amt postpro®



postpro SF
USER MANUAL

V3.0 // FEBRUARY 2023

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2 // 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: FA326 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 PostPro SF. 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 PostPro SF 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 PostPro SF machine closed when not processing to ensure no fumes are inhaled by operators. Keep waste containers closed all the times.

⚠CAUTION Pinch Hazard: The door of the processing chamber is heavy. Close the door carefully using the buttons on the PostPro SF 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 PostPro SF. Install the castor wheels at the base of the machine before attempting to move the machine. Lock the wheels once PostPro SF is in its new position and re-level.

3 // OPERATING THE POSTPRO SF SAFELY

AMT recommends that the client studies this section carefully and if the client has any questions, about how to create a safe operating environment or how to operate the PostPro SF safely, contact us immediately.

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

The PostPro SF 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.

3.1 SAFETY DATA SHEETS (MSDS)

The client should read and understand the chemical Material Safety Data Sheet (MSDS) for each chemical used by PostPro SF. A copy of the MSDS will be available on the PostPro SF user interface 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 PostPro SF machine room.

3.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

While operating the PostPro SF 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.

3.3 GENERAL LAB SAFETY PRECAUTIONS

- Wear goggles.
- Wear a lab coat, disposable gloves, and closed-toed chemical-resistant shoes.
- Change disposable gloves often.
- Wash hands between glove changes and at the end of the processing.
- Always keep lab coats inside the lab area until they are sealed in a bag and removed by a laundry service.

- Tie long hair back to avoid catching it in mechanical parts or brushing it against chemicals on the lab bench.
- Remove jewellery, such as necklaces and rings, to avoid catching them in mechanical parts or trapping chemicals under them.
- No food or drink should be brought into or consumed in the processing room.
- Make sure the processing room has a well-maintained eye-wash station and safety shower.
- Never work alone in the lab.

3.4 SAFETY SUMMARY

PPE

- Disposable nitrile gloves.
- Closed toe safety shoes.
- Laboratory spill resistant coat.
- Close fitting chemical eye protection.
- Half face mask with AX-P3 type filters.



EMERGENCY STOP

- Located on the front left-hand side of the machine.
- Stops all movement and power.
- Process run cannot be recovered.

UPS

- Uninterruptable Power Supply.
- Kicks in when machine loses power or is powered off incorrectly.
- Approx. 5 minutes of operation before total shutdown.

FORCED DRYING CYCLE

- If the machine shuts down or E-stops during a cycle it will enter a forced drying cycle when the machine resumes.
- Short drying cycle to extract any potential solvent from the chamber.
- If this is interrupted it will continue to attempt the forced drying cycle until it completes.

TWO HAND START

- Door only moves when two hand start is pressed.
- Located on both right and left side of the machine.

4 // TRAINING

Prior to the installation taking place, users of the PostPro SF must undertake the online training modules provided to them by AMT. Access will be granted by your AMT representative, please contact them for more information.

AMT, or an authorized representative will provide training for PostPro SF remotely or onsite once the machine has been installed.

All users of the PostPro SF should be present during the entirety of training. The training is essential to understand how to operate the machine safely and how to achieve the best results from the system.

Only persons present at the time of training should use the machine. If necessary additional training can be provided by AMT, or an authorized representative.

5 // EQUIPMENT DESCRIPTION

5.1 OVERVIEW

The PostPro SF offers a controllable surface finish which reduces surface roughness (Ra values) of 3D printed polymer without the loss of detail and definition. In addition, the smoothing process naturally seals the surface of the 3D printed part, which significantly enhances the water-protective and mechanical 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), TPE-210 elastomer materials, Polymethyl Methacrylate (PMMA) Acrylonitrile butadiene styrene (ABS) and many more. It is capable of processing Multi Jet Fusion (MJF), Selective Laser Sintered (SLS), High Speed Sintered (HSS) and Fused Deposition Modelling (FDM) 3D printed parts to the desired surface roughness.

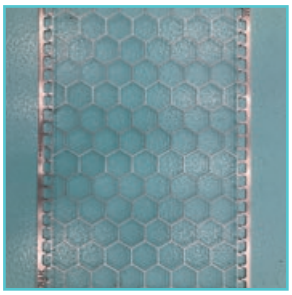
The PostPro SF can be supplied with or without an external extractor. The external extractor is used to cool the machine during operation and act as a additional safety feature.

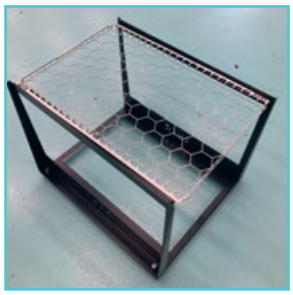
5.2 ITEMS SUPPLIED

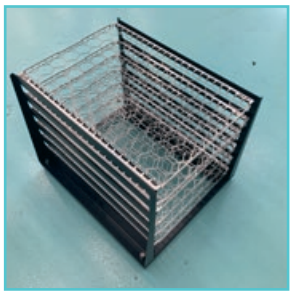
The PostPro SF machines are supplied with the following items:


1 x PostPro SF


4 x Transport Wheels


6 x Processing Rack


1 x Preparation Stand


1 x Storage Stand



3 x User Access Cards



1 x Access Control Card


3 x Panel Keys

6 // MACHINE SPECIFICATION

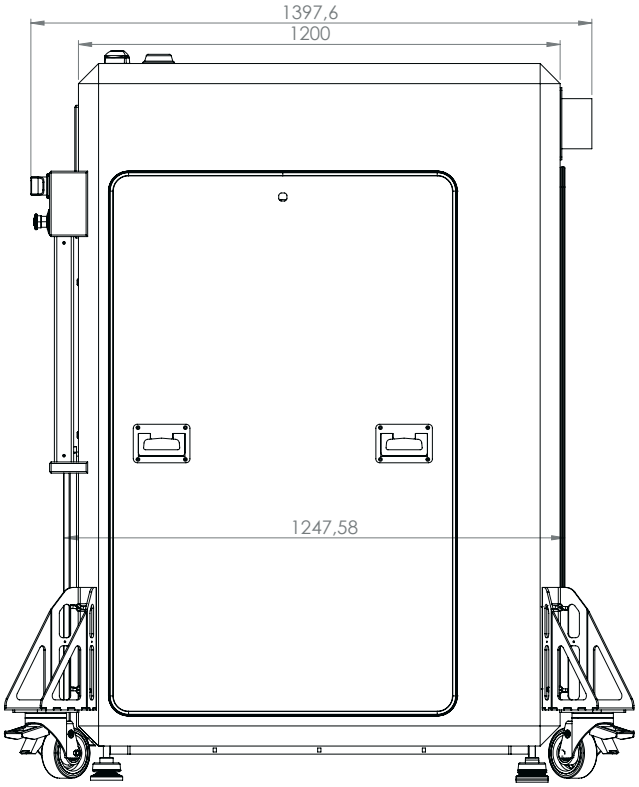
6.1 SF50 MACHINE SPECIFICATIONS

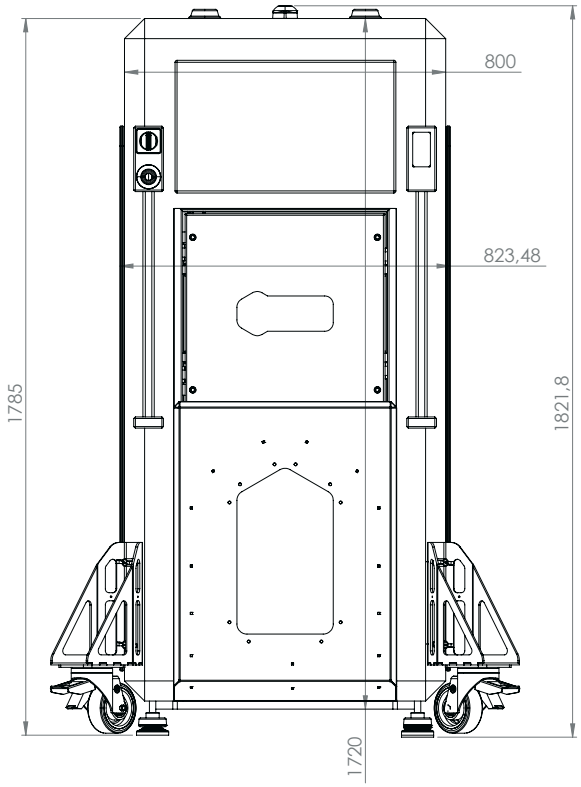
Description	EU	US
External Dimensions (WDH)	830 x 1400 x 1830 mm	33 x 55.5 x 72 in
Weight	800 Kg	1,765 lbs
Recommended Operating Area	2,350 x 3,200 mm	92.5 x 126 in
Capacity		
Process Chamber Dimensions (WDH)	400 x 300 x 400 mm	15.7 x 11.8 x 15.7 in
Process Chamber Volume	48 Litres	48 Litres
Consumable Canister Volume	10 Litres	10 Litres
Power		
Single Phase	220-240V 16A, 50/60Hz, (L+N+PE)	208V, 30A, 50/60Hz, (L+N+PE)
or		
Three Phase	3 x 400V, 16A, 50/60Hz, (L1+L2+L3+N+PE)	3 x 480V, 30A, 50/60Hz, (L1+L2+L3+PE)

6.2 SF100 MACHINE SPECIFICATIONS

Description	EU	US
External Dimensions (WDH)	830 x 1400 x 1830 mm	33 x 55.5 x 72 in
Weight	850 Kg	1,875 lbs
Recommended Operating Area	2,350 x 3,200 mm	92.5 x 126 in
Capacity		
Process Chamber Dimensions (WDH)	400 x 600 x 400 mm	15.7 x 23.6 x 15.7 in
Process Chamber Volume	96 Litres	96 Litres
Consumable Canister Volume	10 Litres	10 Litres
Power		
Three Phase	3 x 400V, 16A, 50/60Hz, (L1+L2+L3+N+PE)	3 x 480V, 30A, 50/60Hz, (L1+L2+L3+PE)

6.2 MACHINE DIMENSIONS (MM)





6.3 POSTPRO SF50 DIMENSIONS AND WEIGHT

	mm / Kg	In / lbs
Width	824 mm	32.5 in
Depth	1,398 mm	55.5 in
Height	1,822 mm	72 in
Weight	800 Kg	1,765 lbs

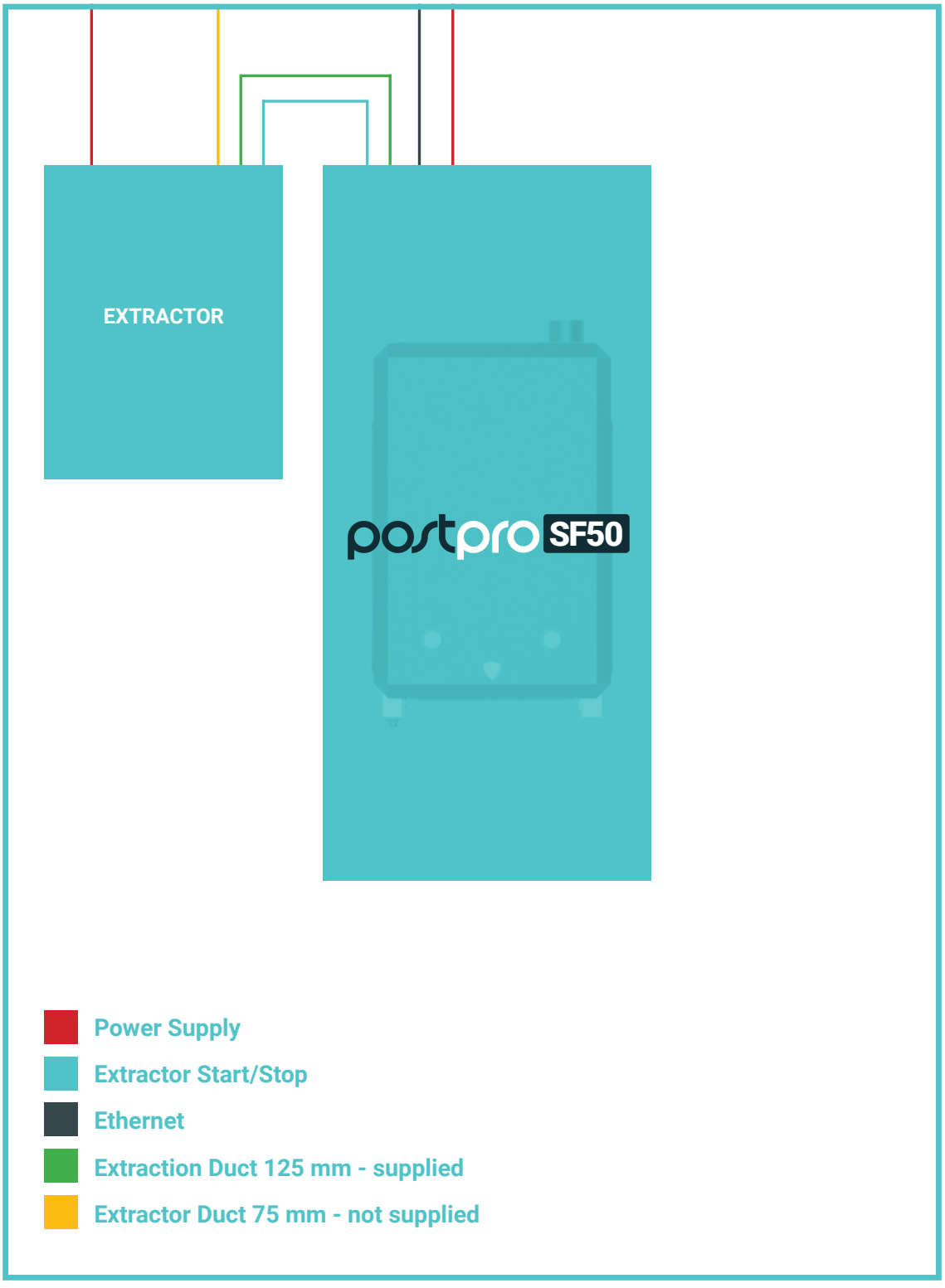
6.4 POSTPRO SF100 DIMENSIONS AND WEIGHT

	mm / Kg	In / lbs
Width	824 mm	32.5 in
Depth	1,398 mm	55.5 in
Height	1,822 mm	72 in
Weight	850 Kg	1,875 lbs

