

FOAM ARMOR, FAST

by Bill Doran



Supplimental Content for
THE FOAMSMITH TRILOGY

ABOUT THE AUTHOR



photo: Nate Zimmer

Greetings! I'm Bill Doran and I build space guns, fantasy weapons, and elaborate sets of armor as my full time living. It's a lot of hard work, and seldom glorified, but it is a whole lot of fun and I wouldn't trade it for any career in the world.

I started making props and costumes with my friends in 2009. Back then, we were just getting into cosplaying for local fan conventions. After that fateful year, I was totally hooked. Before I knew it I was buying more tools, building props for my friends, and traveling around the country to attend as many fan expos as I could afford.

The hobby consumed my life. I knew I needed to make a change, so in 2012 I quit my 9 to 5 day job and opened my own business; Punished Props. Since then I've been building high quality replica props for clients all around the world!

As I picked up experience from my trial and error learning process, I started sharing what I knew with the quickly growing maker and cosplay communities. I've been documenting my builds and techniques so that others might glean some of my insight. My goal is to lower the barrier to entry for this amazing craft, inspire newcomers to join our growing ranks, and to help them learn the techniques they'll need to make their props and costumes stand out from the crowd.

My dedication to passing on my knowledge has turned into a major facet of my business. I have now done many panels and presentations on the craft of prop making at popular fan conventions. To top it off, my eBook, [A Beginner's Guide to Making Mind Blowing Props](#), has made it's way into the hands of thousands of new makers!

Thank you for taking the time to see what I'm all about. I look forward to seeing what we can build together!

-Bill Doran
punishedprops.com

ACKNOWLEDGEMENTS

I could not have done this alone. The prop and costume making community has been an amazing, positive force in my life. Whether I'm looking for personal support or help with a technical problem, scores of amazing individuals have risen up to give me the push I need to improve my craft and my life.

When it comes to sussing out the technical aspects of foam fabrication, I have a handful of extraordinary friends whose brains I can always count on for picking. A gigantic thank you goes out to [Will Morgan](#), [Harrison Krix](#), [Evil Ted Smith](#), [David Carpenter](#), and [Eric Jarman](#). You guys rule!

Also thank you to my amazing wife Brittany. None of this happens, nor is it worth doing, without you. =)



Bill & Brittany Doran at BlizzCon 2014



THE FOAMSMITH TRILOGY

Foam Armor, Fast is an add-on to the The Foamsmith Trilogy

Foam Armorcrafting Part 1: Design, Templating, & Fabrication

Foam Armorcrafting Part 2: Finishing & Painting

Foam Armorcrafting Part 3: Undersuits, Straps, & Lights

Welcome to the Foamsmith Trilogy! The goal of these guides is to help you create stunning, comfortable pieces of armor as painlessly and cheap as possible. In this second entry to the trilogy I will teach you all about the painting and finishing techniques you'll need to turn your foam into true works of wearable art!



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SAFETY!



Safety is always the foamsmith's number one concern. While you might not be cranking up the power tools for your paint job, you will be using some paints and chemicals that you desperately want to keep out of your lungs. Especially when using spray paints, an airbrush, aerosol sealers, and epoxy resins, work in a well ventilated area or even outside. A respirator is also a no-brainer.

Have fun, but be safe. I want to see my fellow foamsmiths around for a very long time!

FOAM ARMOR, FAST

What this Guide Is

This is a step-by-step instructional guide for one specific way to build armor from EVA foam as quickly as possible. There are many other tools, techniques, and materials that can be employed, but this is how I like to get it done, especially when I'm on a tight deadline.

What this Guide Is Not

This is not a comprehensive guide to all things foam armor. For a full rundown on the foam fabrication process, check out the rest of the books in the [Foamsmith Trilogy](#).

I need it done yesterday!

We've all been there. Your favorite comic convention is just a week away and somehow you haven't managed to start building your costume. I totally understand! At this very moment, BlizzCon 2014 is about 10 days away and all I've done is picked out my costume and collected some reference images. I planned on starting it a month ago and then life happened. We're in the same boat and I'm going to show you how to get your costume armor done, fast.

COMPROMISE

Let's not fool ourselves. We're going to have to make some compromises. When time is a factor, certain techniques go right out the window. We won't be making any molds. We certainly won't be doing any custom fiberglass work. I doubt we'll be doing any pepakura either. As much as I love epoxy clay, having to wait 8 hours for it to cure is too much of a hindrance. This is why EVA foam is such a perfect medium for quick fabrication. This wonderful material, combined with a fast drying adhesive like contact cement, will get you admirable results in as little time as possible.

What do we need to give up?

- Complex patterns and pieces near elbow, shoulders, and knees should simply be painted on to the undersuit.
- Highly detailed or relief ornaments may need to be carved in with shallow lines or merely painted on.
- Moving parts may need to be faked or glued in place.
- Any sort of complex electronics are a no-go unless they are ready made.
- Anything that takes 24 hours to cure or dry is going to suck the available time right out of your project. Only use fast drying paints and adhesives.

