

stratasys

Neo® 450/800
3D Printing System
USER GUIDE

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ABOUT THIS GUIDE

This guide is your introduction to building prototypes and end-use parts using a Stratasys 3D production, rapid prototype system. It is designed as a learning and reference tool that explains system operation in an easy to understand, step-by-step, process.

HOW TO USE THIS GUIDE

This guide is divided into easy-to-follow chapters. You can read this guide chapter by chapter or use the Table of Contents when you need to quickly find specific information. Keeping this guide close to your printer will efficiently allow you to troubleshoot and maintain the printer.

CONVENTIONS USED IN THIS GUIDE

The following conventions are used in this guide:

- When you see text in **this font**, it indicates a button being pressed via the User Interface touchscreen. For example, press the **Queue** button within the Navigation Menu.
- When you see text in [blue](#), it indicates that the text is a linked reference to a specific figure, table, heading, or page number.
- Standard **bold text** is used to emphasize items within instructional sequences or indicate a navigational path you must follow to locate/start a software application, open or save a file on your workstation PC, or perform an operation when working with GrabCAD Print. The > character is used to separate items within a navigational path. For example, navigate to **File > Open** from the Main Menu.

REVISION LOG



Translations of this guide are updated periodically. If you are consuming a translated version, please check the English version for latest revision and list of updates.

Revision	Date	Description of Changes
A	December 2022	First release of this document
B	March 2023	Updated fuse values.Updated Maintenance section.

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1 SERVICE AND SUPPORT

This user guide describes the Neo®450 and Neo®800 3D printers.

Please read these instructions carefully before operating the printer. Always observe all the safety guidelines in this manual. If you have any questions regarding the contents of this manual, please contact Stratasys (see “Getting Help” (page 192)).

Keep the manual available for servicing, repairs, and product disposal.

This chapter provides information on service and support for the Neo®450 and Neo®800 3D printers as well as safety information and safety label locations.

Service

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

When calling in for service, always have your printer's software version and hardware serial number available.

Software Support

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

When calling in for service, always have your printer's software version and printer serial number available.

Safety Instructions

To reduce the risk of injury, read these instructions carefully before using the Neo450 or Neo800. Always observe the safety guidelines listed in this manual. Protection of the user is impaired if safety instructions are ignored, or used in a manner not specified in this document..

Hazard Types

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

Safety Warnings

Laser Safety

Figure 1: Laser specifications

		Neo450e	Neo450s, Neo800
Wavelength	nm	355	355
Nominal Power ¹	W	1	2
Minimum PRF	kHz	40	40
Nominal PRF ²	kHz	100	80
Maximum PRF ²	kHz	300	300
Maximum Power	W	4	4
Maximum Pulse Energy	mJ	0.1	0.1
Minimum Pulse Duration	ns	2	2
Leakage @ 1064 nm	mW	< 20	< 20
Leakage @ 808 nm	mW	< 20	< 20
Leakage @ 532 nm	mW	< 20	< 20

¹ At nominal PRF ² PRF - Pulse Repetition Frequency

During normal operation, and with all panels installed the Neo450 and Neo800 are Class I laser products to BS EN 60825-1:2014. Class I products are not considered harmful and require no special safety precautions under normal operating conditions. The laser beam is completely confined. The viewing windows block the UV laser radiation from exposure outside of the device.

Stray radiation can also be dangerous. This radiation can cause fire or explosion and the generation of toxic gases or vapours.

The observance of laser safety must be ensured at all times.



Never stare directly into a laser beam, nor into any beam reflection, whether diffused or from a highly reflective surface.



Safety regulations may differ from country to country. The customer bears sole responsibility for compliance with all applicable safety regulations of their respective regulatory jurisdiction.



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure



Caution:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



Note:

By engineering design no laser radiation exceeding Class 1 accessible emission limits are present or accessible during operation of this laser-based 3D printing system.

Material Safety

The Neo range is an open material platform. Any commercially available 355 nm photopolymer materials, more commonly referred to as resin, can be processed. Please ensure you have the necessary safe handling guidelines from your material supplier.

General Material Handling Safety Guidelines

**IRRITANT:**

Always wear chemical-resistant gloves, goggles, and protective clothing when handling material, containers, or partially cured parts.



100% nitrile gloves offer best hand protection. Latex gloves are not chemically resistant, and are not recommended.



Always ensure good ventilation, and avoid breathing vapors.



Wipe-up any spills immediately, using paper towel dampened with isopropyl alcohol (IPA).



Use soap and cold water to wash material in contact with skin. Never use IPA or hot water, as this will increase absorption.



Use care when handling IPA used for cleaning materials. IPA is highly flammable.

Electrical Safety

Please refer to the Technical Specification ([link](#)) section for electric supply specification.

Always observe the following guidelines:



Installation of the printer must not restrict the main power isolation switch at the rear of the Neo. Please refer to the Site Preparation Guide.



Do not overload a wall outlet, extension cord or adapter as this may result in an electric fire or shock.



Never use an inadequate rated power cord to supply the device.



Inspect the power cord for damage before use.



Do not bend or twist the power cord.



Do not touch the power plug with wet hands.



Do not remove covers as hazardous voltages are present inside.

Hazard Classifications

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

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

**Warning:**

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

**Caution:**

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

Also instructions that:

- Warn of reduced product performance
- Recommend best practice

- **Notes** follow the relative paragraph.






Indicates additional information relative to the current topic.

Product Safety Signs



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

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

Warning Symbols	Meaning	Location	Comments
	High voltage	On the electrical panel door, above and below the main disconnect switch.	Risk of electric shock.
	Gloves	Vat and resin bottles	Risk of chemical exposure. Wear approved safety gloves and sleeves.
	Moving parts	Beneath the build area door, front and left side.	Risk of injury from moving parts.

Product Safety Label and Interlock Locations

Table 1: Warning symbols






Symbol	Definition
	ELECTRIC SHOCK: AC voltage adjacent to, or behind this label. Injury or death from electric shock can result if you ignore these hazard labels
	PINCH POINT: Physical injury can result if you ignore this type of hazard label.
	BELT DRIVE: Physical injury can result if you ignore this type of hazard label.
	LASER RADIATION: Eye injury or blindness can result if you ignore this type of hazard label.
	LASER ON: When LED is lit, eye injury or blindness can result if you ignore this type of hazard label.

Figure 2: Neo450 front safety label locations

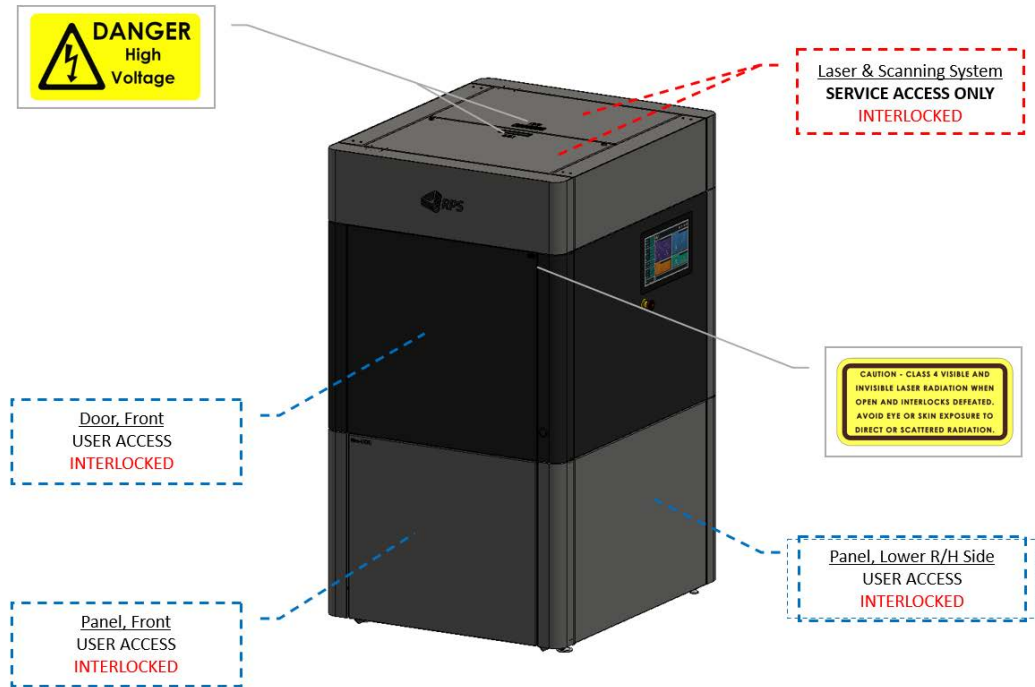


Figure 3: Neo450 rear safety label locations

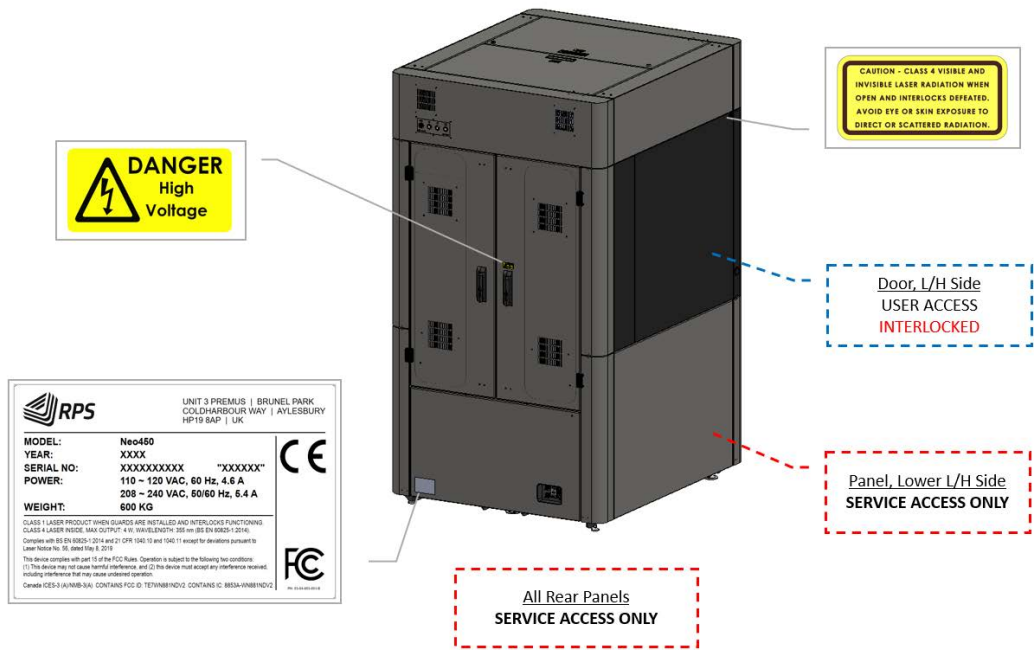


Figure 4: Neo450 internal safety label locations

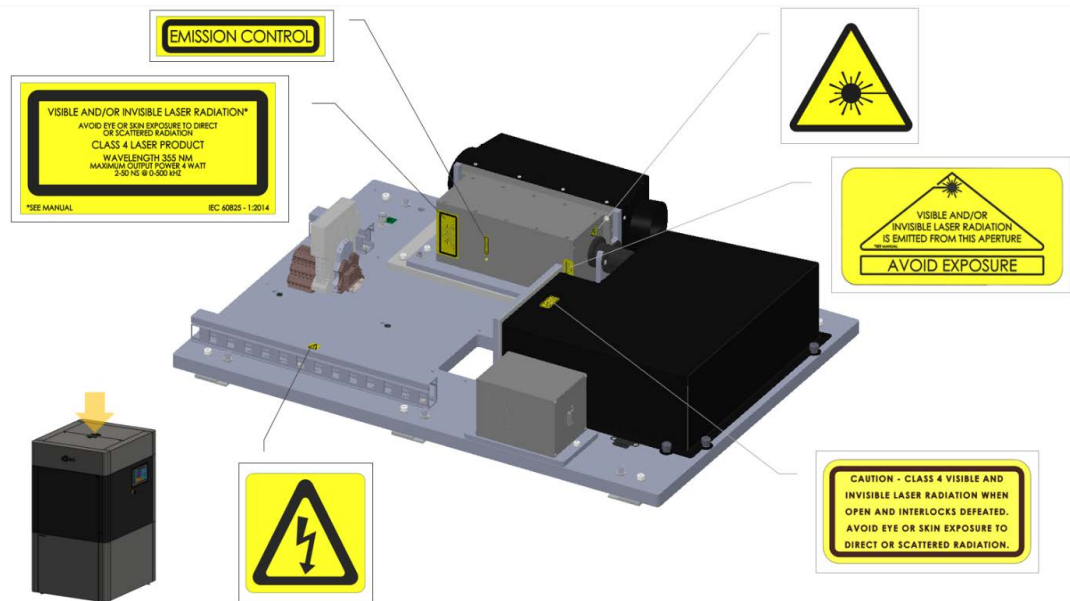


Figure 5: Neo800 front safety label locations

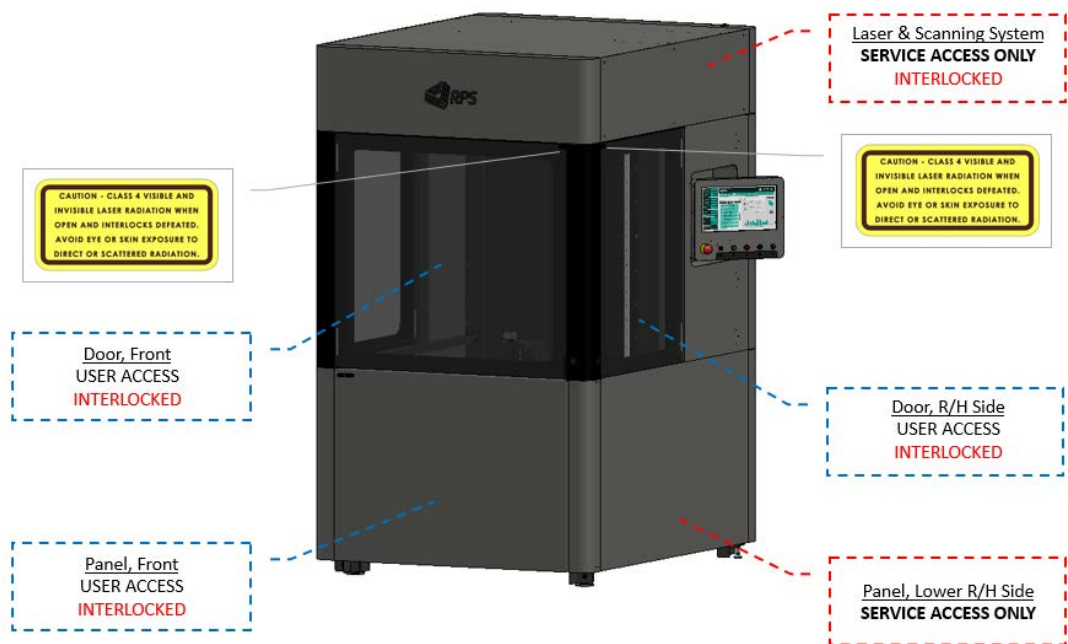


Figure 6: Neo800 rear safety label locations

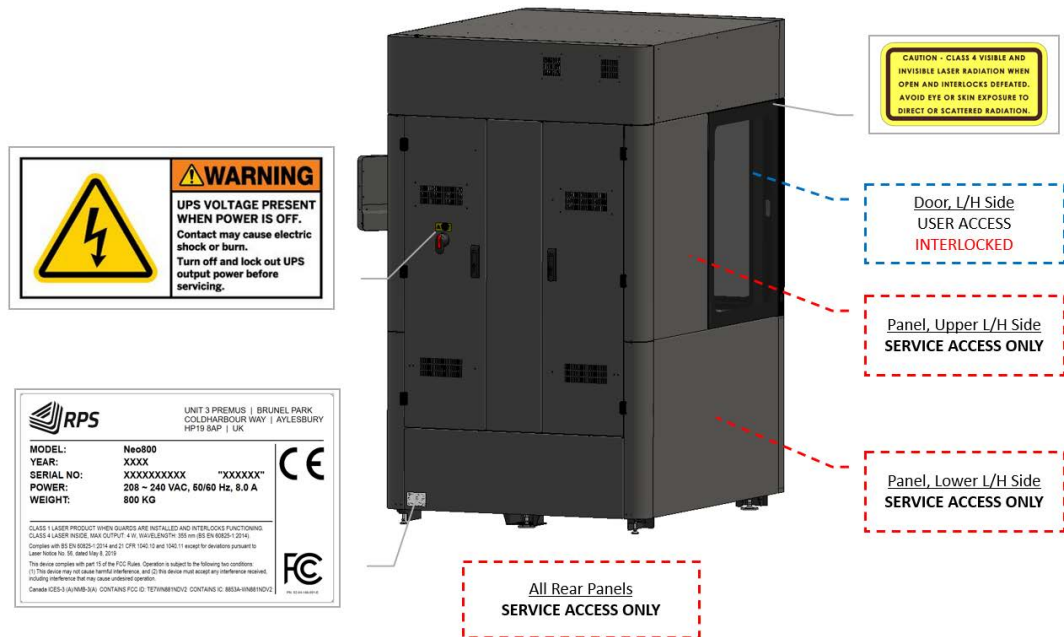
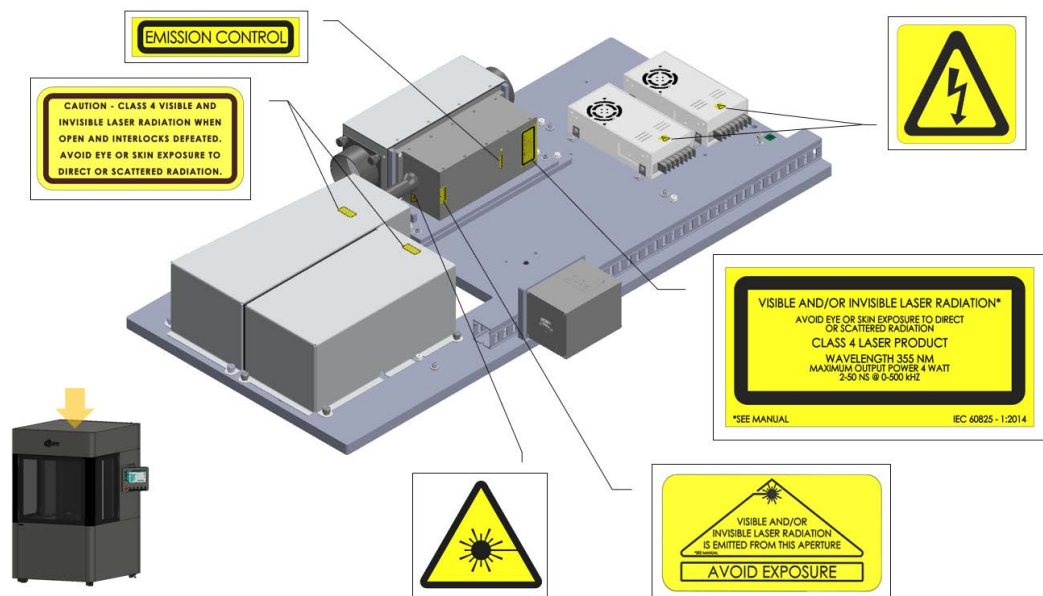


Figure 7: Neo800 internal safety label locations



Potential Safety Hazard Areas

The build chamber, recoater, elevator, and vat lift are highlighted as potential safety hazards that may cause printer failure or reliability problems if proper safety procedures are not followed.



The printer's motors are disabled by interlock switches when any door is open. Use caution.



Warning: Chemical Exposure.

Always wear safety gloves and long sleeves when working in the build area and vat enclosures.



Warning: Moving Parts.

Never wear a tie, loose clothing or dangling jewelry when working around moving components of the printer. The build chamber, recoater, and elevator contain mechanical drive components that can cause severe injury. Hazards are minimized by interlock switches but caution should be used around any moving part. Use extreme caution whenever accessing these areas of the printer.

Interlock System

Safety interlock sensors on each door and lower front panel protect the user from possible UV laser radiation exposure. By opening a door or removing the front panel the interlock system is triggered, closing the safety shutter which physically blocks the output of the laser.

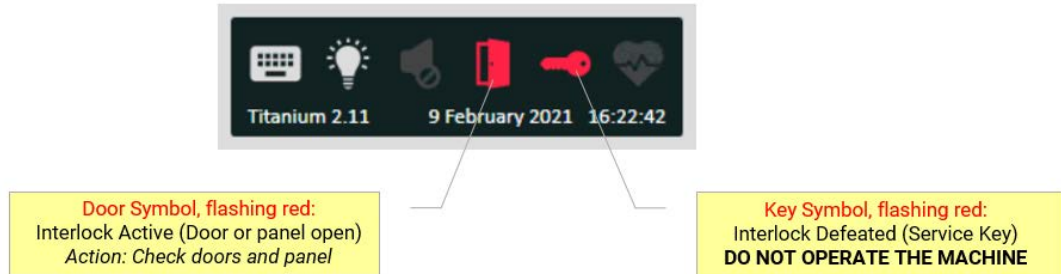
The top cover(s) of Neo450 and Neo800 employ an additional interlock which ensures that the laser cannot be switched on when the top cover remains open.

If the interlock system is active the user will be unable to initiate any move operation, and will be unable to start a job. If the interlock system is triggered while the printer is performing an operation or job, the shutter will close, the laser emissions will be ceased, and other activity halted.

The interlock system may be defeated by trained service personnel in order to perform onsite service procedures.

The Titanium™ Software User Interface indicates interlock status:

Figure 8: Interlock system



If any of the interlocks are defeated, the Neo450 and Neo800 become Class IV devices. Eye or skin damage can occur by direct or reflected laser beam interaction.



Interlocks are to be defeated only by trained personnel when needed during service procedures.



A user must not operate a printer which is displaying the Interlock Defeated symbol.

General Safety Practices

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



Warning: High Voltage.

High voltage is present in the printer.



Warning: Falling Hazard.

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



Warning: Chemical Exposure.

Always wear safety gloves and long sleeves when working in the build area.

**Warning: Chemical Exposure Eyewear.**

Always wear safety glasses when working in the build area.

**Warning: LASER Exposure Eyewear.**

Always wear LASER protective safety glasses that protect against 355 nm, 532 nm, 1064 nm, and 808 nm wavelengths when working on the LASER. Glasses must meet ANSI 136.1 standards. A minimum optical density of 4 is required at 355nm. (+OD4 @355nm).

**Warning: LASER Exposure Clothing.**

Always wear safety gloves and long sleeves when working on the LASER.

Lockout Tagout (LOTO)



Customer site procedures regarding lockout tagout always take precedence over the Stratasys service procedure.

Environmental Requirements

When operating the Neo450 or Neo800, always observe the following guidelines:

- The ventilation ducts must be left uncovered to allow proper airflow into the Neo.
- The Neo should not be exposed to liquids other than to top up the vat with resin.
- Wipe off any resin spills immediately using a cloth dampened with isopropanol.
- Temperature range: 20-23 °C
- Maximum temperature rate change: +/- 1 °C/hour
- Relative humidity: 20-50 % (non-condensing)
- Protect the Neo from dust and corrosive vapours to avoid damage to the mirrors, optics, and electronics.
- Avoid strong electromagnetic fields and static electricity. These can damage the electronics of the interface and amplifier boards.
- For further details please refer to the Technical Specification section at the rear of the manual.

Table 2: Neo450 environmental requirements

Operating Temperature Range	20 ~ 23°C [68 ~ 74°F]
Temperature Maximum Rate of Change	±1°C/hr [±2°F/hr]
Non-Condensing Relative Humidity	20% ~ 50%
Environment Pollution	Degree 2
Maximum Working Altitude	2000 m [6562 ft]
Heat Dissipation Max (110 ~ 120 VAC)	550w 1900 btu/hr
Heat Dissipation, Typical (110 ~ 120 VAC)	300w 1050 btu/hr
Heat Dissipation Max (220 ~ 240 VAC)	1300w 4450 btu/hr
Heat Dissipation, Typical (220 ~ 240 VAC)	700w 2400 btu/hr

Table 3: Neo800 environmental requirements

Operating Temperature Range	20 ~ 23°C [68 ~ 74°F]
Temperature Maximum Rate of Change	±1°C/hr [±2°F/hr]
Non-Condensing Relative Humidity	20% ~ 50%
Environment Pollution	Degree 2
Maximum Working Altitude	2000 m [6562 ft]
Heat Dissipation Max	1900w 6500btu/hr
Heat Dissipation, Typical	900w 3100btu/hr

**Caution**

Any variances outside these parameters will adversely affect part quality and/or accuracy.

**Caution**

Additional air conditioning capacity would be required to remove heat dissipated by any other equipment in the same area.

**Caution**

The printer should not be exposed to direct air flow from the air conditioning or heating systems. Part quality will be adversely affected if air flow is directed at the printer.

**Caution**

The area should be well ventilated. In accordance with standard practices, the air in the room should change approximately 2 to 5 times per hour.

**Caution**

The printer should be placed in a clean, non-smoking environment. Dust and smoke must be kept at a minimum, as they may contaminate the resin and cause deterioration of the optical surfaces.

2 SETUP AND INSTALLATION

This chapter describes basic setup of the Stratasys Neo450 and Neo800 printers.

Basic Setup

Neo450 Weights and Dimensions

Table 1: Neo450 weight and dimensions

Status	Dimensions/Weights
Crated	Width: 1360 mm (53.5 inches) Depth: 1360 mm (53.5 inches) Height: 2115 mm (83.3 inches)
Uncrated (Closed Panels and Touchscreen)	Width: 1050 mm (41.3 inches) Depth: 1225 mm (48.2 inches) Height: 1900 mm (74.8 inches)
Shipping Weight (crated)	860 kg (1896 lbs)
Printer Weight (uncrated, without vat)	600 kg (1323 lbs)

All Neo printers and vats have been designed to be moved with a low-profile pallet jack/truck.

Table 2: Neo450 low-profile pallet jack/truck dimensions

Capacity	≥ 1200 kg	≥ 2646 lbs
Minimum Fork Height	50 ~ 60 mm	2.0 ~ 2.4 in
Maximum Fork Height	≥ 150 mm	≥ 5.9 in
Fork Width	160 mm	6.3 in
Width Across Forks	540 mm	21.3 in
Fork Length	≥ 1100 mm	≥ 43.3 in

Neo450 Vat Dimensions, Weights, and Fill Capacities

Table 3: Neo450 Vat Weights and Dimensions

	Short	Half	Full
Build Volume (X x Y x Z)	450 x 450 x 50 mm 17.72 x 17.72 x 1.97 in	450 x 450 x 200 mm 17.72 x 17.72 x 7.87 in	450 x 450 x 400 mm 17.72 x 17.72 x 15.75 in
External Dimensions (W x D x H)		710 x 800 x 730 mm 28.0 x 31.5 x 28.7 in	
Net Weight		100 kg [221 lb]	
Gross Weight @1.12 kg/ltr ^a	143 kg [315 lb]	192 kg [423 lb]	258 kg [569 lb]
Gross Weight @1.17 kg/ltr ^a	145 kg [320 lb]	196 kg [432 lb]	265 kg [584 lb]
Gross Weight @1.61 kg/ltr ^a	161 kg [355 lb]	232 kg [511 lb]	327 kg [721 lb]

Table 4: Neo450 Vat Fill Capacities

	Short	Half	Full
Material Fill Volume	38 ltr [10 US Gal]	82 ltr [22 US Gal]	141 ltr [37 US Gal]
Material Fill Weight @1.12 kg/ltr ^a	43 kg [95 lb]	92 kg [203 lb]	158 kg [348 lb]
Material Fill Weight @1.17 kg/ltr ^a	45 kg [99 lb]	96 kg [212 lb]	165 kg [364 lb]
Material Fill Weight @1.61 kg/ltr ^a	61 kg [134 lb]	132 kg [291 lb]	227 kg [500 lb]

a. Material density based on a temperature of 26 °C (78.8 °F)

Neo800 Weights and Dimension

Table 5: Neo800 weight and dimensions

Status	Dimensions/Weights
Crated	Width: 1710mm (67.3 inches) Depth: 1860 mm (73.3 inches) Height: 2560 mm (100.8 inches)
Uncrated (Closed Panels and Touchscreen)	Width: 1350 mm (53.2 inches) Depth: 1630 mm (64.2 inches) Height: 2300 mm (90.6 inches)
Shipping Weight (crated)	1000 kg (2205 lbs)
Printer Weight (uncrated, without vat)	800 kg (1764 lbs)

All Neo printers and vats have been designed to be moved with a low-profile pallet jack/truck.

Table 6: Neo800 low-profile pallet jack/truck dimensions

Capacity	≥ 1200 kg	≥ 2646 lbs
Minimum Fork Height	50 ~ 60 mm	2.0 ~ 2.4 in
Maximum Fork Height	≥ 150 mm	≥ 5.9 in
Fork Width	160 mm	6.3 in
Width Across Forks	540 mm	21.3 in
Fork Length	≥ 1100 mm	≥ 43.3 in

Neo800 Type 1 Vat Dimensions, Weights, and Fill Capacities

Table 7: Neo800 Type 1 Vat Weights and Dimensions

	Short	Half	Full
Build Volume (X x Y x Z)	800 x 800 x 120 mm 31.50 x 31.50 x 4.72 in	800 x 800 x 300 mm 31.50 x 31.50 x 11.81 in	800 x 800 x 600 mm 31.50 x 31.50 x 23.62 in
External Dimensions (W x D x H)		908 x 1300 x 870 mm 35.8 x 51.2 x 34.3 in	
Net Weight		240 kg [529 lb]	
Gross Weight @1.12 kg/ltr ^a	434 kg [957 lb]	576 kg [1270 lb]	870 kg [1918 lb]
Gross Weight @1.17 kg/ltr ^a	442 kg [975 lb]	591 kg [1303 lb]	889 kg [1961 lb]
Gross Weight @1.61 kg/ltr ^a	519 kg [1143 lb]	723 kg [1594 lb]	1134 kg [2499 lb]

Table 8: Neo800 Type 1 Vat Fill Capacities

	Short	Half	Full
Material Fill Volume	173 ltr [46 US Gal]	300 ltr [79 US Gal]	555 ltr [147 US Gal]
Material Fill Weight @1.12 kg/ltr ^a	194 kg [428 lb]	336 kg [741 lb]	630 kg [1389 lb]
Material Fill Weight @1.17 kg/ltr ^a	202 kg [445 lb]	351 kg [774 lb]	649 kg [1431 lb]
Material Fill Weight @1.61 kg/ltr ^a	279 kg [615 lb]	483 kg [1065 lb]	894 kg [1971 lb]

a. Material density based on a temperature of 26 °C (78.8 °F)

Neo800 Type 2 Vat Dimensions, Weights, and Fill Capacities

Figure 1: Neo800 Type 2 Vat Dimensions, Weights, and Fill Capacities

Neo800 Vat Weights and Dimensions

			Short	Half	Full
Build Volume	(X x Y x Z)	mm	800 x 800 x 120	800 x 800 x 300	800 x 800 x 600
		in	31.50 x 31.50 x 4.72	31.50 x 31.50 x 11.81	31.50 x 31.50 x 23.62
External Dimensions	(W x D x H)	mm	898 x 1180 x 870		
		in	35.35 x 46.46 x 34.25		
Weight Net					
Weight Gross	@1.12 kg/ltr*	kg	434	594	870
		lb	956	1309	1918
	@1.17 kg/ltr*	kg	442	610	889
		lb	975	1344	1961
	@1.61 kg/ltr*	kg	519	749	1134
		lb	1143	1651	2499

			Short	Half	Full
Material Fill Volume					
Material Fill Weight	@1.12 kg/ltr*	ltr	173	316	555
		US Gal	46	83	147
	@1.17 kg/ltr*	kg	194	354	630
		lb	427	780	1389
	@1.61 kg/ltr*	kg	202	370	649
		lb	446	815	1432
	@1.61 kg/ltr*	kg	279	509	894
		lb	614	1122	1970

*Material density based on a temperature of 26 °C (78.8 °F)

Neo450 Electrical Requirements

Table 9: Neo450 electrical requirements

Related Voltage	Vac	110 ~ 120 ± 10%	220 ~ 240 ± 10%
	Hz	60	50
Over Voltage Category		II	II
Fuse (Power Outlet)	A	10.0	10.0
Short Circuit Rating	A	1000	1000
Peak Power	W	550	1300
Peak Current	A	4.6	5.4
Typical Power	W	300	700
Typical Current	A	2.4	2.8
Power Rating	VA	750	1500



Warning: Electrical Hazard

Equipment installed in all regions other than Europe must be connected to a dedicated 4 mm² ground/earth. This is in addition to a ground/earth connection within the supply socket



Warning: Electrical Hazard

Connection should be made in accordance with local regulations.



Warning: Electrical Hazard

In some regions an AC/AC transformer will be required to meet the specified input voltage. Using the specification above, Stratasys recommends the transformer is sourced locally, ensuring it meets the local regulations.



Warning: Electrical Hazard

Stratasys recommends the Neo is supplied on a dedicated, surge protected circuit.



Warning: Electrical Hazard

Stratasys recommends that all electrical supply work is undertaken by a qualified electrician.

Neo800 Electrical Requirements

Table 10: Neo800 electrical requirements

Rated Voltage	208 ~ 240 VAC \pm 10%
	50/60 Hz
Over Voltage Category	II
Fuse (Power Outlet)	10 A
Short Circuit Rating	1000 A
Peak Power	1900 W
Peak Current	8.0 A
Typical Power	900 W
Typical Current	3.8 A
Power Rating	2200 VA

**Warning: Electrical Hazard**

Equipment installed in all regions other than Europe must be connected to a dedicated 4 mm² ground/earth. This is in addition to a ground/earth connection within the supply socket.

**Warning: Electrical Hazard**

Connection should be made in accordance with local regulations.

**Warning: Electrical Hazard**

In some regions an AC/AC transformer will be required to meet the specified input voltage. Using the specification above, Stratasys recommends the transformer is sourced locally, ensuring it meets local regulations.

**Warning: Electrical Hazard**

Stratasys recommends the Neo is supplied on a dedicated, surge protected circuit.

**Warning: Electrical Hazard**

Stratasys recommends that all electrical supply work is undertaken by a qualified electrician.

**Warning: Electrical Hazard**

Power should be routed to the printer from above.

Neo450 UPS Information

Supplying power to the Neo450 via a suitable UPS offers two advantages:

- Maintaining operation during a short power outage
- Additional power supply quality protection



Caution

For the highest system functionality and protection, Stratasys recommends the Neo450 is supplied via an Stratasys certified UPS.

When connected to a Stratasys certified UPS, the system will benefit intelligent UPS control functionality. Intelligent UPS control offers further advantages:

- Controlled shutdown

Uncontrolled system shutdowns pose a risk of damage to electronic components. In the event of a power outage, the remaining up-time is monitored and the system will initiate a controlled shut down before the UPS is unable to maintain supply.

- Minimal UPS capacity requirement

In the event of a power outage non-critical vat heating is suspended to minimise the UPS capacity specification requirement.

- Ensures build restart

Titanium is often able to recover and restart a build following an uncontrolled shut down, however this is not guaranteed due to the nature of the event. A controlled shut down ensures a build restart is possible when the power is resumed.

- UPS status monitoring

The UPS is continuously monitored by Titanium. UPS faults and health status are reported in Titanium.

Table 11: Neo450 Certified UPS

	110 ~ 120 VAC	220 ~ 240 VAC
Europe, Israel, South Korea, Russia	N/A	Eaton 5P1550i
USA, Canada	Eaton 5P1500*	N/A

*Not available in Colorado, Vermont or Washington State

A “Certified UPS” has been tested for communication compatibility. Alternative UPS brands and models may be compatible if they offer serial communication using the SHUT Protocol.

Neo800 UPS Information

Table 12: Neo800 Certified UPS

	208 VAC	220 ~ 240 VAC
Europe, Israel, South Korea, Russia	N/A	9SX3000I
USA, Canada	9SX3000G	N/A

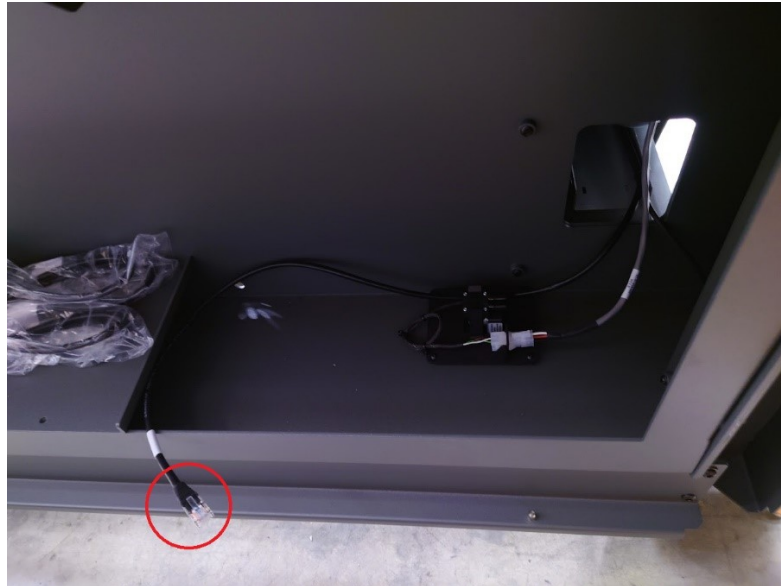
Figure 2: Neo800 UPS Connections



- 1 RJ45 to RS232 serial connection
- 2 Output connection to machine (C20 plug end supplied with Shipping Kit)
- 3 Input power (mains)

A factory-installed internal Cat 5e communication cable is routed behind the right hand panel.

Figure 3: Cat 5e communication cable



Using a newly supplied 10m Cat 5e cable and a female-to-female RJ45 connector, an engineer will re-route and extend the cable along the back of the printer and through the roof. On printers shipped subsequent to the release of this user guide, an additional punch-out tab for the external UPS communication cable has been added.

Figure 4: Additional punch-out tab



Neo450 Connecting to a Certified UPS

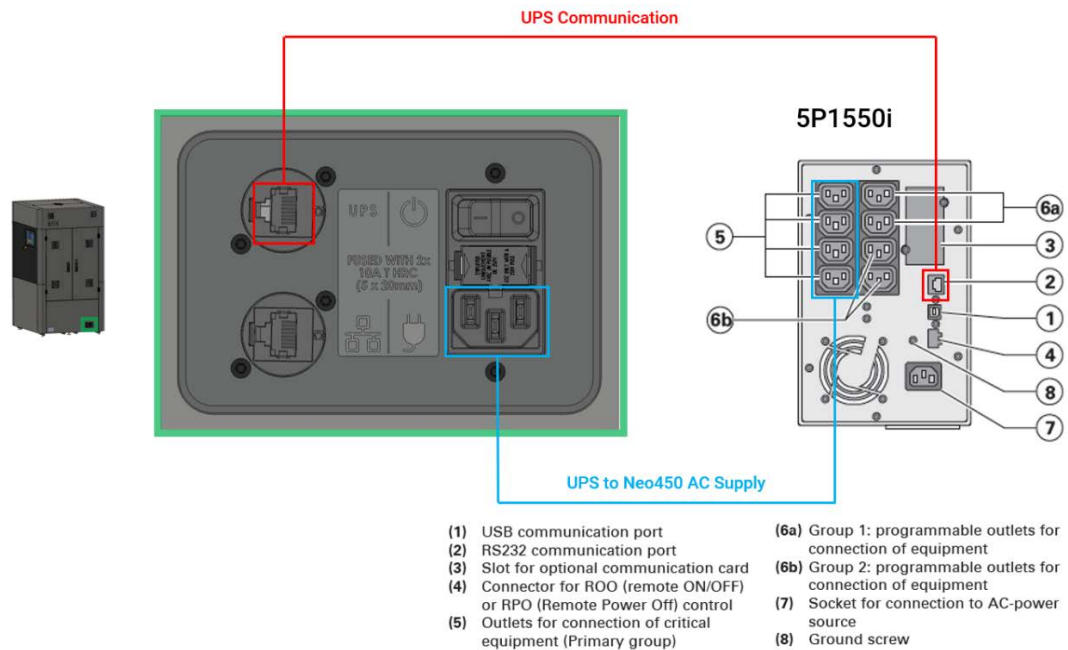
All necessary cables and connectors are supplied with the Neo450.

Eaton 5P1550i (Europe)

Communication Cable: 5m Cat 5e

AC Supply: 5m European AC Supply Cable with IEC Plug E Connector

Figure 5: UPS connections (Europe)

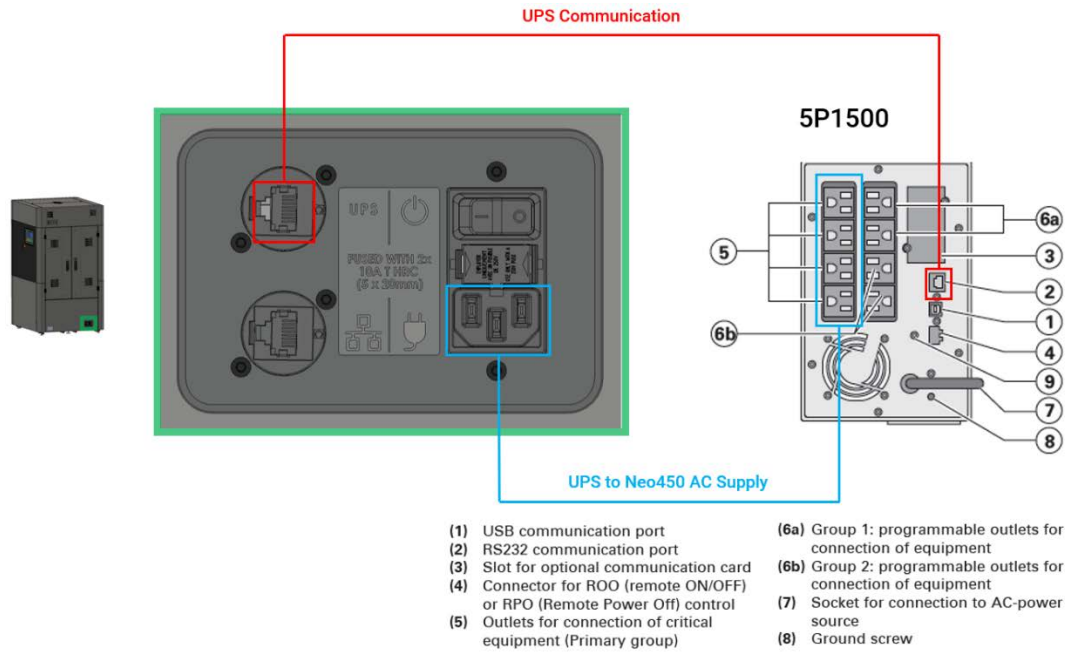


Eaton 5P1500 (USA & Canada)

Communication Cable: 5m Cat 5e

AC Supply: 5m USA & Canada AC Supply Cable

Figure 6: UPS connections (USA & Canada)



**Warning: Electrical Hazard**

Although the Power ON/OFF is an isolator, it must be used with a lockout device: BRADY 148081 to meet EN60204 standards.

