User Guide

VisiJet® PXL

Contents

Description

The VisiJet® line of materials offers numerous capabilities to meet a variety of commercial applications. Using the ColorJet Printing (CJP) technology, 3D Systems' ProJet® x60 3D Printers use the VisiJet® PXL™ material set to build strong, high-definition, full color concept models, assemblies and prototypes, for design realization, advanced communication, as well as development and production cost reduction. Printed models benefit transportation, energy, consumer products, recreation, healthcare, education and other vertical markets. Parts can be sanded, drilled, tapped, painted and electroplated, which further expands the options available for finished part characteristics. Additionally, models have high- temperature resistance, ideal for digital manufacturing and molding applications.

Features

The unique features of VisiJet® PXL include the following:

Best Color and Whiteness

- Brightest whites
- Close to 90% reproduction of CMYK colors on the ProJet® 660*Pro* and 860*Pro*
- Improved color accuracy for light tones
- Multiple Color settings on ProJet® 660*Pro* and 860*Pro* for more customized models.

Water Cure finishing option with Epsom Salt

- Easy and user-friendly post-processing option – only water and salt are required to seal and strengthen your printed parts
- Works with color models for draft color

Great Versatility for all applications

Compatible with Water Cure, Wax, ColorBond™ and StrengthMax™ – something for every application

Applications

VisiJet® PXL is a multi-purpose material system and can be used for many applications such as:

- Concept Modeling
- Ergonomic Testing
- Presentation Models
- Sales Demonstration Models
- Functional evaluation models
- Rapid tooling
- Molding / Casting

Compatibility

3D Printers and Binders

VisiJet® PXL uses a brand new set of binders specially formulated for the whiter core as well as improved droplet formation. VisiJet® PXL is qualified for use on the following printers, using the corresponding binders:

- ProJet® 160, 260C, 360 and 460*Plus* - VisiJet® PXL Clear only
- ProJet® 660*Pro* and 860*Pro* - VisiJet® PXL Clear, Black and CMY only

Infiltrants

- ColorBond™
- StrengthMax™
- Water Cure (see Appendix)
- Wax

Color parts are best finished using ColorBond™. Water cure with Epsom Salt can be used on color parts, but the colors will remain muted.

Storage and Shelf Life

- VisiJet® PXL core should be stored in a cool, dry, ventilated area away from sources of heat and moisture. Container should be kept tightly closed.
- Binders should be stored in a cool, dry environment.
- A cartridge of clear or color binder has a shelf life of 1 year from the date of manufacture.

Quantities Available

ProJet® 160, 260C, 360 and 460*Plus*

Material	Medium	Quantity
VisiJet® PXL Core	Eco Drum	8 kg 14 kg
VisiJet® PXL Clear	Cartridge	1.0 L

ProJet® 660Pro and 860Pro

Material	Medium	Quantity
VisiJet® PXL Core	Eco Drum	8 kg 14 kg
VisiJet® PXL Clear binder	Cartridge	1.0 L
VisiJet® PXL Black binder	Cartridge	1.0 L
VisiJet® PXL Color binders (Cyan, Magenta, Yellow)	Cartridge	0.3 L

Instructions for Use

Software:

VisiJet® PXL requires 3DPrint™ latest software version and these respective firmware versions:

Color Setting:

On the ProJet 660*Pro* and 860*Pro* models, there are two unique color settings to choose from when selecting your ProJet Core Type:

- **Vibrant –** Produces bright, vibrant colors for display and showy VisiJet® PXL models.
- **Pastel–** Produces more natural skin tones, and accurate colors on your new VisiJet® PXL models.

Infiltrating with ColorBond will bring out the best of these two new color settings for VisiJet® PXL.

Processing:

Most parts can be removed from the build chamber as soon as the drying cycle is completed. For best appearance, parts should be removed from the build chamber within 24 hours. If your 3D model has thin, fragile features, allow it to dry for another hour in the printer, or in a 40-60°C convection oven for approximately two hours.

Infiltration:

After your 3D model is dry and cleaned of excess core, it can be infiltrated. When high strength is not critical, Water Cure* is a quick, easy way to finish parts. The best, most colorful, concept models are made by infiltrating with ColorBond. StrengthMax resin will confer superior strength for functional models.

*For more information on the Water Cure procedure, please refer to the Appendix of this guide.

Sanding:

Parts can be sanded to improve the surface finish. Start with 100-grit paper and continue to 220-grit if a smoother finish is desired.

