



**VISIJET® M3 CAST
POST PROCESSING GUIDE**

Safety Symbols and Definitions



ELECTRICAL SHOCK HAZARD: High voltage electricity is accessible in the vicinity of this sign or behind the access panel. High voltage can cause severe burns or death, as well as fires. Access panels are for service only and should be opened only by certified service personnel or trained maintenance personnel.



HOT SURFACE HAZARD: A hot surface is accessible in the vicinity of this sign or behind the access panel. Avoid contact. Hot surfaces can cause burn injury or fire. Allow surface to cool before touching. Access panels are for service only and should be opened only by certified service personnel or trained maintenance personnel.



HARMFUL IRRITANT WARNING: Indicates that skin or eye irritation could result while exposed to a chemical composition.



CAUTION: Indicates the possibility of loss of data or damage to equipment.



WARNING: INDICATES THE POSSIBILITY OF INJURY OR DEATH TO PERSONNEL



WEAR GLOVES: WEAR THE APPROPRIATE GLOVES WHEN REQUIRED. FOR EXAMPLE, WHEN TOUCHING SURFACES THAT MAY CONTAIN OR HAVE BEEN EXPOSED TO MATERIALS, WEAR NITRILE GLOVES. HEAT GLOVES ARE NECESSARY WHEN TOUCHING SURFACES THAT MAY BE HOT TO ENSURE BURNS DON'T OCCUR.

 **NOTE:** A note signifies important information but not information of a critical content.

First Aid and Protective Equipment

The following paragraphs provide general first aid procedures and recommendations for protective equipment to minimize the risks from material exposure. If professional medical attention is necessary, take the Global Harmonized Standards/Safety Data Sheet (GHS/SDS) for the exact material involved to the attending physician.

Skin Contact

If molten material gets on skin, cool rapidly with cold water. Do not attempt to peel material from skin. Use mineral oil to loosen the material. Seek medical attention for burns.

Eye Contact

Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if symptoms persist.

Fume Inhalation

Move affected person to fresh air. If respiratory irritation occurs, if breathing becomes difficult seek medical attention immediately.

Ingestion

Ingestion is unlikely. If ingested, drink plenty of water and seek immediate medical attention. Do not induce vomiting.

Material Disposal

Avoid disposal. Attempt to utilize material completely. Prior to disposal of unused material, consult an approved waste disposal operative to ensure regulatory compliance.

To find out facility disposal requirements, contact a local waste disposal provider. (Local environmental regulatory agency should have a list of qualified providers.) You will need to give disposal service provider a copy of the part material GHS/SDS (Global Harmonized Standards / Safety Data Sheets), and possibly other forms included in the Appendix of your VisiJet® Material Handling Guide, such as Waste Profile Worksheet and SNUR (Significant New Use Regulation - U.S. only). A report will be provided, indicating disposal requirements, as well as a quotation for regularly scheduled pickups. If

assistance is needed locating a waste disposal provider, or completing a waste disposal form, contact your local 3D Systems certified reseller or 3D Systems Technical Support. SDS information regarding the part and support material can be found at the following links. VisiJet M3 Cast SDS (<http://www.3dsystems.com/materials/visijet-s400-wax>) & VisiJet S400 SDS (<http://www.3dsystems.com/materials/visijet-s400-wax>).

3D Systems assumes no liability or responsibility for proper disposal of part material. Proper disposal of part material is the sole responsibility of the user.

For proper Isopropyl alcohol (IPA) disposal, please refer to the manufacturers Safety Data Sheet (SDS).

Health Hazards

Inhalation/Ingestion

Under normal operation, inhalation is not an expected route of entry.

Ingestion - Ingestion may cause nausea, diarrhea and/or stomach pain.

VisiJet® M3 Cast is non-toxic if ingested.

Hazardous decomposition products: Carbon dioxide, carbon monoxide and other toxic fumes can be released at high temperatures or upon burning.

Handling Finished Parts

Finished parts can be handled or disposed of the same as standard household wax products. VisiJet® M3 Cast parts are not recyclable. This material is not intended for and cannot be used for medical implant, food or drink handling applications.

Exposure control - The 3D printer system has a variety of built-in engineering controls which are designed to prevent operator exposure. Do not try to change or disable these controls.

