

Novice Boffer Sword

~Dagorhir Construction Tutorial ~



Bro'gar
of the House Volant
First Knight of Myrmidon

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1 Getting Started

1.1 Materials



Figure 1.1 Required Materials

Materials	Quantity
½” SCH40 PVC Pipe	32” (or any length <32”)
Ozark Trail “Blue” Camping Pad	¼ Roll
DAP Contact Cement	4oz (1/8 th of a quart can)
Duct Tape	*
Strapping Tape	*
Carpet Tape	*
Cloth Tape (any color)	*
Colored Electrical Tape	*
Cloth (any solid non-neon color)	appx. 1ft section per sword
Thread	*
(optional) Gold’s Gym Yoga Mat	*
(optional) Floor Mat Foam (#4 foam)	*
(optional) ½” x 5” Hex Head Bolt	1
(optional) Gorilla Tape	*

Optional Materials

- Yoga mat is for stab legal weapons; this is not required, but is very useful.
- Floor mat foam can be used for the biscuit and flat side layers, but not the striking layers. This will help increase the life of the weapon, but is not necessary.
- Hex Head Bolt is for counterweight; this can be shorter/longer depending on counterweight preference or the weapon can have no counterweight.
- Gorilla tape can be used instead of duct tape

Cost per weapon: ~\$7.50

1.2 Tools



Figure 1.2 Required Tools

- Sharp Cutting Knife
 - Thin blade retractable kind is recommended
- Sharpening Stone
- Scissors
- Permanent Marker
- Tape Measure
- File
- Straight Edge
 - Shown is a 1.25" x 1/8" x 36" aluminum bar. This can also be used to quickly cut strips to an exact size
- Sewing Machine
- (optional) Measuring Tape (ribbon kind)
- (optional) Chalk
- (optional) Paint Brush

2 Preparing the Core

2.1 Cutting the Core

- ½” PVC makes a good single handed weapon core, but is too flexible at longer lengths. A good typical core length is 32” or 30”, any longer will likely fail flex. The PVC also wears out over time, so a longer weapon may pass at first but will fail eventually.
- When cutting PVC, it’s best to use a pipe cutter. Otherwise cut by scoring the outside of the core then cutting through. Cutting straight through the pipe is more likely to result in a jagged edge which cannot be used for a stabbing end.

2.2 Deburr and Break Edges

- 2.2.1 Use a file to clean off any loose pieces of PVC from the inside and outside of the pipe.



Figure 2.1 Cleaning the Pipe Ends

- 2.2.2 Next break the edge around the end of the pipe so it isn’t sharp.



Figure 2.2 Break the Edge

2.3 Cap the Core

- 2.3.1 Pick the flattest end for the tip of your weapon so the tip is more stable.
- 2.3.2 Since the core is hollow, we will need to cap it off. Place duct tape in an X pattern twice so there is 4 layers of duct tape total over the end of the core. Only cap one end for now so it’s easier to tell which end will be the tip of your weapon.
- You can also use leather, rubber, or a coin taped down to cap the core as long as there is not a hard edge of the cap overlapping the edge of the core.

2.4 Biscuit Tip

- 2.4.1 Cut a circle of foam the same size as the tip of the core. This piece must be the same size or a little larger than the core. If it’s smaller make a new one to fit. This foam piece is known as a “biscuit”.
- 2.4.2 Cut a 4” piece of strapping tape and split it in half. Set aside

- 2.4.3 Place the foam circle on the tip of your weapon, press down firmly to fully compress the foam, and use the strapping tape pieces to tape it down with an X pattern. Follow by wrapping with another piece of strapping tape to secure the ends of the tape.

