

For the First-Time Cosplayer: Transforming Your Raw 3D-Prints into Cosplay Props

Introduction:

I see you're an avid comic-con attendee, wanting to take their experience to the next level—with not just cosplaying, but MAKING your very own. I was the same as you once, and I've been making my own props for the last 4 years, from fully functional lightsabers to motorized Iron Man helmets. The following instructions will lead you through a step-by-step process on turning ANY 3D-model / print into a fully detailed prop. As a fledgeling prop-maker, you'll learn post-processing tips and tricks, the optimal materials to use, what kind of paints to use, and how to properly sand, prime, tape, and paint! While each individual part will require slightly different steps depending on how it looks, each part will roughly follow the same process. These particular instructions will use a videogame mask as the example prop.



credit: [VALORANT](#), RIOT GAMES

Background:

It is expected that you either own or have access to a 3D-printer, or a way to obtain 3D-printed parts. This is the base for the props in these instructions, as a different material (such as foam) may require different post-production techniques. Readers are also expected to know how to properly handle aerosol sprays, such as the filler primer or spray paint we will be using. Know that they should be sprayed in passes in slow, one directional movements and held ~12 inches away from the object. It is also expected that you have a prop in mind to make! If you need ideas, I recommend heading to WireFrame3D (<https://www.wf3d.shop/>) to browse any 3D-models that are particularly suited for cosplay (Walsh, N., Levy, J., Wilson, T., & Padron, K). It is also expected that if you are going to use any machine equipment (palm sander, orbital sander, etc.) that you know the risks and safety requirements for proper usage. These tools are purely optional and serve as a way to save time / energy if needed.

Warnings:

Please be wary of the following warnings:

- Note that dealing with a 3D-printer requires care, as many require calibration and have a lot of heated elements, which will burn you if mishandled.
- Many of the materials we will be using require proper ventilation and protective equipment (PPE) for safety! Please be sure you work in a well-ventilated area (outside, workshop, etc) and own a face mask, such as a Facepiece respirator. Such materials include:
 - Spray paint / Filler Primer
 - Bondo Glazing & Spot Putty / Wood Filler
 - Sandpaper & any sanding equipment
- We will be using an X-acto knife for precise cuts, so it is expected that you know proper knife usage and handling so that you do not cut yourself.
- The final product will only look as good as the amount of elbow grease you put in!
- Patience is a virtue

Materials:

Still with me? Perfect. Here are the required materials, with some optional ones listed below as well.

More on those later:

- 3D-printed part
 - By extension, filament & printer
 - Slicing software (if needed)
- [12oz Filler Primer](#) (& Sandable is optional, both work)
- [4.5oz 907 Bondo Glazing & Spot Putty](#) or [Wood Filler](#)
- [Dry & Wet Sanding Sandpaper](#) of various grits, the ones we will be using are:
 - 80, 120, 240, 320, 400, 600
 - 800, 1000 (optional)
 - Emory Board / Sanding Stick (optional)
- Tape
 - [Painter's Tape](#)
 - Masking Tape (optional)
 - [Delicate Surface FrogTape](#) (optional, but I've found this works best with what I need)
- Spray paint (I will be using Rust-Oleum brand, but you can experiment which ones work best for you)
 - [Blue Spray Paint](#) (Only gonna link one because it's all self-explanatory)
 - Orange Spray Paint
 - Silver Spray Paint
 - Whatever other colors
- Miscellaneous parts depending on your prop
 - This mask will include an N-95 COVID Mask and an elastic strap (optional)
 - Some props require threads/string, lights, etc. whatever you want to include, but this tutorial will not go over wiring / electronics inclusion

Instructions:

1. Getting your 3D-print ready for post-processing

- **INFO:** Hopefully by now you have a beautiful raw 3D-print for use. Depending on the print quality of the prop, you may have less work, you may have more work. It all depends. In my case, it was average-to-good quality which lowered the amount of sanding I had to do →
- Inspect it, and note any imperfections.
- NOTE: If needed, you can give the print a quick sanding with 80-120 grit sandpaper all over.