6.5 EXTRACTOR DIMENSIONS AND WEIGHT

	mm / Kg	In / lbs
Width	400 mm	17.5 in
Depth	515 mm	20.5 in
Height	975 mm	38.5 in
Weight	65 Kg	143 lbs

6.6 CONNECTION LAYOUT



6.7 ELECTRICAL POWER REQUIREMENTS

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

6.7.1 POSTPRO SF50

The PostPro SF50 is available in multiple electrical configurations to suit different facility electrical supplies. The electrical configuration must be specified at the point of sale. The tables below show the electrical supply specifications for each configuration.

ALWAYS CHECK THE MACHINE PLATE BEFORE CONNECTION.

Specifications	Option 1		Option 2
Phases	Single Phase		Three Phase
Voltage	220V – 240V		3 x 400V
Frequency	50/60Hz	or	50/60Hz
Mains Fuse Protection	16A		16A
Connection	L + N + PE		L1 + L2 + L3 + N + PE
Maximum Power Consumption	3.0 Kw		3.0 Kw

Specifications	Option 3		Option 4
Phases	Single Phase		Three Phase
Voltage	208V		3 x 480 V
Frequency	50/60Hz	or	50/60Hz
Mains Fuse Protection	30A		30A
Connection	L + N + PE		L1 + L2 + L3 + PE
Maximum Power Consumption	3.0 Kw		3.0 Kw

For additional information please consult the Site Preparation Guide or contact AMT Support.

6.7.2 POSTPRO SF100

The PostPro SF100 is available in multiple electrical configurations to suit different facility electrical supplies. The electrical configuration must be specified at the point of sale. The tables below show the electrical supply specifications for each configuration.

ALWAYS CHECK THE MACHINE PLATE BEFORE CONNECTION.

Specifications	Option 1		Option 2
Phases	Three Phase		Three Phase
Voltage	3 x 400V		3 x 480V
Frequency	50/60Hz	or	50/60Hz
Mains Fuse Protection	16A		30A
Connection	L1 + L2 + L3 + N + PE		L1 + L2 + L3 + PE
Maximum Power Consumption	6.0 Kw		6.0 Kw

For additional information please consult the Site Preparation Guide or contact AMT Support.

6.7.3 EXTRACTOR

Specifications	Option 3
Phases	Single Phase
Voltage	100-240V
Frequency	50/60Hz
Mains Fuse Protection	12.5A
Connection	L + N + PE

7 // MACHINE OVERVIEW

1. **HMI:** With the HMI the user can set process parameters, start a process run, diagnose the machine in case of warnings or errors and communicate with AMT's support.
2. **ON/OFF Isolator:** This switch is used to turn the power supply to the machine on and off.
3. **E-Stop:** An emergency button is placed in the front side and should be pressed in case of an emergency.
4. **Process Chamber Door:** The door lowers to give access to the processing chamber and raises again during processing.
5. **RFID Card Reader:** Holding an access card in front of the RFID reader logs the user in to their respective access level.
6. **Door Movement Buttons:** To avoid getting trapped, the two buttons must be pressed simultaneously to activate the door opening and closing mechanism.
7. **LED Beacon:** This indicator will light up:

   Green • Machine is Operational

   Yellow • Machine has a Soft / Informational Error

   Red • Machine has a hard error or the E-stop has been pressed.

   Blue • If an operator is required.
8. **Air extraction outlet:** 5" outlet which is connected to the extraction unit;
9. **Power connection:** Power lead to connect to mains power supply;
10. **Extractor connection:** Electronic connection to the Extraction Unit;



7.1 CANISTER LOCATION AND CONNECTIONS

1. **RFID Reader** – This is used to read the canister information RFID tag
2. **Load Cell** – This is used to measure the liquid remaining in the canisters
3. **Machine Side Canister Connections** – Male and Female quick release fittings to avoid misconnection by the operator
4. **Finishing Agent Canister** – Finishing agent canister containing virgin solvent (Canister location is interchangeable).
5. **Recovery Agent Canister** – Recovery Agent Canister containing virgin recovery agent and recovered solvent (Canister location is interchangeable).





7.2 PROCESSING CHAMBER

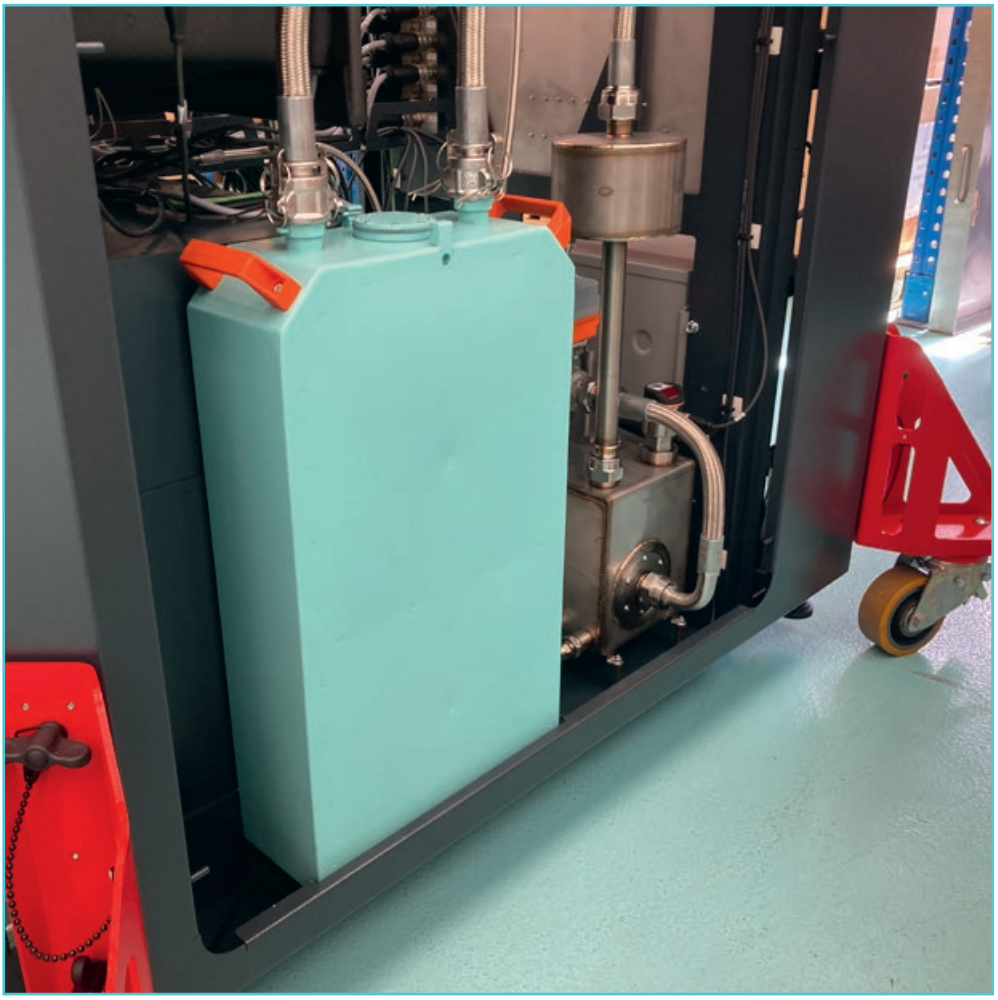
1. **Processing Rack Hanging Pins –** These pins are used to locate processing racks on the shelves
2. **Air/Solvent Injection Ports** – Air and solvent is circulated through these ports. There are 8 ports in total for SF50 and 16 for SF100.
3. **Solvent Drainage Port and Filter** – Drainage port for liquid solvent and processing chamber solvent filter used to recover solvent.



7.3 CARBON FILTER LOCATION

Located behind the right hand panel of the machine.

1. **Carbon Filter** – Consumable carbon filter to capture solvent
2. **Carbon Filter Clamp** – Over centre clamp to keep the filter in position
3. **Filter Connection Inlet** – Carbon filter connection inlet port
4. **Filter Connection Outlet** – Carbon filter connection outlet.



7.4 USER INTERFACE

The PostPro SF is primarily controlled via the touch screen user interface located on the front of the machine.

The owner can define levels of access for different users, such as operator and engineer. Based on the assigned access levels the user will be able to carry out different functions or tasks.

Please note, not all buttons will be active or accessible depending on the user access level.

7.4.1 BUTTON COLOUR CODING

The colours of the control buttons on the user interface (UI) will vary depending on the machine status and the access rights of the logged in user. The following colours are used:

GREEN – Ready for operation

BLUE – Operation in progress

GREY – Unable to operate/access

8 // POSTPRO SF HMI SCREENS

MAIN SCREEN

Process status: Click to see the status of a current process.

User: Identifies who is logged into the machine.

Canisters: Displays information about the inserted cannisters.

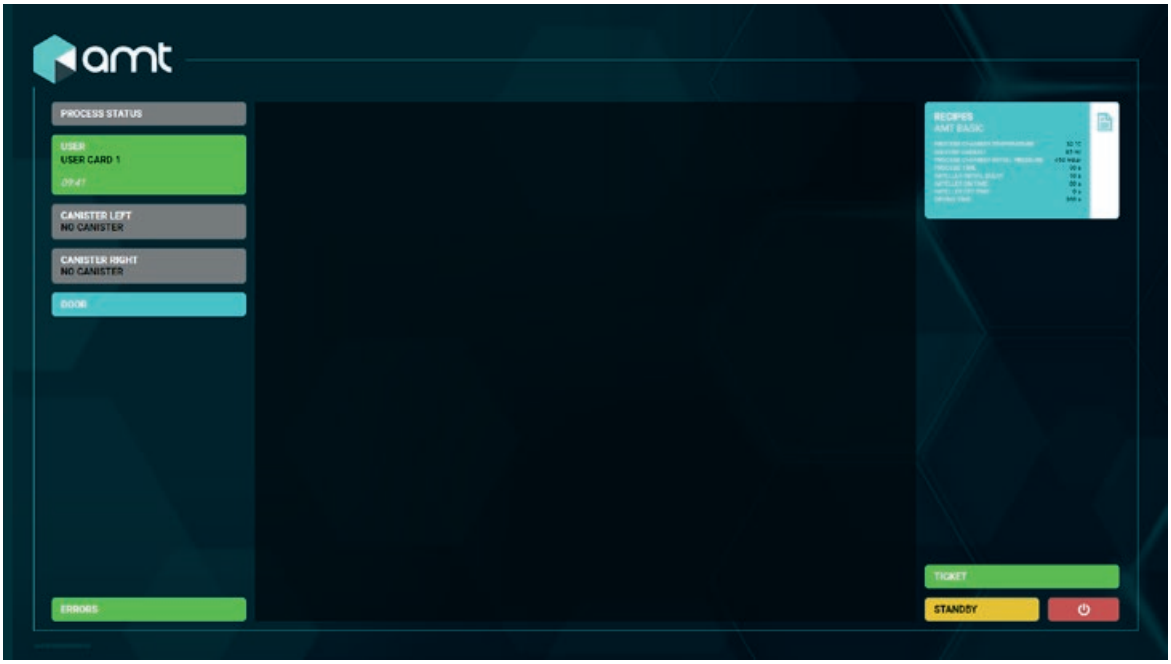
Errors: Lists the present errors.

Recipes: Lists the stored recipes on the machine.