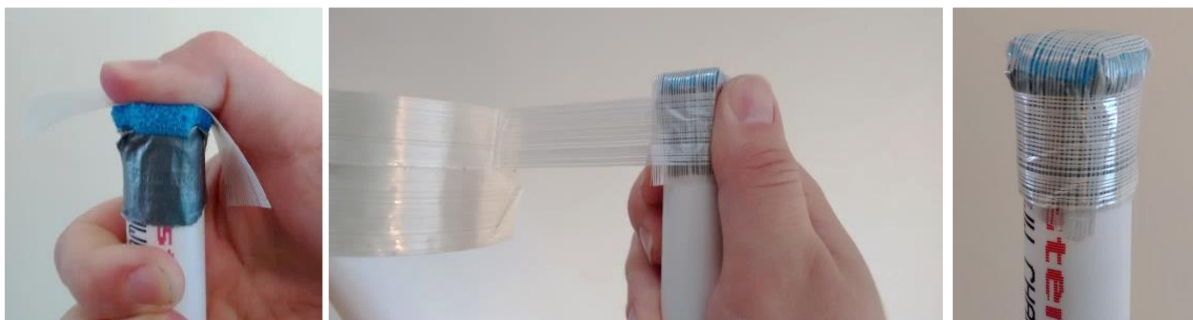


Figure 2.3 Biscuit the Tip

2.5 Mark the Handle Length

- 2.5.1 Mark 8" up from the pommel end of the sword. This allows ~6" for handle and ~2" for pommel. You can also have a shorter/longer handle if desired, as long as it is less than 1/3 the finished length of your weapon.

3 Preparing the Foam

3.1 Cut Three (3) 7/8" x 20" Strips

- These layers will be used on the inside of the weapon, so it is very important that they are straight and square or the weapon will come out curved or crooked.
- If you cut a piece that isn't very straight, cut a new piece. The foam is cheap and it is easier to cut another piece instead of trying to fix the sword after it's built.
- Once you have cut a good piece, you can also save time by using that piece to position your straight edge for the next cut.

3.2 Cut Three (3) 1.5" x 52" Strips

- Cut these strips along the long edge of the camping pad.

When you are done, you should have

- 7/8" x 20" 3 pieces
- 1.5" x 52" 3 pieces



Figure 3.1 Foam Strips

4 Striking Layers

4.1 Flat Side Pieces

4.1.1 Cut one of the 7/8" strips in half

4.1.2 DAP all four 7/8" strips and the core from the tip down to where the handle is marked. Elevate the core so it is not touching the surface, but don't rest it on the tip.



Figure 4.1 First Layer

4.1.3 Let dry for 15 minutes.

4.1.4 Lay core on flat clean surface.

Match one longer 7/8" strips with the tip of the core, overlapping by 1/8"



Figure 4.2 Placing the Side Layer

4.1.6 Lay the layer flat along the length of the core and match another layer to the other side. Make sure your core and foam layers are sitting even and straight on the surface then press them together.

4.1.7 Join the smaller 7/8" strips to the longer strips. Press up into the foam of the last layer so it is compressed as you place the smaller strip. This closes the gap between the two pieces.



Figure 4.3 Joining Foam Layers

4.1.8 Now lay the sword on its side and firmly press all of the layers together along the length of the sword to get good contact.

4.1.9 Lightly trim the corners of the foam near the tip.



Figure 4.4 Trim the Corners

4.2 First Blade Layer

4.2.1 DAP one 1.5" x 52" strip and the front and back of the sword (PVC + edges of side layer) including the tip



Figure 4.5 First Blade Layer

4.2.2 Let dry for 15 minutes.

4.2.3 Hold the strip by the ends with the non-DAP side touching and find the center of the strip.

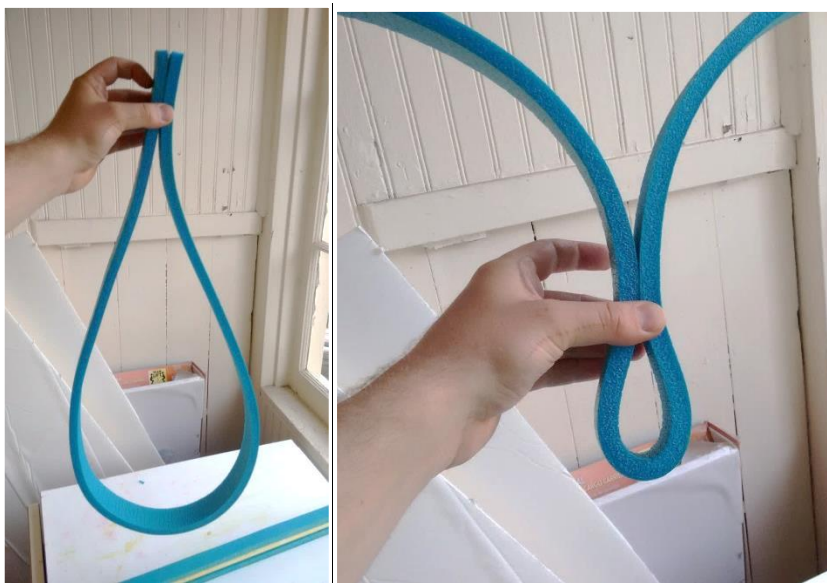


Figure 4.6 Center of First Blade Layer

4.2.4 Center the strip with the tip of the sword and place on top; do not bend yet.



Figure 4.7 Place First Blade Layer

4.2.5 Grab the foam at the sides and slightly push inward as you bend to prevent the foam from being stretched as it bends around the corner. Lightly press into place and repeat for the opposite side.