Hygienic Practices

Appropriate hygienic practices should be followed, including washing with soap and water before meals, breaks, smoking, applying cosmetics, using toilet facilities, and after work. Ensure a convenient washroom location is provided with access to soap, water, and disposable paper towels.

Material Handling

Emergency (GHS/SDS)

Chemtrec USA (800) 424-9300; Europe +1-703-527-3887

VisiJet M3 CAST

Part No.

Dansk - Opbevares utilgængeligt for børn. Undgå kontakt med øjne. Hvis det indtages, søges straks lægehjælp og denne beholder eller etiket vises til lægen.

Deutsch - Von Kindern fern halten. Berührung mit den Augen vermeiden. Bei Verschlucken sofort einen Arzt aufsuchen und diesen Behälter oder Packzettel vorweisen.

English - Keep out of reach of children. Avoid contact with eyes. If swallowed, seek medical advice immediately and show this container or label.

Poison and Deleterious Substance Control law....not applicable

PRTR and Promotion of Chemical Management law (PRTR Law).... no listed components

Fire Services Act....not applicable

Explosives Law....not applicable

High pressure gas safety law....not applicable

Export Trade Control Order....not applicable

Waste Disposal and Public Cleaning Law....applicable. Before disposal, consult an approved waste disposal operative to ensure regulatory compliance.

Spilled Material

Spills of material are HIGHLY UNLIKELY, and should NOT occur in normal operation of the 3D printer system. If a leak occurs, it is an indication of a serious 3D printer system malfunction.

Spills of support material can be cleaned without use of protective gear, and disposed of as office trash.

Promptly remove spilled material, dispose of waste material, and clean up materials per local regulatory requirements.

Suspend use of the 3D printer system until you contact 3D Systems Technical Support for a service visit to determine and repair the source of the leak.

If material is molten, allow it to freeze before clean up. Scrape the material loose from the floor if necessary and vacuum or sweep the solid material into a closed container. Place material in an appropriate container for disposal.

Consider avoiding placement of the 3D printer system over carpeting, or consider use of barriers to avoid the possibility of carpet damage if spills were to occur.

Waste Removal

Avoid disposal. Attempt to utilize preparation completely. Prior to disposal of unused preparation, consult an approved waste disposal operative to ensure regulatory compliance.

Material Storage

Part Material

Shelf Life - VisiJet® M3 Cast Part Material - 5 yr.

Climate - Cool, dry area with adequate ventilation

Temperature Range - 60°F (16°C) to 80°F (27°C)

Maximum Storage Temp - 95°F (35°C)

 **NOTE: For optimal results, keep stored cartons closed and sealed until material cartridges are ready for use.**

Recertification Date

Always check material "Recertification Date" before use. Do not load material cartridges into 3D printer system if cartridge date has expired. When printer detects an expired cartridge, it aborts the build and rejects the cartridge. If a job is printing when the cartridge expires, it will try to continue to complete the job. If the next cartridge is expired, it won't use it.

Support (white) material must be loaded in the left side of material drawer. Part (black) material cartridges must be loaded in the right side of material drawer. Before loading cartridges into 3D printer system, inspect the cartridges for signs of damage or leakage. Do not load a damaged or leaking cartridge. Dispose of material cartridge according to local regulations.



Storing a Partially Used Material Cartridge

To store a partially used Material Cartridge, tighten vent cap and store it upright and not on its side to keep vent cap from clogging.

Material Storage

Material should be stored in their original containers, according to the guidelines given in the GHS/SDS included with the material. Protect material from sunlight and ambient room light.

SMALL OR DELICATE PARTS

MAGNETIC STIRRER HOT PLATE METHOD


The below procedure is a general guideline to help the customer process their printed VisJet® M3 Cast part. Your results may vary slightly from the below procedure. Before proceeding with the procedure, confirm you have the following items in place. Also, make sure to perform this procedure in a well ventilated room or under a ventilation hood.

Items Needed:

Magnetic hotplate stirrer

Silicone net or a 3D printed Acrylate basket

Note: A scalable .stl basket file can be found here: [Acrylate Circular Basket.STL \(http://dddtechpubs-staging.3dsystems.com/projetmjp3600/sites/default/files/printers/projetmjp3600/Service/Acrylate%20Circular%20Basket.STL\)](http://dddtechpubs-staging.3dsystems.com/projetmjp3600/sites/default/files/printers/projetmjp3600/Service/Acrylate%20Circular%20Basket.STL).