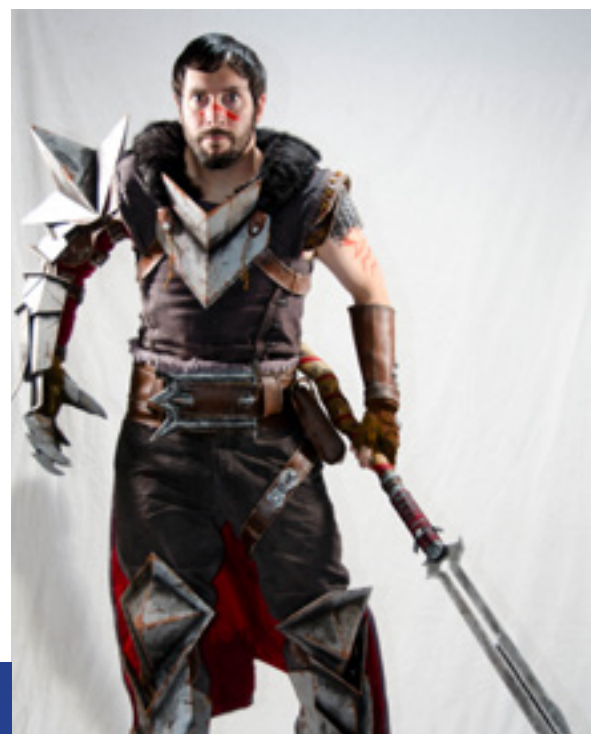
Won't our quality suffer?

If we wanted our costume to be 100% "accurate" to the reference material, we should have started it 6 months ago, but we didn't. We can still produce quality work, but simpler design. This will save yourself the heartache of not finishing the costume in time. Will this armor win the BlizzCon costume contest? No. But it will get finished, I will wear it, and I will have a damn fun time doing so!

Aim for 90% completion with the intention of finishing the remaining 10% after the convention when you have time to pour over the finer details.



90%



100%

My 2011 Dragon Age Mage Hawke costume was barely finished in time for PAX Prime. I got it to a wearable state for the weekend convention and was happy that I had something to wear. After PAX I spent another week upgrading and finishing the finer details to bring the costume to Dragon Con the following weekend.

Hawke Upgrades After PAX

- Added Chest Armor Tassel Things
- Added Waist Cape
- Re-painted belt
- Added leg strap
- Added Chest Straps
- Made a Spear
- Repainted much of weathering
- Added a red undershirt
- Took better photos



Sure, the later Hawke costume is much better and a closer representation to the reference material, but it was an unrealistic goal without another week to work on it. Aim for 90%.

WANTS VS NEEDS

Come up with a list of needs and wants. The “needs” are the bare minimum you need to have finished to consider the costume wearable for an event. The “wants” are things you would love to have, if the time allows it. Only work on the “wants” once all of the “needs” are finished!

Some common “wants” are things like:

- Complicated painting/stencils
- Lighting/electronics
- Moving parts
- Weapons
- Helmets

My wants/needs for my BlizzCon 2014 Darkmantle Armor costume

Need:

- Undersuit that at least covers my naughty bits
- Armor fabricated, painted, and strapped
- Cape/Hood

Want:

- Detailed weathering on armor
- Painted details on undersuit
- Weapons
- Painted details on cape

REFERENCE



In this case I finished my “needs” with enough time to knock out a couple of weapons, but I did not have time to paint the undersuit, add weathering to the armor, or paint the details on the cape. It turns out that 99% of all photos taken at BlizzCon were of my front side, so even if I had spent 2 hours painting details on the cape, nobody would have even noticed! That’s a perfectly acceptable compromise, in my opinion!

CLOSE ENOUGH

MORE TIPS BEFORE STARTING

Fail fast.

Don’t burn daylight banging your head against a wall trying to figure out a complicated solution. If a technique isn’t working, immediately stop doing it that way. The simplest solution is usually the best. Getting frustrated on a challenging part of your armor? Set the piece down and work on something else that you know you can finish.

Go with what works.

Now is not the time to try out new materials or techniques. You may think “oh I’ve seen this done before and it’s definitely the best way to do it”. This is a one way ticket to burning an entire day failing at something that could have been accomplished in one try with a simpler method that you’re more familiar with.

Getting it right the first try is going to be a massive boon to getting your armor made quickly. If this means practicing a tricky cut on some scrap foam before committing to the final piece, so be it.

Embrace the 10 foot paint job.

If you’ve got a decent hand at painting, it can sometimes be easier to paint details on, rather than sculpt or carve them. If you nail it, you should get a finish that looks fantas-

tic from about 5-10 feet away. Painting super detailed pieces that can only be seen from a foot away can be very creatively satisfying, but we don't have time for that!

If it won't be seen, don't build it.

Gotta cape? If it's going to cover your back, don't build the detailed back armor pieces. If your armor has a chainmaille vest under the armor, only make the maille where it sticks out from under the armor, don't burn 3 days weaving an entire shirt.

OK, we're all on the same page now, right?

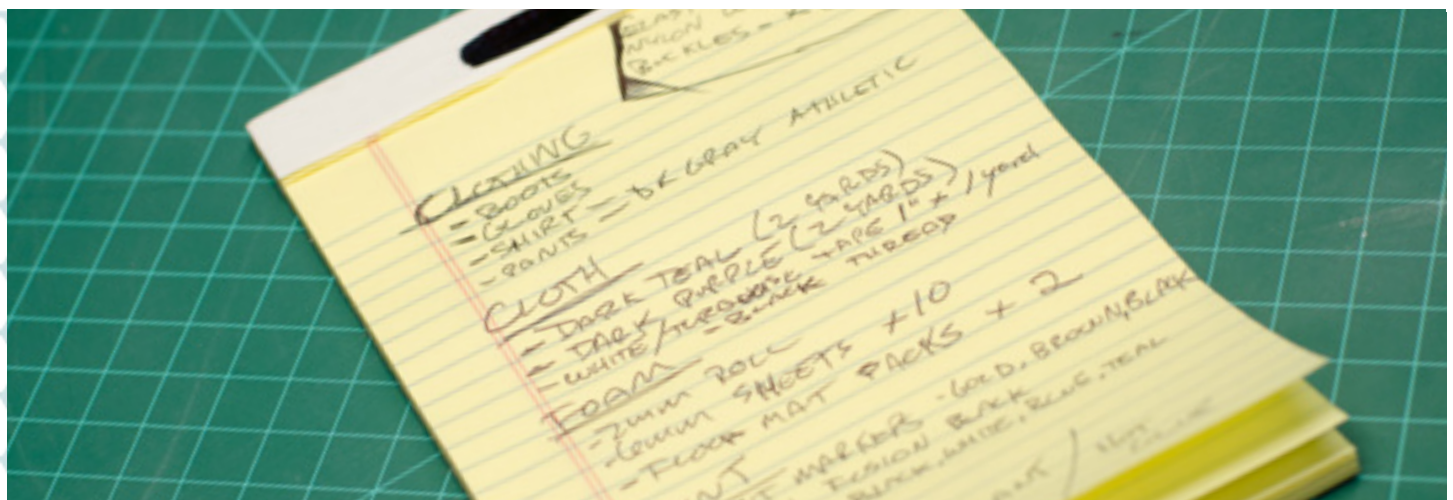
Fantastic. Let's get started as I bust my butt to get this costume done and looking great for BlizzCon!