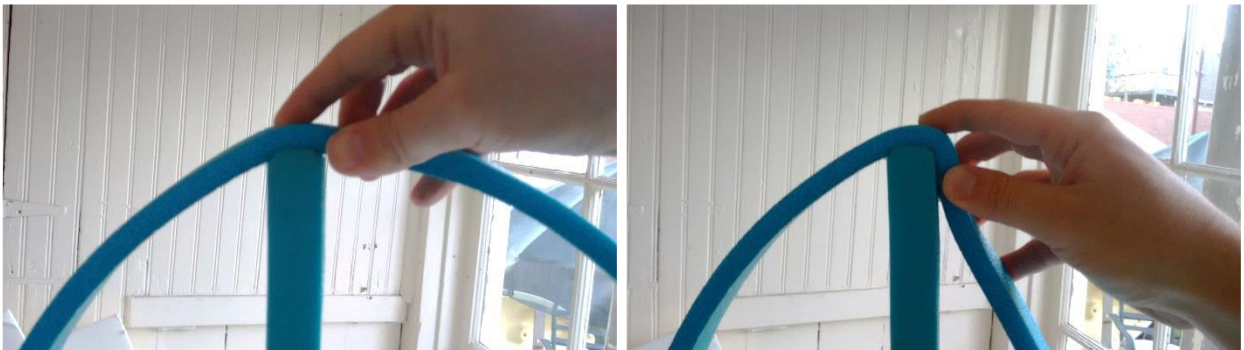


Figure 4.8 Carefully Bend

4.2.6 Slowly position each layer along the sword, aligning with the side of the sword as you go. Be careful not to stretch or pull on the layer. It helps to elevate the end of the strip away from the sword and press lightly inward and let the layer roll into place.



Figure 4.9 Placing the Layer

4.2.7 Firmly press the layers together, including at the tip.

4.3 Second Blade Layer

4.3.1 DAP the next 1.5" x 52" strip.

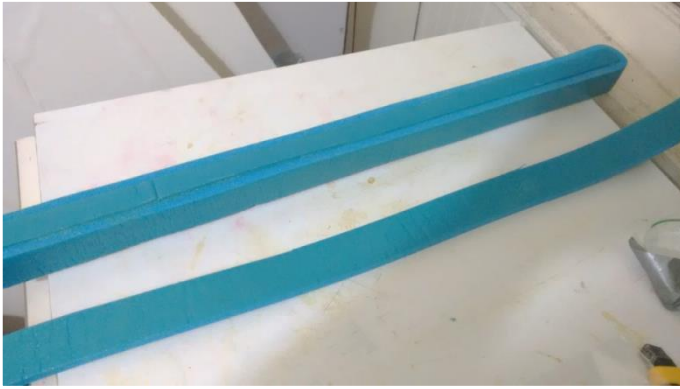


Figure 4.10 Second Blade Layer

4.3.2 Let dry for 15 minutes.

4.3.3 Place the second blade layer in the same method as the previous layer.

4.3.4 Firmly press the layers together, including at the tip.

4.4 Third Blade Layer

4.4.1 DAP the next 1.5" x 52" strip.



Figure 4.11 Third Blade Layer

4.4.2 Let dry for 15 minutes.

4.4.3 Place the third blade layer in the same method as the previous layer.

4.4.4 Firmly press the layers together, including at the tip.

4.4.5 Trim the bottom edges of the layers

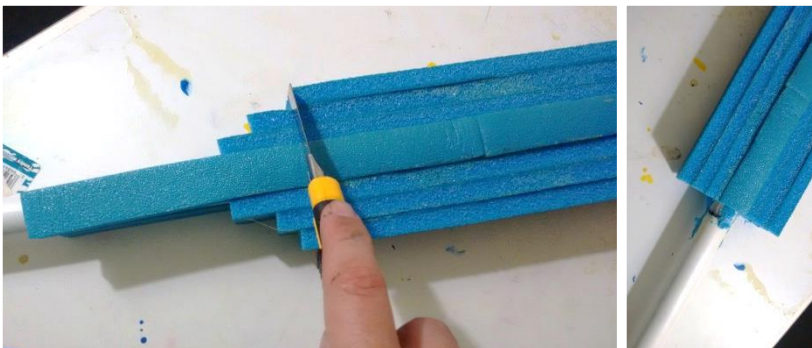


Figure 4.12 Trim Blade Layers

4.5 (optional) Stabbing Tip

4.5.1 Cut a 1.5" x 5" piece of yoga mat

4.5.2 DAP the yoga mat and the tip of the sword



Figure 4.13 Stabbing Tip Layer

4.5.3 Let dry for 15 minutes.

4.5.4 Find the center of the yoga mat strip and place on the tip of the sword in the same method as the blade layers. Let the foam fall gently and then press into place. Be careful to not stretch the foam.

