# Phoenix Touch
## DLP 3D Printer
## Manual

# Overview

Thank you for your purchase of the Phoenix Touch Digital Light Processing (DLP) 3D Printer by Full Spectrum Laser.  This manual shows you how to use your Phoenix Touch DLP 3D Printer and our Retina Create software.  Be sure that you read and understand all of the contents before operating your printer.

The Phoenix Touch™ Pro UV-LED 3D printer is an ideal choice for dental professionals, jewelry artisans, and firms aiming to bring their modeling or prototyping activities to the next level.  The versatility of the Phoenix Touch makes it an ideal solution for manufacturers, business owners, and hobbyists focused on detailed, small footprint prototyping and production. The Phoenix Touch Pro UV-LED is reliable and easy to use with groundbreaking features.  It's self-leveling print head and DLP technology enable much faster print times with high resolution and quality. Coupled with the patent pending SuperVAT™ technology, the Phoenix delivers professional performance with significantly decreased failure rates.  The Phoenix Touch also includes a USB port for standalone use and may be networked with Ethernet or optional WiFi connection.

For more information and product selection, please visit fslaser.com

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# Part 1:  Safety

## Overview

To ensure a safe working environment for both you and the printer, it is necessary to treat the printer and accessories with care. Carefully read and understand all of the contents before operating your printer.

Use only printing materials from Full Spectrum Laser (FSL) or approved partners. Use of other materials may damage your machine and will void your warranty. Modifying the printer without FSL's approval will invalidate the warranty and may pose a health hazard.  Never attempt to operate your printer with the lid open.

When you receive your printer, please carefully inspect it for any shipping damage.  If there are any issues, contact Technical Support immediately via email (**support@fslaser.com**).  Please include your unit's serial number and photos of the problem.

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## General Precautions

## Printer Safety

- The reflected LED light of the projector is not harmful to the eyes, however it is not recommended to run the printer with the yellow cover open.
- Do not open the printer case. This will void your warranty and could expose the user to electrical shock.
- Do not block the printer air vents.
- Regularly clear air vents of all dust, dirt and other debris that might prevent or hinder printer cooling.

## Work Area

- The printer must be installed on a level surface to prevent spillage of resin. The resin may spill out during the lift cycles if the surface is uneven.
- Keep a board nearby to use underneath the build head when removing prints. This will prevent resin from dripping over the front of the printer.
- The printer must be installed in a location away from direct sunlight or intense artificial light sources.  These environments could prematurely cure your resin.
- To ensure resin flows properly, the work area should be kept between (15°C / 60°F) and (26°C / 80°F).
- The printer itself emits no fumes and the resin contains zero volatile organic compounds. However, Isopropyl Alcohol (IPA) is commonly used to finish prints so an area with good ventilation is recommended.

## Resin

FSL photopolymer resin is a mild irritant. Follow standard safety procedures and FSL handling instructions.

- Only use resin from FSL or approved partners. Using 3rd party resin may damage your machine and void your warranty.
- Wear protective gloves when handling the resin. Goggles are also recommended.
- Resin is not edible in liquid or solid form.
- Liquid and solid forms of resin are not approved for use with food or drink.
- Liquid and solid forms of resin are not tested or approved for use in medical applications.
- Do not mix the resin with any substances.
- The resin is light sensitive, so avoid long exposure to strong artificial lighting or sunlight. The transparent yellow cover is designed to filter UV light, but strong exterior light may enter and cure the resin. It is important that the unit be kept out of direct sunlight or high-intensity artificial light.
- To avoid contamination, do not pour used resin back into the original bottle. It is safe to store resin in the build tray for a period of 24hrs or less between prints. For periods greater than 24 hours, we recommend to empty the build tray and to filter the resin. Store filtered resin  in a light-proof container.

- We recommend colored resins be gently stirred for 5 minutes before use if left sitting for more than 7 days due to possible pigment settling.
- All resin should be stored in a cool, dry place at or near room temperature between (15°C / 60°F) and (26°C / 80°F).
- Please refer to Appendix D: Material Safety Data (resin) for information on handling, storage, properties, and an outline of Material Safety of the resin.

## Isopropyl Alcohol Use

Isopropyl Alcohol (IPA) should **never** be used to clean printer components, including the SuperVAT™, build head, lid and printer exterior. Only use paper products for printer cleaning purposes. IPA may be used to clean and cure printed parts once they have been separated from the build head.

# Part 2: Getting Started

## Overview

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The following section is a brief guide to getting your machine properly set up prior to printing. Setup of the Phoenix Touch usually takes less than 10 minutes, but external accessories may be required.

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## Unpacking

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## Setup

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## Unpacking

Once you have removed the unit from the box, you will need to do the following to prepare the machine (wire cutters or scissors required)

1. Remove all wrapping and packaging material from the exterior.  Remember to keep all foam packing should there be a need to return, ship or move the printer to another location.
2. Verify that you have all the components included in the packing list below.
3. Inspect the interior and exterior of the printer for damage. Contact FSL immediately if any damage is discovered.

## Parts and Accessories

The Phoenix Touch includes the following parts and accessories.  If there are any issues, contact Technical Support immediately via email (**support@fslaser.com**).  Please include your unit's serial number and photos of the problem.

**Packing List**

| Part | Quantity |
| --- | --- |
| Phoenix Touch 3D printer | 1 pc |
| SuperVAT™ | 1 pc |
| Build Head | 1 pc |
| Power cable | 1 pc |
| Ethernet cable | 1 pc |
| 500mL Starter Resin | 1 bottle |

Phoenix Touch 3D printer

Build Head

SuperVAT™ Liner

500mL Starter Resin

SuperVAT™ Frame

Power Cable

Ethernet Cable

FSL3D
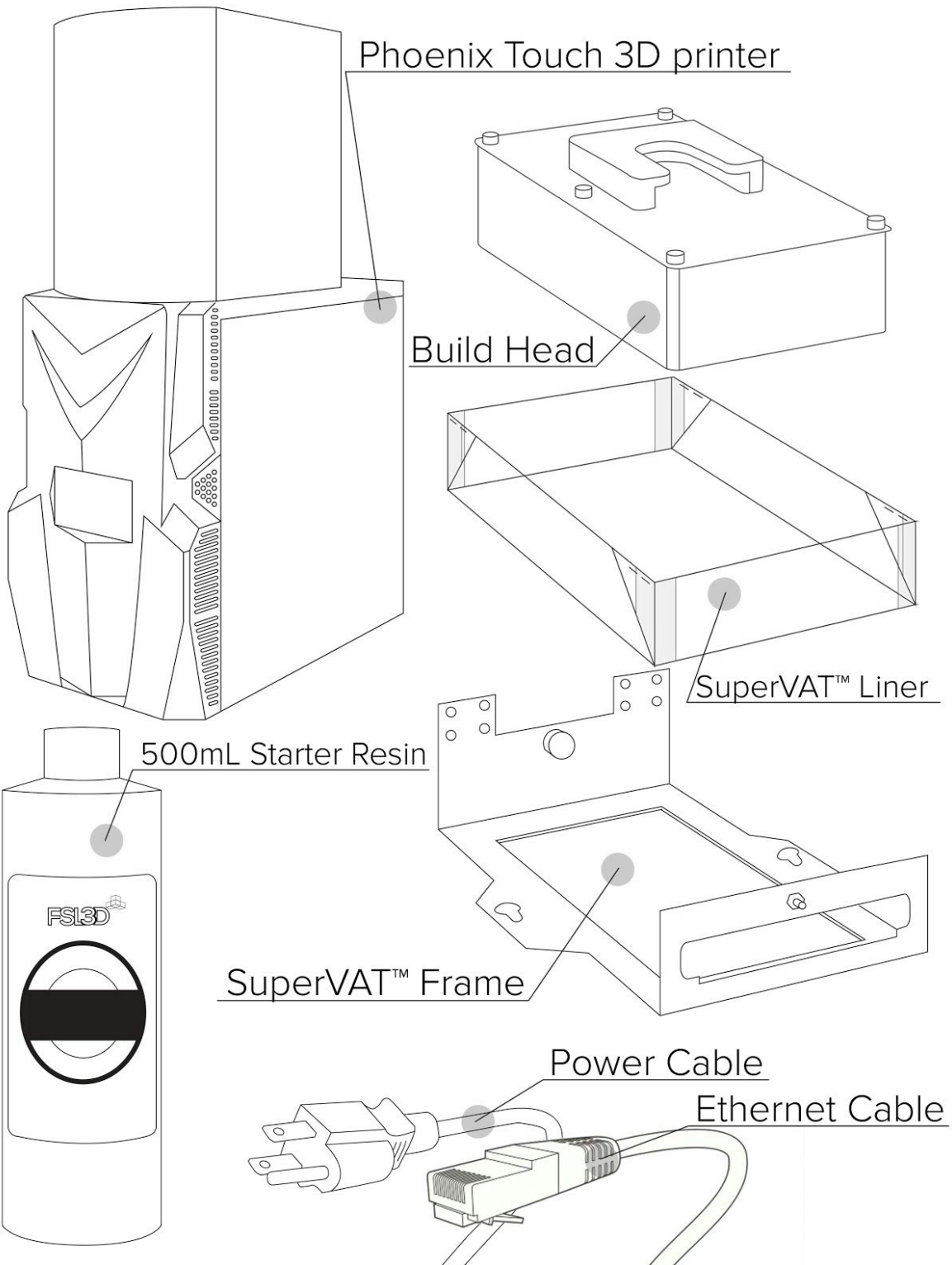
## Additional Recommended Tools

Due to the nature of Stereolithography (SLA) Printing, certain removal and cleaning processes are required.  We recommend the purchase of a number of tools to assist in removing prints from the build head, cleaning prints, and filtering resin.  Some of these tools are sharp and may cause injury if used improperly.  Always take care when removing parts from the build head and handle tools in a safe manner.

