connecting to Your LAN Network** instead.

1. Ensure that your Wi-Fi dongle is connected to the printer.

> **Note:**
> After you connect your laptop to the FreeShape120, by default, your computer should be able to obtain an IP address automatically. If your computer does not, then you may need to modify your network settings. Go to **Configuring a Static IP Address**.

2. Press **Network**.

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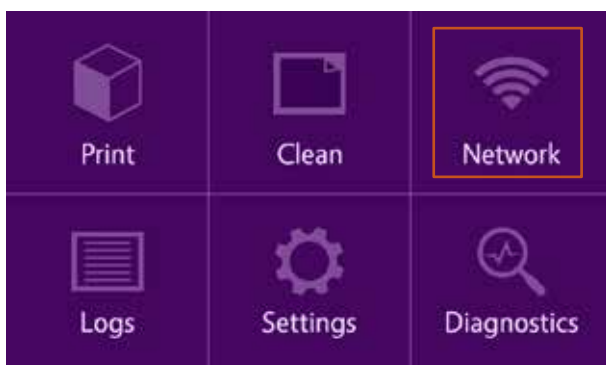
3. Press **Wi-Fi**.
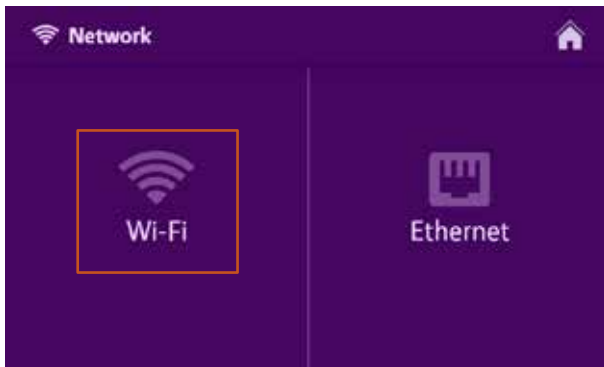
4. Ensure that the **Connect to Wi-Fi** box is turned **On**.

5. Press the arrow next to **Choose a network**.

6. Press the network that you want to use.

You can use the arrows on the right side to select different pages.
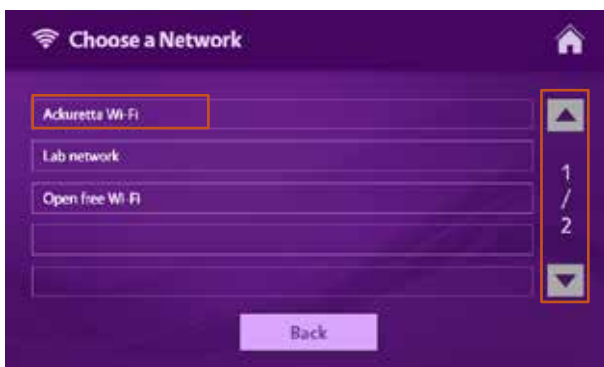
7. If your network is password-protected, a screen appears for you to type in the password.

8. When your printer connects to the network, an IP address appears on this screen.
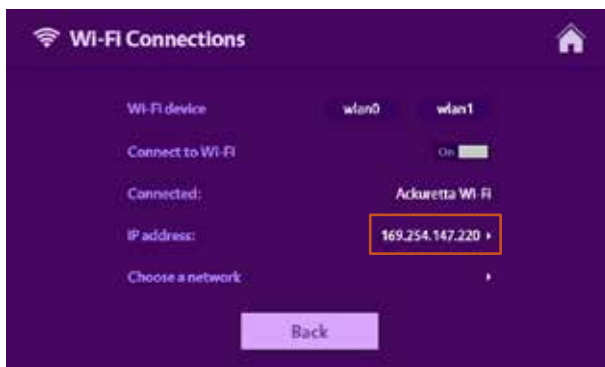
9. Open an internet browser while on the same network as the FreeShape 120 and type the IP address shown into the address bar. The FreeShape 120 web console opens.
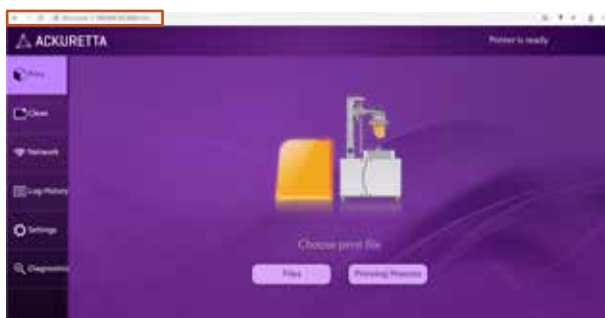
Attach Your Vat

The FreeShape 120 comes with a vat attached during shipping. If you remove your vat and need to reattach it, do the following.

> **Warning:**
>
> Always place the vat on the FreeShape 120 before placing the build platform. The vat protects the LCD, which may become damaged if resin or the build platform falls on it.
>
> Do not touch the vat film and do not place the vat directly on tables with the film side down. If the vat is empty, place the vat upside-down on tables. If the vat has resin, place 2-3 tissues under the vat to protect the vat film from scratching or other damage.

1. Place the empty vat on the LCD panel, so the metal grooves on the sides line up with the handle holes.

2. Hold the rubber stoppers of the handles and slide them inward toward the vat.

3. Turn the handles backwards and down so the handles touch the metal base.

If you turn the handles toward the front or to the sides, the handles may interfere with the door.
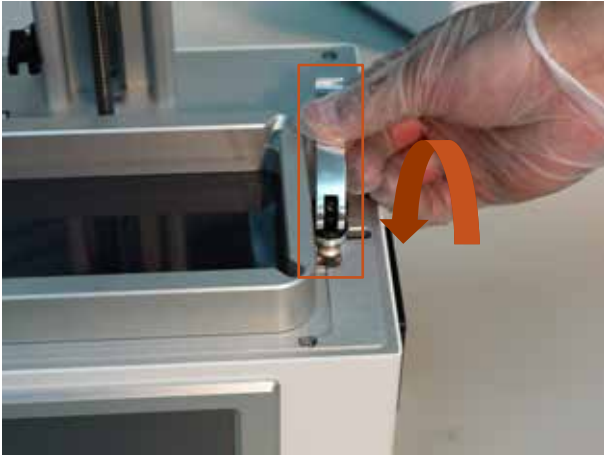
4. The vat is attached to the printer and is ready to add resin.
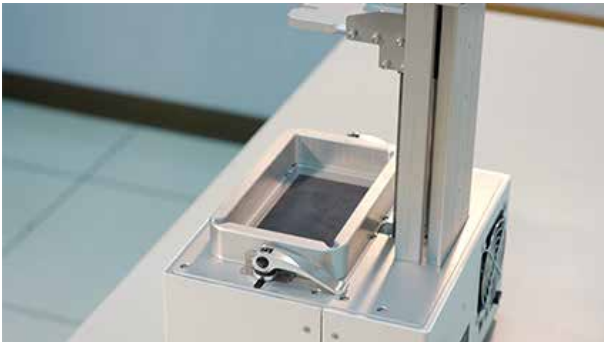
Fill Your Vat with Resin

1. Before pouring, shake your resin bottle for at least 2 minutes so the resin is thoroughly mixed.

2. After shaking, slowly pour resin into the vat. Start pouring in one corner, and slowly move across the surface of the vat, filling the vat evenly.
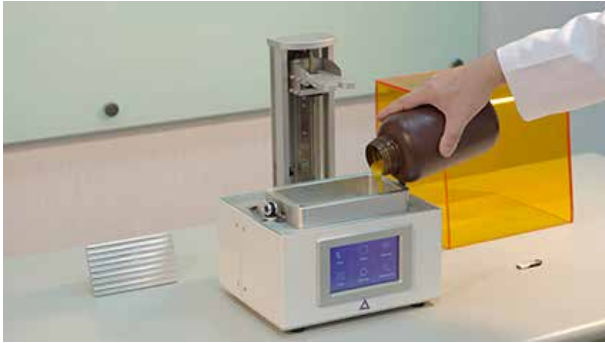
> **Note:**
>
> If any resin is in the vat, stir the old resin with the new resin using a rubber spatula. Pull resin from the bottom of the vat so that if any resin particles separated, it mixes with the new resin properly.

3. The minimum level of resin should be at least 2 mm of resin over the whole vat surface. The maximum amount of resin should be no higher than the resin level in the vat.

Attach Your Build Platform

The FreeShape 120 comes with a build platform attached during shipping. If you remove your build platform and need to reattach it, do the following.

1. Turn the handle counterclockwise, so the space between the handle and build platform becomes wider.

2. Insert the screw portion of the build platform into the gap on the FreeShape 120 guideway.

3. Align the build platform so that the 4 prongs are adjacent to the guideway arm.
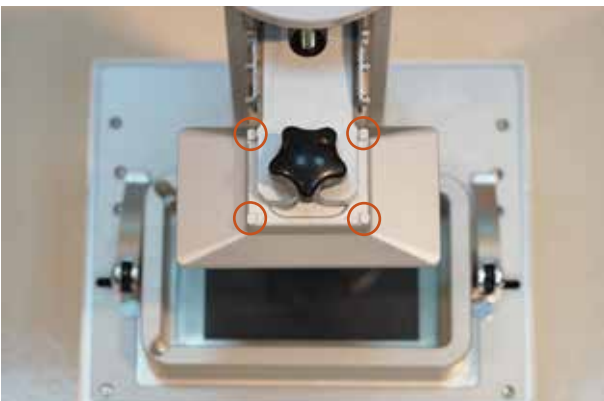
4. Turn the handle clockwise to lock the build platform on the guideway.