Figure 7: Neo450 main power isolation switch location

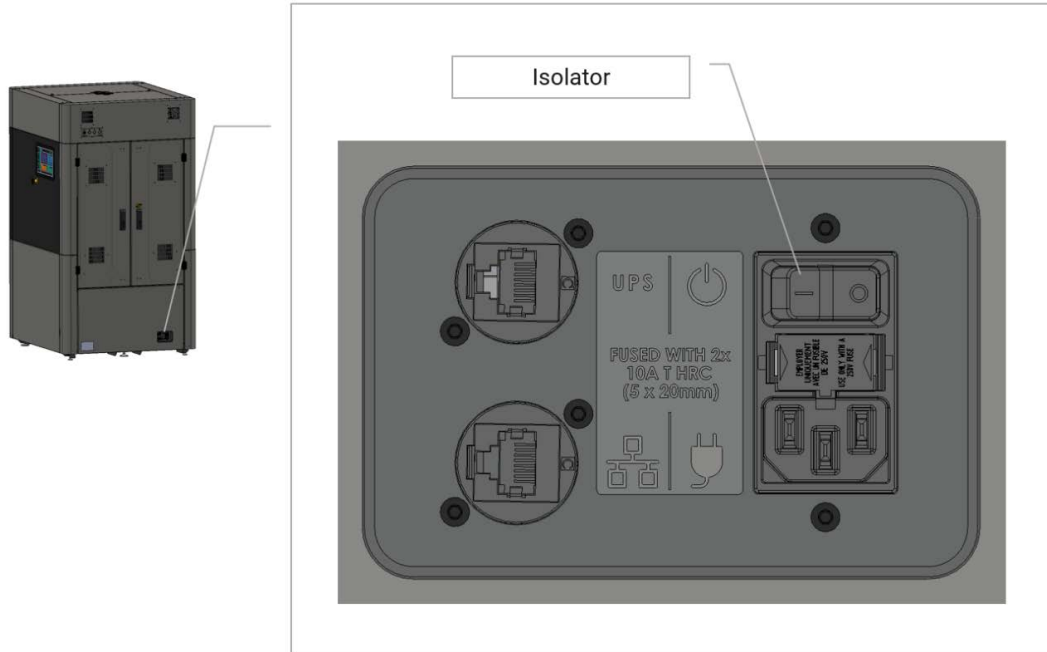
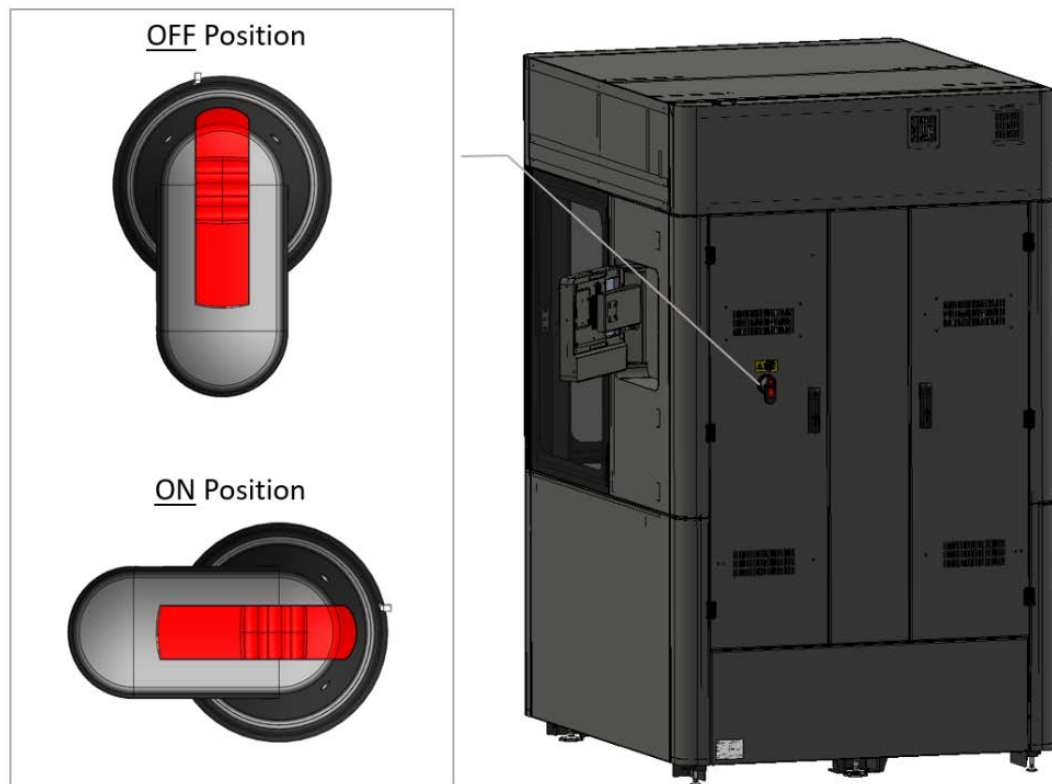


Figure 8: Neo800 main power isolation switch location



Installation of the Neo450 or Neo800 should be performed by trained personnel.

For installation requirements, please refer to the Neo450 or Neo800 Site Preparation guide.

Safe Start-up and Shutdown Sequences

To assure safety during start-up, perform the following steps:

1. Apply power to Neo450 or Neo800 from the customers electrical supply switch on the main isolator.
2. Turn on Neo450 or Neo800 by pressing the On/Off button on the UI.
3. Turn on the computer.
4. After logging into windows wait 30 seconds.
5. Start up the Titanium control software.

Follow instructions in reverse when shutting down the system

Initialization

When the Titanium software is started, it verifies communication and status of the various sub-systems: laser, scanning system, etc. If Titanium has been started following a printer power cycle, this process may take up to 2 minutes. Titanium will report sub-system verification progress. If the platform and recoater positions are unknown, you will be asked to initialize the system. Acknowledging this request will send the platform and recoater to their home positions.

Neo450 Network Connection

The Neo450 is equipped with an on-board ethernet switch. The switch links the application PC and on-board camera to the LAN port at rear of printer. Where possible the Neo450 should be connected via the LAN port (wired connection). Upon connection to a LAN the Neo450 PC can be connected by the network administrator.

Caution



Windows has been configured for reliable Neo operation.

Modification of Windows configuration should be avoided.

No modification to windows configuration should be made, locally or via group policies, to the following:

- Power and Screen Options
- Fast Start-up
- Windows Updates

The on-board camera should also be connected with a fixed IP address.

A network and Internet connection will be required for certain functions, including but not limited to:

- Remote diagnosis
- Remote monitoring
- Webcam access
- Process update email facility

Please contact Stratasys for more details on network connection options.

The Neo450 conforms to the following standards:

Ethernet

- IEE 802.3
- IEEE 802.3u
- IEEE 802.3ab

Neo800 Network Connection

Where possible the Neo800 should be connected with a wired LAN connection. Upon connection to a LAN the Neo800 PC can be connected by the network administrator.

Caution



Windows has been configured for reliable Neo operation.

Modification of Windows configuration should be avoided.

No modification to windows configuration should be made, locally or via group policies, to the following:

- Power and Screen Options
- Fast Start-up
- Windows Updates

A network and internet connection will be required for certain functions, including but not limited to:

- Remote diagnosis
- Remote monitoring
- Webcam access
- Process update email facility

Please contact Stratasys for more details on network connection options.

The Neo800 conforms to the following standards:

Ethernet

- IEE 802.3
- IEEE 802.3u
- IEEE 802.3ab

Installing Virus Protection Software

**Caution**

Please contact Stratasys Customer Services before installing third party software

**Caution**

Installing virus protection software without the correct modification to settings, will typically result in a non-operational printer.

There are numerous virus protection software vendors. Virus protection software differs in design and operation, it is therefore not possible for Stratasys to validate each vendor and subsequent software releases.

Discuss the installation of any third party software with Stratasys Customer Services prior to installation.

ID Plate

The ID plate which includes the printer serial number is found on the lower rear panel. A copy is also located on the frame when the lower rear panel is removed.

Figure 9: Printer ID plate



UNIT 3 PREMUS | BRUNEL PARK
COLDHARBOUR WAY | AYLESBURY
HP19 8AP | UK

MODEL:	Neo800
YEAR:	XXXX
SERIAL NO:	XXXXXXXXXX "XXXXXX"
POWER:	208 ~ 240 VAC, 50/60 Hz, 8.0 A
WEIGHT:	800 kg

CLASS 1 LASER PRODUCT WHEN GUARDS ARE INSTALLED AND INTERLOCKS FUNCTIONING.
CLASS 4 LASER INSIDE, MAX OUTPUT: 4 W, WAVELENGTH: 355 nm (BS EN 60825-1:2014).

Complies with BS EN 60825-1:2014 and 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada ICES-3 (A)/NMB-3(A) CONTAINS FCC ID: TE7WN881NDV2 CONTAINS IC: 8853A-WN881NDV2

Stratasys products and services are subject to Terms & Conditions of Sale as set forth at:
<https://www.stratasys.com/legal/terms-and-conditions-of-sale>



PN: 02-04-146-001-F



Printer Specifications

Figure 10: Printer specifications

Laser & Scanning System		Neo450e	Neo450s	Neo800
Laser [*]	W	1	2	2
Beam Focus		Dynamic	Dynamic & Variable	Dynamic & Variable
Beam Size	μm	250	80 to 750	150 to 600
Scanning Speed	m/s	Up to 10	Up to 10	Up to 10
	in/s	Up to 400	Up to 400	Up to 400
Layer Resolution [†]	μm	50 to 200	50 to 200	50 to 200
Build Modes		SD	HD & SD	HD & SD
Minimum Feature Size				
X & Y ^{††}	mm	0.30	0.15	0.20
	in	0.012	0.006	0.008
Z ^{††}	mm	0.40	0.40	0.40
	in	0.016	0.016	0.016
Accuracy				
Dimension <100mm or 3.94" ^{††}	mm	±0.1	±0.1	±0.1
	in	±0.004	±0.004	±0.004
Dimension >100mm or 3.94" ^{††}	%	±0.10	±0.10	±0.15
Build Capacity				
Full Vat (XYZ)	mm	450 x 450 x 400	450 x 450 x 400	800 x 800 x 600
	in	17.72 x 17.72 x 15.75	17.72 x 17.72 x 15.75	31.50 x 31.50 x 23.62
Half Vat (XYZ)	mm	450 x 450 x 200	450 x 450 x 200	800 x 800 x 300
	in	17.72 x 17.72 x 7.87	17.72 x 17.72 x 7.87	31.50 x 31.50 x 11.81
Short Vat (XYZ)	mm	450 x 450 x 50	450 x 450 x 50	800 x 800 x 120
	in	17.72 x 17.72 x 1.97	17.72 x 17.72 x 1.97	31.50 x 31.50 x 4.72

^{*} 355 nm, solid-state frequency tripled Nd: YV04

[†] Layer thickness range is material dependant

^{††} Accuracy & minimum feature size will vary depending on material, parameters, part geometry and size, pre & post-processing methods and environment.

Stratasys Online Resources

Stratasys encourages you to learn more about additive technologies and your Stratasys printer. A wealth of information is available on our online platforms.

Subscribe to our customer newsletter for quarterly updates on Stratasys knowledge and training. You can learn about the release of new documentation and learning resources.

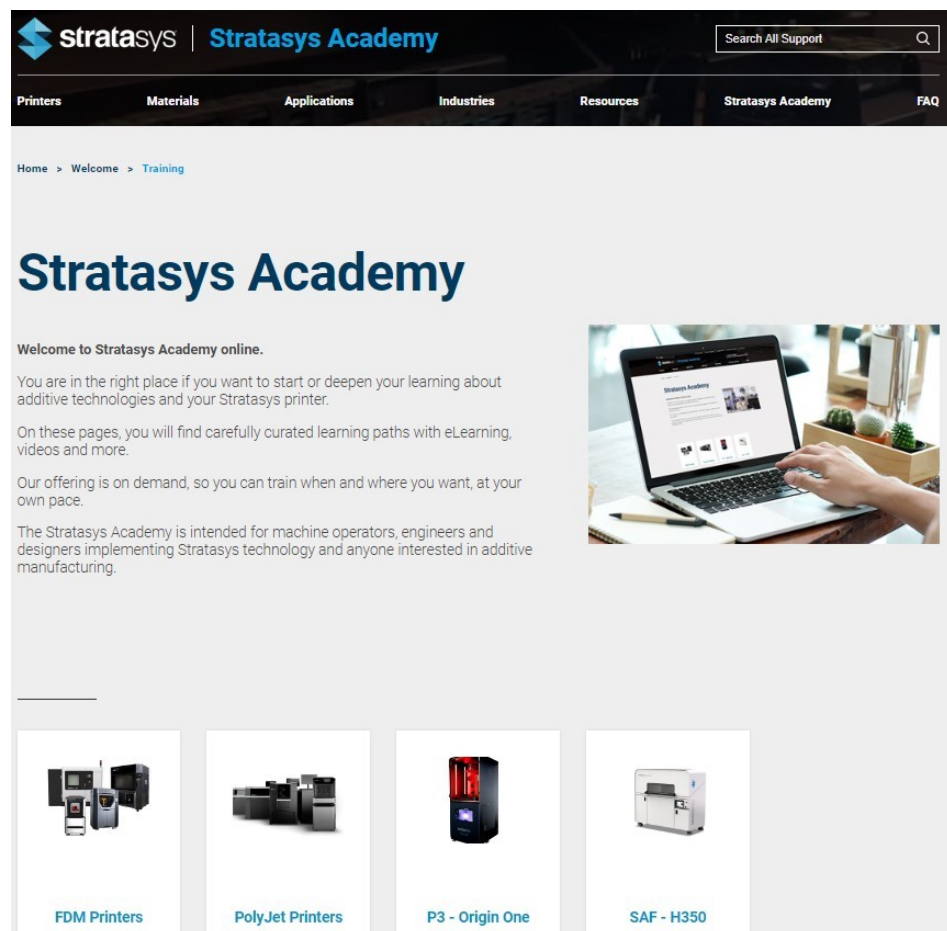
Stratasys Academy

Stratasys Academy is your online learning platform where you can quickly learn and acquire skills on additive technologies and your Stratasys printer.

To guide you in your learning, our online academy provides a variety of resources such as an extensive library of videos and eLearning modules. We periodically update the site with new content.

Start your learning journey today.

Figure 11: Stratasys Academy



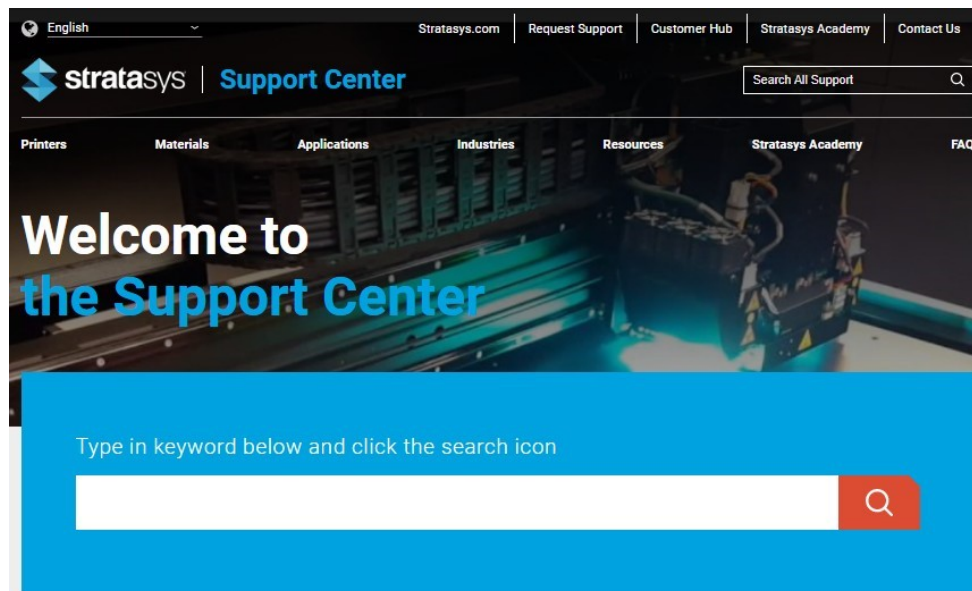
Stratasys Support Center

The **Support Center** is a knowledge base that includes information about design, applications, printing material, and links to many other resources.

In addition, you can check the latest revision of the user guide for your Stratasys 3D printer and download documents in different languages.

The Support Center is available in multiple languages. You can change the display language using the language drop-down menu in the top-left corner of the homepage.

Figure 12: Support Center

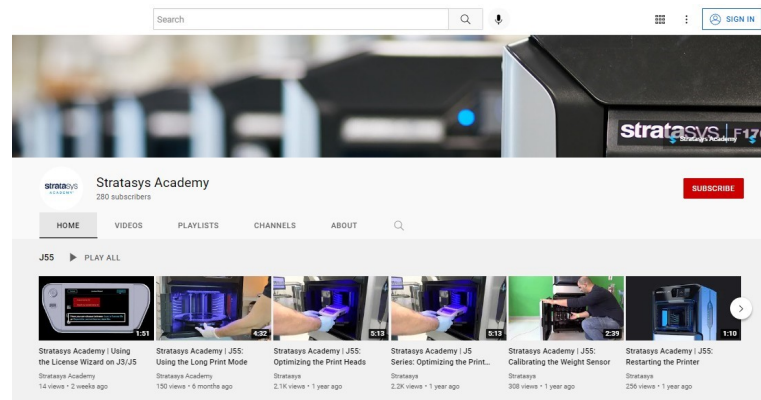


Stratasys Academy YouTube Channel

The Stratasys Academy YouTube Channel features instructional videos about how to operate and maintain Stratasys printers. The channel includes dedicated playlists for different printers and special topics like post-processing.

Make sure to check out this new Stratasys Academy Channel and remember to subscribe!

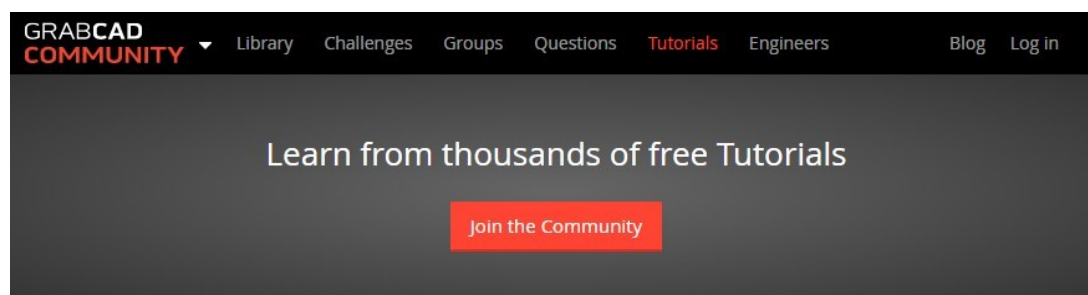
Figure 13: Stratasys Academy YouTube Channel



GrabCAD Community

The Tutorials section of the GrabCAD Community portal is a valuable resource for Stratasys-sponsored and user-generated 3D printing tips. You can also ask 3D-related questions on the portal and download free CAD files.

Figure 14: GrabCAD Community



3 SYSTEM COMPONENTS

This chapter describes the components of the Stratasys Neo450 and Neo800 Printers.

Printer Overview

The Neo450 and Neo800 are designed for building 3D models using the technique of stereolithography. Stereolithography is a form of 3D printing technology used for creating models, prototypes, patterns, and production parts in a layer-by-layer process, using photopolymerization, a process by which light causes chains of molecules to link together, forming polymers. Those polymers then make up the body of a three-dimensional solid.

- The Neo800 3D printer has a maximum build volume of 800 x 800 x 600 mm [31.5 x 31.5 x 23.6 inches] in size, using stereolithography technology.
- The Neo450 3D printer has a maximum build volume of 450 x 450 x 400 mm [17.7 x 17.7 x 15.7 inches] in size, also using stereolithography technology.

The printer's open resin system allows it to be used with any commercially available 355 nm UV curing resin. When paired with Materialise™ Magics™ software, job files may be adapted to build parts with any resin. The Neo800 and Neo450 printers are controlled by PC-based Titanium machine-control software, which is accessed via a touch-screen interface.

Intended Use

Use the Neo450 and Neo800 only for their designed purpose as described above. Only suitable accessories can be used with the product.

Printer Highlights

- Neo800 maximum build volume (W x D x H): 800 x 800 x 600 mm [31.5 x 31.5 x 23.6 inches]
- Neo450 maximum build volume (W x D x H): 450 x 450 x 400 mm [17.7 x 17.7 x 15.7 inches]
- Open resin system with 10 pre-qualified materials
- Built for production
- Stratasys infrastructure
- Multiple vat configurations (Full, Half, Short)
- Minimum feature sizes X/Y; Neo450e 0.3 mm, Neo450s 0.15 mm, Neo800 0.2 mm
- Minimum feature sizes in Z; all Neos 0.4 mm
- X/Y resolution dependent on build mode (SD/HD) and material choice
- Z layer resolution 0.05 mm to 0.2 mm
- Touchscreen graphical user interface

Neo800

The following section contains images and descriptions of the main components and assemblies of the Neo800 Printer.

Figure 1: Neo800 Functional Components

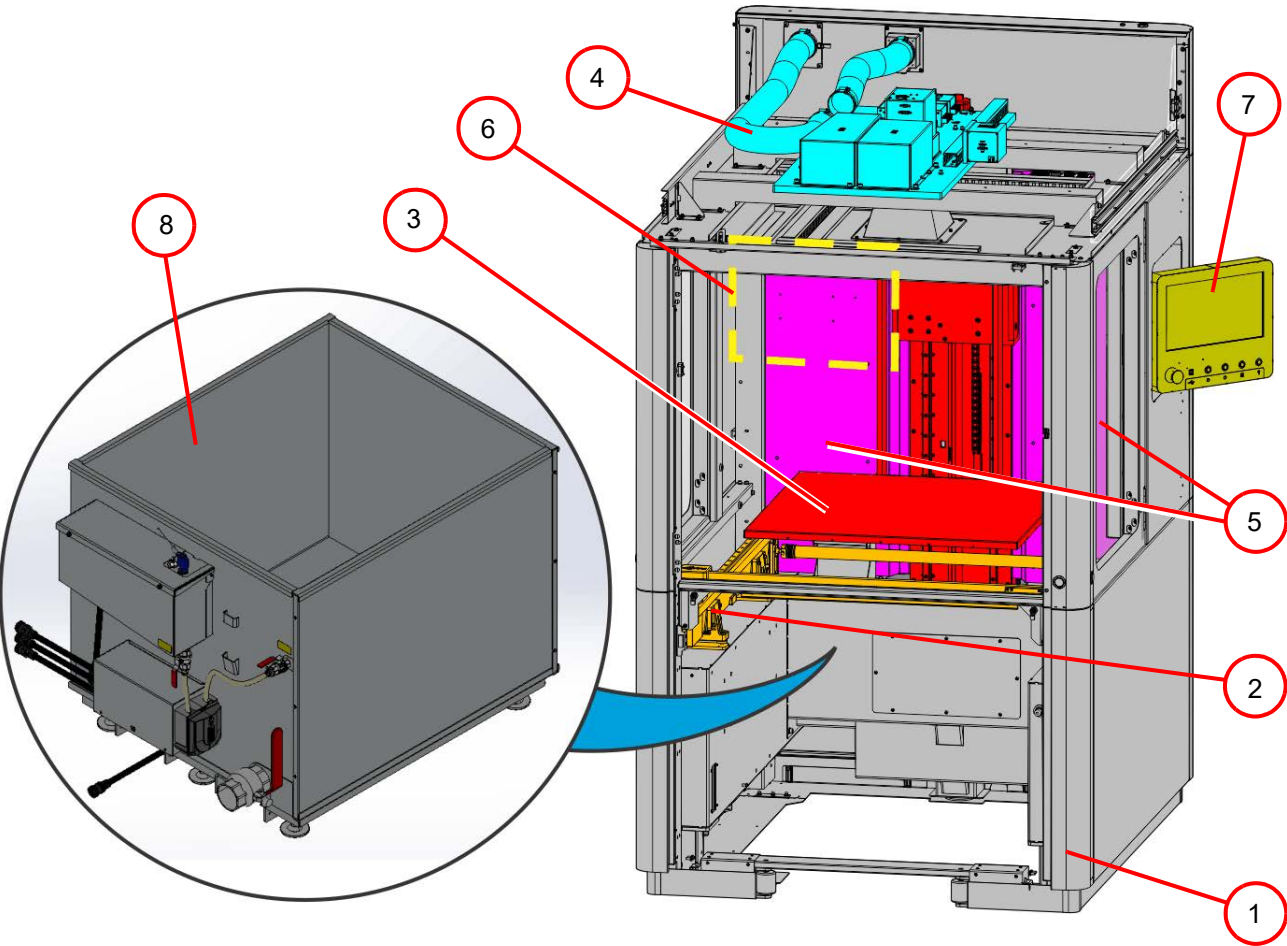


Table 1: Neo800 Components List

ID	Description	ID	Description
1	Frame	5	Electrical Panels (rear)
2	Recoater Assembly	6	PC
3	Z-Stage Assembly	7	Touchscreen Interface
4	Optics Assembly	8	Resin Vat

Recoater Assembly

The recoater blade travels from front-to-back over the resin on the linear rails of the recoater assembly depositing the required thickness of resin on the printed parts. The recoater blade may be removed for cleaning and will maintain the proper gap after installation as long as the securing bolts are tightened properly.

Figure 2: Recoater Assembly Components

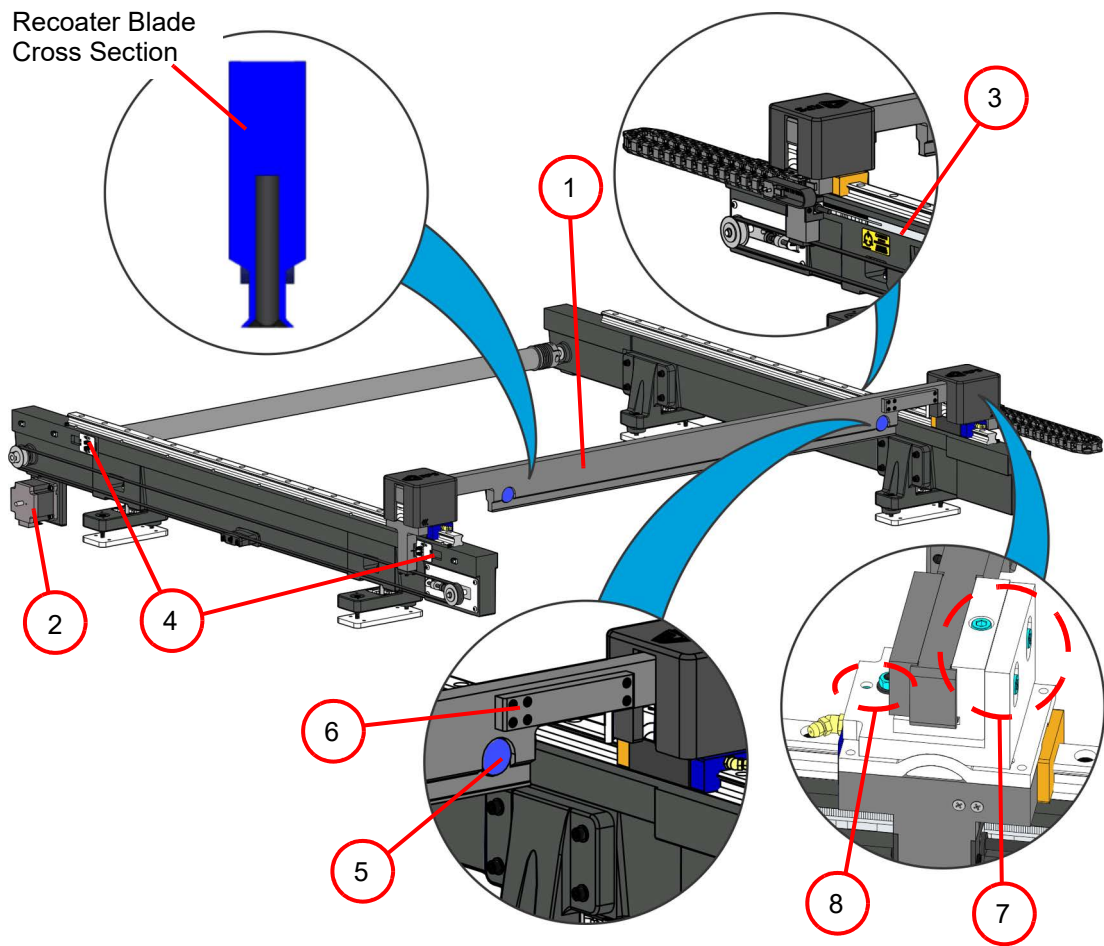


Table 2: Recoater Assembly Components List

ID	Description	ID	Description
1	Recoater Blade	5	Vacuum Level Window
2	Stepper Motor (48 VDC, PLC controlled)	6	Vacuum Port
3	Incremental Linear Encoder	7	Recoater Blade Height Adjustment Screws
4	Limit Sensors (Photo-sensors)	8	Recoater Blade Rake Adjustment Screws

Z Stage

The Z stage lowers the build platform into the resin during the build process and raises the build platform out of the vat when the build is complete. The platform support structure is mounted to four bearings that travel up and down on two linear rails. The Z stage is driven by a stepper motor connected to a ball screw assembly.

Figure 3: Z Stage Components

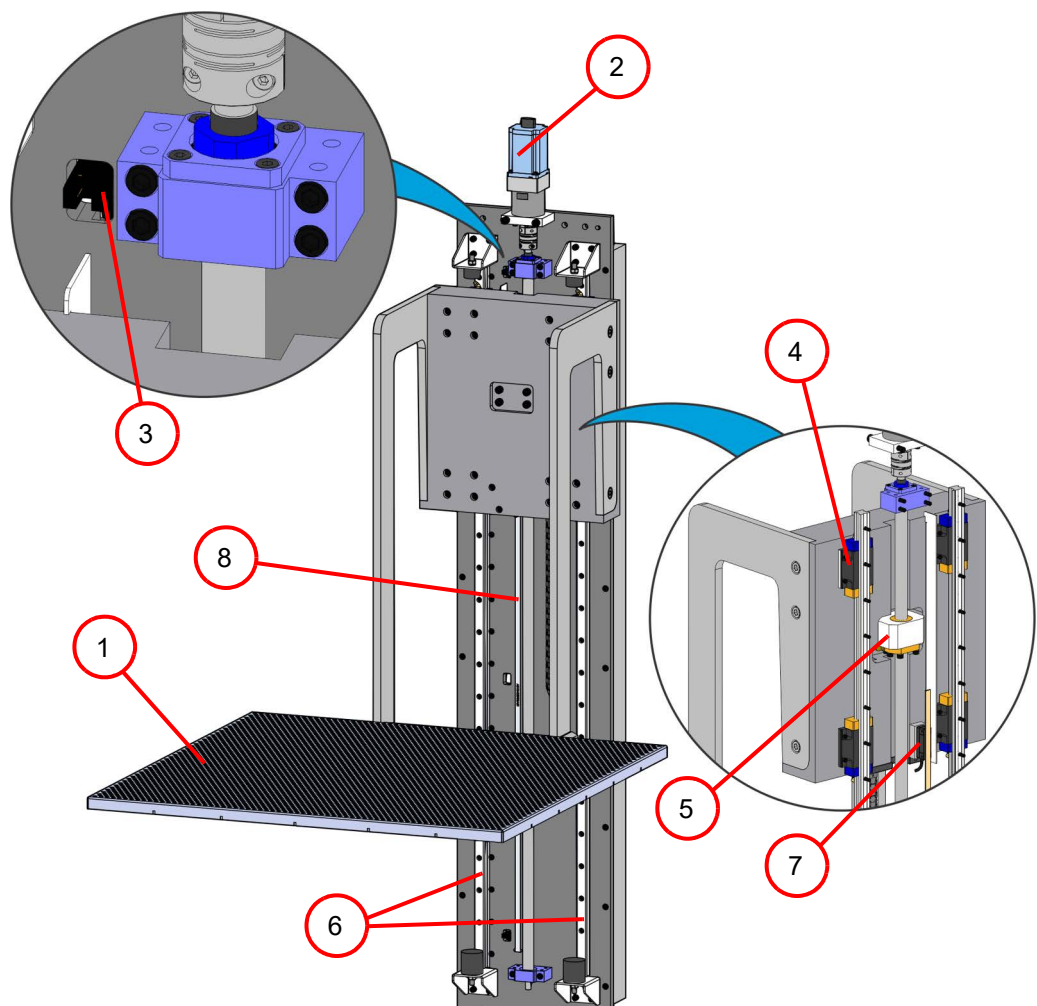


Table 3: Z Stage Assembly Components List

ID	Description	ID	Description
1	Build Platform	5	Ball Screw Assembly
2	Stepper Motor (48 VDC, PLC controlled)	6	Linear Rails
3	Limit Sensor (Photo-sensors)	7	Encoder Sensor
4	Bearing (Qty 4)	8	Encoder Strip

Resin Vat

The resin vat contains resin that is used to build 3D parts. It is generally placed inside the Neo800 build chamber and then leveled. The customer must purchase resin to fill the vat.

i Spare or secondary vats may be purchased by the customer for use with secondary materials which can be used after cleaning the build platform and elevator assembly which contact the new resins.

Figure 4: Resin Vat Components

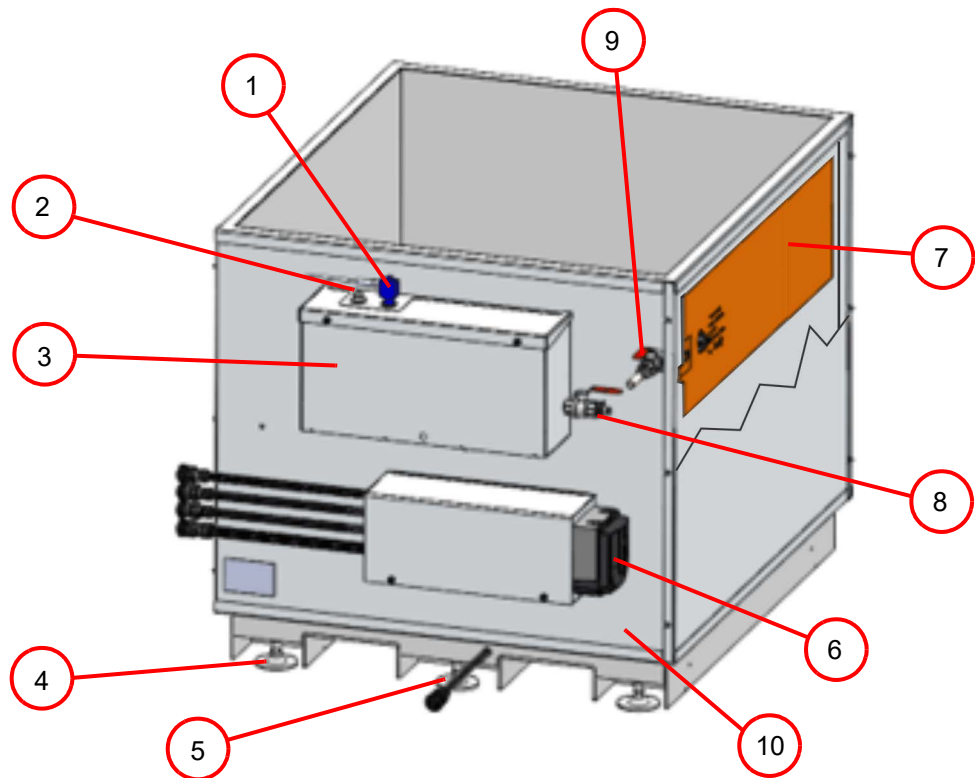


Table 4: Vat Components List

ID	Description	ID	Description
1	Ultrasonic Sensor (Distance)	6	Peristaltic Resin Pump
2	Float Sensor (High Limit)	7	Heater (behind side panel and insulation)
3	Reservoir	8	Reservoir Valve
4	Stabilizing Foot	9	Resin Leveling Valve
5	Leveling Foot	10	Drain Valve (Not Shown)

Optics

The optics enclosure is located above the printer build chamber and houses the laser, scanners and supporting optics components. The enclosure can be accessed through a sliding top cover.

The laser beam first passes through the collimating lens. It is then directed by two turning mirrors through the Z scanner and into the X/Y-axis scanner. The beam is directed downward through the scanner output window into the build chamber. A mechanical shutter blocks the laser beam if the doors are opened during a build operation.

Figure 5: Optics Components

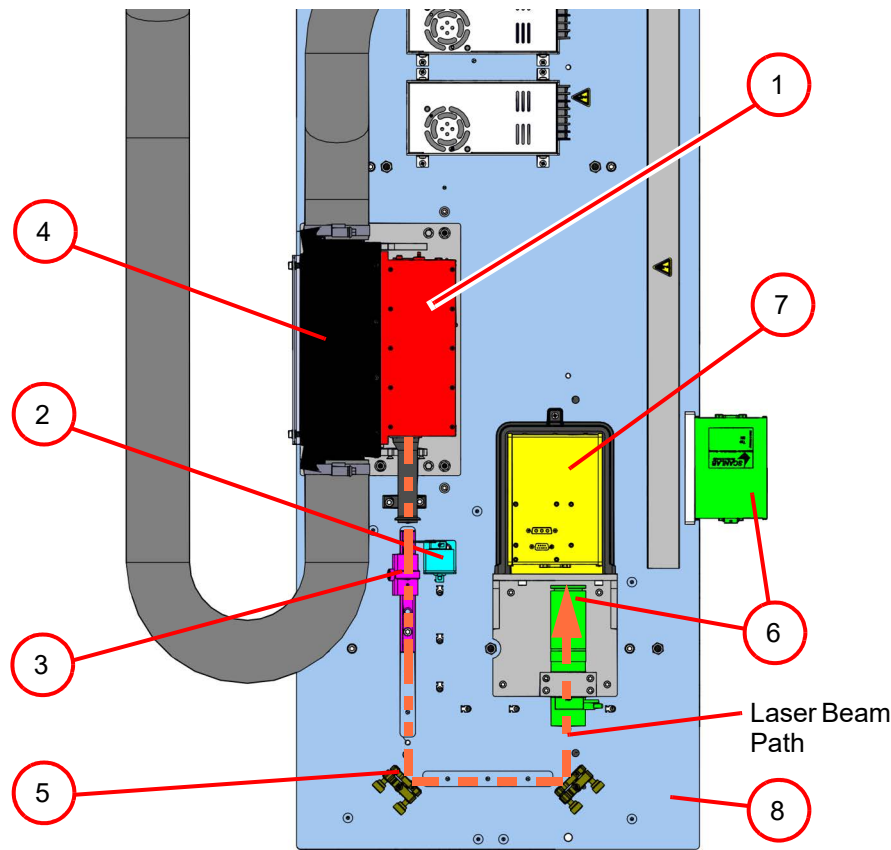


Table 5: Optics Components List

ID	Description	ID	Description
1	Laser	5	Turning Mirrors (Qty 2)
2	Safety Shutter	6	Z Scanner / Galvo and Controller
3	Collimating Lens	7	X/Y Scanners / Galvos
4	Heat Exchanger	8	Optics Plate

Frame

The printer frame serves as the mounting location for various printer components.

Figure 6: Frame Components

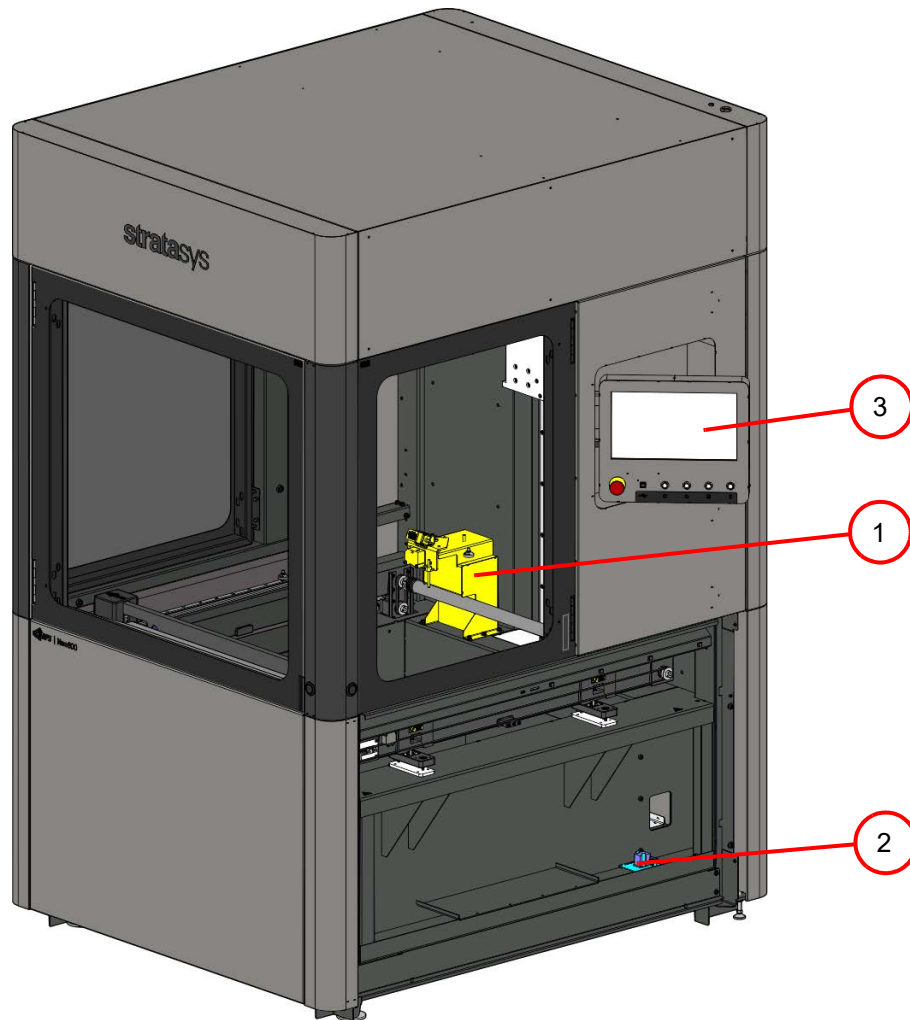


Table 6: Frame Components List

ID	Description	ID	Description
1	Resin Level Sensor and Mounting Bracket	3	Touchscreen User Interface
2	Vacuum Pump for Recoater Blade		

Electrical Panels

The electrical panels can be accessed from the rear of the printer. The area contains high and low voltage components as well as the PC.

Figure 7: Electrical Panel Components

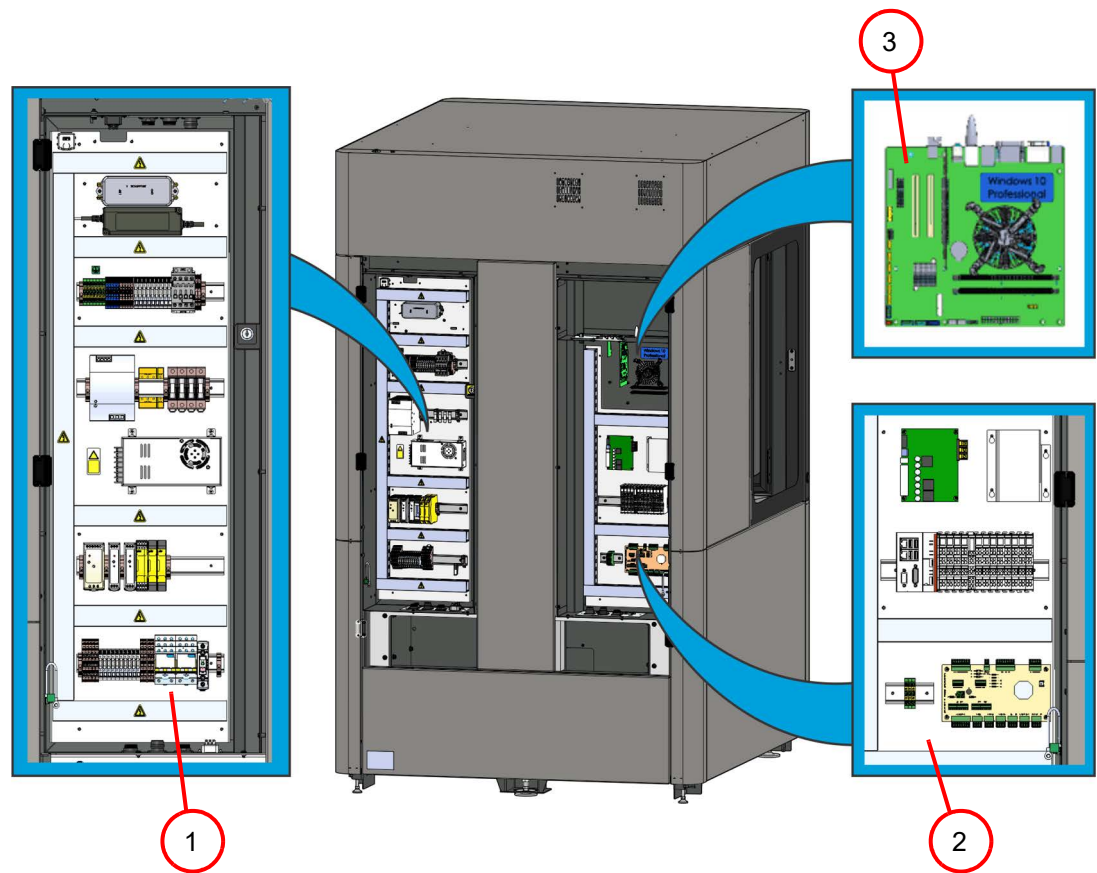


Table 7: Electrical Panel Components List

ID	Description	ID	Description
1	High Voltage Components	3	PC
2	Low Voltage Components		

Neo450

The following section contains images and description of the main components and assemblies of the Neo450 Printer.