Personal Safety
- Nitrile Gloves
- Goggles
- Tongs for removing prints from Isopropyl Alcohol (IPA)

Part removal:
- Cutting board to prevent resin dripping during removal
- Steel paint scraper
- Razor blade for removing delicate printed parts
- Rubber mallet

Part finishing:
- Flush cutters for removing supports
- 1-2L glass container
- 99% Isopropyl Alcohol (IPA)
- Paper Towels
- UV curing chamber/station
- Paint Strainers for filtering resin

Switch

Power

Ethernet Port

Mini B-USB Port

USB Port
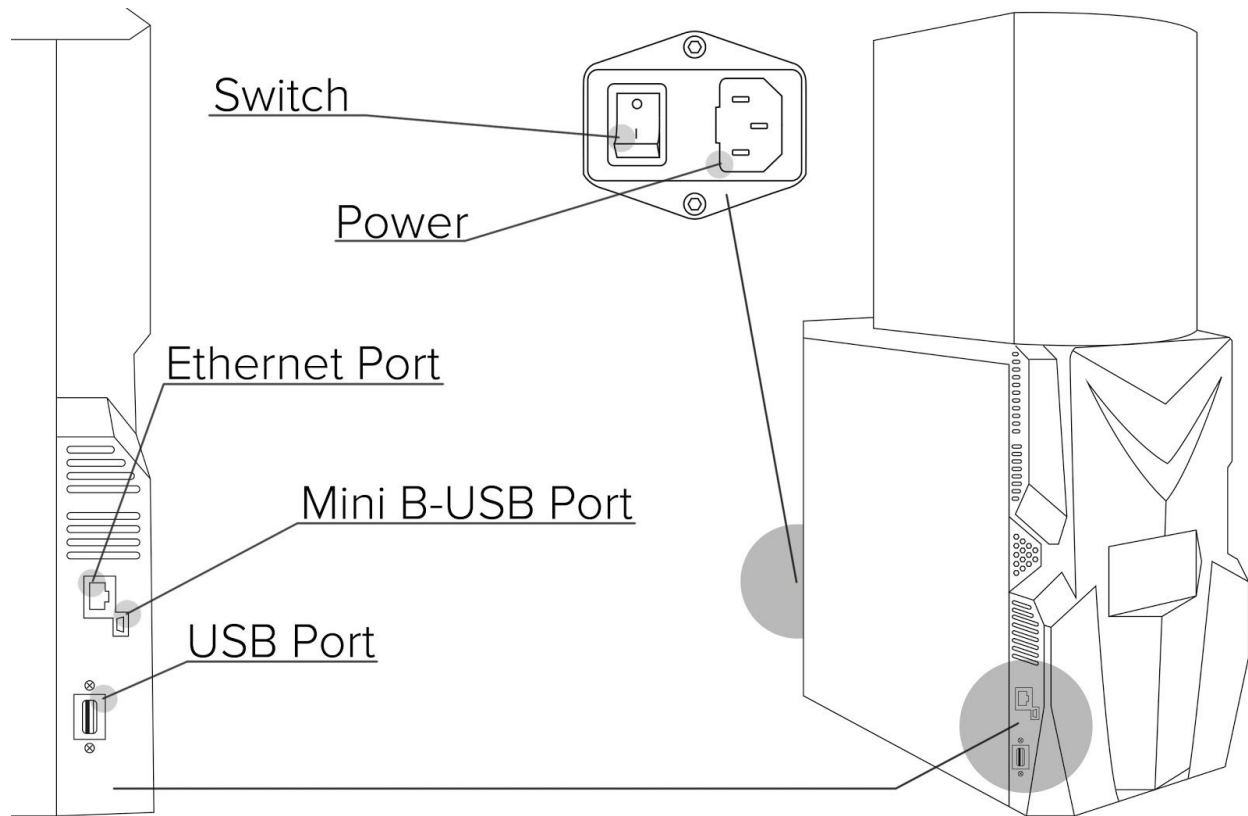
## Setup

Your work area should be kept between (15°C / 60°F) and (26°C / 80°F) to ensure consistent prints.  Be sure that the printer is on a level surface and away from direct sunlight.  The UV blocking yellow cover should prevent premature curing from daily lighting, but avoid long exposure to strong artificial lighting or sunlight.  Verify that your machine is clean and undamaged.

1. Choose your connection method and connect with the corresponding ports.  Ethernet is prefered, but USB-PC connection, WiFi connection, and direct USB thumb drives are also supported (Mini B-USB cable, Wifi dongle, and thumb drive not included).
2. Connect the female end of your power cable to the corresponding port in the rear of the machine.
3. Flip the power switch to the on position.
4. The machine should boot within 90 seconds.

## Placement of SuperVAT™



Remove Screws | Place SuperVAT™ Liner | Replace Screws
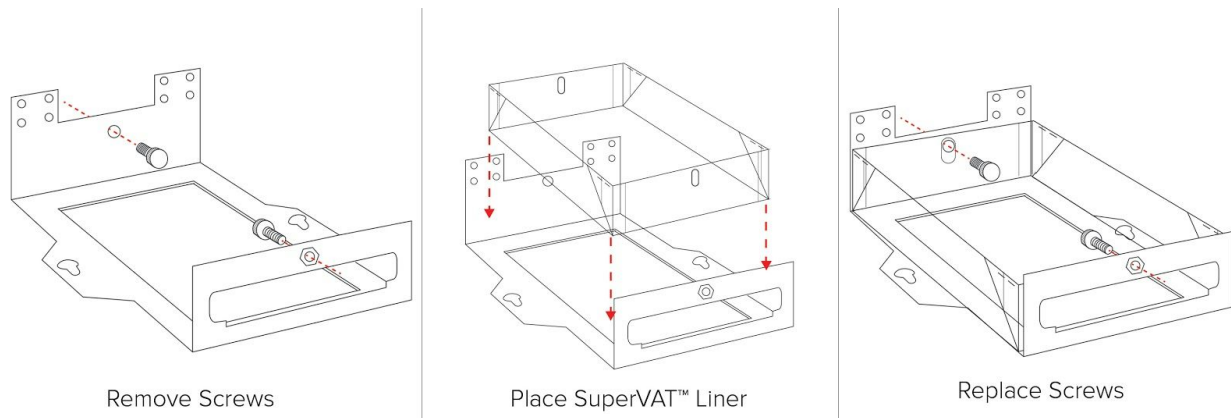
The SuperVAT™ consists of the metal frame, acrylic bottom, SuperVAT™ liner, and two retention thumb screws.  Be sure that all your components are clean and that any packaging and protective films have been removed.  **Do not** remove yellow Kapton tape from the SuperVAT™.

- Peel away the protective film on the acrylic bottom.
- Remove the two retaining screws from the metal frame.  These thumb screws will require no tools.
- Set the SuperVAT™ liner into the metal frame.  Be sure that the bottom lies flush to the acrylic bottom.
- Replace the two thumb screws.  The face of the screws should be on the inside of the vat.



Lower SuperVAT™ over screws | Shift torwards the back of the machine | Tighten screws
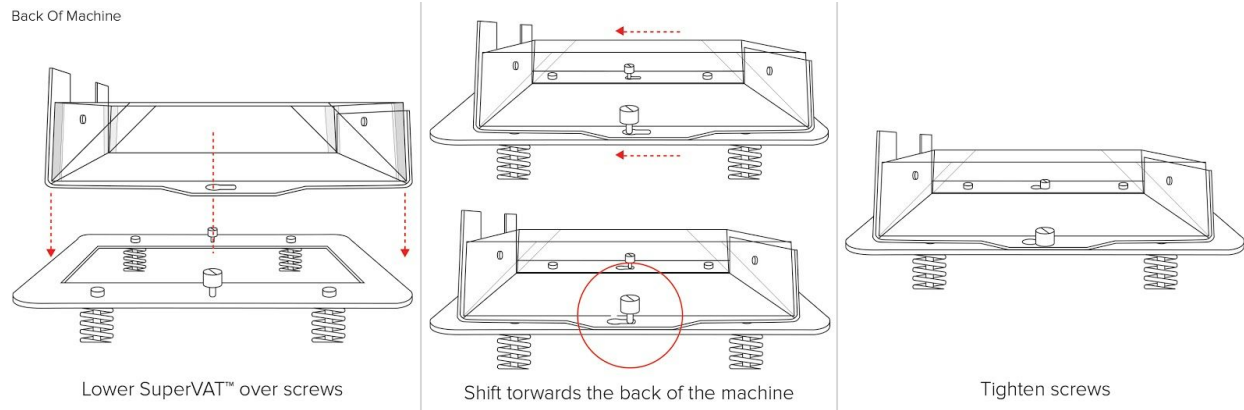
To attach the assembled SuperVAT™ to the machine:

- Loosen the flat head screws on the Phoenix, and lower the assembly over the screw. Keep the taller notched end of the supervat towards the back of the machine. This allows clearance for the build head to move.
- Shift the SuperVAT™ back so that the screw rests in the thinner section of the hole.
- Tighten SuperVAT™ in place.

## Build Head Leveling



4.0mm hex screwdriver required

Loosen bolt and thumb screw          Slide build head into place
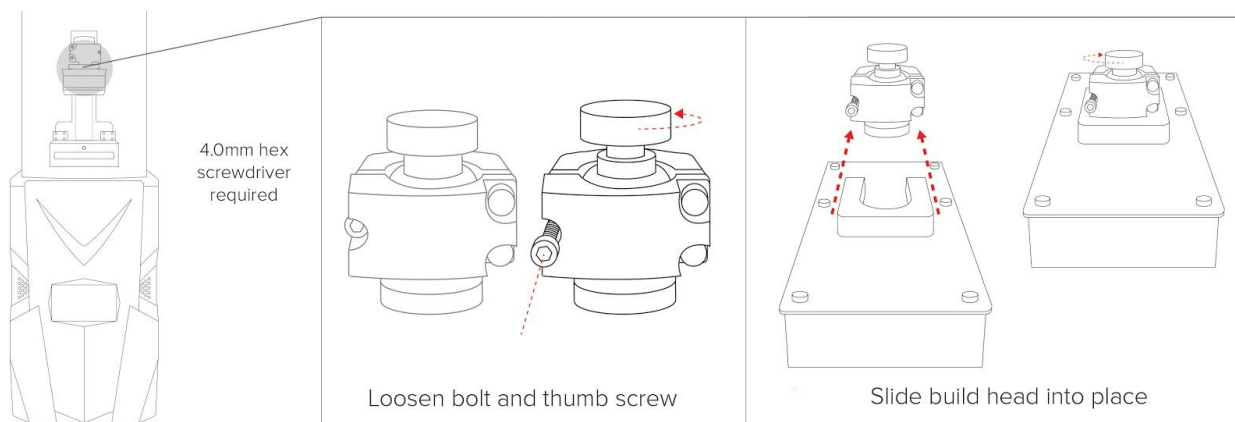
1. To attach the build head, loosen the large thumb screw at the top of the arm assembly. This loosens the bracket for attaching your build head.
2. Loosen the hex bolt using a 4mm hex driver on the left side of the arm (when looking at the front of the machine). This loosens your ball joint for leveling.
3. Slide the build head into place. and tighten the thumb screw. **Do not** tighten the hex screw.
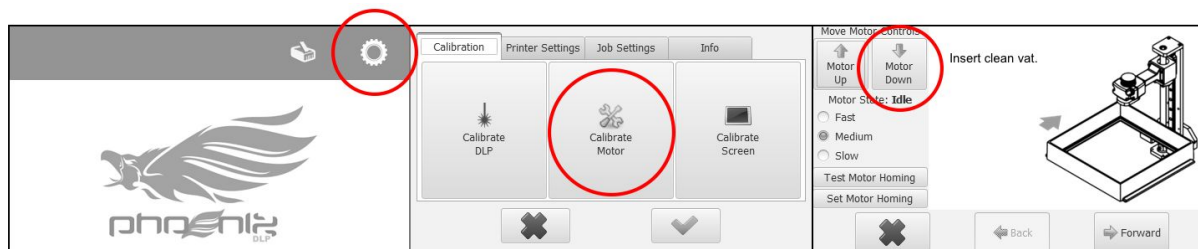


4. Power on your Phoenix. Using the touch screen menu, press the gear icon in the upper right hand corner. On the next screen, select the "Calibrate Motor" button. In the motor control menu, bring the build head down to the inside of the vat using the "Motor Down" button.