5. When the build platform is tight enough to hold itself, it is installed and ready for use.

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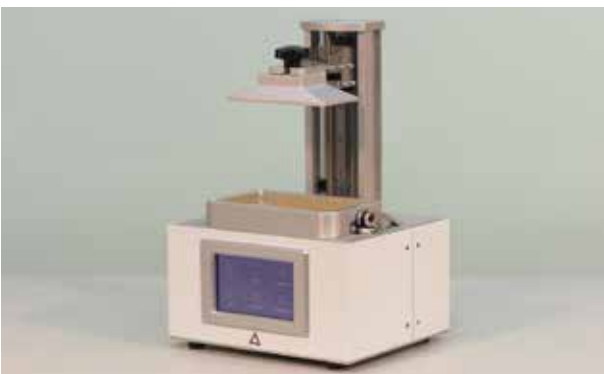
Chapter 3: Printing

After you set up your FreeShape 120, the next step is to get your first print up and running. This section describes the basic process for getting your printer ready and starting up a print.

The topics covered in this section are as follows:

• **Designing Your 3D Model**
• **Making Your Print File**
• **Printing Using a USB Device**
• **Printing Using the Web Console**
• **Printing Process**

Designing Your 3D Model

The most important part of using a 3D printer is having the 3D model to print from. Ackuretta printers and software work best using 3D models saved in STL format.

The following are some examples of software you can use to make your 3D model from:

Dental • ExoCAD DentalCAD • 3Shape Dental System	exocad 3shape
Jewelry • Gemvision RhinoGold • 3Design Software Solution	RhinoGold 3DESIGN SOFTWARE SOLUTION
Engineering • Dassault Systèmes SolidWorks • Autodesk Inventor	DS SOLIDWORKS AUTODESK

Making Your Print File

Ackuretta provides a variety of different software solutions to match your industry or application. Import your STL or other design file into your Ackuretta software, support your print, and use the built-in slicer to make your print file.

The FreeShape 120 supports the following Ackuretta software:

Alpha 3D

Alpha 3D offers ease-of-use for quick and simple print placement and processing. With automatic mesh repair, automatic supports, and automatic nesting, you can load your prints into your machine in minutes.

- **Print file type: .ibf**
- Project file type: .i3dp
- Supported input file types: .stl, .tri

You can download Alpha 3D for free and see the user manual at:
https://ackuretta.com/support/alpha3d/

Omega 3D

Omega 3D uses the most flexible supporting system available for 3D printers. Make every part of your supports exactly as strong as you want, or use the fast and accurate automatic supports to give you a head start.

- **Print file type: .sbf**
- Project file type: .pyr
- Supported input file types: .stl, .fbx, .blend, .obj, .dfx

For a free trial of Omega 3D and for usage instructions, send an email to
support@ackuretta.com.

Printing Using a USB Device

There are two ways of starting a print on the FreeShape 120:

- Attach a USB device with the print file to the printer, and then use the printer console to start the print
- Connect the printer to a LAN or Wi-Fi connection and use the web console to print.

This section describes the former of those two options. To print over a network connection, skip ahead to **Print Over a Wi-Fi or LAN Network**.

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1. Attach your vat and build platform, and fill your vat with resin. For more information, see the relevant sections in **Getting Started**.

2. Copy your IBF or SBF file to your USB device. Connect your USB device to any of the USB ports on the back side of the FreeShape 120.

For more information about making a print file, see **Making Your Print File**.

3. On the FreeShape 120 console, press **Print**.
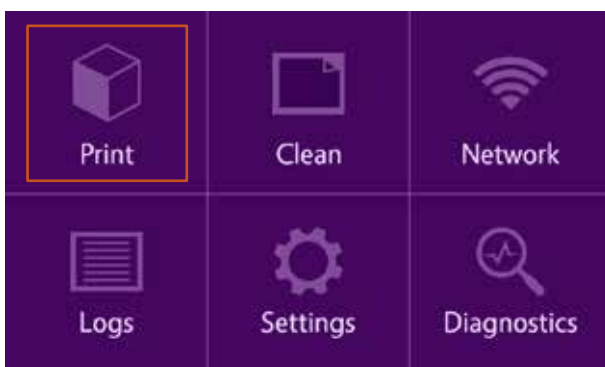
4. On the **Select Files** screen, press **USB**.

5. Find and press the file that you wish to print.
You can use the arrows on the right side to select different pages.

6. After you have selected your print, press **Next**.
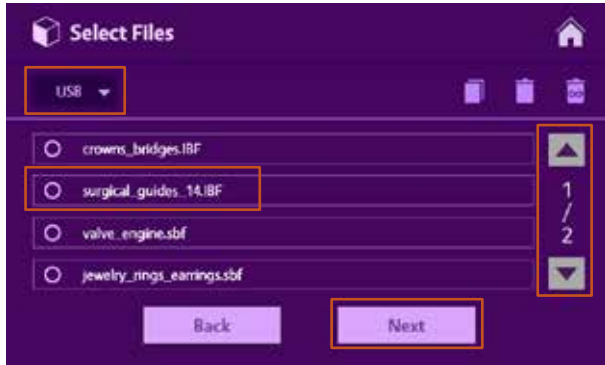
**7.** Confirm your print details, and press **Print** to begin your print.
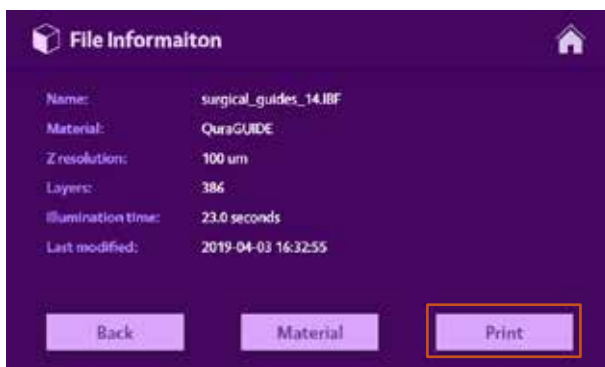
> **Note:**
>
> If your resin profile is incorrect, press **Material** to change your resin settings. If you are using an Ackuretta resin profile from Alpha 3D or Omega 3D, your resin profile will be automatically set from the software.
>
> If you are using a third-party resin, you may need to adjust your resin settings. Ackuretta recommends setting your resin profiles from a LAN or Wi-Fi connection using the web console. See **Material Settings** for more information.

8. The build platform moves down, and your print begins.
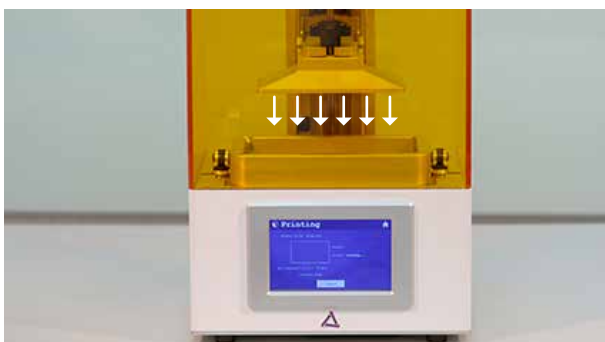
Printing Using the Web Console

If you have connected your printer to a LAN or Wi-Fi network, instead of printing by USB, you can print from an internet browser on your PC or your mobile device. For instructions on how to set up your FreeShape 120 for browser use, see the appropriate section:

- **Connecting Your Wi-Fi Network**
- **Connecting Your LAN Network**

1. Open an internet browser while on the same network as the FreeShape 120 and type the IP address shown into the address bar. The FreeShape 120 web console opens.

2. On the web console, click **Files**.
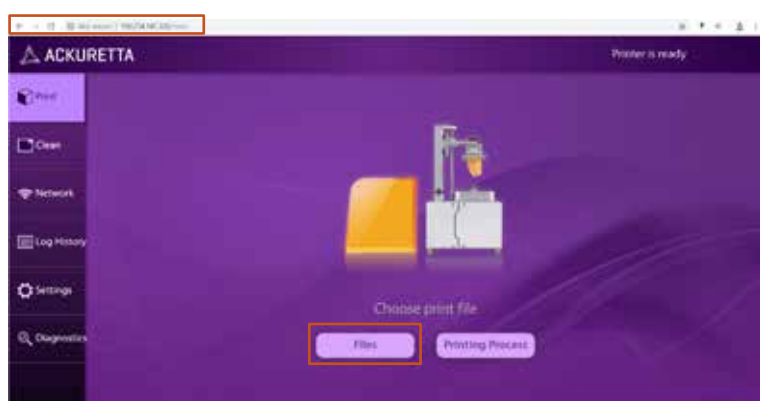
3. Click the + circle on the bottom of the screen to add prints to the printer.

4. Browse for your file and click **Open**.

The FreeShape 120 only supports files in IBF or SBF format. For more information about software and file types, see **Making Your Print File**.
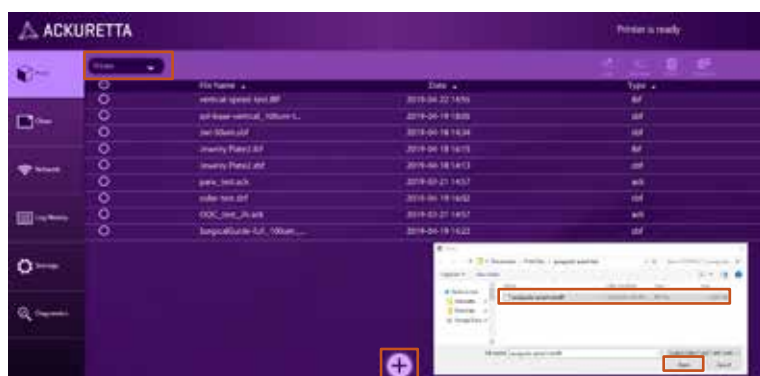
> **Note:**
>
> The files stored on your printer are shown when the top-left selector is set to **Printer**. You can select prints stored on a USB device connected to your printer if you select **USB.** Additionally, you can see previous prints that you have printed if you choose **Print History**. The **Material** option is described in **Material Settings**.