Ticket: Allows tickets to be created and sent directly to AMT support.

Standby: Sends the machine to “Standby Mode”.

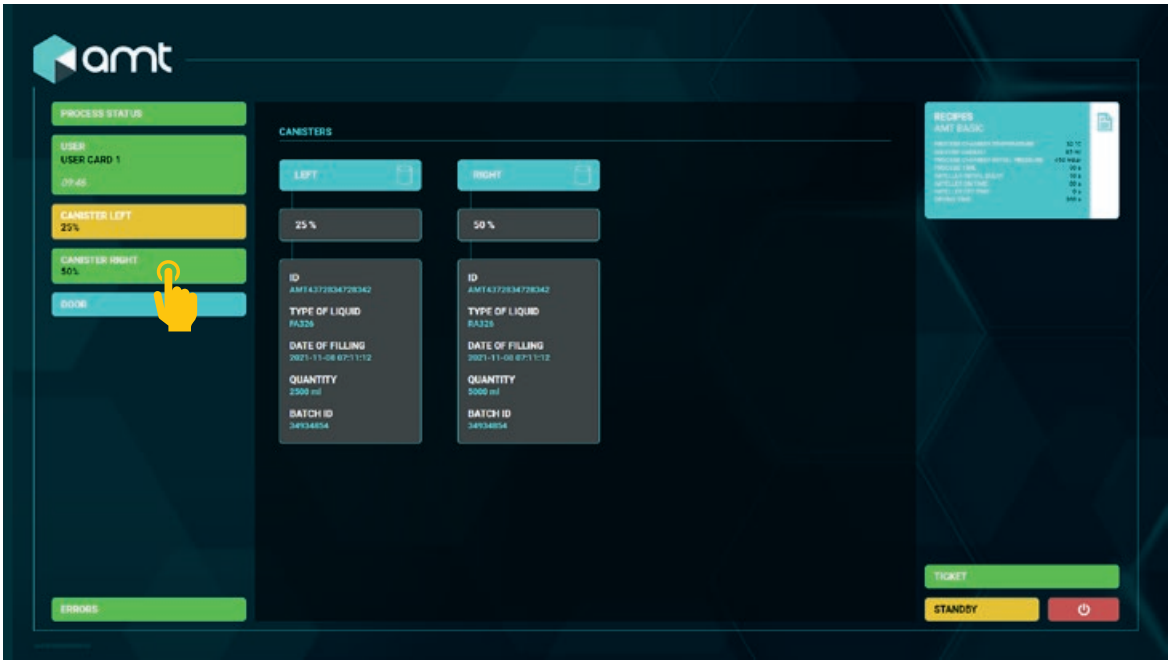
Power off: Completely powers down the machine.



CANISTERS SCREEN

Provides all the important information about the canisters which are loaded into the machine:

- Current canister level (%)
- ID Number of Canister
- Type of Liquid in the Canister (FA Finishing Agent or RA Recovery Agent).
- Age of Canister
- Current canister level (ml)
- Batch ID Number



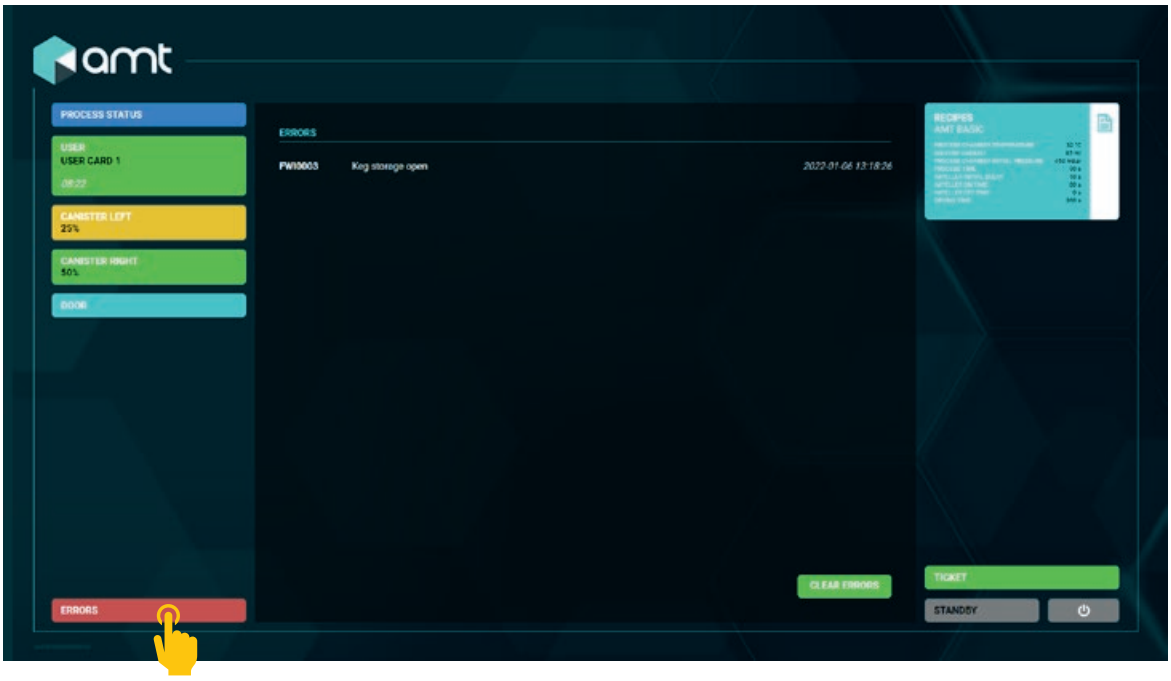
ERRORS SCREEN

Errors can be:

I = Informative error: Provides information related to different components in the system. Can be cleared by the operator and the machine will continue to operate as normal

S = Soft error: Informs the machine operator about a minor issue (e.g. measurement out of tolerance). If it continues to occur, it can turn into a Hard error. Soft Errors can be cleared by the operator and the machine will continue to operate as normal.

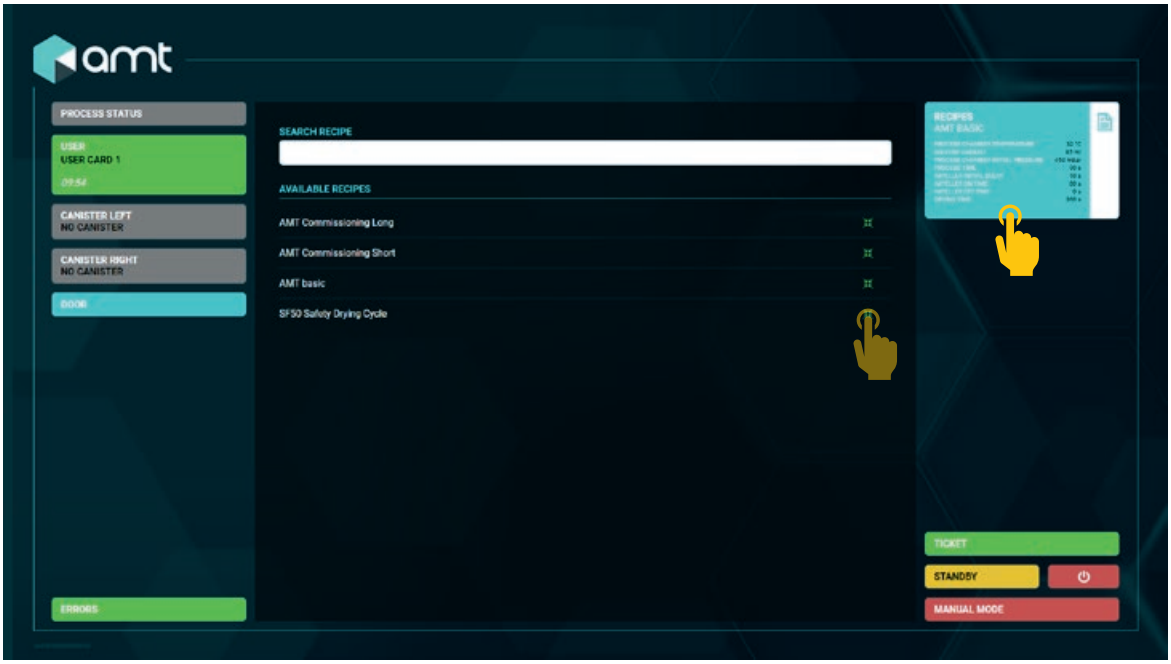
H = Hard error: Informs the machine operator about a major issue in the system. Can not be cleared and the machine won't start a process until it is resolved.



RECIPES SCREEN

The recipe screen allows for the different recipes to be loaded. This is done by clicking the green icon at the end of each recipe.

Use the Search Recipe function to search for a desired recipe.



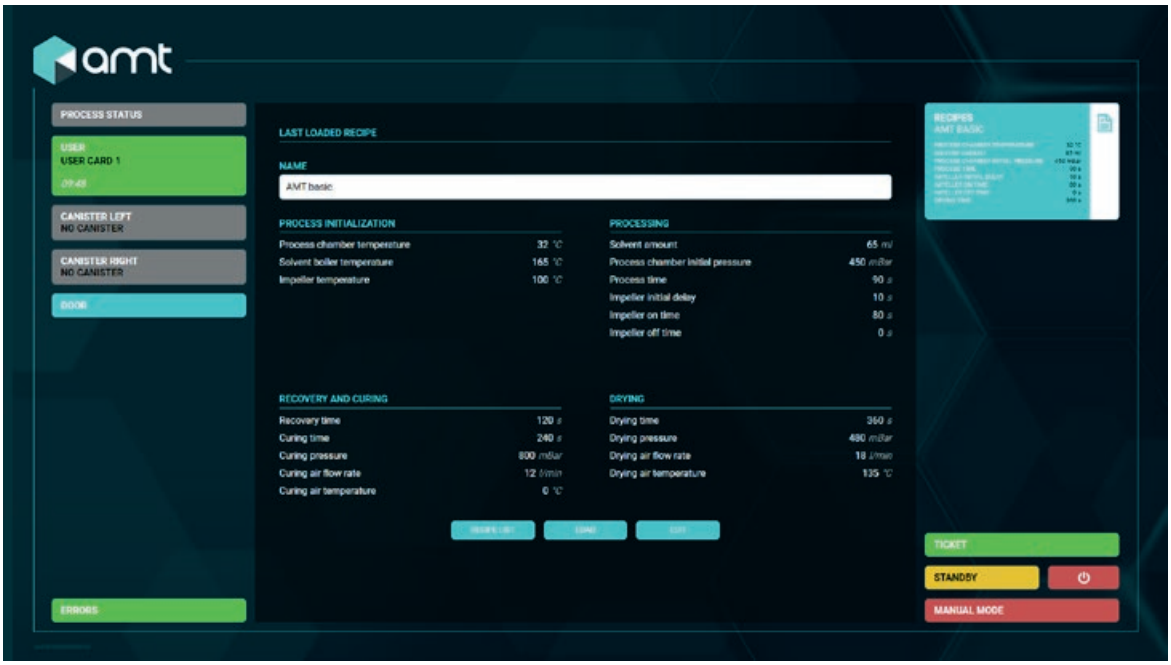
SELECTED RECIPE SCREEN

When a recipe is selected, all of the saved parameters within the recipes can be viewed.

By clicking on **“Edit”** these can then be adjusted. It is only possible to do this if Logged in as a user with the required access level.

Clicking on **“Load”**, will load the selected recipe so that a process can be started.

To go back to the list of saved recipes click on **“Recipe list”**.



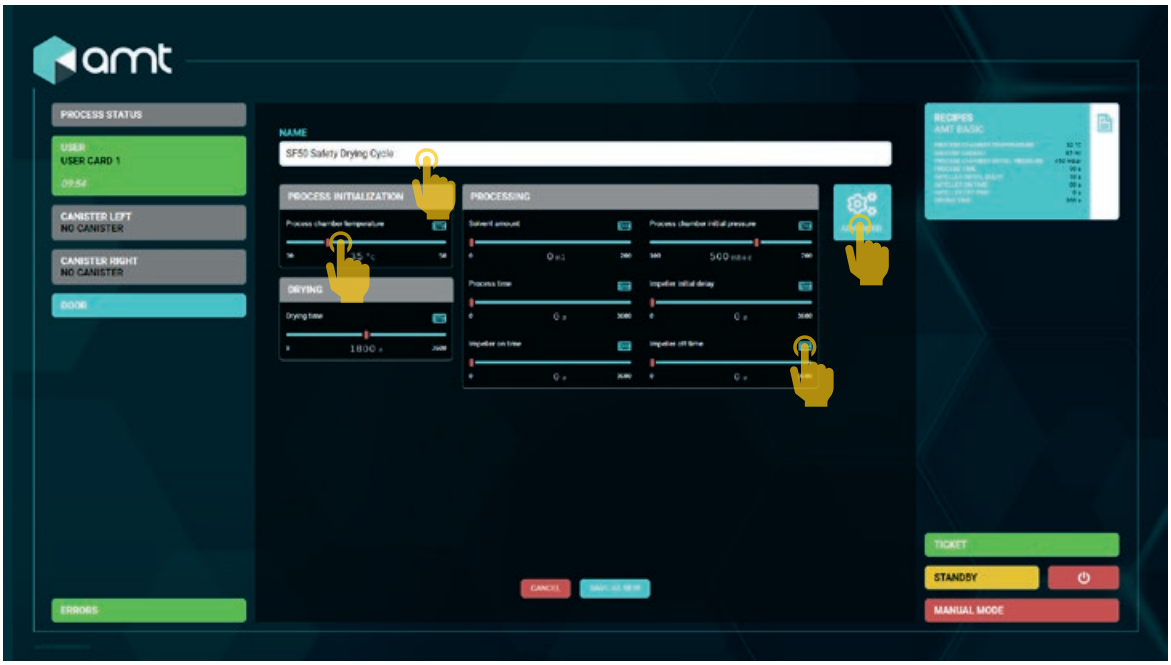
RECIPE EDITOR SCREEN

The different parameters can be adjusted either by moving the red indicator on the bar to the right and left, or by clicking on the small keyboard and entering the value manually.

