



VeroUltraClear RGD820

Overview

VeroUltraClear™ is a transparent, rigid material with a glass-like appearance. It is the clearest 3D printing material in the market today and offers mechanical properties that are similar to the Vero™ family — making it ideal for form and fit testing, simulation of transparent thermoplastics, concept modeling and design verification of clear parts.

VeroUltraClear parts are fabricated using a digital material made of VeroClear™ and VeroUltraClear materials. Printed parts automatically have a core made of VeroUltraClear and a VeroClear coating.

The following table shows the light transmission and yellow index levels for Stratasys® clear materials compared to polymethyl methacrylate (PMMA). These results were obtained from 6-mm thick parts printed on PolyJet™ 3D printers.

	PMMA (for reference)	VeroUltraClear	VeroClear
Transmission (%)	91%	86%	75%
Yellow Index	0.6	1.2	6

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As a rule, best clarity is achieved when clear parts are printed and treated as explained below.

The following sections describe tips and recommendations for obtaining optimum results for VeroUltraClear parts.

- Supported printers and modes
- Preparing the printer
- Printer settings
- Preparing parts for printing
- Part thickness
- Polishing parts
- Gluing parts
- Photobleaching parts



Figure 1: Perfume bottle prototype printed with VeroUltraClear.



Figure 2: Soap tube prototype printed with VeroUltraClear.

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Printing Recommendations and Tips

Supported Printers and Printing Modes

System	Printing Mode	Support Material
J835™/J850™	High Speed High Mix	SUP705™ SUP706B™
J7™ Series	Note: High Quality is not supported.	Note: SUP706B is not available with High Speed Mode.

Preparing the Printer

Traces of other materials can adversely affect the clarity of parts. To ensure best clarity, perform the following before printing clear parts:

- Run the Material Replacement wizard if you are switching from another material to VeroUltraClear and thoroughly flush the system.
- Run the Cleaning wizard and thoroughly clean the print heads, roller, wiper and roller waste collector.

To print parts with the VeroUltraClear digital material, both VeroClear and VeroUltraClear material cartridges must be loaded in the material cabinet. Once they are loaded, you can assign the material by selecting the VeroUltraClear material from the display (Figure 3).

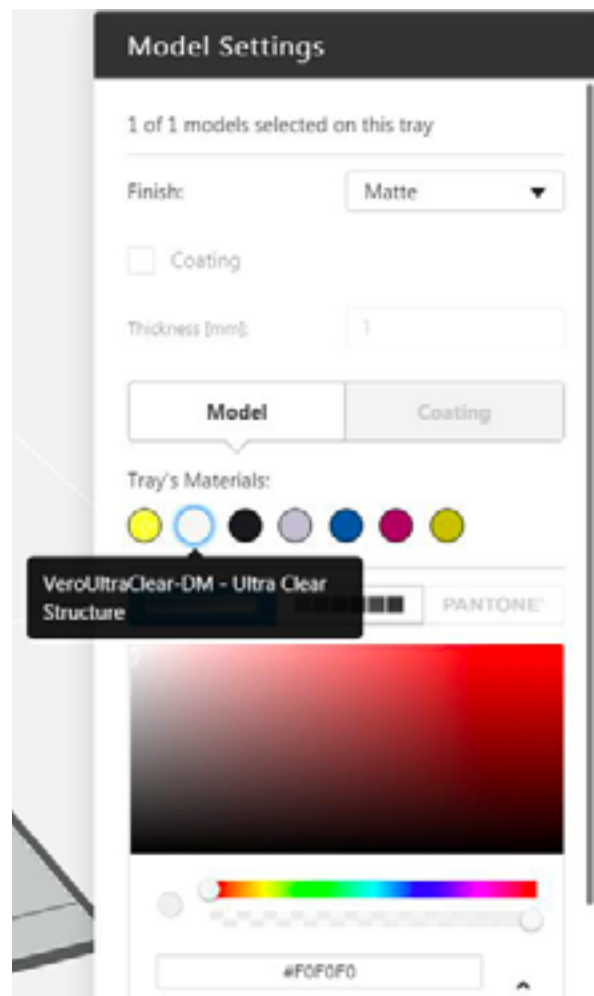


Figure 3: Selecting the VeroUltraClear material.

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Print Settings

The following settings are automatically adjusted to ensure optimum VeroUltraClear part quality.

When printing in High Speed Mode with SUP705:

- Reinforced, 3-mm thick pedestal
- The default grid type is Heavy
- Activation of one UV lamp when there is a part with glossy finish on the tray

When printing in High Mix Mode with SUP705:

- Reinforced, 2-mm thick pedestal
- The default grid type is Heavy
- Activation of one UV lamp when there is a part with glossy finish on the tray

When printing in High Mix Mode with SUP706B:

- Reinforced, 2-mm thick pedestal
- The default grid type is Lite
- Activation of one UV lamp when there is a part with glossy finish on the tray

When printing with VeroUltraClear on J7 Series printers, the color and texture profiles automatically change to the *Vivid 1.1 D50 (Relative) - VeroWt* profile (Figure 4). This is a CMYW profile that does not include VeroBlackPlus™, and enables full-color 3D printing with VeroUltraClear.

Note: Some colors, especially shades of black and certain PANOTNE™ colors, may be difficult to obtain with this profile.