Figure 8: Neo450 Functional Components

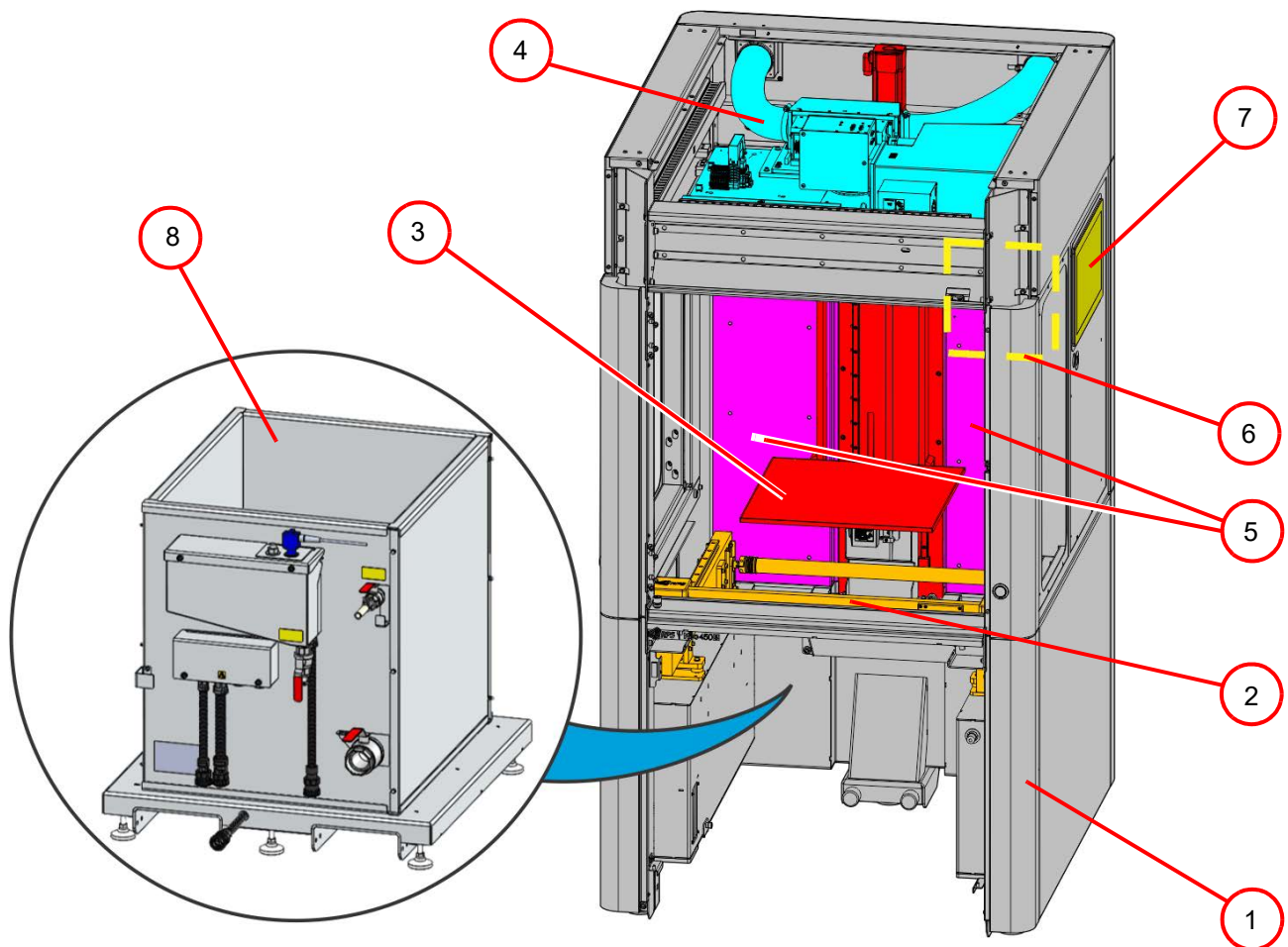


Table 8: Neo450 Components List

ID	Description	ID	Description
1	Frame	5	Electrical Panels (rear)
2	Recoater Assembly	6	PC (rear)
3	Z-Stage Assembly	7	Touchscreen Interface
4	Optics Assembly	8	Resin Vat

Recoater Assembly

The recoater blade travels from front-to-back over the resin on the linear rails of the recoater assembly. The recoater blade may be removed for cleaning and will maintain the proper gap after installation as long as the securing bolts are tightened properly.

Figure 9: Recoater Assembly Components

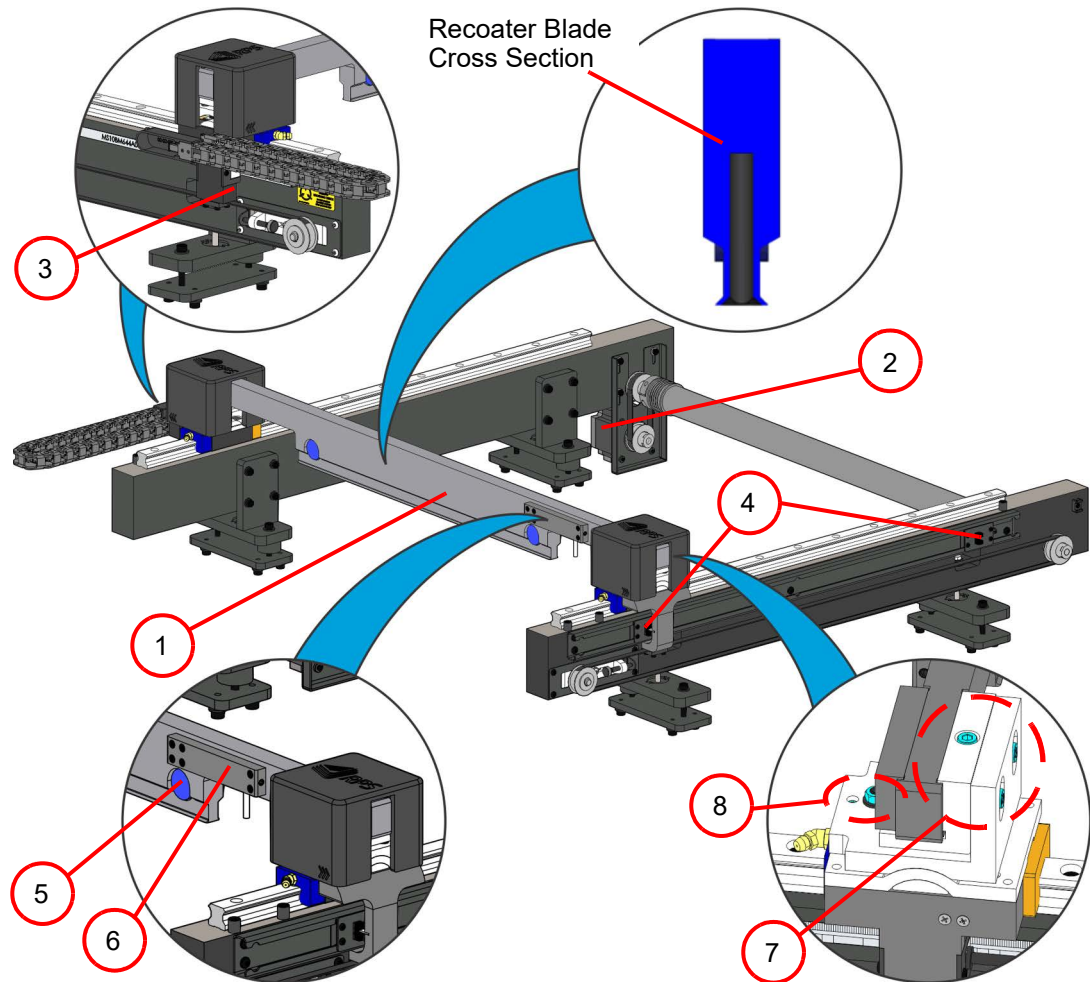


Table 9: Recoater Assembly Components List

ID	Description	ID	Description
1	Recoater Blade	5	Vacuum Level Window
2	Stepper Motor (48 VDC, PLC controlled)	6	Vacuum Port
3	Incremental Linear Encoder	7	Recoater Blade Height Adjustment Screws
4	Limit Sensors (Photo-sensors)	8	Recoater Blade Rake Adjustment Screws

Z Stage

The Z stage lowers the build platform into the resin during the build process and raises the build platform out of the vat when the build is complete. The platform support structure is mounted to four bearings that travel up and down on two linear rails. The Z stage is driven by a servo motor connected to a ball screw assembly.

Figure 10: Z Stage Components

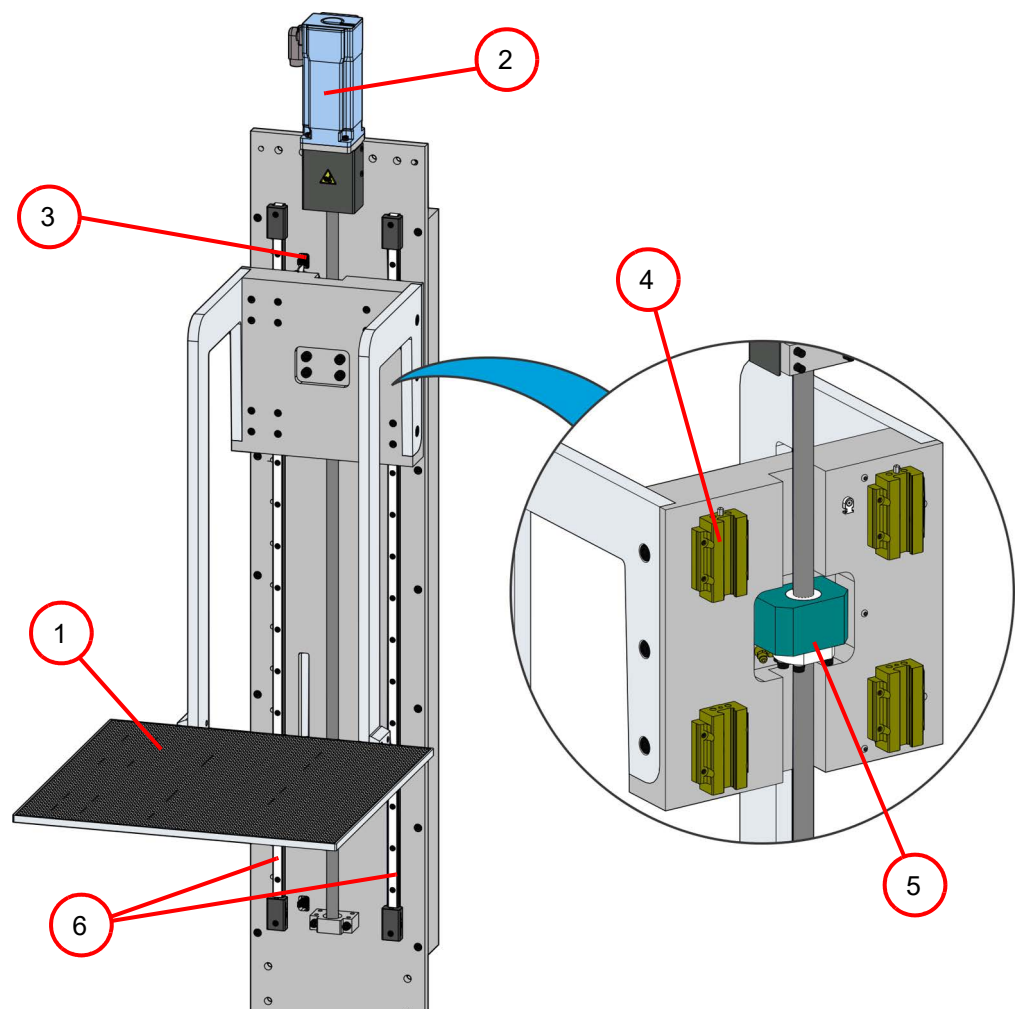


Table 10: Z Stage Assembly Components List

ID	Description	ID	Description
1	Build Platform	4	Bearing (Qty 4)
2	Servo Motor (48 VDC, PLC controlled)	5	Ball Screw Assembly
3	Limit Sensor (Photo-sensors)	6	Linear Rails

Resin Vat

The resin vat contains resin that is used to build 3D parts. It is generally placed inside the Neo450 build chamber and then leveled. The customer must purchase resin to fill the vat.



Spare or secondary vats may be purchased by the customer for use with secondary materials which can be used after cleaning the build platform and elevator assembly which contact the new resins.

Figure 11: Resin Vat Components

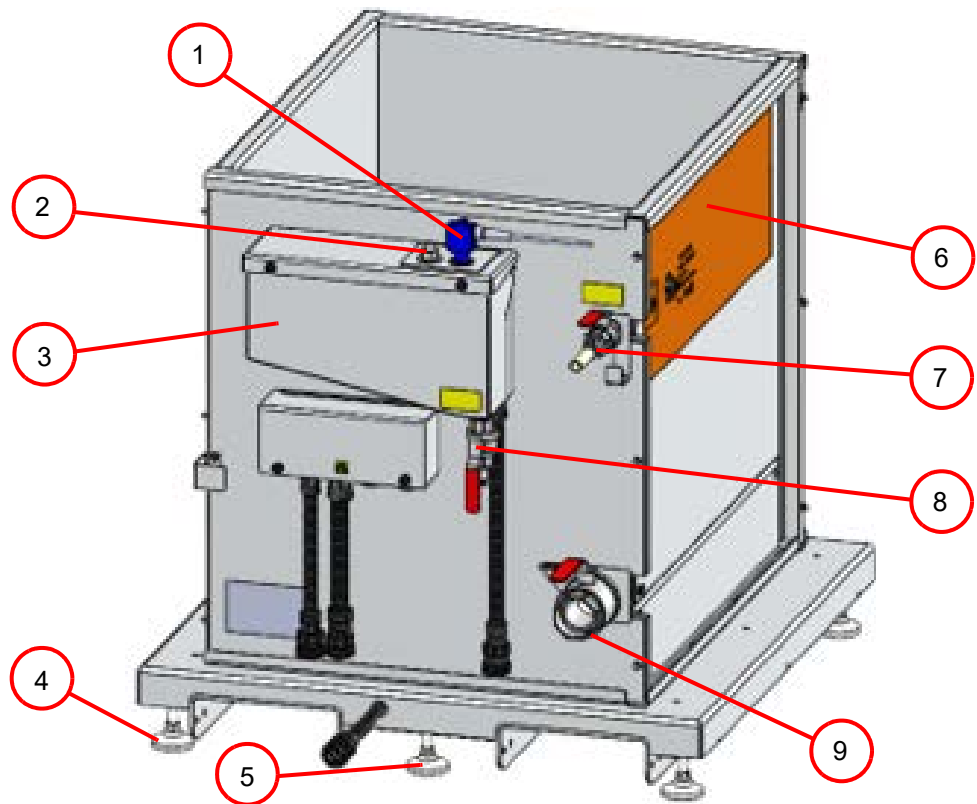


Table 11: Vat Components List

ID	Description	ID	Description
1	Ultrasonic Sensor (Distance)	6	Heater (behind side panel and insulation)
2	Float Sensor (High Limit)	7	Resin Leveling Valve
3	Reservoir	8	Reservoir Valve
4	Stabilizing Foot	9	Drain Valve
5	Leveling Foot		

Optics

The optics enclosure is located above the printer build chamber and houses the laser, scanners and supporting optics components. The enclosure can be accessed through a sliding top cover.

The laser beam first passes through the beam expander. It is then directed by two turning mirrors through the Z scanner and into the X/Y-axis scanner. The beam is directed downward through the scanner output window into the build chamber. A mechanical shutter blocks the laser beam if the doors are opened during a build operation.

Figure 12: Optics Components

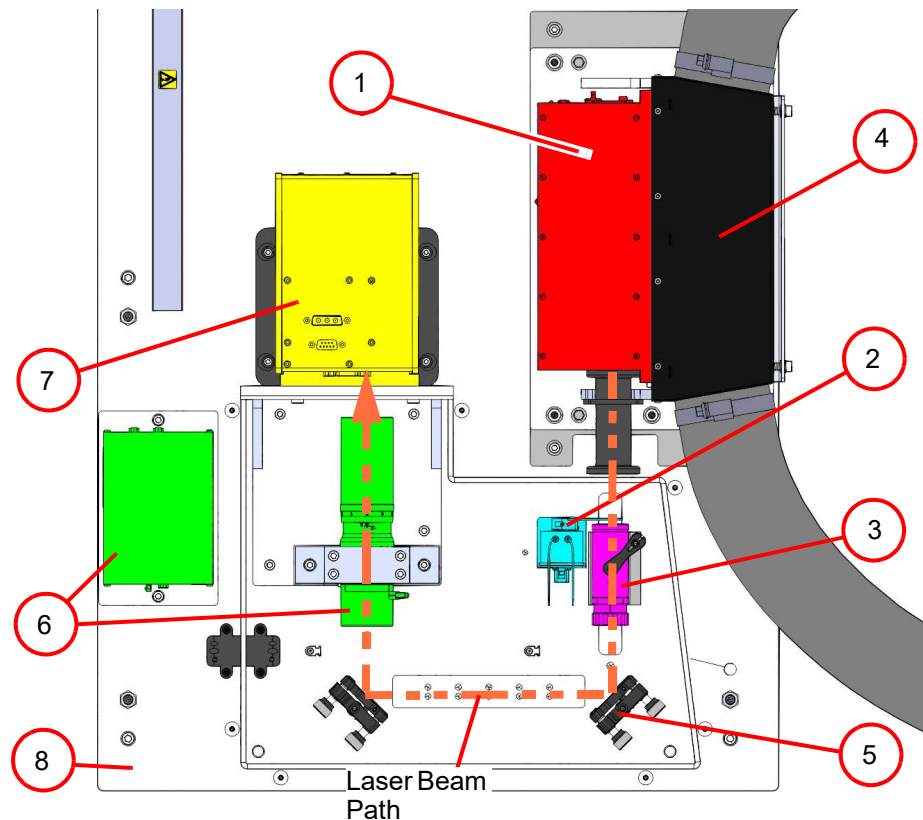


Table 12: Optics Components List

ID	Description	ID	Description
1	Laser	5	Turning Mirrors (Qty 2)
2	Safety Shutter	6	Z Scanner / Galvo
3	Beam Expander	7	X/Y Scanners / Galvos
4	Heat Exchanger	8	Optics Plate

Frame

The printer frame serves as the mounting location for various resin related components.

Figure 13: Frame Components

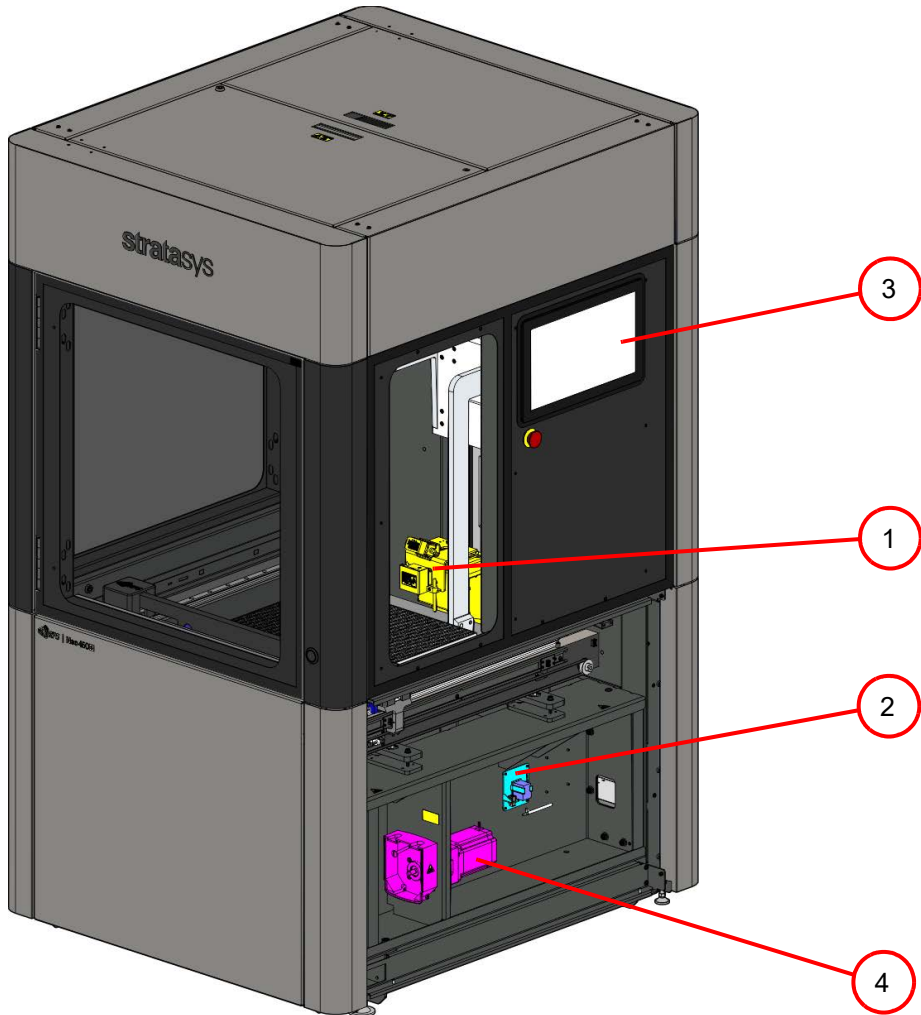


Table 13: Frame Components List

ID	Description	ID	Description
1	Resin Level Sensor	3	Touchscreen User Interface
2	Vacuum Pump	4	Peristaltic Resin Pump

Electrical Panels

The electrical panels can be accessed from the rear of the printer. The area contains high and low voltage components as well as the PC.

Figure 14: Electrical Panel Components

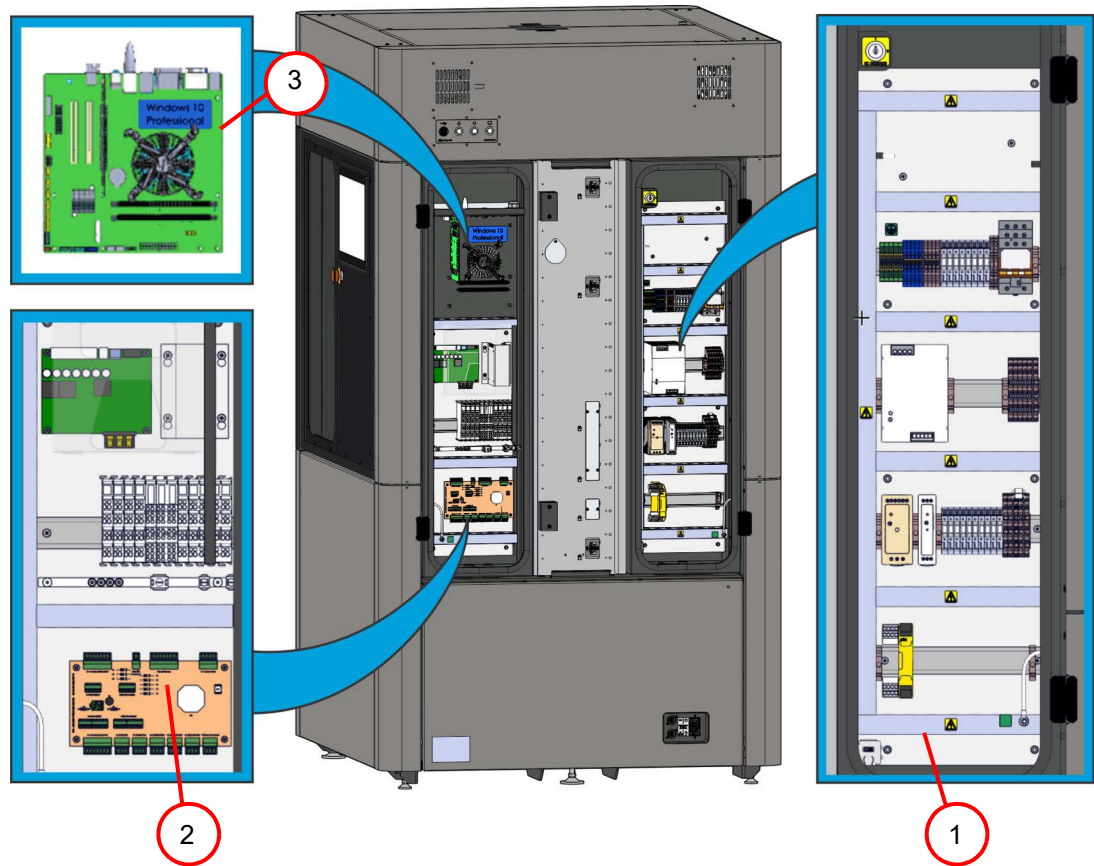


Table 14: Electrical Panel Components List

ID	Description	ID	Description
1	High Voltage Components	3	PC
2	Low Voltage Components		

4 USER INTERFACE AND TITANIUM OVERVIEW

This chapter provides an overview of the Stratasys Neo450 and Neo800 User Interfaces (UI) as well as all other user controls. These controls include buttons, key switches, and a touch-screen graphical user interface. Specific printer operation information and procedures can be found in [Chapter , 5 Operating the Printer \(page 136\)](#). You must power ON the printer prior to using the touchscreen, see “Powering ON the Stratasys Neo800 Printer” (page 136) for instructions.

The diagram illustrates the front panel of the Tibo 450 machine. On the left, a small inset shows the front panel with a color display screen and a yellow emergency stop button. On the right, a larger inset provides a detailed view of the control panel. This panel features four circular buttons: a green button labeled 'Machine ON', a red button labeled 'Machine OFF', and a blue button labeled 'Computer'. Above the green button is a USB port labeled 'USB Port'. To the right of the green button is a power symbol. Below the red button is a power symbol. The text 'Tibo 450' and 'MADE IN BRITAIN' are visible on the panel.

Emergency Stop

When depressed: halts all activity, by cutting power to all systems. The button will latch in the depressed position when pressed fully down. The button is released from the depressed position by rotating clockwise.

USB Ports

Twin USB ports for data transfer via USB storage device.

Printer ON Button

Press and release: Activates/powers-up all sub-systems. When ON, the ON and OFF buttons will be lit. Note: The printer can not be switched ON when the Emergency Stop is in the depressed position.

Printer OFF

Press and release: Deactivates/powers-down all sub-systems.

Computer Button

Only active when the printer is ON

Unlit: computer OFF. Press and release: Starts computer/Windows™

Lit: computer ON. Press and release: Shuts down Windows™/computer



Before switching the printer OFF or switching the main power isolation OFF, ensure the computer is fully shutdown.

Chamber Lamp Button

Unlit: chamber lamp OFF. Press and release: Chamber lamp ON

Lit: chamber lamp ON. Press and release: Chamber lamp OFF

Graphical User Interface

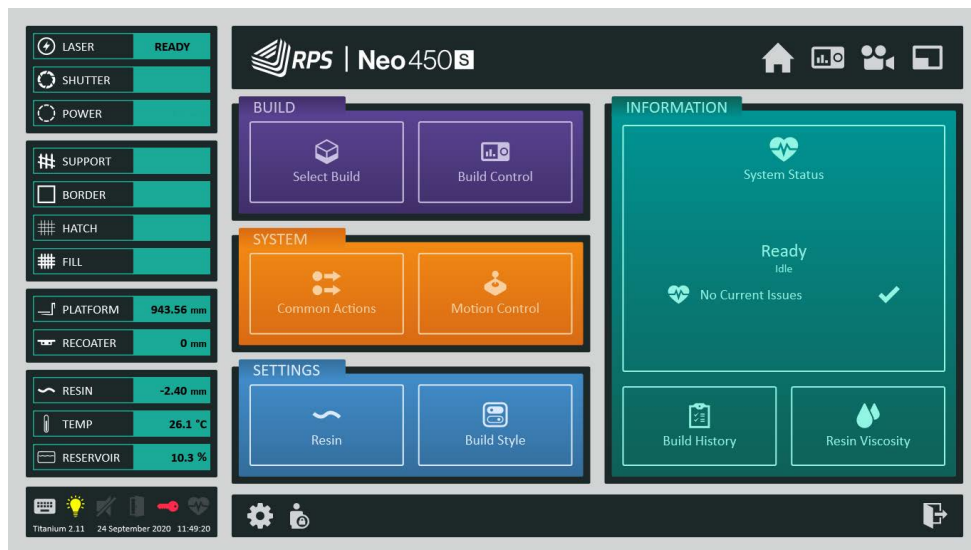
Home Screen

The Titanium application window contains two permanent elements:

- The left-side **Status** pane
- The top **Control** pane

The remaining area varies with the selected activities. The initial home screen is shown below.

Figure 3: Home Screen



The **Home Screen** area is split into five functional areas which will be detailed in the following sections:

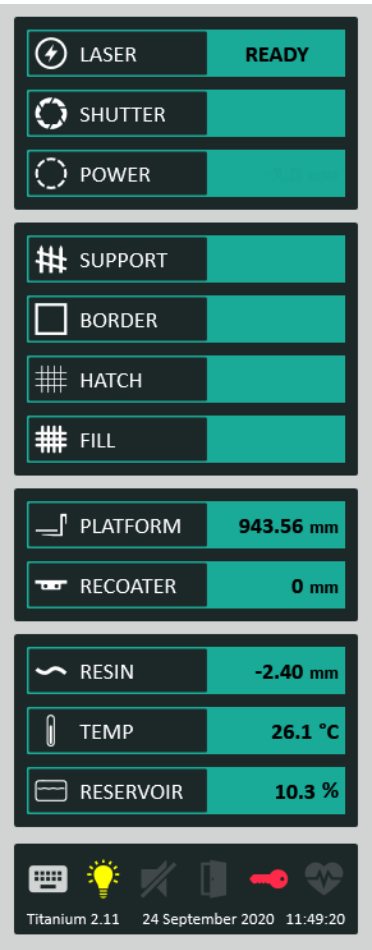
- The **Build** pane contains buttons to switch to the build control pages.
- The **System** pane contains buttons to switch to the common actions and manual motion control pages.
- The **Settings** pane contains buttons to access the main configuration settings for the system.
- The **Information** pane contains buttons to switch to the system information pages.

The bottom **Service** bar contains buttons to switch users, exit and to provide access to further settings.

Status Pane

The left-side status pane is divided into five sections: the Laser Status section, the Scan Speeds section, the Positions section, the Resin section, and the State section.

Figure 4: Status pane



The **Laser Status** indicates:

- The current laser state
- The current shutter state (open or closed)
- The most recent measurement of the laser power output

The **Scan Speeds** indicates:

- The scanning speeds of the supports
- The scanning speeds of the borders
- The scanning speeds of the hatches
- The scanning speeds of the fills

The **Positions** indicates:

- The current position of the elevator
- The current position of the recoater

The **Resin** indicates:

- Resin level
- Resin temperature
- Reservoir fill level

The **State** contains buttons and state indicators:

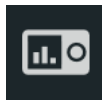
- On-screen keyboard toggle button
- Chamber light toggle button
- Sound mute button
- Door open warning (refer to Interlock System)
- Engineer key warning (refer to Interlock System)
- Status warning button

Control Pane

Figure 5: Control pane



The **Home** button takes you back to the home screen.



The **Build** monitor button displays the standard build monitor page.



The **Camera** view button displays the web camera build monitor page.



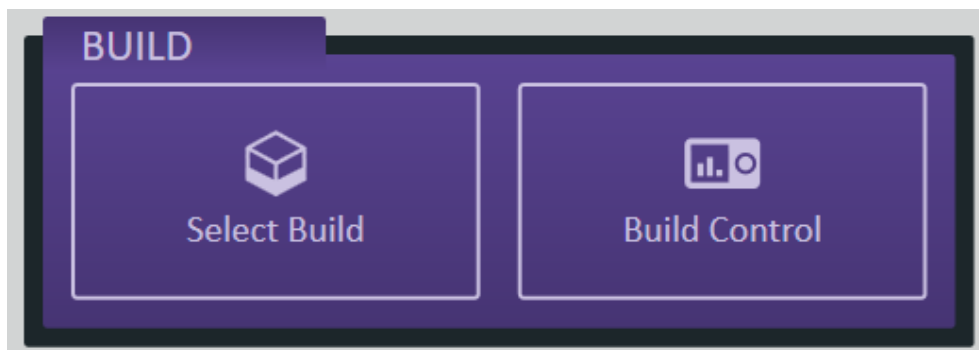
The **Minimize** button minimizes Titanium to the Windows taskbar.



The **USB** button ejects the currently inserted USB memory stick.

Build Pane

Figure 6: Build pane

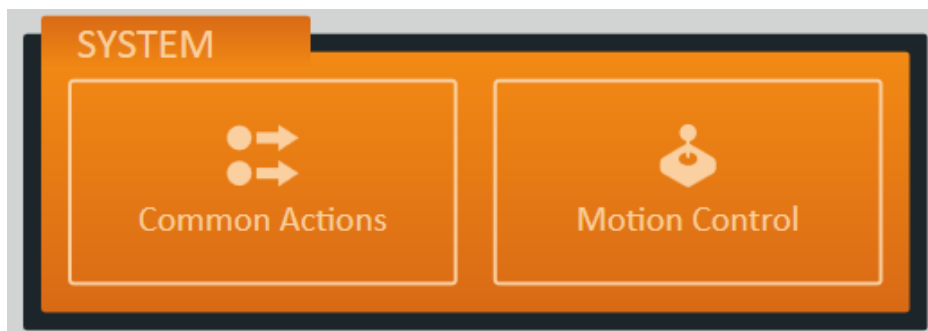


The **Select Build** button switches to the 'select build' page used for loading a new build job.

The **Build Control** button opens the most appropriate build page. If no job is currently loaded, then the select build page is opened. If a job is loaded but not started, then the build style page is opened. If a job is currently in progress, then the build monitor page is opened.

System Pane

Figure 7: System pane



The **Custom Actions** button switches to the custom actions page where a set of system management activities are available: for example prepare resin, resin stirring, and others.

The **Motion Control** button switches to the motion control page where the platform, recoater blade and resin pump can be manually controlled.

Settings Pane

Figure 8: Settings pane

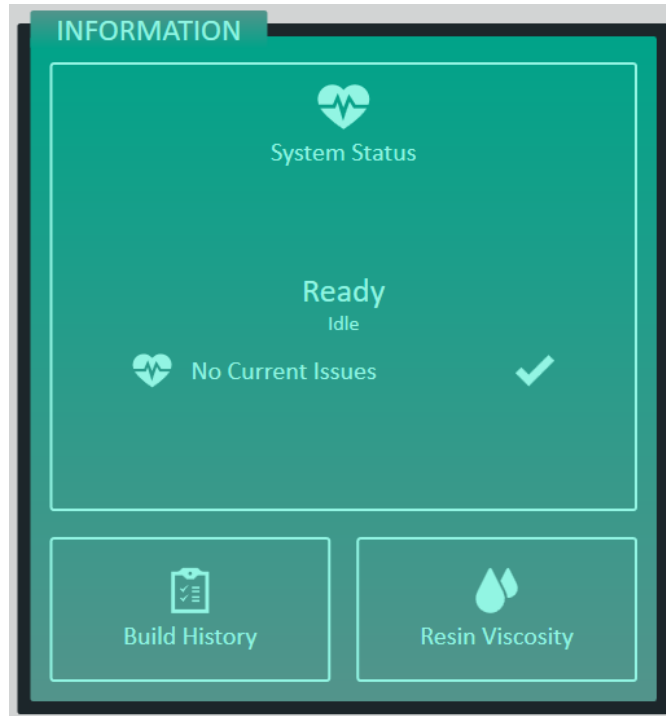


The **Resin** button switches to the resin management page where the active resin can be selected, and the resin parameters adjusted.

The **Build Style** button switches to the build style management page. This page can be used to define the standard build style settings, for the current resin, that will be applied when a new build job is loaded.

Information Pane

Figure 9: Information pane



The **System Status** button shows a brief summary of the current system activity and status. Clicking on the button will switch to the system status page.

The **Build History** button switches to the build history viewing page.

The **Resin Viscosity** button switches to the resin viscosity management and reporting page.

Service Bar

The service bar provides buttons to access specific system actions. The buttons that are present depend on the current user access level.

Figure 10: Standard user service bar



The following buttons are available to a standard user:



Switch to the printer settings page.



Switch the active user level.

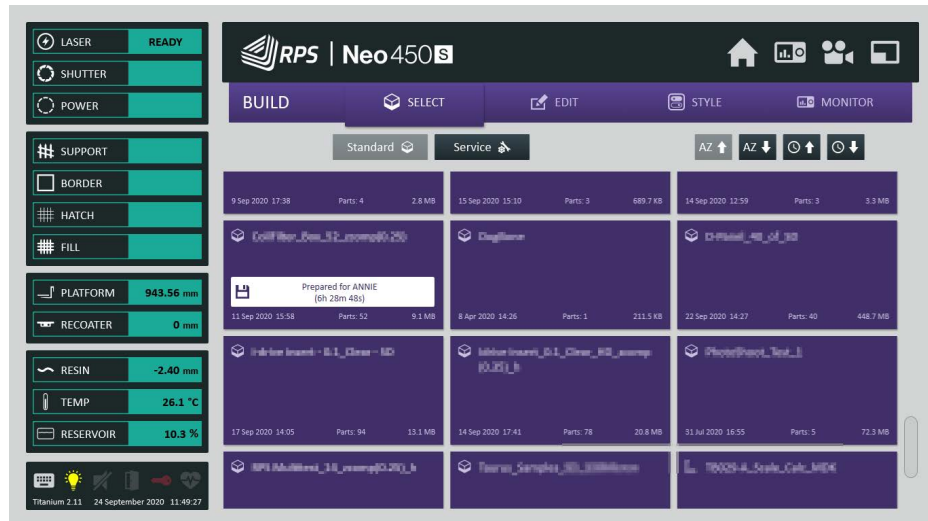


Exit Titanium.

The Build Pages

Select Build Page


Figure 11: Select build page



This page is used for selecting a build job to load. When you select the build, the parts are loaded and displayed in the build style page.

Build jobs that have been previously prepared using Titanium Assistant are indicated with the 'prepared for' insert.

The     sort buttons change the order of the viewed jobs.

The  refresh button refreshes the job collection to pick up external changes.

The  scroll button positions the list back to the top.

Standard Builds

The Standard button lists the jobs found in the configured build folder (see Build Control Settings).

Service Builds

The Service button lists the jobs available in the service builds folder. The service builds include blade gap builds for setting the recoater blade at the correct height and scale bar builds for calculating the resin shrinkage.

Blade Gap Builds

Selecting a blade gap build loads several small hollow blocks spread around the platform. When the build has finished, the gap between the recoater blade and the top of the blocks may be measured with feeler gauges. The correct gap is necessary to build good quality parts.

Scale Bar Builds

The process of polymerisation causes resin to shrink slightly. To compensate for resin shrinkage, parts can be built slightly larger than required so that they shrink to the correct size.

Another cause of inaccuracy is the beam width. If the beam were to trace the border of the part, then the beam would extend beyond the part border by half the beam width as shown in the diagram. To build accurate parts, the beam width must be compensated during slicing.

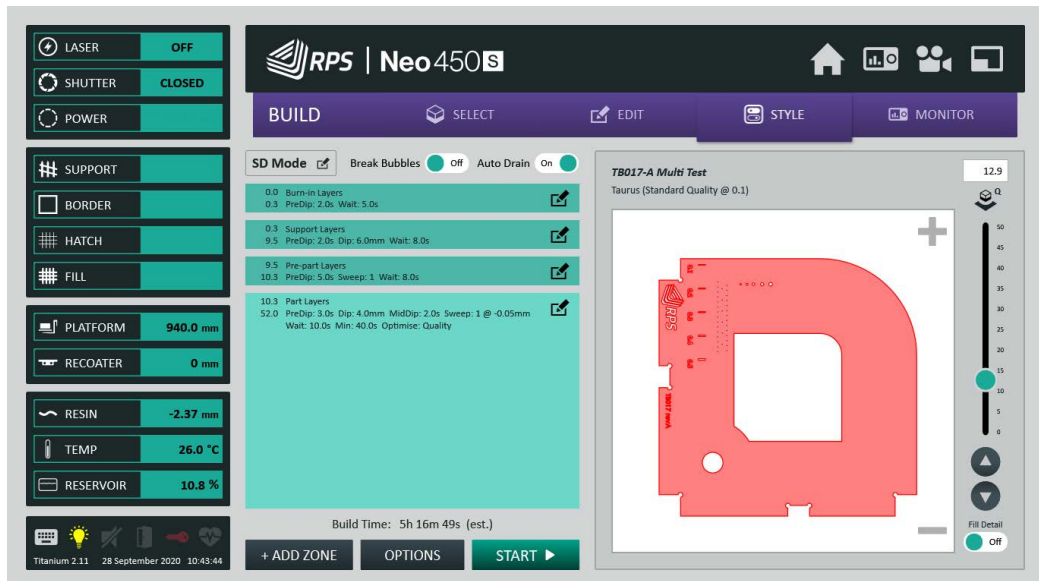
Scale bars are built with no shrinkage factors and no beam compensation. Once the bars are measured, the measured values can be compared to the correct values to calculate resin shrinkage and beam compensation.



In the service builds folder, you will find a Microsoft® Excel™ spreadsheet that can help you calculate resin shrinkage and beam compensation.

The Build Style Page

Figure 12: Build style page



This page can be used to adjust the build zone and exposure settings for the currently loaded build job. When the build style changes have been completed, the **START** button can be used to start the build and switch to the **Build Monitor** page.

Figure 13: Build control options



The quality selector button (SD Mode in the image above) can be used to select one of the three build qualities:

- SD – Standard definition – a larger beam diameter is used for each part on the build platform
- HD – High definition – a smaller beam diameter is used for each part on the build platform
- Auto – each part is built at the resolution defined by the suffix attached to the build file:

A part ending in the suffix **_s** will be built in a support build style.

A part ending in the suffix **_h** will be built in a high-resolution build style.

A part ending with no suffix will be built in the standard build style.

The **Break Bubbles** switch can be used to include the bubble breaking process at the start of the build.

The **Auto Drain** switch can be used to toggle the auto drain option. Auto Drain on will cause the platform to rise to the unload position at the end of the build. Turning Auto Drain off will cause the platform to remain in the resin at the end of the build.

Build Zones

The build zones define the actions of the elevator and recoater during the build.

There are initially 4 build zones:

- Burn-in Zone: This applies a higher exposure to the initial layers of the build to ensure bonding with the platform.
- Support Zone: The support layers are built by dipping the platform into the resin and returning for the next layer. No sweeps are performed.
- Pre-part Zone: The pre-part zone is available to sweep bubbles from the resin surface before the part layers start to build.
- Part Zone: The part layers form most of the build and typically consist of one sweep.

Build Zone Settings

Figure 14: Build zone settings

Build Zone Settings


Part Layers

Recoat

Pre-dip delay:	<input type="text" value="5"/> secs	Dip distance:	<input type="text" value="0.0"/> mm
Mid-dip delay:	<input type="text" value="0"/> secs	Sweep count:	<input type="text" value="1"/>
Post-dip delay:	<input type="text" value="0"/> secs	Sweep offset:	<input type="text" value="50"/> %
Z Wait delay:	<input type="text" value="5"/> secs	Sweep velocity:	<input type="text" value="50"/> mm/s
Min layer time:	<input type="text" value="0"/> secs		

Scan Options

Optimise fill mode: ▼



For each zone, the following settings can be adjusted:

- **Pre-dip delay:** A delay that is applied before the dip phase. It is required for exposure to complete and will vary depending upon the requirements of the resin in use. (This delay occurs regardless of whether dipping is enabled).
- **Dip distance:** The distance that the elevator dips into the resin before moving to the next layer.
- **Mid-dip delay:** A delay that is applied at the bottom of the dip movement before rising to complete the dip. (This delay occurs only if dipping is enabled).
- **Post-dip delay:** A delay that is applied after the dip phase and before the sweep phase. (This delay occurs only if dipping is enabled).
- **Sweep count:** You may wish to increase the number of sweeps due to factors such as resin viscosity, area to recoat and the presence of trapped volumes.
- **Sweep offset:** The sweep offset lowers the platform by the offset value while sweeping.
- **Sweep velocity:** You can change the velocity of the recoater to take account of factors such as resin viscosity and trapped volumes.

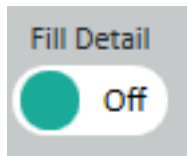
- **Z Wait time:** The time after recoating has completed and before the next layer is scanned. It is required to allow the resin to settle to a flat surface and will vary depending on factors such as resin viscosity.
- **Min layer time:** The minimum layer time enforces a minimum elapsed time between laser scanning start events.

For part-zones the **Scan Options** section provides an additional property that can be set. The **Optimize Fill Mode** determines how the top surface layers of the build job are filled. The options are:

- **Speed:** the surface fill is prioritized for speed (this is the default behaviour and matches previous versions of Titanium).
- **Quality:** the surface fill is prioritized for quality – ideal for jobs with large flat surfaces.
- **Auto:** the surface fill mechanism for a layer is automatically determined. The sensitivity for the detection can be adjusted in the Build Style Options dialog.

Layer Viewing Options

On the build style edit page, the layer drawing has an additional option to display the fill detail.



When this option is enabled, the nature of the filled areas is denoted by color:

- Yellow - represents an upward facing surface with Quality fill.
- Bright red - represents an upward facing surface with Speed fill.
- Dark red - represents a downward facing surface.
- Pale red - represents internal areas.

Custom Zones

If a range of the build requires changes to the recoating style, you can add a custom range using the **Add Zone** button.