5. Select your print file and then press **Next**.
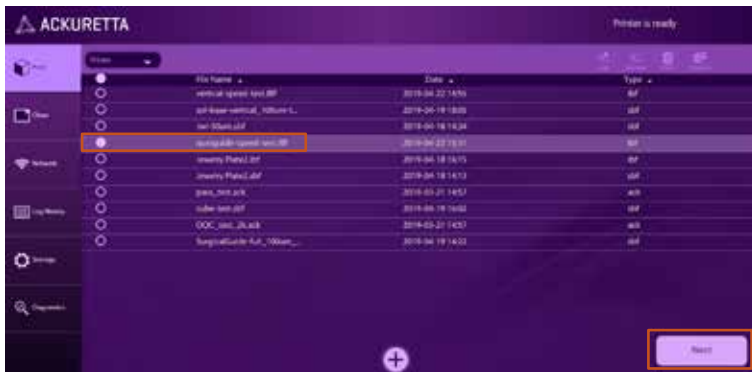
6. Confirm your print details, and press **Print** to begin your print.
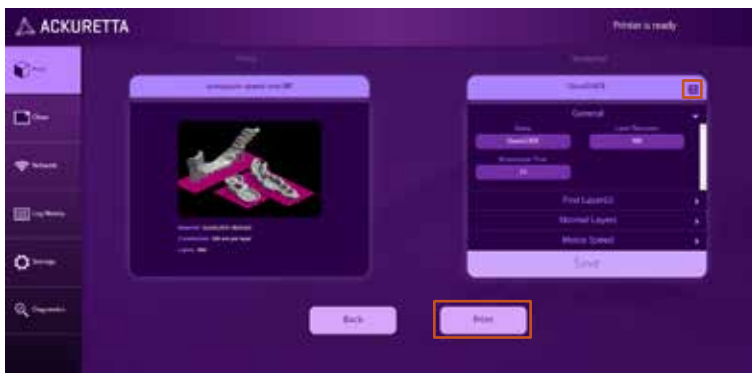
Note:

If your resin profile is incorrect, press the ☰ **Material** icon to change your resin settings. If you are using an Ackuretta resin profile from Alpha 3D or Omega 3D, your resin profile will be automatically set from the software.

If you are using a third-party resin, you may need to adjust your resin settings. See **Material Settings** for more information.

7. A dialog box appears. Confirm your settings and click **Print**.

Your print begins.
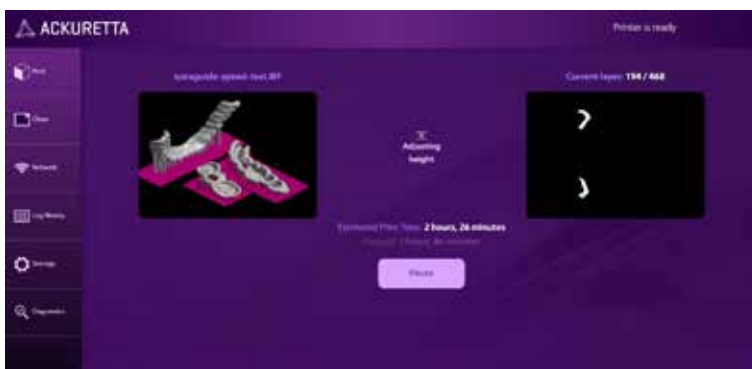
Printing Process

While the machine is printing, you can pause or stop the print at any time from the printer console or the web console. The options are the same, even if the appearance may be different.

After you start a print, the console will automatically display the **Printing Process** screen. From that screen, you can view the print information, see how long the print will take, and activate the print options.

If you leave the Printing Process screen, you can return to it at any time by going to **Print > Printing Process**.
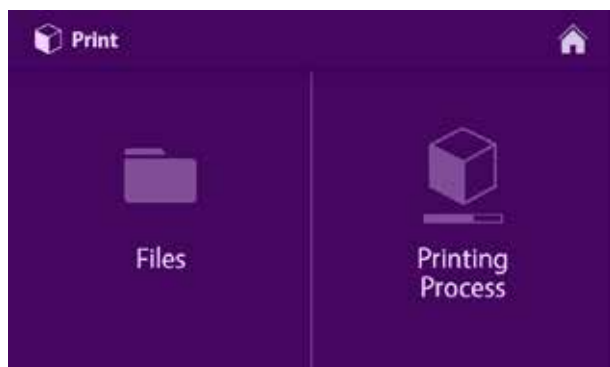
When you first start a print, while the printer is moving into position, the **Cancel** option is available. This option stops the print before any resin has been cured. This is best used when you make a mistake with your printing setup or forget to attach your build platform.
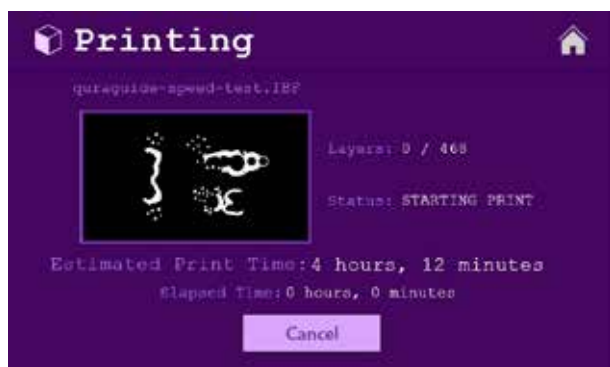
After the FreeShape 120 starts curing resin, the screen changes to show a **Pause** button. This option temporarily pauses the printer so that you can see if a print has failed, or you can use it to add resin.

When you pause, the printer finishes printing its current layer before other options are available.
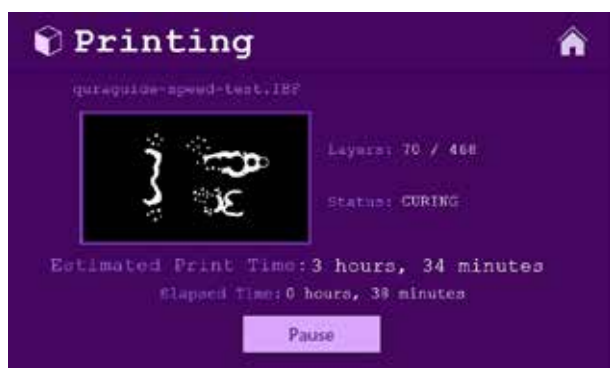
When your printer is paused, two new options become available:

■ **Resume**
If the print is paused, you may continue printing.

■ **Stop**
The printer will completely stop its print so you can clean the platform and begin printing a new print. **You cannot undo this action**.

When you stop, the printer finishes printing its current layer before returning to the home screen. When the layer is finished, the build platform will move back to the top position.
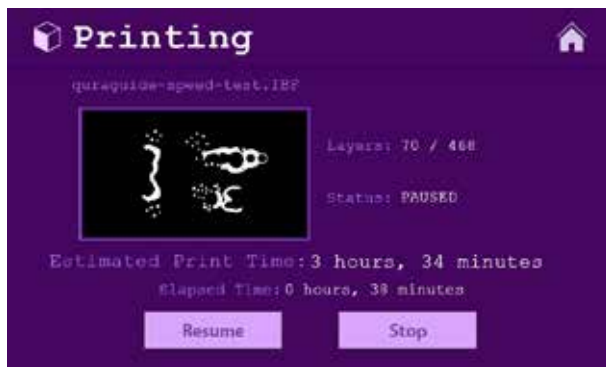
Chapter 4: Finishing Your Print

After the FreeShape 120 completes printing, the print still requires some preparation before it is ready for polishing, casting, or applying to a machine or a patient.

The order of the process is variable, as most steps can be done before or in between others. Generally, the process is as follows:

- **Removing Your Print from the Printer**
- **Separating Your Print from the Build Platform**
- **Cleaning and Drying Your Print**
- **Cutting Supports**
- **Curing Your Print in a UV Oven**

Removing Your Print from the Printer

1. The build platform returns to the top when your print is finished.
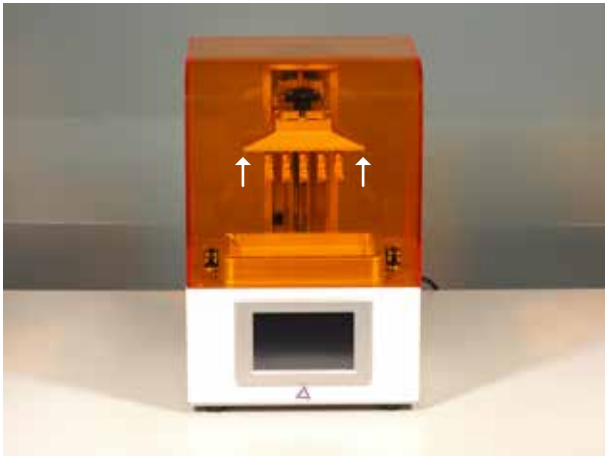
2. Take the hood off the printer.
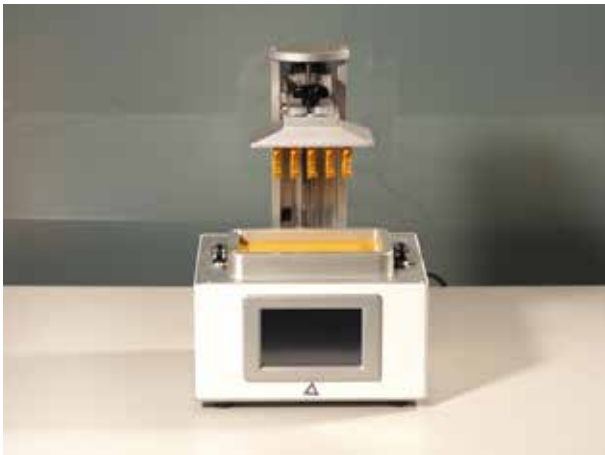
3. Turn the handle of the build platform . The platform hangs loosely off the guideway.