Lower the build head | Continue until all 4 corners are flush | The build head will self level.
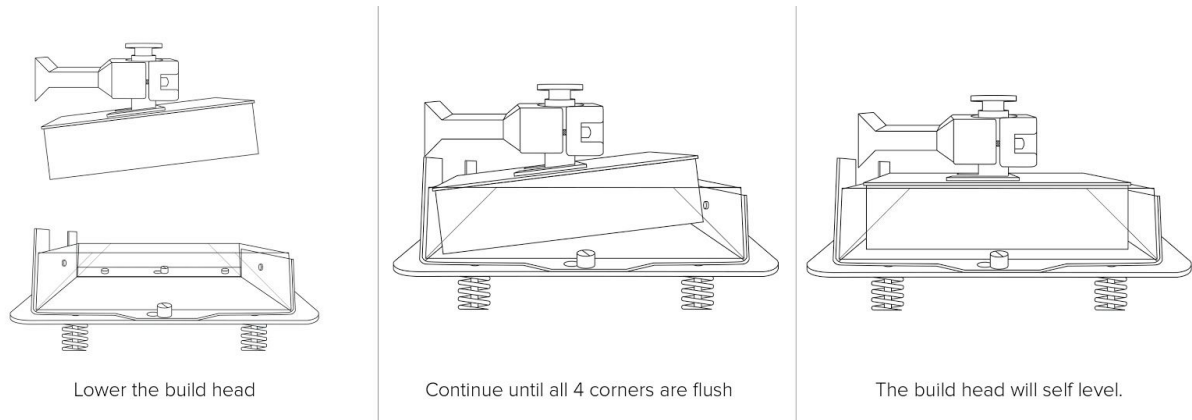
5. Continue to lower the build head until it is completely flush with the base of the SuperVAT™. The ball joint should automatically pivot to level the SuperVAT™ and the build head.
6. Securely tighten the hex screw to lock the build head location. Ensure that the bolt is centered and spaced evenly on the assembly.



Space Evenly
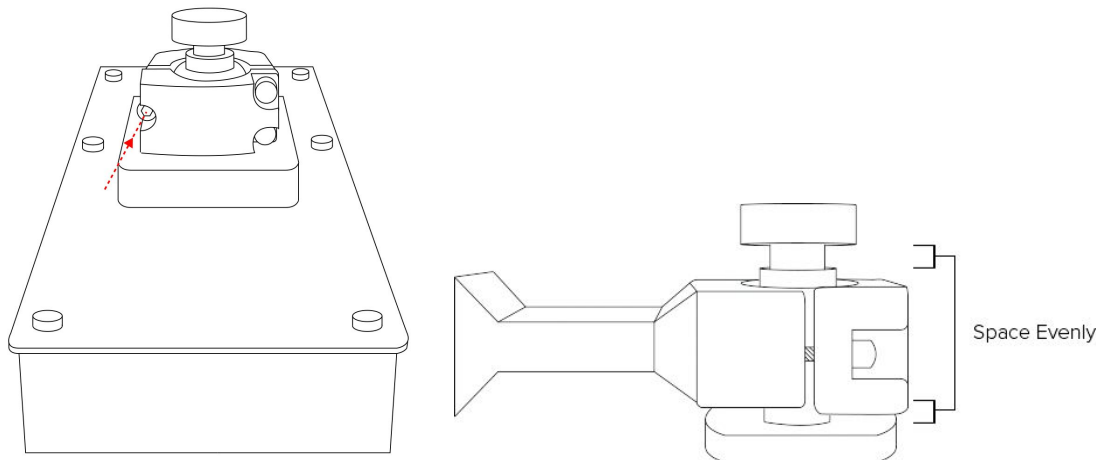
7. Set the motor homing with the "Set Motor Homing" button on the motor control menu.
8. Test the motor homing to verify that it returns to the same location.
9. Move printer head to the highest position utilizing touch screen motor control.

## Adding Resin

● Pour resin into the SuperVat™ liner. Minimum and maximum fill lines are denoted by the notch in the front window of the vat.

Maximum Fill
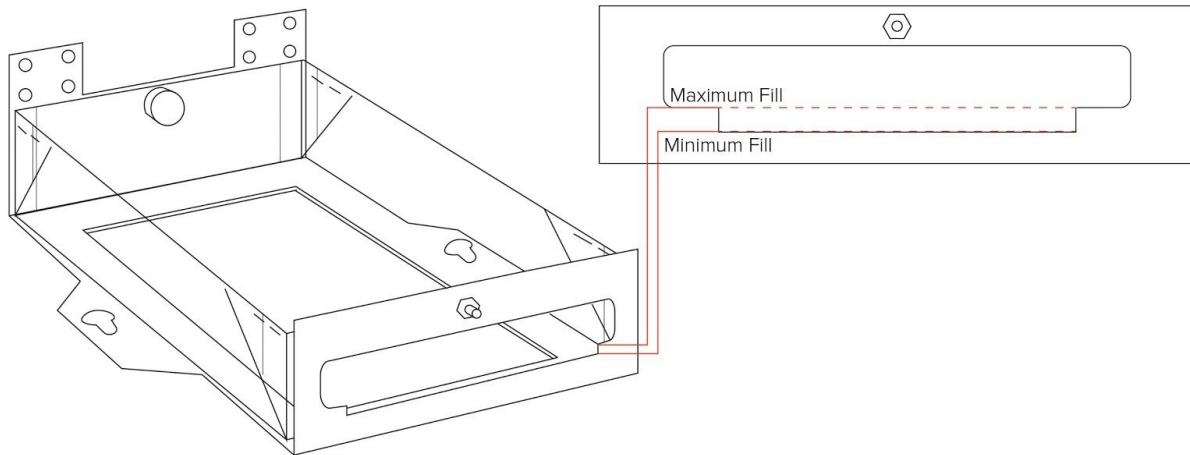
Minimum Fill

- After 50 mL of printing, the job will pause automatically for refilling. Fill the SuperVAT™ just under the recommended maximum fill line before continuing.
- If more resin is needed while printing, you can pause a print at any time to add more resin by pressing the pause button on the LCD screen.  The print will continue from it's last position.  Refilling resin may cause imperfections in the print due to the temperature change.
- Be careful not to exceed the recommended maximum fill line to avoid spillage while printing.
- Do not clean the SuperVAT™ with Isopropyl Alcohol (IPA) or any other chemicals. Doing so may damage the SuperVAT™ liner. Clean only with paper towels.

# Part 3 - Software: Using Retina Create

This next section will show you how to operate the print software RetinaCreate.  Download the latest version on fslaser.com/Software/RetinaCreate for Windows or Mac.

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## Importing

## View Control

## Moving and Orienting Models

## Model Preparation

## Supporting

# Print

## Select Your Printer

Launch the RetinaCreate software.  In the top left menu, choose the "Select Printer" icon to select your printer.  This will create the limits for your build area.
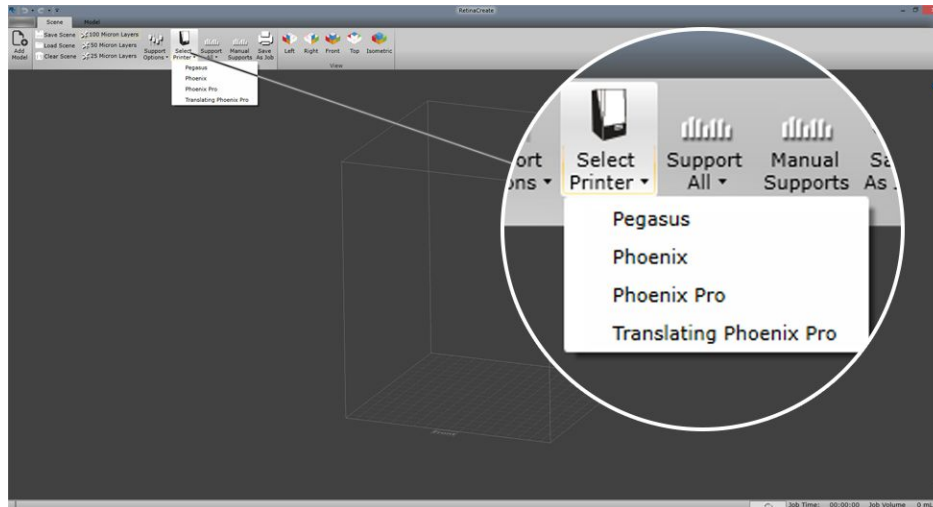


Select your layer thickness in the left menu.  For Phoenix printers, 100 microns is disabled once your printer type has been selected.  50 Micron Layers will be the thickest, while 25 Micron Layers will be the thinnest.

## Add A Model

RetinaCreate supports .stl and .obj files.  Open RetinaCreate and select "Add Model" in the top left menu.  This will open the file explorer for your computer.  Select your file and press "Open". You can also drag and drop the file into the software.
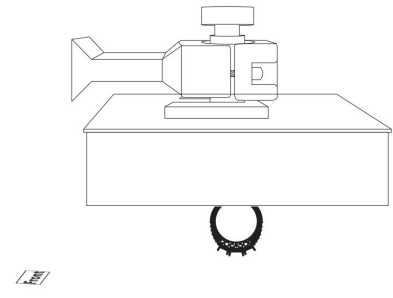You can have multiple files in the scene, but they must be imported one at a time.
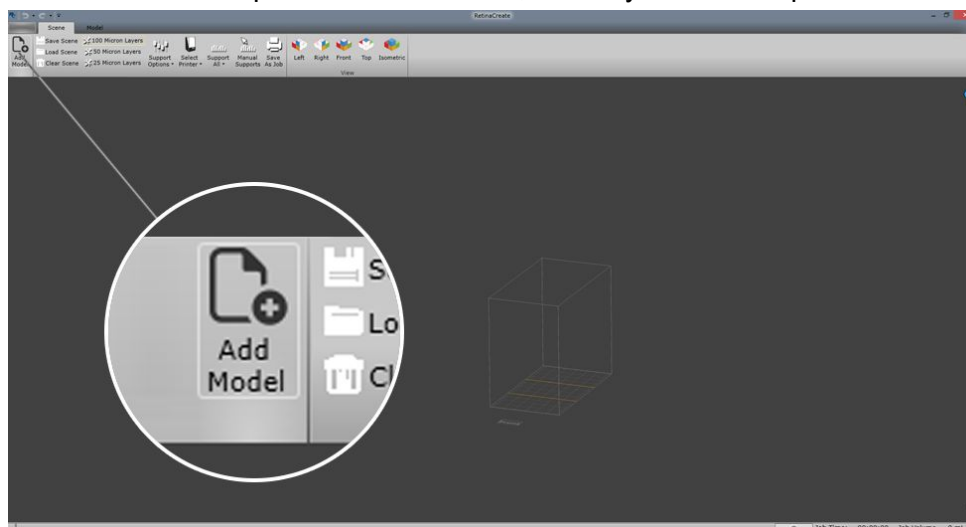
The bottom grid of the box represents the build head the printer. Keep in mind that the build platform is upside down in the printer.
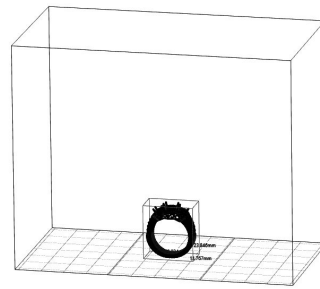
In Software

On Build Head

# View Control

## Zoom In/Out with a Mouse

Roll the mouse wheel up to zoom in and roll down to zoom out.

