



Leather Plague Doctor Mask



by VexFX

For this project we are creating a pair of custom leather Plague Doctor masks.

Quick history lesson: During the bubonic plague in Medieval Europe cities would hire masked Plague Doctors to tend to the infected. More information on

Plague Doctors can be found on Wikipedia [here](#).

If you have any questions about this project that are not addressed here, please feel free to ask in the comments!



Step 1: Prototyping

Before moving up to expensive materials like leather, I started by prototyping the patterns in L200 foam. A similar version of this foam can be found at your local craft or fabric stores, often called "Fun Foam" or "Craft Foam." Mine started as a 4'x8' sheet from Foam Mart here in Los Angeles, and I use it for prototyping on all kinds of projects.

in the past, but I would be modifying the masks to include goggles and making some minor improvements in the overall form. The biggest difference is that for this project I would be using a laser cutter for the final pieces, rather than hand cutting each individual piece. This takes us to our next step...

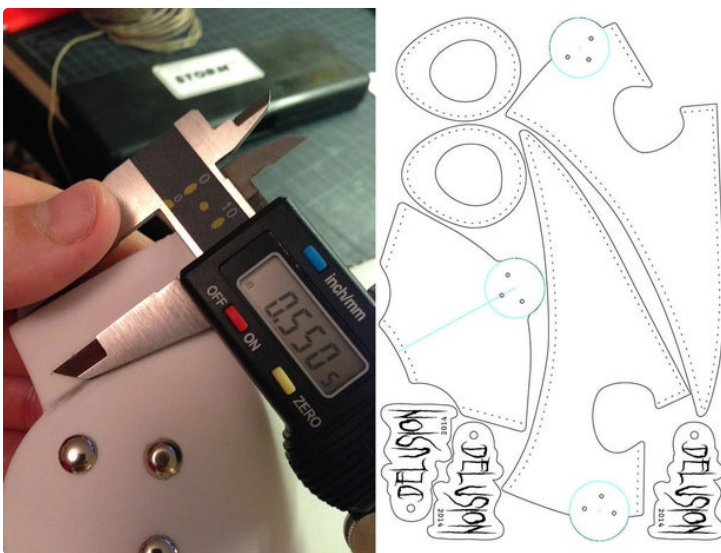
For this project I was using a set of patterns I created



Step 2: Measuring and Digitizing the Prototypes

The prototypes were carefully measured and digitized. To digitize the individual pieces I photographed them over a cutting mat that has a 1"x1" grid. The photographs were then processed to remove lens distortion, flatten out the perspective, and scaled so 1 inch in the document matched the

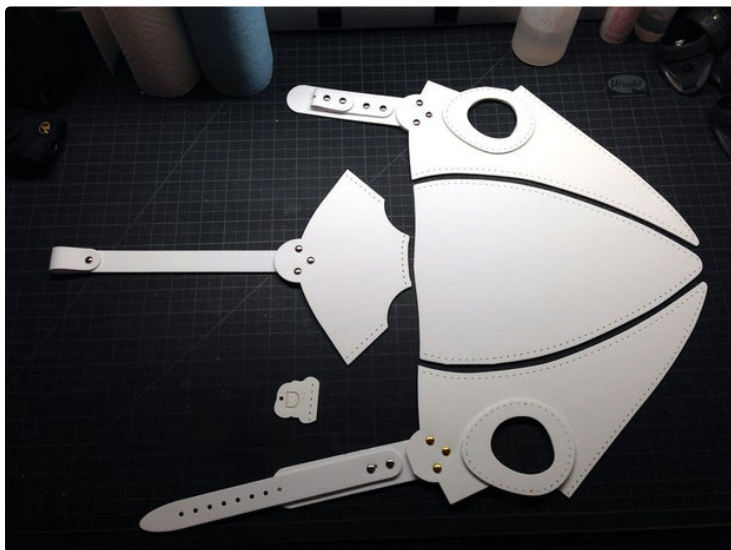
1"x1" grid in the photograph. From there it was just a matter of carefully tracing the individual parts in Adobe Illustrator to create the paths that the laser would eventually follow when cutting out our material.



Step 3: Laser Cutting the L200 Foam

Once the patterns were digitized I laser cut some test pieces out of L200 and assembled a few foam versions of the mask. These masks were then used for test fitting on various head sizes so I could determine final length for the

various straps, and allowed me to make minor modifications and refinements to the patterns before moving on to leather.



