

Post Processing a 3D Printed FDM Part

Introduction

You've printed your part, Yay !

Now what ? Job done, lets get to painting ? ...Well not quite.

Next step would be the post processing of the piece, which generally includes sanding, filling, sanding, bondo, sanding, spot putty, sanding and some more and more sanding. Did I mention sanding ? ...Sanding!

As mentioned above, that step requires a lot of sanding, really works your patience and your arms. I'll be going over my general workflow for finishing pieces as well as some other techniques I've tried.

Disclaimer, depending on the piece details, size and how polished you want it, it could take from a few hours to a few months to achieve.

Useful Tools

- **Dremel Rotary tool**
 - **Snake/Flex Shaft attachment** makes it super easy to handle.
 - Sanding drums, **small** and **big** of various grit.
 - Various Sanding/Engraving bits (Diamond Wheel Points, Carving Bits, etc...)
- **Handheld belt-sander**
- **Sanding Block**
- **Files**
- **Utility knife**
- **Long nose pliers**
- Silicon Spatula

Materials

- Sanding Paper - 120~150, 240~320, 600 grit
- Filler Primer
- Spot Putty

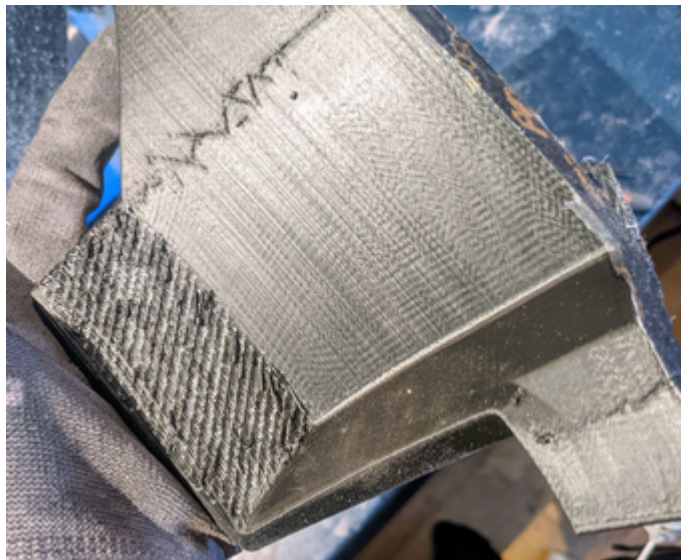
General workflow

Support removal and cleanup

The first thing I do with my freshly printed piece is removing any support material (support, brims, rafts, etc...) that might still be attached, if it was printed with some.

Sometimes its going to be really stuck to the surface and will require some heavy sanding to get rid of.

- **Long nose pliers** are a great tool to remove most support materials.
- A **Utility knife** can also be useful.
- An **handheld belt-sander** can be helpful when trying to remove leftover support bits. Same can be said of a **Dremel** with a sanding drum.



Sanding Pass#1

Next step is to get rid of as many striation lines as possible and flattening any ridges popping out (I use between **120~150** grit to sand for this step, nothing more, nothing less). To tackle that, I use a combination of different tools.

- An **handheld belt-sander** is very good to tackle flat surfaces.
- A **dremel** with a sanding drum is also a good option, however I don't use it too often on bigger/long sections as an uneven pressure applied when stroking can easily create dimples and make the surface uneven.
- With both these tools however, you should avoid staying in the same area more than ~2-3 seconds as the plastic can start to soften and melt because of the friction.
- A **Sanding block** is also good to sand flat surfaces.
- Another useful tool for sanding is a **File**. Files comes in different shapes and sizes and can help greatly. Some triangle or square files are good to reach creases, indents and inside corners. Flat files are great to tackle flat surfaces.



Note: This step comes before any assembly or gluing pieces together. More often than not, its easier to sand the pieces individually and access certain areas that would be more troublesome if the piece was attached to another.



Filling Holes (If Applicable)

Sometimes when printing, your piece can come out with small holes where plastic is missing. Since we don't want anything to get stuck in there, especially water, it's important to fill them up at this stage.