The recipe can be named in the **“Name”** bar.

Once finished, click on **“Save as new”** to save the recipe.

To edit the advanced parameters click on **“Advanced”**.



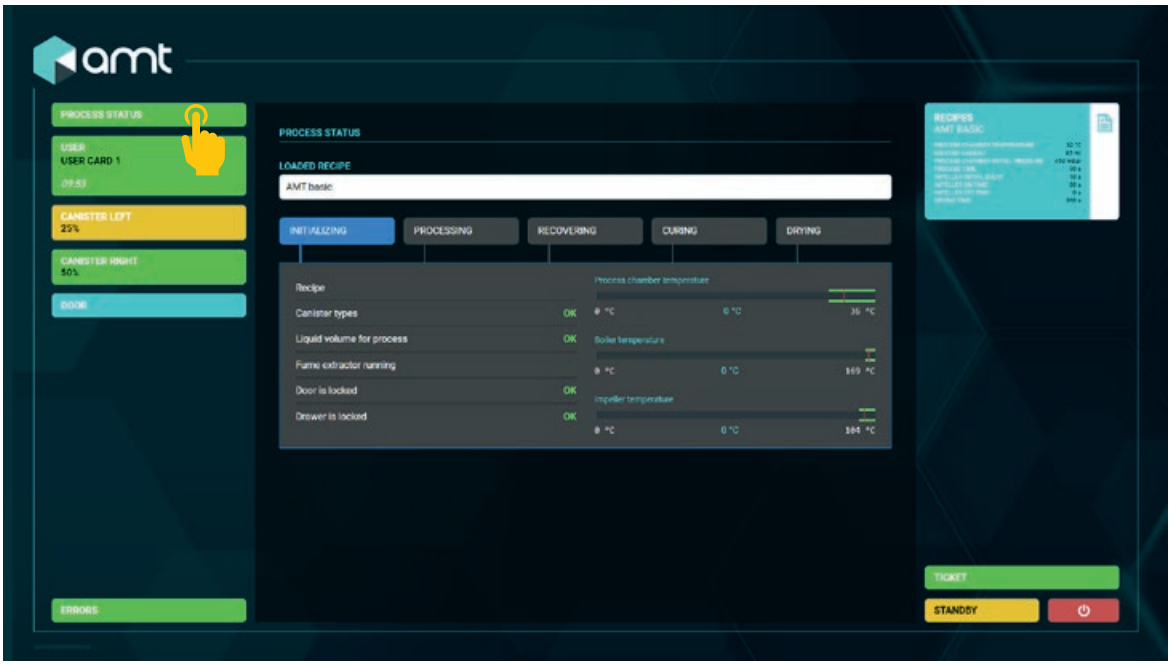
PROCESS STATUS SCREEN

The five stages of the recipe are as follows:

- Initialization
- Processing
- Recovering
- Curing
- Drying

The current stage of the process is highlighted in blue.

Within each stage, the main parameters, including the time remaining, can be seen.



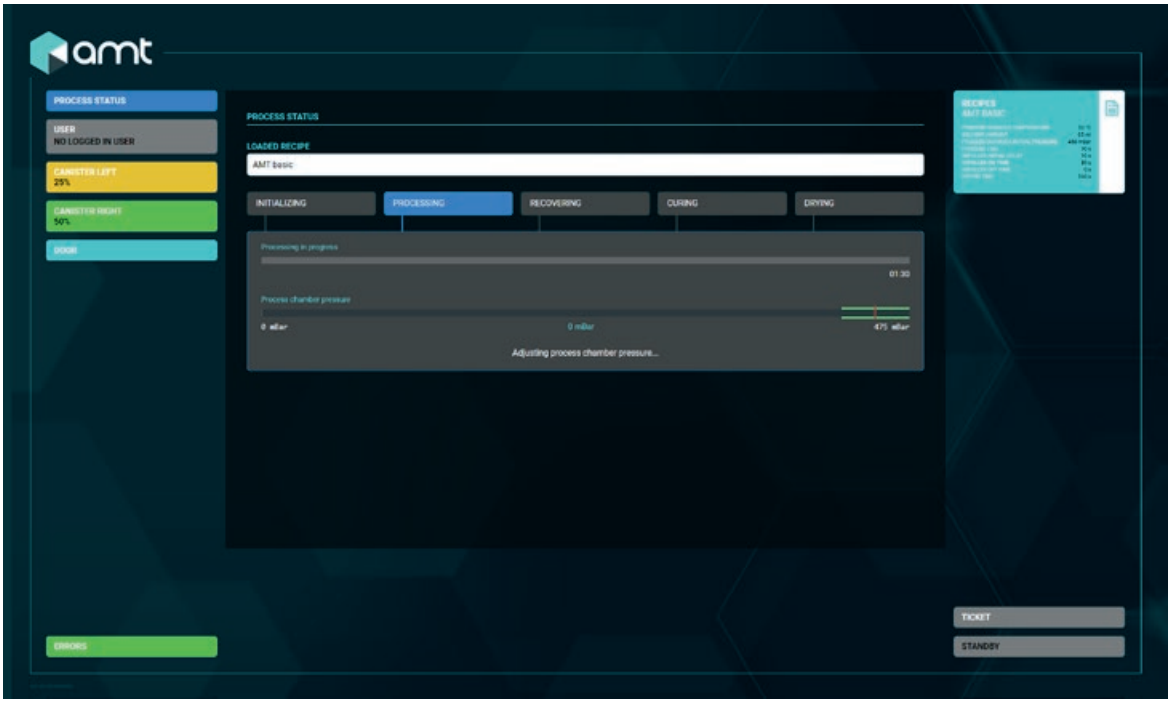
ACCESS CONTROL SCREEN

The five stages of the recipe are as follows:

- Initialization
- Processing
- Recovering
- Curing
- Drying

The current stage of the process is highlighted in blue.

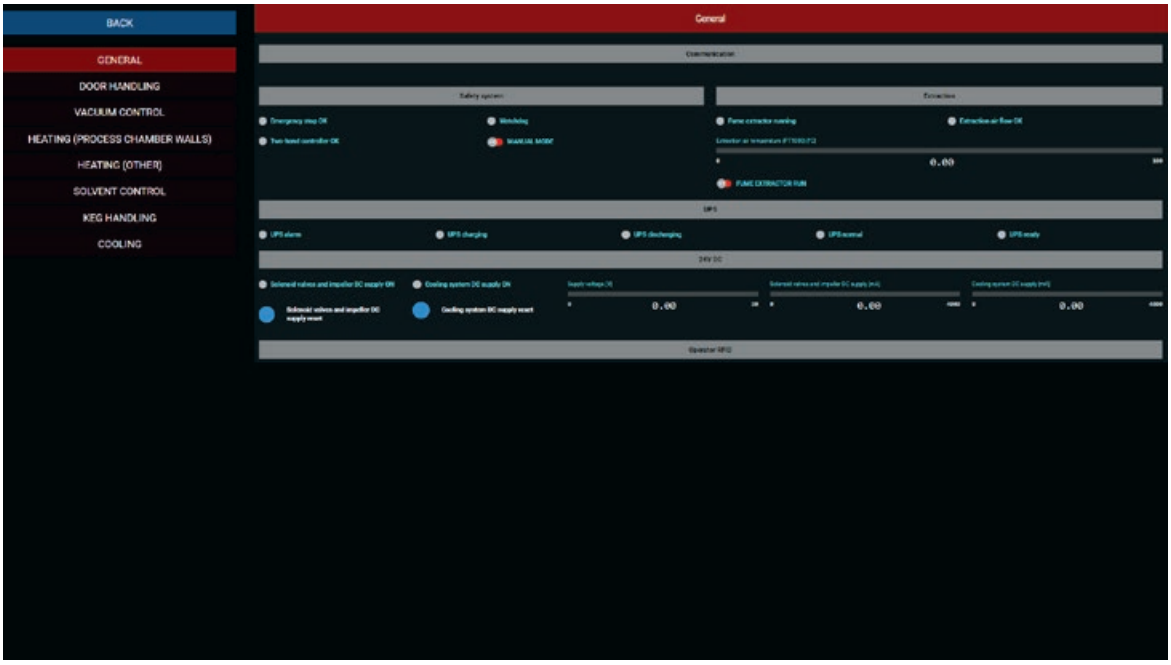
Within each stage, the main parameters, including the time remaining, can be seen.



MANUAL MODE SCREEN

Only accessible to AMT Engineers or trained personnel in possession of an Service Card.

It is useful for troubleshooting and settings adjustment.



9 // POWER ON/OFF

POWERING ON

To power **“ON”** the machine, firstly make sure that all connections are still secure as per the installation guide.

If an external extractor is being used, power this on before the PostPro SF machine.

Next, check the power supply to the machine is on and turn the isolator on the front of the machine to the **”ON”** position.

The machine will take a few minutes to power on and display the home screen.



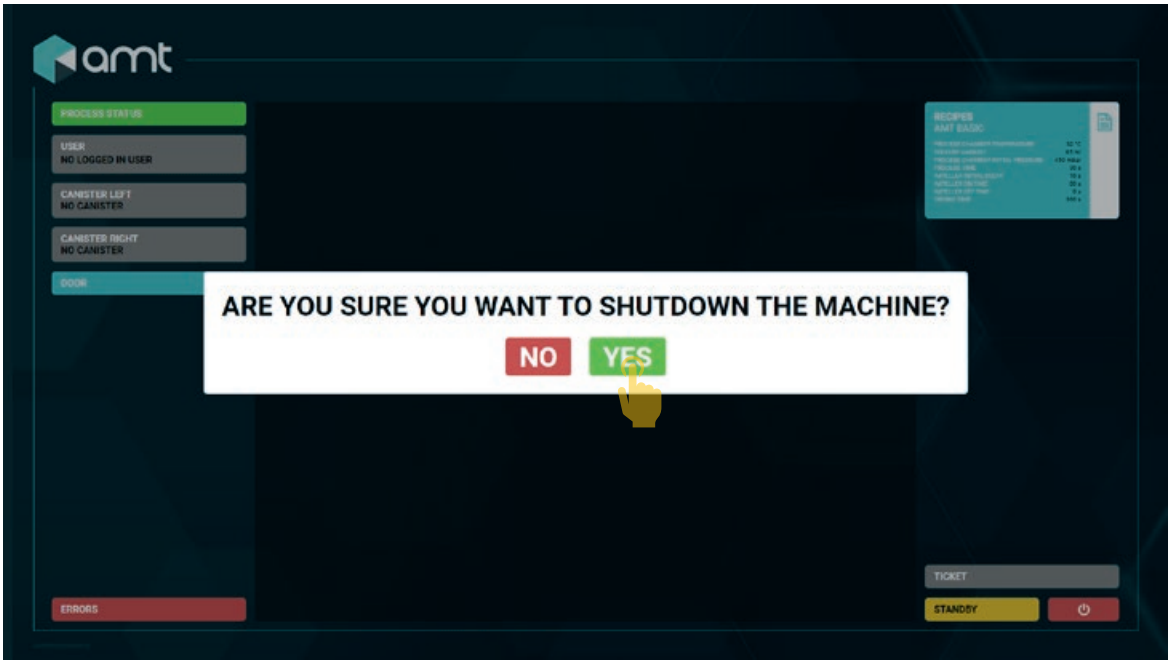
POWERING DOWN

To power down the system correctly, click on the red power button on the right hand side of the HMI, and then click YES on the pop up window.

The system will then fully shutdown. Due to the internal battery, it can take a few minutes to fully power down.

Make sure to switch OFF the extractor connected to the machine separately.