## Rotate with a Mouse

To rotate around the build area, right click and drag anywhere on the screen. Move the mouse to the left to rotate clockwise and to the right to rotate counter-clockwise. Drag the mouse down to achieve top view and drag up to achieve the bottom view.

## Pan with a Mouse

To move the whole screen on one plane, click the mouse wheel and move the mouse.

You can always reset your position using the view menu.
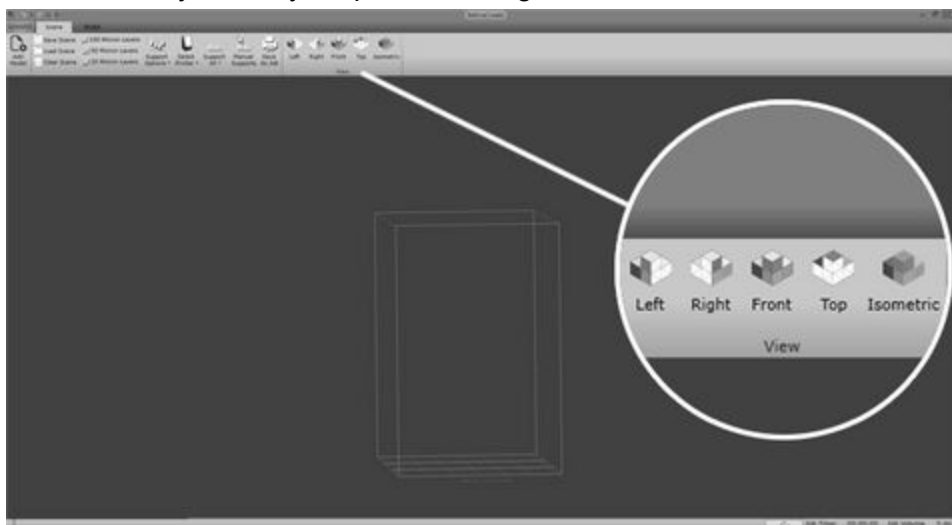
# Moving and Orienting Models

To access the Translate, Rotate, and Scale controls, left click on the model that you want to affect.  While placing models,keep in mind that the Translating Phoenix has 3 sections.  Models that cross over the two yellow boundaries have a possibility of developing minor seam lines.

## Moving

You will see red, green and black arrows surrounding the model. Red and green arrows will drag the model in the direction that they are pointing. Left click and drag the arrows to move the model.
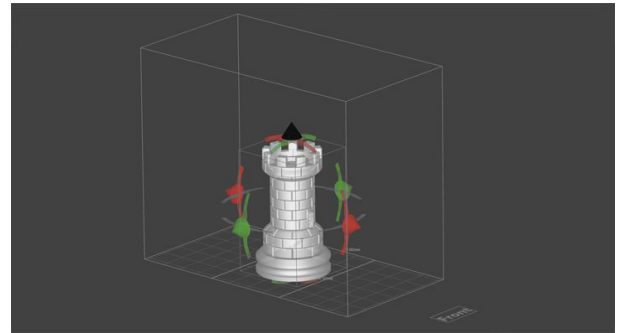


## Sizing

The black arrow on the top of the model pointing upward is to change the size of the model. Left click on the arrow and drag up and down to increase or decrease the dimensions of the model.
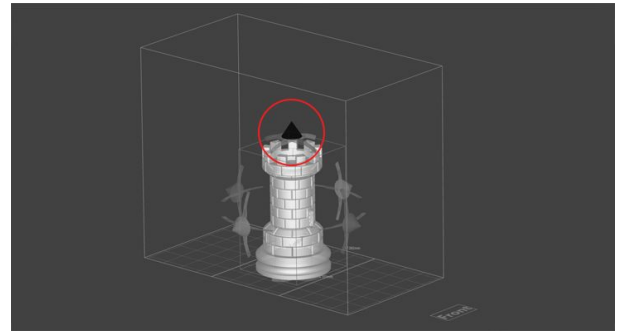


## Orienting

The curved bars attached to the arrows are used to rotate the model. Red, green and blue bars represent X, Y, and Z axes respectively. Left click and drag the bars  to change (Red) X and (Green) Y orientations of the model. Left click and drag horizontally to change the (Blue) Z orientation of the model.
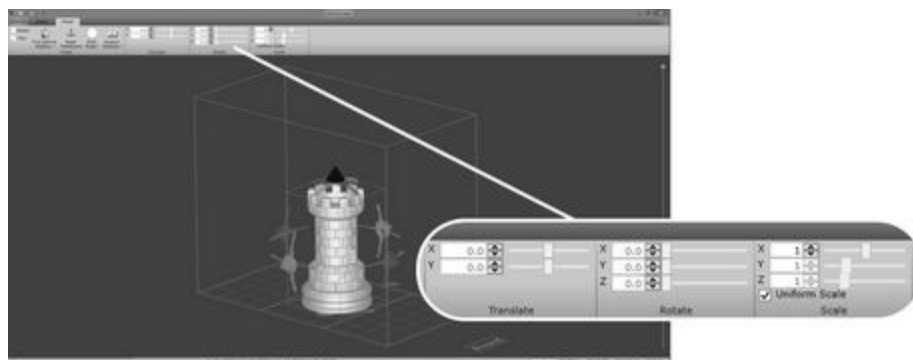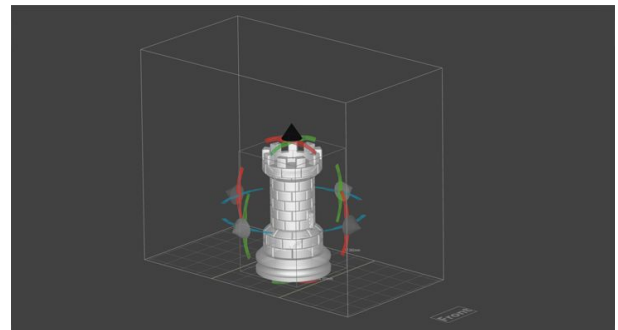




You can use the top menu to control the same features with numerical values.

# Model Preparation

## Shell Model



Shelling a model is a great option that will save resin and give your model inner structural support.  The shelling feature will fill your model with a sturdy support structure while maintaining durable outer walls.  This allows you to use less resin without compromising durability.
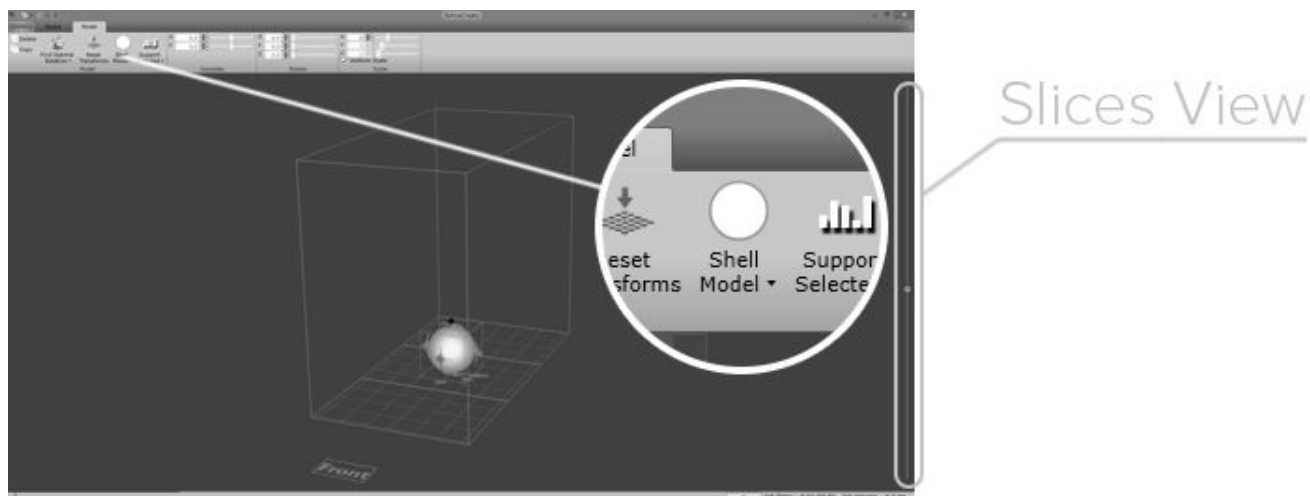


Press the circle above the "Shell Model" to shell your current selection.  You can also press the drop down arrow which will give you the options to shell or to remove the shelling.
To view the slices of your object, use the slider on the right hand side of the screen.

