amt postpro®



PostPro3D USER MANUAL

JANUARY 2023 / V6.0

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1 // RISKS AND SAFETY WARNINGS

⚠DANGER Danger indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠WARNING Warning indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠CAUTION Caution indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

⚠DANGER **Chemical Hazard: PostProBlastX®™** may cause severe skin burns and permanent eye damage, including blindness. The chemical may also cause organ damage with prolonged exposure. Pregnant and breastfeeding women should not enter the processing room or operate PostPro3D®. The client must have an eye wash station and emergency shower available when using this consumable and follow the general lab safety precautions. The consumables may also cause an allergic skin reaction. Do not breathe the mist or vapour.

⚠CAUTION **Chemical Hazard:** Avoid touching parts that have been partially or recently processed, even when wearing nitrile gloves. Ensure that all PostPro3D® process steps are concluded to the manufacturer's instructions before touching any processed parts with bare hands.

⚠CAUTION **Chemical Hazard:** If an operator gets chemicals in their eye, immediately flush it out with water using the safety eye wash. Consult the MSDS for more information about treating eye exposure.

⚠CAUTION **Chemical Hazard:** If an operator gets chemicals on their skin, immediately rinse with water. Consult the MSDS for more information about treating skin exposure.

⚠CAUTION **Chemical hazard:** If a processed part is sticky, even after full processing, something may have gone wrong with the processing steps or the part maybe partially processed. Do not handle the part with bare hands and avoid any inhalation of fumes by using an appropriate mask with filter.

⚠DANGER **Chemical Hazard:** always Keep the PostPro3D® machine door closed when not processing to ensure no fumes are inhaled by operators. Keep waste containers closed all the time

⚠CAUTION **Pinch Hazard:** The lid of the processing chamber is heavy. Close the lid carefully using the handles on the PostPro3D® to avoid pinching fingers or hands.

⚠CAUTION **Electrical Hazard:** Do not open any door in the body of the device as there is an electric shock risk. The doors are for service entry only by AMT Support team only.

⚠WARNING **Chemical warning:** Do not place processed parts in the mouth or give processed parts to children or to animals.

⚠DANGER **Tipping Hazard:** Always use at least two people to move PostPro3D®. Unlock the castor heels at the base of the machine before attempting to move the machine. Lock the wheels once PostPro3D® is in its new position.

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2 // OPERATING POSTPRO3D® MACHINE SAFELY

AMT recommend that the client study this section carefully and if the client has any questions about how to create a safe operating environment or how to operate PostPro3D® safely contact us immediately.

Prior to the installation of the machine we recommend that the client get all safety equipment and procedures in place. We can provide advice on how this is done.

The PostPro3D® machine uses potentially toxic consumables if handled incorrectly. Safety Data Sheets (termed MSDS) are available for all consumables used. The client's safety procedures should rely solely on the information on the MSDS on handling chemicals, what to do if there is a spill and what to do if the chemical comes in contact with skin, etc.

⚠ **Note: These MSDS take priority over any advice AMT provide.**

2.1 // SAFETY DATA SHEETS

The client should read and understand the chemical Material Safety Data Sheet (MSDS) for each chemical used by PostPro3D®. A copy of the MSDS will be available in the shipping crate and AMT can make these sheets available online.

The client should ensure they place paper and electronic copies of the MSDS where machine operatives and visitors can access them quickly in the PostPro3D® machine room.

2.2 // PERSONAL PROTECTIVE EQUIPMENT (PPE)

While operating the PostPro3D® machine the following PPE must be used:

1. Disposable nitrile gloves;
2. Closed toe safety shoes;
3. Laboratory Spill resistant coat;
4. Close fitting chemical eye protection;
5. Half face mask with AX-P3 type filters.

2.3 // GENERAL LAB SAFETY PRECAUTIONS

Always follow these general precautions when working with PostPro3D®:

1. Wear goggles.
2. Wear a lab coat, disposable gloves, and closed-toed chemical-resistant shoes.
3. Change disposable gloves often.
4. Wash hands between glove changes and at the end of the processing.
5. Always keep lab coats inside the lab area until they are sealed in a bag and removed by a laundry service.
6. Tie long hair back to avoid catching it in mechanical parts or brushing it against chemicals on the lab bench.
7. Remove jewellery, such as necklaces and rings, to avoid catching them in mechanical parts or trapping chemicals under them.
8. No food or drink should be brought into or consumed in the processing room.
9. Make sure the processing room has a well-maintained eye-wash station and safety shower.
10. Never work alone in the lab.

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3 // TRAINING

Prior to the installation taking place users of the PostPro3D® must undertake the online training modules on the AMT Academy. Access to the AMT Academy will be granted by your AMT representative. Please contact them for more information.

Additive Manufacturing Technologies will provide training for PostPro3D® onsite once the machine is installed.

All users of the PostPro3D® should be present during the entirety of training. The training is essential to understand how to operate the machine safely, setting up the machine for processing, adjusting the machine for different parts geometries and materials.

Only persons present at the time of training should use the machine. If necessary additional training can be provided by Additive Manufacturing Technologies.

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4 // EQUIPMENT DESCRIPTION

4.1 // LAYOUT

The PostPro3D® machine offers a controllable surface finish which brings surface roughness (Ra values) of 3D printed polymer parts down to 0.3 µm without the loss of detail and definition. In addition, the smoothing process naturally seals the pores on the surface of the 3D printed part, which significantly enhances the water-protective properties of the material.

The machine has been successfully tested with a range of polymers including Polyamide (PA)-12, PA-11, PA-6, Thermoplastic Polyurethane (TPU), ULTEM 9085, TPE-210 elastomer materials, Polymethyl Methacrylate (PMMA) Acrylonitrile butadiene styrene (ABS) and many more. It is capable of processing Multi Jet Fusion (MJF), Laser Sintered (LS), High Speed Sintered (HSS) and FDM 3D printed parts to the desired surface roughness using smart algorithms and the proprietary BLAST® process.



4.2 // LAYOUT

The PostPro3D® is supplied with two auxiliary units, an extraction system and a chiller to support its operation.



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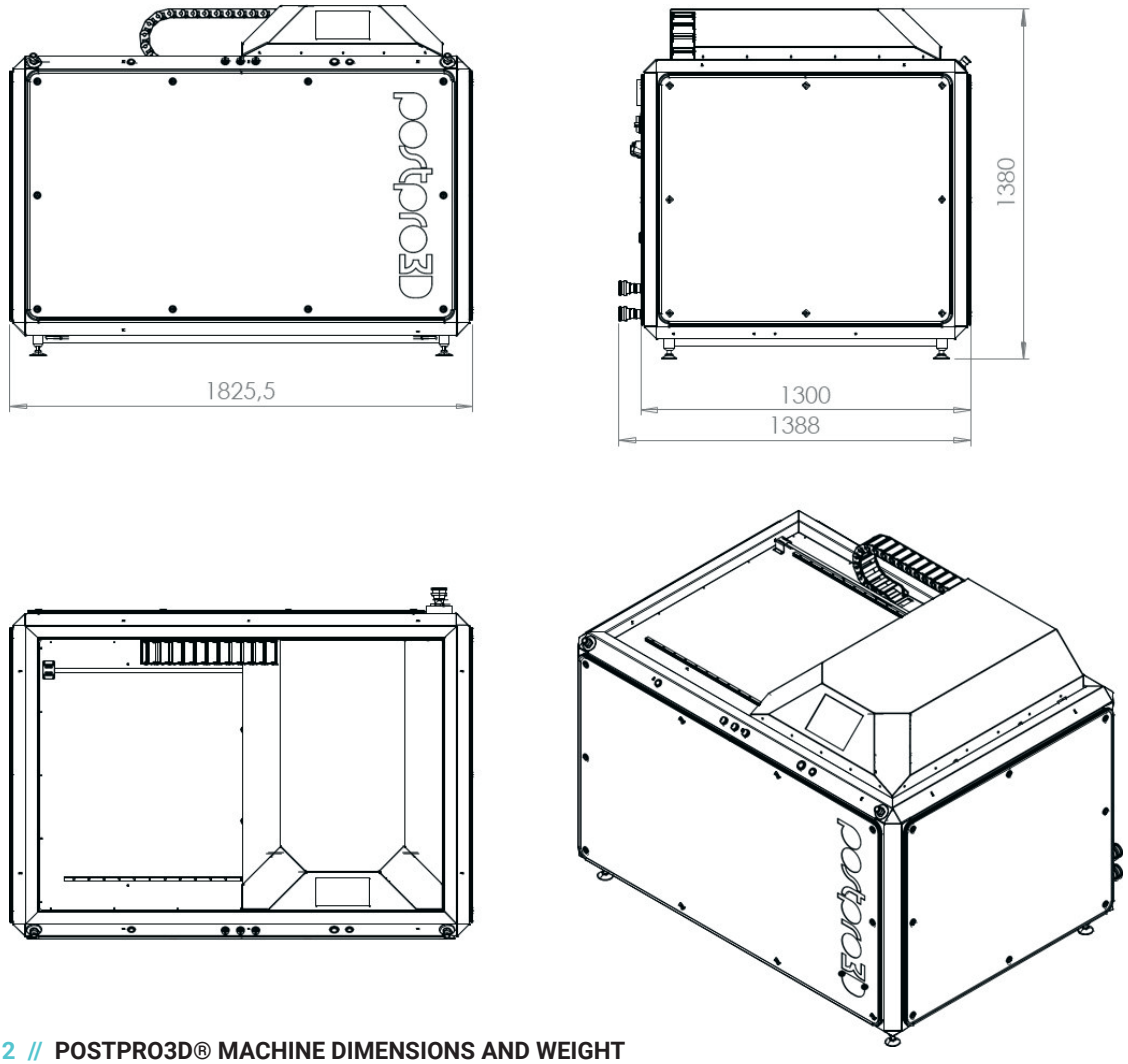
5 // MACHINE SPECIFICATION

5.1 // MACHINE DIMENSIONS



5.2 // POSTPRO3D® MACHINE DIMENSIONS AND WEIGHT

	UNPACKED (NET)	
Dimension	INCHES / Lbs	MM / KG
Height	55	1380
Length	72	1825
Width	51	1300
Weight	2420	1100