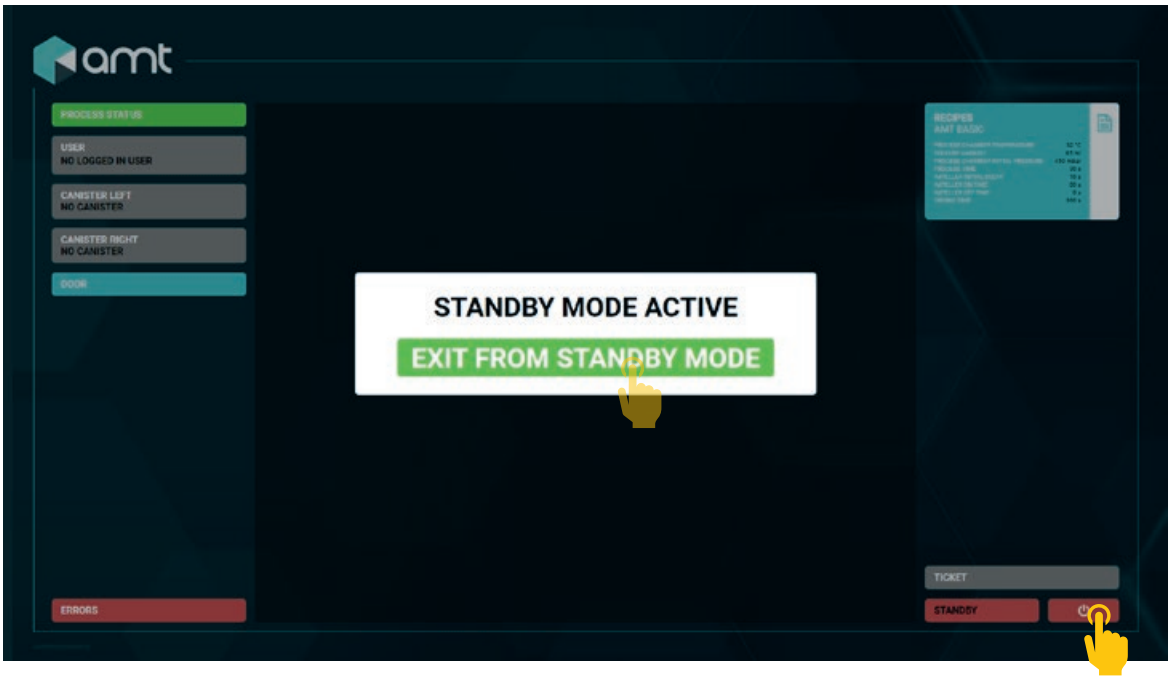
DO NOT ATTEMPT TO POWER BACK ON THE MACHINE UNTIL IT HAS FULLY POWERED DOWN AND THE BEACON IS NOT ILLUMINATED.



STANDBY MODE

If the system is not going to be used for a short period of time click on STANDBY in the bottom right hand corner. The machine will automatically go into **“Standby mode”** which consumes less energy.

Click **“EXIT FROM STANDBY MODE”** to start using the machine again.



10 // CONSUMABLES

The PostPro SF is compatible for use with different consumables. Each consumable is supplied in a pair; Finishing Agent and Recovery Agent. The PostPro SF is a closed loop system so waste and unused solvent from the Process Cycle is recovered. Subsequently there are two canisters within the PostPro SF; a Finishing Agent Canister, which contains fresh consumable, and a Recovery Agent canister, which contains the recovery consumable.

Both of these canisters are located inside the machine in the drawer underneath the chamber door. Each canister is labelled to identify between the Finishing Agent canisters and Recovery Agent canisters.

When the Finishing agent consumable level is below 5% an error will be displayed on the HMI.

Both canisters must be stored in a suitable location which meets the machine environmental specifications as outlined in the PostPro SF Site Preparation Guide.

10.1 UNPACKAGING A CANISTER

The canisters will be supplied in dedicated packaging. Ensure the packing is kept so the canister can be safely returned to AMT after consumption.

Ensure the PPE outlined in Section 3 of this manual is being worn when handling the canisters.

1. **Open the clip on the top of the barrel.**
2. **Remove the Lid.**
3. **Open the sealed bag containing the canisters.**
4. **Pull the canister upwards and out of barrel.**
5. **Keep all packing materials including barrel, bag etc. for shipping back to AMT**

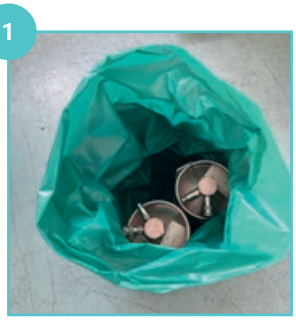


10.2 RETURNING A CANISTER

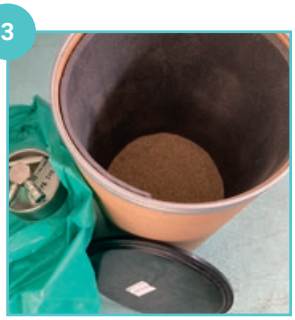
Following consumption of a Finishing Agent or Reovery Agent Canister it is important to correctly package the canister for shipment. Please follow the below instructions:

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

1. Place the canister in the plastic bag and seal.
2. Place the sealed bag containing the canister in the barrel.
3. Fill the barrel with the vermiculite.
4. Place the lid on the barrel.
5. Fix the lid in place using the clip.
6. The canister is now ready for shipment. Please contact AMT to arrange collection and shipment.

1


2


3


4


5

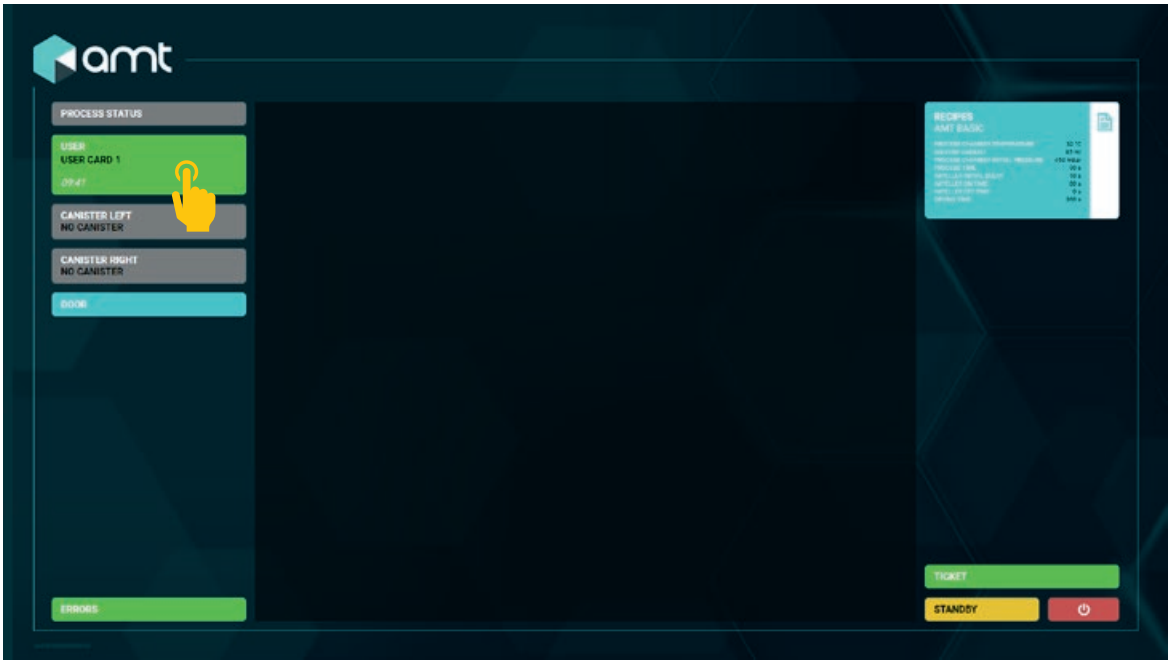

6


11 // SETTING ACCESS CONTROL PERMISSIONS

The machine is supplied with a pack of user cards and it is important to set the access levels according to the users requirements. This is done as follows:

1. Scan the user card which you want to program against the RFID reader on the right hand side of the HMI screen.

2. Press the user button on the screen as shown in the image.



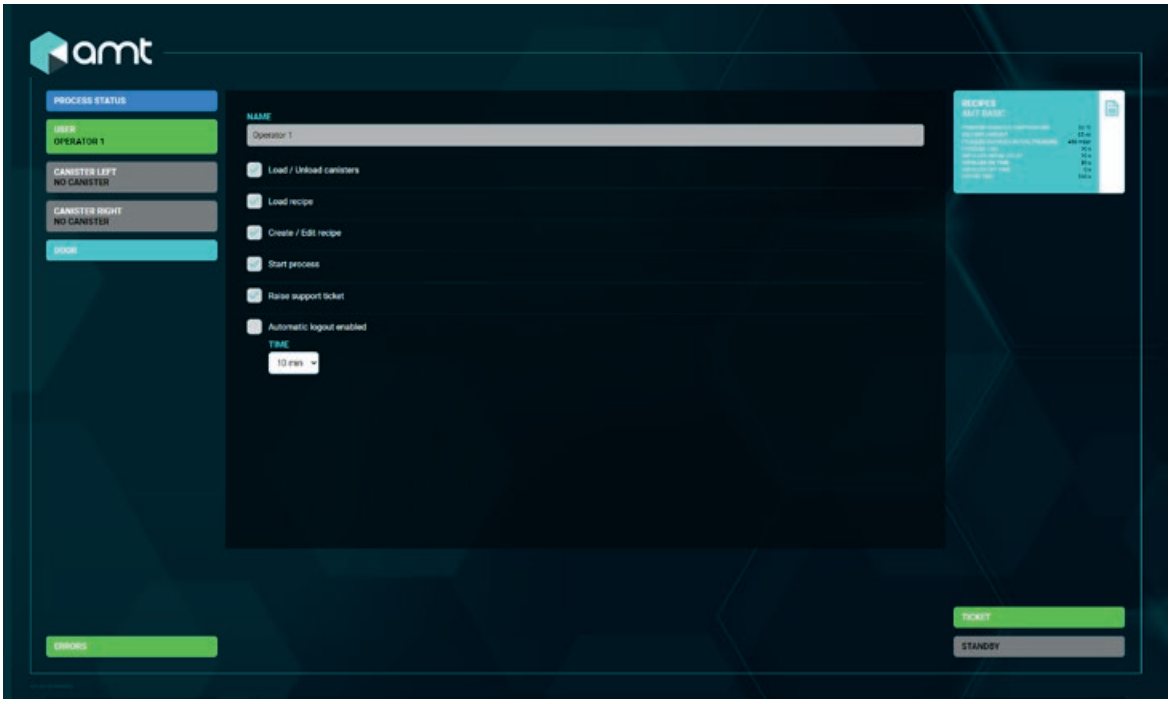
3. Once the user screen is display you will see all of the available permissions. As shown in the image.

4. Scan the **“Access Control Card”** on the RFID reader and select/deselect the permissions according to the user’s requirements.

In addition to permissions, the name of the card can also be changed.

5. Once completed, scan the user card on the RFID reader again to save the changes.

Keep the “Access Control Card” secure so that only authorised users have are able to re-program user cards.



12 // CREATING A RECIPE

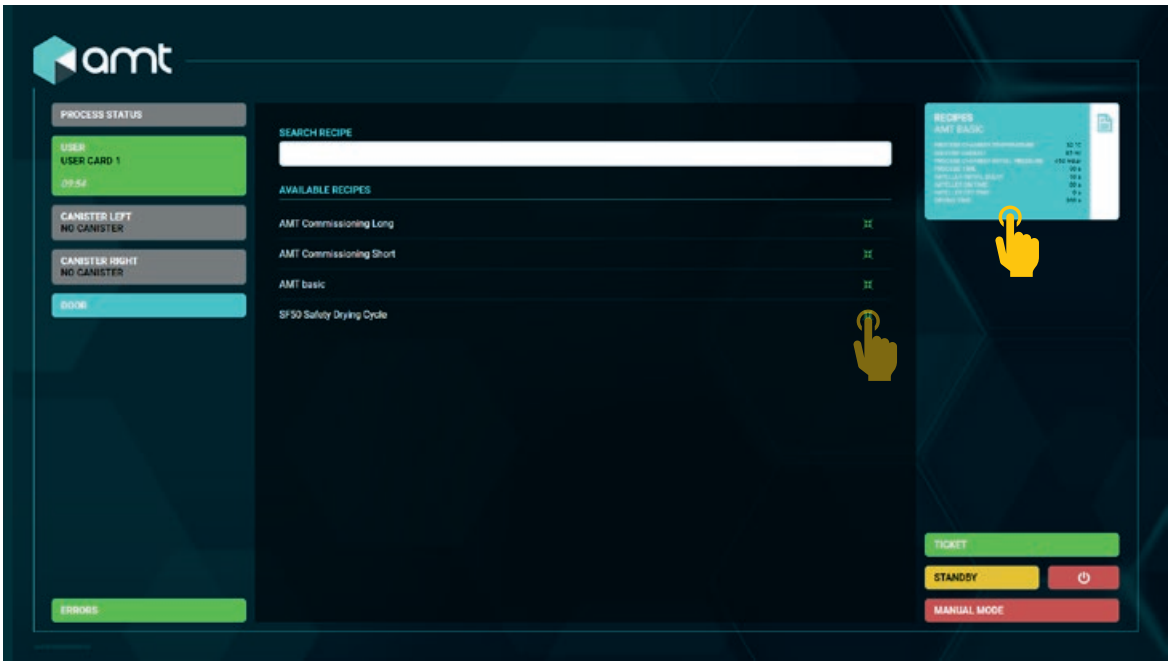
QUESTIONS TO BE ANSWERED

What **Technology** was used to manufacture the parts?	SLS / MJF / FDM, etc.
What is the **Material** of the parts?	PA12 - 11 / TPU, etc.
What is the average **Wall Thickness** of the parts?	E.g. 1-2 mm / 3-4 mm / >5 mm, etc.
How **Full** is the processing chamber?	E.g. half full, completely full?