4.5.5 (optional) Add another layer of yoga mat in the same method as above to have a softer stabbing tip. This may or may not be necessary depending on the chapter.

4.5.6 Sharpen your knife before the next step.

4.5.7 Trim the edge of the yoga mat to match the edge of the blade layers as shown.



Figure 4.14 Trim the Stabbing Layer

4.5.8 Cut an 18" strip of strapping tape. Don't let the adhesive side of the tape touch itself or you will need to get a new piece.

4.5.9 Center the tape over the tip of the sword, do not strap down yet.

4.5.10 Lay the tape gently around the corner of the stabbing tip so it does not compress the foam. Press the tape so it is only touching the stabbing layer as shown.

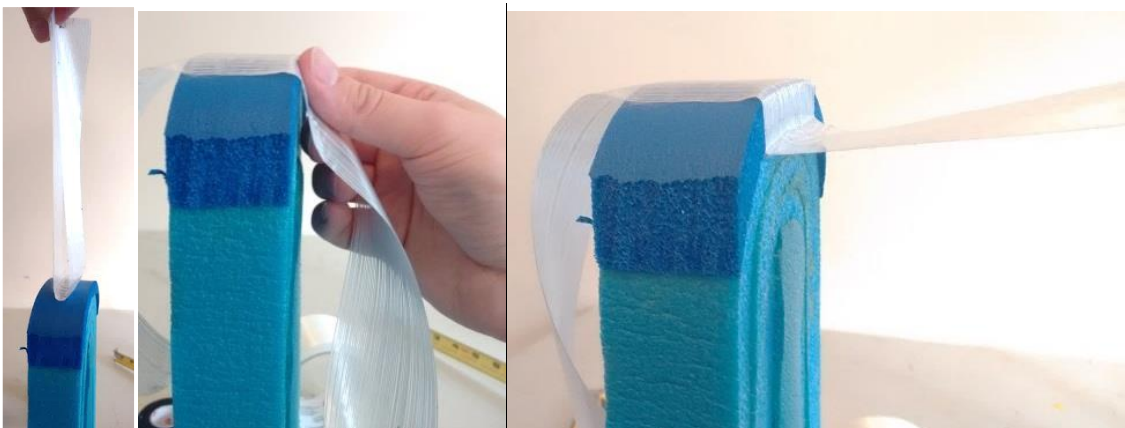


Figure 4.15 Taping the Stabbing Layer

- 4.5.11 While pressing firmly on the stabbing layer, tightly pull the strapping tape down the flat of the sword and press into place. Smooth the tape by stroking downward. The stabbing tip should not be compressed by the tape.



Figure 4.16 Securing the Stabbing Tip

- 4.5.12 Repeat for the opposite side.
- 4.5.13 Cut an 8" piece of strapping tape and split the tape in the middle so you have two 1" x 8" strips. Set one piece aside.
- 4.5.14 Find the center of one piece and place on the corner of the stabbing tip. The edge of the tape should slightly overlap the last layer.
- 4.5.15 In the same method as the first layer of strapping tape, lay the tape over the yoga mat without compressing the foam and press it against the side of the yoga mat.
- 4.5.16 While pressing firmly on the stabbing layer, tightly pull the strapping tape down across the flat of the sword and press into place. Smooth the tape by stroking downward. The stabbing tip should not be compressed by the tape.
- 4.5.17 Repeat with the other 1" x 8" piece of strapping tape on the opposite corner



Figure 4.17 Finished Stabbing Tip

5 Pommel and Handle

5.1 (optional) Counterweight

- 5.1.1 Wrap duct tape around the 1/2" hex bolt near the head of the bolt until it just barely fits into the PVC pipe.



Figure 5.1 Sizing the Bolt

- 5.1.2 Repeat for the end of the bolt



Figure 5.2 Counterweight Ready

- 5.1.3 Insert the bolt into the end of the PVC pipe until it sits flush.
5.1.4 Secure the counterweight by placing an X of strapping tape over the end. Follow by wrapping with another piece of strapping tape to secure the ends of the tape.