## Highlight Unsupported Features

Supports are important for a successful print, especially for models with overhangs. Before supporting your model, it's important to highlight the features that require supports.
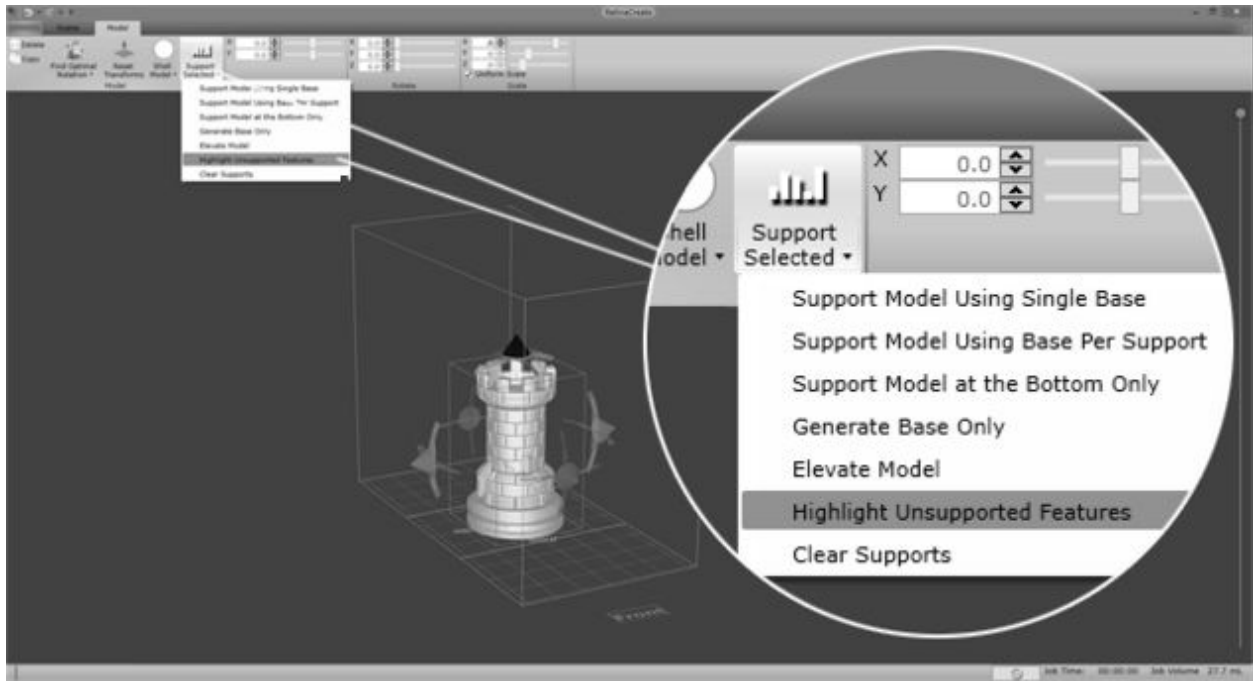


Left click your model to select it. Selecting your model will bring up the Model menu. Press the arrow on the "Support Selected" button, to "Highlight Unsupported Features"
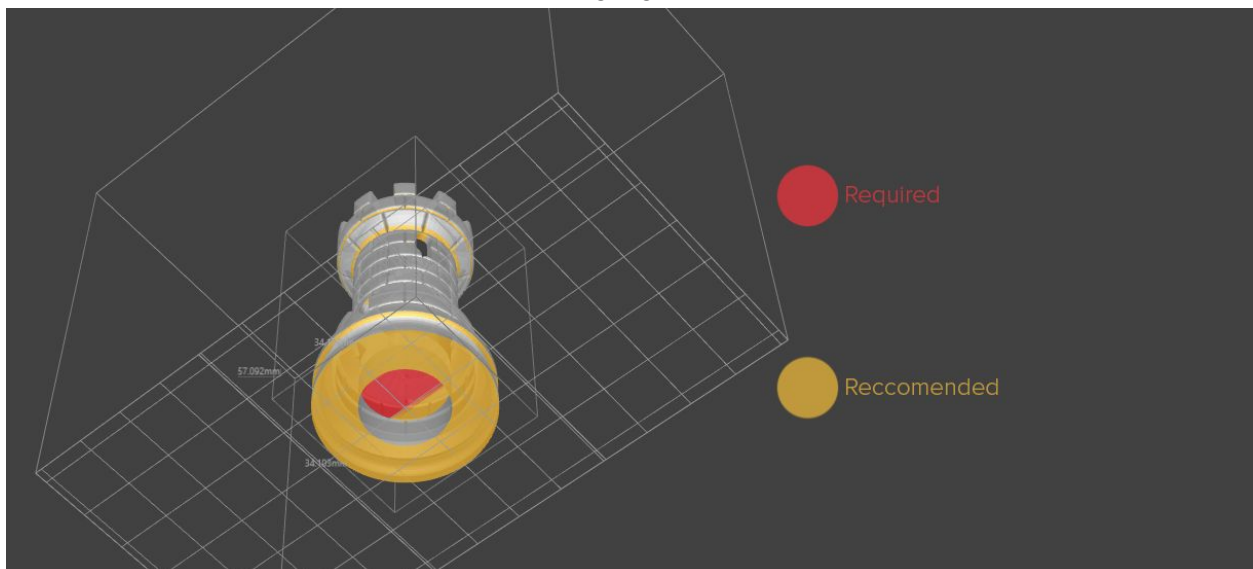


Unsupported features will be highlighted in Yellow, and Red. Red features require supports, Yellow features are recommended to add supports, but not usually necessary.

## Support Settings



Retina Create runs multiple types of printers.  To optimize your supports for the Translating Phoenix, click the Support Options in the upper left hand menu.  If this option isn't visible, be sure no models are selected.

Change the "CylRadius" from 0.9 to 0.6.  This will make your support pillars thinner.  Change the "Touch Point Diameter" from 1.2 to 0.5 to lessen the surface area that touches the model.

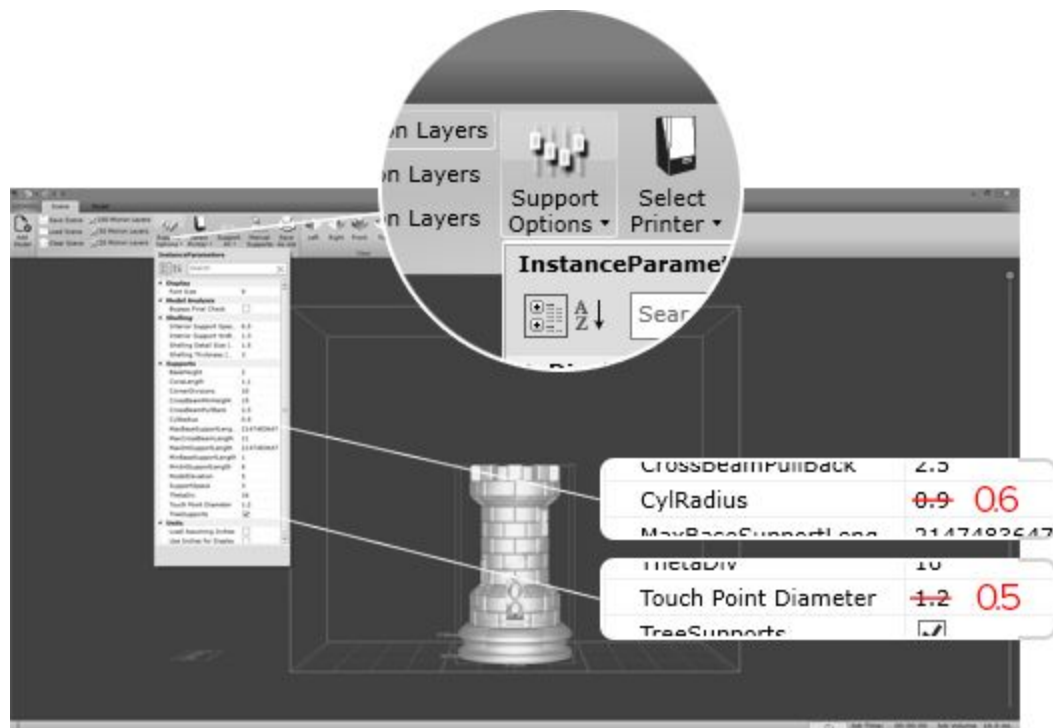# Supporting

Supports, especially for models with overhangs, are important for a successful prints.  Automatic supports will calculate areas that need supporting and will automatically generate trees for optimal success.  Automatic supports will tend to overdo supports which may lead to extra resin usage and dimpled surface finish where the supports have connected.

Manual supports typically require less supports which lead to a better finish, but are more difficult and time consuming to place.  Automatic supports are recommended for beginning users.

## Automatic Supports

Press the graph above "Support Selected" to add automatic supports to your selected model.
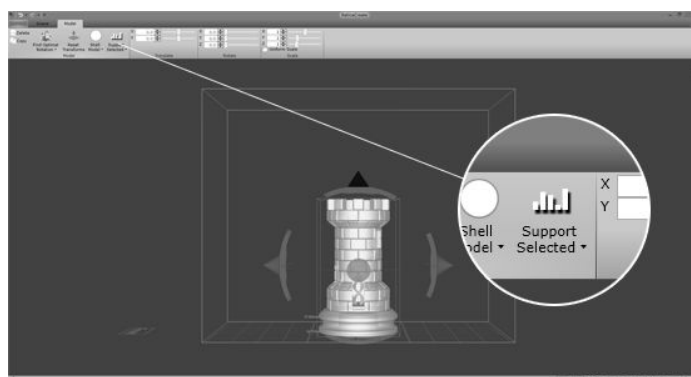
Automatic supports will add a base and will support most of the crucial layers.  This function will avoid placing supports if it believes that it will intersect the model, so always verify manually that all sections are supported.

Keep in mind that automatic supports create a base and will raise your model above the build head.  After supporting, verify that the model does not exceed the bounds of the printer.
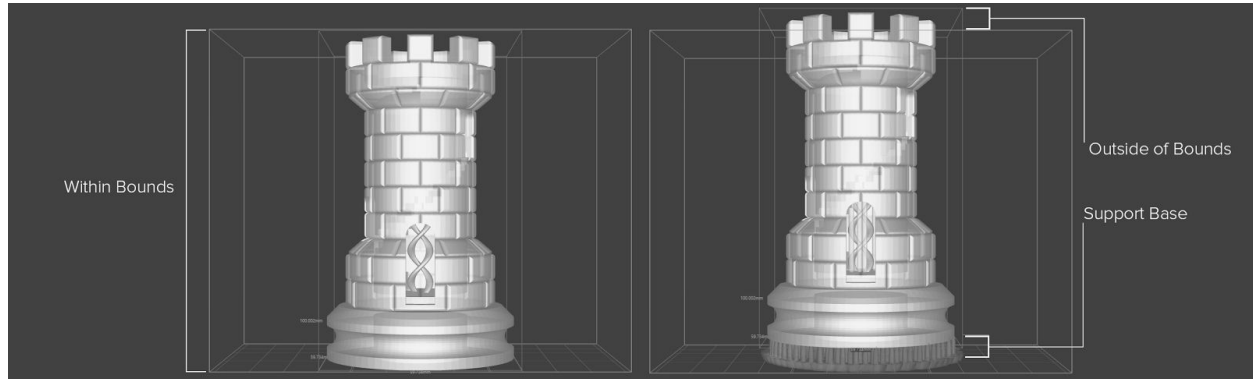


## Automatic Support Modification
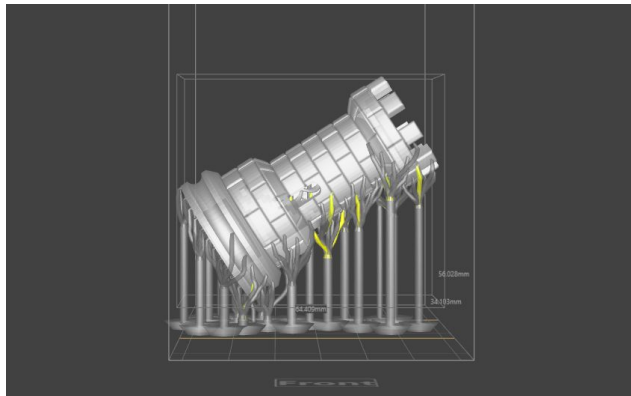


Model rotated to exaggerate the generation of yellow supports

Automatic supports will usually create yellow supports.  Yellow supports are recommended and not always necessary.  They could be left in place or removed.