CREATING A RECIPE

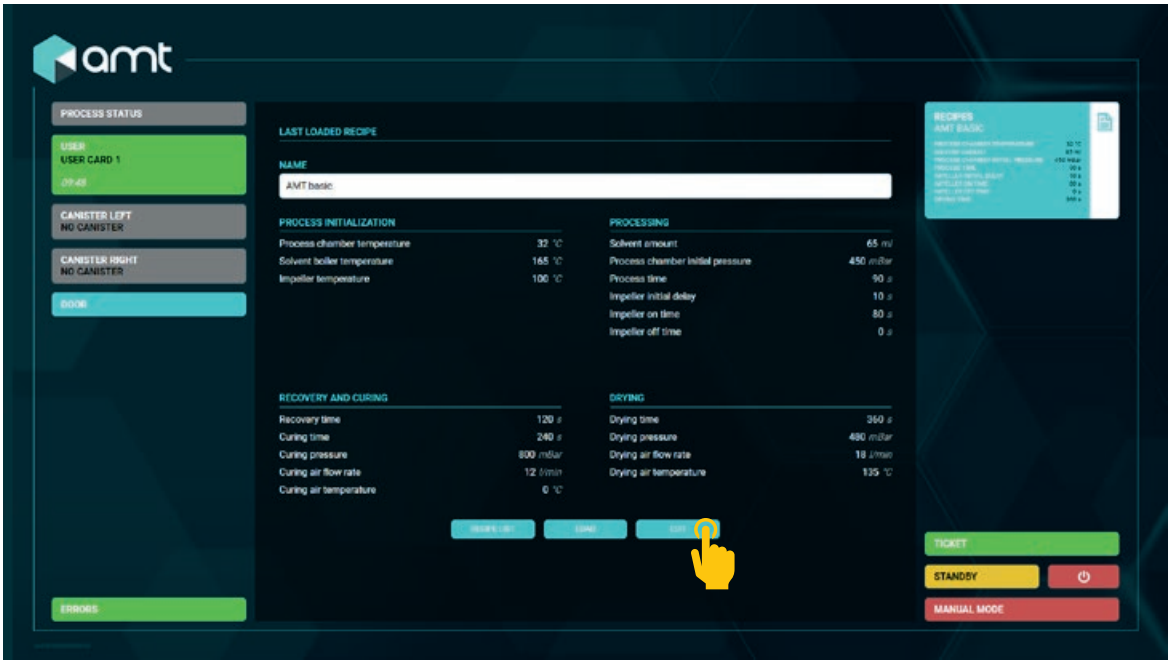
Click on the recipe box on the right hand side.

Then select a recipe which you want to edit or use as a base for the new recipe. This is done by clicking on the green icon at the end of the recipe.



This will the display all of the processing parameters for the selected recipe.

Next, click on **“Edit”**.



The different parameters can be adjusted either by moving the red indicator on the bar to the right and left, or by clicking on the small keyboard and entering the value manually.

If a new recipe is being created, it is important to rename the recipe using the text box at the top.

Once finished, click on **“Save as new”** to save the recipe.

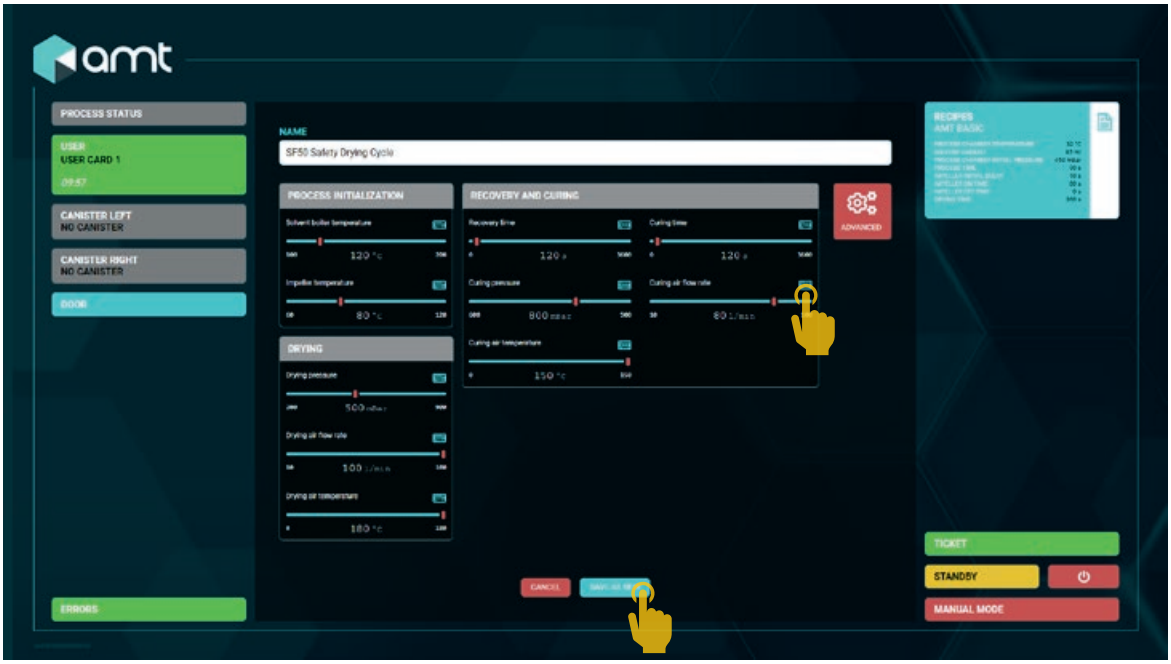
To edit the advanced parameters click on **“Advanced”**.



The advanced parameters can also be adjusted by either moving the red indicator on the bar to the right and left, or by clicking on the small keyboard and entering the value manually.

Once finished, click on **“Save as new”** to save the recipe.

The new recipe can be found under the list of Recipes.



13 // STARTING A PROCESS RUN

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.

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:

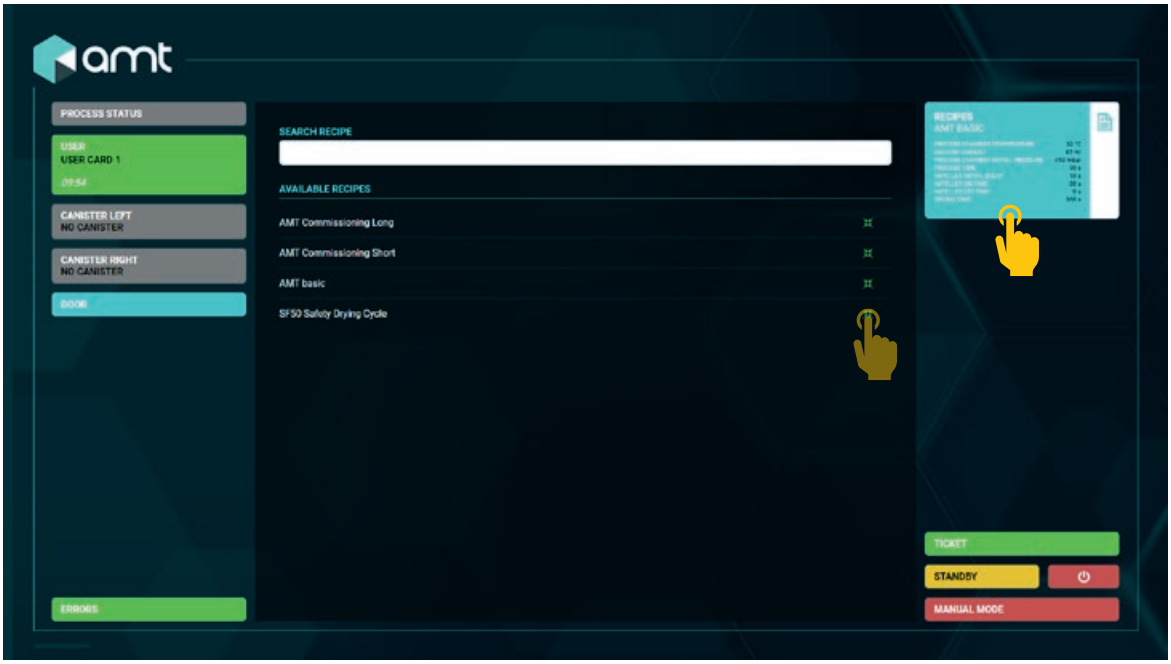
- Parts should be placed at least 25 mm away from chamber walls;
- Parts should be placed at least 10 mm away from each other;
- Parts in the same batch should be of the same colour;
- Parts in the same batch should be of the same material;
- The surface of the parts should be clean before processing;
- 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.



Swipe your user card on the RFID reader to log in.

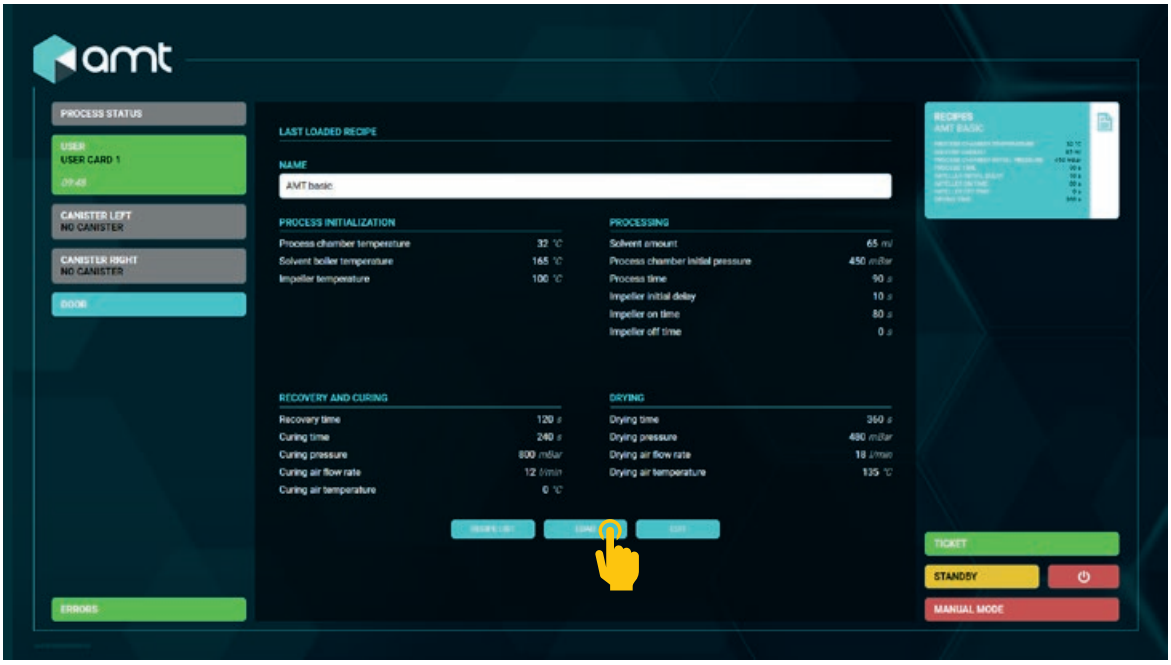
Click on the recipe box on the right hand side.

Then select the recipe which you want to start. This is done by clicking on the green icon at the end of the recipe.



This will the display all of the processing parameters for the selected recipe.