Painting:

Parts printed with VisiJet® PXL can be painted with most commonly available paints and coatings without additional processing. For the best surface finish, sand lightly, use a primer, and then apply paint.

Bonding/Joining:

Parts printed with VisiJet® PXL can be joined using ColorBond or StrengthMax, as well as many other glues and adhesives.

Related Documents/Links

- Water Cure with Epsom Salt Instructions – see Appendix
- Materials Changeover Instructions are located on 3DS Central at 3DScentral.3dsystems.com
- MSDS – on our Web site (3dscentral.3dsystems.com).
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Appendix

Instructions for Water Cure

Water cure with Epsom salt is the best way to finish concept models quickly and easily. No hazardous or restricted chemicals are involved: simply dissolve the Epsom salt into tap water and spray a fine mist over the surface of your parts to give them a smooth, hard surface and a bright white appearance.

The Water Cure with Epsom salt method applies to all parts printed using VisiJet® PXL

Water Cure with Epsom salt can be used on color parts but colors will remain muted.

Model finished with Water Cure

Spraying vs. Dipping

IN MOST CASES, SPRAYING IS STRONGLY RECOMMENDED: it is quicker and easier than dipping. Dipped parts require a large amount of salted water to be prepared and longer drying after dipping. Dipping does not provide added strength as compared to spraying.

In cases where complete penetration of thick sections is desired, the dipping method should be used.

Handling and Usage Information

- The salt used in this procedure must be magnesium sulfate heptahydrate. In most countries, this is sold as Epsom Salt. Do NOT use any other type of salt.
- For storage & handling precautions of the dry salt, refer to the Epsom Salt package or consult your salt supplier.
- While mixing the salt solution and finishing parts, we recommend wearing gloves and safety goggles.

Set Up the Work Area

1. Place a clean sheet of non-stick material (Teflon, freezer paper or wax paper) on your work area for easy clean up and to put your parts on as they dry.
2. Add a layer of paper towels where your model(s) will be placed to wick excess salt water away from your model

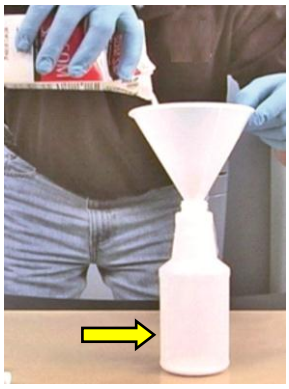
   Tip: Have a sheet of the non-stick material on a tray so parts can be safely moved while they dry.

- For spraying, you will need a spray bottle (supplied with your starter kit or your upgrade kit).
- For dipping, you will need a sturdy, clean, watertight container (example: plastic, glass) and a graduated container or some other means of measuring volume of water and salt.

Spraying Method

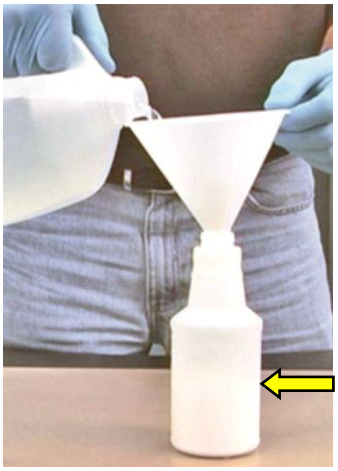
Prepare the Salt Solution

1. Remove the spray head from the spray bottle.



2. Fill with Epsom salt up to the 7 oz line.
3. Add tap water until you reach the 16 oz line.

Tip: Using warm water helps the salt dissolve faster.



4. Note: if you're using a different spray bottle, use the mixing ratios provided in the dipping section of this document.
5. Replace the spray head, close it tightly and shake for 1-2 minutes.
6. If there are still undissolved crystals at the bottom, allow 30-60 minutes to dissolve and shake for 1 more minute.

7. Once all the crystals are dissolved, test the spraying and adjust it to a fine mist using the spray knob.

   Note: If the salt has not dissolved completely, you may experience poor spraying performance. If the amount of salt mixed in is incorrect, the salt solution may be too dilute and parts may become weak during spraying

Spray the part

1. Place your part on a flat surface coated with paper towels or wax paper.

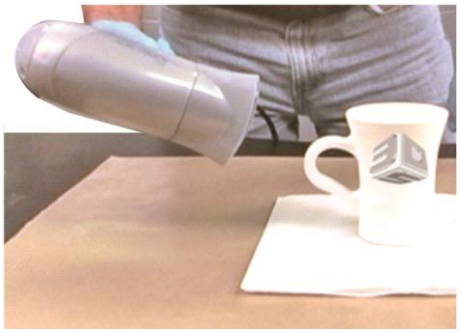
   Tip: Spread extra towels or paper around the area to catch any overspray. This will make cleanup easier. Overspray can be wiped up with a damp sponge or cloth.