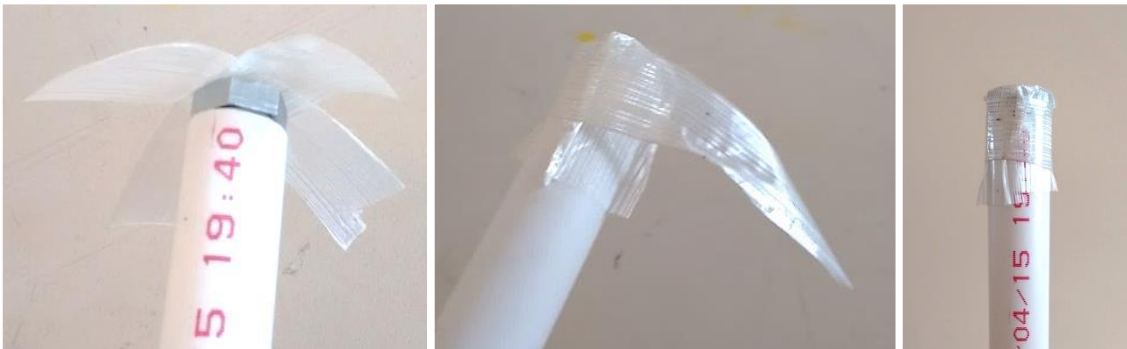


Figure 5.3 Secure the Counterweight

5.2 (optional) Oblong Handle

- The following method uses duct tape to make an oblong handle; you could also use leather strips and attach them with carpet tape.

5.2.1 Mark 1/8" from the edge on the side of a roll of duct tape.



Figure 5.4 Mark and Cut Duct Tape

5.2.2 Sharpen your knife before the next step.

5.2.3 Carefully cut across the roll of duct tape from the 1/8" mark.

CAUTION: Duct tape is difficult to cut through so cut slowly and be careful.

5.2.4 Peel the duct tape off, you should have a 1/8" thick strip of duct tape that is ~8".

5.2.5 Cut the duct tape strip into 4 pieces of 1/2" width then layer 2 pieces together to make two strips of 1/4" thickness.



Figure 5.5 Duct Tape Strips

5.2.6 Place these layers on the handle of your sword, in line with the blade, starting at the base of the foam.



Figure 5.6 Placing the Duct Tape Strips

5.2.7 Secure the strips by taping over with duct tape. Use short pieces perpendicular to the handle and overlap the tape as little as possible. You can stop taping at ~1.5" from the pommel end.

5.2.8 Mark 1.5" from the end of the pommel and cut off the excess duct tape strips.

5.3 Pommel Padding

- 5.3.1 If you did not add a counterweight, cap the end of the core like shown in section 2.3.2.
- 5.3.2 Cut a 1.5” wide strip of camping pad, about 20” long.
- 5.3.3 Wrap the 1.5” strip around the pommel end and mark where the strip crosses the center of the starting edge as shown. Then cut the strip where you have marked. Set aside.

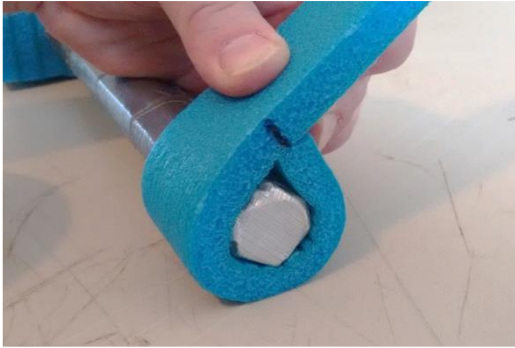


Figure 5.7 Measuring the Strip

- 5.3.4 Wrap the pommel end with carpet tape, slightly overlapping at the ends.
- 5.3.5 Remove the backing off the carpet tape and wrap the 1.5” foam strip around the pommel. Pull the ends of the strip together, they should just barely overlap, and secure with a piece of duct tape.



Figure 5.8 First Pommel Layer

- 5.3.6 Cut a circle of camping pad to match the end of the pommel.
- 5.3.7 Place a square of carpet tape on the end of the pommel then remove the tape backing.
- 5.3.8 Place the foam circle on the end of the pommel and press together.
- 5.3.9 Repeat steps 5.3.3-5.3.8, so that you have wrapped and capped the pommel twice. Use carpet tape between each layer.