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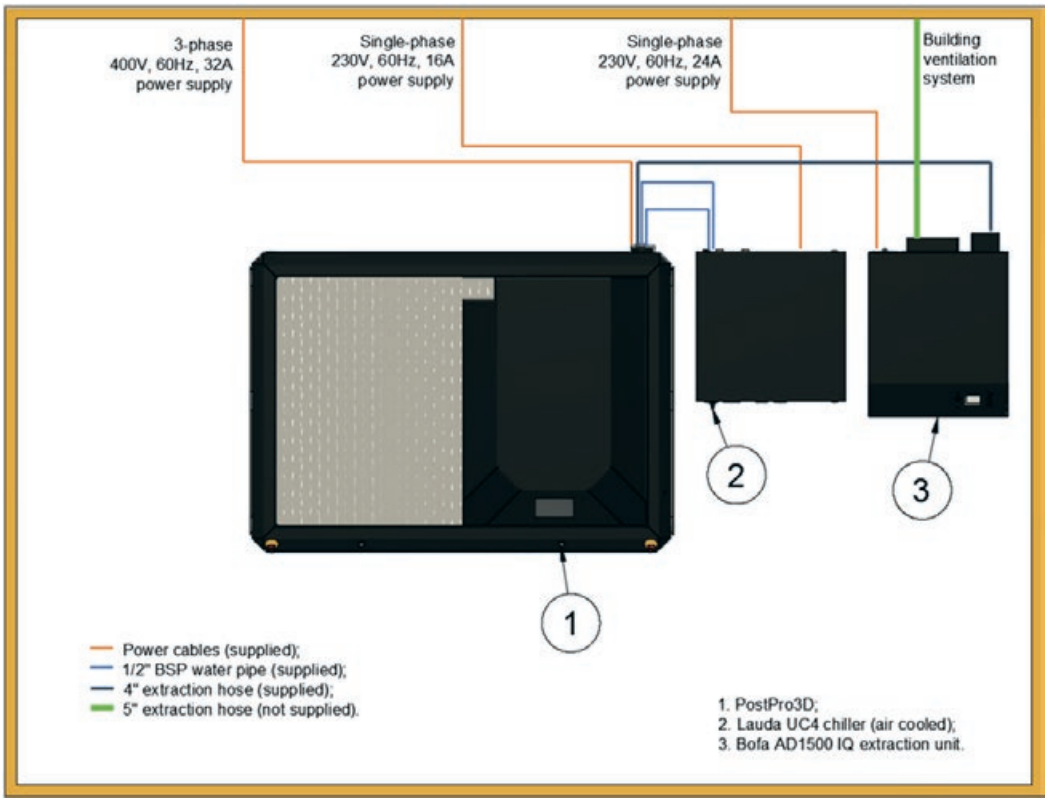
5.3 // EXTRACTION SYSTEM (BOFA AD1500IQ) / COOLING SYSTEM (LAUDA ULTRACOOL – UC4) DIMENSIONS AND WEIGHT

	Lauda Ultracool UC4		BOFA AD1500iQ	
Dimension	INCHES / Lbs	MM / KG	INCHES / Lbs	MM / KG
Height	25	635	48	1197
Width	26	640	32	790
Length	26	644	24	600
Weight	188	85	320	145

5.4 // POSTPRO3D® CONNECTION LAYOUT (USA)

Connection option UC4 (air cooled) chiller:



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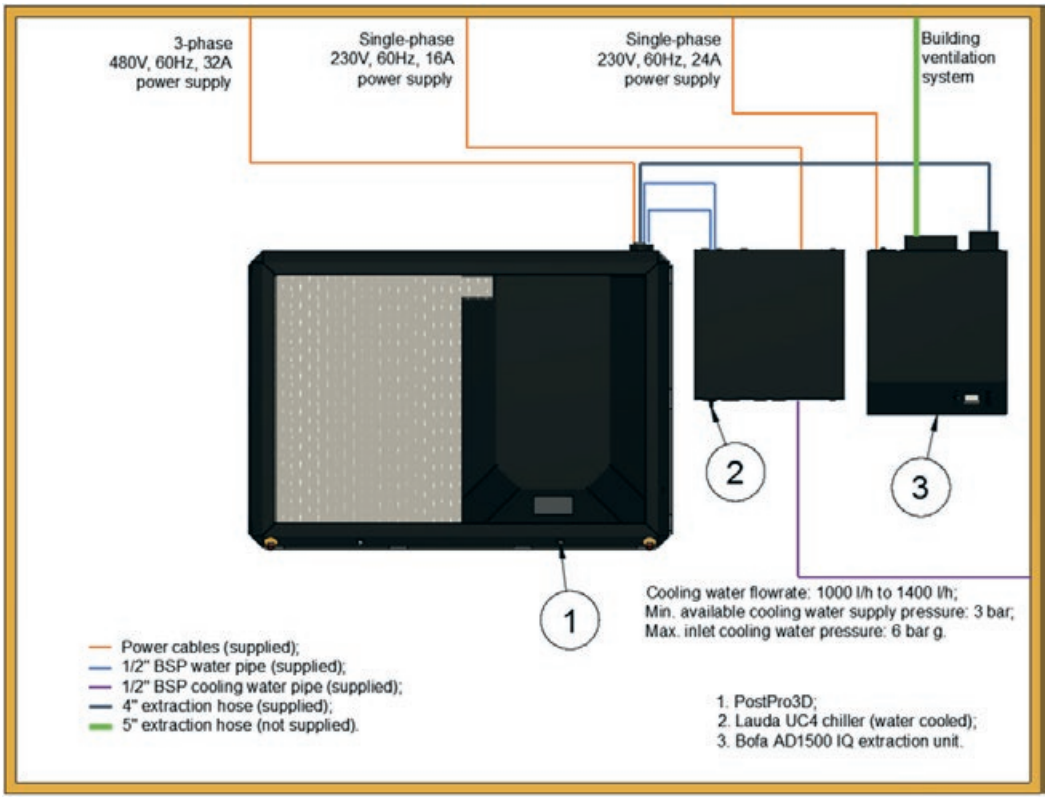
Connection option UC4 (water cooled) chiller:



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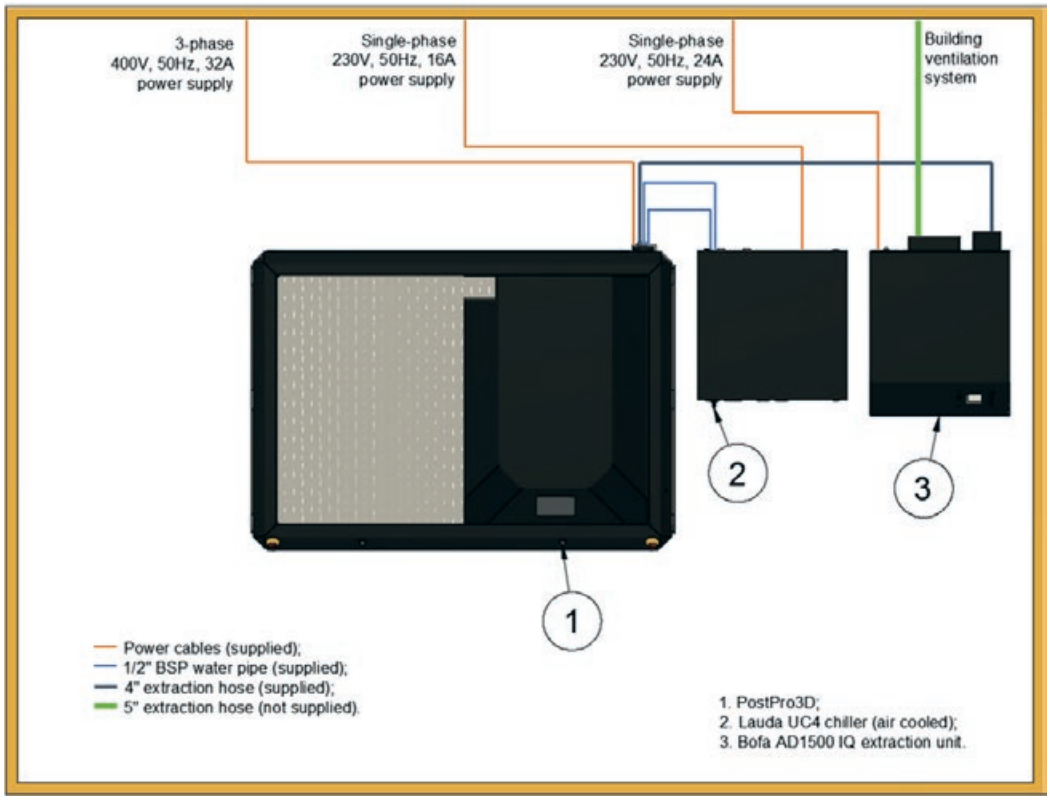
5.5 // POSTPRO3D® CONNECTION LAYOUT (EUROPE)

Connection option UC4 (air cooled) chiller:



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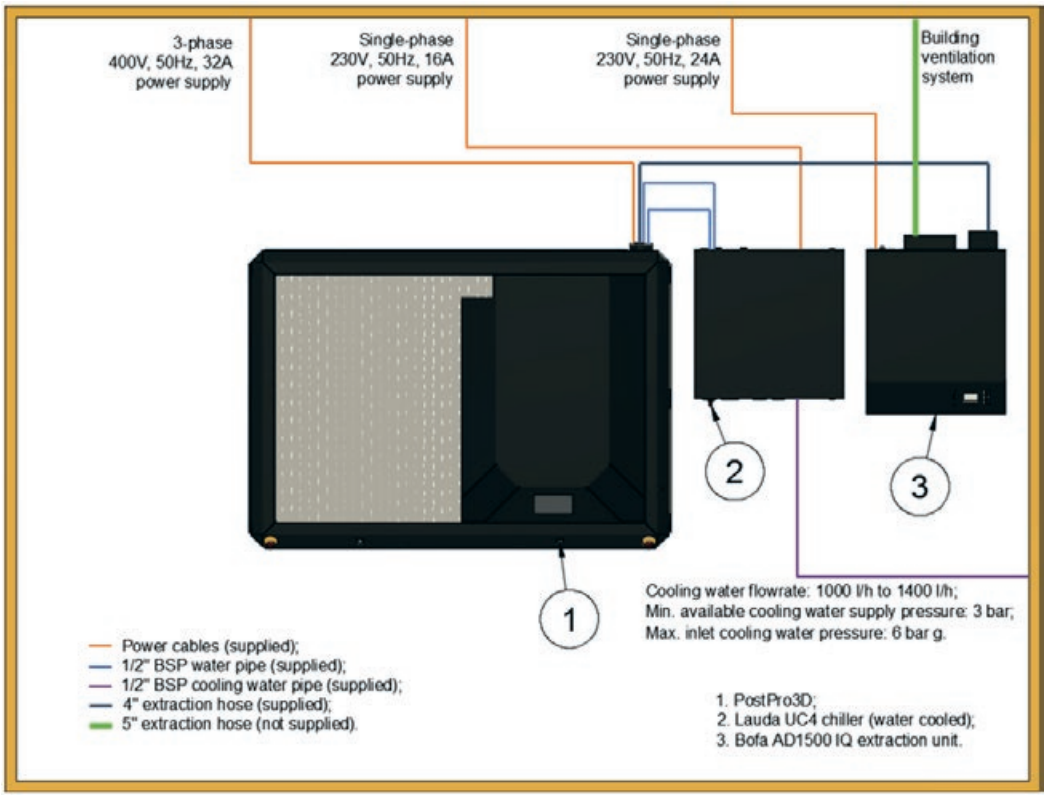
Connection option UC4 (water cooled) chiller:



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5.6 // POSTPRO3D® ELECTRICAL POWER REQUIREMENTS

Note: The client is responsible for connecting all supplied equipment to the building's power supply prior to the installation date.