Figure 4: Vivid 1.1 D50 (Relative) – VeroWt profile

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Preparing Parts for Printing

To achieve maximum clarity, use the following guidelines:

- Always prefer a matte surface finish. The support material that covers matte surfaces helps protect the part's layers from excessive UV radiation, thereby improving clarity.
- When printing glossy parts, arrange them so they have similar heights (Figure 5). This ensures that the parts are not exposed to unnecessary UV radiation, since parts with similar heights require the same number of print-head and UV-lamp passes. When printing parts with different heights on the same tray, the print block passes over all parts even after the shorter parts have been completed. This causes the shorter parts to absorb more UV radiation than necessary, which increases the yellowish tint.
- Position parts at a 45-degree tilt for best clarity on the X and Y surfaces (Figure 6).
- When printing STL files, the clear part is printed with a VeroUltraClear core and a 0.5-mm thick coating of VeroClear. For best results, wall thickness should not be thinner than 1.3 mm.
- When printing color-per-texture type VRML files, the clear part is printed with a VeroUltraClear core and a 1-mm thick coating of VeroClear. For best results, wall thickness should not be thinner than 2.2 mm.
- In some cases, when printing clear texture VRMLs, the print job stops due to a Bumper error. If this occurs, change the grid type from Lite to Heavy and print again.

Note: For assigning colors in GrabCAD Print™ version 1.32, the transparency of clear parts is not visible on the tray. In this version, they are displayed as opaque. This has been fixed in later versions.

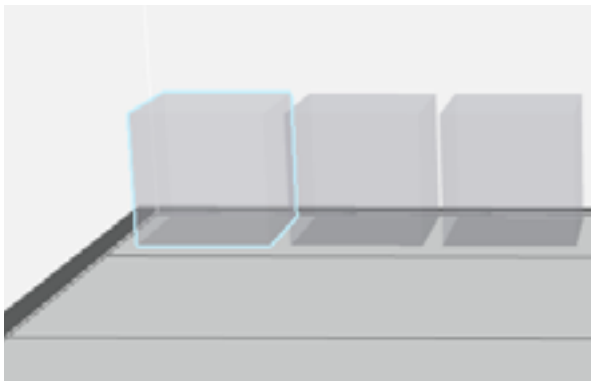


Figure 5: Parts with similar heights.

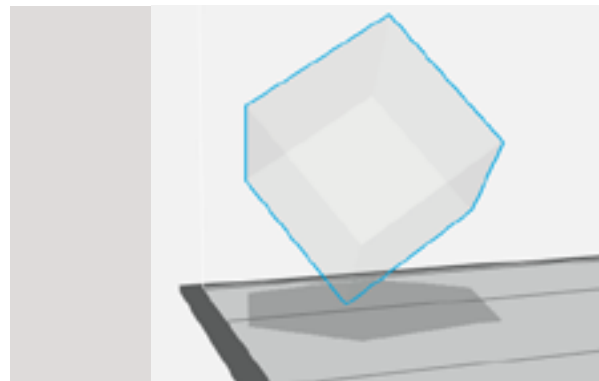


Figure 6: Part orientated with a 45-degree tilt.

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Polishing Parts

Polishing VeroUltraClear parts improves their clarity. (Figure 7) Applying a coat of clear lacquer gives parts a shine and protects their surfaces.

- For polishing instructions, refer to the “Guide to Post Process Applications” on creating translucent 3D parts.
- When removing support material with the water jet, keep cleaning time to a minimum.

Gluing Parts

When gluing parts printed with VeroUltraClear, use clear glue to ensure clarity in the joint areas. Apply glue only where necessary; minimize the glued surfaces.

Photobleaching

Parts printed with VeroUltraClear have a slightly yellow tint when removed from the printer. This is especially true for parts printed with a glossy finish. The yellow tint fades naturally over time, but you can greatly accelerate this process by using a suitable photobleaching treatment. This involves exposing parts to intense LED flood light. Within six hours of exposure, there is a tint reduction of approximately 70%. After 24 hours, there is tint reduction of 95%.

Important: Perform the photobleaching treatment immediately after printing.

Two recommended photobleaching methods include:

Method A: Using an Illumination Chamber (Figure 8)

- Off-the-shelf chamber
- Enables controlling temperature and light intensity
- Assures predictable results

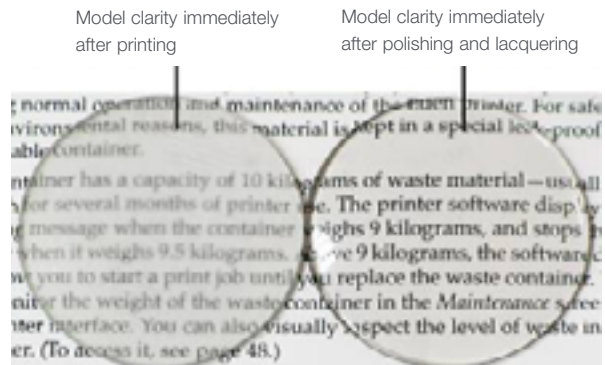


Figure 7: Improved part clarity after polishing and lacquering (right).



Figure 8: Illumination chamber for photobleaching (sample).

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Method B: Using LED Flood Light (Figure 9)

- Self-assembly from readily available components, including a cabinet lined with mirrors and a 100W LED flood light, 6500K daylight.
- Low-cost solution
- Varying results, due to the lack of precise control over temperature and light intensity

Photobleaching Instructions:

1. Immediately after printing, place the parts in the cabinet/illumination chamber.
2. Arrange the printed parts in the cabinet with enough distance between them to allow light to reach all sides of each part.
3. Turn on the light. Verify that the ambient temperature is between 30 – 40°C (86 – 104°F). Higher temperatures may cause part distortion; lower temperatures may not produce satisfactory results.
4. Inspect the model tint after six hours of treatment.
 - For parts with a matte finish, this should suffice.
 - For parts with a glossy finish, continue the photobleaching treatment for up to 24 hours to achieve the desired results.



Figure 9: Sample do-it-yourself photobleaching cabinet with LED lamp and mirrors.



Figure 10: Sample models before photobleaching treatment.



Figure 11: Sample models after photobleaching treatment.

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