Figure 5.9 Wrap-Cap-Wrap-Cap

5.4 Six (6) Duct Tape Straps

- 5.4.1 Using 1" width strips of duct tape, tape a six-cross pattern over the pommel with ~2" of tape overlapping the handle section at each end. Be careful to not compress the foam corners at the top when laying tape over the end. This is easier if you measure out the sections first and lay them from the top down.



Figure 5.10 Duct Tape Six-Cross

- 5.4.2 Squeeze the handle at the base of the pommel padding to slightly compress the base of the pommel padding and to press the duct tape against the handle.

5.5 Three (3) Duct Tape Anchors

- 5.5.1 Using 1" width strips of duct tape, anchor the pommel three times.

5.5.1.1 Place the tape on the pommel, pointing at an angle downward.

5.5.1.2 Wrap down, looping around the handle. It is important that you loop on the handle.

5.5.1.3 Continue the loop upward and wrap around the pommel at a natural angle.

- Keep the tape taunt during this process so that the anchor is tight.
- Place the three anchors at an even spacing around the pommel.

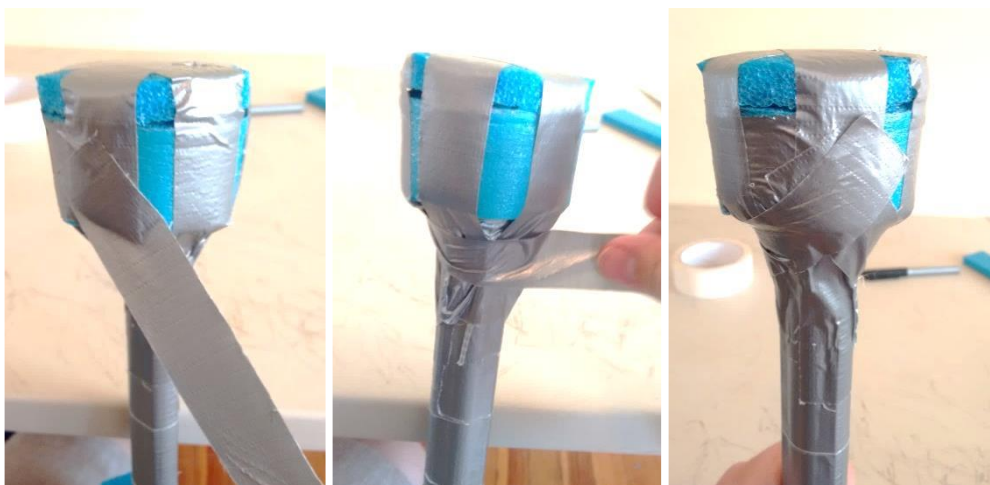


Figure 5.11 Duct Tape Anchor

5.6 Three (3) Duct Tape Torque Wraps

5.6.1 Using a full width strip of duct tape, torque wrap the pommel three times.

5.6.1.1 Place the tape on the pommel, pointing at an angle downward.

5.6.1.2 Wrap down, fully compressing the foam, and loop upward similar to the anchors. This layer should mostly cover the pommel padding and compress it as much as possible.

5.6.1.3 Continue the loop upward and wrap around the pommel at a natural angle.

- Place the three torque wraps at an even spacing around the pommel.

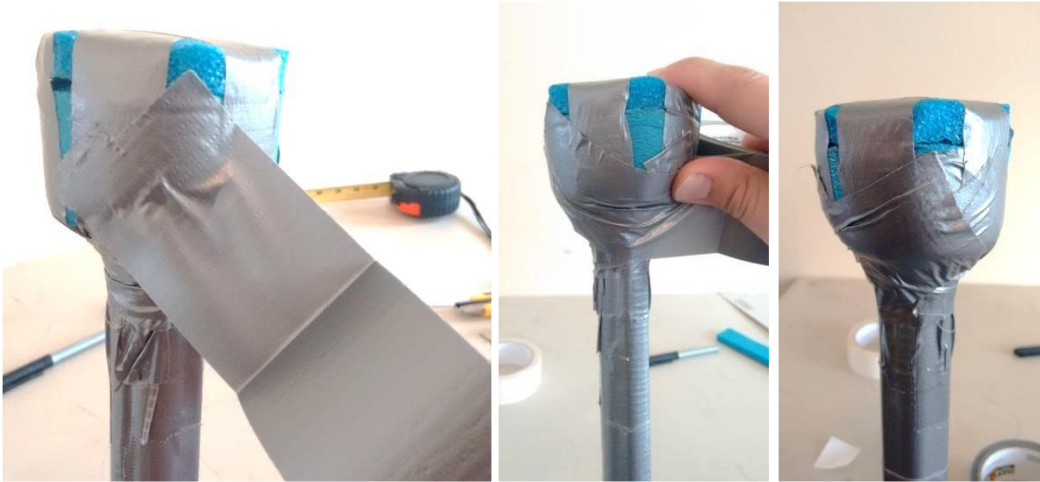


Figure 5.12 Duct Tape Torque Wrap

5.7 Cloth Tape

5.7.1 Cut a 6" square piece of cloth (any color).

5.7.2 Center the cloth on the end of the pommel and tape down with cloth tape. Tape the side of the pommel up to the end as shown.