The PostPro3D machine must be connected to the following supply:

Specification	UK/EU	US
Connection	CEE socket 400 V / 32 A	CEE socket 480 V / 32 A
Voltage	400V 3 Phase + Neutral + PE	480 V 3~/PE
Voltage Fluctuations	+10 % to -10 %	+10 % to -10 %
Frequency	50 Hz	60 Hz
Rated Short Circuit Current	10 kA	10 kA
Nominal Power	23 kW	28.5 kW
Power Consumption (typical, during processing)	9.7 kW	12.4 kW
Mains Fuse Protection	3 x 32 A (characteristic C)	3 x 32 A (characteristic C)
Length of Mains Cable (scope of delivery)	6 m	Not supplied

In addition, an isolation switch to cut power to the machine should be located the outside of the room.

5.6.1 // COOLING SYSTEM

• Single Phase, 230V, 60Hz, 16A (Type C Breaker)

• Refer to separate manual for more information (Attached)

• No power socket supplied

5.6.2 // EXTRACTION SYSTEM

• Single Phase, 230V, 60Hz, 24A (Type C Breaker)

• Refer to separate manual for more information (Attached)

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6 // MACHINE OVERVIEW

6.1 // COMPONENTS, PHYSICAL BUTTONS INDICATORS



The machine has a series of indicating lights and buttons in the front panel to complement the functionalities in the HMI and to provide additional safety measures for safe operation. The items indicated are the following:

1. **E-STOP:** two emergency buttons are placed in the front panel and should be pressed in case of an emergency;
2. **LID MOVEMENT BUTTONS:** to avoid getting fingers trapped, the two buttons must be pressed simultaneously to activate the lid opening and closing mechanism;
3. **HMI:** with the HMI the user can set process parameters, start a process run and diagnose the machine in case of warnings or errors;
4. **RED LED INDICATOR:** this indicator will light up when the E-STOP is pressed, or a hard error is present;
5. **YELLOW LED INDICATOR:** the machine will flash this LED when it requires the operator attention;
6. **GREEN LED INDICATOR:** machine is operational;
7. **FRONT PANEL BLUE LOGO LED:** This will flash when the PostPro3D® requires the operator attention;
8. **ON/OFF SWITCH:** this switch is used to turn the power supply to the machine on and off.;
9. **BODY EXTRACTION OUTLET:** 5” outlet which is connected to the extraction unit;
10. **MACHINE WATER LINE (COOLING) OUTLET:** cooling line connected to the chiller inlet;
11. **MACHINE WATER LINE (COOLING) INLET:** cooling line connected to the chiller outlet;
12. **POWER CONNECTION:** Power lead to connect to mains power supply;
13. **EXTRACTOR CONNECTION:** Electronic connection to the Extraction Unit;
14. **ACCESS KEY:** Turn to access the Protected User Mode;

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6.2 // POSTPROBLASTX® CANISTER LOCATION



The PostProBlastX® Canisters are located inside the left hand side of the machine. The indicated items are explained below:

1. **VIRGIN CANISTER:** This is the canister which contains the PostProBlastX® consumable for processing;
2. **RECOVERY CANISTER:** This is the canister in which any excess solvent from the process cycle is recovered;
3. **SYPHON QUICK CONNECT:** The Syphon connection is the connector through which the PostProBlastX® is transferred from the canister to the machine;
4. **BREATHER QUICK CONNECT:** The Breather connection allows the flow of air into the canister;
5. **LOW LEVEL SENSOR CONNECTION:** This is the connection between low level sensor in the canister and the PostPro3D®.

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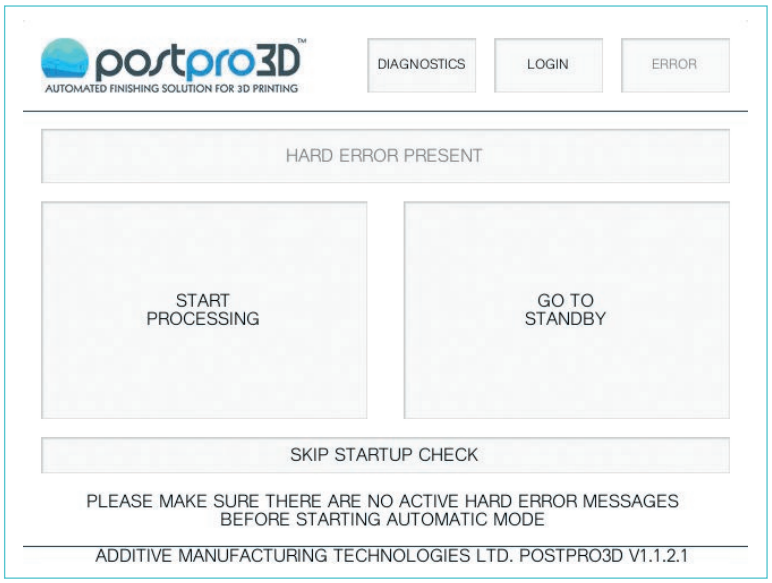
6.3 // HMI (HUMAN MACHINE INTERFACE)

There are two layers of access to the interface, operator and protected. The protected user requires a login and is used for diagnostics and personalisation of process parameters.

Please note not all buttons are visible depending on the user access level.

6.3.1 // START-UP

When the PostPro3D® is powered on the user is prompted with the Start-Up screen shown in the image below.



The Start-Up screen inputs and outputs consist of:

1. **HARD ERROR PRESENT:** This button will light up when a hard error is present. A hard error consists of any error that stops the user from performing a process run. Contact AMT for technical support when this button is lit up;

2. **START PROCESSING:** After powering on this button will initialize the start-up process for the machine. After the initialization has taken place this button will allow the user to start a process cycle;

3. **GO TO STANDBY:** Standby mode can be used when leaving the machine on for longer periods of time without the need to power it off;

4. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.

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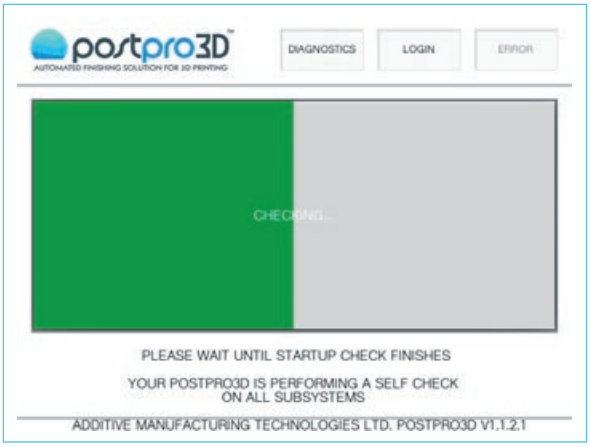
6.3.2 // MACHINE INITIALIZATION

After selecting the 'START PROCESSING' button on the Home Screen the machine will start an initialization process. During the initialization the machine will test various functions on the machine. This process takes approximately 10 minutes.

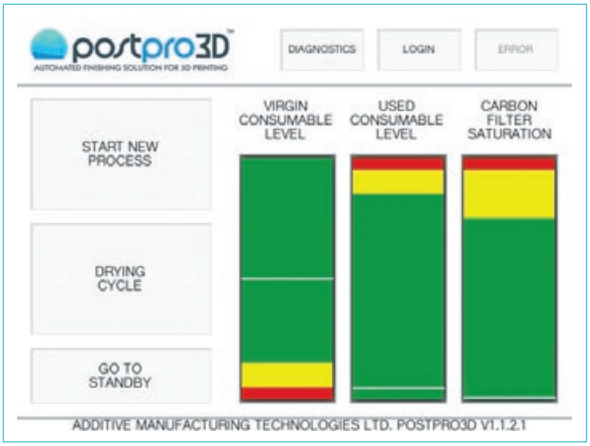
The following screen is displayed while the start-up initialization is in process.



6.3.3 // PROCESSING HOME

After the start-up check is completed the operator will be re-directed to the Processing Home Screen (image below). On this screen the inputs and outputs consist of:

1. **START NEW PROCESS:** by clicking this the user will be able to start a new process run;
2. **DRYING CYCLE:** by clicking this the user will be able to run a drying cycle independently;
3. **OPEN LID:** Level 3 Users open the lid by pressing this button.
4. **GO TO STANDBY:** standby mode can be used when leaving the machine on for longer periods of time without the need to power it off;
5. **ERROR:** by clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface;
6. **VIRGIN CONSUMABLE LEVEL:** this indicator will show the quantity of consumable currently in the virgin cannister;
7. **USED CONSUMABLE LEVEL:** this indicator will show the amount of consumables in the recovery cannister;
8. **CARBON FILTER SATURATATION:** this indicates the level of saturation in the carbon filters. When the dial shows yellow or red a replacement of the carbon filters is recommended.