4. Pull the build platform outward to remove it from the printer.
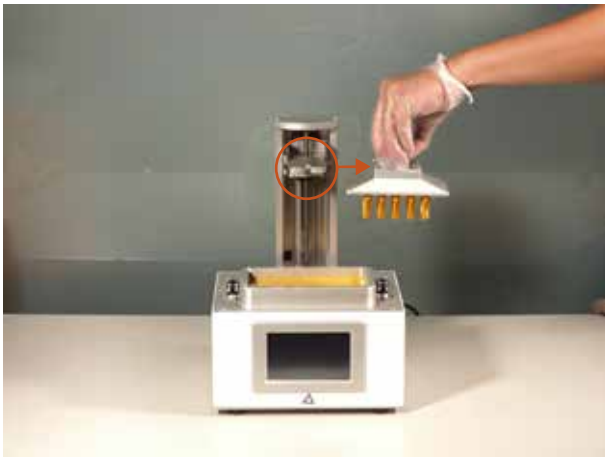
5. The print has residual liquid on it from the vat. Turn the platform over quickly to keep your environment clean.
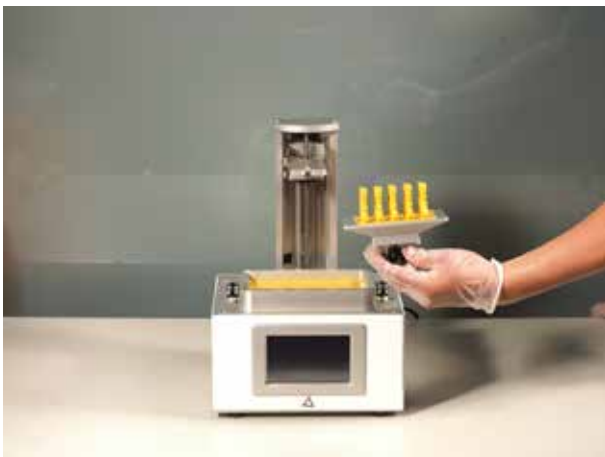
Tip:

You can use a rubber spatula or air blower to push resin off of the build platform back into the vat to save resin.

6. Check your print for failures. If any of your parts are successful, move onto the next part.

If any of your prints failed, you should perform a vat cleaning operation. See **Using the Clean Vat Function**.

Separating Your Print from the Build Platform

■ **What You Need**

A. Safety equipment – gloves, UV-protective glasses, and a respirator or face mask

B. Knife or scraper

C. Tissues or a container for resin disposal

A

B

C

1. Hold the print at an angle.

Tip:

Place tissues or a soft cardboard box below the print to catch the print and excess resin. Wear tough, cut-resistant gloves to prevent injury if your print is too firmly attached to the platform.

2. Slide a utility knife or scraper under one corner of the print. Pull the knife under the print to separate one side from the build platform.

3. Continue sliding the knife through to the other side of the print.

4. Your print detaches from the build platform. Hold your print securely toward the end of the separation, or allow the print to fall into a soft, safe surface.

Cleaning and Drying Your Print

Most resins are somewhat shiny when they are uncured, and turn to a matte appearance when they are properly cured and dried. The goal when cleaning the print is to remove all uncured resin from the print so that the entire print has no remaining wetness or glossiness.

Typically, you will need to do the steps in the following section multiple times.

■ **What You Need**

A. Safety equipment – gloves, UV-protective glasses, and a respirator or face mask

B. Cleaning alcohol – isopropyl alcohol (99% solution) or ethyl alcohol (95% solution)

C. Drying tools – air compressor is preferred, but you can also use a handheld blower or tissues for most prints

D. Ultrasonic cleaner or bath - Optional

1. Spray your print liberally with cleaning alcohol to rinse off residual material.

2. Use a blower or air compressor to dry your print, pushing away the resin and dirty alcohol. Turn the print as necessary while blowing, and make sure you focus on small holes and places where liquid can get trapped.

If you have an ultrasonic cleaner or cleaning bath available, you may soak the print to make cleaning easier. Usually you should do this after separating the print from the build platform.

3. Submerge the print into a bath of cleaning alcohol or an ultrasonic cleaner. For most prints, Ackuretta recommends soaking for about 2 minutes.

After soaking the print, dry the print with your air blower or compressor, and then perform additional fine cleaning if necessary.

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Cutting Supports

For prints that have supports or a base attached, you can remove supports any number of ways. The following are just some tips or hints about how to remove supports. Use the steps that are appropriate to your case.

If you printed a base with your part, you can remove the base with scissors or by hand. This part usually does not affect the print at all, so you can do this without concern about print quality.

Most supports can be cut with a scissors. Ackuretta recommends cutting the supports farther from the print at first, and then cutting close to the print afterwards. This reduces damage to the print.

Thicker supports can be cut with wire cutters. As with scissors, Ackuretta recommends cutting the supports twice, first toward the middle of the support, and then close to the print.

An ultrasonic cutter can be a useful tool for removing very thick supports or very fine supports.

Hold the blade of the cutter directly next to the part, and slowly push it forward through the support.

After your supports have been cut, you can use a rotary tool or polishing kit to grind away the support marks.

Curing Your Print in a UV Oven

The 3D printer cures the resin to a certain level, but the print usually cannot be fully cured by the printer alone. After printing, cleaning, and drying, place your print in a UV oven for final curing.

The Ackuretta UV oven is tested and certified for all Qura- resins. Dreve, Keystone, and other resin suppliers may have preferred UV ovens to use with their materials. See your resin supplier for details about which UV ovens they recommend that you use.

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Place the prints directly onto the plate inside the UV oven. Turn on the oven by pressing the switch on the back of the oven. From the console, start the curing process by pressing buttons as follows:

1. Memory Presets

Save and load up to three preset times using the A, B, and C buttons. To save time, after selecting the time, press and hold the button to save that time to that button, overwriting any previous settings. To load a time, press the button.

2. Start

Press the yellow button to start the oven. The oven will automatically turn off when the time is up.

If you press and hold the start button for several seconds, the oven will flash instead of continuous curing. This is preferred for many resins.

3. Timer controls

Press the arrow buttons to adjust the timer. Curing a print for three minutes is appropriate for most FreeShape 120 prints.

Chapter 5: Configuring Your Printer

Configure your printer from the **Settings** and **Network** tabs. Whenever you modify a setting in these tabs, the printer applies the setting immediately, so be careful with which settings you adjust, and record the previous settings before modifying.

> **Note:**
>
> The machine interface and the web console generally have the same functionality, but may look slightly different. Even if the appearance is not quite the same, you can follow the sections in this guide to do the same tasks on both interfaces.

This section covers the following screens and topics:

• **Machine Settings**
• **Update Settings**
• **Material Settings**
• **Connecting to Your LAN Network**
• **Configuring a Static IP Address**

Machine Settings

The Machine Settings screen shows system-wide settings and information.

This section shows the Machine Settings screen from the web console. All the same functionality exists in the machine interface.

▪ Go to **Settings > Machine**.

The functions in the Machine Settings screen are shown below.

■ **Firmware version**

The currently installed version of the FreeShape 120 firmware.

■ **Machine ID**

The unique ID for this FreeShape 120. This is not the same as the serial number, which is affixed to the back side of the printer.
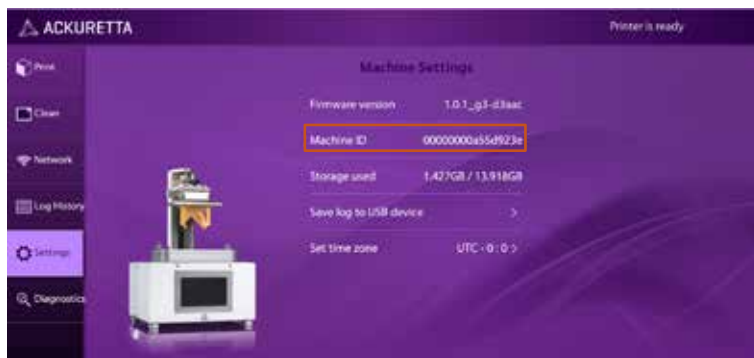
■ **Storage Used**

The FreeShape120 has 16 GB of on-board storage. About 2 GB of that storage is dedicated to the FreeShape 120 firmware and is inaccessible.

> **Tip:**
>
> If your storage is nearly full, you can go to the **Print** screen to delete files. Go to **Print > Printers**, select the files you want to delete, and press the **Delete** button.
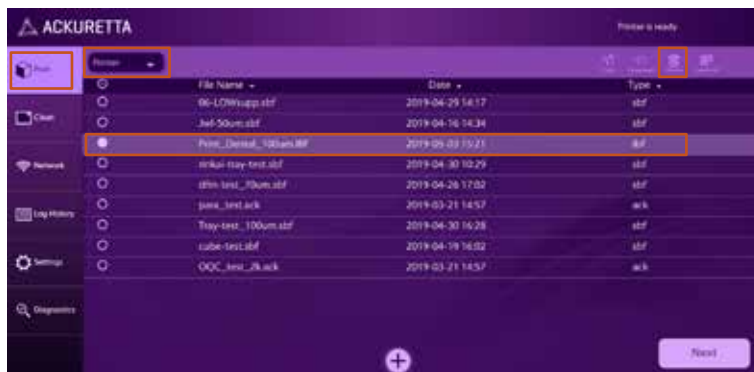
- **Save log to USB device**

  If you encounter a problem with your printer and contact Ackuretta Support, Ackuretta may request your log file in order to perform important system or print diagnostics.