PLANNING THE BUILD



DARKMANTLE REFERENCES

Before you spastically throw yourself into the creative process, spend a good hour or so planning your build. If you've only got a week to put your armor together, you're going to be very happy you did this 6 days from now.



List the materials you need.

Your materials list should be as thorough as you need it to be to cover all of your “needs”. Double check that you aren’t missing anything that’s mundane, but crucial. Also list where you’ll need to buy all of this stuff. If you need to order any of it online, do it now. You may have to shell out the cash for expedited shipping, so be prepared! Also, if you’re in the US and have access to [Amazon Prime](#), use it!

Note: Don’t order materials from overseas, they will NOT get to you in time!

Go buy all of your materials!

If you can, get everything you need in one trip. Driving back into town to get “just one more thing” will double your purchasing time and cripple your productivity!

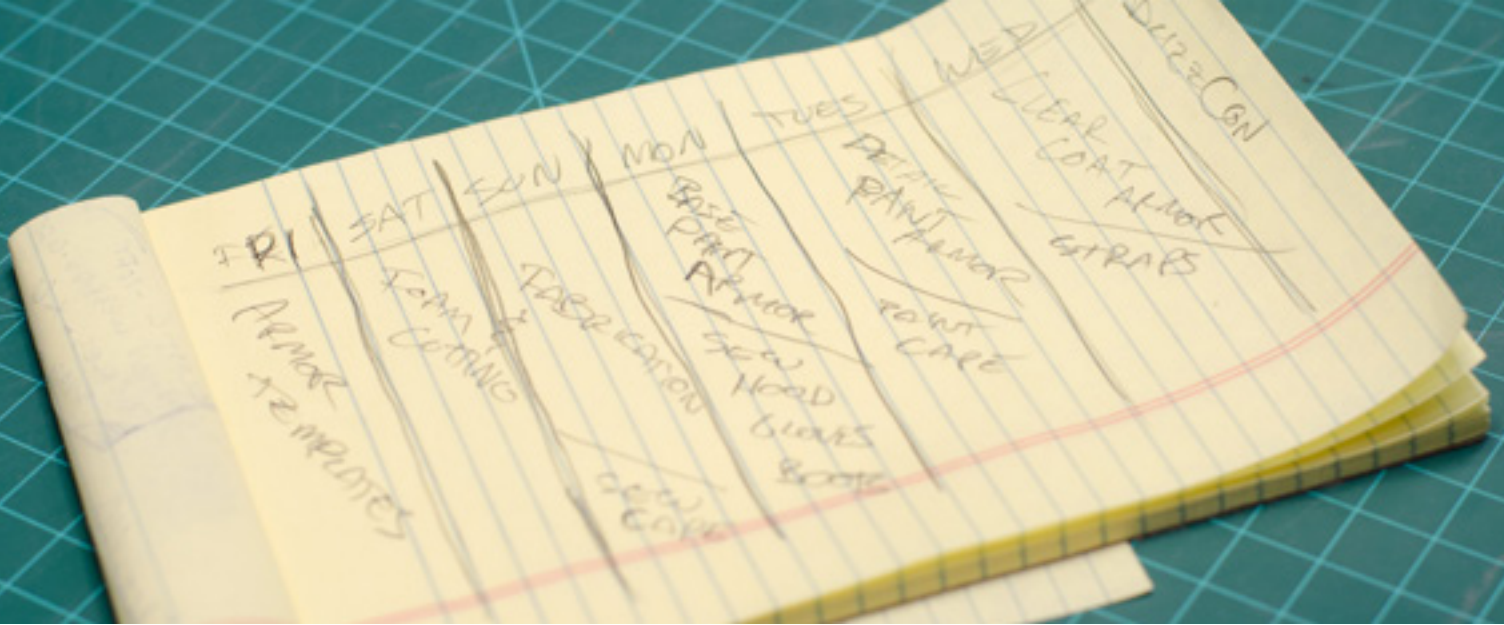
For my Darkmantle costume I spent about 2 hours driving around town to get everything I needed. The rest of my materials were ordered from [Amazon](#), which took me about 30 minutes of shopping.



List all of the armor pieces you need to build.

This list should include all of the pieces you need to build and the different steps needed to bring them to completion. This way you can keep track of all the pieces as they come together. Finishing an entire set of armor and then realizing you forgot to build the cod piece can be very frustrating (and embarrassing) when the convention is less than 24 hours away!