For the most part, I fill up the holes with superglue and quickly spray it with an accelerant. This will create a nice solid surface that can easily be sanded down flat to match the surface of the piece.





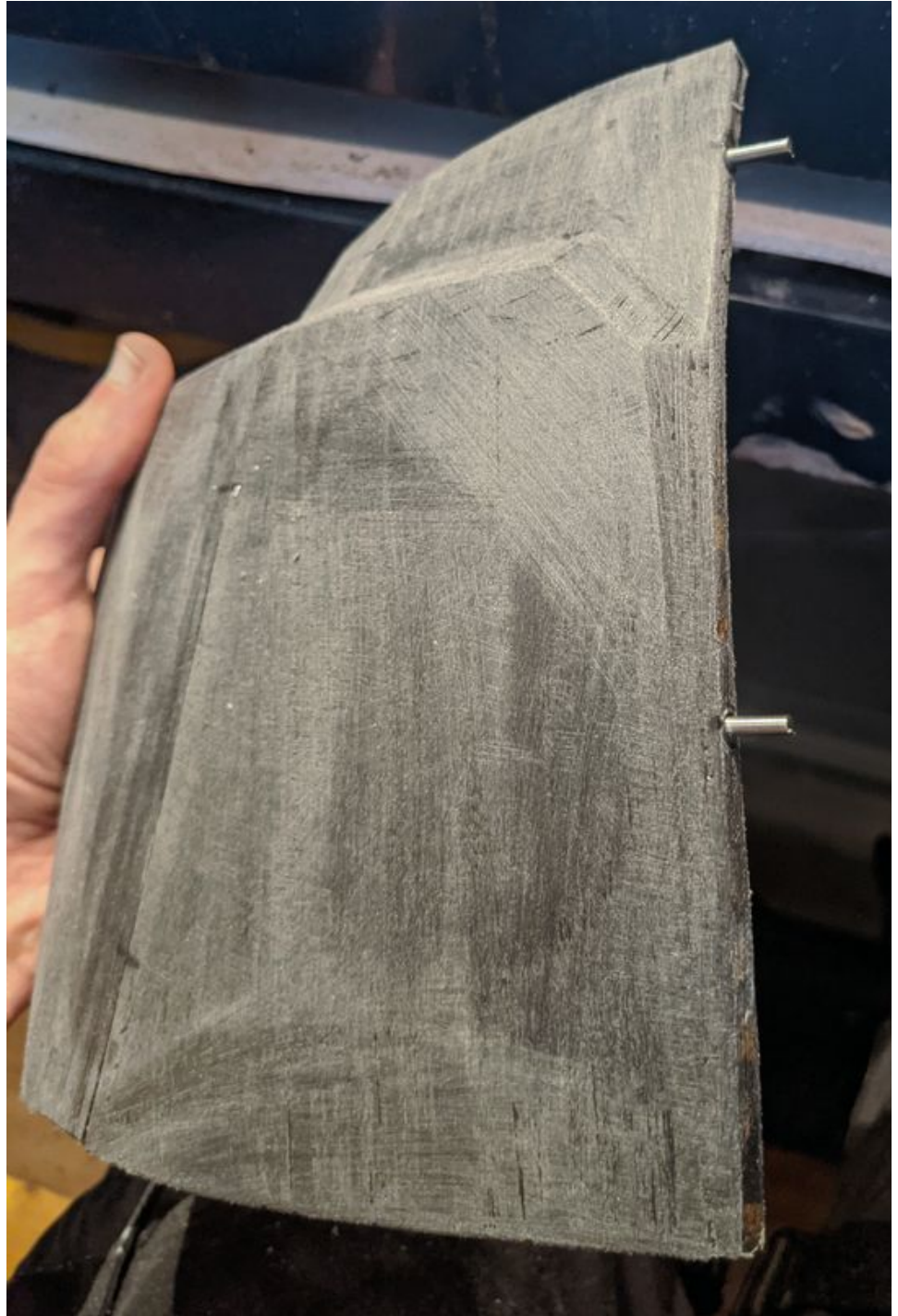
Assembly#1 (If applicable)

If I have pieces that needs to be glued to another, this is usually the part where I would put them together, given that both have gone through *Sanding Pass#1*.