Step 4: Laser Cutting the Leather

Cutting the leather proved a bit challenging, but eventually I was able to get everything calibrated to produce high quality pieces. To start I made a small test pattern that included all the basic elements of the mask patterns in a small 2"x2" square. Those elements include a dashed stitching line, curved lines, small holes, heavy engraving, and fine engraving. Next I cut 10+ 2"x2" squares of leather and started my tests. With each test I would fine tune the laser power,

laser movement speed, number of passes to make a full cut through the leather, and engraving depth/contrast. The goal is to cut the leather without burning the edges too badly. Eventually I settled on settings that required 2-3 passes of the laser to fully cut through the leather. The leather was also covered in blue masking tape to protect the surface from smoke damage.



Step 5: The Leather After Laser Cutting

After laser cutting the leather I allowed it to soak in a bath of warm water for a few hours to wash off the burnt edges and allow for easy removal of the masking tape. Between soakings the water was changed, and the process repeated until the water remained clear.

The pieces were then left to dry overnight. I also flipped the leather every few hours to insure that both sides would fully dry out, and had a fan blowing over them to help speed up the process.



Step 6: Staining and Sealing the Leather

Now that the pieces have all been cut out and cleaned, it's time to start staining. I used a medium brown water-based stain on both sides of each piece, followed by a matte-finish water-based sealer to protect the leather and keep the stain from transferring to anyone wearing the masks.



Step 7: Assembling the Masks

With the individual pieces all stained and sealed assembly could begin. First the edges of the mask and straps that would contact the performer's skin were rubbed with beeswax and run over with a tool called an edge-slicker. This rounds off and smooths the edges.

Next the stitching holes were individually punched with an awl to temporarily expand them to allow for stitching. The holes will eventually close up and lock

around the thread. Next the pieces were stitched together with a heavy waxed thread and all thread tie-off points inside the mask were protected with a dab of beeswax to prevent them from rubbing against the performer and protect them from wear.

Finally the straps, complete with buckles, were riveted to the mask.



Step 8: Preparing the Goggles

Now that the mask base is assembled it's time to start work on the goggles. I started with black plastic welding goggles and removed their straps. I also removed the circular rubber covers for the vents on the sides of the goggles. These would eventually be covered with a metal piece to add a bit of style/contrast to the goggles.

Next the goggles were roughed up with wire brushes, sand paper, and files. Large gouges and scratches were added that would be accented during the weathering process.

Prior to painting, small holes were drilled around the

base of the goggle that would be used to stitch it to a leather ring that would in turn be stitched to the final mask.

The goggles were then cleaned with acetone to remove any oils or contaminants, masked, and sprayed with 2 coats of a matte black primer designed for use on plastics.

After the primer 4 layers of gold metallic paint were then sprayed onto the goggles and left to cure overnight.



Step 9: Weathering the Goggles

After the paint had cured they were hit once again with the wire brushes to add small scratches in the gold paint.

Next a heavy wash of black acrylic paint was brushed onto the goggles and quickly wiped off with crumpled paper towels. This leaves dark staining in all the deep scratches and dings, and also leaves small streaks on the surface of the goggles. They instantly started looking like aged brass.

Next a more watered-down wash of a reddish brown was applied, followed by multiple washes of a pale green to give the goggles a nice aged patina.

The picture for this step shows the goggles at this point, prior to the following 2 steps that really make them pop.

To make the goggles look more like real metal I dry-brushed bright gold enamel paint over the edges and high-points of the goggles to simulate metal exposed from wear and use of the goggles.

Finally the goggles were sealed with a glossy varnish that deepened the weathering and brought out the metallic qualities.



Step 10: Attaching the Goggles

After the goggles were painted I attached small metal detail pieces over the vent holes in their sides. These silver pieces were also weathered with brown and patina green washes to age them a bit. Their silver appearance provides a bit of contrast to the aged brass of the goggles, and adds a bit of style. You can also see that they still have a good gap allowing air to flow into the mask and help prevent the goggles from fogging up.

Next the goggles were stitched to leather rings using a lighter weight brown waxed thread. The entire

goggle assembly is then stitched to the mask using the same heavier waxed thread as the rest of the mask.