Left clicking supports will select them.  Selected supports are shown in red.  You may select multiple supports at a time.

- Press the delete key to manually delete the selected support.
- Left-click and drag a support to relocate it to another position.
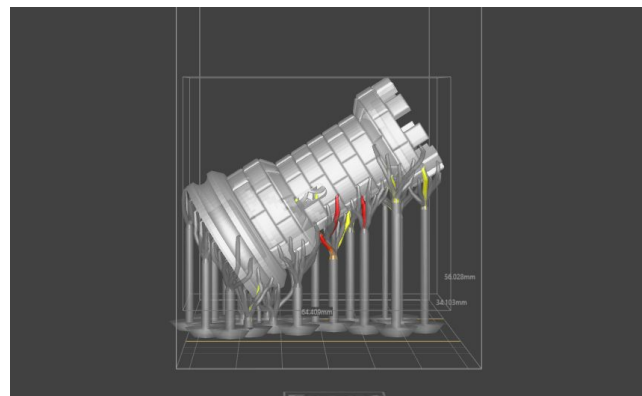
## Manual Supporting



Models with flat bases can be printed directly to the build head to avoid dimpling caused by supports.  If you would prefer a base, or have an object that can't be printed flat, select "Elevate Model" to add space before supporting.
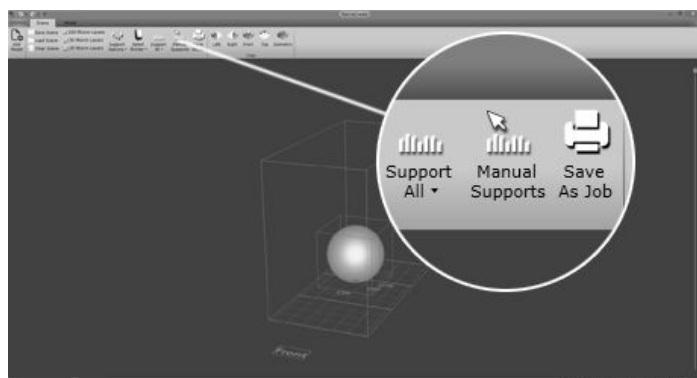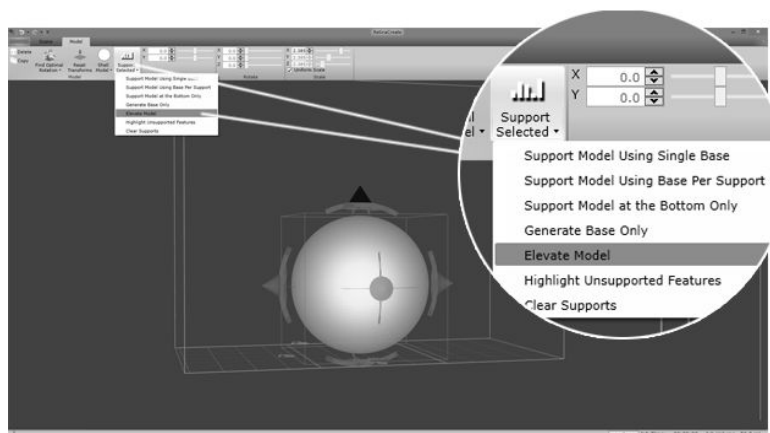


The "Manual Supports" option will appear in the top left menu when no models are selected.  Press this button to begin adding supports.  Supports can be added by left clicking on the model.

While highlighting unsupported layers, you will see red and yellow sections. Red sections are necessary to produce the print while yellow sections are recommended, but may not always be necessary.

Begin by supporting the necessary red areas then continuing to yellow areas. When adding supports, add them in a symmetrical pattern.  This will help distribute the weight evenly when printing.
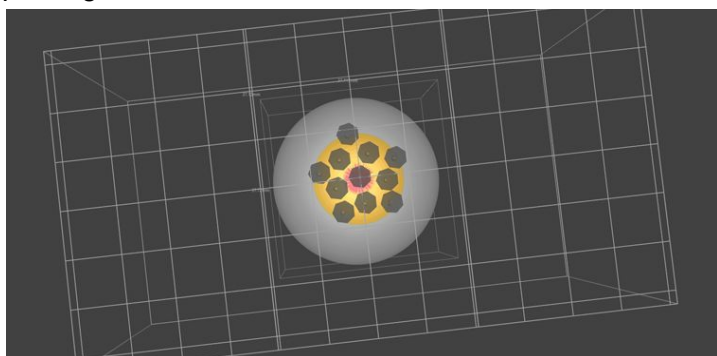
When supporting models with long overhangs, add supports no further than 3mm apart. This can be achieved by placing models so that each support's base touches the surrounding bases.



3mm
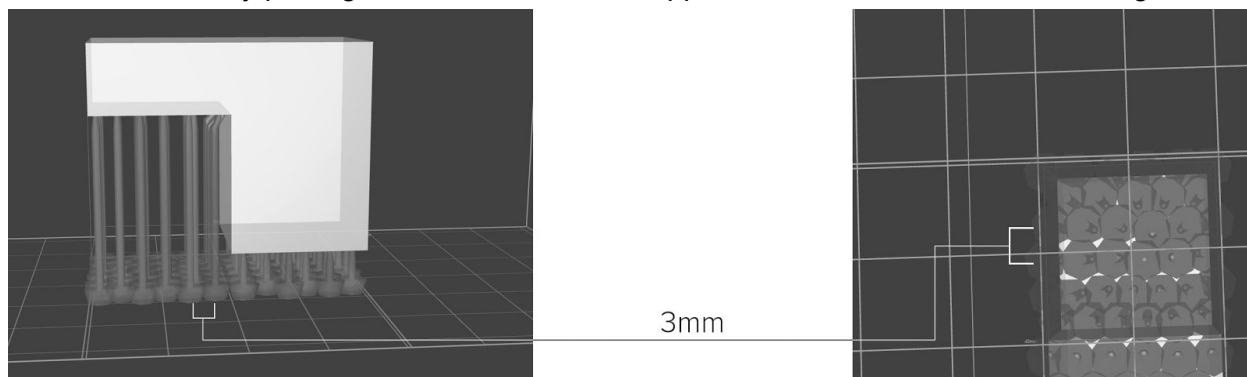
Some models may be printed with further spacings or fewer supports, but each model will vary. Select the "Highlight Unsupported Features" to refresh the view. If there are no more red areas and all yellow areas look supported, continue to print.
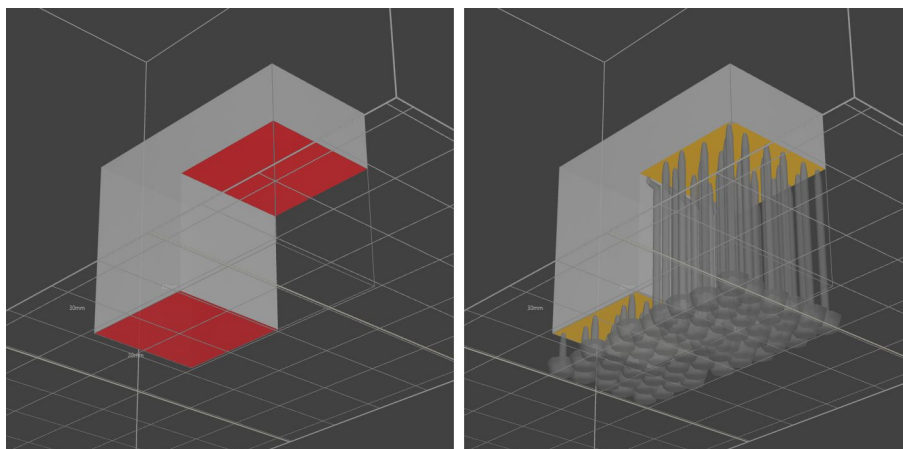


# Print

Please double check the list below before you proceed to print.
- Are all tapes and films removed from all the printer parts?
- Is the build head level?
- Is the SuperVAT™ and the build head securely installed?
- Is the resin filled below the recommended maximum fill line?
- Is the printer well connected to the power outlet?
- Is the printer connected to your computer with the Ethernet cable, USB cable or Wifi?

## Network Printing
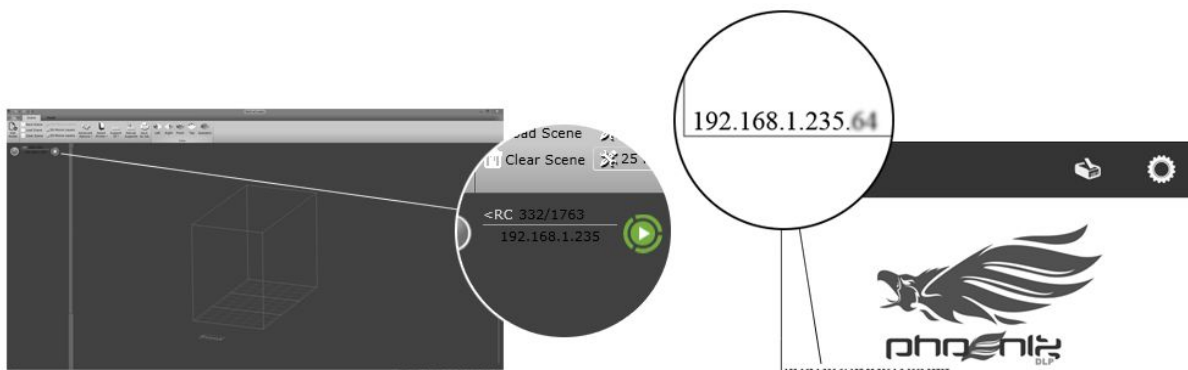


If your printer is connected to a network by ethernet or wifi, RetinaCreate will display the connected printers on the upper left side of your screen.

When the printer is ready you will see a green circle, the word 'Idle', and the printer's IP address. Your printer's IP address can be found at the lower left corner of the touch screen. Click the green circle with a triangle to transfer your file to the printer.