 This .stl file can be sized to fit your glass container using the Client Manager. This .stl file is recommended to be printed on a Acrylate printer only. Do not print this .stl file using VisiJet® M3 Cast material.

(2) Borosilicate glass (Pyrex) container with lid/cover.

99%> Isopropyl Alcohol (IPA)

Safety goggles

Respirator mask

Nitrile gloves

1. Confirm that there is a clean build plate that has been placed in the freezer for a minimum of 15 minutes prior to step 2.

 **NOTE:** For small delicate parts, it is recommended to use the cold plate method to remove build parts off the build plate.

 **CAUTION:** WAX PARTS ARE VERY DELICATE AND MAY CRACK IF LEFT IN THE FREEZER FOR AN EXTENDED PERIOD OF TIME.



2. Place the build platform on top of the cold blank build plate as shown. Keep freezer door open.



3. Within a couple of minutes, you will hear crackling sounds. This is the sound of a parts separating from the build plate. Carefully touch each part to confirm the build part has separated from the build plate. Larger pieces will take a bit longer than smaller ones. Remove build plate from freezer when all parts have separated from build plate.




4. Put on safety goggles, an air respirator and a pair of Nitrile gloves for the remainder of this procedure.
5. Turn on your magnetic stirrer hot plate to 35° Celsius. If your hot plate does not have an exact temperature setting, then use an infrared thermometer. Adjust the heat dial until 35° Celsius is achieved.

 **Caution: Parts will lose detail/melt if cleaning at temperatures exceeding 35° Celsius.**



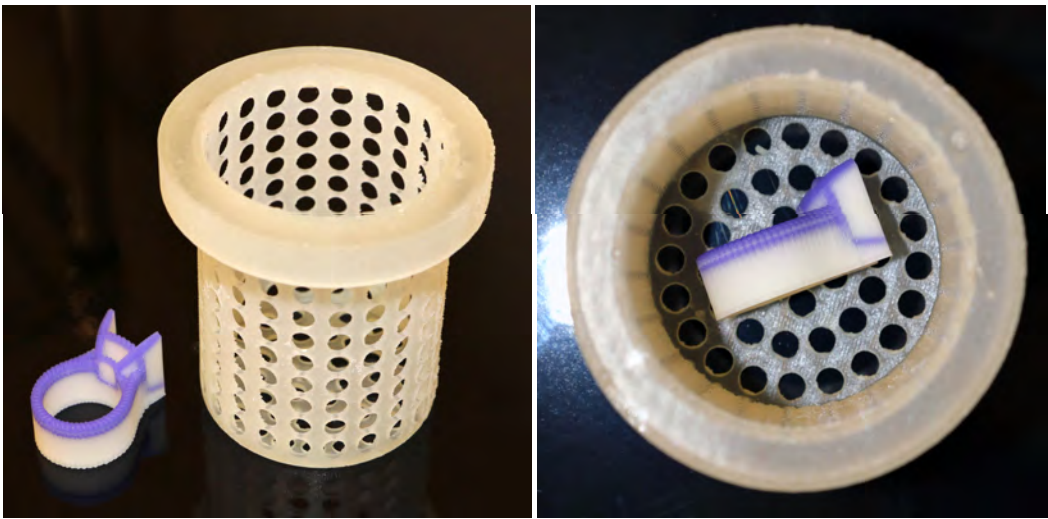
6. Fill an approved glass container with 99%> Isopropyl Alcohol (IPA) and leave at least 1" of space from the top of the container. Place on hot plate and cover with the lid to avoid evaporation.

 **NOTE: As soon as the first part touches the IPA, you will start to create an IPA and Wax mixture. At some point this will become saturated depending on how many parts and how much support is on them. When it seems like the parts are taking too long to process, replenish the container with fresh IPA.**



7. Carefully place desired part(s) into bottom of basket. Do not double stack parts.

 **NOTE: Confirm part(s) have reached room temperature from freezer before placing in basket. Frozen/cold part(s) that are processed will crack due to thermal shock.**



8. Remove the lid from the container. Gently lower the basket in the container.



9. Turn on stirrer to a low/medium setting so that there is a nice smooth circulation in the container. If IPA is splashing out of container, turn your settings down.