Use the list to plan an overlap between the fabrication on some pieces with painting on other pieces. No matter what, we will need to wait for paint to dry. Why waste that time when you could spray on a layer of paint and build another piece of armor while you wait for the paint to dry.



Make daily milestones.

The goal with daily milestones is to separate your progress goals into smaller segments that can be measured on a daily basis, instead of just the one goal of “finishing all of it by BlizzCon”. This way, we can tell if we’re behind schedule 5 days out instead of the night before the convention.

I write down my daily milestones before I ever touch knife to foam. I’ll start by planning on being finished a day early and work my way backwards from that day to the current day. Then I’ll spread out and fill in different days worth of work to where they make sense in the schedule. I always build in a day at the end to tie up any loose ends and work on any “wants”.

If you find yourself already behind on day two, feel free to burn the midnight oil to get caught up. It’ll be way more healthy to do that early in the process than having a forced, panicked fury build the night before the event. Also take time every couple of days to re-evaluate your progress and update your milestones.



Stay Organized

Losing your templates or half finished pieces can be a massive setback to your productivity. Label a box or a dedicated shelf for all of the materials and pieces you’ll need for this build. Put everything back in this place when you aren’t working on it.

Template pieces can go into a folder and stowed in your project box. You never know when you might need to rebuild a piece and having access to your templates at a moment's notice will be extremely handy when you need it!



BUYING MATERIALS & TOOLS

Foam

You're going to need a bunch of foam. I prefer to buy mine locally at hardware and craft stores. I also tend to keep a lot of it on hand. For my Darkmantle armor, I had enough foam on hand to make the whole thing!

Types of foam I keep on hand:

- [1/2" Thick Foam Floor Mats](#)
- [6mm Thick Craft Foam in Sheets](#)
- [2mm Thick Craft Foam in a Roll](#)

If you are buying new foam stock for this costume, buy more than you think you need! Foam is cheap, so go bonkers. It's better to spend an extra \$10-\$20 on foam than to need to run out to the store for more later.

1/2" FLOOR MATS

Found at your local hardware stores, amazon.com, and wesellmats.com

1/4" FLOOR MATS

Found at your local hardware stores, automotive stores, and amazon.com

Having trouble finding floor mats? Look for "anti-fatigue floor mats".





6MM CRAFT FOAM

Found at craft stores, like Michael's, and amazon.com in 9" x 12" sheets.



2MM CRAFT FOAM

Found at craft stores, like Michael's, and amazon.com in sheets and rolls.

LOVE THAT BARGE

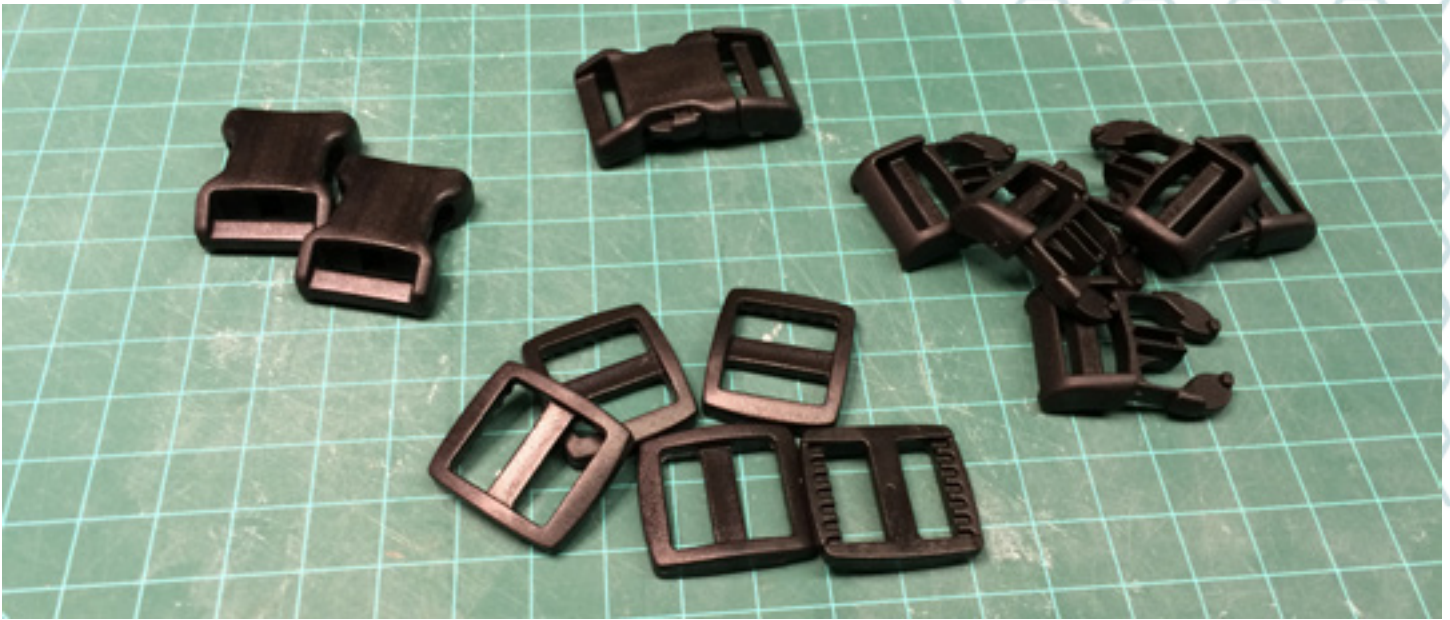


Glue

You're going to need two types of glue for your armor: Contact cement and super glue. I prefer [Barge Cement](#) for just about all of my foam fabrication. You can buy it on Amazon now, which is rad, but you might be able to get it locally at leatherworking stores. Can't find it? [DAP sells a decent contact cement](#) that's available at most hardware stores.