The file will not print automatically. It will take a minute for the menu to pop up on the printer. When the file has transfered, follow the steps on the touchscreen of the computer to begin printing. **Do not** disconnect your network until the print has started.

## Print from USB

Click off of the model into the background space of the work area to deselect it. When unselected, the menu will have a "Save As Job" option. "Save Scene" **will not** create a printable file. Save the job file to the USB drive you'll be using to print.
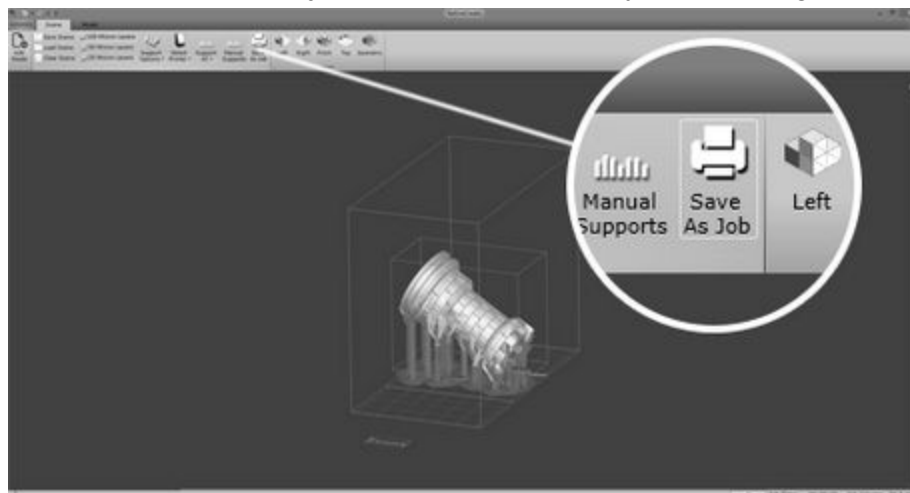


Connect your USB drive to the USB port on your printer. Select the USB icon on the top of the screen. This may take 5-10 seconds to appear. If it doesn't appear, power your printer off then on again keeping the flash drive plugged in. Press the print button and follow the directions on the screen until it begins printing.

# Part 4: After Printing

Remember to follow all safety instructions when in contact with resin and isopropyl alcohol.

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## Removal

## Finishing Steps

# Removing the Build Head

- When the model has finished printing, wait at least 10 minutes to allow excess resin to drip back into the vat before opening the lid.
- Wear gloves when handling resin.
- Open the lid.
- Place a board over the SuperVAT™ before removing the build head to avoid resin drips over the front of the machine.
- To remove the build head, loosen the large thumbscrew enough so the build head slides out.  You do not need to completely remove the screw.
- Remove the build head and transfer it to a safe location for cleaning.
- Always make sure to remove the build head before removing the SuperVAT™ liner. Removing the resin tray first will expose the inner electronics of your printer to resin drips from the build head.
- Close lid to protect the resin from external UV light.

# Finishing Steps

## Removing Your Model

- Use the edge of a steel paint scraper and wedge it underneath the print.  Most prints can be removed delicately.  For stubborn prints, use a hammer or mallet  to tap the end of the scraper to help release your print.  Be careful not to damage your build head. Continue until the whole model is removed.

## Rinsing Uncured Resin

- Fill your container with 99% Isopropyl Alcohol (IPA) and place your model inside. Let it soak for 15 minutes to clean excess liquid resin. You may try holding the model with tongs and swirling the model inside the container remove any loose resin. We recommend you cover the container with a lid to prevent excessive evaporation of the IPA.
- Clean the build head with paper towels or other paper wipes. You should clean the platform right away after each print.
- Do not wash the SuperVAT™ with any chemicals. Cleaning the SuperVAT™ with alcohol may cause it to crack. Wipe the SuperVAT™ clean with paper towels
- Take the model out of the IPA using the tongs after soaking.

## Finishing

- Use the flush cutters to snip away supports.
- Put the model on some paper towels to dry.
- You can finish here, but post curing is recommended for surface finish and print hardness

## Post-curing

- Printed objects are by design cured to about 90% strength to extend the useful life of the SuperVAT™.
- To fully cure your prints, expose your prints to a UV light for 30 minutes.  Speed Cast resin requires a minimum of an hour of curing.  This ensures that the model is completely dry for proper casting burnouts.
- Alternatively, you may place the models in sunlight to cure.  Sunlight may cause the clear models to turn slightly yellow as sunlight contains a certain wavelength of light that breaks down color additives in the resin.

## Post Processing

- After curing, use sandpaper to remove any imperfections.  Rinse in IPA to remove dust. You **will not** need to post cure again.
- You can use any finishing processes at this point.  eg. Painting

# Part 5:Touch Screen Interface

## Overview

The Phoenix Touch comes equipped with a touch screen interface on the front of the machine. From this screen you can monitor prints, pause and stop prints, configure network settings, calibrate the printer and print models

**Contents**

## Main Menu

---
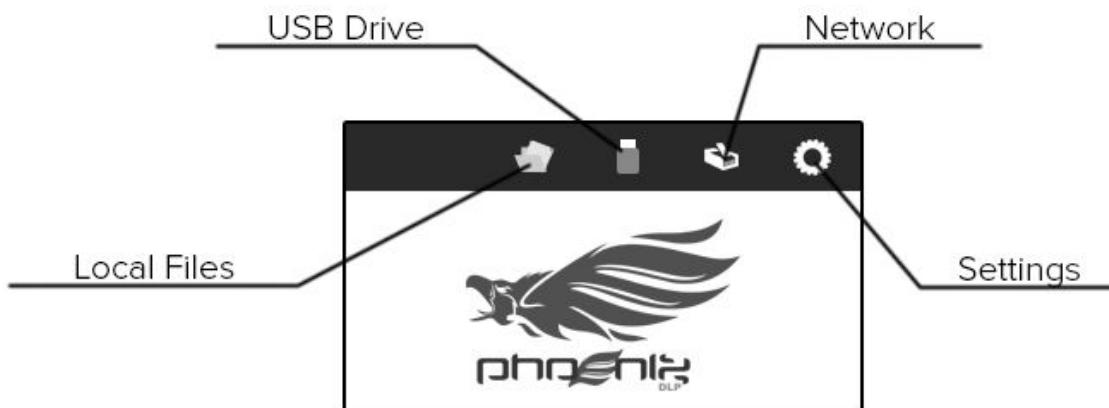


- "Local Files" host the most recently printed files. This will let you print directly without needing to use the original media.
- The "USB" icon will appear if you have a USB flash drive connected with the proper file type.
- The "Network" icon will assist with connecting to an ethernet or wifi network.
- "Settings" will take you to the settings menu to adjust various printer functions.

## Print Monitoring

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When the printer is in an active print job, a screen is displayed which allows the user to monitor the job.

Current Layer- Will show the current slice that is curing.
Resin- Notification to how much resin has been used
Layers- Shows Remaining Layers/ Total Layers
Time- Time Elapsed/ Total Time
Progress Bar- Yellow bar along the bottom of the screen showing the time elapsed.
Stop- Cancel your print
Pause/Play- Toggle pause/play to pause the print for refills, and to replay from the last location
Full Zoom- Zoom to the bed to view the laser tracing
Zoom in- Incrementally zoom in
Zoom Out- Incrementally zoom out

Current Layer

Resin

Layers

Time

Progress Bar

Stop

Pause/Play

Full Zoom

Zoom In

Zoom Out

2:02:36/7:23:51  Remaining:2049/2610  Q=14 V=14.0mL
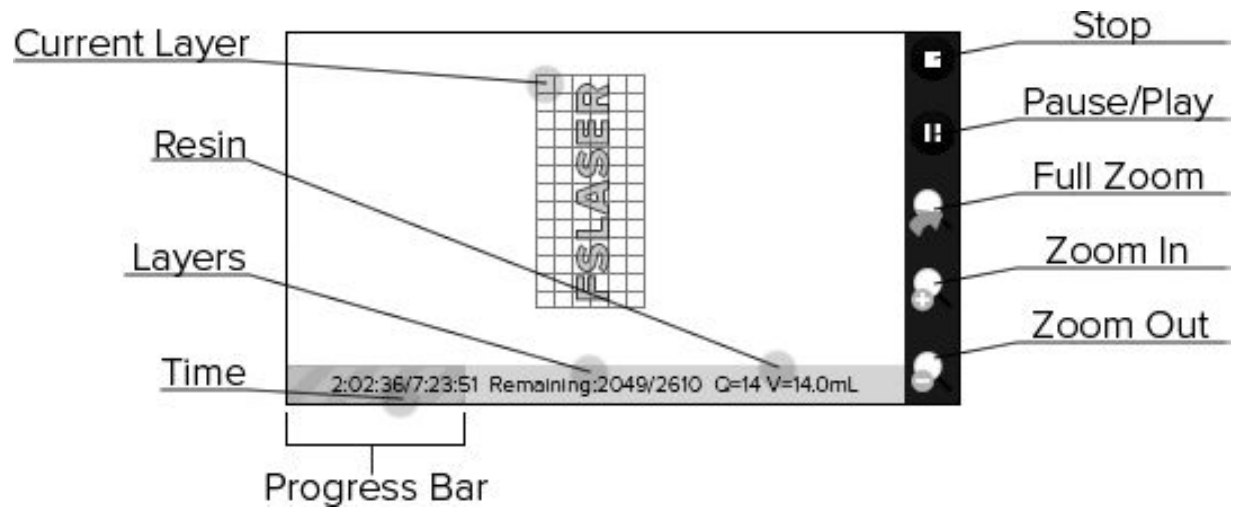
# Part 6: Maintenance

## Contents

## Mechanical Care

## Transportation

## Resin Care

# Exterior Printer Care

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- To keep the body of Phoenix clean, use microfiber cloth to wipe the outside. Avoid products that contain ammonia, e.g. Windex.
- Never clean any part of the exterior or the cover with Isopropyl Alcohol (IPA) since it will cause permanent damage to the printer.
- Never remove the SuperVAT™ before removing the build head.  Remove the build head first to prevent drips and resin damage to the exterior and interior components of the printer.
- Occasionally use compressed air to clear dust from vents and fans.

# Transportation

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To transport the printer, please follow the instructions below.
- Clean excess resin from the build head with paper towels.
- Wrap the build head in plastic wrap and reattach to the printer.
- Clean resin from the SuperVAT™ liner with paper towels.  Never use IPA which may cause cracking. Wrap the liner with plastic and place it back into the printer.
- Lower the build platform by using the motor control.  Lower it until the build head touches the base, securing the vat in place.
- Rebox the printer and accessories in the original package as they were received.

# Resin Care

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### Removing Cured Pieces From Failed Prints

In case of a failed print, you will need to remove cured resin remnants from the SuperVAT™ liner. Lightly run a soft rubber spatula across the bottom surface of the liner to find the pieces and dislodge them. Tweezers or other devices with sharp edges may damage the SuperVAT™ liner.