I also laser cut some smoked acrylic lenses that were just dark enough to make the lenses appear pitch black when the mask is being worn, but allow for great visibility even in low-light environments.

And finally the masks were completed! This was an amazing project, and I'm really happy with the overall quality of the finished product.



Step 11: Template Download

Many people have been asking for a copy of my templates for this project, and initially, I was reluctant to share them as I've invested a great deal of time and resources in their creation. That said, in the spirit of fostering and celebrating creativity I've decided to share my templates here with you under a Creative Commons license. [Attribution-NonCommercial 4.0 International](https://creativecommons.org/licenses/by-nc/4.0/)

This license means you are welcome to use and modify my templates for non-commercial use, as long

as you provide attribution (credit) to the original author. Chris Ellerby & Vex FX.

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Enjoy!

/Chris (Vex FX)

[https://www.instructabl...](https://www.instructables.com/Leather-Plague-Doctor-Mask/)

Download



Thanks for the inspiration!



Awesome!! I absolutely love the exhaust pipes. That looks great. What did you use for the exhaust pipes?

Thats 1 of main problems with the masks that people buy. i.e. the breath holes are on the bottom, which is the wrong place. The original plague Dr masks had the holes on the cheeks next to your nose.



I'm glad you like the pipes as much as I do! I drew up the exhaust pipes in Fusion 360 then 3d printed them on an Ender 3 Pro with eSun PLA+ filament. Sanded everything then primed and painted.



Are the templates available to those of us looking to make our own?



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



I was curious if you have a pdf of the templates used. I would love to make this. I really love your pattern



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



Good question and I second that. A PDF file being available would be excellent. I would even be willing to pay for one that was reasonably priced on say, ETSY.



any way to make a vector out of your design?



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



Any chance you could upload a template for the pieces? it looks amazing!



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



Where is the full template? I can't find a decent template anywhere.



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



how i can get the pattern piece?



I've updated the original instructable to include my templates. Please review the new Step 11. Enjoy!



This was super helpful, Thank you!



The mask will just not be as durable and may require repairs depending on how it's used.



Very cool masks. a I am happy for you winning the grand prize. Who would of thought that something that " Grimm" would take first place! could you imagine back then when you were sick as a dog and the doctor would show up in this "horrific" outfit. nice job Bro.



people from the time period they were used thought that they were beautiful, some even wrote poems about them. ;)



Oh my days! Wish I'd found this before starting my first mask! Could've saved me a bit of time :P I'm fumbling through mine as it's my first try but I think it'll still turn out good! Definitely saving this for my next one :D



Congratulations on winning the leather good contest!

Well done nice work you deserved it!



Thanks so much, I could not be happier! The leatherworking tools from that prize will be a big help with future projects, and I am excited to further explore the world of leatherworking!



Hi. Nice Work.

Do you have the laser Cutter DXF file? I would like to make one too.

Thank you



I love this! Definitely going on my list.

Where'd you find the smokey acrylic for the lenses? I needed something similar for a different project, but couldn't find what I needed and was just going to dye the clear stuff black.



This is amazing. It better win the contest. It turned out amazingly well. Good Job!



Thanks so much, I hope so too! Getting those leather working tools would be a game changer for me, and help fuel my excitement for working with leather.



great first post! And awesome project. Voted



Awesome, thanks!



I think some 1 haz duh sniffles



I noticed a logo in multiple images. Are you selling these masks? If so could you provide either a link to your website or a price.



The logo is for an attraction that is running in Los Angeles now called "Delusion." I'm not currently offering them for sale, but may do so at some point.



What Oz. Leather did you use, and is it pretty durable? I want to make one just to want the mask to crush or misform easily.



Just don't want the mask to deform or crush* sorry for the typo.



This was 4-5 Oz leather, and is pretty durable. A slightly thicker leather would be nice for the straps, or doubling the leather and sewing the edges to make nicer straps would be a good option. Right now they are being used in a live attraction here in Los Angeles and seem the be holding up pretty well. They hold their shape, but can be crushed/deformed as you would get with any leather. Thankfully they are easy to shape back to your desired form pretty easily.



what is tjat from



It's based off actual masks worn my doctors during the bubonic plague in medieval Europe. You can learn more about Plague Doctors here: http://en.wikipedia.org/wiki/Plague_doctor