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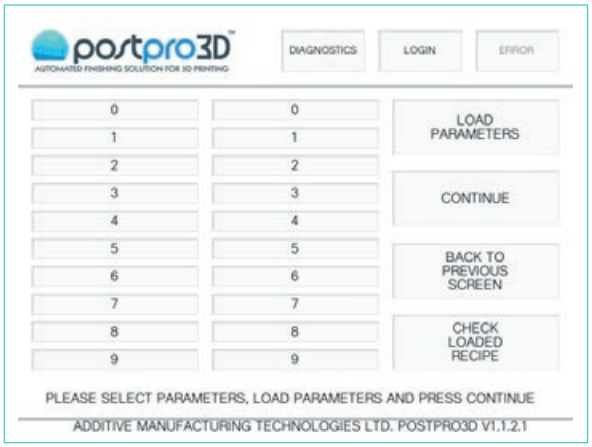
6.3.4 // RECIPE SELECT

This screen allows you to select a pre-determined recipe for use in the processing cycle. On this screen the inputs and outputs consist of:

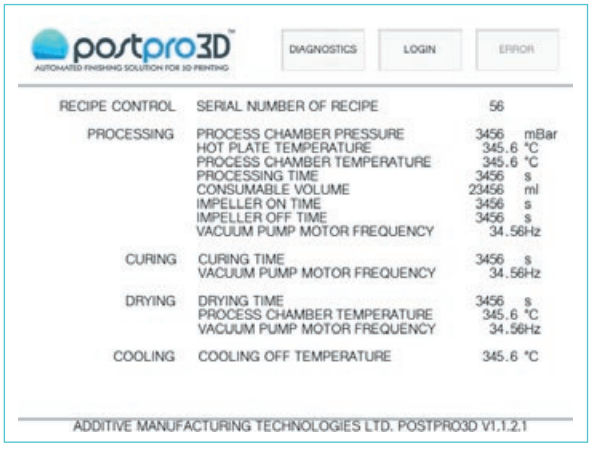
1. **RECIPE NUMBER SELECT: T**wo columns of numbers from 0 – 9 allow the user to select a predetermined recipe for processing. To first column represents the first number and the second column represents the second number of the recipe. For example, to select recipe number two, select '0' and '2';
2. **LOAD PARAMETERS:** Once the Recipe number has been selected press the 'LOAD PARAMETERS' button to load the recipe parameters for use;
3. **CONTINUE:** Press this to start the process cycle;
4. **CHECK LOADED RECIPE:** Press this to view the process parameters of the loaded recipe. Please note this button is only available when the access key has been turned;
5. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



6.3.5 // VIEW LOADED PARAMETERS

This screen shows the loaded recipe parameters. On this screen the inputs and outputs consist of:

1. **PREVIOUS SCREEN:** Select this button to return to the Recipe Select Screen
2. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



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6.3.6 // CYCLE IN PROGRESS

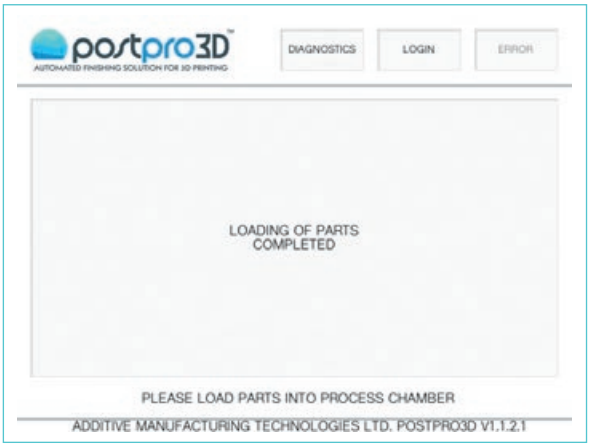
The following screen is shown when the process cycle is underway. The time remaining of the cycle is shown on this screen.



The PostPro3D® prompts the user to open the lid when required to do so. When the below screen is shown the operator must press and hold the buttons to open the lid.



When the lid is fully open the below screen is shown and the operator can release the buttons.



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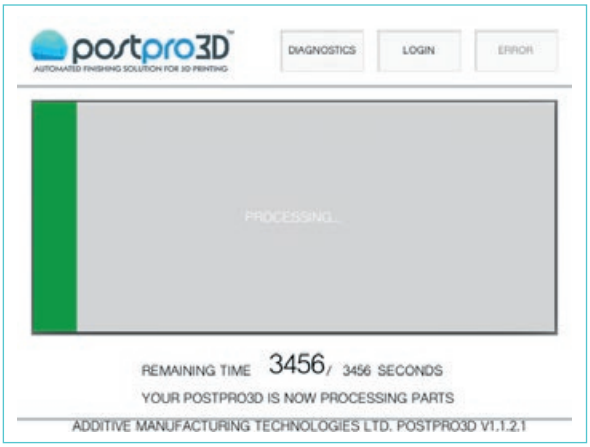
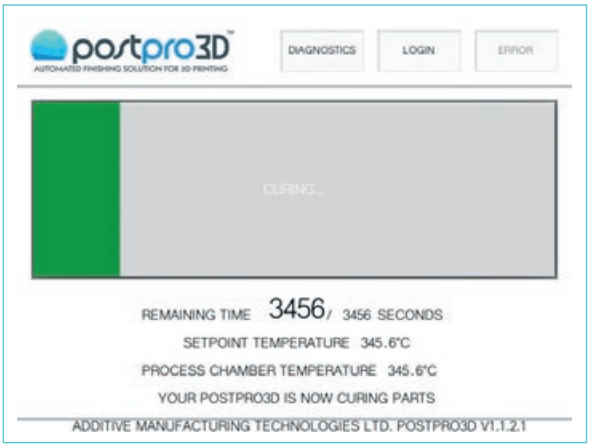
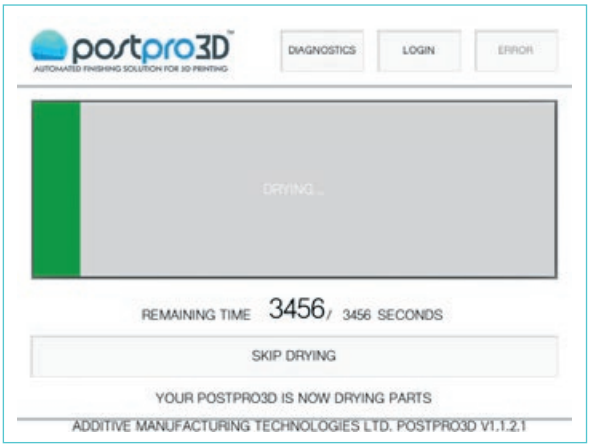
When the parts have been inserted into the chamber the operator selects the 'LOADING OF PARTS COMPLETED' button and then holds the push buttons to close the lid.

The PostPro3D® will then display the status of the process cycle.







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Form all these screens the 'ERROR' button can be pressed to view any machine errors.

6.3.7 // SECURITY LEVEL AUTHENTICATION

After the access key has been turned a 'LOGIN' button will be visible in the top right corner of any screen. Press this button to open the Security Level Authentication Screen. On this screen enter a password to access the protected user. Use the keypad to enter a password and the enter key to authenticate.

If the password is correct a confirmation screen will be shown.

6.3.7 // DIAGNOSTICS

After logging in as the protected user a 'DIAGNOSTICS' button will become visible in the top right hand corner of any screen. Press this button to enter the Diagnostics screen. The Diagnostics menu has the following options:

1. **MANUAL MODE MENU:** This button is only accessible by AMT qualified engineers with the service access;
2. **RECIPE EDITOR:** Press this button to access the Recipe Editor. The Recipe Editor allows the user to create and modify recipes;
3. **ERROR HISTORY:** This opens the Error History which displays machine errors;
4. **IO CHECK:** This shows the current status of all the machine IO's;
5. **PROCESS STATUS:** This shows the Automatic Mode Process status counter values;
6. **PROCESS LOG:** This shows a log of previous process runs;
7. **MAINTENANCE COUNTERS:** This shows the timer counters for various machine components.;
8. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



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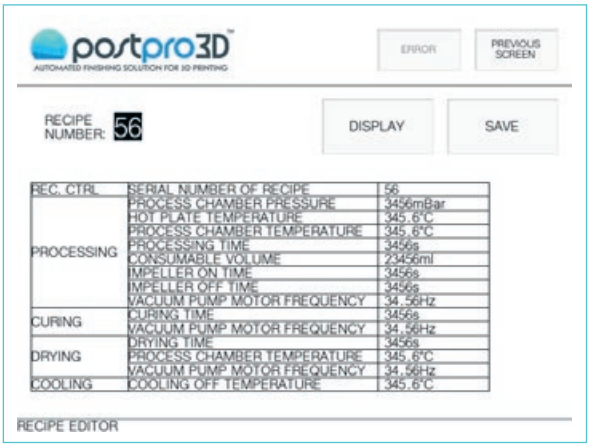
6.3.7 // RECIPE EDITOR

The Recipe Editor allows you to create and modify process recipes. This screen shows the process parameters for the displayed recipe. Press on the values of any of the variables to change. The following inputs are available on this screen:

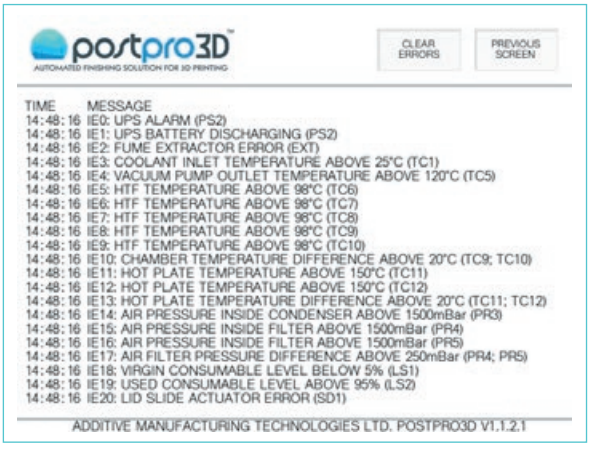
1. **RECIPE NUMBER:** Press this to select a recipe number. Pressing this button opens a keypad which allows the user to enter a value;
2. **DISPLAY:** After entering a Recipe Number press 'DISPLAY' to load the process parameters of the recipe;
3. **SAVE:** Press this button to save the entered process values to the recipe number for future use in a process cycle;
4. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu;
5. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



6.3.8 // ERROR HISTORY

This screen shows the error messages present on the machine, including the error code, description of the error and the time at which the error occurred. The following buttons are present.

1. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu;
2. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



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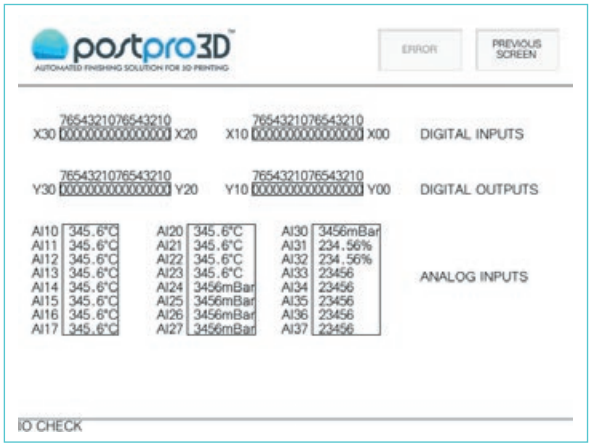
6.3.9 // IO CHECK

This screen shows the status of the inputs and outputs of the PostPro3D®. The following buttons are present.