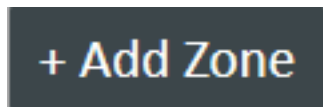


Figure 15: Creating a custom zone

Build Zone Settings

Zone name:

Range

Start height: mm End height: mm

Recoat

Pre-dip delay: secs Dip distance: mm

Mid-dip delay: secs Sweep count:

Post-dip delay: secs Sweep offset: mm


Z Wait delay: secs Sweep velocity: mm/s

Min layer time: secs

Scan Options

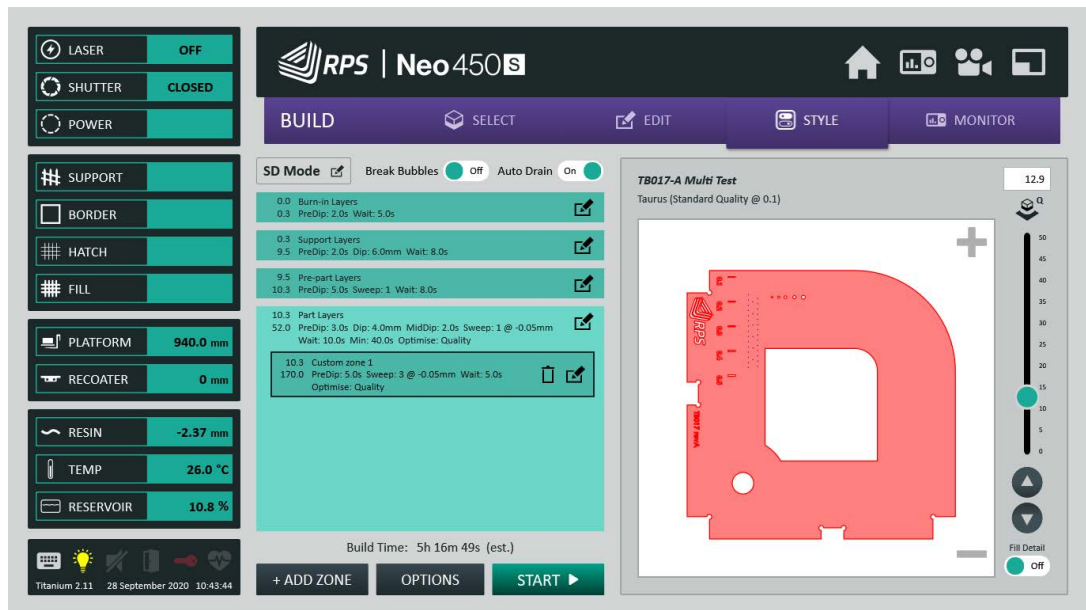
Optimise fill mode: ▼

Zone range cannot be the same as the part zone 10.3 - 13.2



Pre-defined custom zone settings can be created via the **Standard Build Style Setup** page. These can be loaded using the **LOAD PRESET** button. For example, you can create a custom zone with a sweep count of three and a slow sweep velocity.

Figure 16: Build style with a custom zone



Build Style Options

The **OPTIONS** button allows you to change the exposure, the sizes of the burn-in and pre-part layers and the resin scaling.

Figure 17: Build style options

Build Style Options

Zones

Zone size (0 = none): Burn-in: Pre-part: mm

Sensitivity for the auto quality fill threshold:

Fine Coarse

Resin scaling X: Y: Z:

Exposure

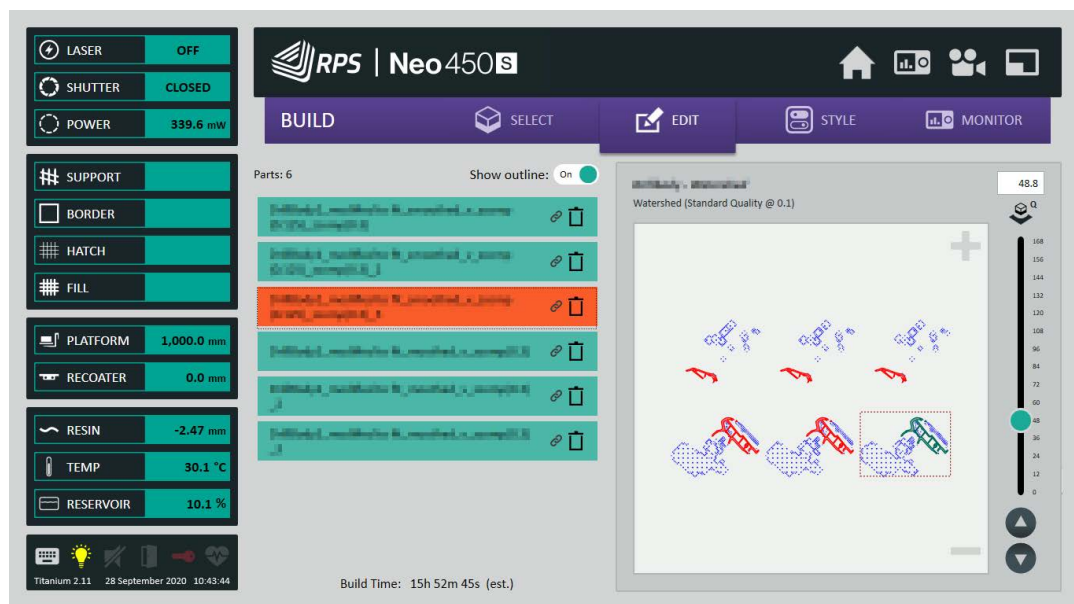
	SD	HD	
Burn-in overcure depth:	<input type="text" value="0.26"/>	<input type="text" value="0.26"/>	mm
Support overcure depth:	<input type="text" value="0.26"/>	<input type="text" value="0.26"/>	mm
Border overcure depth:	<input type="text" value="0.18"/>	<input type="text" value="0.18"/>	mm
Fill overcure depth:	<input type="text" value="0.15"/>	<input type="text" value="0.15"/>	mm
Hatch overcure depth:	<input type="text" value="-0.02"/>	<input type="text" value="-0.02"/>	mm
Enhanced border scan:	<input checked="" type="checkbox"/> On	<input checked="" type="checkbox"/> On	
Prevent 'end of supports' power adjustment:			<input type="checkbox"/> Off

- **Zones:** The zones section allows the size of the burn-in and pre-part zones to be defined. For the part zones there is an additional setting for adjusting the sensitivity of the automatic quality fill mechanism.
- **Scaling:** The scaling factors can be changed for the current build. For more information on scaling, see the maintenance builds section of this manual.

- **Exposure:** The exposure value defines the penetration depth of the beam into the resin. The exposure values are highly dependent on the resin being used. A higher value will cause the laser to scan with a slower speed, or a higher power, or a combination of both.
- **Enhanced border scan:** a toggle to enable enhanced border scanning (if available) – enabling this may extend the build time.
- **Prevent end of supports power adjustment:** a toggle to prevent recalculation of the exposure settings when the last support layer is reached.

Build Edit Page

Figure 18: Build edit page

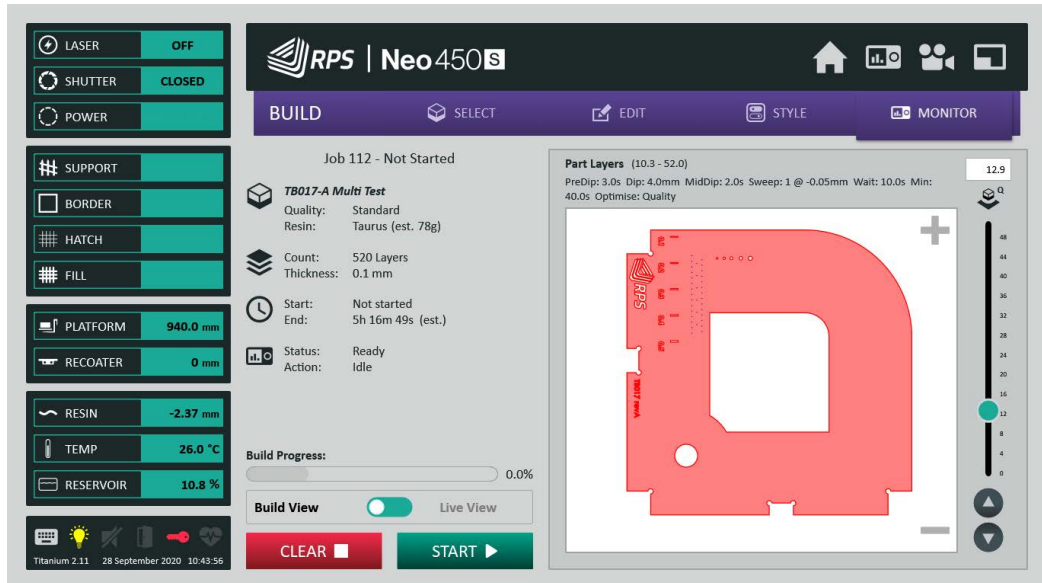


The build edit page can be used to delete individual parts from the current build job.

Select the part to delete either by clicking on the listed part on the left, or by clicking on the part in the layer drawing.

Build Monitor Page

Figure 19: Build monitor page



The **Build Monitor** page displays information about the current build job.

On the left, you can see the build name, number of layers, build time estimate, and current printer activity.

On the right, you can see a drawing of the current layer.

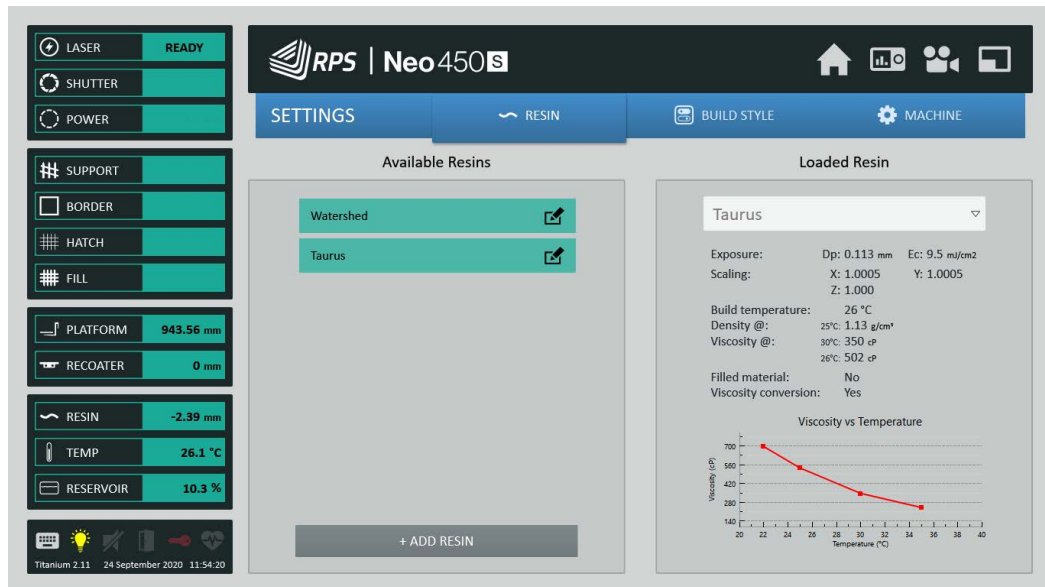
The vertical slider bar can be used to view layers other than the current layer. The up and down buttons can be used to increment the layer view. The layer view resets to the current layer when the next layer is loaded for scanning.

The **Build View** switch toggles the view between the layer display and the live view from the webcam.

The Setup Pages

Resin Setup Page

Figure 20: Resin setup page



The **Resin Parameters** page is used to manage and select the resins available on the system.

The left-hand side of the page contains a list of the available resins. Depending on the resin, and the current user's access level, resins can be added, edited, or deleted.

The right-hand side of the page is used to specify and summarise the properties of the resin loaded into the machine.



This symbol indicates that the resin has validated build style settings for at least one layer thickness.



This button can be used to edit a resin. The properties that can be edited will depend on whether the resin is custom or predefined.




This button can be used to delete a resin that has been manually added.

Resins can be added, edited, and deleted in the **Resin Parameters** page. Exposure values should be supplied by the manufacturer of the resin.

Figure 21: Edit resin

Edit Resin

Name:	<input type="text" value="Watershed"/>			
Exposure:	Ec (mJ/cm ²):	<input type="text" value="11.5"/>	Dp (mm):	<input type="text" value="0.165"/>
Build temperature (°C):	<input type="text" value="30.0"/>			
Density (g/cm ³) @:	25°C:	<input type="text" value="1.12"/>	Filled:	<input checked="" type="checkbox"/> No
Viscosity (cP) @:	30°C:	<input type="text" value="260"/>		
Scaling:	X:	<input type="text" value="1.0013"/>	Y:	<input type="text" value="1.0013"/>
	Z:	<input type="text" value="1.000"/>		
Usage adjustment:	Factor:	<input type="text" value="1.0"/>	Constant:	<input type="text" value="0.0"/>



If you edit a resin, remember to reload a loaded job for the changes to take effect.

The **Add Resin** button can be used to add a custom resin.

Figure 22: Add Resin

Add Resin

Short name:

The short name identifies the resin - do not change once in use.

Full name:

Exposure: Ec (mJ/cm²):

Dp (mm):

Build temperature (°C):

Density (g/cm³) @: 25°C:

Filled: ☒ No

Viscosity (cP) @: 30°C:

22°C:

25°C:

35°C:

Scaling: X:


Y:

Z:

Usage adjustment: Factor:

Constant (Kg):

Name cannot be empty

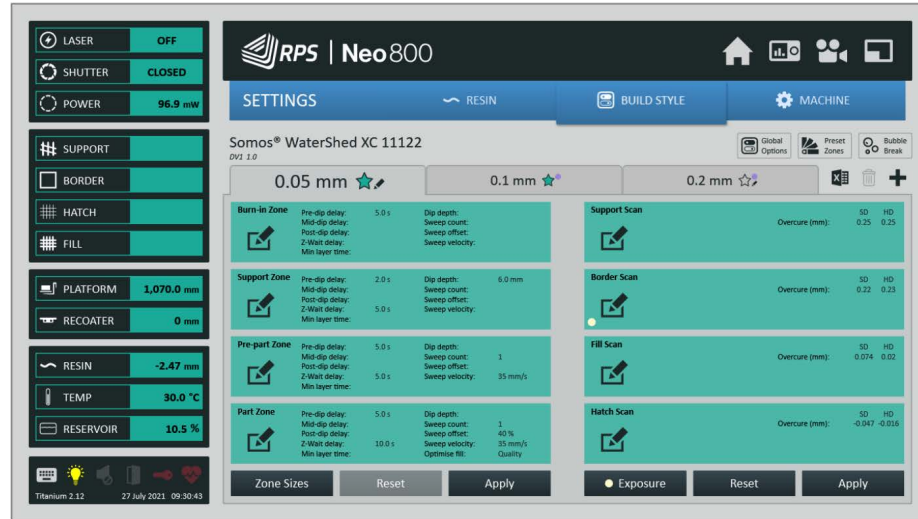


The short name should be kept as a concise name for the resin. This is used on the display when limited space is available. This name is also used internally to manage the resin and should not be changed once the resin has been used for a build.

Exposure values should be supplied by the manufacturer of the resin.

Standard Build Style Setup Page

Figure 23: Standard build style setup page



The **Build Style** page is where default parameters can be entered or modified. The build style parameters control the scanning and recoat operations. The recoat parameters can be set independently for each of the 4 build zones.

Standard build style parameters are set independently for each Layer Thickness.

Build Style Status

The build style settings are monitored and differences to a reference set indicated on the display.

For a predefined resin, the reference settings are pre-set within the software. These reference settings can either be certified or uncertified. The settings are certified for an individual layer thickness through an evaluation and testing process. Uncertified settings are provided as a starting point for refining the optimum build parameters.

The following symbols are used in the style selector tab to indicate the status of the build style for an individual layer thickness:



The reference build style settings for the layer thickness are factory defined – and have been certified.



The reference build style settings for the layer thickness are factory defined – but have not been certified.



The current layer thickness build style settings contain one or more accessible properties that differ from the reference set.



A colored circle is used to indicate that the style contains settings that require engineering level access (red) or developer level access (purple).



Validated settings do not guarantee successful builds for all geometry types. Assessment of a build, and subsequent adjustment to recoat parameters will need to be made on a case-by-case basis.

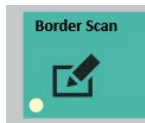


Adjustments to Validated exposure parameters are rarely required. Unless directed to, adjustments to exposure parameters are not recommended.



Validated settings have been established through testing. This assumes that the resin has been correctly maintained, and in good condition.

Within the style edit page, a pale-yellow circle is used to highlight the set that contains the non-reference settings. For example:



or



And within the configuration dialogs, the individual field that does not match the reference set will be highlighted using a pale-yellow background. For example:



Build Style Settings


The **Reset** buttons can be used to restore the settings to the reference set.

The **Exposure** button allows the standard exposures to be set.

Figure 24: Build exposure options

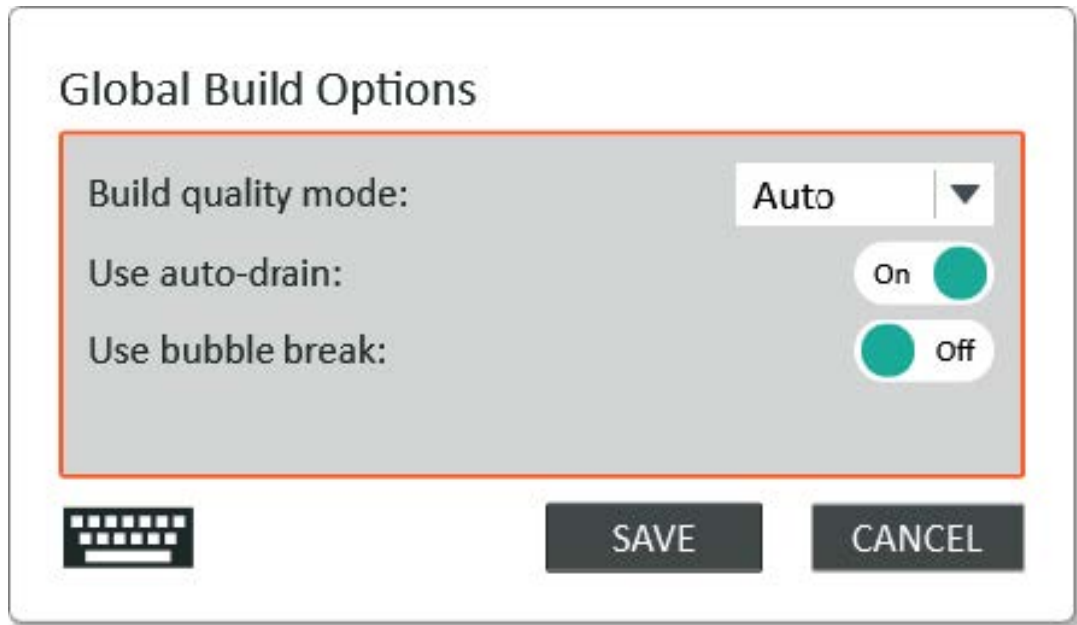
Build Exposure Options

	SD	HD	
Burn-in overcure depth:	0.26	0.26	mm
Support overcure depth:	0.26	0.26	mm
Border overcure depth:	0.18	0.18	mm
Fill overcure depth:	0.15	0.15	mm
Hatch overcure depth:	-0.02	-0.02	mm
Prevent 'end of supports' power adjustment:	<input checked="" type="checkbox"/> off		

 **RESET** **SAVE** **CANCEL**

The **Global Build Options** button can be used to set the global option preferences:

Figure 25: Global Build Options



The image shows a 'Global Build Options' dialog box. It has a title bar at the top. Below the title bar, there is a grey rectangular area containing three settings: 'Build quality mode:' with a dropdown menu set to 'Auto', 'Use auto-drain:' with a toggle switch turned 'On', and 'Use bubble break:' with a toggle switch turned 'Off'. The entire grey area is enclosed in a red border. At the bottom of the dialog box, there is a keyboard icon on the left, and two buttons labeled 'SAVE' and 'CANCEL' on the right.

Global Build Options

Build quality mode: Auto

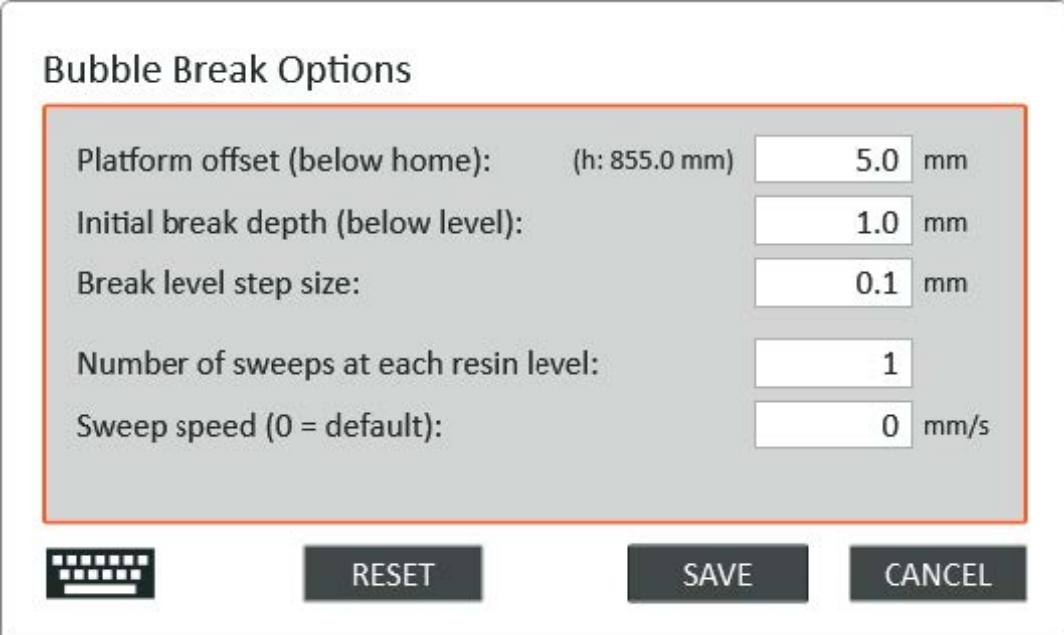
Use auto-drain: On

Use bubble break: Off

SAVE CANCEL

The **Bubble Break** button can be used to set the preferences for the bubble break operations used during the build process:

Figure 26: Bubble Break Options



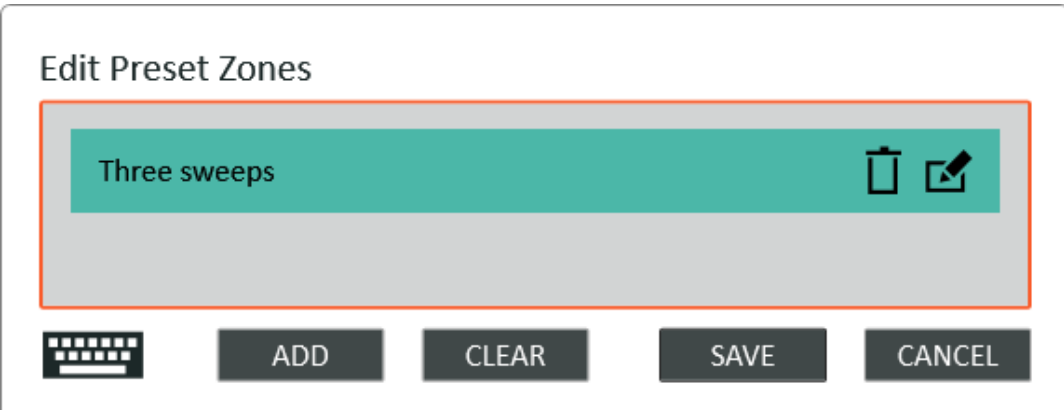
The screenshot shows a dialog box titled "Bubble Break Options". It contains five input fields with their respective units and values:

Parameter	Value	Unit
Platform offset (below home):	5.0	mm
Initial break depth (below level):	1.0	mm
Break level step size:	0.1	mm
Number of sweeps at each resin level:	1	
Sweep speed (0 = default):	0	mm/s

At the bottom of the dialog, there is a keyboard icon, a "RESET" button, a "SAVE" button, and a "CANCEL" button.

The **Preset Zones** button can be used to edit the collection of pre-set zone settings. The pre-set zones can be loaded into the current build job as Custom Zones.

Figure 27: Edit preset zones



The screenshot shows a dialog box titled "Edit Preset Zones". It contains a list of preset zones, with one zone highlighted in teal:

Preset Zone	Actions
Three sweeps	[Delete] [Edit]

At the bottom of the dialog, there is a keyboard icon, an "ADD" button, a "CLEAR" button, a "SAVE" button, and a "CANCEL" button.

The pre-set zones have the same edit fields as for the standard zones with the addition of a name field (for more details, see “Build Zone Settings” (page 152):

Figure 28: Build zone settings

Build Zone Settings

Zone name:

Range (use non-zero height to override the default height values)

Start height: mm End height: mm

Recoat

Pre-dip delay: secs Dip distance: mm

Mid-dip delay: secs Sweep count:


Post-dip delay: secs Sweep offset: mm

Z Wait delay: secs Sweep velocity: mm/s

Min layer time: secs

Scan Options

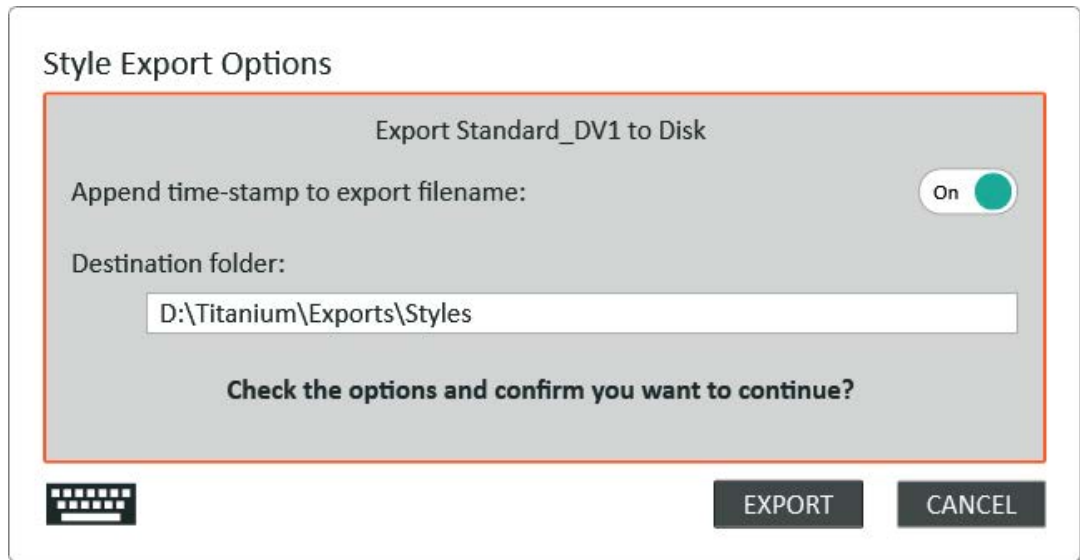
Optimise fill mode: ▼



For the administrator user there are two additional buttons available: the **Import Styles** and **Export Styles** buttons.

The **Export Styles** button can be used to create a saved copy of the current build style settings for all layer thicknesses. These can be saved locally, to a USB memory stick, or sent via email.

Figure 29: Style Export Options

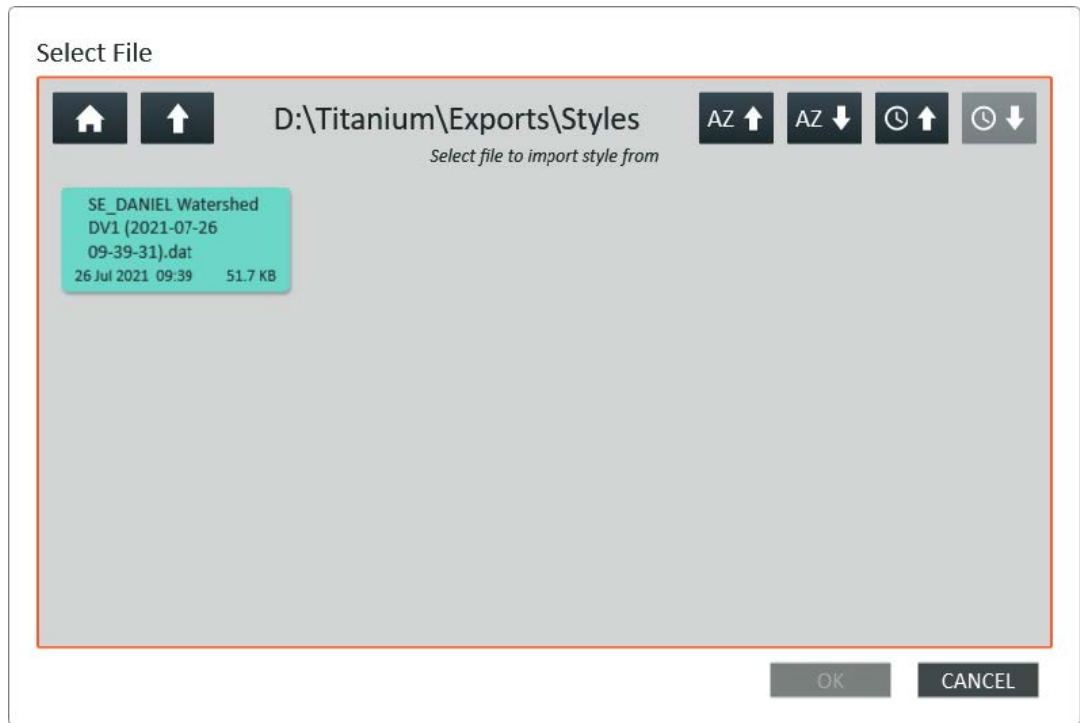


The dialog box is titled "Style Export Options". It contains a section with a grey background and a red border. Inside this section, the text "Export Standard_DV1 to Disk" is centered. Below it, the label "Append time-stamp to export filename:" is followed by a toggle switch set to "On". The label "Destination folder:" is followed by a text input field containing "D:\Titanium\Exports\Styles". Below the input field, the text "Check the options and confirm you want to continue?" is centered. At the bottom of the dialog, there is a keyboard icon on the left and two buttons, "EXPORT" and "CANCEL", on the right.

The **Import Styles** button can be used to import the settings previously saved with the export styles button. This allows the import of all layer thicknesses or the selection of individual layer thickness.

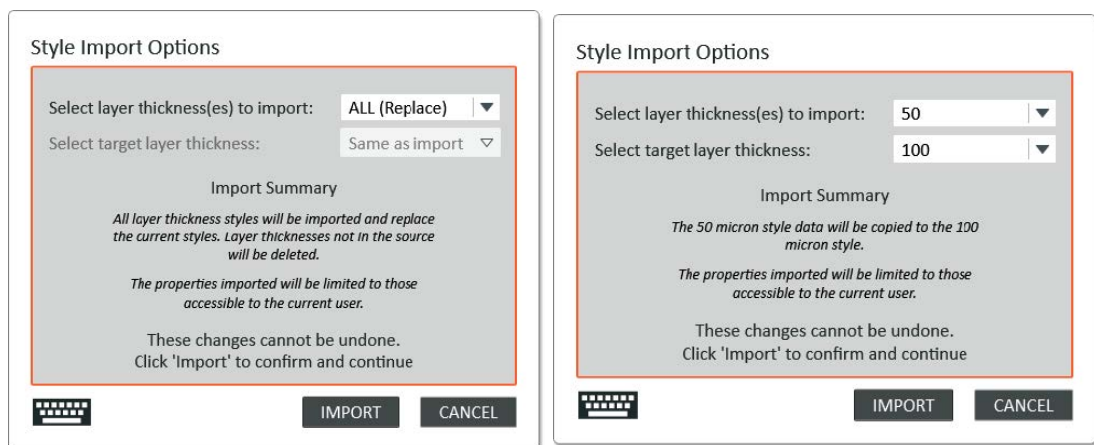
The import action takes place in two stages. First, select the file to be imported:

Figure 30: Select File



Next, select the layer thicknesses:

Figure 31: Style Import Options



Build Style Management

The following buttons provide additional functionality for managing the build style settings:



The current style settings can be exported to an Excel spreadsheet using this button.



The add button can be used to add a set of style parameters for a new layer thickness.



The delete button can be used to delete the style parameter set for the selected layer thickness. This applies only to sets added by a user.

For custom resins, there are two additional buttons available to allow the administrator user to save the current settings as a reference set that will be available for the reset action and for the style status reporting.



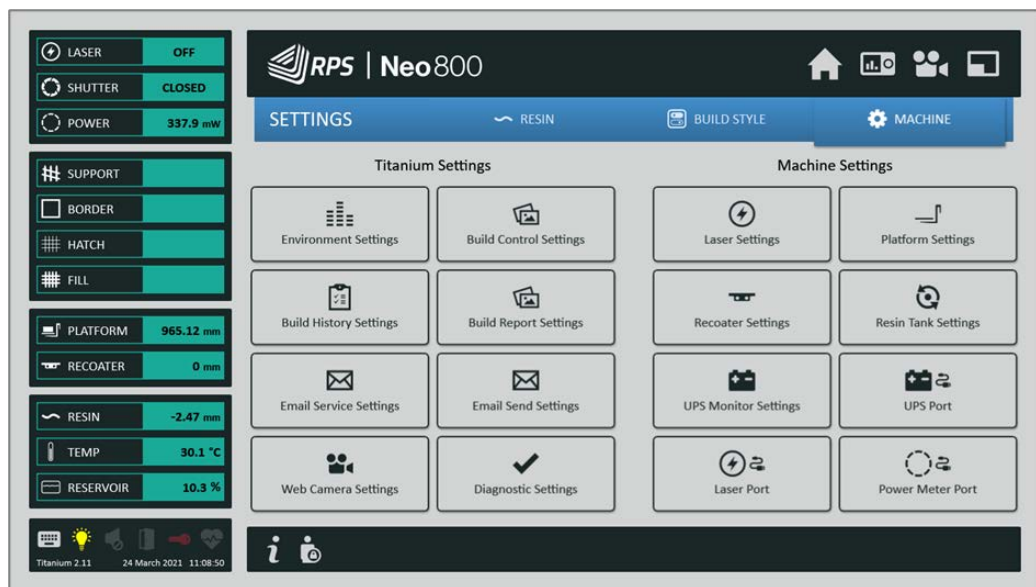
Save the current style settings as the reference settings for the current layer thickness.



Clear the saved reference settings.

Machine Setup Page

Figure 32: Machine setup page



The machine settings control the general configuration of the machine. Some of the edit fields are only available to a service engineer and are not shown in this manual.

Setup Service Bar

The setup page service bar contains buttons to further access information or settings. The contents of the service vary with the current user.

Standard User



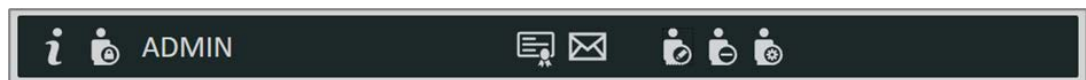
Show the 'About' information dialog.



Switch the active user level.

Admin User

Figure 33: The service control bar - admin user



An admin user has access to the standard user buttons, plus the following:



Change the Admin user password.



Delete the Admin user password.



Edit the security options.



Apply Titanium feature license.



Send a test email message.

Environmental Settings

Figure 34: Environment settings

Environment Settings


RPS machine name:	<input type="text" value="Daniel"/>
Custom machine name:	<input type="text"/>
Machine serial number:	<input type="text" value="MVAABMREAA"/>
Organisation:	<input type="text"/>
Location (City/Country):	<input type="text"/>

Chamber Light Settings

Light on times (hh:mm 24hr):	<input type="text"/>
Light off times (hh:mm 24hr):	<input type="text"/>

Display Settings

Show build dates as relative:	<input type="checkbox" value="off"/>	Show build duration in hours:	<input type="checkbox" value="off"/>
Show original build end time:	<input type="checkbox" value="off"/>		




- The environment settings can be used to set the name and location of the printer. Some of these settings are only available to a service engineer.
- The **Custom Machine Name** setting allows the printer to be allocated a name by the customer. This name will be used to identify the printer in emails and export files. If left empty, then the Stratasys printer name will be used.
- The chamber light settings allow one or more times to be specified when the chamber light will be switched on or off. These actions are applied when the specified time is reached – subsequent user actions will take priority. Multiple time entries can be submitted by separating them with commas.

Display Settings

Figure 35: Display Settings

Display Settings

Show build dates as relative:	On <input checked="" type="checkbox"/>	Show original build end time:	On <input checked="" type="checkbox"/>
Show build duration in hours:	<input checked="" type="checkbox"/> Off	Show build style status:	On <input checked="" type="checkbox"/>
Auto-restore Titanium window:	On <input checked="" type="checkbox"/>	User-absent threshold (mins):	<input type="text" value="30"/>



- The **Show build dates** as relative option, when enabled, uses 'today, yesterday and tomorrow' in place of the actual date when displaying the build start and end times.
- The **Show build duration in hours** option, when enabled, uses 'hours' as the highest unit of time when displaying the build duration.
- The **Show original build end time** options, when enabled, displays an additional field on the build monitor page that reports the originally estimated build end time in addition to the dynamic estimated end time field.
- The **Show build style status** option controls the highlighting of non-default style settings on the style configuration page.
- The **Auto-restore Titanium** window option causes the Titanium window to be automatically selected as the active window if no user activity has been detected for a threshold period.

Build Control Settings

Figure 36: Build control settings

Build Control Settings

Build Loading Options

Build files folder:

Use strict job validation (integrity failure = error): ☒ On

Build Start Options


Auto-accept resin level when in range: ▼

Make the start delay option available at build start: ☒ Off

Build Fault Detection Options (Stop Build)

Detect unexpected resin level change between layers: ☒ Off

Resin level change fault threshold (mm): mm



The build management settings can be used to adjust the build process preferences:

- Build files folder: set the folder that is used by the **Select Build Page**.
- Use strict job validation: this switch can be used to relax the job validation checks to stop some validation errors preventing a build starting.
- Build start options: the delayed start option can be enabled, and an auto-accept mode set for the delayed start mechanism.

The build fault detection options provide some additional fault detection. If triggered, these cause the build to be stopped. These are disabled by default.

- Detect unexpected resin level change between layers: this could be triggered by a bubble passing under the resin level sensor and causing a problem with the resin level.

Build Report Settings

Figure 37: Build report settings

Build Report Settings

Build Progress Output

Enable the output of the build progress to a text file: ☐ Off

Progress file output format: Simple XML ▾

D:\Titanium\BuildProgress.txt

Estimate Variance Detection Output

Ahead of schedule detection threshold: 5.0 %

Behind schedule detection threshold: 5.0 %

Stuck layer detection threshold (% of scan time): 75.0 %

Stuck layer minimum detection period: 2 mins

Build Buzzer Options

Adjust resin buzzer: ☐ Off

Build complete buzzer: ☐ Off

Build failed buzzer: ☐ Off

SAVE CANCEL

The build report settings dialog can be used to control options relating to the reporting of the build progress.

- Build progress output: this switch can be used to enable output of the build progress to a text file that can be used by Titanium Assistant™ and a customer application to monitor the build progress.

The estimate variance detection properties can be used to control how the actual build time is reported and alerts raised if taking longer than expected.

- Ahead detection threshold: the percentage of overall build time to use to report whether the build is ahead of schedule.

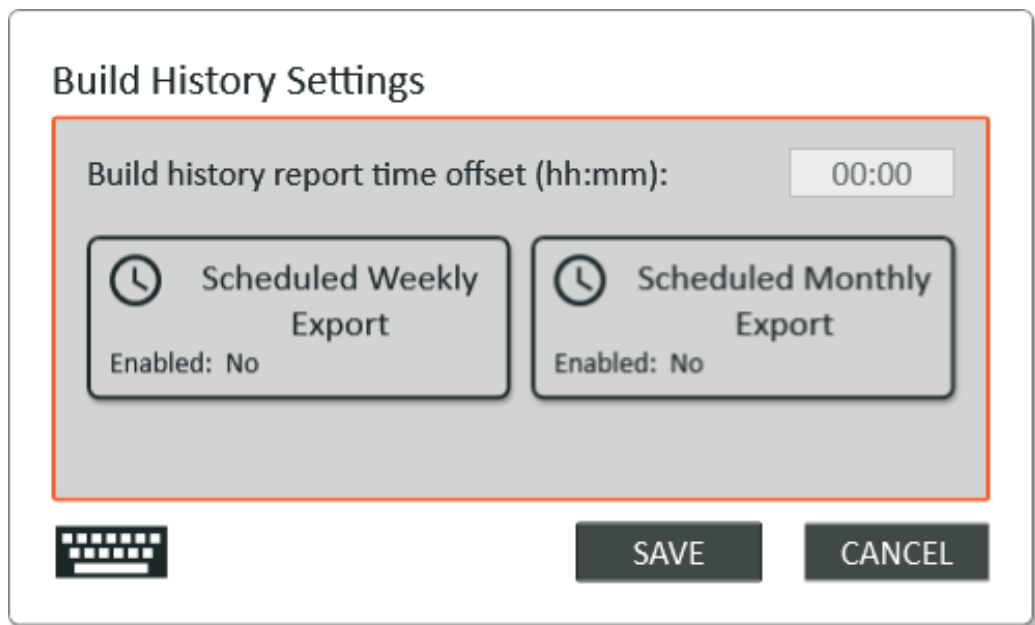
- Behind detection threshold: the percentage of overall build time to use to report whether the build is behind schedule.
- Detection threshold: this is the percentage of the estimated scan time to allow being overdue before issuing a warning.
- Minimum detection period: this is the minimum overdue period to allow.

The buzzer options allow additional buzzer notifications to be used for events during a build:

- Adjust resin buzzer: the buzzer will be sounded when the resin level needs adjusting.
- Build complete buzzer: the buzzer will be sounded when the build is complete.
- Build failed buzzer: the buzzer will be sounded if the build job fails.


Build History Settings


Figure 38: Build history settings




Build History Settings

Build history report time offset (hh:mm): 00:00

 Scheduled Weekly Export
Enabled: No

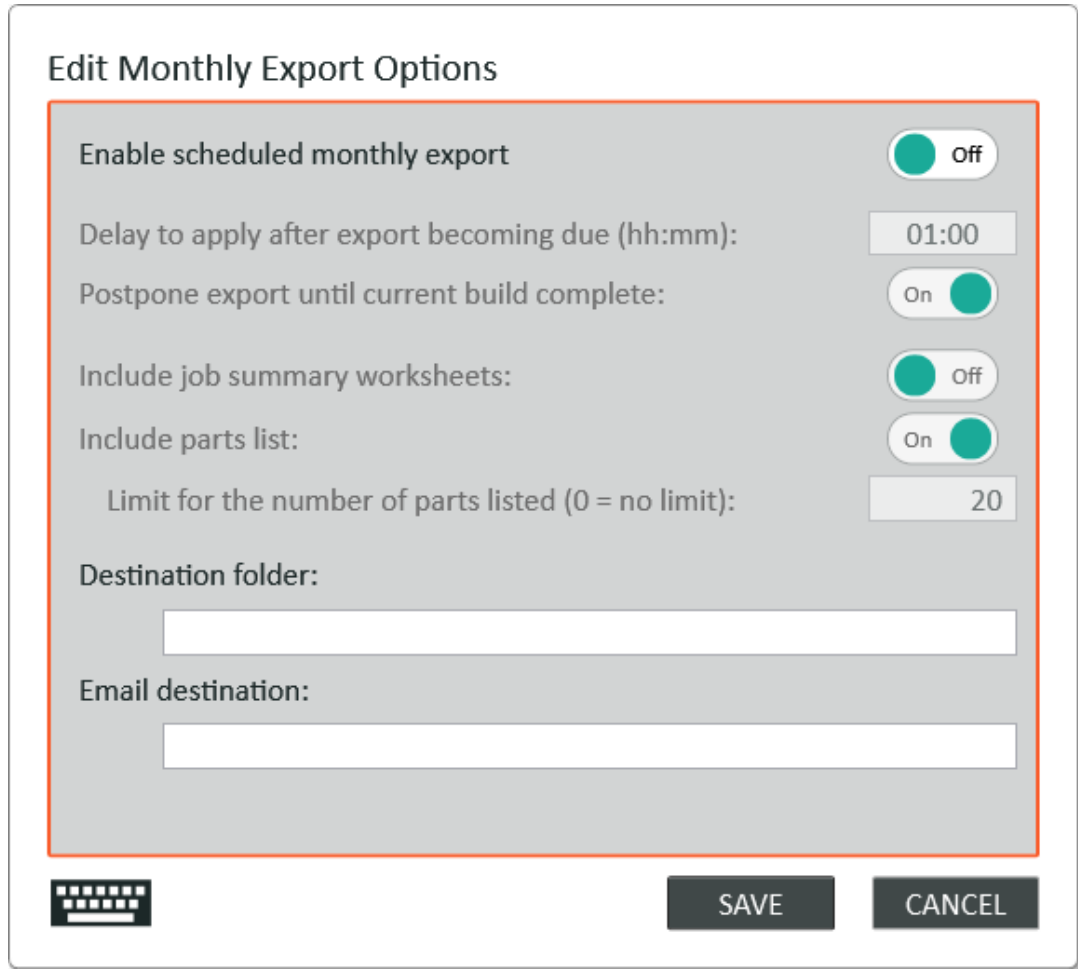
 Scheduled Monthly Export
Enabled: No

 **SAVE** **CANCEL**

The build history time offset provides a setting for the history reporting time period. By default, the history reports the job statistics for whole days starting at midnight. The build history report time offset allows the daily report start time to be set to a more convenient time of day.