[Super glue](#) is splendid for those quick little things that need to be tacked down on your armor. I prefer the types that come with a [spray accelerant](#) to make it dry instantly! Look for this magical stuff at your local hobby stores.





Straps & Buckles

You will likely need to attach the armor to yourself somehow and for that, I prefer nylon webbing straps. If you have the time, you can order [straps](#), [Velcro](#), [buckles](#), and [slides](#) from [Strapworks.com](#) or on Amazon. If you don't have the time to get them shipped to you, these can be purchased, for a premium, at your local craft stores.



Cutting Tools

If you don't already have the necessary cutting tools for foam, get your hands on a good [snap off utility knife](#), an [X-Acto knife](#), and a [sharpener](#). I also keep various lengthed metal rulers on hand for making clean, straight cuts.

It also doesn't hurt to have a good rotary tool, like a [Dremel](#). I like to use a high grit sanding or grinding bit to round over the cut edges on my foam armor.

TEMPLATES FROM SCRATCH, FAST

Odds are good you'll be making an all new set of templates, just like I did with my Darkmantle set. It becomes incredibly handy to have some kind of body form to work from when you're in a hurry. I have a plaster bandage torso that I made of myself that is indispensable for making new body armor templates.

Don't have the time to make one? A Duct tape dummy could be your next best thing! You'll need an old t-shirt, a couple rolls of Duct tape, and a friend you can trust. There are dozens of instructional videos for both plaster torso casts and tape dummies on YouTube.



HOW DO YOU MEASURE UP?

Measuring with a foam ruler.

To get measurements as close as possible, I highly recommend you make a ruler out of the foam you'll be using for most of your pieces. Mine is made from a piece of floor mat foam, cut corner to corner, to make it as long as possible. This way, when taking body measurements, they will take into account the thickness of the foam!

When measuring your body parts, overcompensate on the size. Making your pieces a little bigger than they need to be means modifying them later on, not rebuilding them from scratch. A little waste makes for time savings galore!

Take the time to draw good, detailed templates on sturdy paper (I used a roll of [masking paper](#) from the hardware store). This way you can hold the templates up to your body and see if your measurements are even close. The template for my Darkmante chest piece took me about an hour to draw and cut out, but it was worth it. I knocked out all the foam pieces in one try.



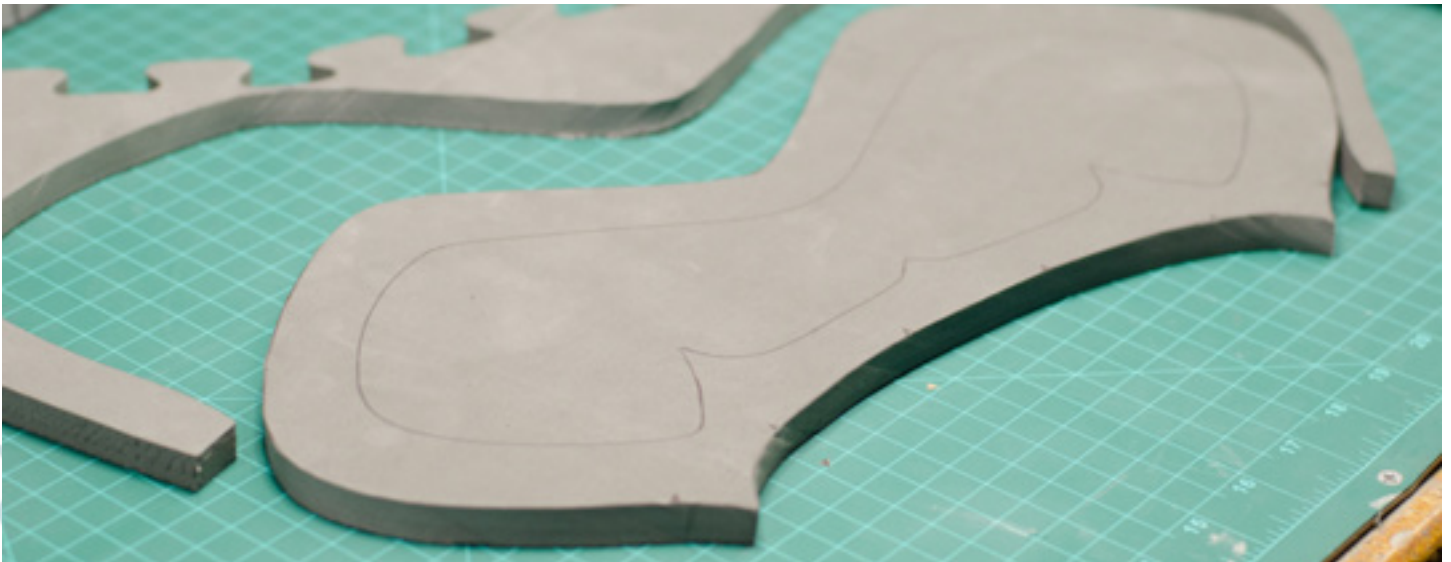
CUTTING YOUR FOAM



GOOD TECHNIQUE IS KEY

Getting good, clean cuts on the first try is vital to producing armor on a deadline. This means keeping your blades sharp, hence the sharpener. The sharpener will also keep you from needing to run out and buy more spare blades.