  To obtain your log file:

  1. Attach your USB device to a USB port on the rear side of the FreeShape 120.

  2. On the FreeShape 120, go to **Settings** > **Machine**, and then click **Save log to USB device**.

  3. Confirm your selection by clicking **Download**, and when the download completes, click **OK**.

  4. The log file will be named **freeshape.log.zip**. Email the complete ZIP file to **support@ackuretta.com** .

■ **Set Timezone Offset**

Set your time zone in order to show the actual time of your system in log files. The Timezone function will not affect print performance or any other function of your printer.

1. Go to FreeShape 120 web page, and click **Set Timezone Offset**.

• Toggle either + or - to set if your time zone is before or after UTC 0:00.

• Set the amount of hours offset in the space before the colon (:).

• If your time zone has a minute offset, set that offset in the space after the colon (:)

2. After your setting is complete, click the **Set Timezone Offset** button.

Update Settings

Check your FreeShape 120 firmware version and update your firmware from this screen.

Go to **Settings > Update**.

The functions in the Update Settings screen are shown below.

▪ **Firmware version**

The currently installed version of the FreeShape 120 firmware.
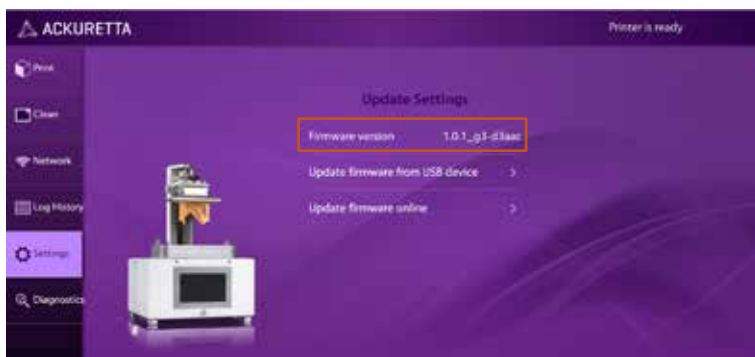
■ **Update firmware from USB device**

Click this button to check your USB for a new firmware version and begin installation. Use this method of firmware installation only if your FreeShape 120 is not connected to an internet-enabled connection.

To update your firmware:

1. Download the latest firmware file from the Ackuretta website: **https://ackuretta.com/support/freeshape/**

> **Note:**
>
> The firmware update will be in a ZIP package. Unzip the package, and you will receive a file with no file extension, such as *freeshape_update-0.7.4.5-fb112* . That is the firmware file.

2. Copy your firmware file (**not** the ZIP package) to your USB device.

3. Attach your USB device to a USB port on the rear side of the FreeShape 120.

4. On the FreeShape 120, go to **Settings > Update**, and click **Update firmware from USB device**.

5. The machine will check your USB device for an update, and if one is found, an update screen will appear.

6. Confirm by clicking **Update**.
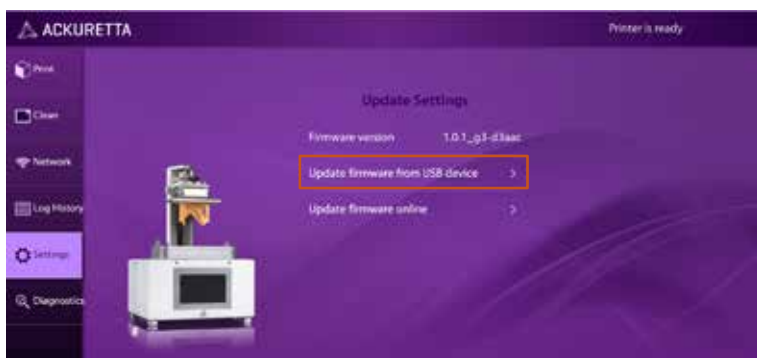
■ **Update firmware online**

The FreeShape 120 will automatically search the latest firmware from the Ackuretta web server.

1. Ensure that you are connected to an internet-enabled network. Turn off firewalls and antivirus if necessary.

2. On the FreeShape 120, go to **Settings > Update**, and click **Updade firmware online**.

3. Confirm by clicking **Update**.

4. The FreeShape 120 will automatically reboot after the update is complete.
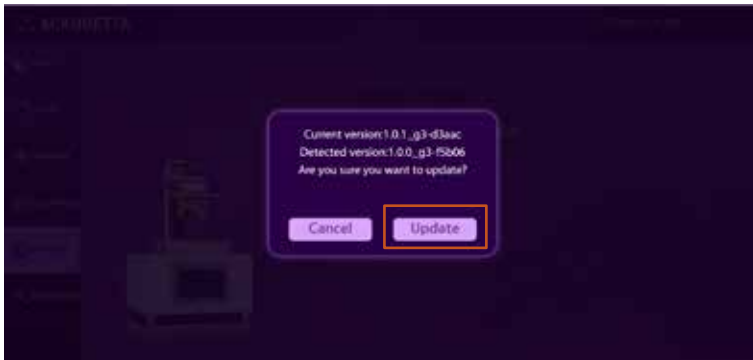
Material Settings

The FreeShape 120 printer stores settings for all Ackuretta materials. You can modify or add materials from here.

If you upload a print file using an Ackuretta resin in Alpha 3D or Omega 3D, the FreeShape 120 automatically detects the resin profile and prints using the settings stored in the printer. If you use the "Resin Test" profile in Alpha 3D, or any non-Ackuretta resin in Omega 3D, you will additionally need to set a material setting on the FreeShape 120.

The Material Settings can be found from the Print menu.
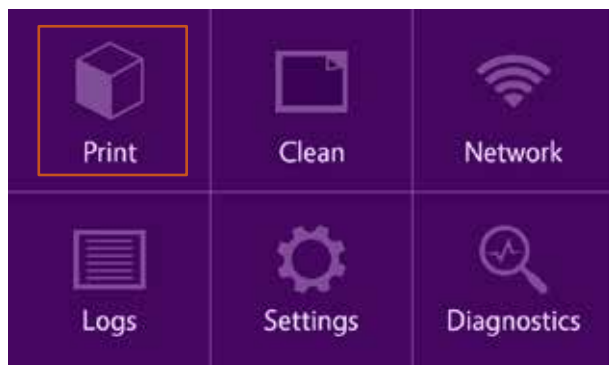
Go to **Print**, and then expand the dropdown menu. Select **Material** to see the Material Settings.
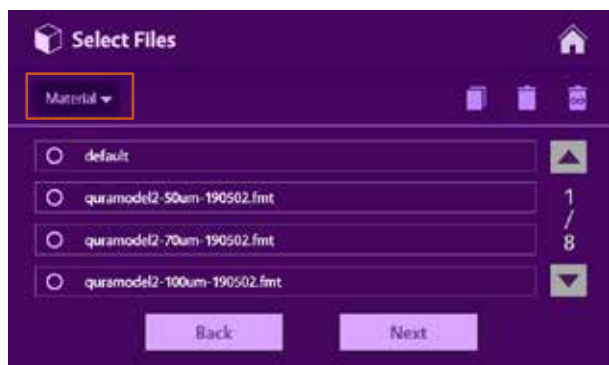
■ **Material Settings Options**

The Material Settings screen includes a few options.

• Select one or more materials from the left side.

• You can use the arrows on the right side to select different pages.

• **Next** - Select 1 material setting, and then press Next to edit the parameters for that material.

• ▢ - Copy 1 or more selected resin profiles to your USB device.

• ▢ - Delete any selected resins.

• ▢ - Delete all resin settings, and return your resins to the firmware defaults.
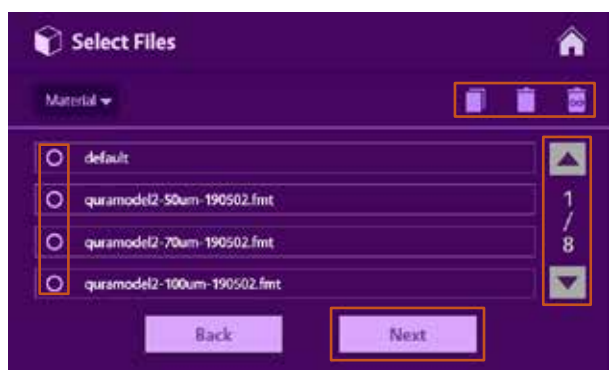
■ **Edit Material Settings**

After you have chosen a setting to modify, you will go to the **Edit Material** screen. The following settings are available from all screens:

Name	The name of the material. This should be the same as a material name as shown in Alpha 3D or Omega 3D.
Z resolution (Layer Thickness)	The Z-resolution of the print. This value should be the same as the value chosen in Alpha 3D or Omega 3D. The minimum Z-resolution for the FreeShape 120 is 10 µm, and the guideway may only move in multiples of 10 µm. Typical values include: 200 µm, 100 µm, 70 µm, 50 µm, and 30 µm.
Back	Go back to the previous page. This will not save your settings.
Save	Save and exit this page. If the **Name** and **Z-resolution** are both the same as another material, then a popup will appear asking you if you want to overwrite a previous setting, or add a new resin.

■ **First Layer(s)**

The printer will add additional curing to the first layers of the print. This ensures that the print does not fall from the build platform.

• **Number of Layers**
  The number of layers that will be cured additionally. Ackuretta recommends using a value between 4 and 10.

• **Illumination Time**
  The amount of time these layers will be cured. Ackuretta recommends using a value about 3 times that of the Normal Layers Illumination time.

• **Wait Before Print**
  The printer will pause before curing each layer for this amount of time.

• **Wait After Print**
  The printer will pause after curing each layer for this amount of time.

• **Lift After Print**
  The printer will lift this high off of the vat after each layer.

• **Wait After Lift**
  The printer will suspend the print above the vat for this long after each layer.

■ **Normal Layers**

After the first several layers, the printer will use the following parameters for all remaining layers.