^ Yorick Mask Raw Print

2. Apply the first layer of Bondo to the print [PRIMING]

- **INFO:** 3D printing is a Fused Deposition Modeling (FDM) process, which means that prints will be built from the ground up. Because of this, there will be layer lines, or small lined inconsistencies in the walls of your print. You can see it a bit in the picture above. We will be covering those up.
- Note the imperfections you noticed on your print in step 1.
- Apply Bondo onto any obvious layer lines, with a heavier layer on any imperfections.
- Depending on the print quality, it may be necessary to apply Bondo to the entire print.
 - It is usually not necessary since later steps will handle the smoother bits.
- Leave to dry for ~1-3hr.



3. Sand down the Bondo Layer using 240-320 grit sandpaper. [SANDING]

- **INFO:** Run your fingers over the print. Places that were previously bumpy should now be getting smoother and/or relatively smooth, depending on how much Bondo was applied.
- **WARNING:** Be careful NOT to sand off ALL of the Bondo, as that defeats the purpose of the Bondo smoothing out your print. Bondo smooths out the print by FILLING in holes and imperfections, so getting rid of the color entirely would prove detrimental to your post-processing.
- If you feel that 240 grit sandpaper is too rough, switch to 320 grit. If necessary, you can even go up to 400 grit.



4. Apply a thin coat of Filler Primer. [PRIMING]

- **INFO:** This step should fill in any small cracks / imperfections that you did not need to pay special attention to with the Bondo. This also acts as a primer for your paint, giving you a clean canvas to work with once your print is adequately smooth.
- Follow the instructions on the can. But a general rule is to keep the spray can angled 5 degrees, 12 inches away from the print. Spray in passes, each coming from the same direction.
 - Passes should be light coats, and if you started from left to right then ALL subsequent passes should be from left to right. This isn't like spray paint vandalism.
 - **WARNING:** Do NOT overspray (spray too much or too close to the print). This may cause coats to be too heavy, causing paint to run (streaking) and will be difficult to sand off later.
- Paint until you cover all parts of the print. It is OKAY if the primer does not fully cover the print with the first coat. That is why we are doing multiple coats.
- Wait 30 minutes in between each coat, and apply 3 coats in total.
- Leave to dry **~6-12hr**.



5. Sand down your print. [PRIMING]

- **INFO:** You will probably spend the most time on this step. You will now sand down the print until it is nice and shiny smooth (if that's what you desire for your print). This will allow your print to have a good base layer for your spray paint and also contribute to a high-quality finish for your prop.
- You can either dry sand or wet sand. It is honestly personal preference, but I typically start with dry sanding and move to wet sanding for details (Hughes).
 - Dry sanding allows you to spot imperfections more easily and it is more convenient, but dust will get everywhere and gunk up your sandpaper without proper maintenance.
 - Wet sanding requires a water source and wet-specialized sandpaper (don't worry, I linked wet-or-dry sandpaper so you should be good) so that the paper does not get damaged. It is cleaner and generally better for removing paint and getting a "shinier" finish after sanding.
- Here is my process:
 - Dry sand 320 grit all over the print to start off, sanding in a CIRCULAR motion. This is to avoid scratches.
 - Dry sand 400 grit all over the print, cleaning any major scratches that would be left over from the 320 grit. Now onto wet sanding.

- Find a container and fill it a quarter-way with water. I typically wet sand over a sink. Dip your sandpaper and your print into the water, and then sand away, still in a CIRCULAR motion.
 - 400 grit wet sand over the entirety of the print
 - 600 grit wet sand, then 800 grit wet sand
 - 1000+ grit wet sand (optional, only for really shiny finishes, i.e gold plating)
- Pat dry your prop with a towel and let it sit out **~20 minutes** to dry fully.
- NOTE: If you are repeating this step, you can just start from wet sanding onwards.



STOP!

6. Check your print.

- INFO: If you notice any more imperfections that you aren't happy with, feel free to repeat steps **2-5** again, or just step **4-5** if the imperfections are small enough. Repeat these steps until you are happy with the print.
 - Remember that the prop will only look as good as the amount of work you put into it! Putting in elbow grease really makes a difference here.
- If it looks super smooth (no layer lines or imperfections in sight), or as smooth as you'd like it to be, then you're free to continue.
- NOTE: In my case, I was in a time crunch so there are evident imperfections but I knew that my spray paint of choice would cover those up, and the final product was going to be weathered.



- Seeing the light bounce nicely off of the print is a good indicator of it being ready!