Figure 5.13 Cloth Pommel Cover

5.7.3 Wrap cloth tape in a spiral starting at the top of the handle. It's important to start at the top because it prevents the tape from rolling up under your hand when you stab.



Figure 5.14 Wrap Handle with Cloth Tape

6 Cover

6.1 Measure the Blade

- 6.1.1 Measure the perimeter of the weapon blade, and then add 1" for hem. For this sword, the width of the cover cloth is 10.5"



Figure 6.1 Blade Perimeter

- 6.1.2 Measure the blade length allowing 1.5" extra at the handle end and rounding up to the nearest inch that passes the center of the tip. For this sword, the cover length is 28".



Figure 6.2 Blade Length

6.2 Cut Cloth for Cover

- The following method is a quick way to cut multiple weapon covers. You can also simply cut a rectangle of fabric (e.g. the cover for this sword is 10.5" x 28").

- 6.2.1 Lay your cloth flat on a wide table.

- 6.2.2 Mark $\frac{1}{2}$ the cover length (e.g. 14") from the fabric end on each side then fold the cloth over on itself across these marks, matching the edges as shown. Check the dimension of the folded cloth afterwards to make sure it is $\frac{1}{2}$ the cover length.



Figure 6.3 Cloth Folded Once

- 6.2.3 Fold the cloth again lengthwise, matching the folded edge with the end of the previous fold. This section should now be $\frac{1}{4}$ the cover length.



Figure 6.4 Cloth Folded Twice

- 6.2.4 Next measure and mark the width of your cover (e.g. 10.5”) along the top and lower edge of the fold you just made. With a straight edge, draw a line to connect these marks then cut along this line with a pair of sharp scissors. Also cut along the cloth where it is a single layer below your fold as shown.



Figure 6.5 Cut Cloth Along Line and Below Fold.

- 6.2.5 This process can be repeated along the length of the fold to cut out multiple covers of the same length.

6.3 Sew the Cover

- 6.3.1 Fold the cover in half across the width of the cover and sew the sides to make a tube. While sewing, keep the seam straight and at a $\frac{1}{2}$ ” distance from the edge.
- Don't forget to backstitch when you start your seam



Figure 6.6 Sew the Long Edge

- 6.3.2 (optional) Lay the cover flat with the seam facing up and iron the seam open. This removes creases from the cover so it will lay flat on your weapon.



Figure 6.7 Press Seam Open and Flat

- 6.3.3 With the seam centered and facing upward, measure across your cover and mark the center 1.5" as shown leaving room for the hem. For this cover this is from $1\frac{3}{4}$ " to $3\frac{1}{4}$ "



Figure 6.8 Mark the Center

- 6.3.4 Measure and mark 1" and 1.5" down each edge from the center marking.



Figure 6.9 Mark the Edges

6.3.5 Connect the center mark and the top side marking with a straight line as shown.



Figure 6.10 Connect the Marks

6.3.6 Sew along the line starting at the lower marking on one side and ending at the lower marking on the other side. Between the edge marks sew as close as possible to the edge of the cover.

- To change direction after sewing between these marks, you can lower the needle into the cloth then release the foot lever. This will allow you to move the cloth freely without losing your position.



Figure 6.11 Sew the Tip

6.3.7 Trim the excess material at the tip, being careful to not cut the hem.



Figure 6.12 Trim the Tip

- 6.3.8 Turn the cover right-side out and fit it over the blade. This should be a tight fit to help protect the weapon. Also check the tip of the cover, if there are loose sections this can be fixed by taking the cover off and resewing that section of the hem. Loose corners on a weapon will likely fail at weapon check.



Figure 6.13 Finished Cover

- 6.3.9 Pull any slack down and out of the cover then attach to the handle using cloth tape.



Figure 6.14 Tape Bottom of Cover

- 6.3.10 If you added a stabbing tip to your weapon, also mark the handle with green tape.