Scheduled Exports

Figure 39: Scheduled exports



Edit Monthly Export Options

Enable scheduled monthly export ☐ Off

Delay to apply after export becoming due (hh:mm): 01:00

Postpone export until current build complete: ☒ On


Include job summary worksheets: ☐ Off

Include parts list: ☒ On

Limit for the number of parts listed (0 = no limit): 20

Destination folder:

Email destination:

 **SAVE** **CANCEL**

The scheduled exports can be enabled to generate regular exports of the recent build history collated weekly or monthly. The exported data is written to an Excel spreadsheet on, or soon after, the completion of the report period.

The export content options are similar to those available in the build history pages.

The scheduled export specific options are:

- The Delay to apply after export option delays the generation of the report by a period up to 24 hours. For example: a normal weekly report would be due at midnight at the start of a Monday. This delay could be used to have the report generated at 8:00 am on the Monday.
- The Postpone export until current build complete option can be enabled to ensure that a build started within the previous period gets properly included within the report.
- (Optional) The Destination folder field specifies the folder where the export will be stored.

- (Optional) The Email address field provides the option for the export data file to be sent to one or more email addresses (use semi-colon to separate addresses).

Email Service Settings

Figure 40: Email service settings

Email Service Settings

Enable email service: ☒ Yes

Email SMTP server:

Email port:

Email account name:

Email 'From' Address (when server allows)
titanium.notification@rps.ltd <DANIEL>

Select 'from' display name: NEO ☒ Windows ☐

Service Check Settings

Ping check interval: (0 = ping disabled) secs

Ping timeout period: secs

Retry and Discard Settings

Retry interval: secs

Discard unsent after: hours

Discard unsent after: attempts

The email service settings can be used to change the email service that is used, and to control the message retry settings.

The email 'from' address settings can be used (for some email services) to set the email from address that is contained in the email. Some email servers force the 'from' email address – preventing these settings being effective.

Email Send Settings

Figure 41: Email send settings

Send Email Options

System messages: ☒ On Active alert reminder times: 8:00

To: neosupport@rps.ltd

Build control (start, stop, etc.): ☒ On

To: neosupport@rps.ltd

Build alerts: ☒ On Stuck: ☒ On Off schedule: ☒ On

To: neosupport@rps.ltd

Build progress: ☐ Off

To:

On layers: 1n,s50%,p1n,p20%*,p95%

Support messages: ☒ On

To: neosupport@rps.ltd

Viscosity messages: ☒ On

To: viscosity@rps.ltd

SAVE CANCEL

Use these settings to configure the Neo450 or Neo800 to send emails when certain events occur, such as:

- System messages: system alerts and faults.
- Build control: major build event messages – start, stop, pause, resume, etc.
- Build alerts: warnings generated during the build. For example: overdue layer.
- Build progress: build progress message (see section below for more detail).
- Support messages: email messages that will be sent to Stratasys – for example snapshot emails. This will be configured to a Stratasys email address.
- Viscosity messages: email messages relating to the resin viscosity reporting mechanism. This will be configured to a Stratasys email address.

You can enter several email addresses, separated by semi-colons.

It is intended that the support and viscosity email addresses are set to an Stratasys address. Whereas the system email messages are intended for a customer administrator. The system messages include system error emails and build warning emails.

Build Progress Emails

You can define how Neo450 or Neo800 send build progress emails.

Each definition is made up of a number and some optional characters, for example:

- 50
- s50%
- p1n
- p30%

Separate each individual definition with a comma, for example:

- 1n,s50%,p1n,p30%

Character definitions:

- A number on its own specifies a build height (in millimetres).
- n changes the number to relate to a specific layer number.
- % changes the number to relate to a percentage progress of the build.
- s changes the number to relate only to the support zone.
- p changes the number to relate only to the part zone.
- * indicates a repeating definition.

The position of the special characters is not relevant – but, as a convention:

- s or p should go before the number.
- n or % should go after the number.
- * should be last.

See some examples:

- 50 – sends an email at build height 50mm
- 50n – sends an email at layer 50
- 50% – sends an email at 50% of total build
- 1n – sends an email at layer 1
- s1n – sends an email at first layer of the support zone
- p1n – sends an email at first layer of the part zone
- 50* – sends an email every 50mm
- 50n* – sends an email every 50 layers
- 30%* – sends an email every 30% of build (i.e. 30%, 60%, 90%)
- p30%* – sends an email every 30% of the part zone (i.e. p30%, p60%, p90%)

Diagnostic Settings

Figure 42: Diagnostic settings

Diagnostic Settings

⤴ Alert Threshold Options

Resin temperature alert threshold (0 = off) (+/- variance): 2.0 °C

Heater temperature alert threshold (0 = off) (+/- variance): 2.0 °C

⤴ Log Tidy Options

Diagnostic log file retention period: 31 days

Diagnostic CSV file retention period: 31 days

⤴ Snapshot Options

Include basic Build History data in snapshot: On

Restrict standard snapshot content (0 = all): 0 days

Restrict email snapshot content (0 = standard): 7 days

⤵ Log File Options

SAVE CANCEL

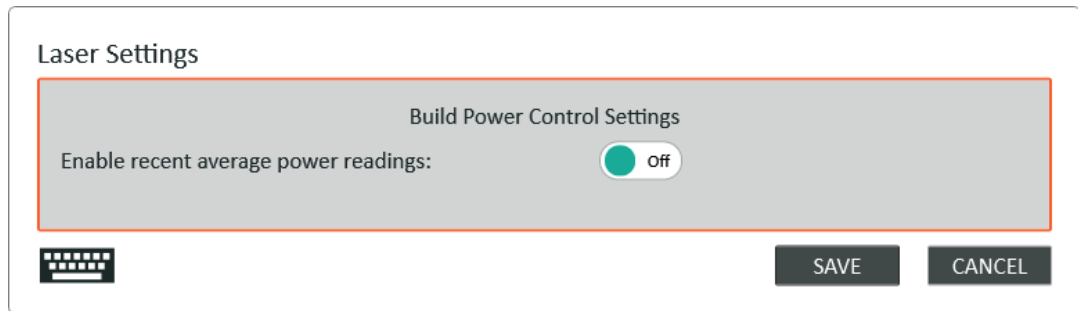
The Neo450 and Neo800 record all software activity and saves the data to a set of text and CSV files. The daily text log files record system actions as they occur. While the daily CSV files record numeric statistics collated into short periods during the day: For example, processor usage, memory used, resin temperature.

The daily log files are retained for the configured number of days.

The log file options should be left in the 'off' state unless directed to enable them by a support technician.

Laser Settings

Figure 43: Laser settings screen



Laser Settings

Build Power Control Settings

Enable recent average power readings: ☐ Off

SAVE CANCEL

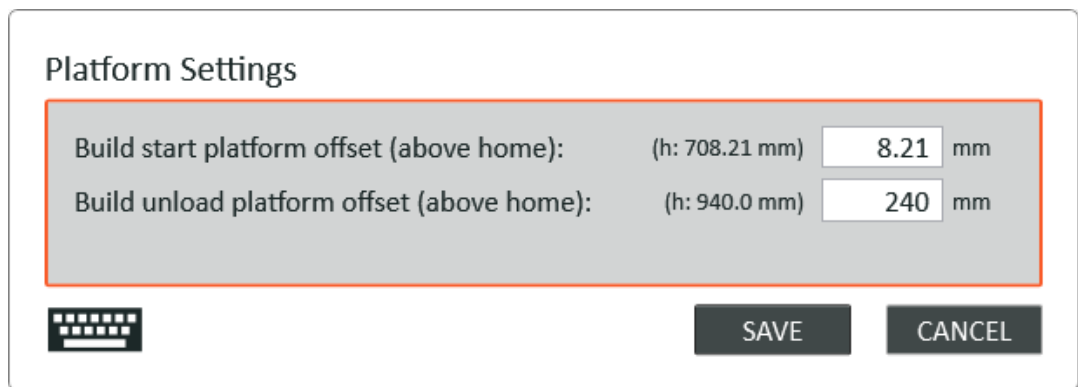


Caution

Changing any of these settings is not recommended unless directed by a support technician.

Platform Settings

Figure 44: Platform settings screen



Platform Settings

Build start platform offset (above home): (h: 708.21 mm) 8.21 mm

Build unload platform offset (above home): (h: 940.0 mm) 240 mm

SAVE CANCEL

The **Build start platform offset (above home)** must be set accurately to a specific level for the current printer. This is the position of the platform at the start of a build.

The **Build unload platform offset (above home)** is the height to which the platform will be raised at the end of a build as part of the auto-drain process.

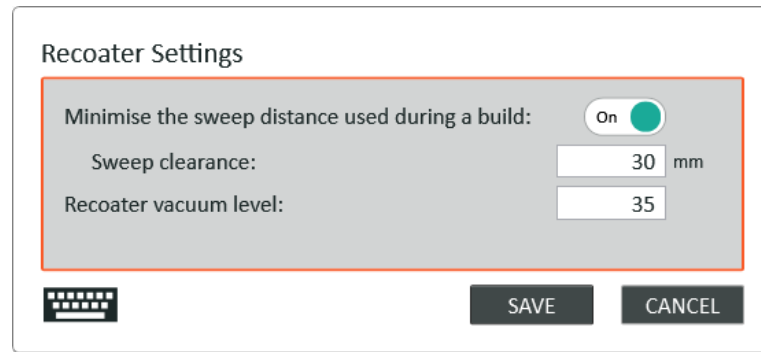


Caution

Changing any of these settings is not recommended unless directed by a support technician.

Recoater Settings

Figure 45: Recoater settings screen



The Recoater Settings dialog box contains the following elements:

- Recoater Settings** (Title)
- Minimise the sweep distance used during a build:** A toggle switch set to **On** (indicated by a green circle).
- Sweep clearance:** A text input field containing the value **30** followed by the unit **mm**.
- Recoater vacuum level:** A text input field containing the value **35**.
- A keyboard icon at the bottom left.
- SAVE** and **CANCEL** buttons at the bottom right.

The **Minimise the sweep distance used during a build** feature is used to restrict the recoater movement to the minimum necessary – thus reducing the build time. When disabled a full sweep of the platform will be used during builds. By default, this is enabled.

The **Sweep clearance** determines the space either side of the build job that the recoater blade will move to ensure that the build layer has been cleared.

The **Recoater vacuum level** setting is used to adjust the resin level within the recoater blade.

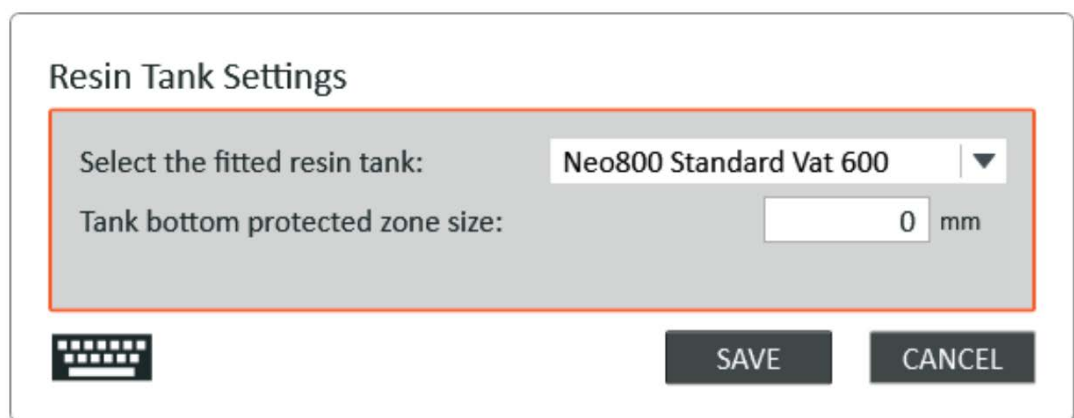


Caution

Changing any of these settings is not recommended unless directed by a support technician.

Resin Tank Settings

Figure 46: Resin tank settings page



The Resin Tank Settings dialog box contains the following elements:

- Resin Tank Settings** (Title)
- Select the fitted resin tank:** A dropdown menu showing **Neo800 Standard Vat 600** with a downward arrow.
- Tank bottom protected zone size:** A text input field containing the value **0** followed by the unit **mm**.
- A keyboard icon at the bottom left.
- SAVE** and **CANCEL** buttons at the bottom right.

The resin tank settings provide the means to select the type of resin tank that is fitted to the system. The tank bottom protection zone is provided to prevent the platform from entering the lower part of the vat. This may be useful if there is a build-up of settled resin that needs to be avoided. This will reduce the maximum build height that is available.



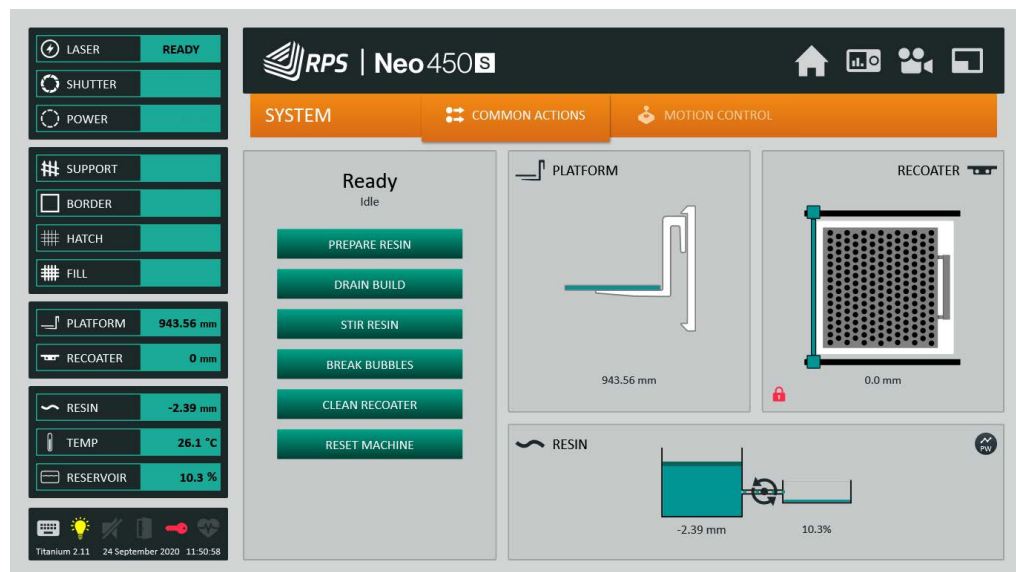
Caution

Changing any of these settings is not recommended unless directed by a support technician.

The System Pages

Common Actions Page

Figure 47: Common actions page



This page allows you to easily perform common tasks:

- Prepare Resin empties the reservoir, moves the platform to the start position and levels the resin, prompting you to add or remove resin if necessary.
- Drain Build moves the platform to the unload position.
- Stir Resin shows a dialogue box which prompts for the stir velocity, stir duration, top position and stir depth. Selecting Start will run the stir process.
- Break Bubbles shows a dialogue box which prompts for the bubble break settings. Selecting Start will run the bubble break process.
- Clean Recoater lowers the resin level as much as possible and moves the recoater blade to a set position for cleaning.

- Reset Machine moves the recoater to the home position, moves the platform to the home position and empties the reservoir.


Motion Control Page

Figure 48: Motion control page





This page allows you to manually move the platform, recoater and resin.

Platform Movement

The  symbol indicates that the platform is unable to move because the recoater is not in the home position.


Standard Options

- When you press the  button, the platform will raise until the button is released.
- When you press the  button, the platform will lower until the button is released.
- When you press the TOP button, the platform will go to the top position.
- When you press the START button, the platform will go to the build start position.
- When you press the HOME button, the platform will go to the home position.
- When you press the BOTTOM button, the platform will go to the bottom of the vat.
- When you press the STOP button, the current movement will be cancelled.
- When you press the SET START button, the current position will be set as the build start position



Advanced Options

- If you want to move the platform to an absolute position, enter the position in the Move Absolute text box and press GO.
- If you want to move the platform relative to its current position, enter the distance in the Move Relative text box and press GO.
- You can change the velocity of the platform by selecting a new velocity in the velocity drop down.

Recoater Movement

The  symbol indicates that the recoater is unable to move because the platform is too high.



Standard Options

- When you press the  button the recoater will move towards the back until the button is released.
- When you press the  button the recoater will move towards the front until the button is released.
- When you press the HOME button the recoater will move to the front.
- When you press the BACK button the recoater will move to the back.
- When you press the STOP button the current movement will be canceled.

Advanced Options

- If you want to move the platform to an absolute position, enter the position in the Move Absolute text box and press GO.
- If you want to move the platform relative to its current position, enter the distance in the Move Relative text box and press GO.
- You can change the velocity of the recoater by entering a new velocity in the text box.

Resin Movement**Standard Options**

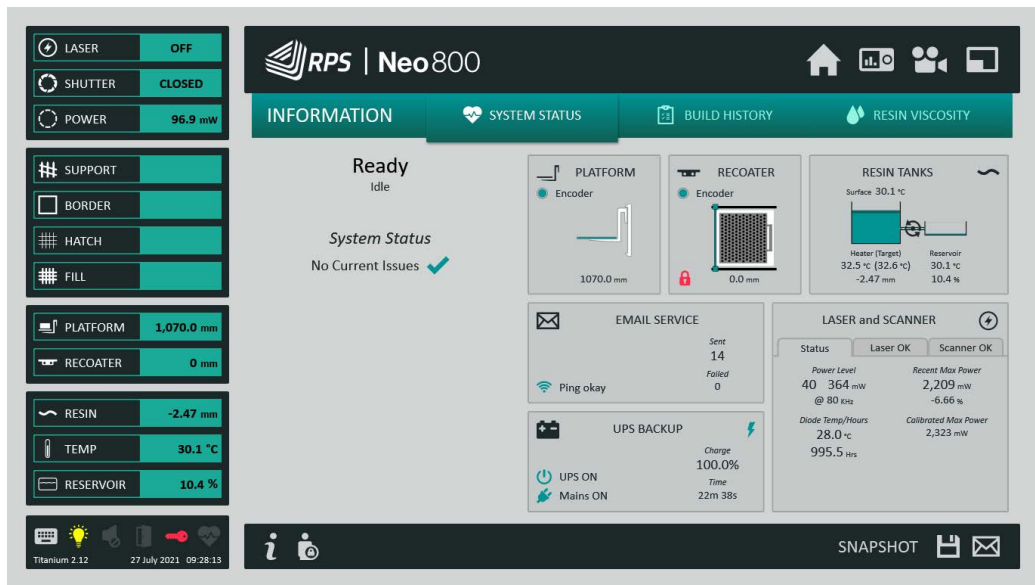
- When you press the  button the resin will move from the vat to the reservoir until the button is released.
- When you press the  button the resin will move from the reservoir to the vat until the button is released.
- When you press FILL the resin will be moved from the vat to the reservoir until the reservoir is full.
- When you press PRIME the resin will empty or fill the reservoir to 10% capacity. This action is also performed automatically when you start a build.

- When you press LEVEL RESIN the resin will move either in or out of the reservoir to achieve the correct building level. This will not be achieved if there is not enough resin in the system.

The Information Pages

System Status Page

Figure 49: System status page



This page displays the current status of the system.

The left side of the page shows the current activity of the system, and reports any issues detected.

The right side of the page shows a visual representation of the status of the platform, recoater blade, resin tanks, laser, email service, and UPS.

A snapshot is a single .Zip file that contains the current configuration settings and diagnostic log files – for use by a service engineer.

The service bar buttons provide the following:



Display the Titanium information dialog: reporting software and hardware version details.



Change the logged-on user.



Create a system snapshot and save to the local disk.



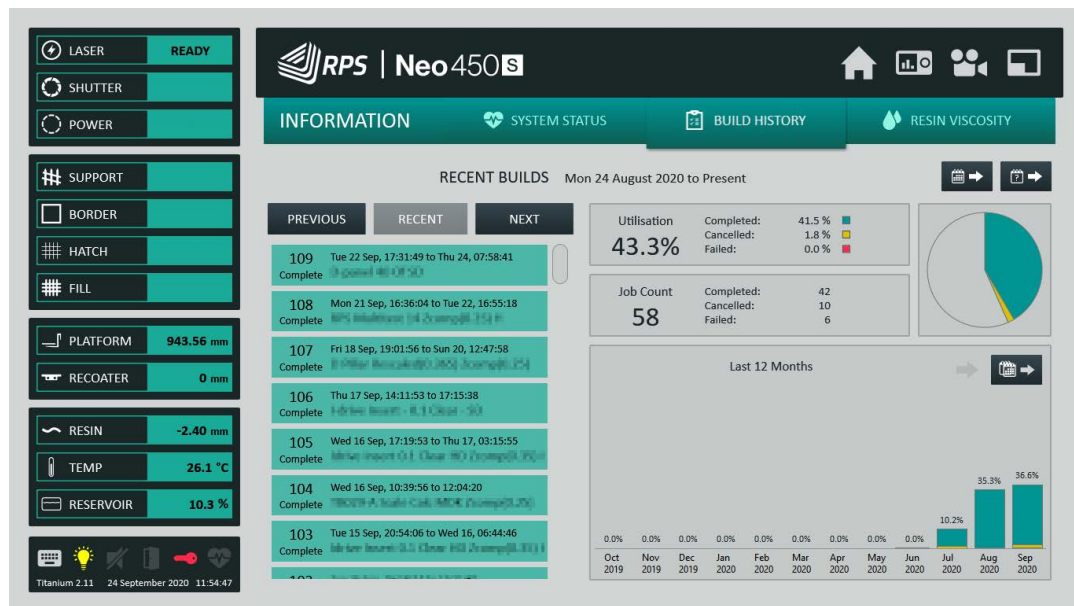
Create a system snapshot, save it to the local disk and send it via email.



Create a system snapshot and save to a USB drive (only visible if present).

Build History Page

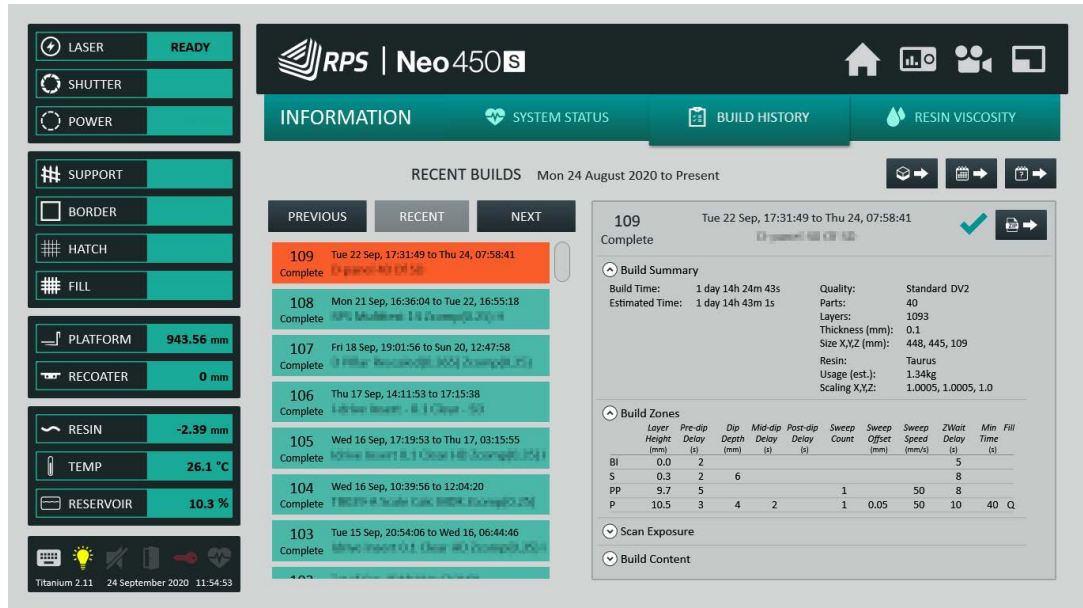
Figure 50: Build history page



The Build History page shows the builds that have been started on the Neo450 or Neo800. Each build is given a unique number. Monthly utilization is shown on the right. Previous months can be seen by pressing the previous button.

Selecting an individual build job shows the detailed build parameters.

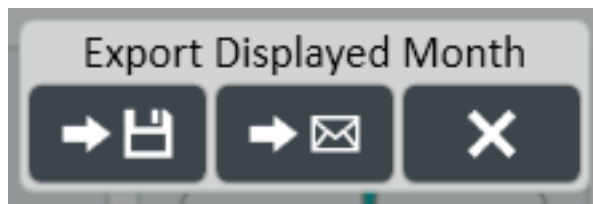
Figure 51: Build history details



Build History Export

The build history page includes the facility to export the data to Microsoft Excel spreadsheet files.

Export Destinations



The destination of the export is selected once the export type has been selected. The destination is either selected via a popup selection (for the direct exports) or via the export options dialog (for the custom period export).

The export destinations are the local disk drive, an email recipient or a locally installed USB drive (if present).

Export Types

The export options are:

Export a 12-month summary.



This contains a summary tab and a tab for each individual month within the reporting period. The exported period will be that displayed on the history page bar graph.

Export a month summary.



This contains a summary tab containing a list of the build jobs for the month including details of the job's start times and duration. An option allows for additional tabs to be included, one for each individual build job. The exported month is the month currently displayed on the build history page.

Figure 52: Export month options

Excel Export Options

Export the displayed Month to Disk
Recent Builds
Mon 24 Aug 2020 to Thu 24 Sep 2020

Include job detail tabs (58 jobs):

Off

Include parts list (max 94 parts):

On

Limit for the number of parts listed (0 = no limit):

0

Destination folder:

D:\Titanium\Exports\History

Check the options and confirm you want to continue?

EXPORT

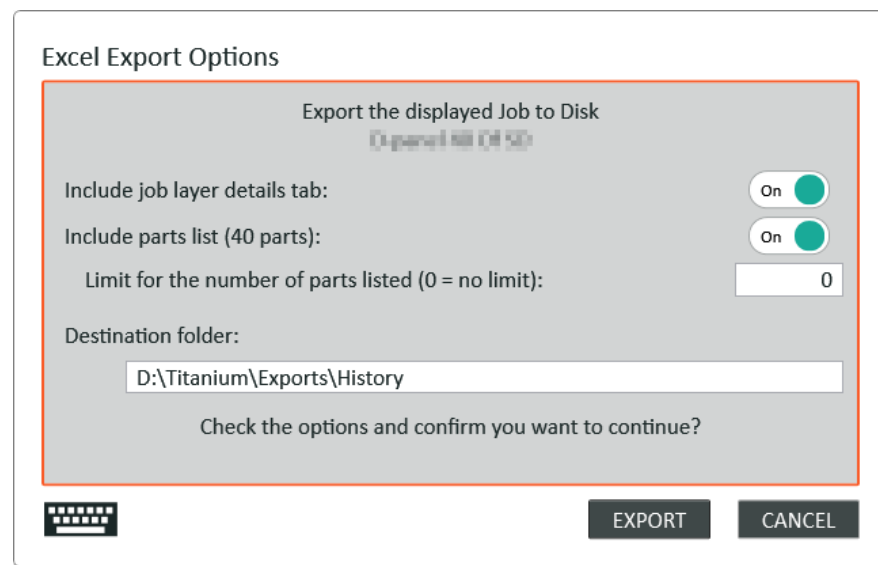
CANCEL

Export an individual build job.



This contains a summary tab for the build job containing details of the exposure and zone settings used. An option allows for an additional tab to be generated that contains recorded data for each individual layer within the build. The exported job is the one currently displayed on the build history page.

Figure 53: Export individual job options



The dialog box is titled "Excel Export Options". It contains the following elements:

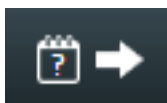
- A header section with the text "Export the displayed Job to Disk" and a sub-header "(Up to 1000 rows of 50)".
- A toggle switch for "Include job layer details tab:" set to "On".
- A toggle switch for "Include parts list (40 parts):" set to "On".
- A text input field for "Limit for the number of parts listed (0 = no limit):" with the value "0".
- A text input field for "Destination folder:" with the value "D:\Titanium\Exports\History".
- A confirmation prompt: "Check the options and confirm you want to continue?".
- At the bottom, there is a keyboard icon, an "EXPORT" button, and a "CANCEL" button.

Export a diagnostic pack for an individual build job.



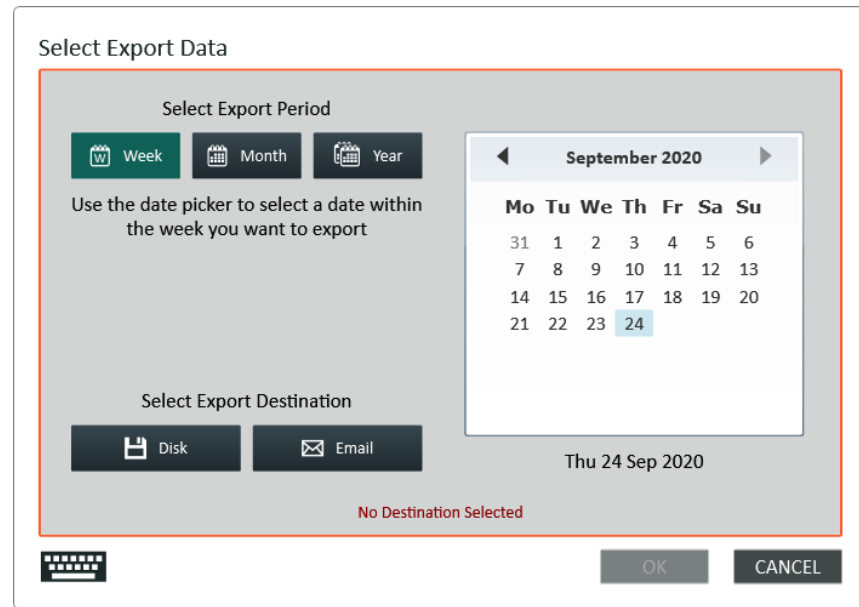
This export puts together a zip file containing the standard job export spreadsheet along with additional files that could be useful in diagnosing issues occurring during a build. The exported job is the one currently displayed on the build history page.

Custom period export.



This option allows the user to select the period to be exported: week, month, or year. The format of the report is as for the report options above.

Figure 54: Custom period export dialog



Titanium Assistant

Titanium Assistant is a companion application to Titanium. It is available to help assess and prepare build jobs on a computer other than a Neo450 or Neo800.

Titanium Assistant offers the following features:

- Preparation of the build style settings ahead of building.
- Independent build time estimates.
- Uploading of prepared build jobs to a local Neo450 or Neo800.

Titanium Assistant can be used in two ways:

- Stand-alone – a build job can be loaded, and style settings prepared using virtual Neo printer settings. The prepared job will need to be transferred manually to the Neo printer using a USB memory stick.
- Connected – a build job can be loaded, and style settings prepared using the printer settings of the target Neo printer retrieved via a local network connection. The prepared job can be transferred to the Neo printer via the network link, or manually using a USB memory stick.

To use the connected mode, Titanium Assistant requires that the Titanium data folder of the Neo printer be shared on the local network and is available to Titanium Assistant as a mapped drive.

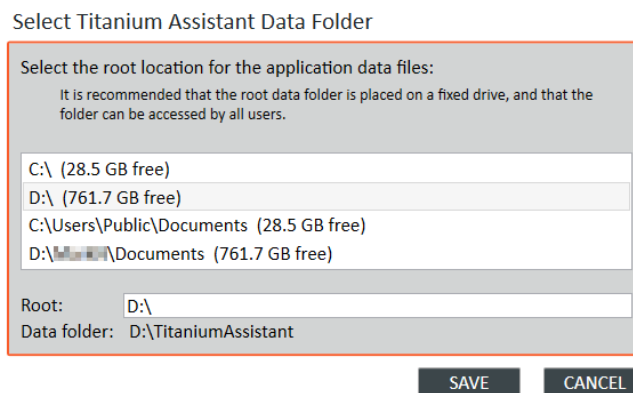
Installation

Titanium Assistant is an application developed for the Microsoft Windows® operating system. The software is provided as a standard Windows Installer package and can be installed like any other Windows application.

Data Folder

When Titanium Assistant is first started it has to be configured with a data folder. This should be a fixed local drive with plenty of free storage. The following dialog will be displayed with a recommended option already selected.

Figure 55: Data folder selection dialog

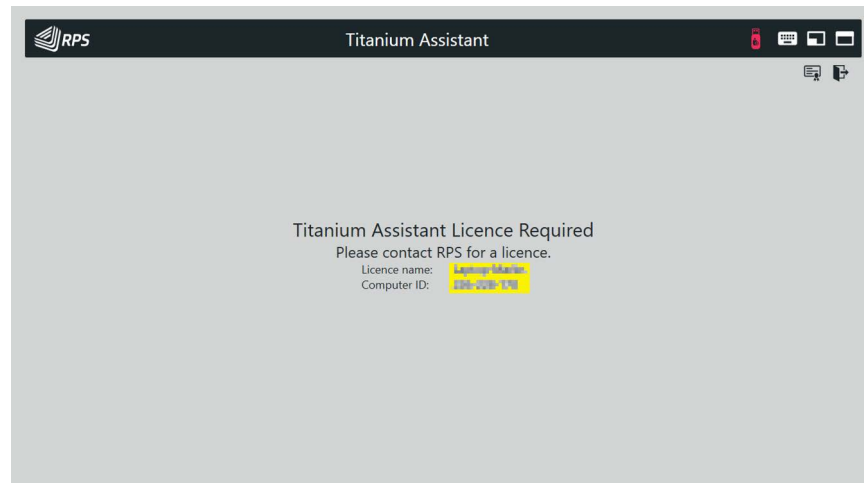


The drives displayed will depend on those available on the local computer. Select the root folder within which the data folder will be created.

License

Once installed, Titanium Assistant requires a license file to enable its operation. This will be provided by Stratasys once the application has been installed and run for the first time.

Figure 56: Titanium assistant license request page



The license name and computer ID (highlighted above) will need to be supplied to Stratasys in order for the appropriate license file to be created. When the license file is received it should be made available on the local printer.


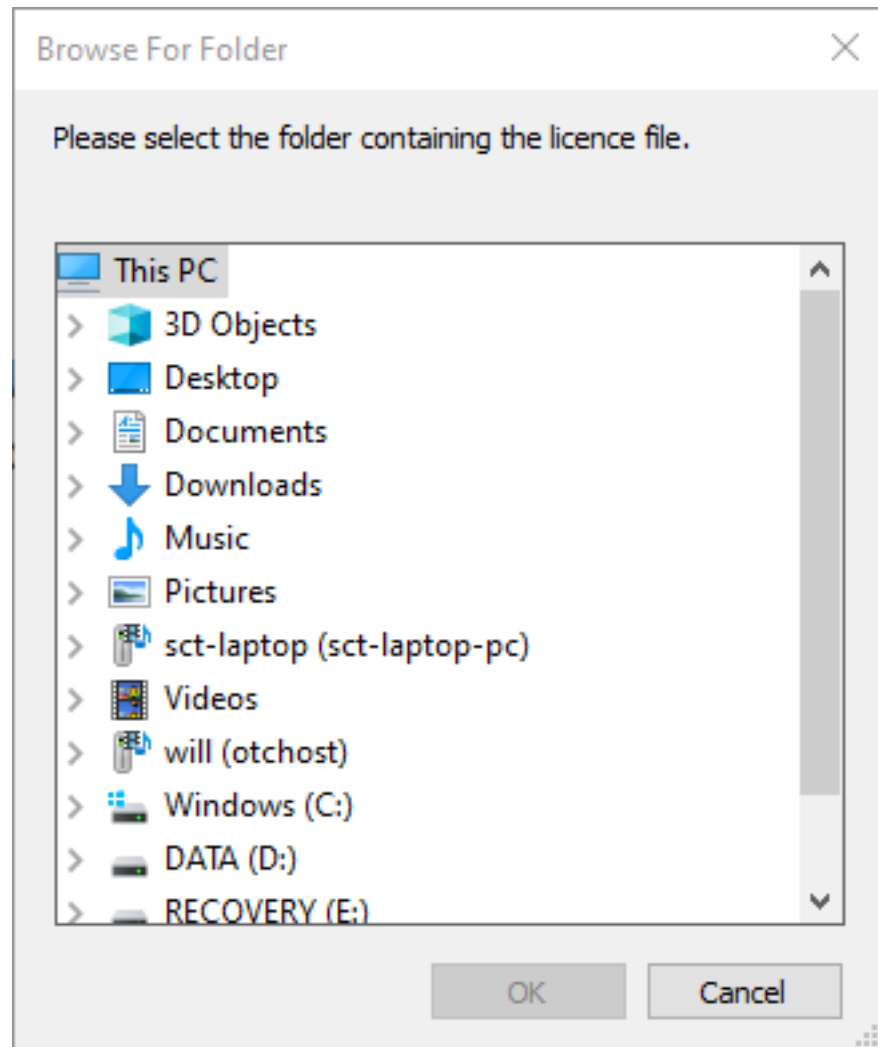
To import and activate the license click on the  button located towards the top-right if the Titanium Assistant main page. This will launch a Windows folder selection dialog that can be used to navigate to the location where the license file is available.

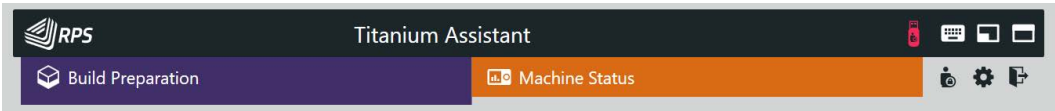
Figure 57: License folder selection dialog



Titanium Assistant will need to be restarted after the licence has been imported. After which, the standard page header will be displayed.

Main Application

Figure 58: Titanium assistant header



The header page allows the user to switch between the main operational states: build preparation and printer status. The other buttons provide access to specific actions:



Switch user mode between 'standard', 'admin' and 'engineer'.



Open the configuration page.



Exit Titanium Assistant.



Maximize Titanium Assistant.



Minimize Titanium Assistant.



Enable the internal popup keyboard.



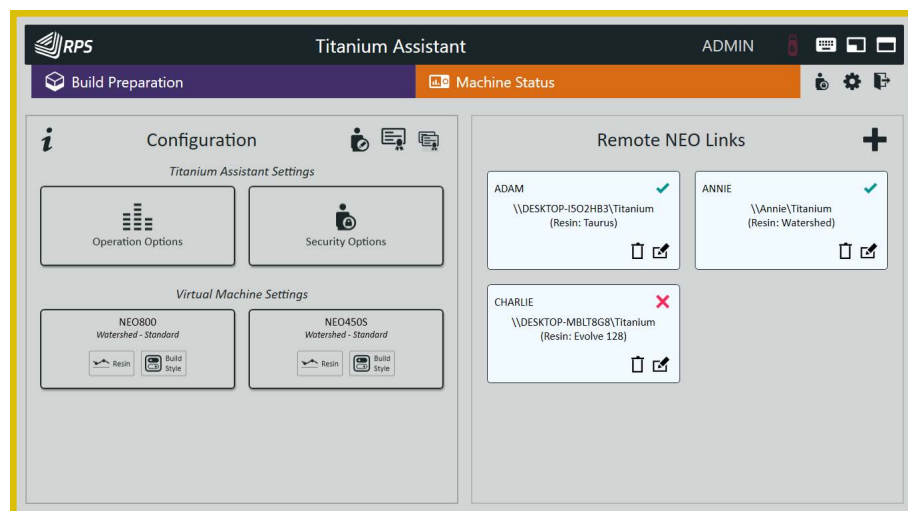
Eject USB memory stick.

Many of the operations within Titanium Assistant are the same as within Titanium, and it is assumed that the reader is already familiar.

Configuration

The configuration page allows the operation and settings of Titanium Assistant to be adjusted, and the links to the local Neo printers to be established.

Figure 59: Titanium assistant configuration page



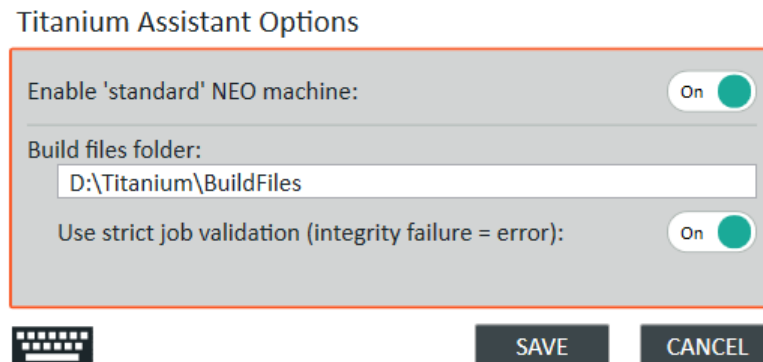
Some configuration settings are only available when logged on as an 'admin' user.

General Settings

These settings control the operation of Titanium Assistant.

Titanium Assistant Options

Figure 60: Titanium assistant options dialog




Titanium Assistant Options

Enable 'standard' NEO machine: On

Build files folder:
D:\Titanium\BuildFiles

Use strict job validation (integrity failure = error): On

 SAVE CANCEL

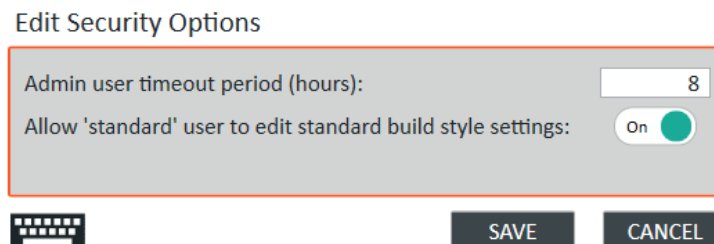
The **Enable 'standard' NEO machine** option can be used to control whether the virtual Neo printers are made available within Titanium Assistant. A virtual Neo printer is one that represents a non-specific Neo450 or Neo800. Turning this off may be useful when Titanium Assistant is used with remote Neo printer links and the virtual Neo printers are not required.

The **Build files folder** specifies the location where Titanium Assistant looks for build jobs to be loaded.

The **Use strict job validation** option determines whether some load issues are reported as errors or warnings.

Security Options


Figure 61: Security options dialog



Edit Security Options

Admin user timeout period (hours):

Allow 'standard' user to edit standard build style settings: On

 SAVE CANCEL

The automatic 'admin user timeout period' can be adjusted.

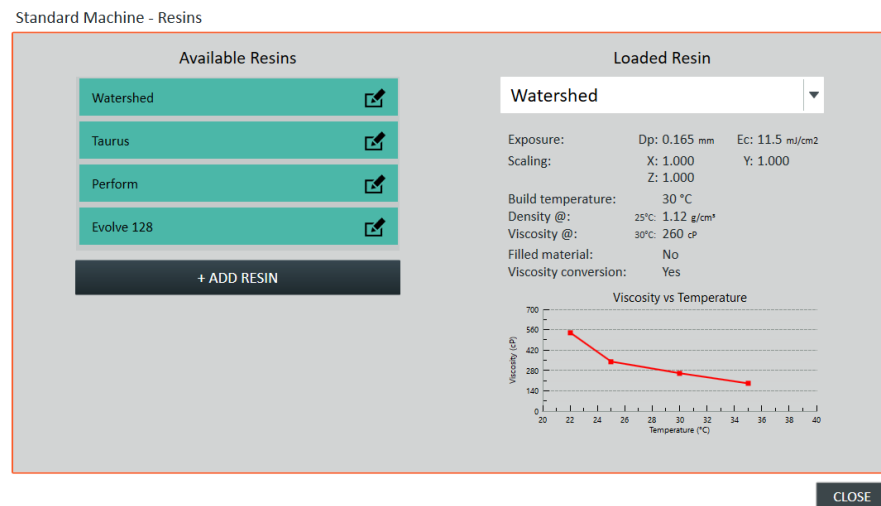
The 'allow standard user to edit standard build style settings' option can be disabled to restrict access to these settings to an admin user.

Virtual Neo Settings

These settings control the configuration of the resin and build style settings used when preparing a build job for a 'virtual' Neo printer.