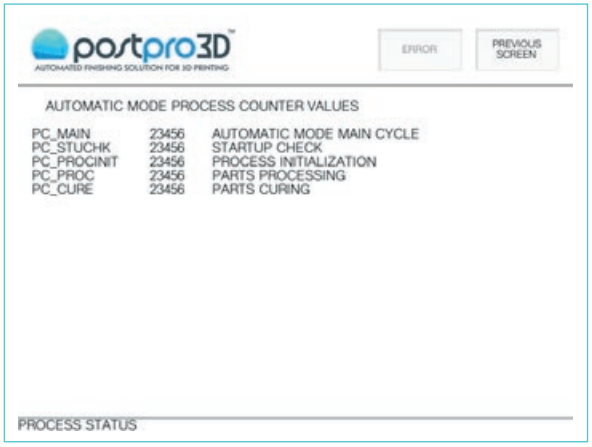
1. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu.
2. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



6.3.10 // IO CHECK

This screen shows automatic mode process counter values of the PostPro3D®. The following buttons are present.

1. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu.
2. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



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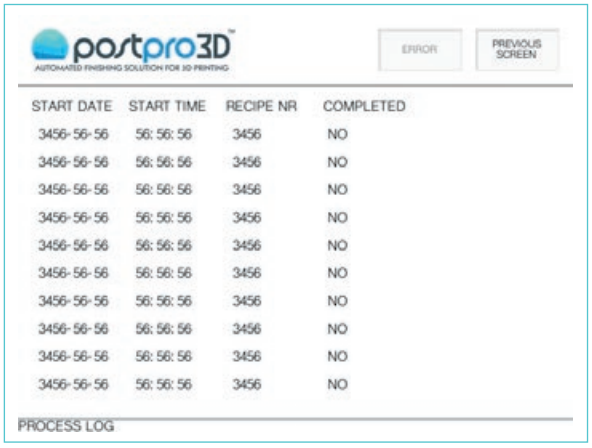
6.3.11 // PROCESS LOG

This screen shows the process history of the PostPro3D®. The start date, start time, recipe number, process status and user who started the process is displayed.

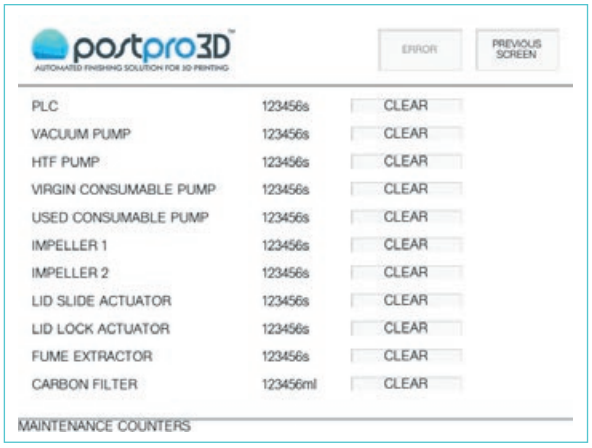
1. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu;
2. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



6.3.12 // MAINTENANCE COUNTERS

This screen shows the maintenance counters of various components of the PostPro3D®. The following buttons are present.

3. **PREVIOUS SCREEN:** Press to return to the Diagnostics Menu;
4. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



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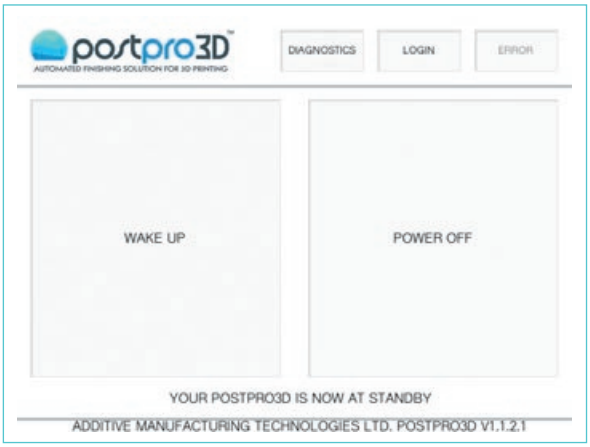
6.3.13 // STAND-BY

After selecting 'GO TO STANDBY' on the Start Up Screen. The below screen will be displayed. This offers the following options:

1. **WAKE UP:** Pressing this button readies the machine and returns to the Start Up Screen;
2. **POWER OFF:** Press this button to safely power off the machine;
3. **ERROR:** By clicking this button the user can access a log of machine errors. This will be shown throughout all pages of the user interface.



After pressing the 'POWER OFF' button the following screen is displayed which informs the user when it is safe to power off the machine using the power switch located on the rear of the machine.



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7 // OPERATION

Before the operation of the PostPro3D® ensure the operator is wearing the appropriate PPE and is following the procedures for safe operation as outlined in Section 2 of this manual.

7.1 // POWER ON/OFF

7.1.1 // POWER ON

To power on the PostPro3D® follow the procedure outlined below:

1. Ensure the PostPro3D® coolant hoses are connected to the chiller;
2. Ensure the extraction outlet of the PostPro3D® is connected to the mobile extraction unit and the outlet of the extraction unit is connected to the external extraction of the building;
3. Power on the Chiller using the power switch located on the front of the unit;



4. Power on the Extractor using the power switch on the rear of the unit and the Stand-By button on the front of the machine;





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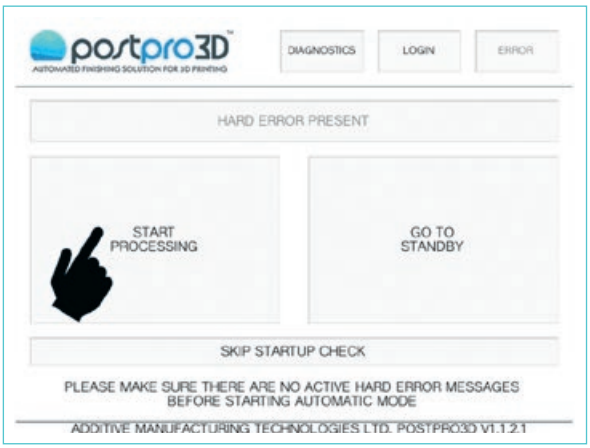
5. Power on the PostPro3D® using the power switch located on the rear of the machine;



6. The machine will then boot. When ready, the Start-Up screen will be displayed on the HMI;

7. Press the 'START PROCESSING' button to initialize the machine and begin the start-up check;



8. Once the initialization is complete the Processing Home Screen will be displayed.

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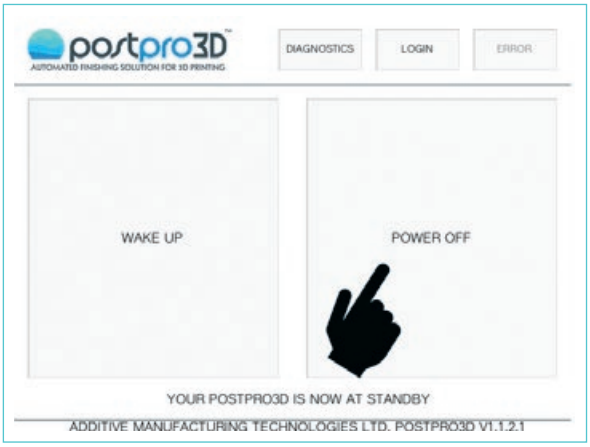
7.1.2 // POWER OFF

To power off the PostPro3D® follow the procedure outlined below:

1. On the HMI navigate to the Start-Up screen;
2. Press the 'GO TO STANDBY' button;



3. Press the 'POWER OFF' button.;



4. Wait for the machine to safely power down;
5. When prompted power off the PostPro3D® using the power switch located on the rear of the machine;



6. Power off the Chiller and Extraction unit using the power switches located on each unit.

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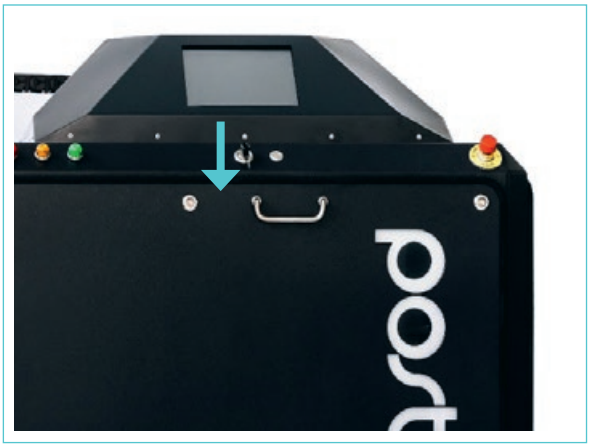
7.2 // ENTER THE PROTECTED USER MODE

In order to access certain buttons and functions on the PostPro3D® it is necessary to first enter the Protected User Mode. To do this:

1. Turn the access key;



2. After the key has been turned the 'LOGIN' button will displayed at the top of the HMI. This will be visible on all screens. Press 'LOGIN';



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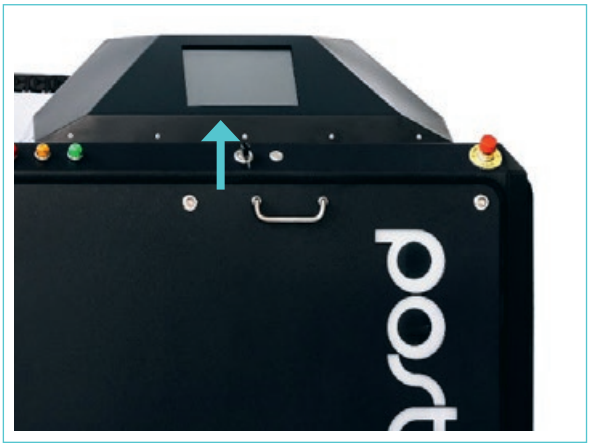
3. Enter the password using the keypad on the screen. Press the 'ENTER' key to confirm;

4. If the authentication was successful, the HMI will notify the user. If the password is incorrect the user will be prompted to re-enter the password;

5. It is now possible for the user to access protected buttons and functions;

6. Turn the key to exit the Protected User Mode;

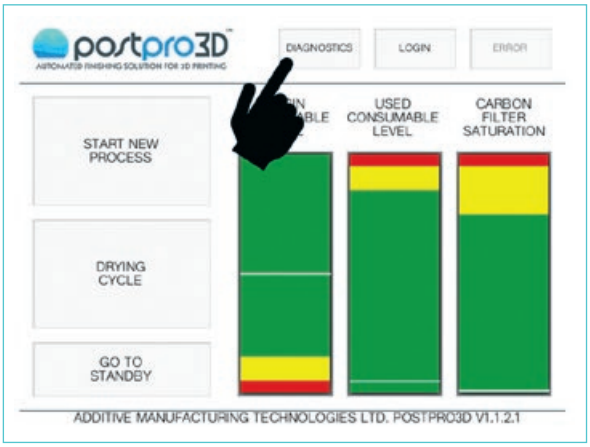


7.3 // CREATE/MODIFY A RECIPE

To create or modify a recipe follow the instructions outlined below. Explanations of each of these parameters can be found in Section 7 of this manual.