7. Apply a Coat of Paint. [PAINTING]

- **INFO:** Depending on your prop, this could be one of the final stages of your print. However in this case, I will be going over how to paint a prop that requires multiple colors, which calls for multiple coats of paint. Applying a smooth first layer is key, and relies not only on your technique but also your environment.
- **WARNING:** Spray paint may not attach that well if the paint conditions are bad. Be sure to read and follow the instructions on the spray can. It is strongly DISCOURAGED to paint in over **70%** humid weather, nor in temperatures not between **55-80** degrees Fahrenheit (Lee).
- Recall how to properly use spray paint. Key rule is 5 degree angle, 12 inches away.
- Apply a light-medium coat of paint. Be careful not to overspray and cause streaks. The prop should be entirely covered here.
- **NOTE:** In this particular example, I painted in silver. However, I was stupid and caused a bit of orange peeling (a term to describe paint chemically reacting to form an orange skin-like pattern). If this happens to you, do NOT panic! Just go back to steps **5-6**, and sand down the imperfections. Then start step **7** again.



8. Taping off the Prop for More Colors.

- **INFO:** So the discrepancies in pictures is because I didn't take any pictures of me taping off the silver bits when painting the prop silver to blue. But just know that I taped off general areas that I wanted to show 'exposing' the silver layer underneath to show 'weathering' of the prop. I also taped off the teeth area because the teeth in the prop are silver (see [Introduction](#))
- **WARNING:** Remember to wait at least 15-20 hours after painting the prop before applying any tape. This is to lower the possibility of paint peeling off with the tape if not given enough time to dry and cure.
 - Paint typically takes 4-7 days to fully cure, but is "fully dry" within 1-2 days.
- Tape off any part of the prop that needs to protect the color underneath. In my case the mask is primarily blue and orange, so before painting the mask orange I need to tape off all the parts that will stay blue.



- Use an X-acto knife in order to make more accurate cuts to the tape, creating unique shapes that will properly cover all the areas that need to be covered.
- Be sure to LIGHTLY press the knife along edges in order to not accidentally scratch the paint with the blade.
- Repeat steps **7-8** as necessary.

9. Peeling Off the Tape.

- INFO: Now's time for the best part of the prop-making process: Revealing the model (*Abare*). Now you can see the model coming together nicely. Compare how the model looked taped off vs. how it looks fully revealed. If you were careful, no extra paint would be peeled off with the tape!
- Slowly peel off all bits of the tape to reveal the model. If your prop requires some parts to still be covered, then take extra care to ensure that those particular pieces of tape stay attached to the prop. In this case I kept a big scarring near the chin tape covered so that I could reveal it much later.
- Repeat steps **8-9** as necessary.



- This is what we have right now. For most props, you're done!!



10. Applying extra details to the prop as necessary (optional). [PAINTING]

- INFO: This prop is going for a more “weathered” look, so I will be applying a “black wash” to the prop to mimic grime and dirt buildup.
- In order to do a black wash, mix black acrylic paint with water (2:1 ratio). The paint should become watery and runny.
- Using a foam brush, apply the blackwash mixture all over the prop and then QUICKLY wipe it off with a paper towel.
 - Majority of the paint should be wiped off, leaving dark stains in the crevices of the model, much like how normal dirt would build up.
- Repeat as many times as necessary until satisfied with the end results.



- INFO: For this prop I wanted to attach a mask to the back that shows through the mouth. This isn't really for functionality but mainly for aesthetic purposes, as it allows the wearer to breathe through it but it is still black to mimic the actual mask.
- Cut the COVID mask into a desired shape to fit nicely into the prop mask.
- Use any adhesive (I used superglue) to attach the COVID mask to the underside of the mask.
- INFO: I also wanted to include straps so that the mask is actually wearable. The prop model comes with 2 hooks to be able to loop an elastic band through.
- I used a medical blue elastic band I got from the hospital for it.



11. Have fun with it!

- *INFO: I made funny tiktoks with it (not attached) and got to dress up with it, but that's what you do with a cosplay prop.*
- Congratulations, you have now successfully turned a raw 3D-print into a high-quality, cosplay-ready prop! You are now one step closer to making a super awesome cosplay, and what's even better is that you made this prop entirely on your own. Be proud of yourself!