### Handling

- Please wear protective gloves when handling resin. If you get any on your skin, wash thoroughly with soap and water immediately. The resin can cause mild skin irritation.
- Never ingest resin nor drink/eat from printed parts.
- Cured resin is safe to touch and handle without gloves or other protection.

### Refilling

- Pause the print.
- Pour resin directly into the tray. Do not exceed the maximum fill line as it will spill and damage the printer while printing.

### Spills

- Clean up immediately before it hardens.
- To clean printer body use paper towels or clean microfiber cloths.
- IPA may be used to remove resin on surfaces and tools.  **Do not** use IPA on any printer component.

### Storage

- Always store the resin in opaque bottles or under the printer cover. Natural light will cure the resin.

### Reusing

- You may reuse the remaining resin in the liner, but do not return it to the original bottle since it may result in contamination.
- Filter used resin through paint filters to remove small cured bits of resin.
- Store resin in a lightproof container

### Disposal

- Cleaned parts and cured resin may be thrown away as normal waste. They are non-recyclable.
- Resin in liquid form must be cured before disposal. Place the resin in a clear plastic bottle or bag and use sunlight or a UV lamp to cure.

# Appendix A: Supported WiFi Adapters

FSL3D continues to test adapters / chipsets and will update this list as results are evaluated.

## Contents

## Tested Adapters

- TP-LINK TL-WN722N (FSL3D recommended)
- Netgear WNA1100
- D-Link DWA-126
- Rosewill RNX-N150HG
- Ralink

## User Reported Tested

- Edimax ew-7722U

## Not Recommended

- Tenda W311M (limited range)

# Appendix B: Technical Specifications

## Phoenix Touch Specifications

- Technology: Digital Light Processing(DLP) with exposure on entire 2D field layer
- Resolution: XY pixel resolution at 50um
- Z Motor Control: screw driven stepping motor (5um step resolution)
- SuperVAT™: Patent-pending SuperVAT™ technology to replace consumable PDMS type build containers
- On board computer: 1GHz processor with 512MB SDRAM for on board processing, 2 GB internal storage, 8GB microSD external storage
- Display: 4.3" LCD Color Touchscreen with advanced software for Macintosh and Windows
- Interfaces: USB, Ethernet, WiFi (requires optional dongle), USB key
- Build Volume: up to 120mm x 64mm x 85 mm (3.78" x 2.13" x 3.94") build area
- Dimensions: 225mm x 405mm x 651mm (8.8" x 16" x 25.6")
- Weight: 29lbs
- Power: 24V 2.5 Amp internal power brick (<75W total power draw)

# Appendix C: Troubleshooting

## Contents

## Hardware

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## Software

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Issue: Machine does not boot for more than one minute

Solution: Unplug power cable from machine (not at wall) for 5 seconds and plug back in.

# Appendix D: Material Safety Data

A copy of the Material Safety Data Sheets for all resins are located and may be downloaded at the FSL3D Download site.

# Clear Photopolymer Resin

Standard colored resins will contain the same properties to clear resin.

## Product and Company Information

- Product Name: 3D Printing Resin
- Product Number: FSL3D Proprietary Resin
- Company: FSL3D, LLC
- Address: 6216 South Sandhill Road, Las Vegas, NV 89120
- Telephone: 702-802-3100

## Composition / Information on Ingredients

- Proprietary Resin.

## Hazards Identification

### Emergency Overview

- Irritant.
- Irritating to eyes, respiratory system and skin.
- Possible sensitizer.

### Properties Affecting Health

- Harmful by inhalation.
- Harmful if swallowed.
- May cause eye / skin irritation.
- Suspect respiratory tract irritation.

### Principle Routes of Exposure

- Inhalation: May cause respiratory tract irritation. May cause irritation to nose and throat. Headache. Nausea.

- Oral: Harmful if swallowed.
- Eye Contact: Skin contact causes eye damage.
- Skin Contact: May cause skin irritation. Repeated or prolonged dermal contact may cause sensitization by skin contact.

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## First Aid Measures

- Oral Exposure: If swallowed, wash out mouth with water provided person is conscious. Call a physician.
- Eye Contact: In the case of contact with eyes, rinse immediately with plenty of water for 15 minutes and seek medical attention.
- Ingestion: If ingested seek medical attention immediately.
- Inhalation: If inhaled, remove to fresh air. If breathing is difficult, give oxygen and call a physician.

## Fire Fighting Measures

- Flash Point: Unknown on product.
- Autoignition Temperature: Unknown on product.
- Flammability: Unknown on product.
- Fire Fighting Information: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Emits toxic fumes under fire conditions.
- Extinguishing Media: Water spray, foam, dry chemical or carbon dioxide.

## Accidental Release Measures

- Personal Precautions: Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
- Environmental Precautions: Keep out of drains and waterways.
- Methods for Cleaning Up: Absorb with an inert material and then place in a chemical waste container and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

## Handling and Storage

- Handling: User Exposure: Do not breathe vapor. Avoid contact with eyes, skin or on clothing. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.
- Storage: The storage temperature should not exceed 100 °F (38 °C). Keep tightly closed. Store in a cool, dry, well ventilated place. Do not expose to ultraviolet light. High temperatures (>80 °C), pressure and contamination with peroxides may result in autopolymerization of the product.

## Exposure Controls / Personal Protection

- Engineering Controls: Ensure adequate ventilation. Safety shower and eye bath. Recommended use in a chemical fume hood.
- Eye Protection: Wear eye / face protection such as safety goggles or glasses with side shields.
- Hand Protection: Wear chemical-resistant gloves when handling.
- Skin and Body Protection: Wear impermeable gloves and suitable protective clothing. Prevent contamination of skin or clothing when removing protective equipment.
- Ventilation: Provide natural or mechanical ventilation to minimize exposure.

## Physical and Chemical Properties

- Appearance: Clear.
- Physical State: Liquid.

## Stability and Reactivity

- Chemical Stability: Stable under recommended storage conditions.
- Hazardous Polymerization: Reacts rapidly upon exposure to ultraviolet or blue light.
- Hazardous Decomposition Products: Acrid smoke-fumes, carbon monoxide, carbon dioxide, sulfur oxides, hydrocarbons, nitrogen oxides and perhaps other toxic vapors may be released during a fire involving this product.

## Toxicological Information

- Route of Exposure: Inhalation: Material is harmful to mucous membranes and upper respiratory tract.
- Multiple Routes: Causes eye and skin irritation. Harmful by inhalation, ingestion or skin absorption.
- Sensitization: Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.
- Signs and Symptoms of Exposure: Nausea, headache, and vomiting.

## Ecological Information

- Toxic to aquatic organisms.

## Disposal Considerations

- Dissolve or mix with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

## Transport Information

- Not regulated for transportation.

# Appendix E: Warranty Statement and Warranty Information

FSL3D warranties the Phoenix Touch 3D Laser Printer for a base period of 90 days. Extended warranty periods are available at the time of purchase.

## Contents

## Covered Parts

To ensure a safe working environment, it is necessary to treat the printer and accessories with care. Please carefully read all instructions before attempting to operate your 3D printer.

## Not Covered Consumable Parts

The following list of parts are considered consumable and are not covered under any warranty and may need to be replaced periodically.

### Resin

Once cured, resin cannot be reused. However, uncured liquid resin can be reused for the next print. Do not return used resin to the original bottle to avoid contamination. Always store unused resin in a dark cabinet or bottle. Unopened unused resin carries a one year warranty and will be replaced free of charge if it cures in the bottle without light exposure (excludes shipping/handling charges).

## VATs / Build Tray

Experience shows that after the use of 2-4 liters of resin, the anti-stick surface of the VAT may be consumed and that the VAT will need to be replaced. The anti-stick layer of the tray may also begin to cloud after many prints. To limit this and to extend the life of the tray, vary the printing location. You may purchase replacement VATs from FSL3D.

## Build Platform

Constant removing parts from the build platform will eventually wear down the aluminum surface. Experience shows it to last at least 10 liters or more of printing. You may want to consider spare build platforms if you print / change resin frequently. Spares platforms will allow to begin a new print immediately after the previous print.

# Excluded Events

The warranty is valid only for normal use and excludes Acts of God, user error and use outside of normal parameters.
Parts exposed to spilled resin are considered user error and are not covered under warranty. Best practices to minimize resin exposure include:
- Always ensure that the printing surface is level as the resin may spill while printing.
- Never fill the VAT with resin past the fill line.
- Always use a 9"x14" cutting board over the VAT whenever removing the build platform to prevent spills.
- Always remove the build platform before removing the VAT to prevent resin from falling into the internal portion of the machine.

# Return Policy

For products purchased directly from FSL3D within the first 30 days and if the 3D Printer has been opened, one may return the machine subject to a 20% restocking fee plus shipping fees. This 20% fee results from the need to replenish or replace consumable items. If the 3D printer is returned new, unopened or if the order is cancelled, then only a 5% restocking fee and shipping fees (if any) are applied. Consumable items, e.g. the build plate, VAT or resin, may not be returned if opened. If returned unopened, then only a 5% restocking fee and shipping fees are applied.
For products purchased from 3rd Party Distributors or Resellers, please review the 3rd Party Distributor / Reseller return policy.

## Shipping Expenses

Within the first 30 days, FSL3D will replace or repair any defective parts free of charge and pay for ground shipping of parts if one paid FSL3D for shipping on the original order. Overnight shipping is also available but for an additional charge. If the 3D Printer was picked up in person or delivered through third party shipping methods, FSL3D considers the parts sold FOB from the FSL3D warehouse. As a result, the customer must arrange for shipping or pickup of replacement parts, since FSL3D did not make the original shipping arrangements.
After the first 30 days, FSL3D will replace or repair any defects within the warranty period free of charge. However, all shipping charges to and from FSL3D are the responsibility of the customer. The warranty includes parts and labor only. Shipping of defective and replacement components to / from FSL3D is excluded by the warranty. The customer may arrange their own shipping or drop parts off for exchange at the FSL3D warehouse free of charge. Typically FSL3D has most replacement parts on hand for immediate shipment of parts under warranty.

## Advance Replacement Policy

Within the first 30 days, FSL3D will advance replace any failed parts free of charge.
After the first 30 days, unless otherwise authorized, all defective parts must be returned to FSL3D postage paid for evaluation before replacements are issued. FSL3D's warranty policy is to repair parts whenever possible and replacing them only if they are not able to be repaired. As a result, all warranty parts must be returned first to determine if the parts can be repaired.

## Accuracy and Tolerance Statement

FSL3D makes no specific accuracy or tolerance guarantees, but machines are designed with full end user calibration / adjustment. Users may self calibrate their machines to fine tune accuracy requirements. For details contact FSL3D Technical Support.