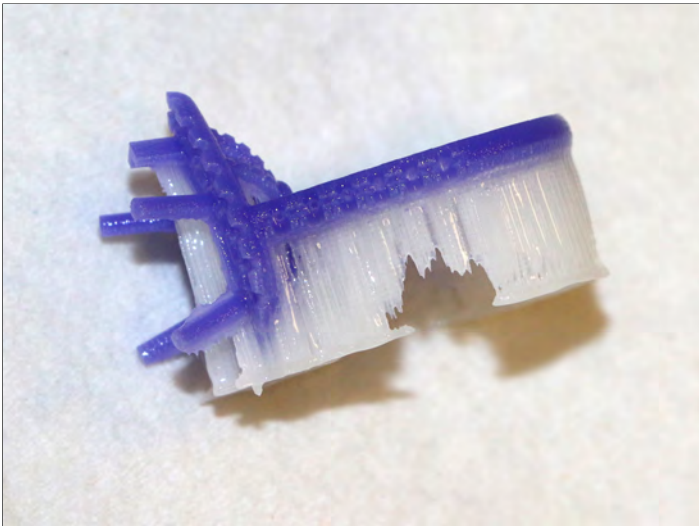
10. Replace lid facing upside down on top of basket. This will help reduce evaporation.




11. Observe your part every 30 seconds (+/-) to see the progress of the support material dissolving.

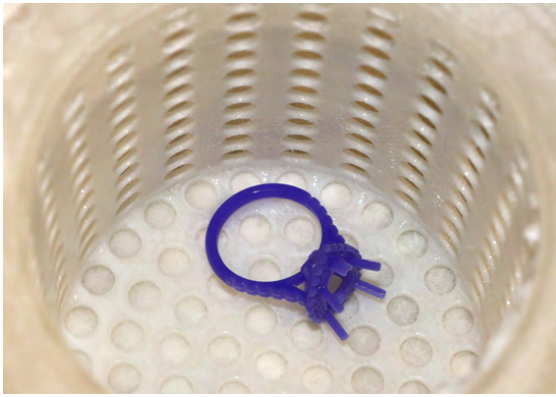


12. This part was removed from the basket after 2 minutes. You can clearly see the support material dissolving away from the build material (M3 Cast).



 Note: Depending on geometry of part(s), saturation of wax in alcohol (cloudy appearance) and stirrer speed, results will vary moderately on the amount of time the support wax is removed from the build part.

13. Once your part(s) looks visually free of support material, turn stirrer dial to "0" and remove basket. Place basket onto a dry paper towel.



14. Secure lid on container and turn off magnetic hot plate if no additional parts will be further processed.
15. Place the basket into a 2nd IPA bath (room temperature) to remove any residual support material off part. Swirl the basket around manually for no more than 10 seconds.
16. Remove basket and place on dry paper towels.
17. Carefully remove part from basket and allow them to air dry. Part are very delicate, so handle with care.
18. Finished processed rings below. Below is there is white residue left on the rings. This is evaporated IPA. This will have NO affect on casting.



ULTRASONIC CLEANER METHOD

The below procedure is a general guideline to help the customer process their printed VisJet® M3 Cast part in a Ultrasonic Cleaner. Your results may vary slightly from the below procedure. Before proceeding with the procedure, confirm you have the following items in place. Also, make sure to perform this procedure in a well ventilated room or under a ventilation hood.

Items Needed:

Small ultrasonic cleaner

Silicone net or a 3D printed Acrylate basket

Note: A scalable .stl basket file can be found here: Acrylate Rectangular Basket.STL (<http://dddtechpubs-staging.3dsystems.com/projetmjp3600/sites/default/files/printers/projetmjp3600/Service/Acrylate%20Rectangular%20Basket.STL>).

(1) Borosilicate glass (Pyrex) container with lid/cover.

99%> Isopropyl Alcohol (IPA)

Safety goggles

Respirator mask

Nitrile gloves

1. Confirm that there is a clean build plate that has been placed in the freezer for a minimum of 15 minutes prior to step 2.

 **NOTE: For small delicate parts, it is recommended to use the cold plate method to remove build parts off the build plate.**

 **CAUTION: WAX PARTS ARE VERY DELICATE AND MAY CRACK IF LEFT IN THE FREEZER FOR AN EXTENDED PERIOD OF TIME.**



2. Place the build platform on top of the cold blank build plate as shown. Keep freezer door open.



3. Within a couple of minutes, you will hear crackling sounds. This is the sound of a parts separating from the build plate. Carefully touch each part to confirm the build part has separated from the build plate. Larger pieces will take a bit longer than smaller ones. Remove build plate from freezer when all parts have separated from build plate.