• Illumination Time
The amount of time each layer will be cured. This is the most important parameter for a material.

• Wait Before Print
The printer will pause before curing each layer for this amount of time.
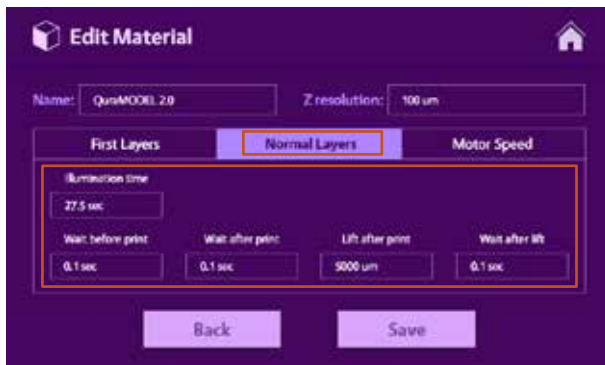
• Wait After Print
The printer will pause after curing each layer for this amount of time.

• Lift After Print
The printer will lift this high off of the vat after each layer.

• Wait After Lift
The printer will suspend the print above the vat for this long after each layer.

■ **Motor Speed**

Some prints may fall because they either get stuck to the platform or because there is not enough time for the resin to fill into the vat after the build platform moves up. Control the motor speed to prevent these issues.

• Z-Axis Peel Speed
After printing a layer, the guideway will move at a maximum of this speed.
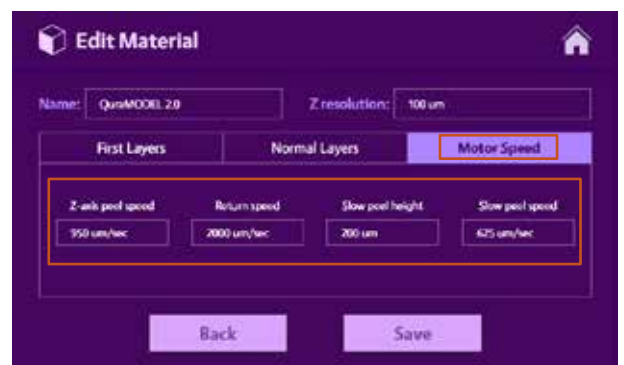
• Return Speed
When the print is complete, the guideway will move up at this speed.

• Slow Peel Height
After printing a layer, the guideway will move up slowly for this amount of distance. Then it will move the remaining distance shown in the Lift After Print setting at an increased rate.

• Slow Peel Speed
Immediately after printing a layer, the guideway will move at this speed for a distance equal to the Slow Peel Height. After that, it will increase based on the Z-Axis Peel Speed. Ackuretta recommends using a value of half of the Z-Axis Peel Speed.

Connecting to Your LAN Network

Connect to a network that you can access the printer web console and start up prints from your internet browser. There are two major methods to connect your FreeShape120 printers to your networks: LAN (Ethernet) connection and Wi-Fi connection.

If your environment uses a Wi-Fi connection, follow the instructions in **Connecting to Your Wi-Fi Network** instead.

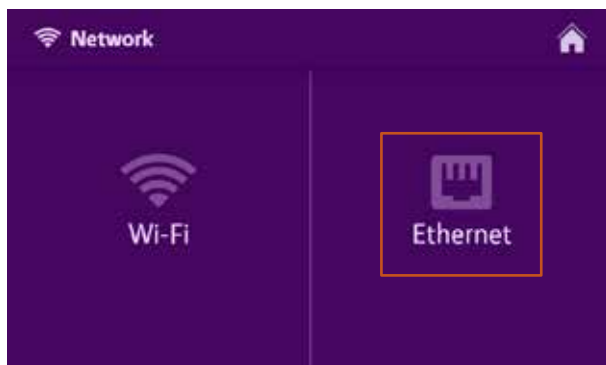Connect your FreeShape 120 to either your router or directly to your computer using an Ethernet (LAN) cable.

> **Note:**
>
> After you connect your laptop to the FreeShape120, by default, your computer should be able to obtain an IP address automatically.

To see your LAN network IP address, first go to **Network**.
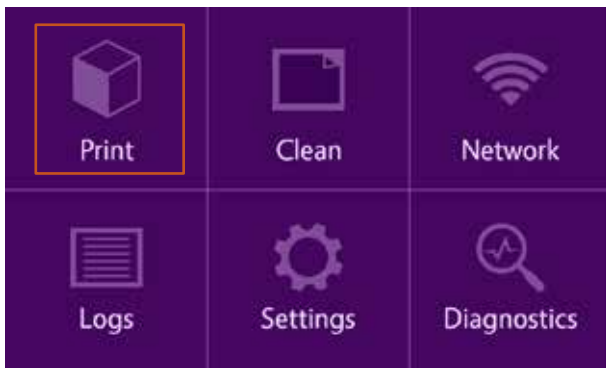
Then go to **Ethernet**.

The LAN **IP address** appears here.

Open an internet browser while on the same network as the FreeShape 120 and type the IP address shown into the address bar. The FreeShape 120 web console opens.
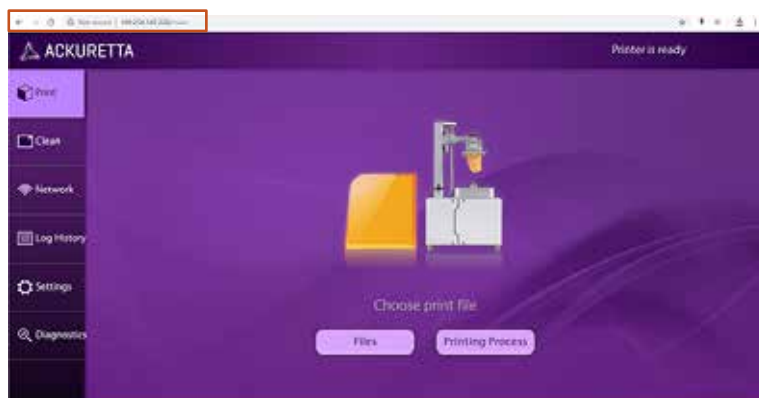
Configuring a Static IP Address

Most connection use dynamic IP address and DNS servers. Go to the IP address tab if your office security systems require you a set a Static IP address or DNS server, then you will need the IP configuration feature in your FreeShape120.

Press **Network** on your FreeShape120 console.
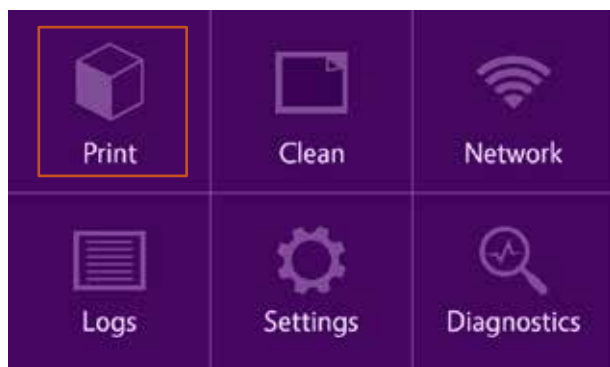
Choose the network type that you want to set a Static IP address for, either Wi-Fi or Ethernet.
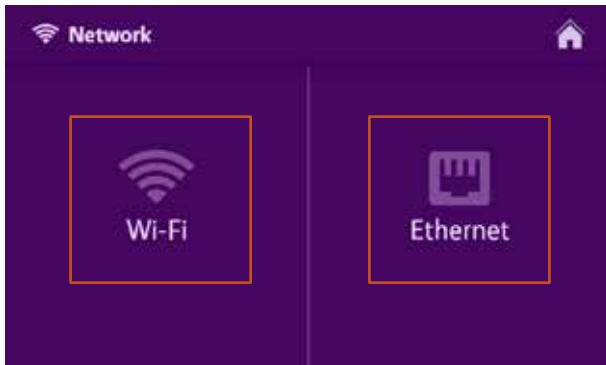
Press the **IP address**.

The IP address will be blank if your FreeShape 120 is not yet connected to any network. In that case, press the arrow button.

IP Address Configuration

Set up the relevant fields as needed in your environment. To set up each field, press the arrow button next to the item.

- **Configure IP**
  Change this to **Manual** to set up a static IP address.

- **IP address**
  Choose your IP address for this printer.

- **Subnet mask**
  Enter the subnet mask of your router. The most common subnet mask is **255.255.255.0**.

- **Default gateway**
  Enter the IP address of your router or your gateway.

- **Primary DNS server**
  Enter the primary DNS server IP address assigned by your ISP.

- **Secondary DNS server**
  Enter the alternate DNS server IP address assigned by your ISP.
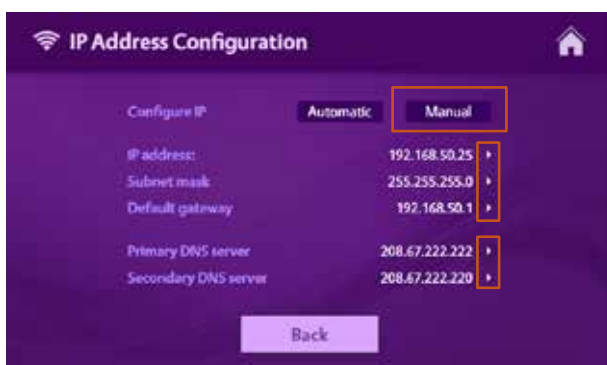
Chapter 6: Maintaining Your Printer

Using the Clean Vat Function

Whenever your print fails, use the Clean function to remove pieces of prints that did not stick to the build platform during printing. The Clean function cures one layer of resin at the bottom of the vat, and then you can easily remove that cured layer and throw away any lingering debris with it.