Next, click on **“Load”.**



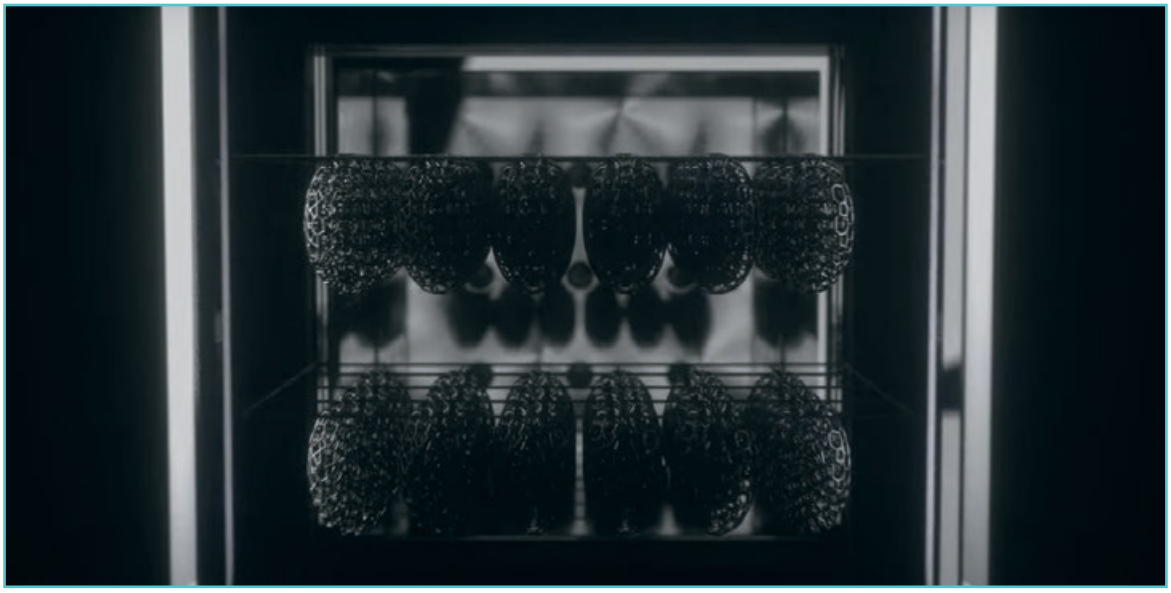
Once the machine has initialised, it will prompt the operator to load the parts.

Do this by selecting **“OK”** and pressing the two hand buttons on each side of the machine to load the parts.

Once loaded, close the door again using the two hand buttons and start the process.

It is important to load the parts quickly and close the doors as soon as they are loaded to prevent the parts from heating up.



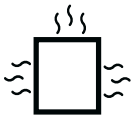


14 // HOW THE PROCESS WORKS

VAPOR SMOOTHING PROCESS

The process has 5 main stages:

1 INITIALIZATION



Processing chamber warms up

After reaching the setpoint parts can be loaded into the chamber

2 PROCESSING



Solvent is introduced into the chamber and a condensation process takes place. This causes the surface of the parts to reflow and smooth

3 RECOVERY



Recovery of the solvent starts

4 CURING



Parts start to harden again

5 DRYING



Any remaining trace of solvent in the parts and processing chamber is removed

- Each of these stages has their own parameters which are adjustable.
- It is necessary to change the process parameters depending on the material, geometry and quantities of the parts being processed.
- By changing the parameters, different levels of smoothing and sealing can be achieved.

INITIALIZATION STAGE

The following parameters can be adjusted:

Process chamber Tº (ºC): Setpoint of the walls in the processing chamber which needs to be reached before the process starts.

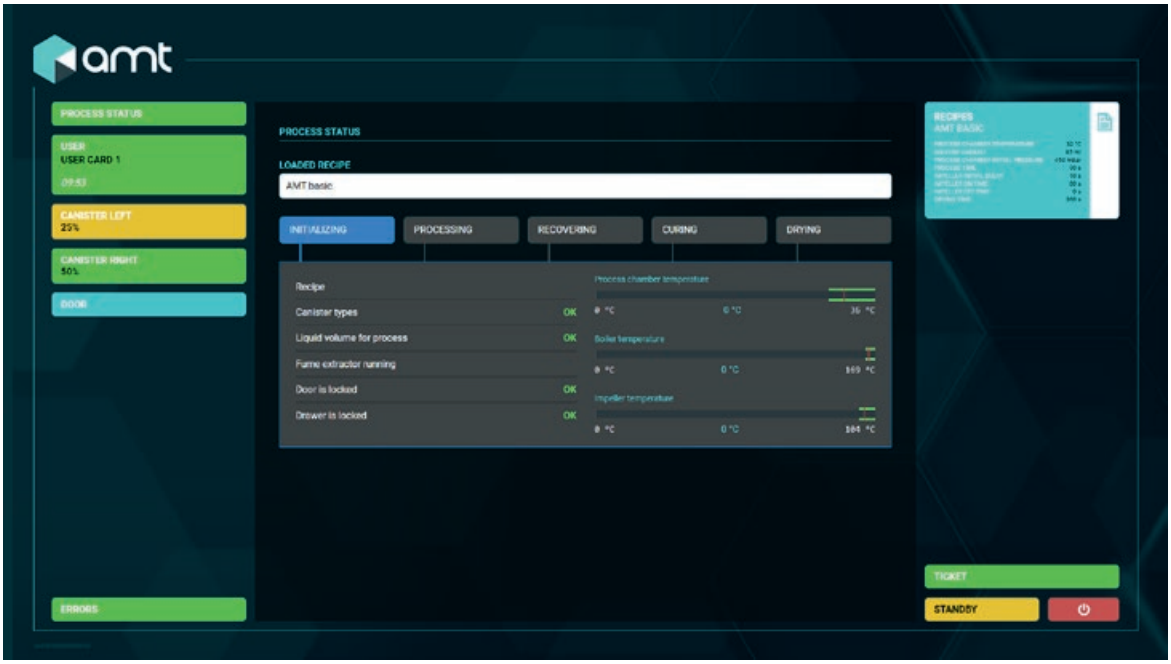
Recommended: 37 – 39ºC

Boiler T° (°C): Temperature at which the boiler is set to, to ensure that the solvent is heated to its boiling point.

Recommended: 120ºC

Impeller Tº (ºC): Temperature that the impeller above the processing chamber reaches before the solvent is dosed into the processing chamber.

Recommended: 100ºC



PROCESSING STAGE

The following parameters can be adjusted:

Solvent Amount (ml):

Volume of solvent which is dosed into the chamber.

Processing time (s):

Exposure time of the solvent on the surface of the parts.

Process chamber pressure (mbar):

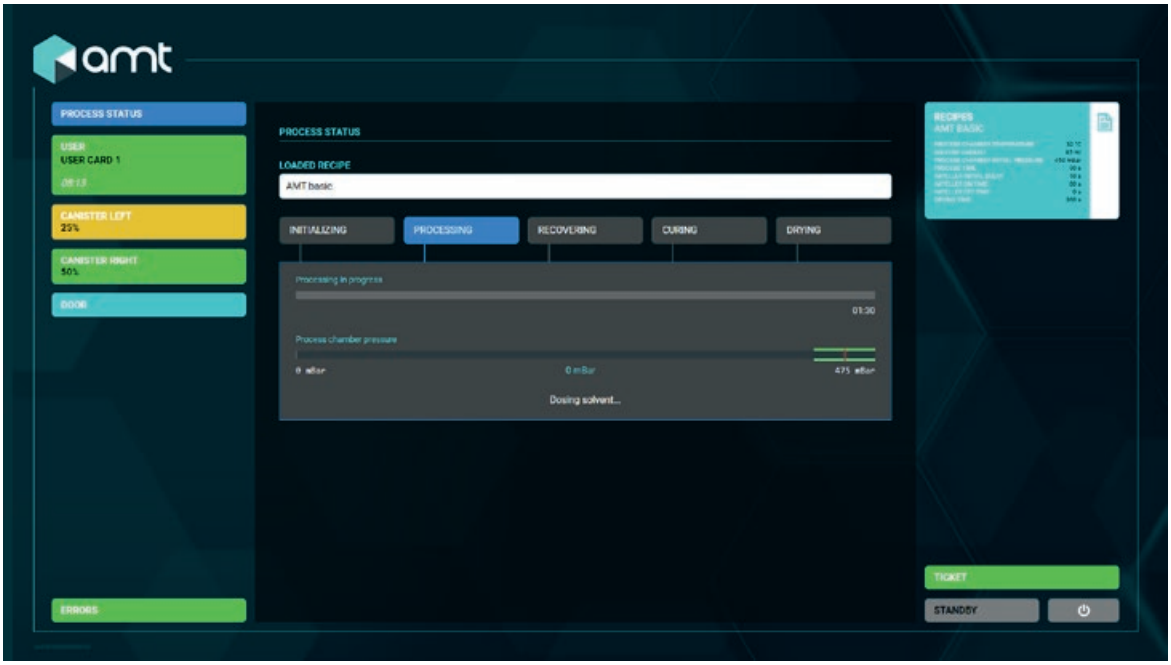
Pressure that the vacuum pump pulls inside the processing chamber.

Impeller initial delay (s):

Time after which the impeller starts working.

Impeller ON/OFF time (s):

Defines whether the impeller is working constantly or in intervals.



PROCESSING STAGE – SOLVENT AMOUNT

Here are some additional details about how each of these parameters affects processing of parts:

Solvent Amount (ml):

Volume of solvent which is dosed into the chamber.

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.

Typical range for Consumable volume for a full chamber of parts is between 100 – 250ml.

PROCESSING STAGE – PROCESSING TIME

Processing time (s):

Exposure time of the solvent on the surface of the parts.

A higher process time will result in increased smoothness on the parts.

If the Process Time is too long this could result in over processing or damaging the parts.

Typical range for processing time is 100 seconds – 250 seconds.

PROCESSING STAGE – PROCESS CHAMBER PRESSURE

Process chamber pressure (mbar):

Pressure that the vacuum pump pulls inside the processing chamber.

A lower pressure results in a less aggressive smoothing process.

Higher pressure results in a more aggressive smoothing process.

Typical Process Chamber pressure is between 300 – 500mBar

PROCESSING STAGE – IMPELLER CONTROLS

Impeller initial delay (s) / Impeller ON/OFF time (s):

Time after which the impeller starts working.

The impellers are used to circulate the solvent around the processing chamber.

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.

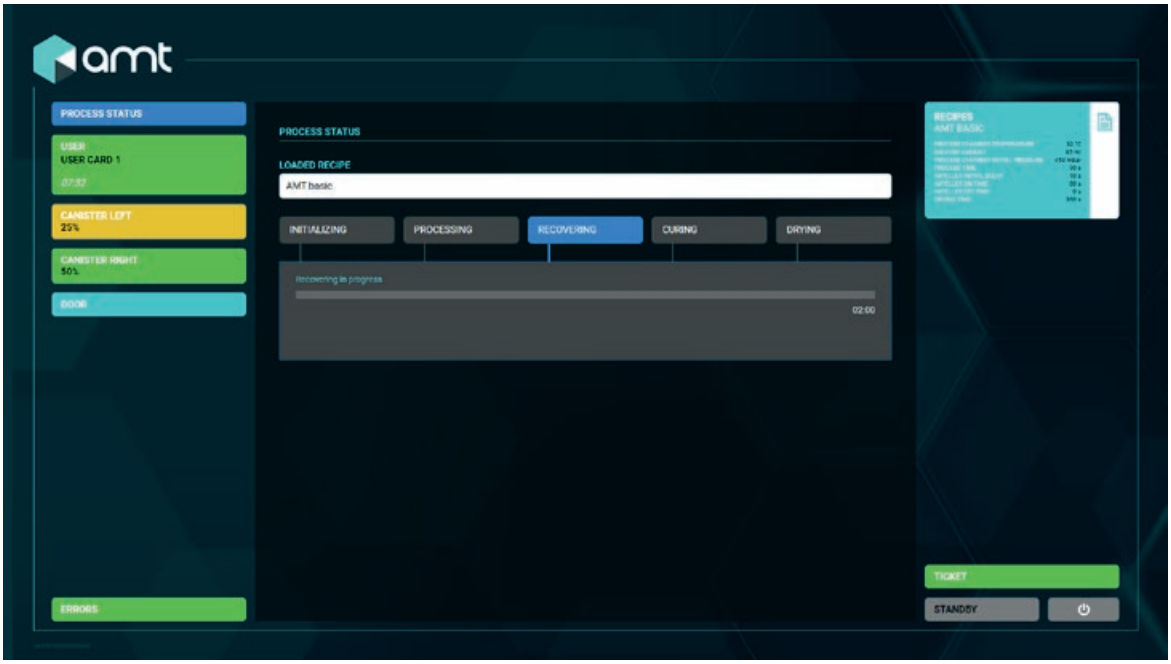
RECOVERY STAGE

The following parameter can be adjusted:

Recovery time (s):

Period in which the machine recovers most of the solvent.

Recommended: 120s



CURING STAGE

The following parameters can be adjusted:

Curing time (s):

Duration in which the parts resolidify.