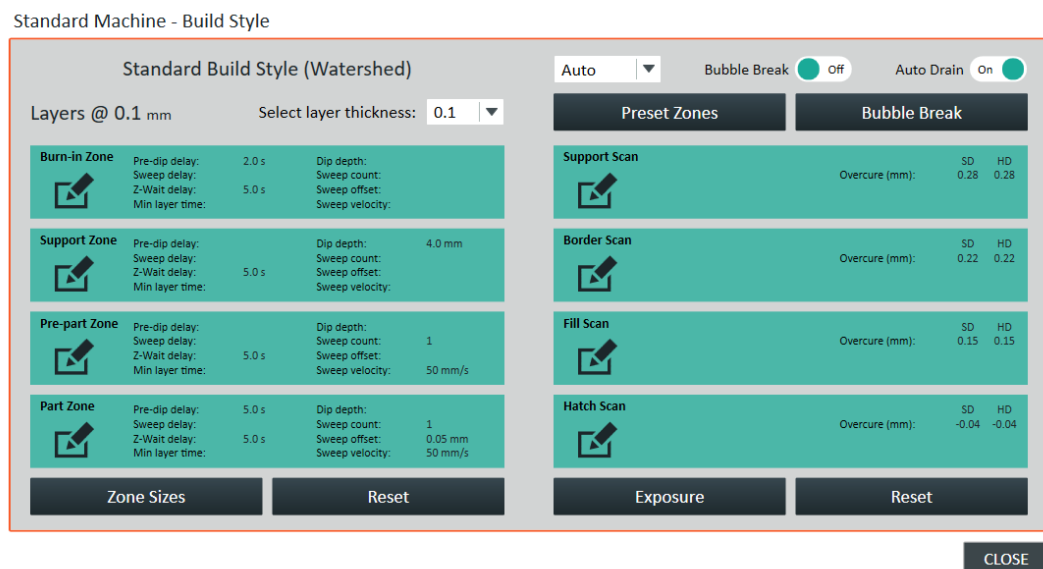
The resin management dialog should be used to select and define the resin used by the virtual Neo printer. The resin should be selected before editing the build style.

Figure 62: Resin management dialog



The build style edit dialog can be used to edit the style settings for the currently selected resin.

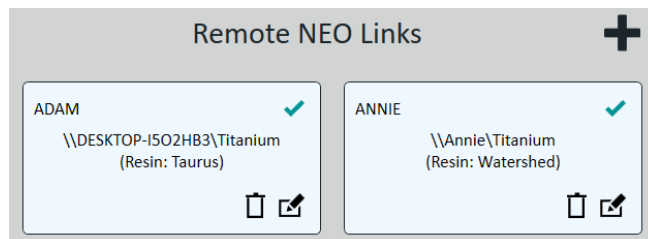
Figure 63: Build style edit dialog




These dialogs mirror the equivalent pages within Titanium.

Remote Neo Links

Figure 64: Remote Neo links



The  button can be used to add a link to a remote Neo printer. Each printer that has been added will be displayed as a panel on the configuration page.



The tick indicates that the link to the remote Neo printer has been verified.



The cross indicates that there is a problem with the remote link.



Edit the remote Neo printer link.



Delete the selected remote Neo printer link.

To define a remote Neo printer link, the following dialog is used:

Figure 65: Edit remote Neo printer link dialog

Edit NEO Machine Entry

Remote machine data folder:

Remote Access Properties (if required)

User name: **Change Password**

Domain name:

OK **CANCEL**

The remote printer data folder entry should be the URL necessary to access the shared Titanium folder of the Neo printer.

If the Titanium folder has been mapped as a drive letter, this may be just a drive letter reference: For example, 'T:\'.

The remote access properties for the username, domain, and password may not be required. This will depend on how the remote file share has been made available on the local network.

Basic Part Preparation using Materialise Magics

The workflow of the Neo stereolithography printers involves taking a CAD model and converting it into an .stl file. The .stl file is further processed into slice files that consist of the data for each layer that is to be printed. Once this process is completed, the file is sent to the printer and printed. During the printing process, different parameters are applied depending on which printer is used.

Prerequisites

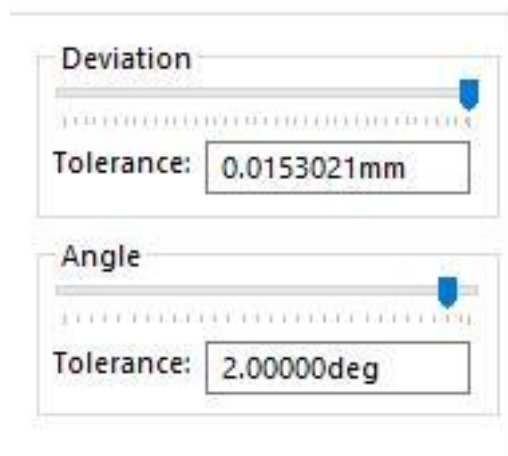
- CAD package
- Materialise Magics base software and modules:
 - Materialise Magics RP
 - Materialise Magics RP Slicing
 - Materialise Magics RP SG
 - Materialise Magics e-Stage (recommended, essential for new users)
- Titanium Assistant (optional, but recommended)

CAD file

The part is first designed using a CAD package. From the CAD software, the 3D models are exported to an .stl file, which is the format required for this process. Parameter settings are important, as a low or poor resolution part file will be very faceted and will create a poor surface finish.

An example setting for exporting in SolidWorks™ is maximum deviation, and an angle tolerance of 2 degrees.

Figure 66: Deviation and Angle settings



Magics Parameters Machine Parameters Set:

- X, Y, Z build envelope dimensions
- Beam compensation (Watershed typical example, Neo800: 0.09 SD, 0.07 HD)
- Z compensation (typically 0.3mm)
- Slice files set to .slc at desired layer thickness (typically 0.1 mm)

Importing to Magics

- Import high resolution .stl files from CAD.
- Check if the files need fixing using Fix Wizard.
- Place on platform (Automatic Placement or manually).

Positioning

- Avoid large flat surfaces if possible.
- Avoid placing part edges square to direction of blade. Rotate as needed.
- Minimum Y and Z will provide the fastest build times.
- General rule to typically build successful parts: rotate 20/20/25 (if symmetrical) in X/Y/Z.

Export

- Check parts start at correct Z height, which is typically 10 mm.
- If not using e-Stage, generate supports manually and edit as needed.
- When exporting platform, check export directory every time.
- If using e-Stage, check that the correct profile is used.
- Part and supports should be exported to .slc files.

Build file

- The part and support .slc files will be located in the designated export directory.
- To select them all, right click and **Send to | zip folder**.
- Rename this file. Next, copy and move the file to BuildFiles folder, which is located either in Titanium Assistant or on the printer.

Titanium Assistant

- When using Titanium Assistant, build parameters can be changed on the computer before sending to the printer. The build time is dynamically updated based on changes to the parameters.
- Recoater settings, such as z wait, dip distance, sweep speed, etc., can be changed.
- Additional zones can be added that have different parameters on different layers.
- Save the settings and transfer to the printer.

Titanium

- Once a build is in the printer's BuildFiles folder, either through Titanium Assistant or manually, it can be loaded.
- From the **Home** screen, click **Select Build** and choose the build.
- If prepared using Titanium Assistant, the build can be started immediately.
- The printer will initialize the platform, request more resin if required, and then start building.
- Build progress can be observed using Titanium Assistant or remote software.

Materialise Magics

Magics is the software used to further prepare the parts for printing by converting the models into slice files. These files contain the data and vectors for the laser to scan.

Printer Parameters

Most of the printer parameters are filled out when the printer is installed. There will be multiple profiles for the different modes (Standard Definition and High Definition) and also profiles for the different layer thicknesses required. Major parameters include the beam compensation, which accounts for the size of the beam. There is also Z compensation, which accounts for the overcure through the underside (typically 0.3 mm).

New Scene

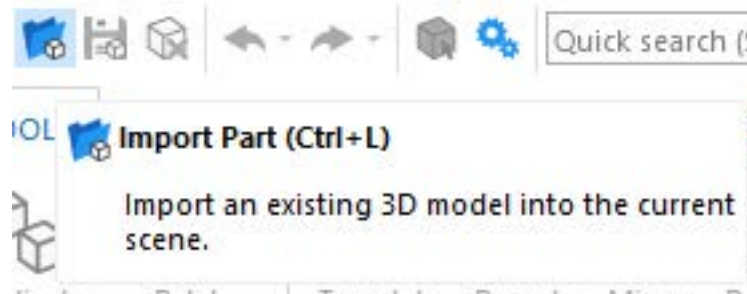
Figure 67: New Scene



To load a printer in Magics, use the **New Scene** button. The **New Scene** button loads the build area of the printer in which to place parts and the other relevant parameters.

Importing

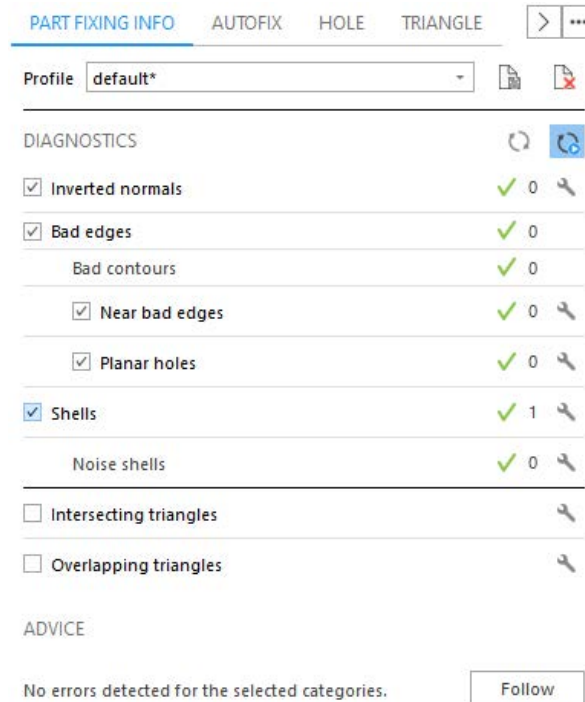
Figure 68: Importing



Once the model has been exported to a high resolution .stl, file, it can be imported into Materialise Magics. This places the part into a virtual build area which is a representation of where the printer can print.

Fix Wizard

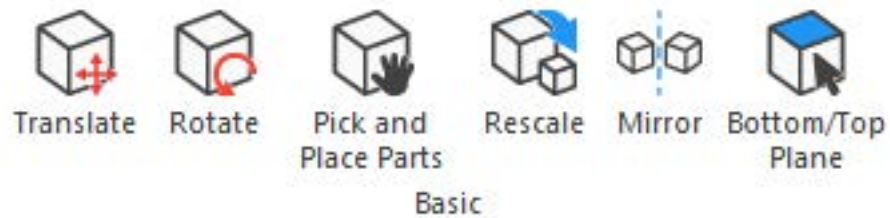
Figure 69: Fix Wizard



Depending on the quality of the .stl file, it may need to be fixed by Magics to ensure a good print. It is recommended to not use autofix on import.

Positioning

Figure 70: Positioning



Once the part has been loaded, it must be positioned within the build area. This can be done manually or by using translation tools.

Auto Placement

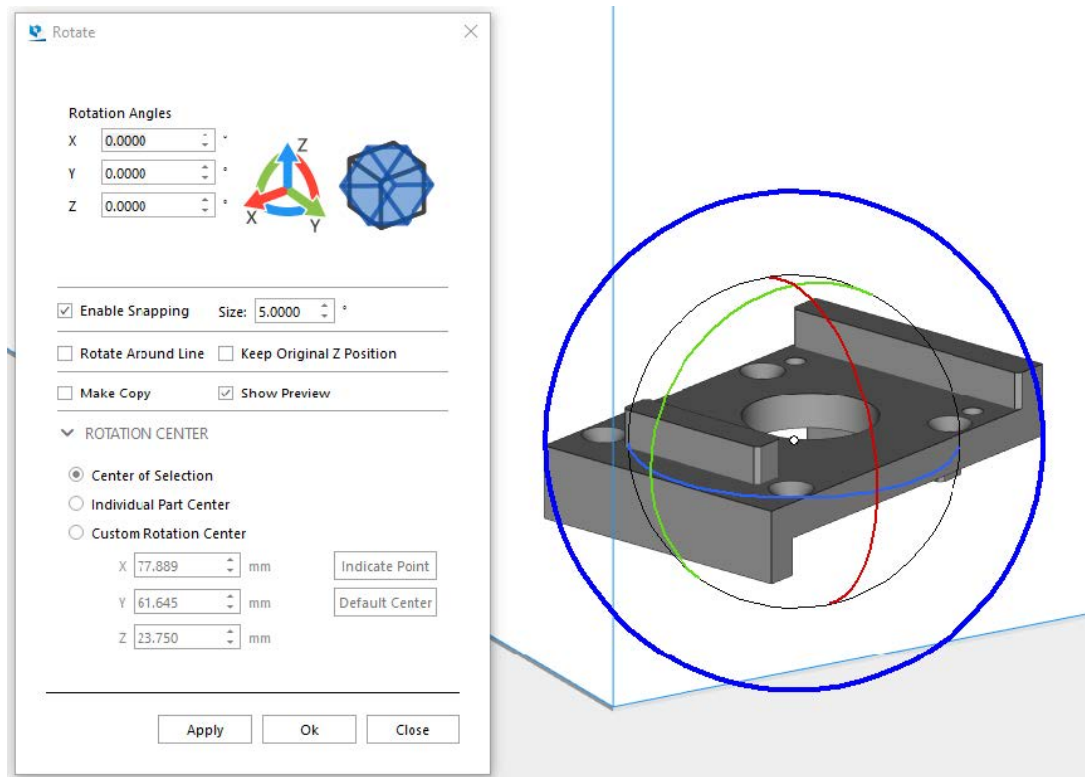
Figure 71: Auto Placement



This feature will automatically place parts which have been selected onto the build area. It will space them apart and position at the default Z height (10 mm).

Orientation

Figure 72: Orientation



When orienting parts, there are several factors which must be considered. The design requirements will dictate most builds. For example, mold faces should be free of support pips. As such, they will always face upward.

Regarding geometry, large flat surfaces, trapped volumes, and other problem areas should be avoided.

A shallow angle from horizontal can produce a minimum Z height but will also create more noticeable curved surface stepping in the final part. Therefore, an easy general rule is to rotate a part 20° in X, 20° in Y, and 25° in Z if the part is symmetrical. This will typically build most parts if they do not have difficult geometry.

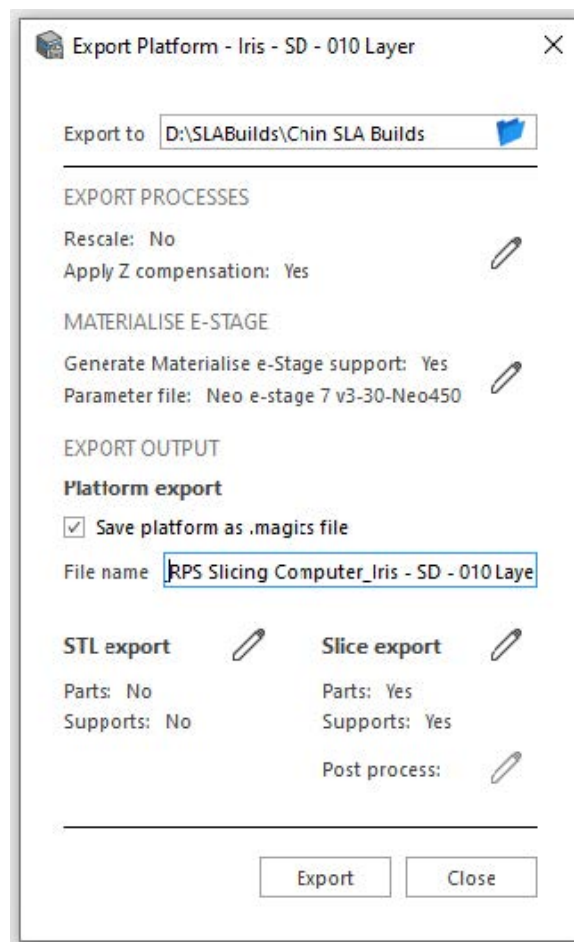
Exporting

Figure 73: Export Platform button



When the parts are all in position, the build platform can be exported. Ensure all parts are within the build area, and they are all at least 10 mm Z height.

Figure 74: Export Platform dialog box



- Check the export directory each time so that files are not overwritten.
- Check that z compensation has been applied when slicing to .slc files.
- Check that a suitable e-stage profile is selected for the platform.
- The platform can be exported as a .magics file to save positioning.
- STL export is not required when using Titanium unless advanced supporting is required (for example with Tetrashell parts).
- Check that slice settings are correct. They should be in SLC format and the desired layer thickness should be selected (typically 0.1 mm).

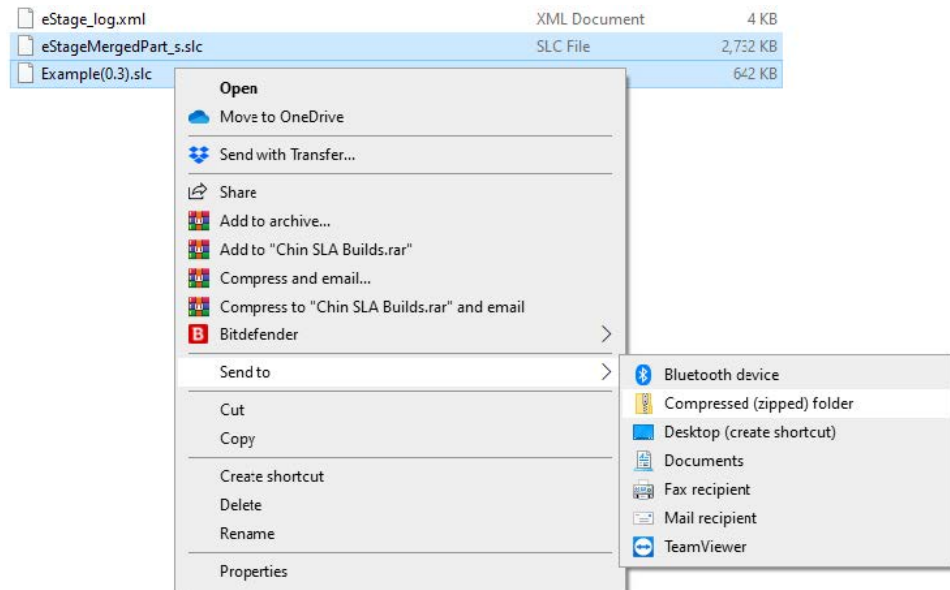
If only e-Stage is used for supporting, this is when the supports are generated. The final output will be the part .slc files and the support .slc files. Support files can be identified by the appended _s to the file name.



if the “one platform support” option is selected in the e-Stage parameters, there will be a single e-Stage support file.

Preparing Build Files

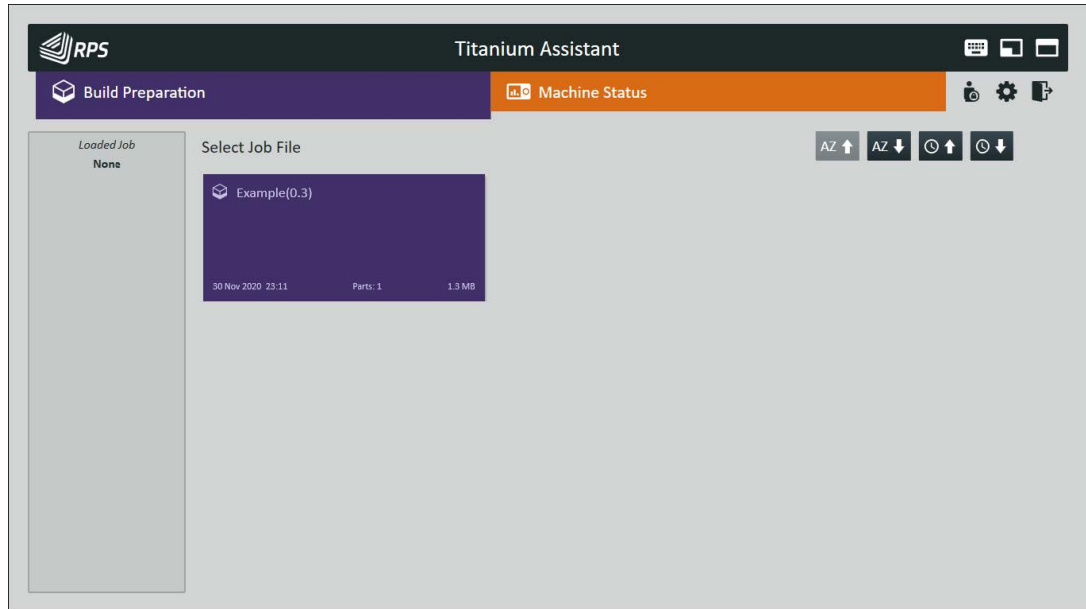
Figure 75: Preparing build files



Once a platform has been exported, navigate to the destination folder and select all of the slice files. Next, right-click and use **Send to > Compressed (zipped) folder**. Rename as required in line with workflow. This is the basic build file and can either be sent to Titanium Assistant for preparation and quoting, or directly to the printer.

Titanium Assistant

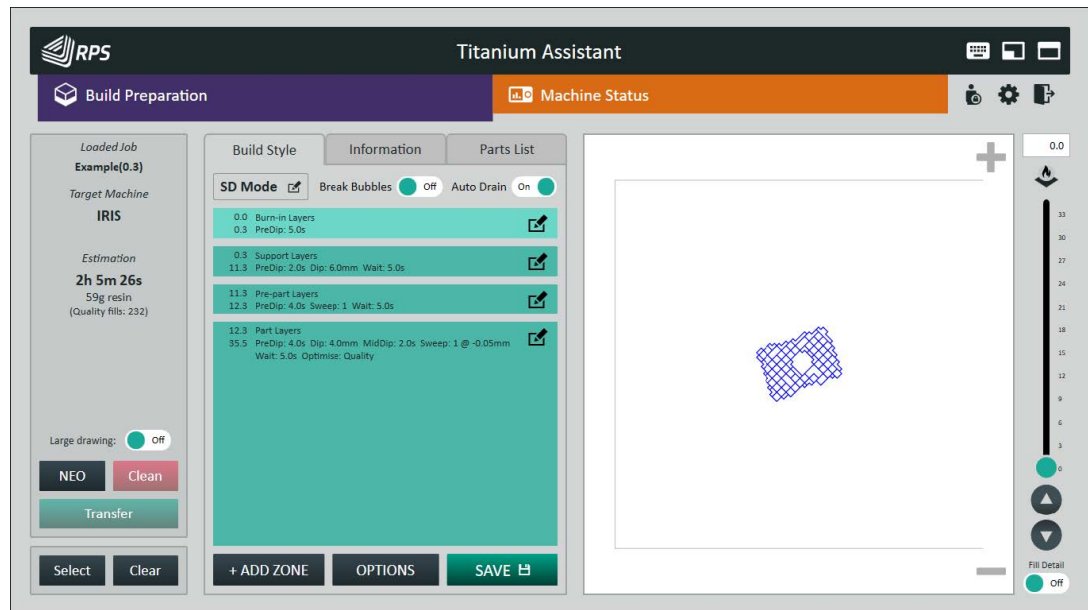
Figure 76: Titanium Assistant



After the slice files have been placed into a .zip file, the .zip file is then copied to the BuildFiles directory of Titanium Assistant. The default path is (D:\)TitaniumAssistant\BuildFiles. The file is then loaded into Titanium Assistant.

By using Titanium Assistant, build parameters such as the recoater settings, scale factors, and quality mode can be changed. In addition, the slider allows for viewing of each individual layer as it will be drawn. As such, any glitches can be caught early in the process. The following screen is shown when the build is loaded.

Figure 77: Titanium Assistant - Machine Status





Click on this icon to change the recoater settings for the selected build zone.

Figure 78: Build Zone Settings

Build Zone Settings

Part Layers

Recoat

Pre-dip delay: secs Dip distance: mm

Mid-dip delay: secs Sweep count:

Post-dip delay: secs Sweep offset: %

Z Wait delay: secs Sweep velocity: mm/s

Min layer time: secs

Scan Options

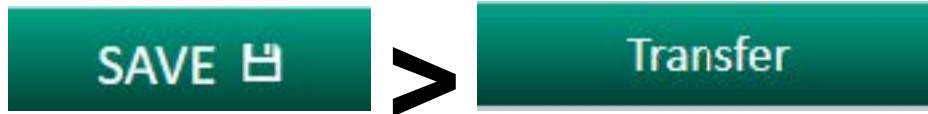
Optimise fill mode: ▼

RESET **SAVE** **CANCEL**

- **Pre-dip delay:** A delay that is applied before the dip phase. It is required for exposure to complete and will vary depending upon the requirements of the resin in use. (This delay occurs regardless of whether dipping is enabled).
- **Dip distance:** The distance that the elevator dips into the resin before moving to the next layer.
- **Mid-dip delay:** A delay that is applied at the bottom of the dip movement before rising to complete the dip. (This delay occurs only if dipping is enabled).
- **Post-dip delay:** A delay that is applied after the dip phase and before the sweep phase. (This delay occurs only if dipping is enabled).
- **Sweep count:** Increase the number of sweeps to account for factors such as resin viscosity, area to recoat, and the presence of trapped volumes.
- **Sweep offset:** The sweep offset lowers the platform by the offset value while sweeping. For the part-zones, the offset is entered as a percentage of the layer thickness.
- **Sweep velocity:** Change the velocity of the recoater account for factors such as resin viscosity and trapped volumes.

- **Z Wait delay:** The time after recoating has completed and before the next layer is scanned. It is required to allow the resin to settle to a flat surface, and will vary depending on factors such as resin viscosity.
- **Min layer time:** The minimum layer time enforces a minimum elapsed time between laser scanning start events.

Options cover parameters which are setup with the printer installation.

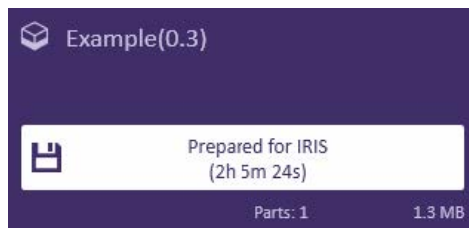


Once settings have been applied, they are saved to the build file. They can then be transferred to the printer over the network.



Titanium assistant is also used for monitoring printer status.

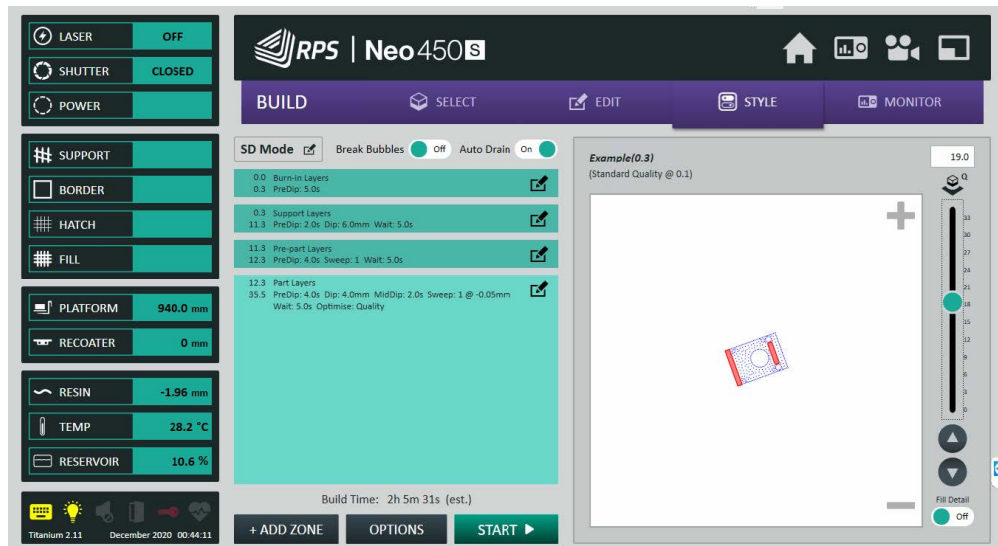
Titanium



When a build is prepared using Titanium Assistant, it displays which printer the parameters have been set for and the build time estimate.

Once a build is loaded on the printer, it can be further modified before starting as well as dynamically while printing.

Figure 79: Titanium

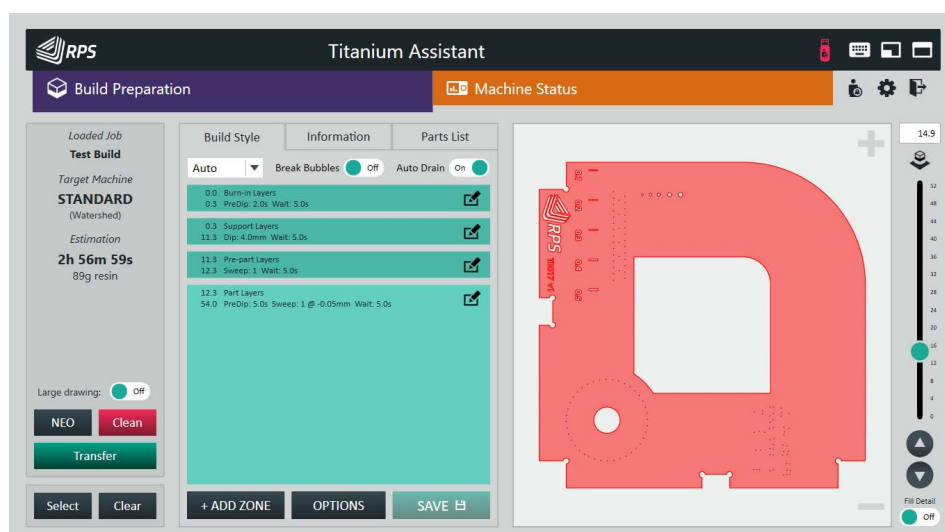


Build Preparation

The build preparation pages are similar to those encountered in Titanium. There are some differences that will be described below.

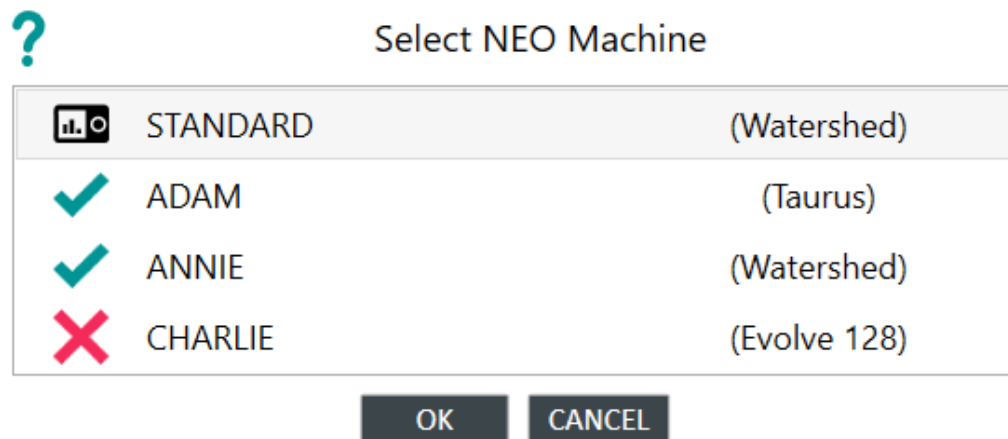
Select Job

Figure 80: Build preparation – select job



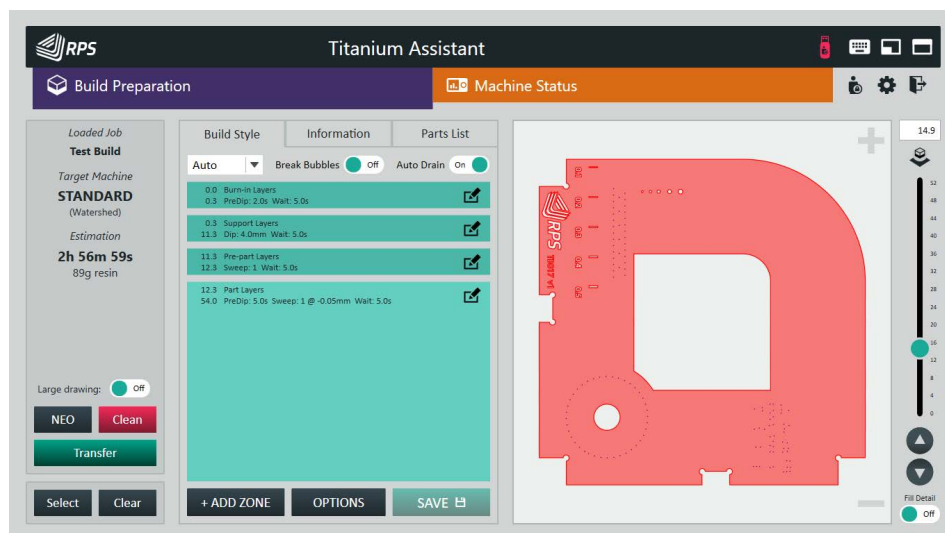
The job selection page operates the same as within Titanium. When a job is selected, the user will be prompted to identify the printer for the job is to be prepared:

Figure 81: Select Neo machine dialog

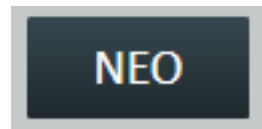


Edit Job

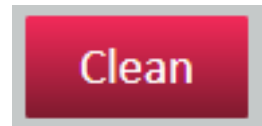
Figure 82: Build preparation – select job



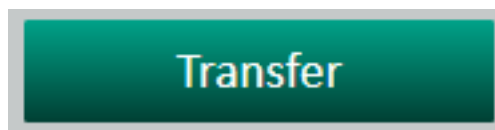
The editing of the build style is the same as within Titanium. However, instead of starting the build there is a **save** button. Saving the job causes the current build style settings to be stored in the zip file that contains the job's slice files. It is these saved settings that Titanium will detect and load as a 'prepared' job.



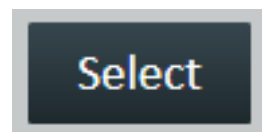
This button can be used to select an alternative Neo printer as the destination for the job being prepared.



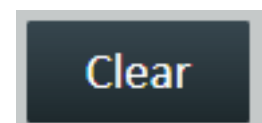
This button can be used to clean the build job being prepared. Any style settings previously saved to the job's zip file are removed.



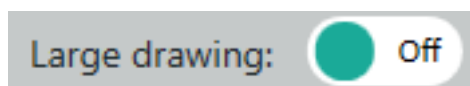
This button initiates the transfer of the prepared job to a remote Neo printer. This button is only enabled if a remote transfer is possible.



This button can be used to select an alternative job to load.

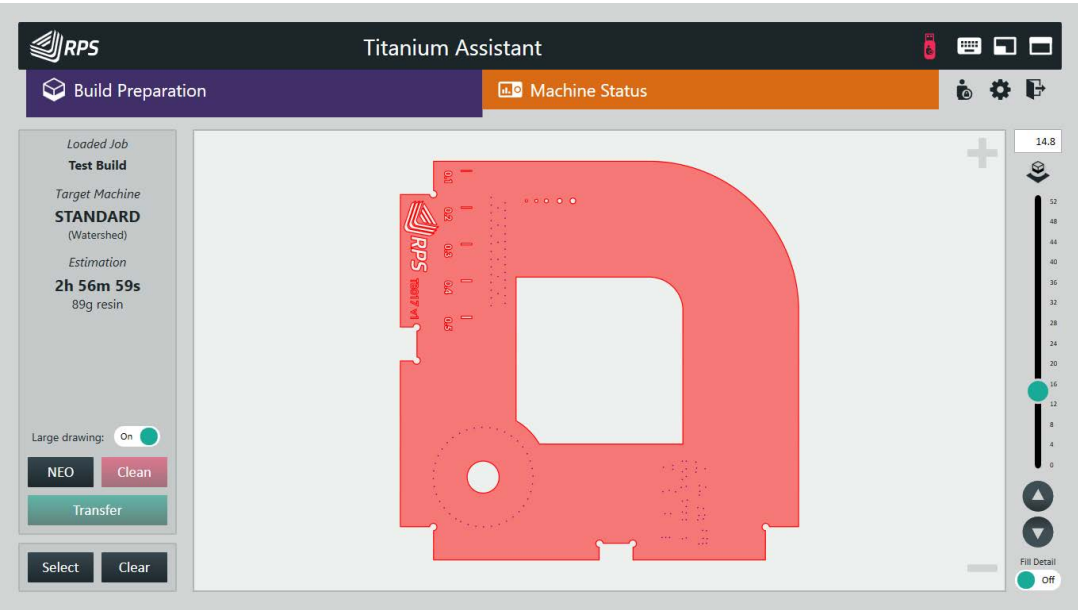


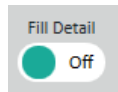
This button can be used to remove the currently loaded job.



The 'large' drawing toggle can be used to enlarge the size of the area used to contain the layer drawing:

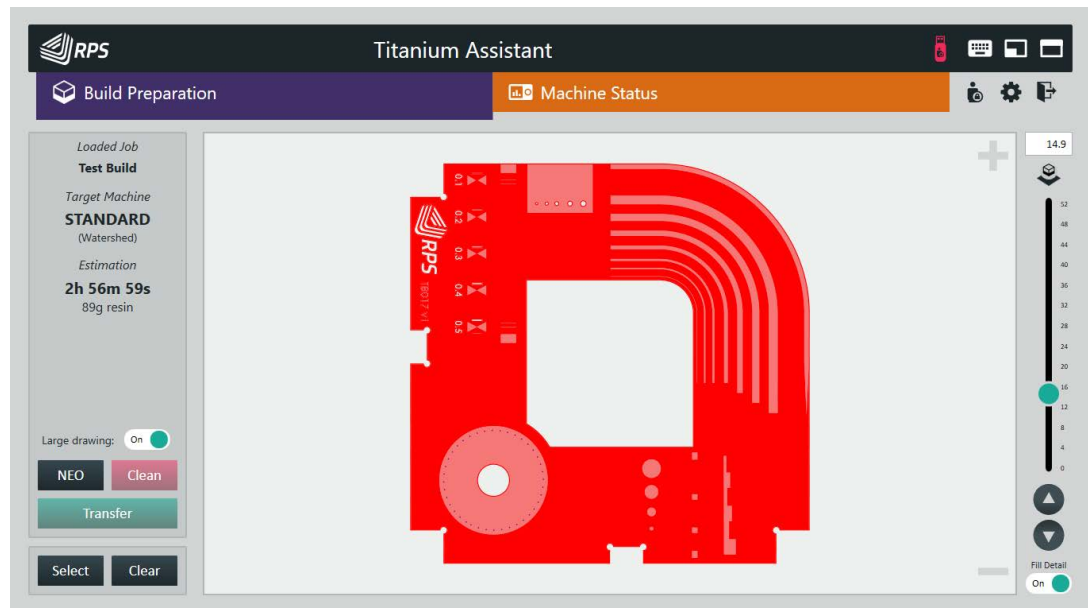
Figure 83: Build preparation – large layer drawing





The fill detail toggle can be used to enable the visual display of parts of the layer that form the upper or lower surfaces of the overall object being built. These are the parts that will use 'fill' pen rather than the 'hatch' pen. The 'fill' areas are highlighted by using a deeper red colour.

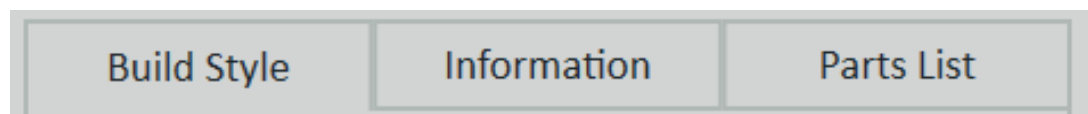
Figure 84: Build preparation – fill detail enabled



While the 'fill detail' option is enabled the layers make take longer to redraw. Thus, it is recommended to keep this option disabled unless specifically being used.

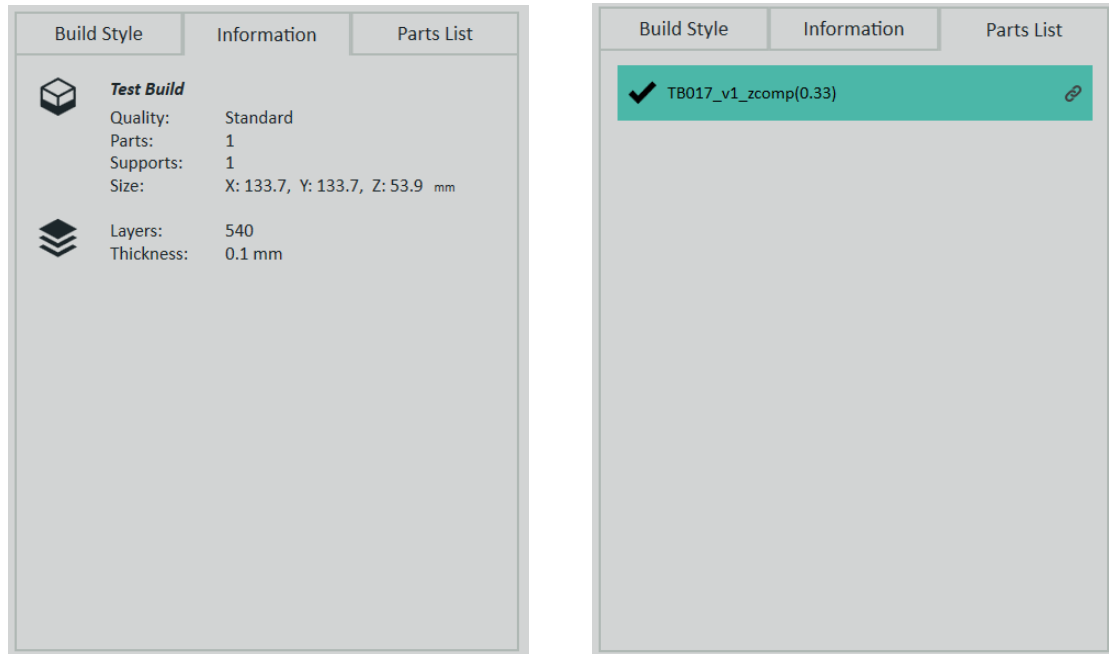
Tabbed Panels

Figure 85: Build preparation – tabbed panels



In addition to the build style edit panel, there are two additional tabbed panels that can be selected.

Figure 86: Tabbed panels



The **Information** panel provides some additional information about the loaded job. The **Part List** panel provides a list of the separate 'part' slices files that have been loaded.

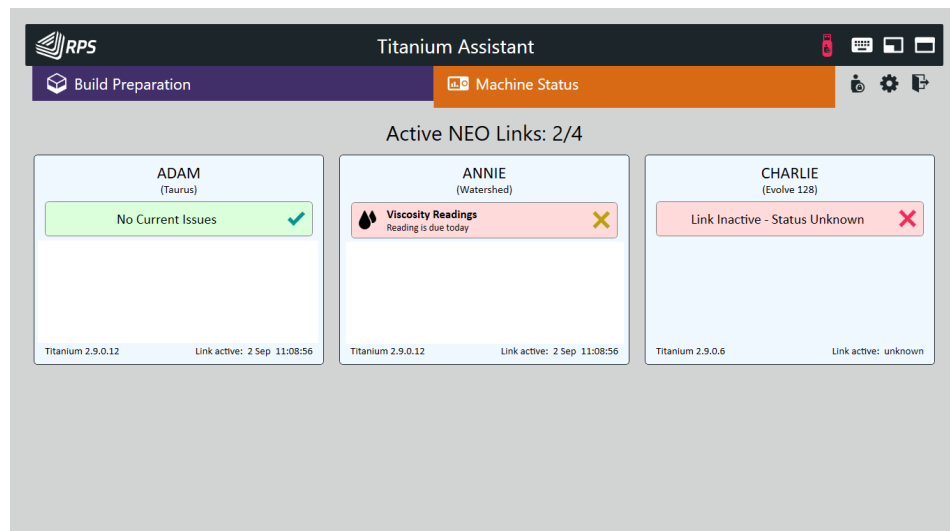
For the parts list panel allows for individual parts to be toggled on or off. This is to allow the build estimate to be reviewed with and without a part.



This will not truly reflect the impact of removing parts that share supports.

Machine Status

Figure 87: Machine status page



The machine status page reports the current status of the links to the configured remote Neo printers.

The link is 'inactive' when Titanium Assistant cannot establish a link to the shared Titanium folder of the remote printer. In this instance the state of the remote Neo printer is simply unknown.

If a link is established, then the current status of the Neo printer is displayed – reporting any known issues.

5 OPERATING THE PRINTER

This chapter explains basic steps in operating the Stratasys Neo450 and Neo800 printers.

Principle of Operation

Stereolithography is an additive manufacturing process using a vat of liquid ultraviolet (UV) curable photopolymer resin and a UV laser to build parts one layer at a time. For each layer, the laser beam scans the cross-section of the parts on the surface of the liquid resin. Exposure to the UV laser light solidifies the cross-section and adheres it to the layer below.