2. *Lightly* coat one side of your part with a fine mist from a distance of one to two feet (30-50 cm). DON'T TRY TO SATURATE THE SURFACE – just a light misting is good. Make sure the entire side is coated. Avoid touching the part where it has been sprayed.
3. Carefully turn the part and coat the other side with a similar fine mist.

   Note: Fine structures/protrusions may be delicate. Over-saturating with water may cause drooping/breakage of such fine structures.

4. Let the part air dry for at least 5 minutes before moving it.

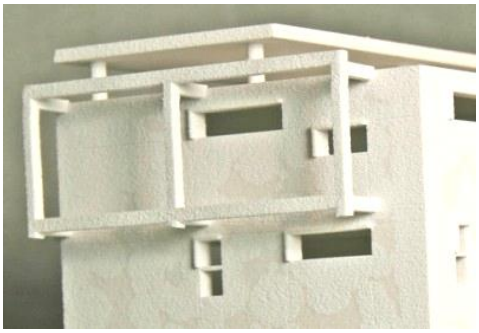
   Tip: A fan or hair dryer can be used to harden the surface layers more rapidly. This allows for quicker handling. Note the part may still be weak, so handle with care.



Dry the Part

Allowed to air dry at room temperature, the part will be dried to touch within a couple hours and fully dried within 24 - 48 hours.

For faster drying, the parts can be placed in an oven set to 70˚C for 1-2 hours. This also helps guarantee maximum whiteness of the parts. Drying time may vary depending on your oven and the size of your models.



Note: If you dry your models at room temperature, a pattern may appear on your parts after several days. See photo to the right (contrast has been exaggerated to make it more visible).

This may be prevented or removed from a part by drying it for 1-2 hours at 70°C.

Dipping Method

Prepare the Salt Solution

1. Measure enough tap water into the container to submerge your part completely and allow room for handling.
2. Allow room in the container for the volume of salt and for the water that will be displaced by your part.
3. For each 1 **volume** of water, add 0.7 **volume** of salt (see table below).

Metric Units		Imperial Units	
Water	Salt	Water	Salt
1 L	0.7 L	0.5 gal.	45 oz
2 L	1.4 L	1 gal.	90 oz
5 L	3.5 L	1.5 gal.	1 gal. 6 oz
10 L	7 L	2.5 gal.	1 gal. 96 oz

Note: If the amount of salt mixed in is incorrect, the salt solution may be too dilute and parts may become weak during spraying.

Tip: Using warm water helps the salt dissolve faster.

4. Stir the water solution intermittently until the salt completely dissolves (5-10 minutes).
   If there are any undissolved crystals at the bottom, allow 1-2 hours to dissolve, and then stir again for 1-2 minutes.

   Note: Failure to dissolve all the salt could cause crystals to deposit onto your part when you dip it.

Dip the part

Tip: Wear gloves while dipping models to keep the bath clean and prevent mold growth.

1. Gently submerse the part in the bath for at least 5-10 seconds or until bubbles subside.
2. Slowly remove the part and hold it above the bath for 5-10 seconds to allow a majority of the excess water to run off. Rotate the part to help the water escape from any cavities or crevices.
3. Move the part to the paper towels and gently dab the bottom of it on the dry paper towels.

   Tip: Avoid wiping the excess water on the top surfaces with a paper towel as this will compromise surface finish.
4. Place the dipped part on the wax paper and allow it to air dry for 1-2 hours before handling.

   Tip: A fan or hair dryer can be used to harden the surface layers more rapidly. This allows for quicker handling. Note the parts may still be weak, so handle with care.

Dry the Part

- Allowed to air dry at room temperature, the part will be fully dried within 24 - 48 hours.
- For faster drying, the parts can be placed in an oven set to 70˚C for 3-4 hours. This also helps guarantee maximum whiteness of the parts.

Clean Up

- Any overspray is easily cleaned up with a wet cloth or sponge.
- The salt solution may be covered and reused for up to one week. Always check the solution before any subsequent uses - if the solution is cloudy or discolored in any way, discard it and make a fresh batch.
- The salt solution may be safely disposed of by pouring down a sink drain and flushing with plenty of water.

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