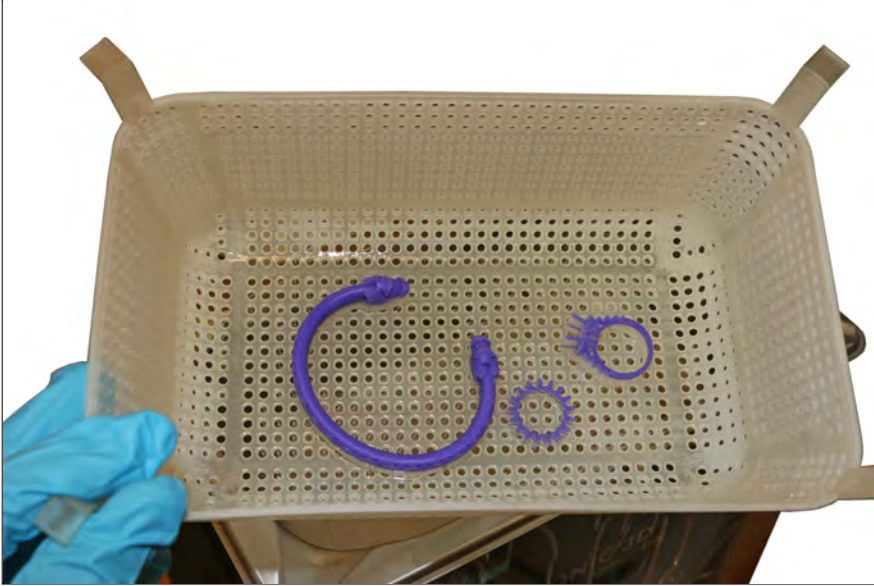


4. Put on safety goggles, an air respirator and a pair of Nitrile gloves for the remainder of this procedure.
5. Fill the ultrasonic cleaner with 99%> Isopropyl Alcohol(IPA) to the maximum fill limit for your cleaner. Cover with lid and set temperature to 30° Celsius.



- Carefully place desired part(s) into a non-metal basket. Metal baskets will retain more heat and have the potential to melt or deform delicate parts. A silicone net or a 3D printed Acrylate basket is preferred.

NOTE: Confirm part(s) have reached room temperature from freezer before placing in basket. Frozen/cold part(s) that are processed will crack due to thermal shock.



- Before lowering the basket into the ultrasonic cleaner, confirm the IPA is at the recommended 30° Celsius temperature using a thermometer. The ultrasonic cleaner will slightly rise in temperature during the cleaning process so monitoring the temperature throughout the cleaning process is highly recommended for optimal part processing.
- Slowly lower the basket into the ultrasonic cleaner. Confirm parts are completely submerged.

NOTE: As soon as the first part touches the IPA, you will start to create an IPA and Wax mixture. At some point this will become saturated depending on how many parts and how much support is on them. When it seems like the parts are taking too long to process, replenish the container with fresh IPA.



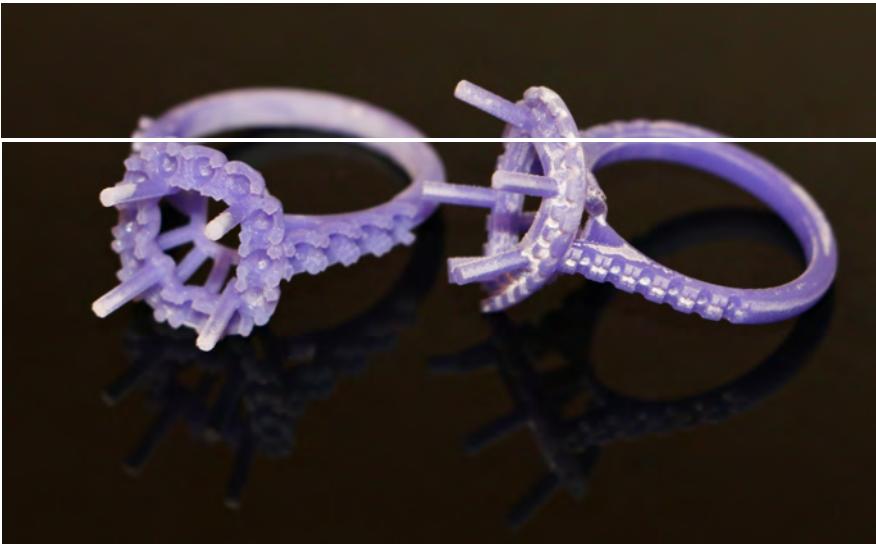
- Replace lid and turn on the Ultrasonic agitator.