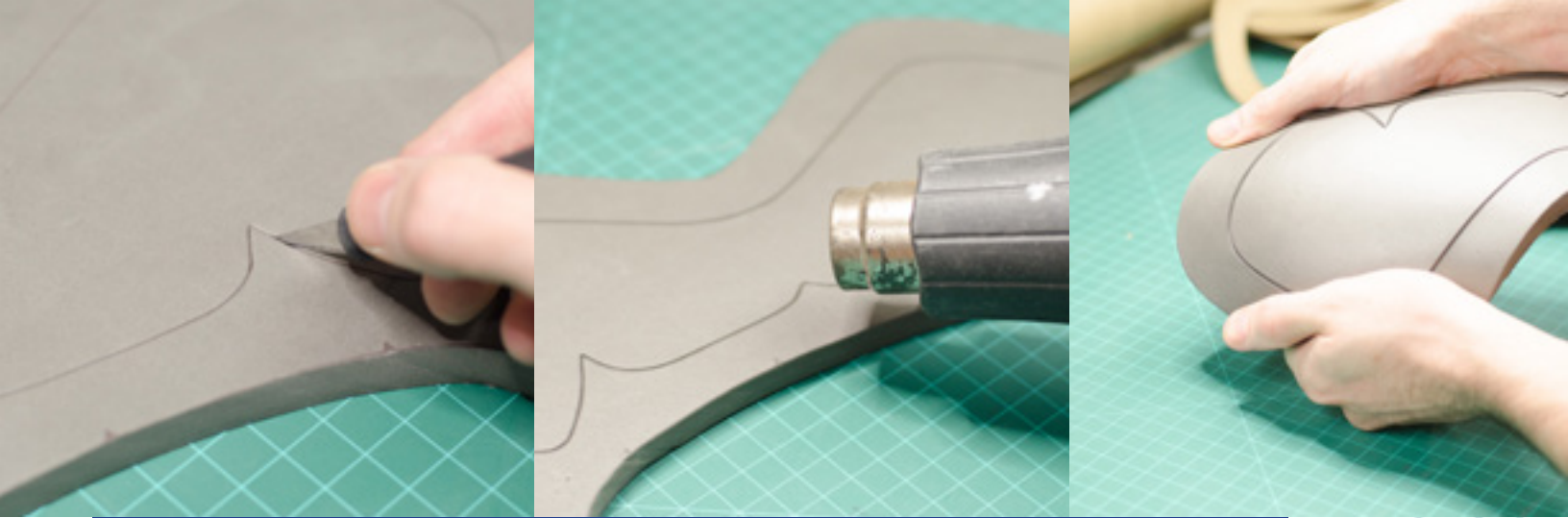
Do not rush your cuts. Taking your time with a cut and getting it right on the first try, will save you hours and heartache later on in the build. If you have a complicated cut to make, practice it on some scrap before committing to the final piece.



When your pieces are cut out, roughly try them on your body before taking the time to cut in or glue on any detail pieces. There's nothing more time wasting then taking an armor piece all the way to completion before realizing that it's too small.



SORRY LADIES, HE'S TAKEN.



INTRICATE DETAIL: EASY MODE

When your pieces are properly sized, you can start adding details! If at all possible, add detail by scoring the foam with your X-Acto and heating it with your heat gun. This is an amazing way to add intricate detail to your armor in very little time.

Sometimes you can't get away with just scoring in detail lines and will need to add more foam on top of your armor to get the proper look. This is where your Barge cement wins the day. Cut out your raised armor detail pieces from thinner layers of foam, lay down the cement on the two faces that'll be glued together, wait 5 minutes, then push them together. If the two surfaces don't meet up on the edge perfectly, they can be cleaned up with your rotary tool or a benchtop disc sander.



ASSEMBLING YOUR ARMOR



Especially if you have some complex curves and forms in your armor, you'll want to pre-form your pieces before gluing them together. Grab that heat gun, warm up your armor pieces, and manhandle them into a close approximation of their final form.



Once again, Barge is our hero here. I like to get a large portion of my armor pieces cut out and ready for adhesion before I dive in. Then I'll put on my respirator (Barge is pretty nasty stuff) and get to work.

Since Barge needs about 5 minutes to sit before it can be adhered, I like to work in small batches. I'll apply the goo to several pieces of armor and then cut or assemble other pieces while it dries. When you get into a nice rhythm like this, you'll be surprised how much armor you can crank out in just a handful of hours.

Once again, patience is a virtue here. Once your foam pieces are Barged together, they will NOT come apart without tearing, so get it right on the first try.



READY FOR COLOR

PAINTING YOUR ARMOR

In *Foamsmith Vol 2*, I dive deep into the options available for sealing your armor. We won't be doing any of that for our rush build. Instead, our armor pieces will only be base coated with [Krylon Fusion spray paint](#). Will the finish and texture be exactly what we want? No. However, good sealing and finishing could take additional *days* and we simply don't have the time.

But Bill! Won't that crack when the armor bends? It might a little bit, however this is one of those compromises that we talked about earlier.