1. Enter the protected user mode, see section 5.2;

2. Press the 'DIAGNOSTICS' button at the top of the HMI, this will be displayed on any screen once the user has entered the Protected User Mode;



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3. Press the ‘RECIPE EDITOR’ button;



4. Select a Recipe by pressing on the numerical value of the Recipe Number;



5. Type in the desired recipe number on the keypad;

6. Press the ‘DISPLAY’ button to show the saved parameters of that recipe;



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7. Press the number, located in the third column, of each parameter to change the value;



8. Enter the desired value on the onscreen keypad;

9. When all parameters have been changed to the desired level, press the ‘SAVE’ button to save the recipe;



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7.4 // START A PROCESS CYCLE

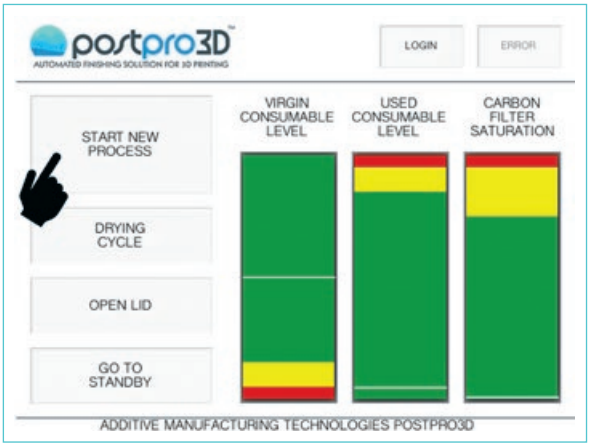
Before starting a process cycle, ensure all parts which are to be processed have been sufficiently prepared, as outlined in Section 8 of this manual, and there is sufficient PostProBlastX® consumable available for the process cycle. See Section 6 for instructions on how to change the PostProBlastX® canister.

Before the operation of the PostPro3D® ensure the operator is wearing the appropriate PPE and is following the procedures for safe operation as outlined in Section 2 of this manual.

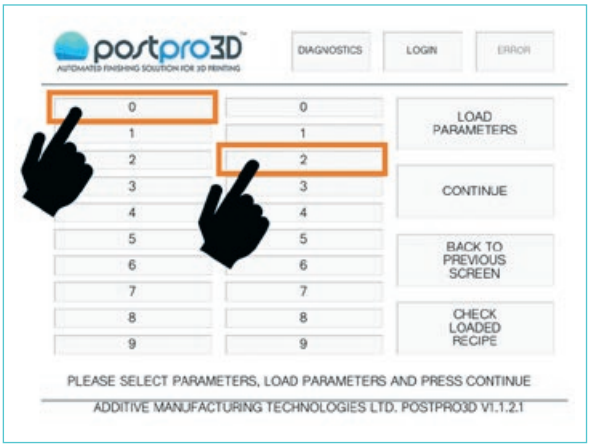
To start a process cycle, follow the below procedure:

1. Ensure the machine has initialized and the start-up check has been completed;

2. Press the 'START NEW PROCESS' button;



3. Select a recipe number using the two columns of numbers. For example, for recipe two select the value '0' from the first column then '2' from the second column;



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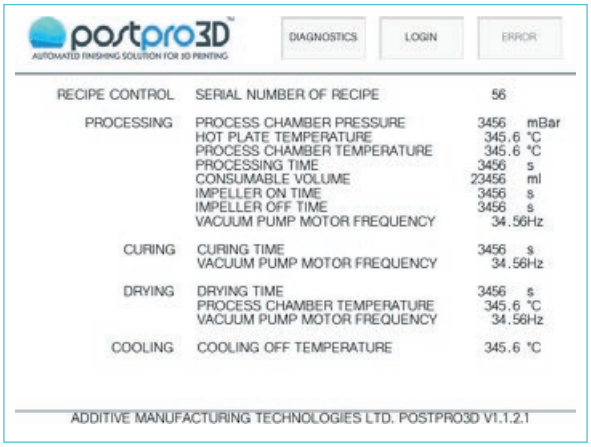
4. Press the ‘LOAD PARAMETERS’ button to load the recipe parameters. If there is an issue with the recipe parameters an error will be displayed. In this case it is necessary to modify the recipe to correct the error, see section 5.3;



5. Once the parameters have been loaded it is possible to check the recipe parameters by turning the access key and pressing the newly available ‘CHECK LOADED RECIPE’ button. Turn the access key to return to the previous screen;







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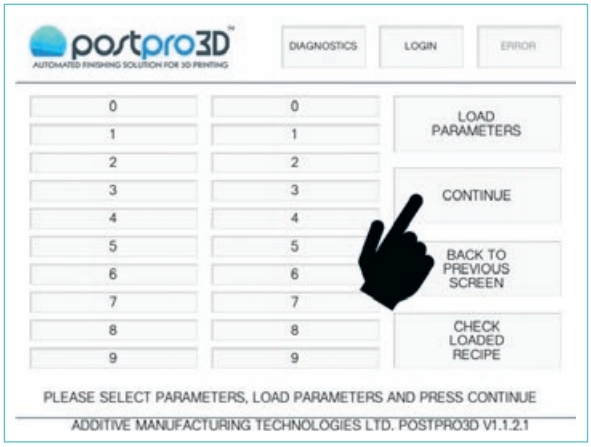
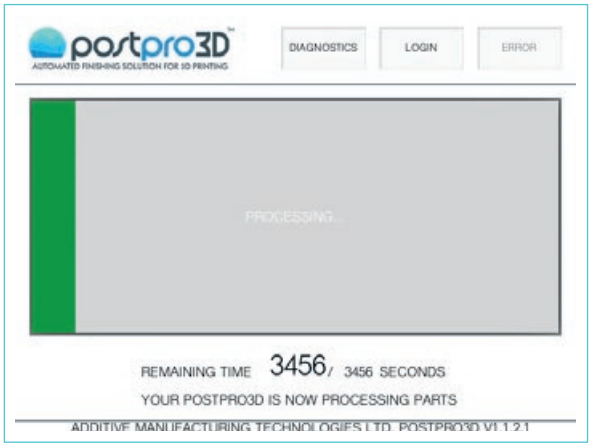
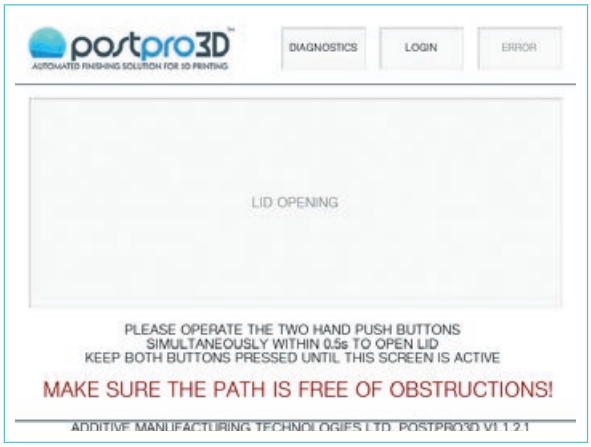
6. Press the ‘CONTINUE’ button to start the process cycle.;



7. The PostPro3D® will display the following screen as the machine initializes and begins to heat the process chamber;



8. When the initialization has finished the following screen will be displayed and the PostPro3D® logo will begin to flash, indicating the need for operator input;



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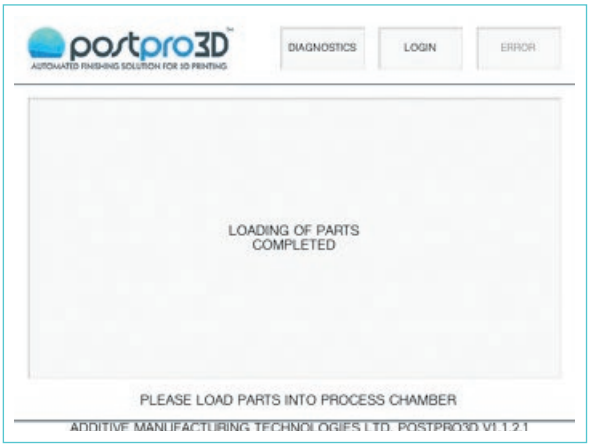
9. Ensure the path of the lid is free and there are no obstructions;

10. Press and hold the two hand push buttons located on the front of the PostPro3D®. The lid will begin to open. Keep the buttons pressed until the lid has come to a complete stop;

Beware of pinch and trap hazard from moving lid.

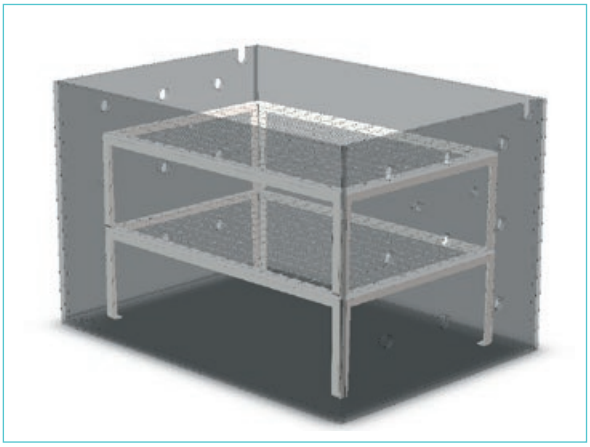


11. When the lid has fully opened the following screen is displayed;



12. Place the racks with parts attached into the Process Chamber. If necessary, stack the second rack on top of the first as shown below,

Caution Chamber walls may be hot.



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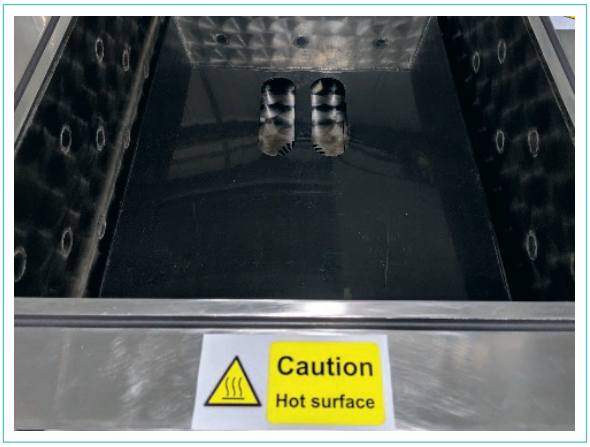
13. Place the Diffuser on top of the racks;

Caution Chamber walls may be hot.