9. Observe your part(s) every 20 seconds (+/-) to see the progress of the support material dissolving. This will happen relatively quickly.

 **Note: Depending on geometry of part(s), saturation of wax in alcohol (cloudy appearance) and agitation speed, results will vary moderately on the amount of time the support wax is removed from the build part.**

10. Once the part(s) look free of support material, turn off agitator and remove basket from cleaner and place on dry paper towels.
11. Place the basket into a 2nd IPA bath (room temperature) to remove any residual support material off part. Slowly swirl the basket around manually for no more than 10 seconds.
12. Remove basket and place on dry paper towels.
13. Carefully remove the delicate part(s) from basket and allow them to air dry. Part(s) are very delicate, so handle with care.
14. Finished processed part(s) below. As you can see there is white residue left on the part(s). This is a combination of evaporated IPA and the dried surface of the wax. This will have NO affect on casting.





LARGE OR BULKY PARTS

The below procedure is a general guideline to help the customer process their printed VisJet® M3 Cast part in a large ultrasonic cleaner. Your results may vary slightly from the below procedure. Before proceeding with the procedure, confirm you have the following items in place. Also, make sure to perform this procedure in a well ventilated room or under a ventilation hood.

Items Needed:

Hotplate

(1) Large ultrasonic cleaner

99%> Isopropyl Alcohol (IPA)

Safety goggles

Respirator mask

Nitrile gloves

Heat resistant gloves

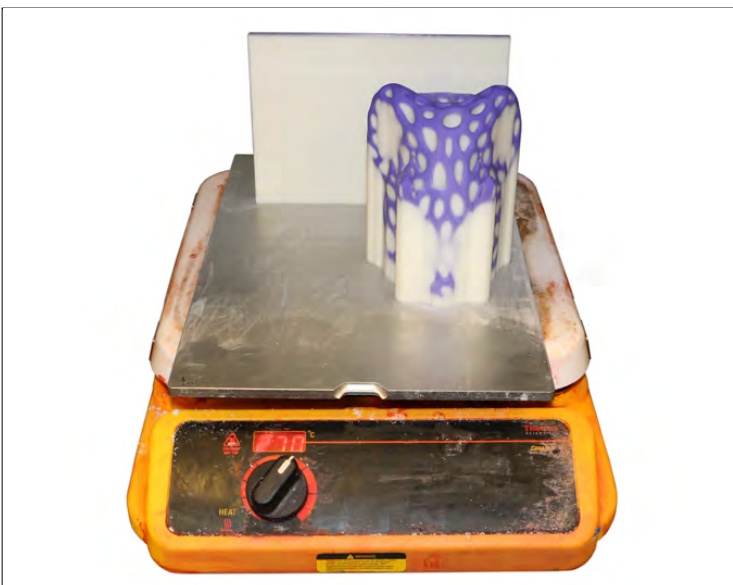
- 1 Put on safety goggles, an air respirator mask and a pair of Nitrile gloves while operating the Ultrasonic cleaner.
- 2 Fill the ultrasonic cleaner with 99% Isopropyl Alcohol(IPA) to the maximum fill limit for your cleaner.
- 3 Cover with lid and set temperature to 30° Celsius.



