

# Clear Coating



## Application Guide

Original Instructions

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## 1 OVERVIEW OF ENTIRE PROCESS

Clear parts are traditionally made from Polymethyl methacrylate or PMMA. PMMA has been given many brands and names including Lucite®, Plexiglas®, Acrylite®, etc. The main disadvantage of this material is that it must be molded or cast, which adds additional mold creation costs and lead time. This process is further limited in the geometries that can be formed due to the requirement of molds. A few common applications that require clear parts are: Form and fit testing, Prototyping clear models, fluid mechanics, Medical applications, Aerospace, and Art.

## 2 ADVANTAGE OF OUR PROCESS

With the advancement of 3D printing it is possible to print clear parts directly decreasing lead time and cost of producing production quality clear parts. 3D printing uses Additive Layer Manufacturing to build a part out of many thin layers; each layer has slight variations which causes the part to appear cloudy. These cloudy parts can become truly clear through a simple post process that removes these layer variations. This process can be used for any plastic 3D printed parts; this includes MJP, SLA micro-SLA and FTI printers. This process can be used to improve transparency of clear materials or it can be used to improve the surface finish of opaque materials by giving them a glossy finish.

### Safety

- Read and understand the [MSDS](#) (Materials Safety Data Sheet) for the following products before use.
  - [Aerosol Clear Coat Spray Can](#)
  - [High Solids Automotive Clear Coat](#)
  - [High Solids Hardener](#)
  - [High Solids Reducer](#)
- Wear protective clothing, gloves, and eye protection during procedures. Nitrile Gloves should be worn to prevent contact with chemicals. This is not required, but is a recommended safety measure.
- Always work in an open, well ventilated space.

### 3 LIST OF NECESSARY EQUIPMENT

Sand Paper



Hobby Knife With Curved and Straight Blades



**For Basic Clear:**

Aerosol Clear Coat Spray Can



**For Advanced Clear:**

**Automotive Clear Coating Supplies**

- High Solids Automotive Clear Coat
- High Solids Hardener
- High Solids Reducer



- Painting Booth
- Painting Gun
- Optional: Fish Eye Remover

## 4 PROCESS

There are different levels of clear coating, depending on the application required. We have broken them down into the following two levels:



Basic Clear



Advanced Clear

### Basic Clear

This process is the basic clear coating where the parts are painted with an aerosol clear coat.

1. Build parts in a transparent material.
2. Post process the part with the recommended procedures for your printer technology
3. Dry sand part with a 180 grit sand paper to remove layer lines (do not use a higher grit paper, otherwise you risk permanently scratching the part)
4. Once the layer lines are completely gone, move down to a higher grit paper. **Note: completely remove previous grit sanding lines before progressing to higher grit sandpaper, if not the sanding lines will be visible after the clear coat**
5. Progress from 180 ->240 ->400 -> 800-> 1200
  - a. Wet sanding with water is optional, it helps to evenly sand the parts and avoid gouging the part with the sand paper.
6. .After 1200 grit sanding, rinse the part with water to make sure there is no dust on the part. Any dust or particles on the part when printing will affect transparency of part.



7. After the part has been sanded to this level, use aerosol can of Clear Coat to spray part.
  - a. Spray one side of the part with a thin steady even coat and let dry in clean environment without dust. Note: it will take approximately 20-30 minutes for thin coat to dry.
  - b. When 1st side is dry, spray on the other side of part with a steady even coat and let dry in a clean environment without dust.
  - c. Repeat steps "a" and "b" until both sides have 2-3 coats.

**NOTE: Spraying additional coats can cause paint to run or pool creating an orange peel finish. If this happens you will have to completely clean the part of clear coat and start the spraying process over again.**



### Advance Clear

This type of clear coating process gives the best finish and highest level of transparency. This method requires less sanding, but will take longer for the paint to dry. This process is recommended for customers who have experience in painting.

1. Build parts in a transparent material.
2. Start with 150 grit sand paper to completely removed layer lines.
  - a. For complicated geometries and sharp edges, a hobby blade can be carefully used to remove layer lines and smooth sections that are difficult to sand.
3. Once the layer lines are removed, use 220 grit to remove scratches from 150 grit. If you progress further in the process before all of the sanding lines are removed, they will show through after clear coating.
4. Use 320 grit paper to remove the sanding lines from the 220 grit paper.
5. Spray in a paint booth using high solids auto paint clear coat. Refer to the paint's manufacturer recommendations for mixing and application. We recommend high solids automotive paints because they have a higher paint to solvent ratio that will give a best surface finish.
6. Refer to the paint's manufacturer recommendations for temperatures and humidity levels, usually between 60 °F and 70 °F and low humidity.



## 5 TROUBLESHOOTING

Symptom	Solution
Scratches will not come out when sanding	Return to a lower grit paper until line is removed then progress to higher grit paper.
Unsmooth/bad clear coating painting step	For lacquer based paint use IPA to wash part and retry; for automotive paint, use recommended paint thinner to remove.
Sometimes when spraying a part with automotive paint, the part has small indentations.	This is called fish eyeing, the surface tension of the paint causes small indentations. Add fish eye remover to paint to reduce surface tension in paint and prevent fish eyeing on the surface.
Defects in the part's internal, cannot be sanded.	Check STL file for bad data, bad data can affect transparency of parts. <ul style="list-style-type: none"> <li>• <b>MJP:</b> Bad data can cause support material to be printed inside the part.</li> <li>• <b>SLA:</b> Bad data can create hollow pockets creating curing variations.</li> </ul>



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