After one complete layer has been scanned, the platform descends by a single layer thickness, typically 0.1 mm. Then, a resin-filled blade moves across the vat applying another layer of resin on the parts. On this new liquid surface, a next layer is scanned, adhering to the previous layer.

The process continues until all layers of all parts have been scanned. After building, parts are cleaned in a cleaning solution and then cured in a UV oven.

Basic User Operations

Powering ON the Stratasys Neo800 Printer

1. On the rear panel, turn the Main Power Isolator switch to the ON position.

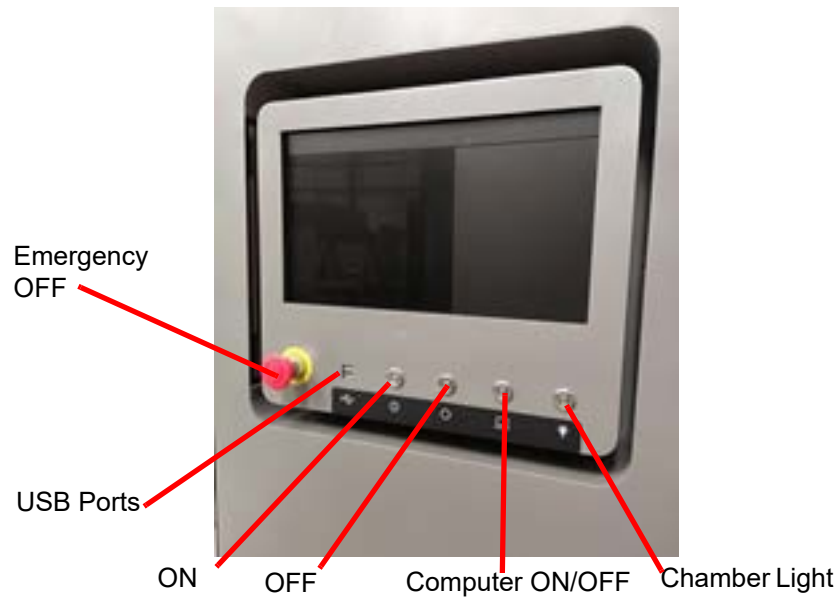
Figure 1: Power Isolator in the ON position



2. Press the ON button on the touch screen display control panel. If the printer does not power up and illuminate the ON button, verify that the E-stop is not ON.

3. Press the Computer ON/OFF button. It should light up blue.

Figure 2: Control Panel Buttons



4. After the computer comes ON, swipe up on the touch screen display.
5. The login screen will display. Type in "rpsupport" to log in.
6. The Windows desktop will display.

7. Confirm TwinCAT has loaded by checking the Windows Systems Icons on the right of the taskbar.
8. Double-click the Titanium icon to start Titanium.
9. The Titanium start screen will display. After Titanium starts and establishes communication with hardware, initialize the printer as requested.

Figure 3: Titanium Start Screen



Powering OFF the Stratasys Neo800 Printer

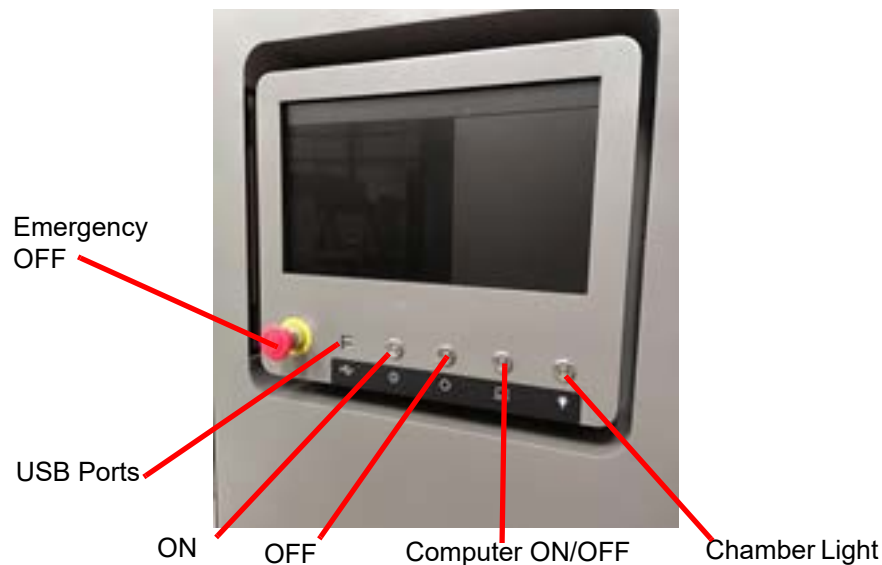
1. From the Main menu in Titanium, select the exit icon in the lower right corner of the screen.

Figure 4: Main Menu Exit



2. When Titanium has closed, select **Shut down** from the Windows Start menu.

Figure 5: Control Panel Buttons



3. Press the OFF button.
4. On the rear panel, turn the Main Power Isolation to the OFF position (counter-clockwise rotation).

5. Turn OFF the Main Power switch.
6. Disconnect the system from incoming AC power in accordance with site lock-out tag-out procedures.

Powering ON the Stratasys Neo450 Printer

1. Verify that main power switch at the rear of the printer is set to ON (illuminated green).

Figure 6: Neo450 Main Power Switch



2. On the rear top panel, press the Machine ON button. The button will illuminate white.

Figure 7: Neo450 Control Panel



3. After the computer comes ON, the Windows desktop will display.
4. Confirm TwinCAT has loaded by checking the Windows Systems Icons on the right of the taskbar.
5. Double-click the Titanium icon to start Titanium.

- The Titanium start screen will display. After Titanium starts and establishes communication with hardware, initialize the printer as requested.

Figure 8: Titanium Start Screen



Powering OFF the Stratasys Neo450 Printer

1. From the Main menu in Titanium, select the exit icon in the lower right corner of the screen.

Figure 9: Main Menu Exit



2. When Titanium has closed, select **Shut down** from the Windows Start menu.
3. After the computer shuts down, press the Machine OFF button on the rear top panel,

Figure 10: Neo450 Control Panel

Machine OFF



- 4.

5. Turn OFF the Main Power switch.
6. Disconnect the system from incoming AC power in accordance with site lock-out tag-out procedures.

Emergency Stop (E-Stop) Operation

The emergency stop button is located on the touchscreen display control panel. See [Figure 11](#). Pressing the red E-stop button removes power from all printer systems. The button will latch in the depressed position when pressed fully down. The button is released from the depressed position by rotating it clockwise.

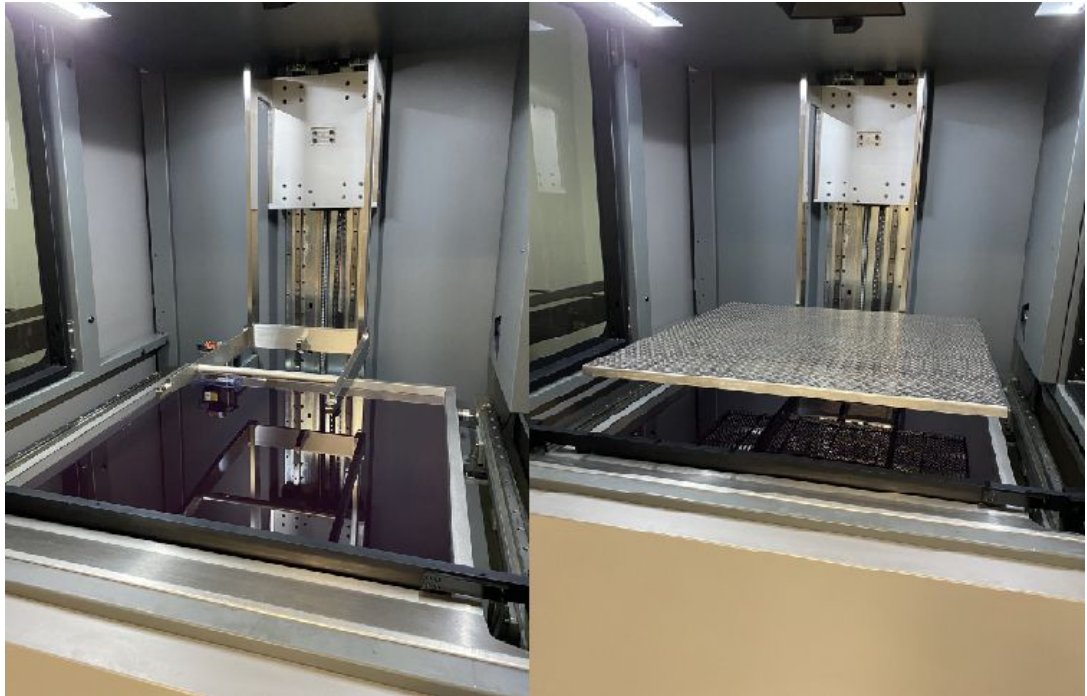
Figure 11: Emergency Stop Button



Loading a Job

Before starting a job, install a clean and dry build platform.

Figure 12: Install build platform

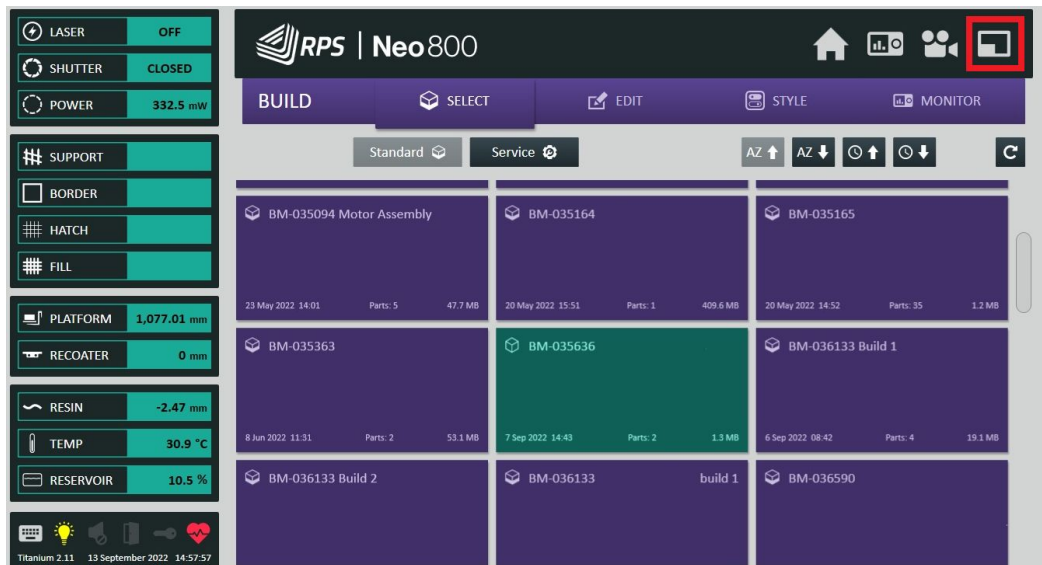


Once a job has been prepared in Magics, has been oriented, and supports have been generated, it can be loaded onto the printer via the LAN or through a USB drive.

USB Method

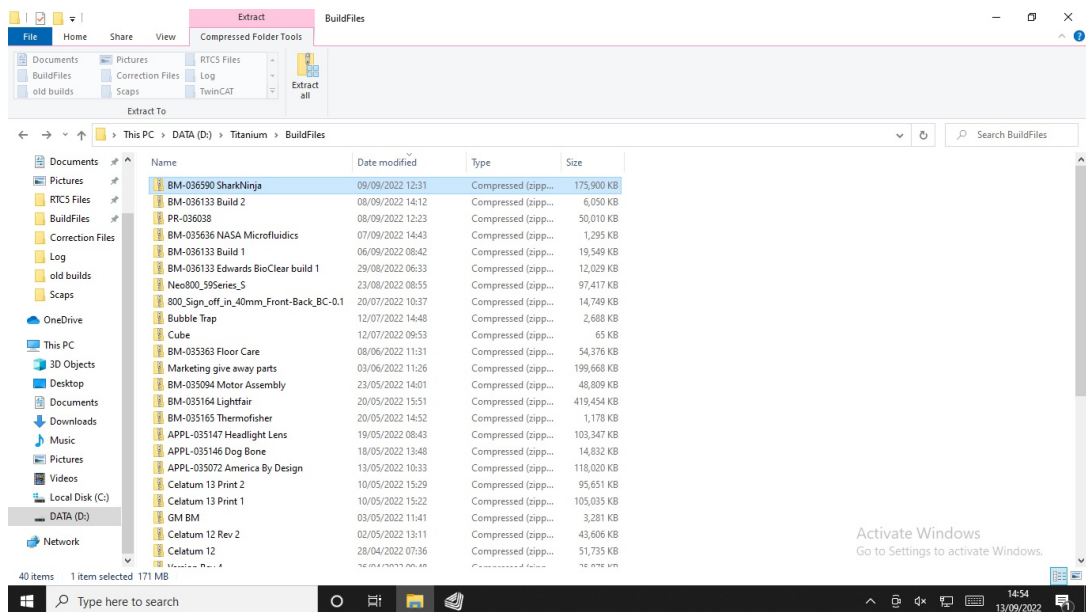
1. Insert a USB drive into one of the USB ports on the printer display assembly.
2. Click **Minimize Titanium**, which is accessible from most Titanium menus. See [Figure 13 \(page 146\)](#).

Figure 13: Minimize Titanium



3. Open a **File Explorer** window.
4. Copy the file from the USB drive and navigate to the Titanium working directory.
5. Paste or drop the zip file in the directory. In the example shown below, the directory is D:\Titanium\BuildFiles.

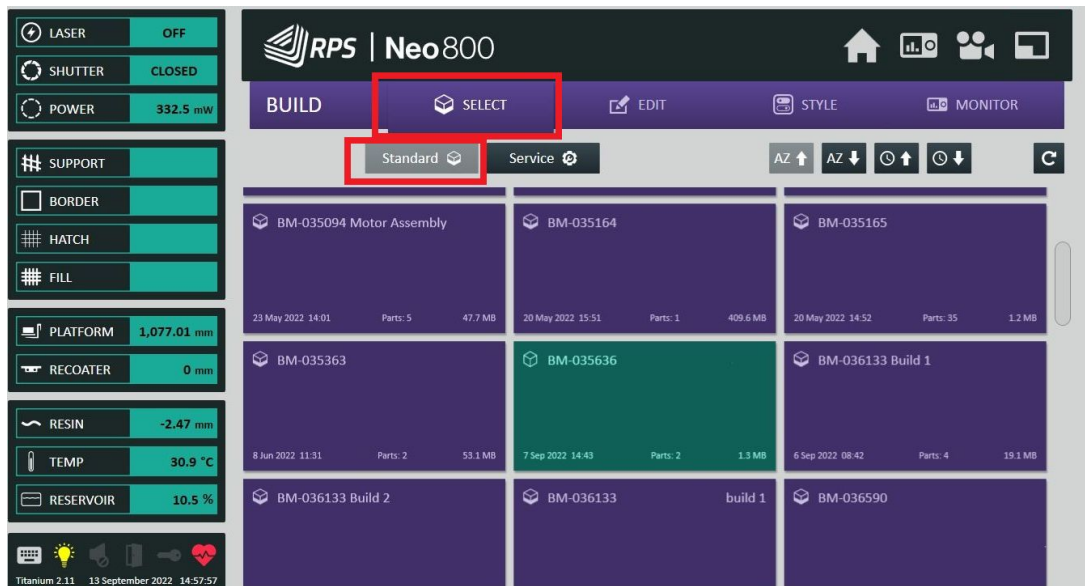
Figure 14: Queue directory



Starting a Build

1. In Titanium, select **Build Control** from the **Home** menu.
2. In the **Build Control** menu, click the **Select** tab and ensure that **Standard** is grayed out. This displays the folder into which the jobs are placed.

Figure 15: Build select standard menu



3. Select the job from the menu. A dialog box displays asking for confirmation.

Figure 16: Build load dialog

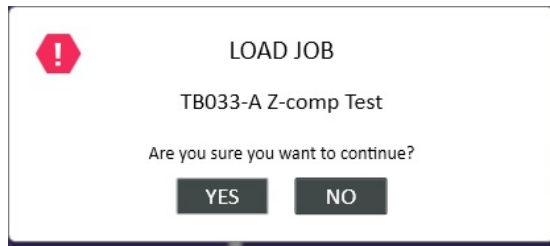
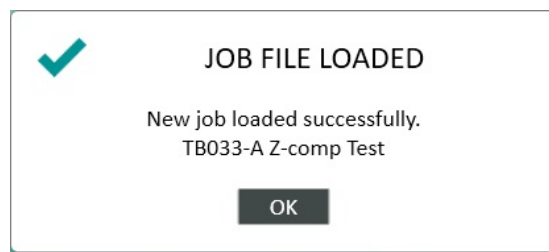
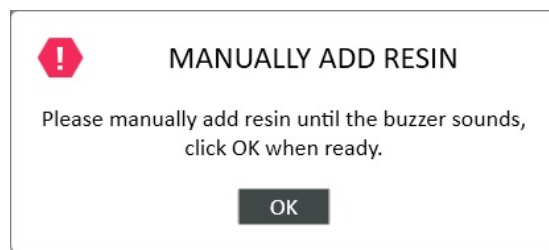


Figure 17: Build job file loaded



4. Press **Start**. The elevator lowers the build platform to the start position and verifies the resin level.
5. A dialog box displays requesting resin be added to the vat.

Figure 18: Selecting the build

**Warning: Skin Irritation**

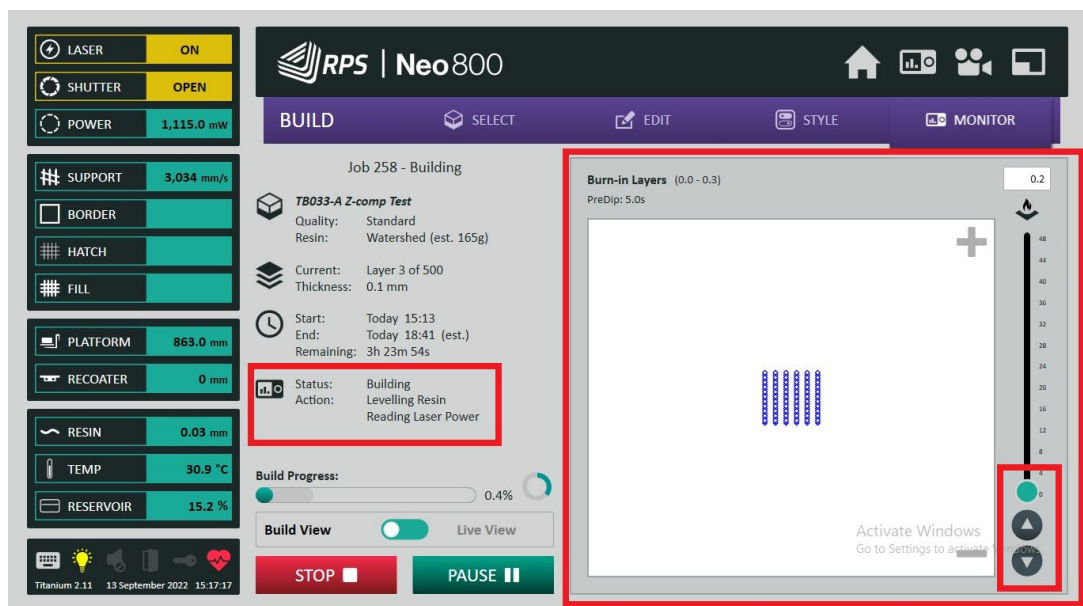
Ensure proper PPE is worn when adding resin to the vat.



Fill the vat from the front chamber door over the spill tray. Filling from another location can result in resin getting on the recoater rails.

- Open one of the build chamber doors, and add resin to the vat. A beep sounds indicating when enough resin has been added.
- Close the build chamber door, and select **OK** on the dialog box.
- The build continues. The **Status** and **Action** sections indicates current build status and activity. The part layer window shows the current build layer.
- Use the arrow keys and slider to see future build layers. This section reverts to the current build layer when the next layer starts.

Figure 19: Status and Action sections



Pausing the Build

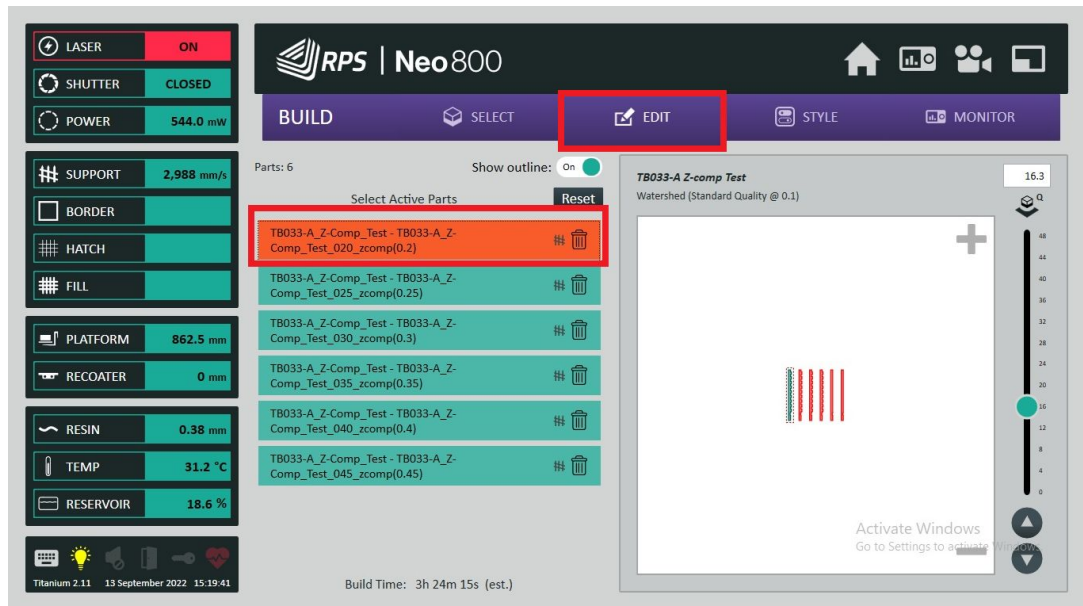
The current build can be paused at any time by pressing the **Pause** button.

If one part is failing in a multiple part build, it may be removed without affecting the rest of the build. To do this:

- First pause the build and accept the **Pause** dialog box.
- Next, select the **Edit** tab and select the part that will be deleted.
- Once selected, the corresponding part will highlight in the layer preview window.

4. Confirm the correct part is selected.

Figure 20: Deleting a part from a paused build



5. After deleting the part from the build, the build can be resumed.

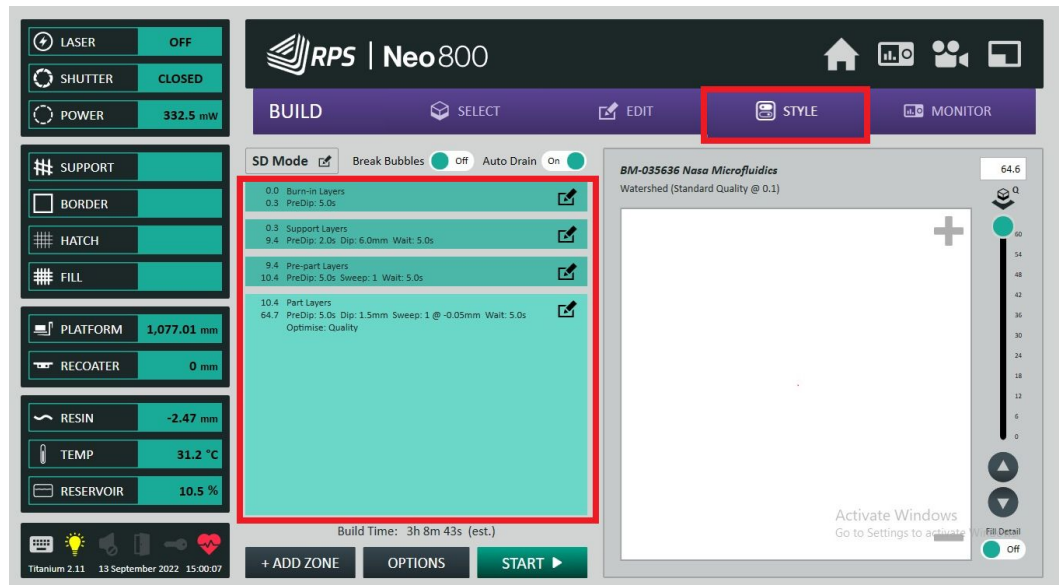


After deleting, builds prepared using the one-platform support option for e-Stage will continue to build the support structure.

Changing the Build Style

The **Build Style** may also be changed after a build has begun. This is accomplished by pausing the part and selecting **Style**. Selecting Style displays different part sections.

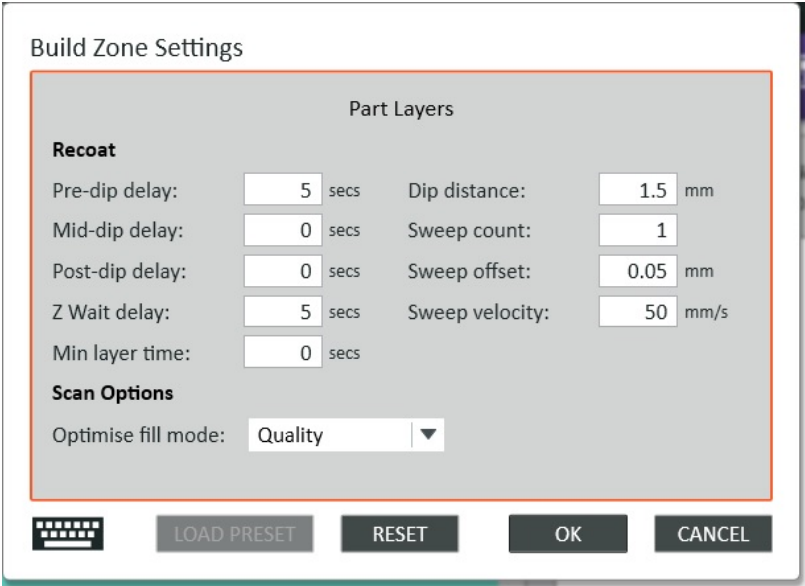
Figure 21: Changing the Build Style



Build Zone Settings

Selecting one of the build zones will display the **Build Zone Settings** dialog box. Here, recoater parameters may be changed to compensate for when resin is not recoating the entire layer. For example, changing the **Sweep count** from **1** to **2** will add a second recoat. This will help to ensure proper resin recoat.

Figure 22: Build Zone Settings

The image shows a 'Build Zone Settings' dialog box. It has a title bar 'Build Zone Settings'. Inside, there's a section titled 'Part Layers' which contains two sub-sections: 'Recoat' and 'Scan Options'. The 'Recoat' section has six input fields: 'Pre-dip delay' (5 secs), 'Mid-dip delay' (0 secs), 'Post-dip delay' (0 secs), 'Z Wait delay' (5 secs), 'Min layer time' (0 secs), 'Dip distance' (1.5 mm), 'Sweep count' (1), 'Sweep offset' (0.05 mm), and 'Sweep velocity' (50 mm/s). The 'Scan Options' section has one dropdown menu 'Optimise fill mode' set to 'Quality'. At the bottom, there are five buttons: a keyboard icon, 'LOAD PRESET', 'RESET', 'OK', and 'CANCEL'.

Removing a Completed Part

1. After the part completes, the elevator raises the build platform above the vat. This allows superfluous resin to drain.
2. Manually remove the build platform from the Neo450.
3. To remove the build platform from the Neo800, use the Unload Trolley shown in [Figure 23 \(page 153\)](#).
4. Open the front door of the Neo800 and position the Unload Trolley in front of the printer.



The printer has a slot (shown below in red) that allows the Unload Trolley access under the printer panels and the vat.

Figure 23: The Unload Trolley



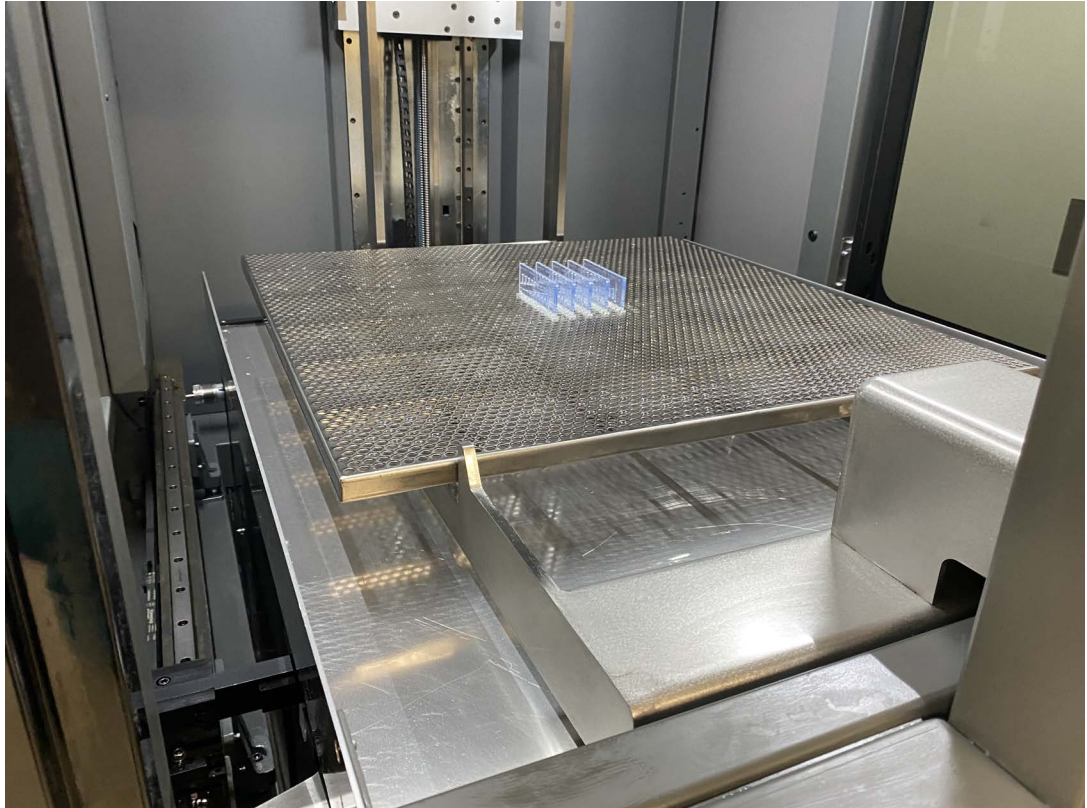
5. Move the Unload Trolley into position slowly. The platform removal arms must be lower than the build platform on the elevator arm. Rotate the crank arm clockwise (to the right) to lower the arms.

Figure 24: Positioning the Unload Trolley



6. Once the Unload Trolley is positioned under the build platform, rotate the crank arm counter-clockwise (to the left) to raise the build platform from the elevator arms. After the build platform is raised from the elevator arms, pull the Unload Trolley away from the printer.

Figure 25: Removing the build



7. The parts may now be removed from the platform. After part removal, the platform must be cleaned using an appropriate method dependent on local codes.

Swapping the Vat

This procedure describes the task of swapping the currently installed resin vat for another vat. It can take 1-3 hours to complete this task depending on the cleanliness of the printer and the preparation level. Once the new resin vat is installed, it will take up to 24 hours to allow the resin to warm up and de-gas. Swapping the vat may affect calibrations, so it is recommended to perform accuracy builds after completion of this procedure.

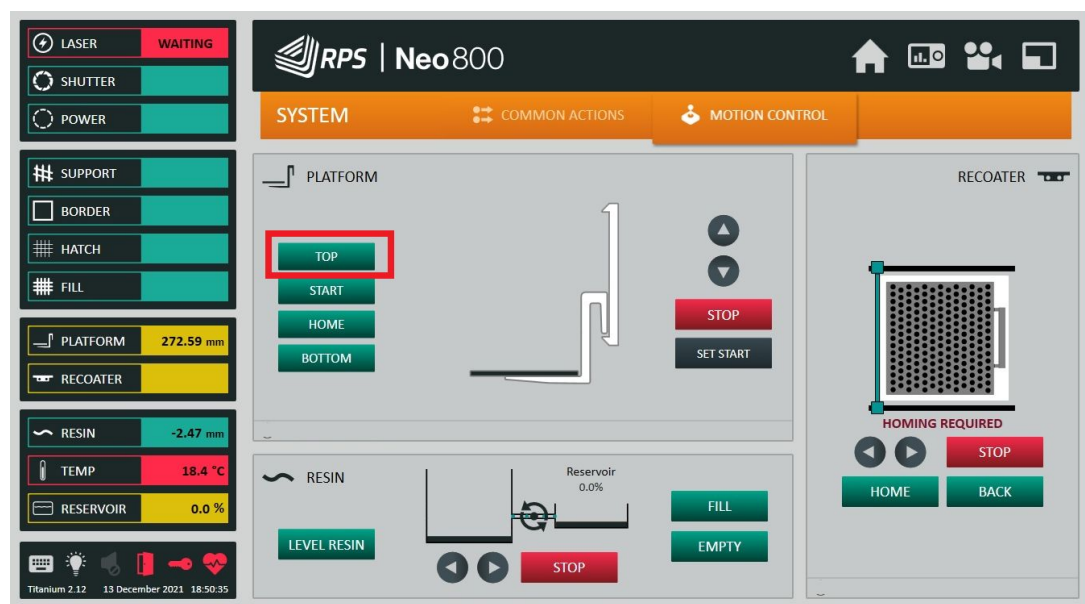
Required Tools

- Metric hex wrenches
- Metric spanners
- Side and Roof Panel Key (Southco E3-26-819-15)
- Low level (or low profile) pallet truck
- Disposable gloves
- Isopropyl alcohol
- Rag or lint free paper towels

Removing the Vat

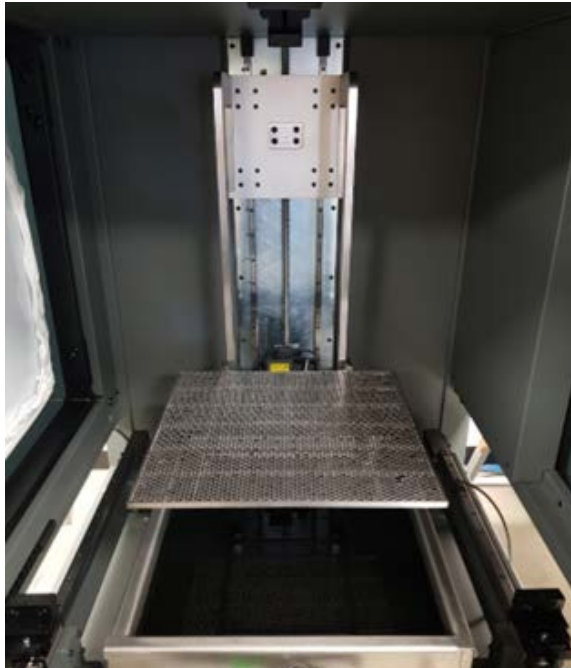
1. From the control panel in Titanium, Motion Control, select **Top** to move the platform to the top so that the vat can move freely, without obstruction.

Figure 26: Motion Control Top



2. Remove the platform and clean it thoroughly.

Figure 27: Neo Platform



3. Allow the remaining resin to drain off the elevator arms and wipe them clean to avoid dripping.
4. From the control panel in Titanium, Motion Control, select **Fill** to remove resin from the vat and add it to the reservoir. This will minimize resin spills from the vat.

Figure 28: Motion Control Fill



5. Close off the valves connecting the peristaltic pump to the reservoir and vat.

**Caution: Damage to Equipment**

Resin will leak over time if the valves are not closed.

Figure 29: Vat and Reservoir Valves (Closed Position)



6. Remove and clean the recoater blade. See “Cleaning the Recoater Blade” (page 182).
7. Close Titanium and power OFF the printer. See “Powering OFF the Stratasys Neo800 Printer” (page 139).

8. For the Neo800, use a hex wrench to remove the retention screw for the leveling sensor bracket and turn the bracket 90 degrees counter-clockwise so that the vat is able to move without striking the temperature probe. Reinstall the retention screw to its mount so that it is not lost.



Do not adjust the sensor bracket grub/set screws.

Figure 30: Resin leveling sensor, rotated



9. For the Neo450, use a hex wrench to remove the retention screw for the leveling sensor bracket. Next, lift the bracket straight back on its hinge. Reinstall the retention screw to its mount as to avoid losing it.

Figure 31: Neo450 resin leveling sensor, rotated up



10. Confirm the temperature probe is clean.

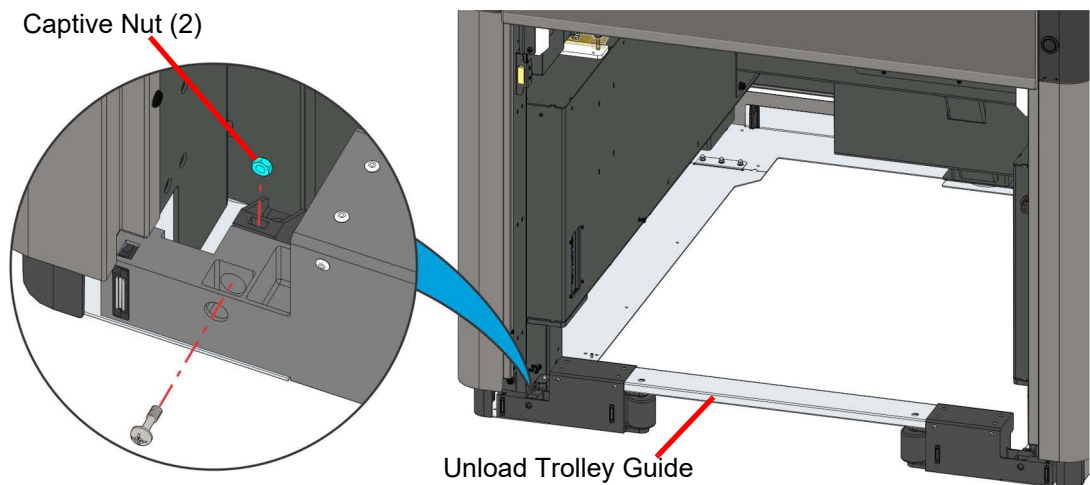
11. Use a 4 mm hex wrench to release the front cover. Rotate the hex bolts (2) on the left and right sides 1/2 turn to release the cover. Lift and remove the cover off the locating pins at the bottom.

Figure 32: Removing the Front Cover



12. For the Neo800 only, use a 4 mm hex wrench to remove the screws (2) securing the Unload Trolley guide to the captive nuts at the front of the floor tray assembly. Set aside the Unload Trolley guide.

Figure 33: Unload Trolley Guide Detail



13. Disconnect the vat connectors and position them so that they do not obstruct movement of the vat.

Figure 34: Neo800 Vat Connectors



Figure 35: Neo450 Vat Connectors



14. Make sure that any excess peristaltic tubing is tucked so that it does not obstruct movement of the vat.

Figure 36: Peristaltic Tubing on Neo800 Vat (Type 1 and Type 2)



Vat Type 1
(Drain valve in back)



Vat Type 2
(Drain valve in front)

Figure 37: Peristaltic Tubing on Neo450 Vat



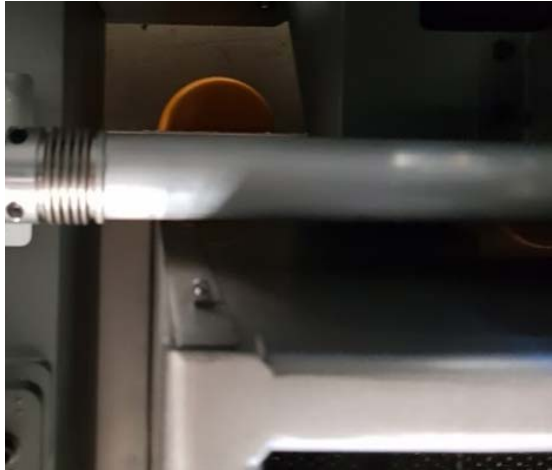
15. Note that the position of the vat stabilizer feet are located through the floor tray to aid in alignment of the new vat. For the Neo450, to aid in positioning new vat, use a marker to indicate the location of the vat stabilizer feet.

Figure 38: Locating the vat feet



16. Insert the forks of the low profile pallet jack beneath the lifting channels of the vat. Make sure that the ends of the forks do not extend beneath the printer frame.

Figure 39: Viewing the pallet jack forks from above



Good
(Forks end before frame)



Bad
(Forks end after frame)

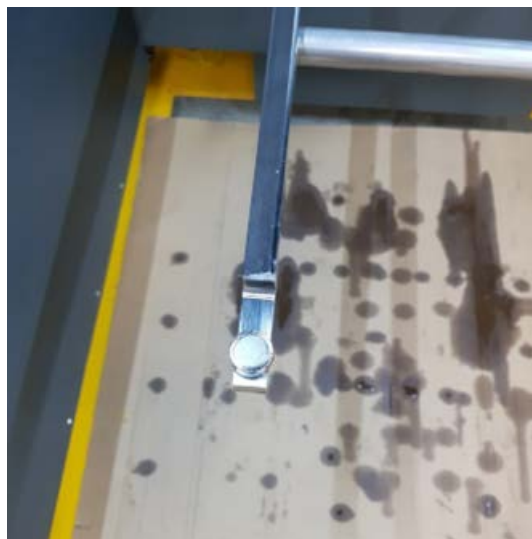
17. Lift the vat so that it is free to move. Make sure that the top of the vat will not strike the printer frame as it is pulled through the front of the enclosure.

Figure 40: Lifting the Vat



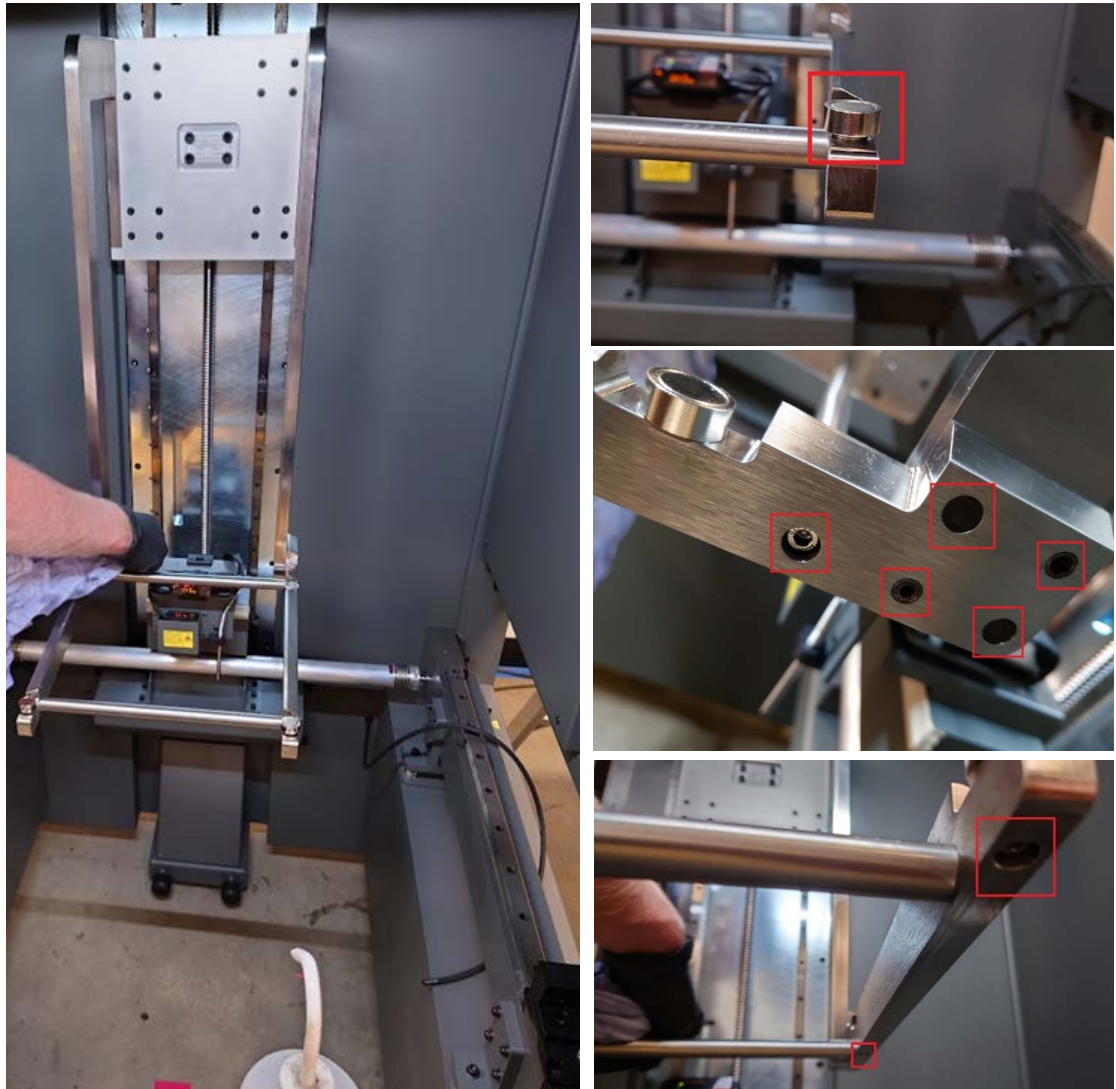
18. Make sure there is a clear path for the vat and pallet jack to move. Slowly pull the vat straight out of the printer.
19. Place a piece of cardboard underneath the platform to catch any drops of resin and aid in clean-up.