■ **What You Need**

A. Gloves

B. Small pieces of paper - note cards, sticky notes, or business cards work well

C. Vat

D. Resin - at least 0.5 mm across the surface of the vat

E. Tissues

F. A container for resin disposal

1. Click the **Clean** tab.
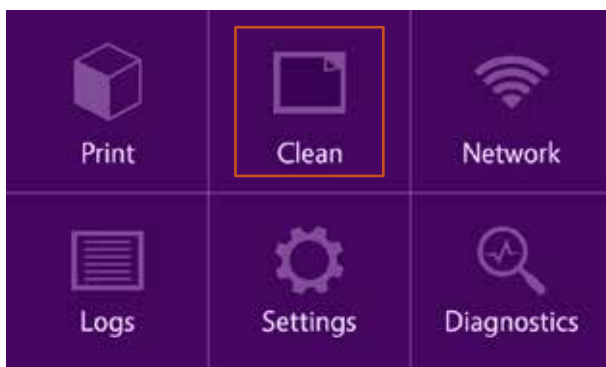
2. Click on the white box next to "seconds" to adjust the length of the Clean Vat curing time.

> **Note:**
>
> Ackuretta recommends three times the curing time of the resin being used. The default value of 100 is more than enough for most resins.

3. Click on **Clean** after entering your preferred amount of time.

4. The FreeShape 120 cures one layer of resin at the bottom of the machine. When it is finished, the **Clean Finished** screen appears.

5. Push resin away from one side to the other so that a corner of the layer at the bottom is exposed.

Slide your paper underneath a corner of the cured layer, and then peel the layer off of the vat.

If your paper is saturated with resin during this process, dispose of your paper and obtain a new piece.

> **Tip:**
>
> You may remove the vat from the machine, and balance it on the vat handle to make this task easier.
>
> Alternatively, you can suspend the vat so the vat handles are raised off of a table. If you do this, **do not** allow the vat bottom to touch a table directly.

6. Pull the layer off of the vat. If you have a chemical-resistant glove, you can grip the layer by hand.

Allow excess resin to drip off the layer before disposal.

7. Dispose of the resin layer by your normal resin disposal method.

Replacing the LCD Panel

The FreeShape 120 LCD panel encounters some wear over time. Eventually, pixels on the LCD panel will go dark, and some areas of the panel will not cure as thoroughly as other areas.

Ackuretta provides 2 free LCD panels with the FreeShape 120 that can be used for replacement purposes.

■ **What You Need**

A. Hex key
B. LCD panel (new)

1. Turn off the power and unplug the power cable from the FreeShape 120.

2. Remove the hood, build platform, and vat.

3. Use the hex key to remove the 4 screws from both sides of the front casing.

> **Note:**
>
> Do not remove the screws holding the back panel. It is not necessary for this operation.

4. Pull the front casing outward from the machine. Set the UI side down on the table.

5. Before completely removing the front casing, unplug the UI console cable by moving the connector from side to side.

> **Tip:**
>
> If the console cable is too tight to pull out, you can push the prongs outward with a pin or screwdriver.

6. Pull the LCD wiring off of the circuit board using your fingernail.
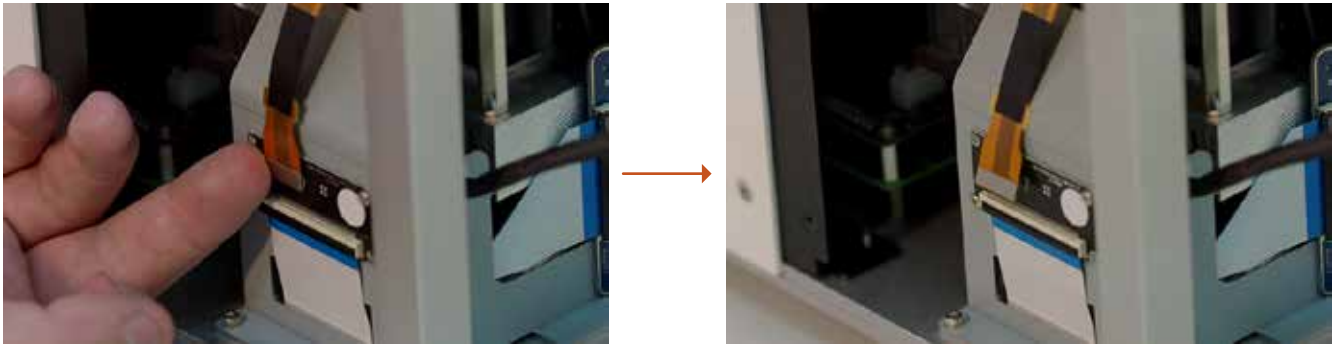
7. Use the hex key to remove the 4 screws holding the LCD panel frame.
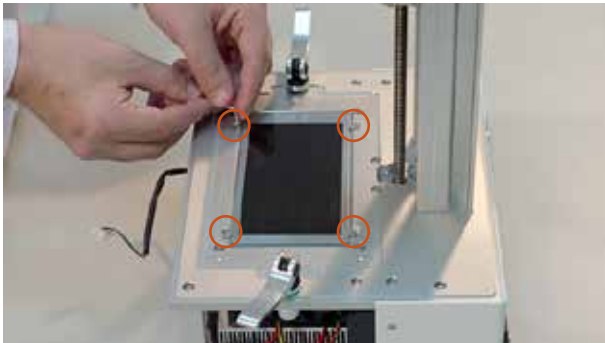
8. Remove the LCD panel frame from the machine and set it aside.
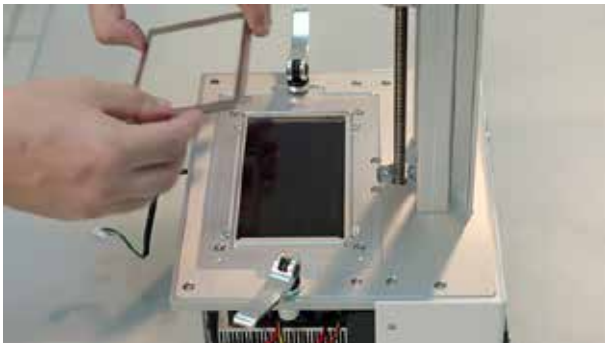
9. Lift the LCD panel from the gap on the cable side. You can use the hex key or a screwdriver to raise it upwards.
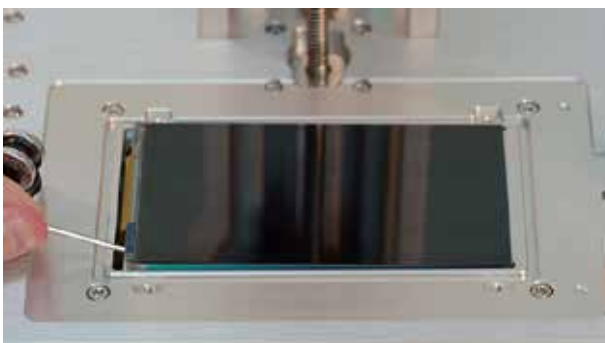
10. Remove the old LCD panel from the machine.
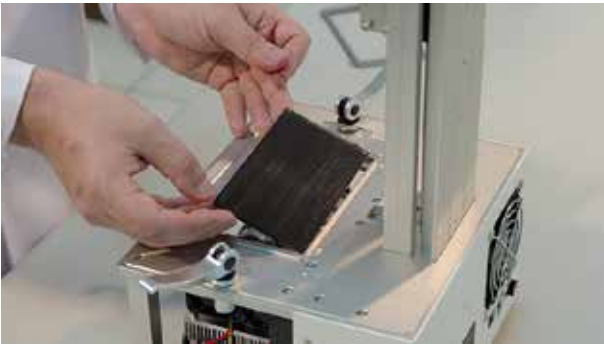
11. Retrieve your new LCD panel. Place the LCD panel into the machine by first sliding the panel wire through the gap in the side.
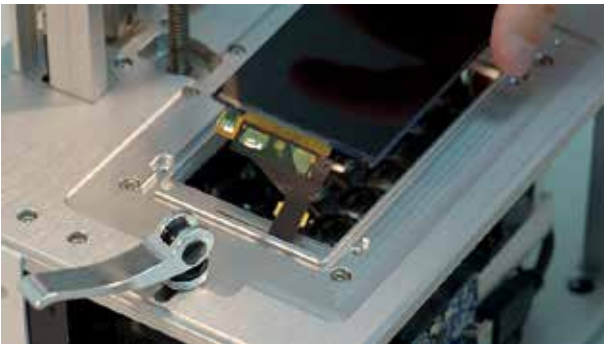
12. Return the panel frame to the machine and reattach the 4 hex screws to secure the LCD panel.
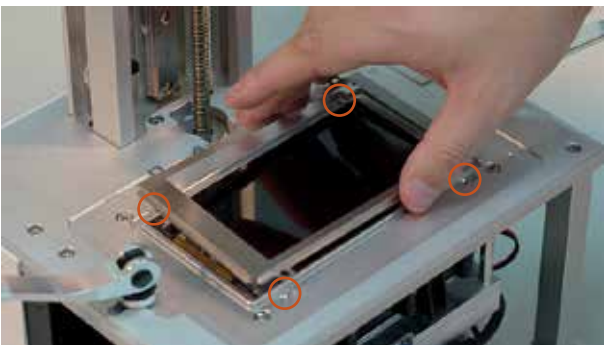
13. Return the front cover to the machine. Connect the cable to the UI board.

14. Reattach the 4 hex screws on the sides of the front cover.

15. Put your machine back together to prepare for printing. Do all of the following:

- Put the vat back on and fill with resin.
- Attach the build platform.
- Place the hood over the machine.
- Plug in the power cable.
- Turn on the machine.