In the same vein, if I have pieces that connects to one another but aren't intended to have a permanent bond, I will dry fit them together, see

if they line up properly, check what areas might need some more sanding, etc...

1. Before gluing pieces together, I make sure that the surfaces that are going to have glue on it have been sanded with **120~150** grit sandpaper. This allows the glue to get a better grip and produce a stronger bond.
2. Next up is identifying if a support structure is required and adding it if necessary.
 - Pieces that will be subject to stress, or are rather large and thin will most likely need some support to help prevent the seam where they were attached from breaking.
 - If the model doesn't have support "built-in" such as areas allowing other parts to be inserted to make the piece more solid, then I'll usually drill holes in the pieces to insert small metal rods.
 - An example of "Built-in" support in this case would be a hole in in a blade allowing a steel rod to go through and keeps it from breaking if force is applied perpendicularly.
 - Holes should be lined up on both sides to avoid the pieces not matching properly. Instead of using a drill to make them, I find the Dremel with a [carving bit](#) do a better job here than a regular drill



as it offers
more
control.

3. To glue pieces together, I generally use super glue (in my case, a brand called Super Bond) and some spray accelerator (that comes with it) to make the glue dry super quickly.

Gap filling (If needed)

Filling Gaps between pieces with Resin

Let's face it, sometimes, when you print a part it doesn't always come out perfectly. Supported areas may not be the most accurate or the bottom of the part may have warped a bit. This then has a good chance of leaving gaps where the pieces are glued together (*Fig 1.1, 1.2*).

To help fill those gaps and strengthen the bond between the 2 pieces, I simply fill it with resin. I prefer using the [Smooth-On Onyx Fast](#) resin for its quick cure time and overall strength.

The process is pretty straightforward, You just have to cover the backside of where you want to pour the resin (so it doesn't go straight through and drip everywhere)

- For the bracer, Duct tape was put inside it on the joint. For the Chest Plate, it was put behind it.

Then its the simple task of mixing a bit of resin (usually tend to do it in 2-3 batches) and pour it carefully along the joint.

Wait for it to cure, then proceed to sanding it flush with the rest of the pieces.

Sometimes, when sanding the resin flush with the pieces, some tiny holes may become apparent. This is because tiny air bubbles gets trapped in the liquid when mixing it and can become visible when sanding the outer layer of the resin to reveal the inside.







Sanding Pass#2

For the 2nd Sanding Pass, I start by applying a full coat of Filler Primer on the piece.

The Filler Primer will come and fill most imperfections from the layers.

It also allows to pinpoint areas that may need a bit more love by giving the whole piece a uniform color.

After completely dry, the whole piece is fully sanded with the help of some water (Wet Sanding). This makes it so that the sandpaper doesn't get clogged by the filler primer.

I usually take between **240~320** grit sandpaper for this step as we don't want to leave big scratches on the surface.

At this stage, if I see any small imperfections/tiny holes left, I fill them up using a silicon spatula and Spot Putty . Then, once dry, sand it flush with the surface.

I also tend to generally not go too high for the grit (above 600) unless its a piece that needs to be as smooth as possible, like a master for a gem mold. Staying below the 600 range allows for a better adhesion of the paint to the surface I find.





Quality Check

After the second sanding pass, I like to get a good look at what the piece looks like. Since the surface is visibly uneven in terms of color, it can be a bit hard to spot areas that might need a bit more love. To address that issue, I give the piece a good uniform basecoat of a mat color with a spray can. (Do not use glossy spray paint here)

I generally use gray for generic pieces, however, if I need to have a piece in perfect condition, like if its a master for a mold, I go with silver as it brings out all the defects really well.

If I find some spots to fix, I go ahead and fix them using various techniques outlined above, depending on the situation.

If I don't find anything, then I move ahead to the next stage for the piece, which would be painting.