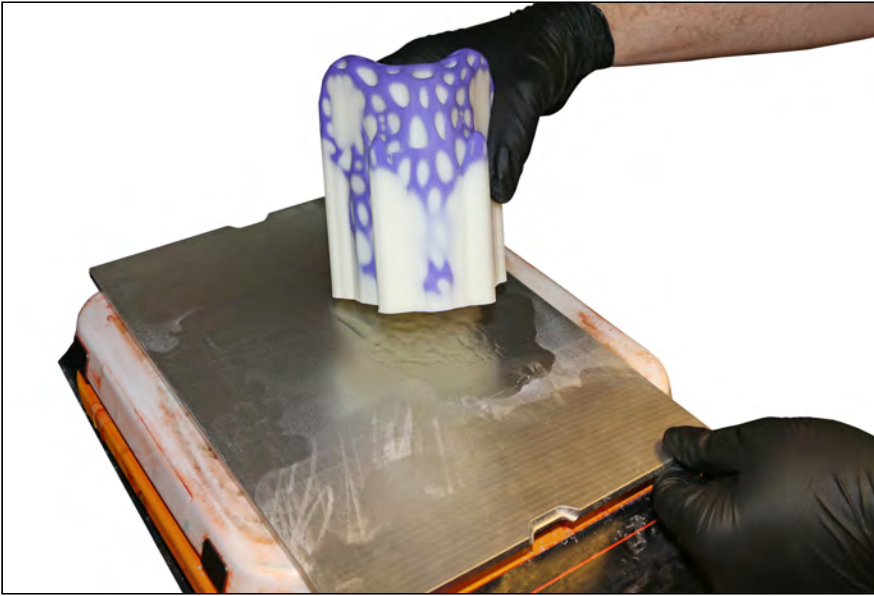
- 4 For large bulky parts, it is recommended to use the hot plate method to remove build parts off the build plate.
- 5 Place build plate with build part onto hotplate pad.
- 6 Turn on the hotplate between 200° to 275° Celsius.



Caution: Hot plate is extremely hot and will cause build plate to become too hot to handle with Nitrile gloves. Use protective heat-resistant gloves when performing this step.



7. Within a few moments the support wax will begin to melt. Carefully touch each part(s) to see if it starts to slide across the build plate. Larger pieces will take a bit longer than smaller ones. Once all the part(s) have released, turn off the hotplate and remove each part(s) off the build plate and place on a wax paper.



8. Before lowering the part into the ultrasonic cleaner, confirm the IPA is at the recommended 30° Celsius temperature using a thermometer. The ultrasonic cleaner will slightly rise in temperature during the cleaning process so monitoring the temperature throughout the cleaning process is highly recommended for optimal part processing.
9. Remove cover and place part(s) in Ultrasonic Cleaner.
10. Replace cover and turn on ultrasonic agitator.
11. Observe your part every minute (+/-) to see the progress of the support material dissolving.

 **NOTE: As soon as the first part touches the IPA, you will start to create an IPA and Wax mixture. At some point this will become saturated depending on how many parts and how much support is on them. When it seems like the parts are taking too long to process, replenish the vat with fresh IPA.**



12. The below part was removed from the Ultrasonic cleaner after 3 minutes. You can clearly see the support material dissolving away from the build material (M3 Cast).



Note: Depending on geometry of part(s), saturation of wax in alcohol (cloudy appearance) and agitation, results will vary moderately on the amount of time the support wax is removed from the build part.



13. Once the part(s) look free of support material, turn off agitator and remove part from Cleaner and place on dry paper towels.
14. Place part(s) into a 2nd IPA bath (room temperature) to remove any residual support material off part. Swirl part around manually for no more than 10 seconds.
15. Remove part(s) from 2nd IPA bath and place on dry paper towels.
16. Finished processed parts below. As you can see there is white-ish residue left on the parts. This is evaporated IPA. This will have NO affect on casting.



DISPLAY PARTS

If you do not like the white-ish surface appearance on your part, you can return it to all purple to make it aesthetically pleasing.

Items Needed:

Spray gun (<http://store.preval.com/collections/preval-sprayer/products/preval-sprayer>

(<http://store.preval.com/collections/preval-sprayer/products/preval-sprayer>))

99%> Isopropyl Alcohol (IPA)

Baby Oil

 **NOTE: Keep in mind that this oiling step is only for display parts. Oiled parts will not cast well.**

1. Make a small mixture of IPA and Baby Oil in the bottom of the paint can. Mix by volume, 70% IPA, 30% baby oil. The two liquids have very different densities and will separate over time, make sure to mix it thoroughly before use.
2. Hold your part about 10 inches away from the spray nozzle and give it a few (3 or 4) light coatings of IPA/Baby Oil spray. You do not want to saturate the part. A light mist to make it a little wet.
3. Allow the part to dry and become all purple again.
4. If you think you need more purple, add another coating.

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