14. Press the 'LOADING OF PARTS COMPLETED' button on the HMI;



15. Ensure the path of the lid is free and there are no obstructions;

16. Press and hold the two hand push buttons located on the front of the PostPro3D®. The lid will begin to close. Keep the buttons pressed until the lid has come to a complete stop;

Beware of pinch and trap hazard from moving lid.



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17. The process cycle will then continue. The HMI will display the status of the process cycle and the time remaining;

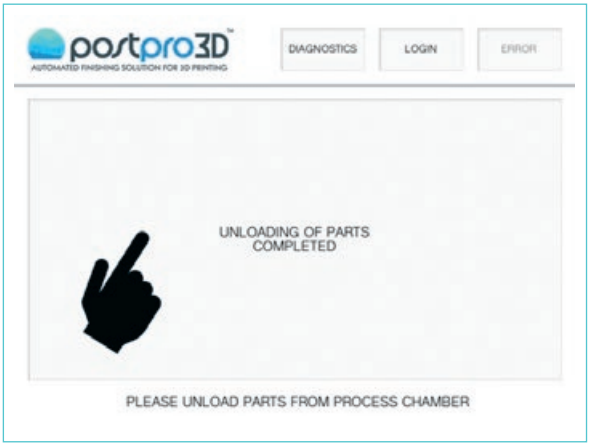
18. When the process has completed, the user will be prompted to unload the parts. Firstly, it is necessary to open and close the lid with the two push buttons;

Beware of pinch and trap hazard from moving lid.



19. The operator can then unload the parts. Once the parts have been unloaded press the 'UNLOADING OF PARTS COMPLETED' button then press and hold the two push buttons to close the lid.

Caution Chamber walls may be hot.





20. Ensure the lid is closed at the end of each process cycle.

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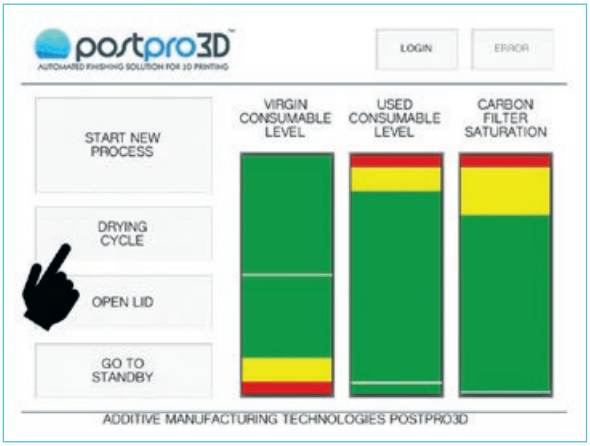
7.5 // START A DRYING CYCLE

If necessary, it is possible to start only a Drying Cycle. This will heat up the chamber and allow the operator to dry parts and the Process Chamber independently of running a complete Process Cycle. To do this:

1. Ensure the machine has initialized and the start-up check has been completed.

2. Press the 'DRYING CYCLE' button.



3. The Drying Cycle will start, and the progress of this cycle will be displayed on the HMI.

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8 // POSTPROBLASTX® CONSUMABLE

The PostPro3D® uses the PostProBlastX® consumable in the Process Cycle. The PostPro3D® is a closed loop system so waste and unused solvent from the Process Cycle is recovered. Subsequently there are two canisters within the PostPro3D®; a Virgin Canister, which contains fresh consumable, and a Recovery Canister, which contains the recovered consumable.

Both of these canisters are located inside the machine on the left hand side. Each canister is labelled to identify between the Virgin and Recovery Canisters.

When the Virgin consumable level is below 5% or when the Recovery Canister is at 95% capacity an error will be displayed on the HMI.

8.1 // UNPACKAGING A CANISTER

The PostProBlastX® consumable will be supplied in dedicated packaging. Ensure the packing is kept so the canister can be safely returned to Additive Manufacturing Technologies after consumption.

⚠ **Ensure the PPE outlined in Section 2 of this manual is being worn when handling the PostProBlastX® Canisters.**

1. Open the clip on the top of the barrel.
2. Remove the Lid.
3. Pull the canister upwards and out of barrel.
4. Remove the Canister from the sealed bag.
5. Remove the caps on the ends of the connectors
6. Keep all packing materials including barrel, bag, vermiculite and connector caps.

8.2 // CHANGE A CANISTER

The procedure for changing a Virgin or Recovery Canister is the same. Please ensure that the correct canister is being used.

Only ever use canisters which have been provided by authorized Additive Manufacturing Technologies personnel.

Never open or attempt to open a canister.

⚠ **Ensure the PPE outlined in Section 2 of this manual is being worn when handling the PostProBlastX® Canisters.**

Follow the below procedure:

1. Use the supplied panel key to open and remove the left hand panel of the PostPro3D®.



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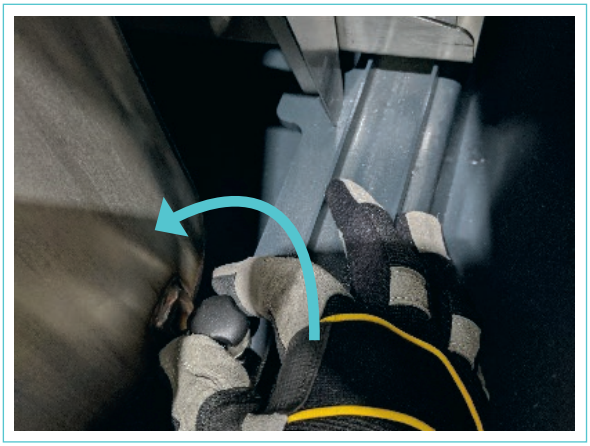
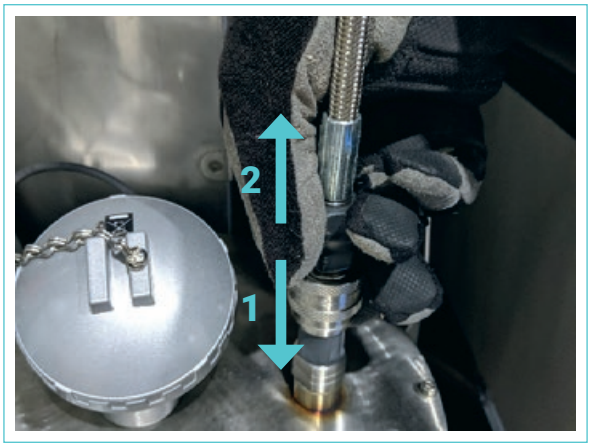
2. Remove the two hand screws securing the canister to the base of the PostPro3D®



3. Disconnect the Syphon quick connect, Breather quick connect and unscrew the Low Level Sensor connector.







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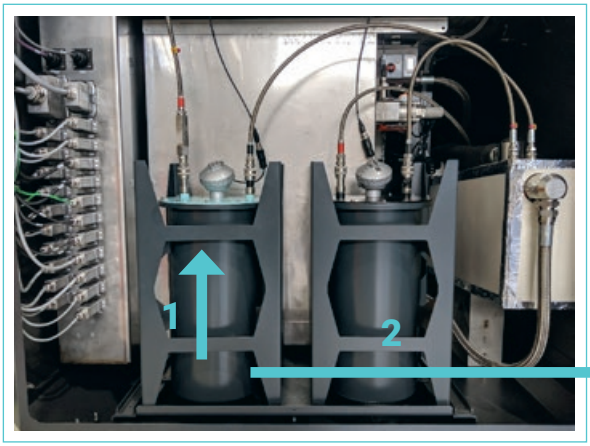
4. Remove the PostProBlastX® canister.



5. Insert the new PostProBlastX® canister
6. Secure in position with the two hand screws.
7. Connect the Syphon quick connect, Breather quick connect and Low Level sensor connector.
8. Ensure the correct tubes are connected to the correct connectors.
9. Replace the left hand panel and secure with the panel key.

8.3 // PACKAGING AND RETURNING A USED CANISTER

Following consumption of a Virgin Canister or after filling a Recovery Canister it is important to correctly package the canister for shipment. Please follow the below instructions:

⚠ **Ensure the PPE outlined in Section 2 of this manual is being worn when handling the PostProBlastX® Canisters.**

1. Place the connector caps on the end of the connectors
2. Place the canister in the plastic bag and seal
3. Place the sealed bag containing the canister in the barrel.
4. Fill the barrel with the vermiculite.
5. Place the lid on the barrel
6. Fix the lid in place using the clip.
7. The canister is now ready for shipment. Please contact Additive Manufacturing Technologies to arrange collection and shipment.

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9 // PROCESS PARAMETERS EXPLAINED

In order to achieve the desired finish level depending on the material, quantity or geometry of the parts the user wishes to process it is necessary to change the process parameters contained with a Recipe. These are explained below:

PROCESSING CYCLE

Process Chamber Pressure
This is the pressure inside the processing chamber when the PostPro3D® is in the processing and drying cycles. A lower pressure results in a less aggressive smoothing process. Whereas, a higher pressure results in a more aggressive smoothing process. This value must be adjusted in conjunction with the Process Chamber Temperature to control the procedure (see below).

Hot Plate Temperature
This is the temperature of hot plate which is used to vaporise the solvent. It is recommended that this is always set to 100°C.

Process Chamber Temperature – Processing Cycle
This is the temperature within the processing chamber when the parts are being processed. To avoid vapor condensing on the chamber walls the Process Chamber Temperature should be increased to coincide with higher Process Chamber Pressures.

Process Time
This controls the duration of time the parts are exposed to the solvent. A higher process time will result in increased smoothness on the parts.

Consumable Volume
This is the amount of solvent that is used in the process. The larger the quantity of solvent the more processing occurs in a given time. Increase the Consumable Volume for more aggressive smoothing or when higher surface areas require processing.

Impeller On Time / Impeller Off Time
These two parameters control the function of the two fans located at the bottom of the processing chamber. The impellers are used to circulate the solvent around the processing chamber. If the parts being processed are located at the bottom of the processing chamber it may not be necessary for the impellers to be operational. When parts are being processed through the chamber it is recommended to cycle the fans on and off to ensure a consistent and steady flow of solvent around the chamber.

Vacuum Pump Motor Frequency – Processing Cycle
This is the speed at which the vacuum pump operates during the processing cycle. It is recommended that this value is always 50.00Hz

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CURING CYCLE

Curing Time
This is the amount of time after the Processing Cycle in which the solvent is removed from the parts and processing chamber. This ensures the surface is ready for the drying stage. The minimum set point for this should be 300 seconds (5 minutes).