Recommended: 600 – 900s

Pressure during Curing (mbar):

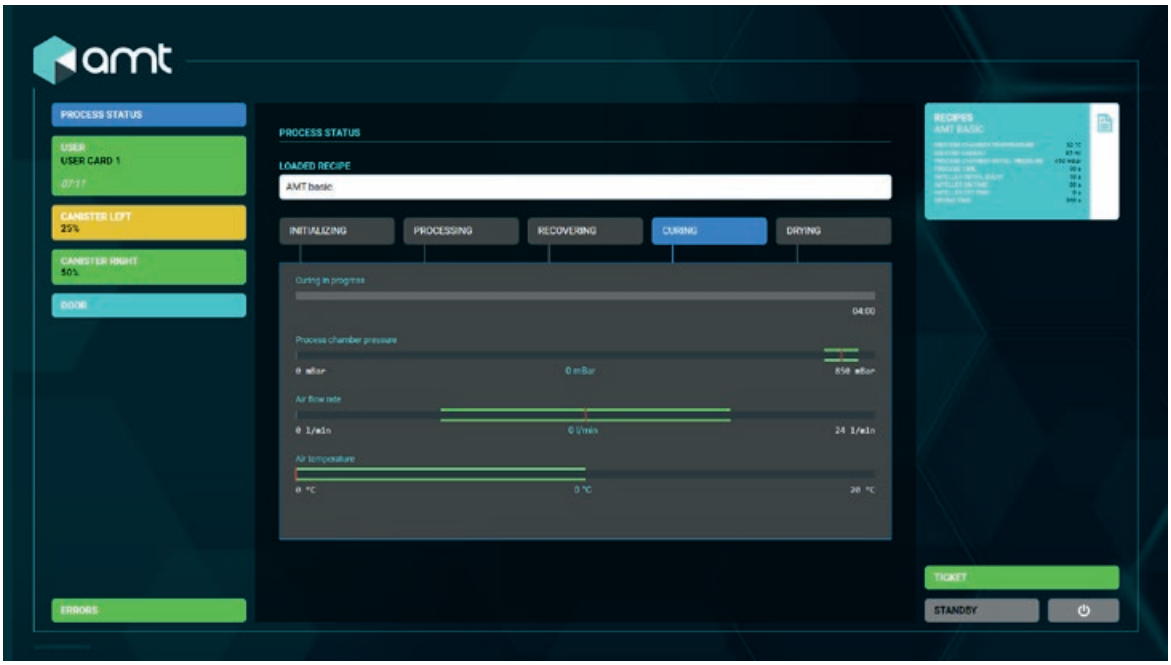
Pressure inside the processing chamber.

Recommended: 600 – 800 mBar

Air flow during Curing (L/min):

Flow rate of the air which is blown into the processing chamber.

Recommended: 20 – 30 L/min



DRYING STAGE

The following parameters can be adjusted:

Drying time (s):

Duration of the drying cycle to remove any traces of the solvent.

Recommended: 3600 – 5400s

Pressure during Drying (mbar):

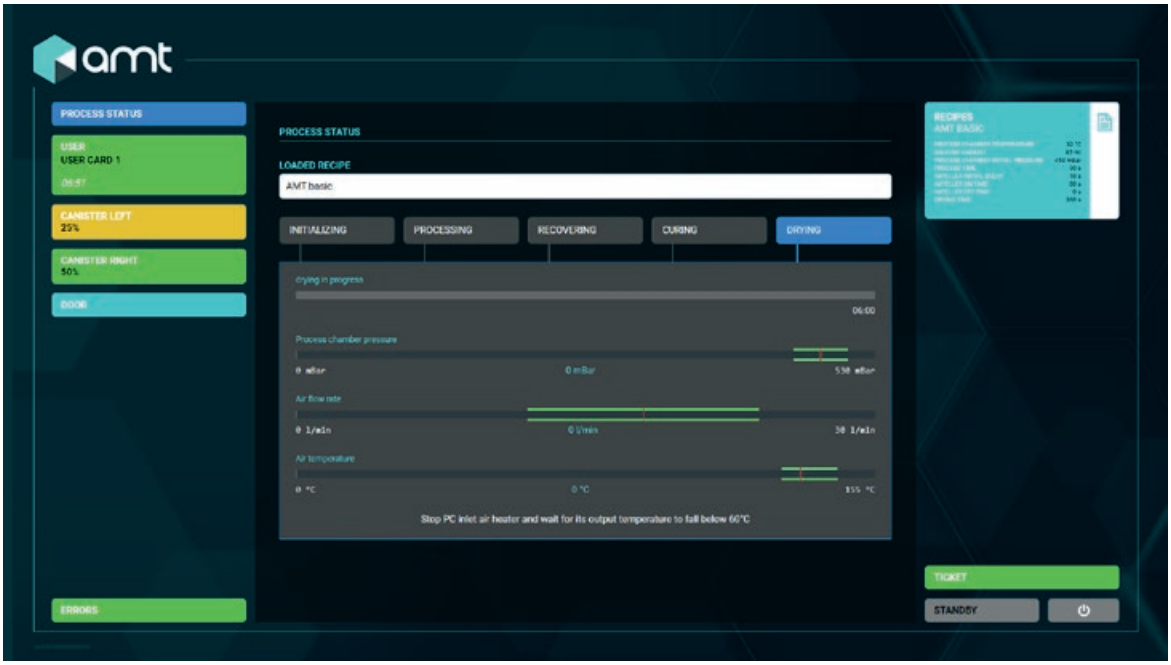
Pressure inside the processing chamber during Drying.

Recommended: 500 – 700 mBar

Air flow rate during Drying (L/min):

Flow rate of the air blown into the processing chamber.

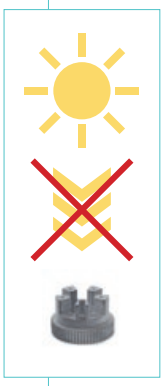
Recommended: 50 – 70 L/min



BEST PRACTICE



Try to keep the part's temperature as constant as possible before the Vapor Smoothing!



Condensation of the solvent on the parts' surface is highly dependent on the difference in temperature between the parts and the solvent. The warmer the parts are when the process starts, the less condensation will take place and in turn, the less the surface will smooth.

For this reason, store parts out of direct sunlight in a temperature and humidity-controlled room which is between 16 -19 degrees Celsius.



Keep the Vapor Smoothing room clean!



Good housekeeping practices in and around the machine is crucial in preventing unwanted contamination. Parts surfaces are very sensitive to dust from the environment, and contaminated surfaces are highly visible after smoothing.

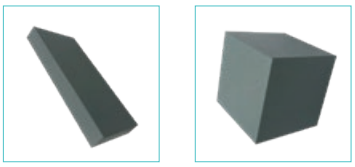
The processing chamber should be cleaned after every run using a "lint free" wipe and IPA.

Group the parts before smoothing!

Do not mix parts of different technologies, materials or wall thicknesses within the same process run. Processing conditions vary depending on these characteristics and mixing parts up will lead to inconsistent results.

Furthermore, do not mix coloured or dyed parts with white parts as contamination, in the form of black dots, can be found all over the white parts after smoothing.

THICK PARTS



COLOURED PARTS



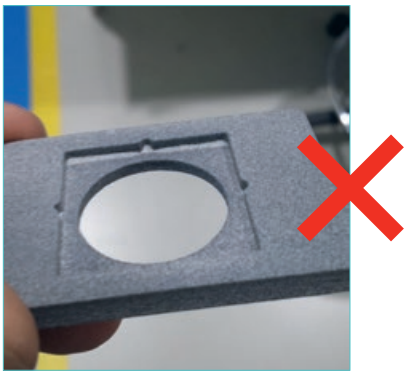
THIN PARTS



Ensure the parts have be thoroughly de-powdered!

There must be **no powder** left on the parts, especially in internal cavities and around sharp features. In general, poor de-powdering leads to bad smoothing results as the powder will caused imperfections as it processes. This is known as Over-Processing.

If necessary, do a secondary blasting step to remove all residual powder on corners and intricate shapes.





Freeze to improve the results on very thin parts!

Very thin parts tend to warm up quickly inside the processing chamber.

The condensation of the solvent can be improved by increasing the difference in temperatures between the parts and the chamber walls. We recommend freezing thin parts (<1mm) for at least 30 minutes to achieve this. A blast freezer is recommended, however a standard freezer should also work.





Design for Post Processing!

Incorporating a hanging features into the part design can save time when loading processing racks and also prevent parts from having sink marks.

The most common approach is to design sacrificial hooks on the parts which can be removed after processing.

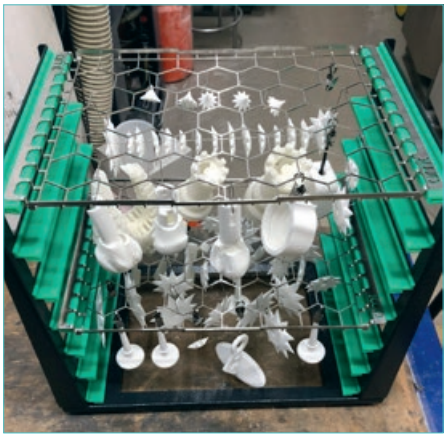


Use Stainless Steel wires and hooks to hang parts!

Some materials can react or oxidize during the process which can lead to contamination on the parts. Stainless steel is an inert material that is easy to purchase and works very well for suspending parts on to the process racks.



Make sure to use thin clips/hooks or “welding rods” to reduce the amount of condensation they attract. This will help to prevent drip marks forming on the parts.



Hang parts correctly!

For best results:

Parts should be placed at least 25 mm away from chamber walls.

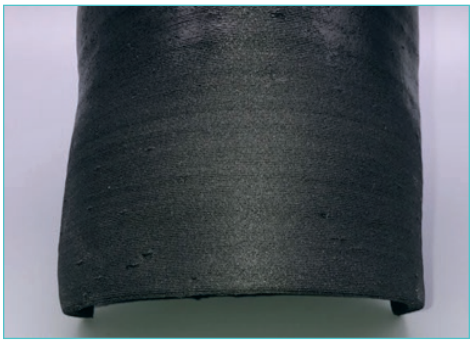
Parts should be placed at least 10 mm away from each other. Ensure parts are not touching each other.

Cupping geometries should be hung with the openings facing downwards at a 10º - 20º angle.

Minimise the contact points between the clips/wire and the part to reduce the severity of witness marks after processing.

PROCESSING ISSUES

UNDER-PROCESSING



POSSIBLE CAUSES:

1. Pressure during processing was too low.
2. Not enough solvent was used.
3. Processing time was too short.

HOW TO AVOID:

1. Raise the pressure during processing.
2. Increase the amount solvent.
3. Increase the processing time.

OVERPROCESSING / BRIDGING



POSSIBLE CAUSES:

1. Pressure during processing was too high.
2. Too much solvent was used.
3. Processing time was too long.

HOW TO AVOID:

1. Lower the pressure during processing.
2. Decrease the amount solvent.
3. Decrease the processing time.

Note: When troubleshooting, is it best to adjust one parameter at a time. Firstly, adjust the processing pressure, followed by fine adjustments to the solvent volume and processing time.

17 // MAINTENANCE SCHEDULE

To ensure continued and ongoing safe and successful operation of the PostPro SF the following maintenance schedule is recommended.

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 consumable is contained (i.e. replacing Santoprene tubes, replacing cannisters) must be carried out by personnel trained by AMT. The person in charge shall make sure that all the safety measures specified in the training are taken.

Before the operation of the PostPro SF ensure the operator is wearing the appropriate PPE and is following the procedures for safe operation as outlined at the start of this manual.

17.1 // 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.

17.2 // MONTHLY

- 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 dis-coloured (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.

EC DECLARATION OF CONFORMITY

This Declaration of Conformity is the original Declaration of Conformity according to Directive 2006/42 / EC.

Additive Manufacturig Technologies Hungary Kft.

8200 VESZPRÉM, GÉPRAKTÁR UTCA 1.

We declare under our sole responsibility that the product is of the following type

Chemical Vapor Smoothing Machine SF Series

to which this declaration applies comply with **Appendix I** to Directive **2006/42/EC** safety and health requirements for Compliance with the safety and health requirements of the EC Directive the following standards and / or technical specifications have been considered:

MSZ EN ISO 12100:2011 // MSZ EN ISO 13849-1:2016
MSZ EN ISO 12921-1:2005 // MSZ EN 60204-1:2019
MSZ EN ISO 13851-1:2019 // MSZ EN ISO 14120:2016
MSZ EN ISO 12921-4:2005

In the European Community, the following are responsible for documentation:

Norbert Heizer // Additive Manufacturig Technologies Hungary Kft., 8200 Veszprém, Gépraktár utca 1.

Viktor Pap-Kovács

CTO/MD

Veszprém, May 25, 2022

18 // CONTACT INFORMATION

For further information, please contact AMT:

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