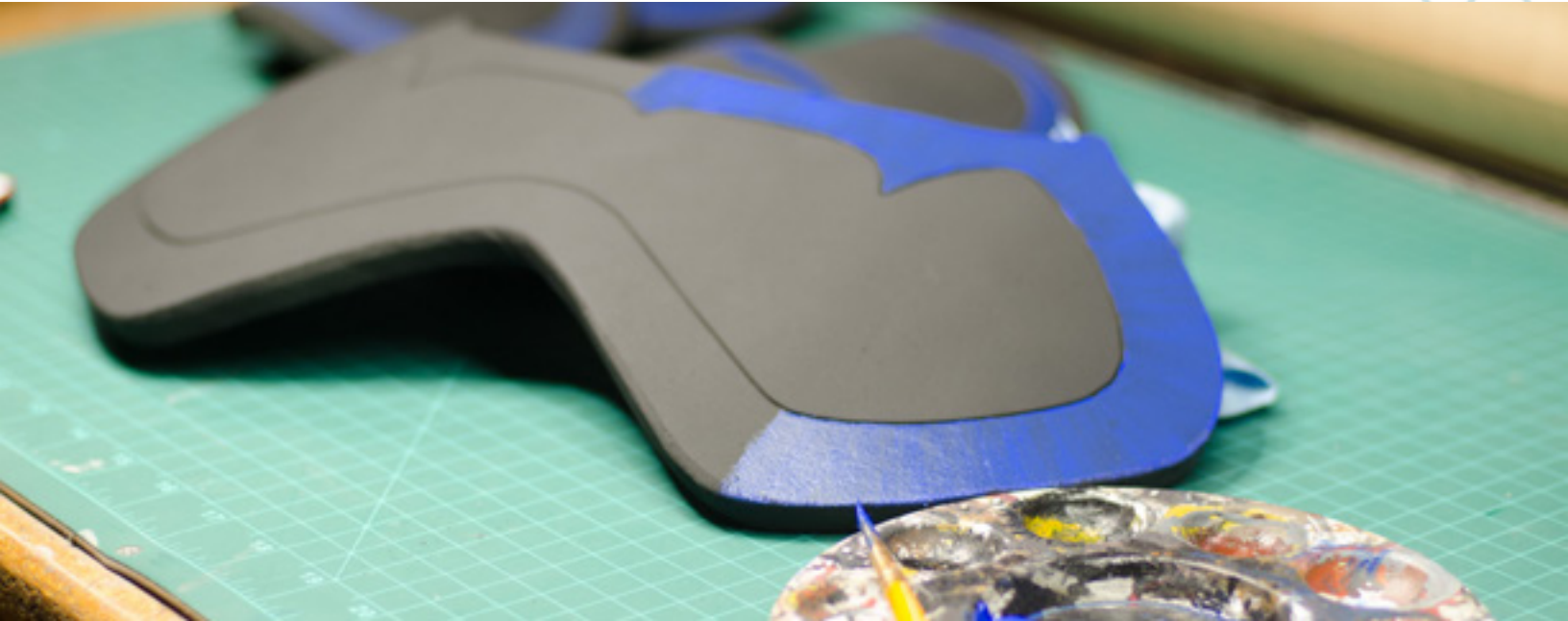


I love Krylon Fusion for foam armor. It dries extremely fast and bonds well to EVA. For the Darkmantle set I used their flat black camo paint.



If your armor as a base metallic color, I highly recommend spraying the base coat in a couple layers True Metallic PlastiDip. I haven't tried it yet myself, but I've seen some other stuff done with it and it's really amazing. Give yourself a good day to let it dry and do some tests on scraps before committing it to your final pieces.

For all of my armor, I sprayed down a flat black paint. For your build, pick the most prevalent color and go to town on everything. I prefer spraying the base coat (versus brushing) as it is the quickest way to lay down a lot of paint. Again, that Krylon Fusion is indispensable for this kind of work.



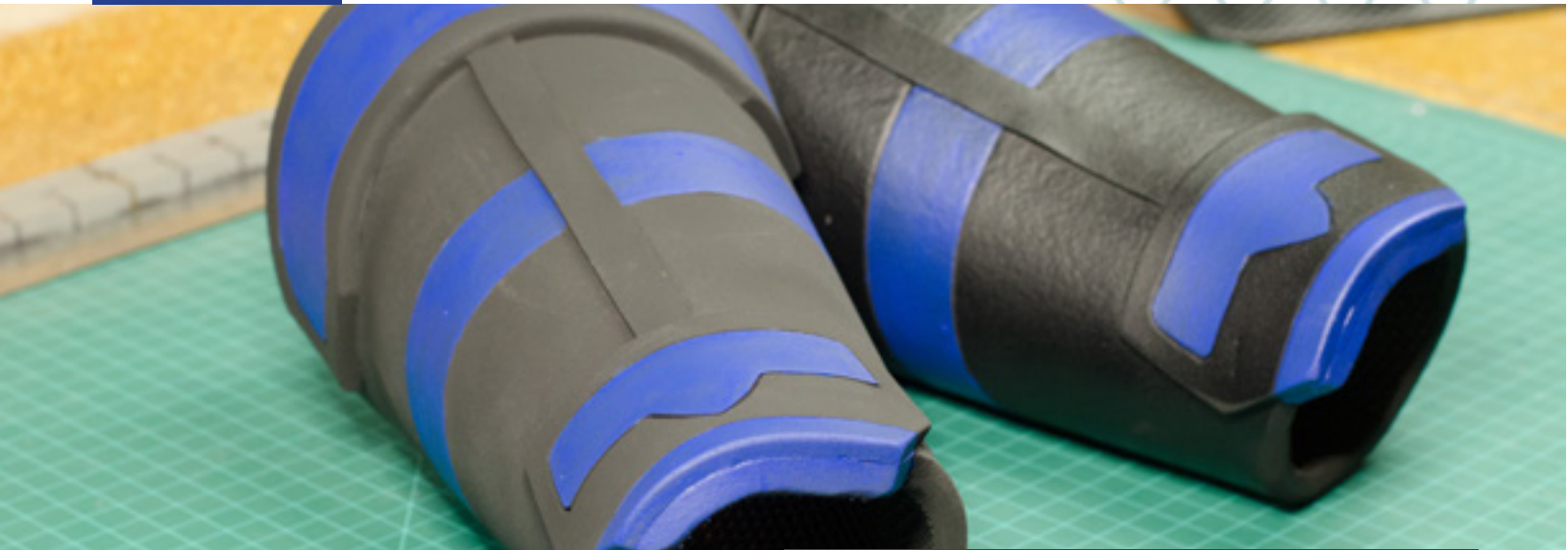
If time permits, you'll want to mask and spray any other colors of paint. For this build, I decided the fastest method would be to brush on the other color I needed (blue). This was done with acrylic paints. They fully dry in about a day and are usually fairly flexible.