Replacing the Vat Film

If the film on your vat becomes damaged, then you may need to replace it. Cloudiness or tears on the vat surface require replacement, but small bumps do not.
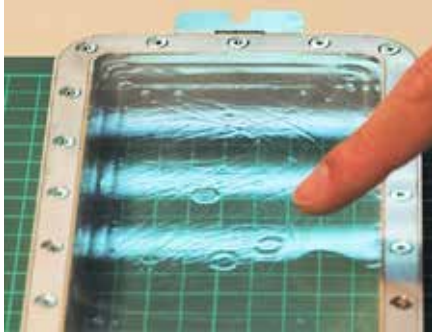
- ■ **What You Need**

  A. Vat to replace film on
  B. Vat film (new)
  C. Hex key
  D. Utility knife
  E. Screwdriver (flat head, small) - Optional
  F. Microfiber tissues - Optional

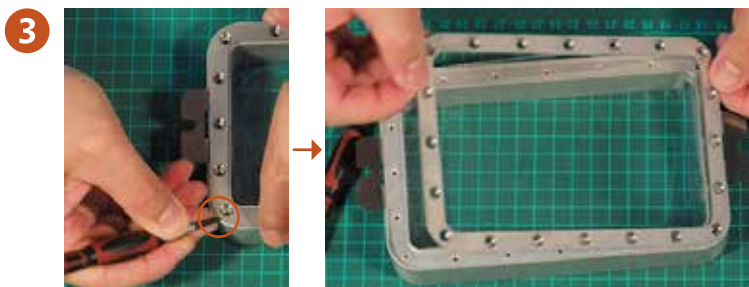**1.** Cut a new vat film sheet in half so that it is about 2-4 cm larger than the vat frame on all sides.
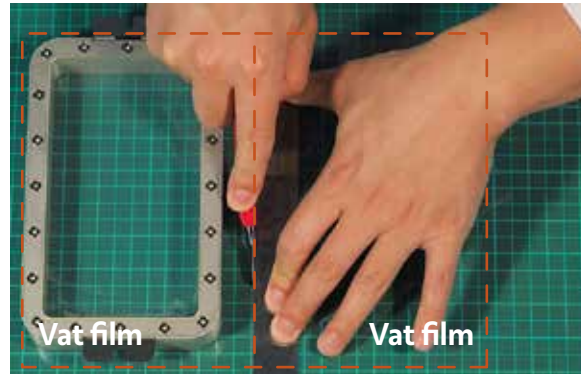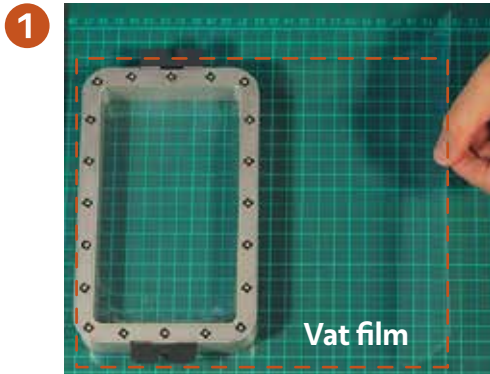
Tip:

Store the other half in a dry, safe space to use in the future.

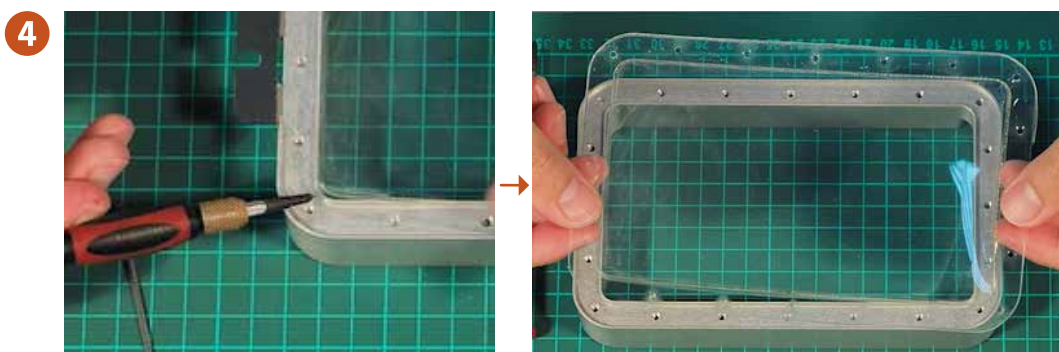**2.** Place the vat on a table upside-down. Remove all screws from the underside of the vat.
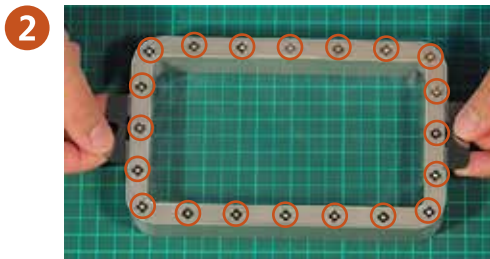
3. Pull the bottom plate off of the bottom of the vat.

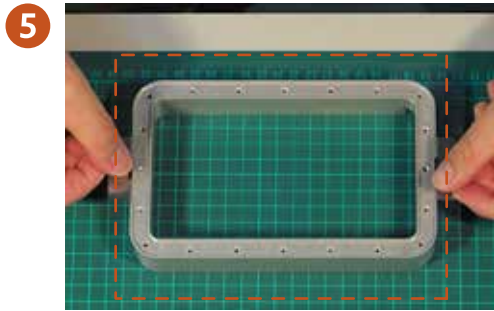**Tip:**

Use the screwdriver to assist in removing the plate.

**4.** Remove the old vat film. The screwdriver may also be useful here.

Note:

Clean any resin that may have remained between the vat film and the frame.

**5.** Place the vat film piece over the vat frame.

6. Place the bottom plate over the vat film. Press it as far down as possible.

• Cover the bottom of the vat frame with the new vat.

• Put the bottom plate over the film.

• Poke 4 holes in the film through the screw holes in the corners of the frame.

• Attach screws through those 4 holdes to tighten the film to the frame.
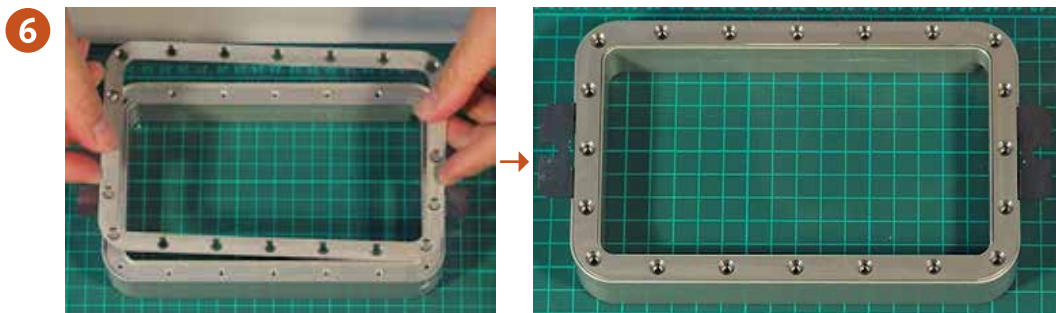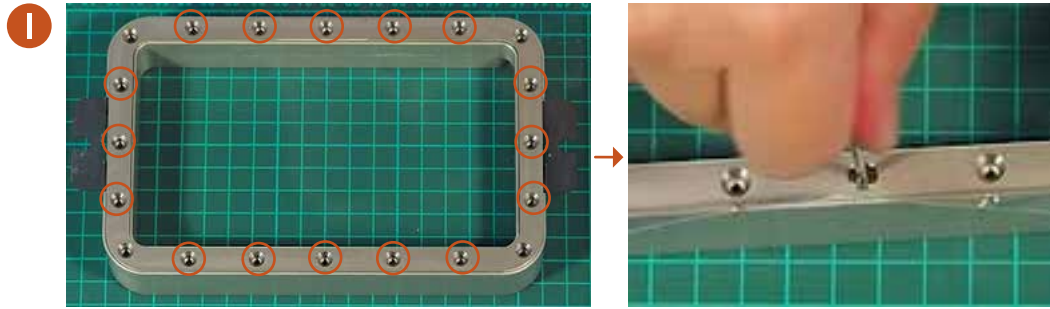

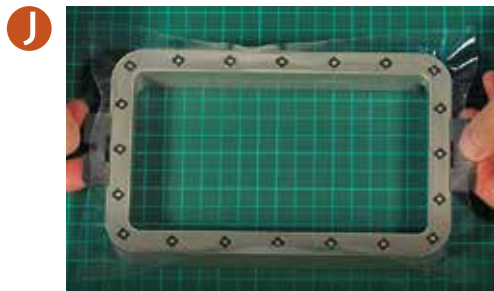**7.** Poke holes in the vat film at the screw holes on the 4 corners of the frame.
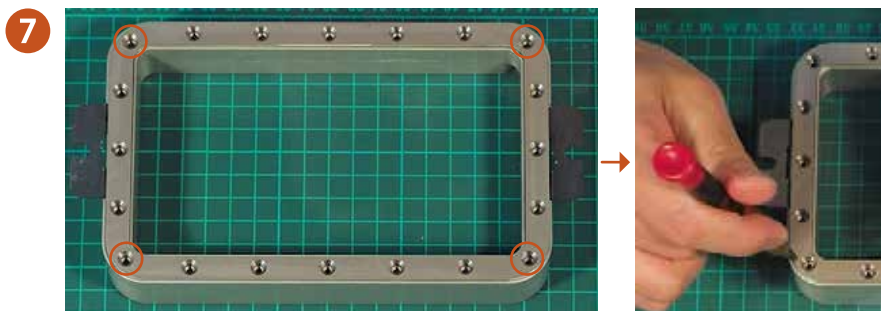
8. Attach screws through those 4 holes.

9. Poke holes and attach screws in the remaining holes.

10. Tighten all screws so that the vat film is very tight.

11. Cut off the excess film with a utility knife.

Your vat is now ready for printing.