Figure 41: Cardboard Under Platform



20. Clean the inside of the printer and the surrounding area. Use isopropyl alcohol to fully clean resin from the Z-stage arms, taking care to clean the screw holes, and underside, around the magnets etc.

Figure 42: Cleaning the Z Stage Arms



Installing the Vat

1. Set up the height of the new vat so the lowest point is as follows:
 - 7 mm off the floor for a Type 1 Neo800 vat
 - 15 mm off the floor for a Type 2 Neo800 vat
 - 15 mm off the floor for a Neo450 vat (unless this is a vat that has been previously set up for the printer and floor position)
2. Remove the piece of cardboard beneath the build platform.
3. Make sure a clear path exists to the front of the printer.
4. Lift the new vat with the low-level pallet jack. Make sure that the ends of the pallet jack forks do not extend past the back side of the tank so they will not contact the printer frame.
5. Align the vat with the front of the build enclosure. Position the vat left to right so an even gap exists on both sides in relation to the printer frame.
6. Slowly move the vat straight into the front of the enclosure avoiding contact with the rear of the printer. Position the vat above the foot positions in the floor tray.



Warning: Lifting Hazard

The vat is extremely heavy, especially when it is filled with resin.

7. Slowly release the handle of the pallet jack and lower the vat to the floor. Gently readjust the position of the vat as required until the feet rest on the floor inside the foot locations in the floor tray.
8. Remove the pallet jack from the printer.
9. Level the vat using the clean recoater bar and a coarse level.



Caution: Possible Printer Shutdown

The vat heaters are powered by mains voltage. When resin is detected in the vat, a sudden spike in current can trip the fuses and cause the printer to shutdown unexpectedly.

10. Connect the flexible conduits, ensuring that the lugs are lined up with the slots in the sockets.



Conduit connectors are keyed on top.

11. Reposition the resin level sensor and thermistor over the vat.
 - a. Rotate the sensor to locate the set screws into the indentations on the mounting bracket.
 - b. Use a hex wrench to fasten the sensor bracket retaining bolts.

Figure 43: Neo800 Leveling sensor in place

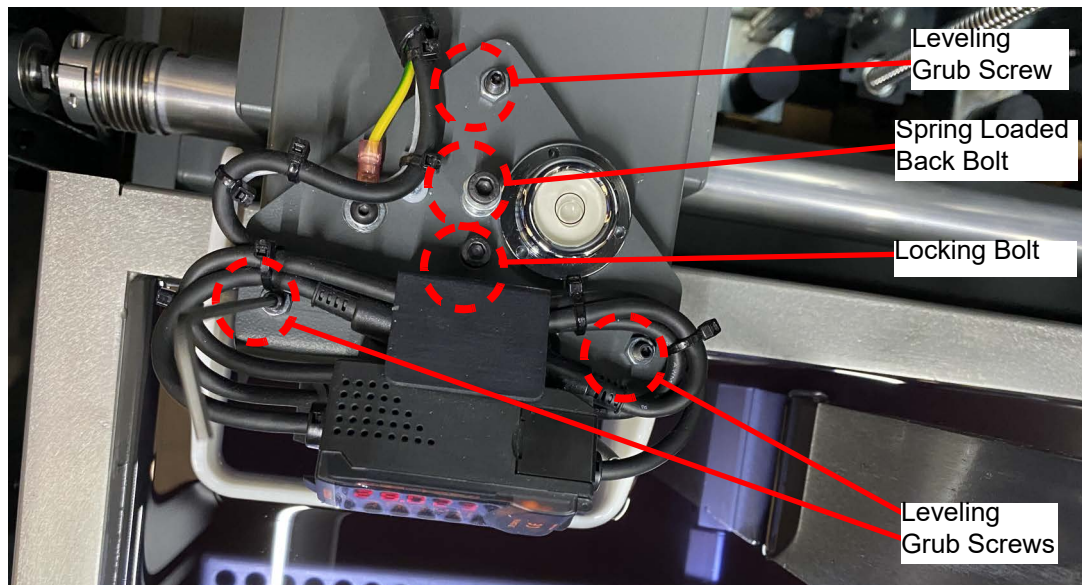


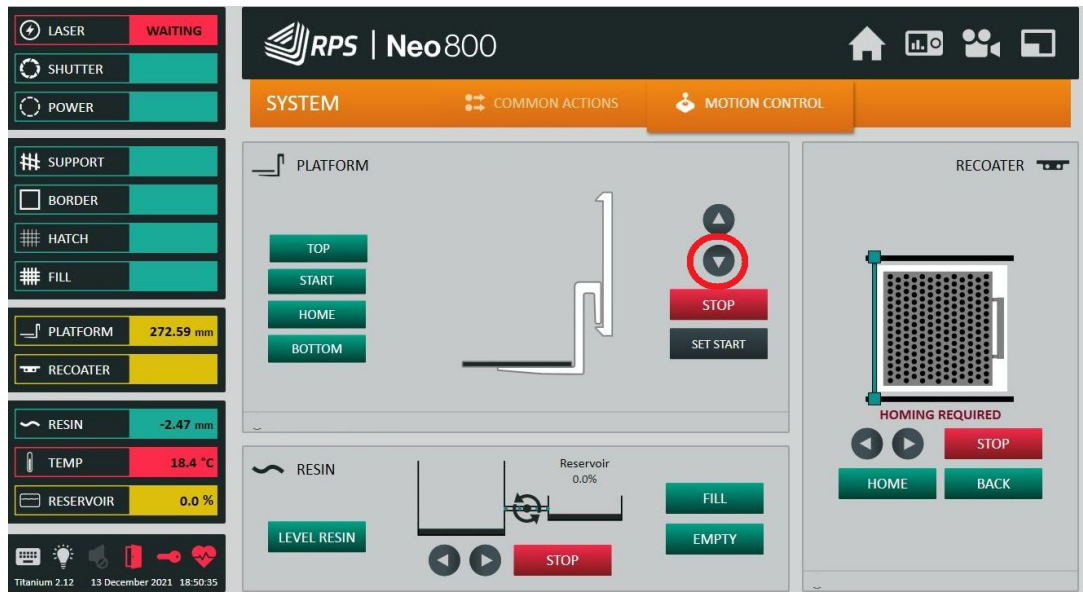
Figure 44: Neo450 Leveling sensor in place



12. Make sure that the temperature probe does not have any of the old resin on it as it will contaminate the new vat.
13. Power ON the printer and launch Titanium. See [“Powering ON the Stratasys Neo450 Printer” \(page 140\)](#). Do not initialize the printer, but make sure that the recoater flag is in the home position.

14. In Titanium, select Motion Control, then use the down arrow to lower the Z stage arms.

Figure 45: .Motion Control down arrow



15. Slowly lower the Z stage arms until they are at or near the Vat rim level. Make sure that a 5 mm gap exists between the back of the vat and the back of the Z stage arms. Stop movement of the arms before contact can occur. Readjust the position of the vat if necessary.

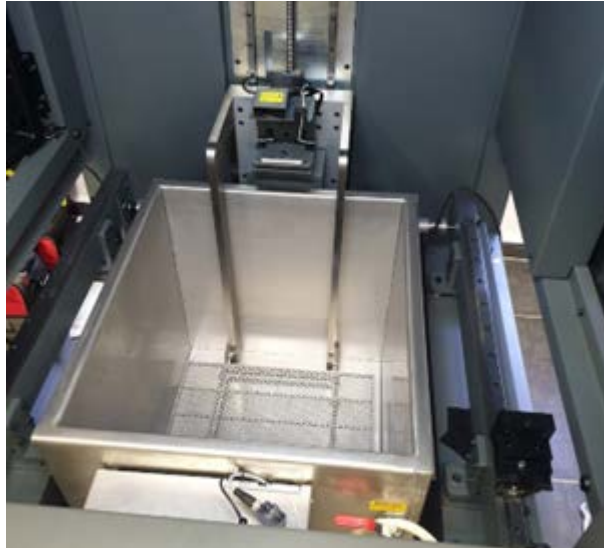
Figure 46: Vat to Z stage clearance



16. Install a platform to the Z stage arms.

17. Check that the platform is square in the vat. Use the pallet jack to adjust the vat position as necessary.

Figure 47: Squaring the vat to the platform



18. Place the blade back into position on the printer, aligned with the clamp mounts while the flag is in the home position. Ensure that the blade has space between the platform and the front of the vat. If not, it could indicate the vat is too far back. Use the pallet jack to adjust the vat position as necessary.

Figure 48: Checking the blade to vat spacing



19. Use a 3 mm hex wrench to fasten the hex bolts (4) that secure the clamps to both ends of the recoater blade..



The clamping pieces are tapered. The wider end must be on top.

20. Install the recoater mount covers to both sides of the printer.
21. Install the vacuum pump tube to the recoater blade and adjust the vacuum air valve fully counter-clockwise.
22. Reinitialize the machine and carefully move the platform to its top and bottom limits.
23. If installing a new vat, install the peristaltic pump tubing. See [“Installing the Peristaltic Tubing”](#) (page 180).
24. Install the front cover to the bottom locating pins. Use a 4 mm hex wrench to rotate the hex bolts (2) on the left and right sides 1/2 turn to secure it in place.
25. Use a 4 mm hex wrench to fasten the screws (2) securing the Unload Trolley guide to the captive nuts at the front of the floor tray assembly.
26. Reopen the vat and reservoir valves.
27. If necessary, fill the resin vat.
 - If the vat is full of resin already and has not been kept warm with a heater attachment, it will require time to warm up.
 - If the resin has not been poured in yet, do so now as per installation. Set the platform to start position and fill up to 1 mm under level. The resin will need to warm up and de-gas overnight. It will expand.
28. Adjust the resin level in the recoater blade as described in [“Vacuum Level Adjustment”](#) (page 191).
29. Perform blade gaps and accuracy assessments for the new material. See [“Recoater Blade Gap Procedure”](#) (page 186).



If the recoater blade gap is off significantly, call your regional service representative. The resin level will need to be set with tools specific to this procedure.

6 MAINTENANCE

This chapter describes various maintenance tasks that will routinely need to be performed on the Stratasys Neo450 and Neo800 printers.

Maintenance Schedule

Maintenance tasks must be performed on a regular basis in order to maintain optimal system operation. [Table 1](#) outlines the general maintenance schedule for the Stratasys Neo450 and Neo800 printers. Detailed instructions for each task make up the rest of this chapter.

Table 1: Maintenance Schedule

6 Month	As Needed	Maintenance Task
X		"Six Month Maintenance" (page 174)
X		"Pump Tubing Replacement" (page 174)
	X	"Cleaning the Recoater Blade" (page 182)
	X	"Recoater Blade Gap Procedure" (page 186)
	X	"Vacuum Level Adjustment" (page 191)

Six Month Maintenance

Pump Tubing Replacement

Peristaltic Tubing

Required Tools

- Flathead Screwdriver
- 4mm hex wrench

Removing the Peristaltic Tubing

1. From the control panel, exit Titanium.
2. Open the front door of the printer build enclosure.

3. Remove the resin guard and front cover. The resin guard simply lifts off.

Figure 1: Resin Guard Removed



Although this procedure was created for the Neo800 it also applies to the Neo450. However, the pump for the Neo450 is located on the right side of the printer inside the right cover. This will necessitate removing the right cover in addition to the front cover.

4. Use a 4mm hex wrench to release the front cover. Rotate half a turn to release the cover then lift the cover off the locating pins at the bottom.

Figure 2: Removing the Front Cover



5. Close the vat and reservoir valves to prevent resin spilling out.

Figure 3: Vat and Reservoir Valves (Closed Position)



6. Use a flathead screw driver to rotate the cover locking screw 45 degrees. Remove the cover.

Figure 4: Pump Cover



7. Note the tubing orientation then apply pressure to the brackets securing the tubing at the inlet and outlet of the pump casing while pulling the tubing out.

Figure 5: Pump Tubing



Press here to release tubing.

8. Push on the pump roller assembly to release it so it free spins by hand, then rotate and pull out the tubing as it rotates.

Figure 6: Pump Release Button



9. Use pliers to squeeze the tube securing clip allowing it to slide away from the valve.

Figure 7: Disengaging the Tube Securing Clip



10. Pull the tubing away from the valve. Remove and retain the clip from the tubing.
11. Insert the loose end of the tubing into an empty resin container to prevent resin from spilling on the floor.

Figure 8: Loose Tubing

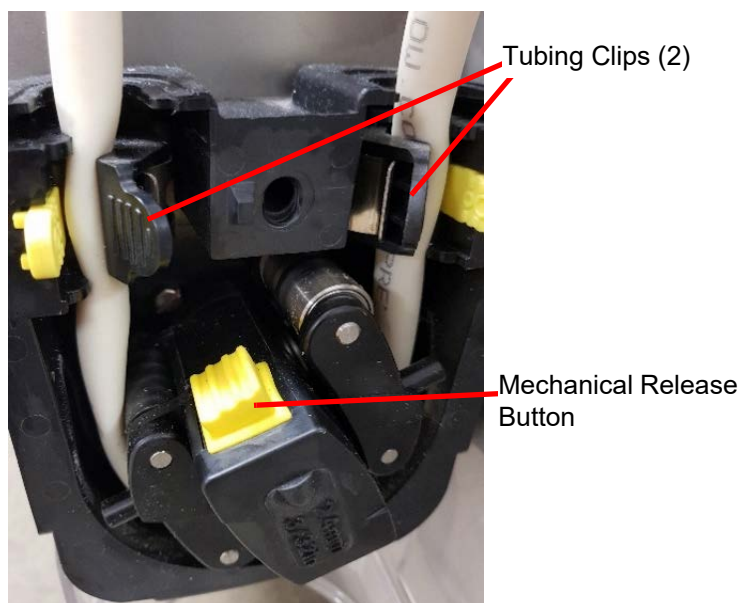


12. Repeat steps 11 and 12 to remove the attached end of the tubing.
13. Insert the entire tubing into the container and dispose per local requirements.

Installing the Peristaltic Tubing

1. Install the tube securing clips (2) on to the ends of the new tubing.
2. Insert both ends of the tubing into the valves while squeezing the clips to open and slide over the valve.
3. Route the tubing into the roller pump casing in the same orientation as it was in when starting.
4. Install the peristaltic tubing into the pump at the front of the vat. Orient the tubing so that the resin flow is going from the tank to the reservoir.
 - a. Release the cover by rotating the slotted bolt 45 degrees. Remove the cover.
 - b. Push the clip open where the tube enters the pump at one side and insert the tube.
 - c. Press the yellow mechanical release button on the pump body to disengage it from the motor. This will allow hand rotation of the pump body.
 - d. Feed the tube around the pump by rotating the pump body.
 - e. Push the second clip open and insert the tube into it.

Figure 9: Peristaltic pump with tube installed (cover removed)



5. Close and lock the door.
6. Use a 4mm hex wrench to secure the front panel. See [Figure 2](#).
7. Install the resin guard plate.

8. Operate the pump in the motion control menu and make sure that the Resin/Reservoir values update as expected.

Figure 10: Neo800 Peristaltic resin pump and tubing installed



Figure 11: Neo450 Peristaltic resin pump and tubing installed



As Needed Maintenance

Cleaning the Recoater Blade

Required Tools

- 3 mm hex wrench
- Grease gun set
- Disposable gloves
- Lint free fabric or paper towels
- Isopropyl alcohol
- Plastic scraper

Removing and Cleaning the Recoater Blade

1. Using a gloved finger, check the underside of the recoater blade for debris or built up resin. Check the entry to the vacuum cavity as well.
2. If debris is present on the underside of the recoater blade, attempt to remove it using a gloved finger. If the debris cannot be removed, the recoater blade will need to be removed from the printer. A plastic scraper or wooden tongue depressor may then be used to clean the recoater blade.

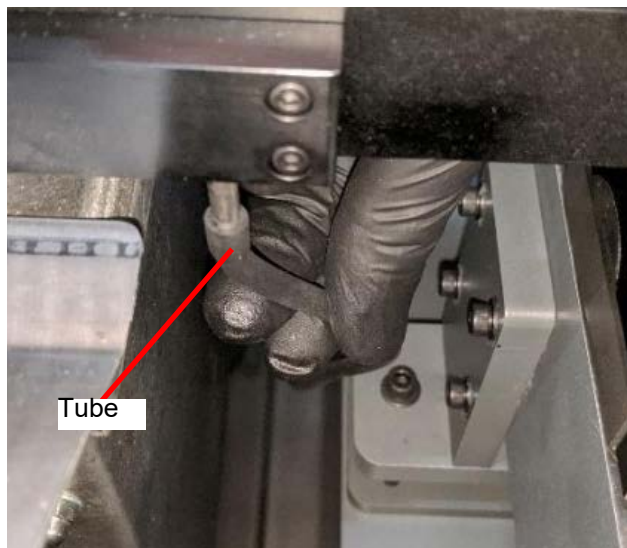


Caution: Damage to Equipment.

Never use metal (for example, a scalpel blade), to clean debris from the recoater blade. Metal can damage the flat surface of the blade resulting in a burr that will mark a line into parts.

3. Remove the vacuum pump tube.

Figure 12: Vacuum Pump Tube



4. Remove the recoater mount covers from both sides of the printer.

Figure 13: Removing the Recoater Mount Covers



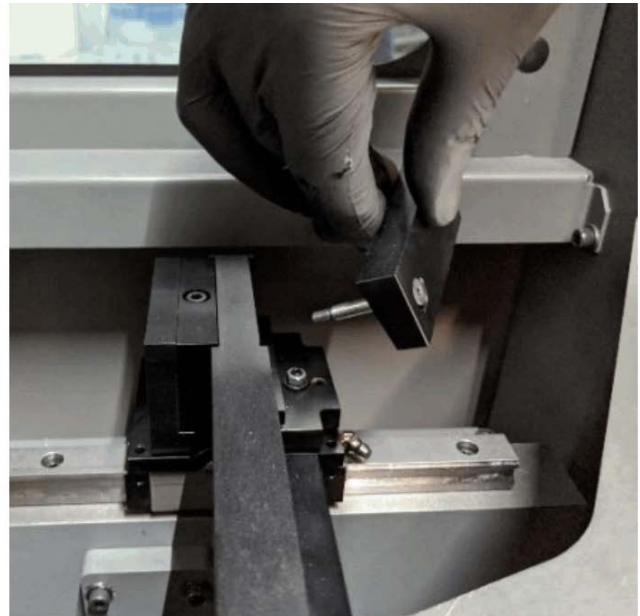
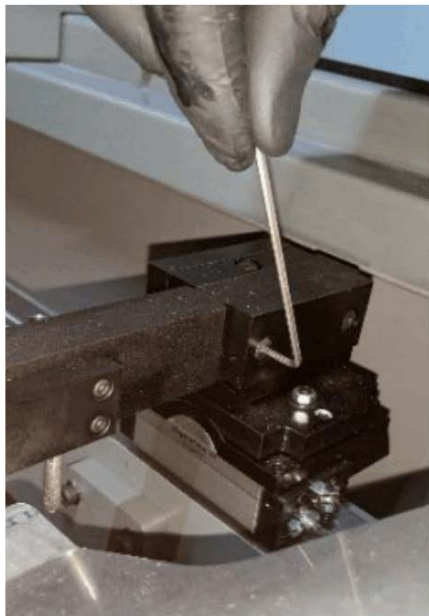
5. Use a 3 mm hex wrench to remove the hex bolts (4) that secure the clamps to both ends of the recoater blade. Retain the clamps (2).



Caution: Damage to Equipment

Do not use the ball end of the hex wrench when loosening or tightening the bolt as it is can cause rounding.

Figure 14: Removing the Recoater Blade Clamps



6. Remove the recoater blade from the printer.

**Caution: Damage to Equipment**

Care must be taken when removing the recoater blade to avoid damaging the precision edges.

Figure 15: Removing the Recoater Blade



7. Drain any excess resin from the recoater blade. To avoid resin entering the vacuum inlet, keep the recoater blade positioned in an upright orientation. While keeping the recoater blade upright, clean the inside of the blade using lint free paper towels and isopropyl alcohol.

Figure 16: Recoater Blade Vacuum Port



8. Use a plastic scraper or wooden tongue depressor to remove any difficult resin deposits.



Caution: Damage to Equipment.

Never use metal (for example, a scalpel blade), to clean debris from the recoater blade. Metal can damage the flat surface of the blade resulting in a burr that will mark a line into parts.



Installing the Recoater Blade

1. Place the blade back into position on the printer, aligned with the clamp mounts.
2. Use a 3 mm hex wrench to fasten the hex bolts (4) that secure the clamps to both ends of the recoater blade. See Figure 14.



The clamping pieces are tapered. The wider end must be on top.

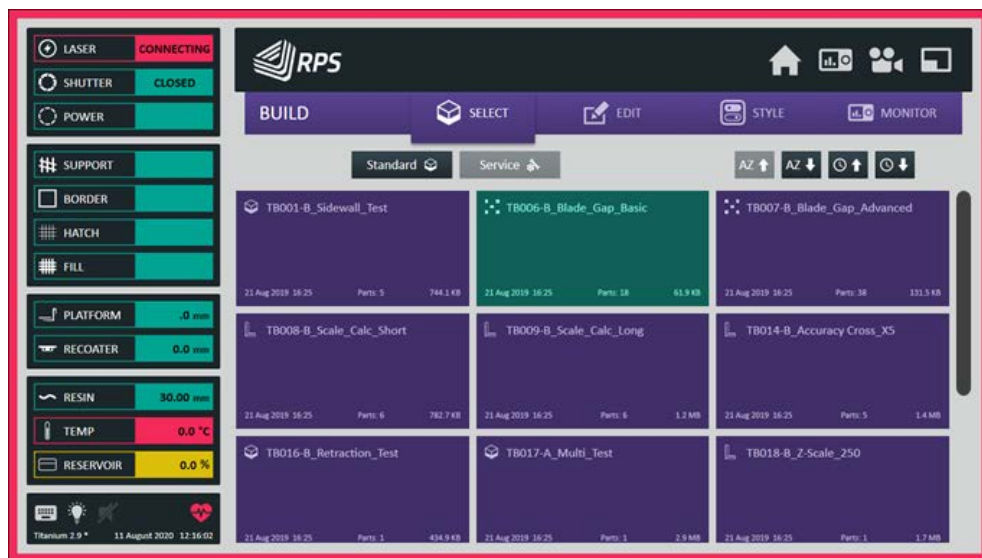
3. Install the recoater mount covers to both sides of the printer. See Figure 13.
4. Install the vacuum pump tube to the recoater blade. See Figure 12.

Recoater Blade Gap Procedure

Procedure

1. From the control panel, select Home/Build/Service, and load the blade gap part file 'TB006-B_Blade_Gap_Basic' as shown. Press **OK**.

Figure 17: Selecting the Blade Gap part file



2. Press **Start** and add or remove resin as prompted. The printer will beep when enough resin is added and the resin sensor display will read 30. The Neo800 will now build blade gap blocks (approx. 45 minutes). When they are built the machine will pump resin from the vat into the reservoir to expose the blade gap blocks and notify you when the build is complete.
3. Ensure that the blade gap blocks are free of bumps or defects. Rebuild if required.

- When the build is complete, the stepper motor driving the recoater blade will be de-energized. Manually move the recoater blade slowly for a short distance to determine the amount of resistance in the de-energized motor.



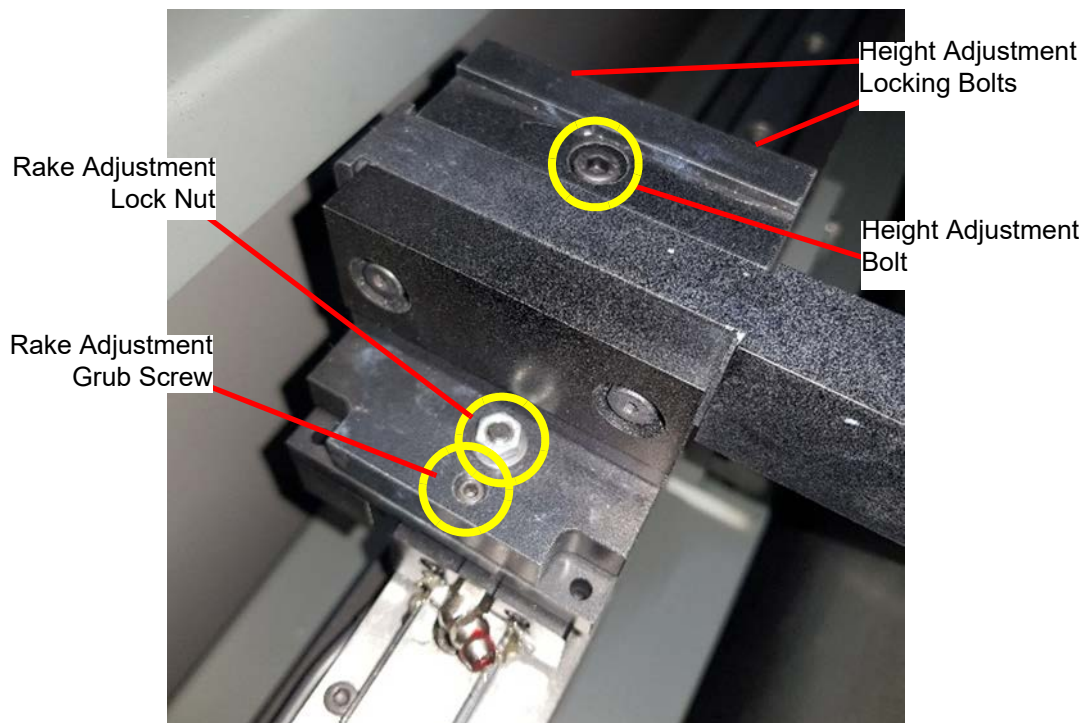
If preferred (or to gain a better feel), the motor can be de-coupled from the belt by loosening the four bolts on the mounting bracket and lifting the motor up.



Do not attempt to manually move the recoater blade while the stepper motor is energized.

- The rake will now be checked by using a feeler gauge beneath the front and rear of the blade's surface against the front left and front right blocks. This gap should be equal front and back, and needs to be checked on the left and right side of the blade as a small amount of twist can be introduced in the blade and they can differ.

Figure 18: Recoater blade adjustment



- Loosen the recoater blade height adjustment locking bolts (two left, two right) at the rear of the recoater blade bracket. The locking bolts must be loosened on both sides for all height adjustments. Failure to do so will cause the recoater linear rail bearing to be twisted.
- Gently move the recoater blade over the front blocks. If the blade touches the side of the block, adjust the height of the blade by turning the height adjustment bolt in a clockwise direction until it just passes over the block. Once the blade has been adjusted to just clear the front row of blocks, tighten the height adjustment locking bolts.

8. Measure the blade gap of the front corner blocks (disregard the center block as this point) with a feeler gauge between the top of the blocks and the recoater blade front and rear edges. Adjust the recoater blade until you have an even 0.125mm [0.005 in] gap across both corner blocks on both the front and rear of the edges of the blade, with no resistance felt with the feeler gauge. Watch the resin surface and when the feeler gauge is gently removed from under the blade, there should be no flicker seen on the surface.



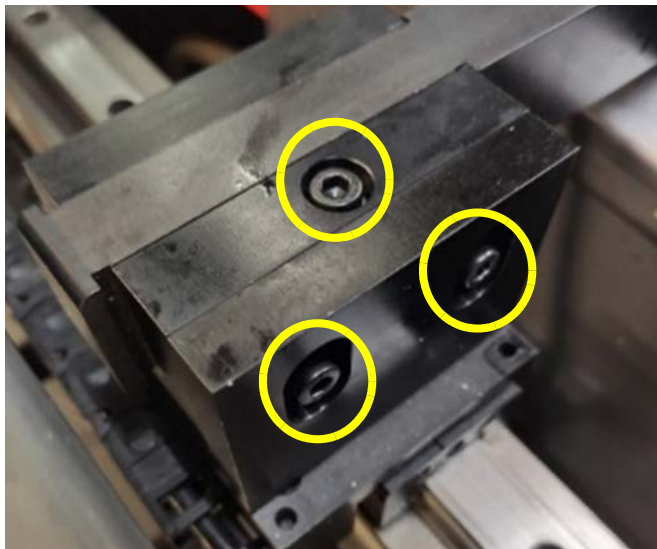
Be careful not to over-adjust the rake of each end of the blade in different directions. Although a small amount of adjustment in opposing directions to achieve an even gap is common, the blade is machined to tight tolerances and should not need to be twisted.

9. Insert a 0.150 mm [0.006 in] feeler gauge and a slight resistance should be felt and a flicker on the surface of the resin will be seen when the feeler gauge is slowly removed from under the blade.

Figure 19: Checking the blade height with a feeler gauge



Figure 20: Recoater blade height adjustment and locking bolts



10. Once the blade gap has been set for the front corner blocks, gently push the recoater blade to the back of the vat, over the two rear corner blocks.



If the blade gaps vary from the front to the back of the platform, the recoater linear rails may be slightly out of level and must be adjusted. To correct this issue, please call your regional service representative to schedule a service visit. This is not a customer adjustable item.

11. Repeat this procedure until the correct blade gap is achieved across all four of the corner blocks.
12. Push the blade over the rest of the blocks while checking that the correct clearance is maintained across the whole platform.
 - Some recoater blades are not completely flat and can dip slightly in the middle causing all the center blade gaps to be slightly smaller. In this case, adjust the blade evenly to clear the tightest block correctly.
 - If the center blade gap is smaller in only one place, it is likely that the recoater mounting brackets are twisting in and distorting the blade. If this is the case, re-parallel the linear rails and check the yaw of the rails as described earlier in this document.
13. Repeat the above procedures until an even 0.125 mm gap is achieved across all blocks and the rake is correct. This procedure is time consuming, but it is critical that it is carried out as accurately as possible.
14. Install the two black plastic recoater mount covers by sliding and clipping them on top of the mounts.

Figure 21: Recoater mount cover installed



Vacuum Level Adjustment

Procedure

1. From the control panel, navigate to Motion Control and select **Level Resin**.
2. On the frame to the right of the vat, locate the resin level control valve, pull the red lock ring forwards.
3. Using the resin level control valve, bring the resin level in the window to approximately half-way up. Clockwise will raise the level, counter-clockwise will lower it. Give the level several minutes to settle after each adjustment is made.

Figure 22: Vacuum pump and adjustment valve



Figure 23: Resin level window



7 TROUBLESHOOTING

This chapter describes troubleshooting steps that can be performed to correct basic problems with the Stratasys Neo450 and Neo800 printers.

Getting Help

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

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

- Your printer's software version.
- Your printer's serial number.

Neo450 Fuses

Always Contact StratasyS before replacing fuses.

Figure 1: Neo450 fuse locations (part 1)

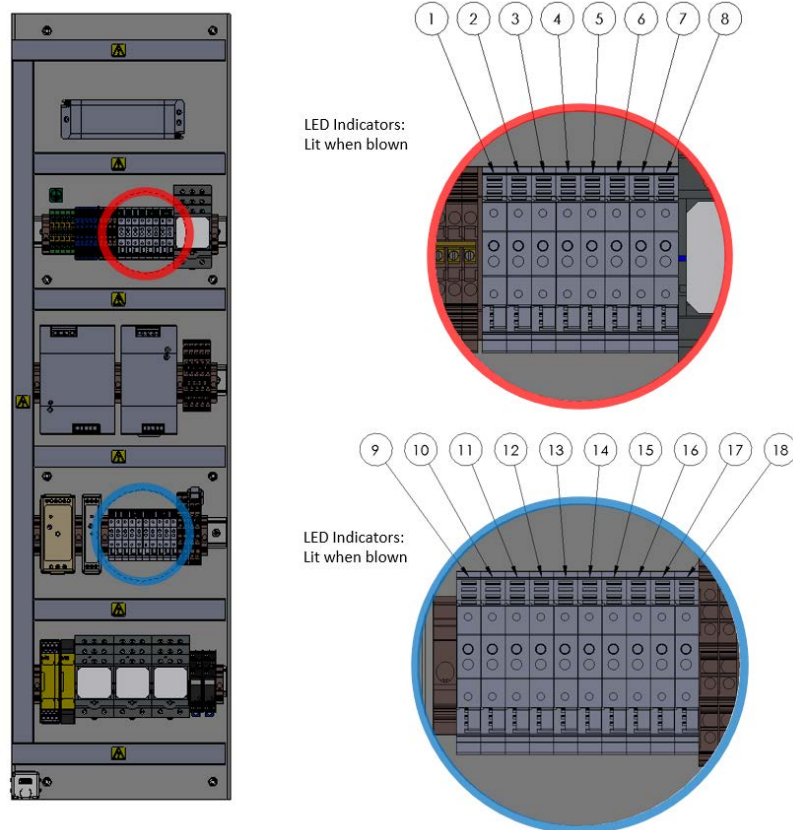


Figure 2: Neo450 fuse locations (part 2)

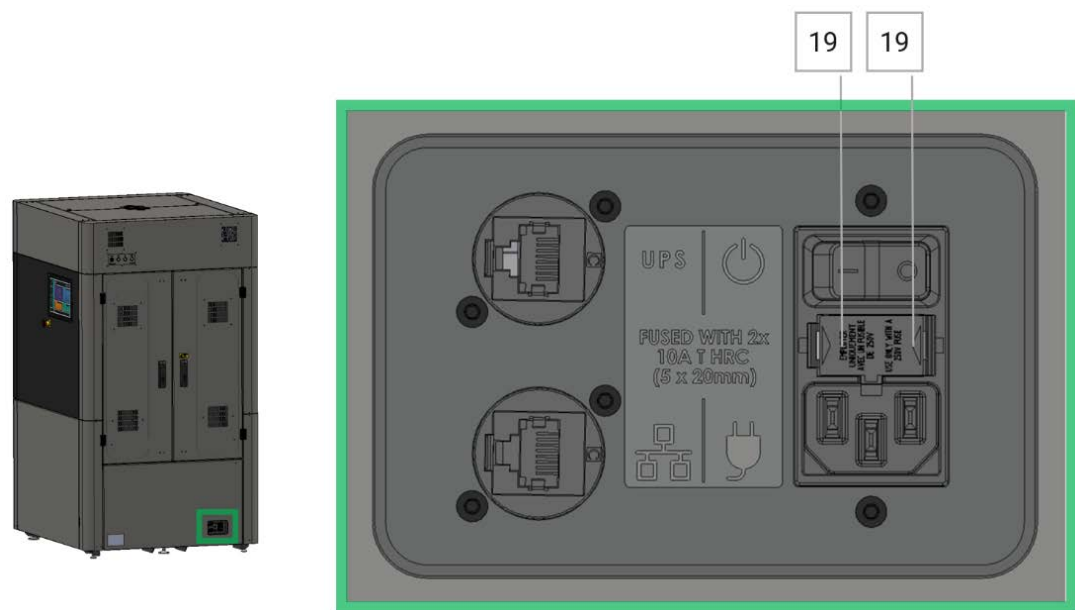


Figure 3: Neo450 fuse specifications

Neo450 Fuses

AC Fuses	ID	Rating	Specification	Size, mm
<i>PSU1</i>	1	1.0 A	Anti-Surge, T	5 x 20
<i>PSU2</i>	2	1.0 A	Anti-Surge, T	5 x 20
<i>PSU4</i>	3	2.5 A	Anti-Surge, T	5 x 20
<i>PSU5</i>	4	2.5 A	Anti-Surge, T	5 x 20
<i>PSU6, LED Driver</i>	5	2.0 A	Anti-Surge, T	5 x 20
<i>PSU7</i>	6	2.0 A	Anti-Surge, T	5 x 20
<i>Vat Heater</i>	7	6.3 A	Anti-Surge, T	5 x 20
<i>Reservoir Heater</i>	8	2.0 A	Anti-Surge, T	5 x 20
DC Fuses	ID	Rating	Specification	Size, mm
<i>Safety Relay, Heater Safety Relay</i>	9	630 mA	Quick Blow, F	5 x 20
<i>SIB, PLC BUS</i>	10	1.6 A	Quick Blow, F	5 x 20
<i>User Interface Control Lamps</i>	11	630 mA	Quick Blow, F	5 x 20
<i>Interlock Safety Relays</i>	12	630 mA	Quick Blow, F	5 x 20
<i>Vacuum Pump</i>	13	630 mA	Quick Blow, F	5 x 20
<i>Monitor</i>	14	1.6 A	Quick Blow, F	5 x 20
<i>Cabinet Fan</i>	15	630 mA	Quick Blow, F	5 x 20
<i>Stepper Motor PLC Supply</i>	16	6.3 A	Quick Blow, F	5 x 20
<i>Computer PSU</i>	17	6.3 A	Quick Blow, F	5 x 20
<i>PLC Processor</i>	18	6.3 A	Quick Blow, F	5 x 20
Main Isolator Fuses	ID	Rating	Specification	Size, mm
<i>Live</i>	19	10.0 A	HRC, Anti-Surge, T	5 x 20
<i>Neutral</i>	19	10.0 A	HRC, Anti-Surge, T	5 x 20

Neo800 Fuses

Always Contact Stratasys before replacing fuses.

Figure 4: Neo800 fuse locations

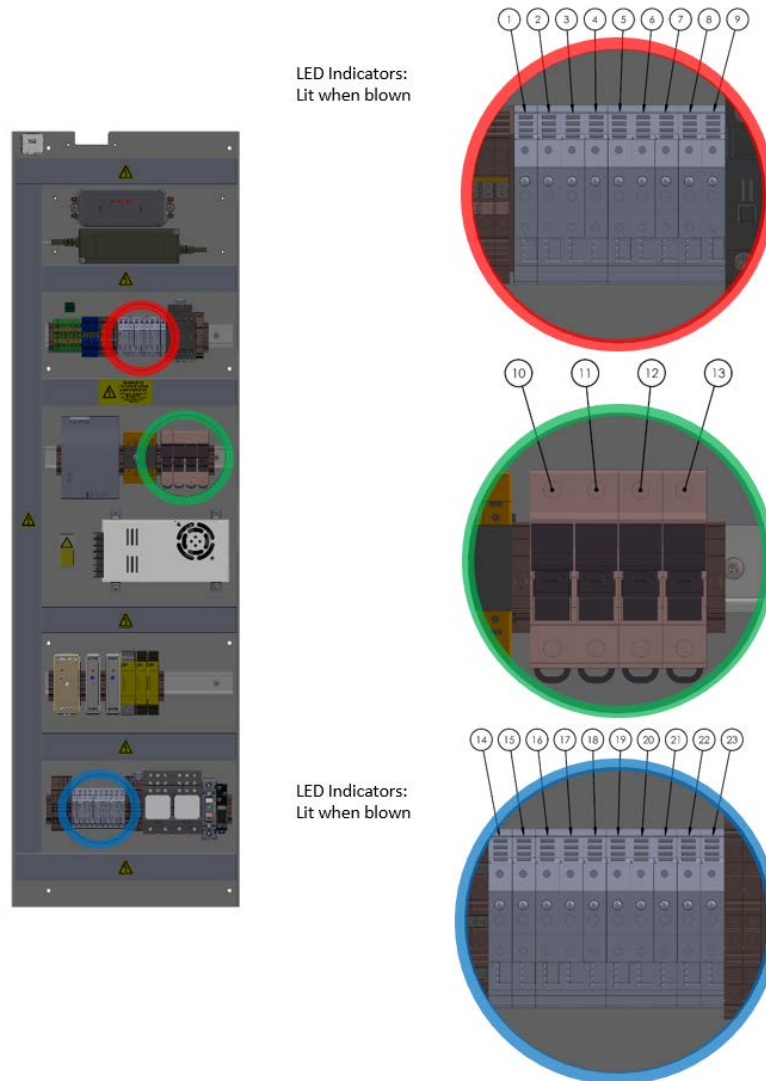


Figure 5: Neo800 fuse specifications

Neo800 Fuses

AC Fuses	ID	Rating	Specification	Size, mm
<i>PSU1</i>	<i>1</i>	1.0 A	Anti-Surge, T	5 x 20
<i>PSU2</i>	<i>2</i>	1.0 A	Anti-Surge, T	5 x 20
<i>PSU3</i>	<i>3</i>	2.5 A	Anti-Surge, T	5 x 20
<i>PSU4</i>	<i>4</i>	2.5 A	Anti-Surge, T	5 x 20
<i>PSU5</i>	<i>5</i>	2.0 A	Anti-Surge, T	5 x 20
<i>PSU6, LED Driver</i>	<i>6</i>	2.0 A	Anti-Surge, T	5 x 20
<i>PSU7</i>	<i>7</i>	2.0 A	Anti-Surge, T	5 x 20
<i>Vat Heater</i>	<i>8</i>	6.3 A	Anti-Surge, T	5 x 20
<i>Reservoir Heater</i>	<i>9</i>	2.0 A	Anti-Surge, T	5 x 20
Main Isolator Fuses	ID	Rating	Specification	Size, mm
<i>Live</i>	<i>10</i>	10.0 A	HRC, Anti-Surge, T	10 x 38
<i>Neutral</i>	<i>11</i>	10.0 A	HRC, Anti-Surge, T	10 x 38
<i>UPS Live (Optional)</i>	<i>12</i>	6.0 A	HRC, Anti-Surge, T	10 x 38
<i>UPS Neutral (Optional)</i>	<i>13</i>	6.0 A	HRC, Anti-Surge, T	10 x 38
DC Fuses	ID	Rating	Specification	Size, mm
<i>Safety Relay, Heater Safety Relay</i>	<i>14</i>	630 mA	Quick Blow, F	5 x 20
<i>SIB, PLC BUS</i>	<i>15</i>	630 mA	Quick Blow, F	5 x 20
<i>User Interface Control Lamps</i>	<i>16</i>	630 mA	Quick Blow, F	5 x 20
<i>Interlock Safety Relays</i>	<i>17</i>	630 mA	Quick Blow, F	5 x 20
<i>Vacuum Pump</i>	<i>18</i>	630 mA	Quick Blow, F	5 x 20
<i>Monitor</i>	<i>19</i>	1.6 A	Quick Blow, F	5 x 20
<i>Cabinet Fan</i>	<i>20</i>	630 mA	Quick Blow, F	5 x 20
<i>Stepper Motor PLC Supply</i>	<i>21</i>	6.3 A	Quick Blow, F	5 x 20
<i>Computer PSU</i>	<i>22</i>	6.3 A	Quick Blow, F	5 x 20
<i>PLC Processor</i>	<i>23</i>	6.3 A	Quick Blow, F	5 x 20

8 SUPPLEMENTARY INFORMATION

Customer Service

Servicing and Repairs

**Warning: Electrical Hazard**

LED Chamber lamps must be replaced with same manufacturer and type, and must not exceed 5W each.

Except for routine cleaning, the Neo450 and Neo800 do not contain user-serviceable internal parts. All servicing and repairs should only be performed by an Stratasys representative. Only Stratasys has the correct knowledge and procedures to service, repair, and optimize the system.

Contacting Stratasys

For service, repairs, advice, or information, contact your local Stratasys representative, or Stratasys directly using the details below:

<https://support.stratasys.com/en/contact-us>

Declaration of Conformity

Declaration of Conformity information is available from your Stratasys representative. Please contact your local regional office for a copy of this document.

Regulatory and Environmental Information

EMC Class A Warning

**Warning:**

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

FCC Statements (U.S.A.)

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

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Stratasys contact information is available from the [Stratasys Support Center](#).

**Caution:**

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



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

Supplier's Declaration of Conformity**47 CFR § 2.1077 Compliance Information****Models:**

Neo450e

Neo450s

Neo800

FCC Compliance Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with

the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

UK Conformity Assessed (UKCA) Marking



This conformity mark indicates that the printer conforms with the applicable requirements for products sold within Great Britain.

Canada Electromagnetic compatibility (EMC)

Normes de Sécurité (Canada)

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

DOC Statement (Canada)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

MSDS (Material Safety Data Sheet)

You can obtain current Material Safety Data Sheets for printer materials from the Stratasys website at: <http://www.stratasys.com/materials/material-safety-data-sheets>.

Disposal of Waste Equipment by Users in Private Households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Alternatively, the product can be returned to Stratasys for a fee, to be properly disposed of in compliance with environmental regulations.