Your Boffer Sword is complete!

For the best weapon durability, allow the weapon to cure for one week before use.

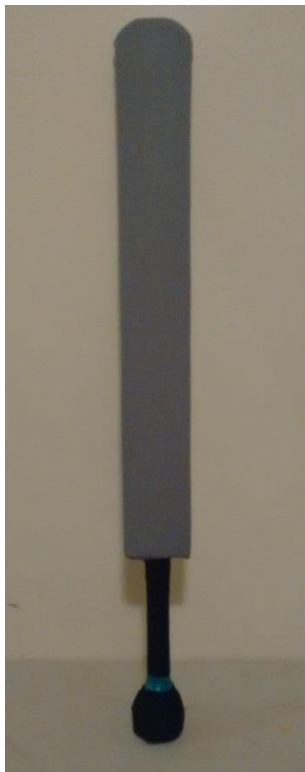


Figure 6.15 Finished Weapon

Appendix A: General Foamsmithing Tips

DAP Contact Cement

- Don't wear nice clothes when using DAP, it will not come out of clothing.
- Always DAP outside in a well ventilated area.
- DAP acts differently on different foams.
 - Blue foam will collect excess DAP on the surface, which can be scrapped off for reuse.
 - Marine foam will dry DAP very quickly.
 - Floor mat foam will absorb the first coat of DAP, so always recoat after a few minutes.
- Don't use too much DAP, there should be just enough DAP to tell that there is DAP on the surface (i.e. no dry spots). Using too much will waste DAP, make your weapon heavier, and make it take longer to dry.
- An easy way to tell if you used too much DAP on a surface is to scrape a piece of blue foam over the surface. All of the puddling DAP is excess.
- After attaching the pieces, always press the foam together along the entire surface to insure full contact.
- Don't DAP in cold or wet weather
 - DAP needs to dry to cure and it will take longer for the DAP to tack and could ruin the bond.
- The recommended solvent for DAP is mineral spirits. This can be used to clean your hands or work surfaces.
- It takes 7 days for DAP to cure to full strength. Using your weapons before this time will reduce their lifespan.

Foam

- Reverse rolling the camp pad and letting it sit for ~30mins will make it easier to work with.
- The foam has a curve based on which side was on the outside/inside. In general it's easier if you work with the outside of the roll on the outside of your weapon so the foam doesn't try to peel up.
- Keep your blade sharp when cutting; foam can quickly dull a blade so if you notice that your knife is not cutting as easily or you need to use extra force then it is time to sharpen.
 - Forcing a knife to cut is the quickest way to cut yourself by accident; a knife should cut on its own with little force, and if it's not then it needs to be sharpened.
- When cutting, use a clean flat surface and hold your knife perpendicular to the foam.
 - A sharp blade can cut through foam easily, and it is easy when going fast to get wavy or crooked cuts. Take your time and get used to cutting straight and square, this will make your foam pieces easier to build with and your final product will look cleaner.
- Use a straight edge when cutting to keep your lines straight.
- All closed cell foams have "cells", which are bubbles within the foam. A small cell size increases the durability and wear characteristics of the foam. This is why people often use "microcell" foam instead of blue camping pad. Microcell costs twice as much and must be ordered in quantity, but hits smoother and lasts longer.
- The most commonly used foam in boffers is 2lb/ft³ density, referred to as 2lb or 2# foam. This is used for the striking surface of the weapon; blue camping pad is 2lb foam. 4lb foam is used as structural support near the weapon core with thinner weapon cores (e.g. 0.5"), but it is not necessary on larger cored weapons.

Tape

- There are many kinds of tape used in foamsmithing
 - Strapping Tape - tip reinforcement, blade covering, securing the pommel
 - Duct Tape - building the grip, securing/covering the pommel
 - Gorilla Tape - same uses as duct tape, but much stronger
 - Cloth Tape - haft covering, grip covering, pommel covering, securing the cover
 - Packaging Tape - blade covering
 - Electrical Tape - weapon class marking (blue/red/green)
- Don't use electrical tape for haft covering; the foam will break down faster than it would with cloth tape.
- Don't use duct tape on the striking surface; duct tape is thick and stiff and will make the weapon hit harder.
- Some foams do not have a "skin" layer like blue foam, and using a layer of packaging tape or strapping tape over the surface will help protect it. Although in general it is better to have a tight fitting cover over the foam.
- When taping over a striking surface, tape it all or tape it none. Leaving an edge of tape over the striking surface will create a stress riser that will eventually rip the foam.