Vacuum Pump Motor Frequency – Curing Cycle
This is the speed at which the vacuum pump operates during the Curing Cycle. It is recommended that this value is always 10.00Hz

DRYING CYCLE

Drying Time
This is the length of time the Drying Cycle. The Dying Cycle is used to remove all remaining traces of solvent from the parts after processing. The recommended Drying Time is at least 5200 seconds.

Process Chamber Temperature – Drying Cycle
This is the temperature within the processing chamber during the Curing Cycle. This is set higher than the temperature during the Processing Cycle to increase the speed at which the solvent dries. The recommended set point is between 45°c and 75°c.

Vacuum Pump Motor Frequency – Drying Cycle
This is the speed at which the vacuum pump operates during the Drying Cycle. It is recommended that this value is always 50.00Hz

COOLING CYCLE

Cooling Off Temperature
This is the temperature at which the chamber returns to after the Drying Cycle before the parts can be removed from the chamber. This should be the same as the Processing Chamber Temperature – Drying Cycle

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9.1 // ADJUSTING PROCESS PARAMETERS

It is possible to adjust every process parameter on the machine, some of the parameters have a large affect on the processing, some parameters are for minor adjustments to process and other parameters are fixed during the installation and should not be adjusted.

Primary variables to change based on part material and geometry

Minor variables to change based on workflow and Primary variables selected

Fixed values when set during installation



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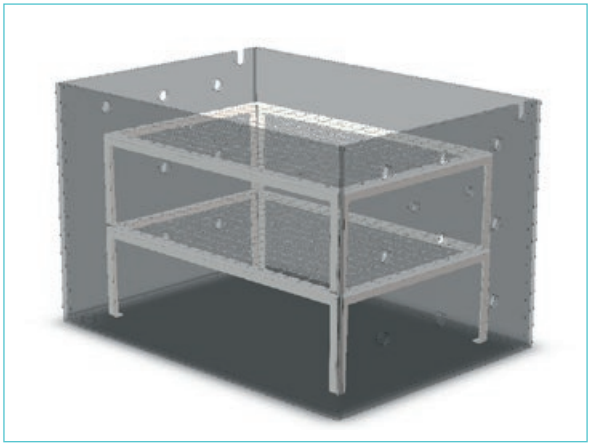
10 // GUIDELINES FOR SUCCESSFUL PROCESS RUNS

10.1 // PROCESS PREPARATION

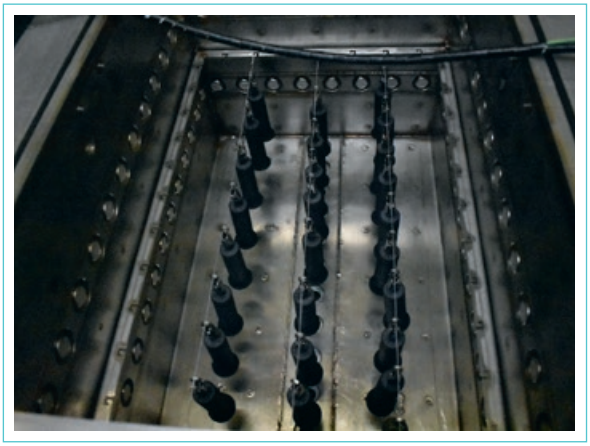
Prior to starting a process run, parts must be suspended in the provided rack using wire avoiding contact with the inner chamber walls and other parts. Two standard racks may be stacked to make full use of the process chamber volume.





Preparing a batch is an important step in obtaining a good surface finish. The following are the most important rules on how to do so appropriately:

- Parts should be placed at least 25 mm away from chamber walls;
- Parts should be placed at least 10 mm away from each other;
- Parts in the same batch should be of the same colour;
- Parts in the same batch should be of the same material;
- The surface of the parts should be clean before processing;
- Parts should not contain residual powder;
- Parts should not be printed with low quality materials (i.e. > 50 % recycled powder);
- Parts should only be placed in the chamber when the machine is in the “Ready” state;
- Parts should not be kept in the chamber for longer than 30 seconds before starting a process;
- The process chamber should be cleaned regularly using IPA, acetone or equivalent cleaning solution to avoid contamination of the parts;
- For a glossier look, parts can be submerged in tap water for 10 to 30 minutes, or frozen prior processing.



For additional guidance please refer to the PostPro3D Advanced Operations Guide.

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11 // TROUBLESHOOTING

In the event of an error the PostPro3D® will indicate the user with the illumination of either the Yellow or Red LED indicators located on the front of the PostPro3D®. In addition to this the blue PostPro3D® logo on the front of the machine will begin to flash and an error code will be displayed on the HMI.

The operator may not use the machine while it is being diagnosed.

11.1 // SOFT ERROR

In the event of a soft error the Yellow LED indicator will flash. A soft error will not stop the function of the PostPro3D® and will only be displayed as a warning. The LED indicators will continue to flash until the error has been cleared. For instructions how to clear an error please refer to section 11.3 of this manual. In the event of a soft error contact Additive Manufacturing Technologies to diagnose the error.

11.2 // HARD ERROR

In the event of a hard error the Red LED indicator will flash. A Hard error will stop the function of the PostPro3D® and it will not be possible to operate the PostPro3D® until this error has been cleared. In the event of a hard error contact Additive Manufacturing Technologies immediately so the error can be resolved.

11.3 // E-STOP

In the event of an E-Stop situation when a user has pressed either one of the two E-Stop buttons located on the front of the machine. The PostPro3D® will immediately shut down into a safety state.

To clear an E-Stop ensure the machine and operating area is safe then release the E-Stop button which has been pressed.

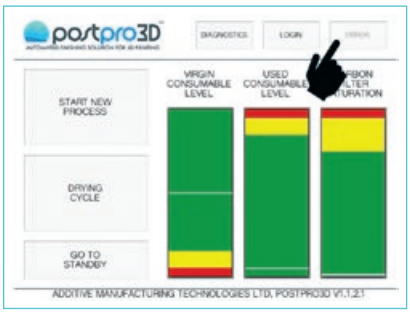
11.4 // FORCED DYRING CYCLE

In the event of a hard error or E-Stop occurring during a Process Cycle the PostPro3D® has an additional safety feature called the Forced Drying Cycle (FDC) to eliminate the risk of a user being exposed to the PostProBlastX consumable. The FDC heats up the processing chamber to a temperature of 45 °C for 10 minutes to clear any remaining solvent in the processing chamber. After a hard error or E-Stop has been reset and upon entering Automatic Mode the Forced Drying Cycle will start before the user can operate the PostPro3D®.

11.5 // CLEAR AN ERROR

When an error is present the indicators will continue to flash until this error has been cleared. Once the source of the error has been resolved. Please follow the below instructions to clear an error on the PostPro3D®:

1. From any screen on the HMI press the ‘ERROR’ button;





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12 // MAINTENANCE SCHEDULE

To ensure continued and ongoing safe and successful operation of the PostPro3D® the following maintenance schedule is recommended. Instructions on how to carry out these maintenance tasks can be found in the separate document: PostPro3D® Maintenance Manual.

Note: prior to performing any maintenance procedure the PostPro3D® must be switched off and unplugged from the three-phase power socket. Auxiliary units must also be switched off and unplugged.

Note: operations that involve the systems where the PostProBlastX™ is contained (i.e. replacing Santoprene tubes, replacing cannisters) must be carried out by personnel trained by AMT to do so. The person in charge shall make sure that all the safety measures specified in the training are taken.

Before the operation of the PostPro3D® ensure the operator is wearing the appropriate PPE and is following the procedures for safe operation as outlined in Section 2 of this manual.

12.1 // WEEKLY

- Clean the machine and ensure it is free of dust and contaminants.
- Clean process chamber with IPA or similar cleaning solution to prevent contamination of parts during processing.
- Clean the seal on the top of the chamber and ensure it is free of dust and contaminants.
- Clean the lid rail and lubricate using silicone grease

12.2 // MONTHLY

- Remove lid cover and check the heat exchanger glycol mix level. Top up, if necessary.
- Check cooling line pipes and fittings for possible water and glycol pre-mix leakages.
- Check consumable line tubes and fittings for possible leakages.
- Check vacuum pump pipelines for possible air and glycol mix leakages.
- Check the vacuum pump gearbox oil level through the sight glass and fill the gearbox with oil, if necessary. Change the oil when it becomes discoloured (the recommended lubricant is “vacuum vanes fluid plus 100” by Edwards).
- Check vacuum pump coupling and fan. Cooling fan and vent holes should be kept clean.
- While processing, check vacuum pump pressure and temperature readings.

12.3 // YEARLY

- Remove lid cover and inspect for signs of internal wear. Inspect lid mechanism motion and check for any signs of degradation (i.e. belt slippage).
- Replace solvent line Santoprene peristaltic tubing (not applicable to all machines)

12.4 // EVERY 4 YEARS

- Change vacuum pump gearbox oil.
- Inspect and clean vacuum pump claws.
- Replace vacuum pump O-rings.
- Check and clean vacuum pump cooling fan assembly.
- Replace the heat exchanger glycol mix.

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12.5 // EVERY 10 YEARS

- Vacuum pump element overhaul.

12.6 // ON MACHINE “WARNING”

- Virgin cannister level low: replace empty virgin cannister with new full virgin cannister. Full virgin cannister will be provided by AMT and empty cannister should be returned to AMT.
- Used cannister level high: replace full used cannister with new empty used cannister. Empty used cannister will be provided by AMT and full used cannister should be returned to AMT.
- Carbon Filter Reached Saturation: replace carbon filter. This is carried out by AMT. Contact AMT for assistance.
- All other machine warnings: contact AMT for technical support.

12.7 // ON MACHINE “ERROR”

- All machine errors: contact AMT technical support.

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13 // DECLERATION OF CONFORMITY

CE

EC Declaration of Conformity

Additive Manufacturing Technologies Ltd.

Based in Sheffield, UK, Unit N, Europa House, Sheffield Airport Business Park, South Yorkshire, Postal Code: S9 1XU

Declares under our sole responsibility that the product:

PostPro3D

to which this declaration relates, is in conformity with the directives **2006/42/EC** (Machinery Directive), **2014/35/EU** (Low Voltage Directive) and **2014/30/EU** (EMC Directive) and meets the standards:

EN ISO 12100:2010,

EN 12921-1:2005 + A1:2010,

EN 12921-4:2005 + A1:2008,

EN60204-1:2018 + A1:2009,

and **EN 61000-6-4:2007+A1:2011**

issued by the European Community.

ADDITIVE MANUFACTURING TECHNOLOGIES

SHEFFIELD – 8TH JAN 2020

Joseph Crabtree
CEO

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14 // CONTACT INFORMATION

For Further information please contact Additive Manufacturing Technologies:

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