After painting on your detail pieces, if you're happy with the finish, call it done and move on. In my case, I wasn't in love with the ultra flat black finish, so I sealed everything in with clear, flat PlastiDip.



Sealing with a couple layers of clear PlastiDip is a good idea anyway, if you've got a day to let it dry. This is why it pays off to plan an extra day of working time at the end of your build.

BARE



CLEAR PLASTIDIP

STRAPPING YOUR ARMOR

You're going to want to strap that armor to yourself and nylon webbing and elastic are going to be your best bets for doing so! Getting the pieces to fit you exactly will take some trial and error, so give yourself more time than you think you'll need to get it right. Fortunately, once you have the functional parts added, you usually only need to do some adjustment to get it to fit right. For this, adding more length of straps than you need and having an adjustment slide can help you out big time.

For my Darkmantle armor, making a harness that kept the chest piece in place properly was the toughest challenge. I also decided to put buckles on the shoulder straps to attach the pauldrons.



Shoulder straps will want to drift apart, especially with the weight of pauldrons on them. Add a nylon webbing strap between them across your back to keep them together.

Things to keep in mind when strapping your armor.

- Use the same width elastic and nylon webbing so that you can bulk order slides and buckles in one size for all of your strapping. For mine I used $\frac{3}{4}$ " wide straps. Order more buckles and slides than you think you need.
- Buy elastic that is as heavy weight as possible. You can get really good stuff for a fair price at craft stores like Joanne's. Buy more than you think you need.



Pin down elastic straps with pieces of nylon webbing. This will keep the elastic from stretching on the places where it's hot glued to the armor.



For fast adhesion, hot glue is your best friend. Not only will it hold your straps down like a champ, it can be melted with a heat gun for repositioning straps during the assembly process. To make sure your nylon webbing stays put, try scoring the foam with a knife and heating it up with a heat gun. This gives your hot glue something to grip on to!

Strapping your armor can be one of the most time consuming and frustrating parts of the build process, so plan your daily milestones accordingly.

UNDERSUITS

Unless you're supposed to go nude under your armor (totally possible), you'll probably want to put together some kind of undersuit. What type of garment you use varies wildly dependent on your reference material, but one constant exists: If you can buy the garment pre-made, do so. You may want to get the garment "just right", but sewing something completely from scratch can often take just as long (or longer) as making the armor.



The undersuit for my Commander Sheppard armor is just repurposed athletic clothing that I painted a texture onto.

This is one of the places where making a compromise will pay off in a big way, especially if most of your undersuit is covered by armor anyway. Want something custom? Buy a pre-made garment and modify it to your needs. For my Darkmantle armor, I bought a black t-shirt and cut off the sleeves. *Super technical* alteration, right?

My Darkmantle pants are women's yoga pants. You heard me right. They were the right color and didn't hinder my armor at all, so I went for it.



**REAL MEN WEAR
WOMENS YOGA PANTS.
APPARENTLY.**



If you desperately need something specific on your undergarments, consider simply painting details on with a fabric marker. Will it pass muster upon close inspection? Probably not. Will it look pretty good from 10 feet away? Totally! Most importantly, it's a great way to make a 10 hour job into a 1 hour job and get your costume wearable in time for your event.

SEWING



You *may* have to sew something for your costume. I know a lot of cosplayers are adept at tailoring. I am not one of those cosplayers. My best advice for novice tailors is to use patterns. Either pick up something that's close enough at your local craft store, or rip up a pre-made garment and use that to make a quick and dirty pattern.





For my Darkmantle costume, I really needed a hood and cape. The cape was fairly straightforward, but the hood presented a bit of a challenge to me. So, I cut up an old shop hoodie and used that as a pattern!

I ran out of lining cloth for the inside of the cape. Fortunately I had a planned trip to the hardware store that day and bought a cheap, black curtain that worked splendidly.



I'm kind of shocked that this only took me one try to pull off. Your results may vary.

FOOTWEAR

Again, unless your armor doesn't have any shoes (unlikely), you're going to have to handle the footwear situation. Buying "close enough", pre-made garments will save you hours of headache during the build.

Scouring the internet for something that looks as close as possible is going to be your best bet for getting the closest match in as little time as possible. This is much more time efficient than driving from store to store *hoping* they have something close. Be sure to do your online shoe shopping as early in the build as possible to allow for shipping time, especially if you have to modify the shoes at all.

For my Darkmantle armor, I repurposed an old pair of pirate costume boots that I had on hand. They worked amazingly well and, since I've owned them for years, they fit properly and were fairly comfortable.



DEM BOOTS

The *last* part of my costume that people notice is the footwear. If you're going to compromise on "accuracy" this is the place to do it.

There you go folks! A full set of foam armor finished in record time!

Again this is just one way to do it, but I've found it's the quickest way to get the best results with as little compromise to quality as possible.

This full armor build took me just under 50 hours of work (yes, I kept track, you should too) in 10 days. I even took an entire day off the weekend before BlizzCon to play video games. At no point was I stressing that I might not get it finished. I even had a day at the end to make a couple of weapons!



Thank you for reading my guide! I hope you've been inspired to get your foam armor builds started, even if you don't have much time to get them done. I look forward to seeing what we can build together. You can pick up the rest of the Foamsmith Trilogy at punishedprops.com.

-Bill Doran

