

How to Make an IFGS Foam Weapon

By Brian Booker, 2008

Introduction

You're going to design and build your own IFGS foam-padded weapon! We're not talking about something made with PVC, pipe insulation, and duct tape, either; this is a lighter, generally higher-quality, foam-padded weapon suitable for safe use in most live action games. You'll be able to customize it to suit your character, fine tune its balance and weight to your liking, and say to people "I made that!" Constructing a safe and beautiful weapon can be just as rewarding as costuming, and just as labor-intensive.

If you follow these guidelines, you'll be able to make your first foam-padded weapon quickly and easily. Where you take it from there is entirely up to you! Want to make the next Stormbringer or Grayswandir? Want to create a custom padded-wire guard to look like a musketeer? That's up to you. This guide is merely intended to provide you the basic information you'll need to make a safe, durable, balanced, and highly effective foam-padded weapon.

You'll need some tools, materials, an adequate workspace, and access to the outdoors or a well-ventilated area; with these, you'll be able to design a custom foam-padded weapon and then construct it!

Tools & Materials

These instructions assume that you wish to construct a short sword with a 36" straight blade, tapered edge, angled tip, and enclosed basket guard. To construct a long sword or other weapon type, simply adjust the required amounts of closed-cell foam, fabric covering, and core length. Additionally, you can use different widths of foam to vary the thickness of the blade, or to introduce curves and other shapes. Just keep in mind that some shapes will require hand-sewing techniques.

You'll need access to the following tools and materials (Figure 1):



Figure 1: Some of the required tools and materials

- New or high-quality scissors
- Permanent marker, medium point
- Yardstick
- Needle and thread and/or sewing machine
- Strapping tape, 1/4" wide
- Duct tape in the color of your choice, at least 3" wide
- Bottle of foam spray-adhesive
- Hack saw, Dremel tool, or table saw (a table saw is only appropriate for a bamboo core)
- X-acto or box knife with new blade; extra blades
- Graph paper or other weapon design method
- 1.25 yards or more of spandex, or a similar lightweight stretchy fabric, in the color of your choice
- Strong thread (not 100% cotton, which won't hold up well) in a color that matches your fabric
- Straight pins (optional)
- Athletic tape for sword grip (optional)
- Lead tape, or some other material to use for balancing the weapon (optional)

- Round pipe insulation for pommel padding (optional)
- 15" x 36" or larger sheet of closed cell foam, 3/8" thick (You can find this at your local hardware store, or you can use "camping foam" padding, which is closed cell foam with a slightly harder consistency. Do not use open cell foam, which is very soft and compresses too much.)
- 3" x 12" or larger sheet of closed cell foam, 1/8" thick
- Bamboo or fiberglass core, at least 44" long

Workspace

The ideal workspace for weapon construction is ventilated and has a long worktable under bright light. Access to the outdoors, or a suitable ventilated area, is required for use of foam spray adhesive. Spray adhesive is a form of glue, and should be used with care. It should not be used indoors without adequate ventilation, and all surfaces should be protected with spread-out newspaper or cardboard. When used with care in a ventilated space, spray adhesive is entirely safe; it can be washed off skin with soap and hot water.

Weapon Design

These instructions will produce a 48" long short sword, with a 12" hilt/pommel/guard and a 36" blade. If you wish to create some other type of weapon, you'll need to design it on graph paper or some other medium (Figure 2). If you don't decide what you're making before you make it, key steps could get missed or measurements might be off. So take a moment to consider the final product; watch movies or browse the internet for designs. Mankind has reinvented it countless times throughout history, so there is no shortage of designs to copy if you can't come up with something yourself.

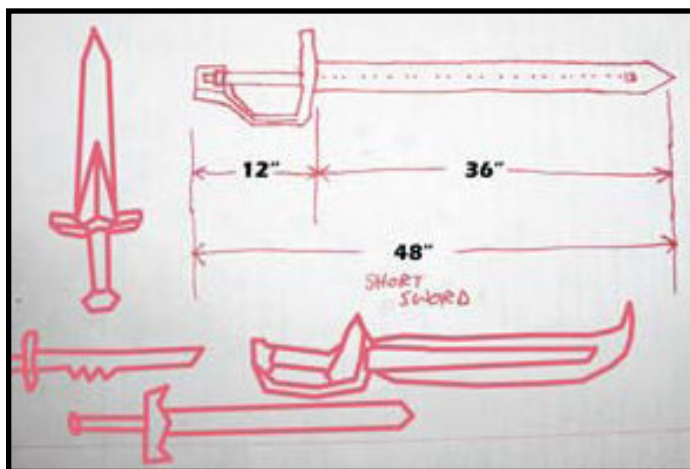


Figure 2: Sample short sword designs

First, decide which general type of weapon you wish to build; these include short sword, long sword, spear, axe, and mace. Each presents different challenges, but all are fundamentally the same in terms of construction. A mace would require much more padding, an axe would require additional infrastructure to maintain the strength of the blade, a spear requires a longer shaft that may be reinforced to reduce "whip", and swords have a wide variety of potential guards and blade shapes.

Construction

The following sections detail the process of constructing the foam weapon that you have designed. Once you have the tools, materials, workspace, and weapon design organized you are ready to go. A weapon can be constructed in as little as an hour, but may take many hours if you have an exotic design or are planning to add detailed trim to the weapon for visual effect. The following steps do not have to be followed exactly in this order, but you are likely to find that this order is logical and works well.

Prepare the Foam Blade

In this process, you will create 3 pieces of 3/8" closed-cell foam that each measure exactly 2" x 36".

1. Use your yardstick & marker to mark the short edge of your piece of foam at 2", 4", and 6" (Figure 3).

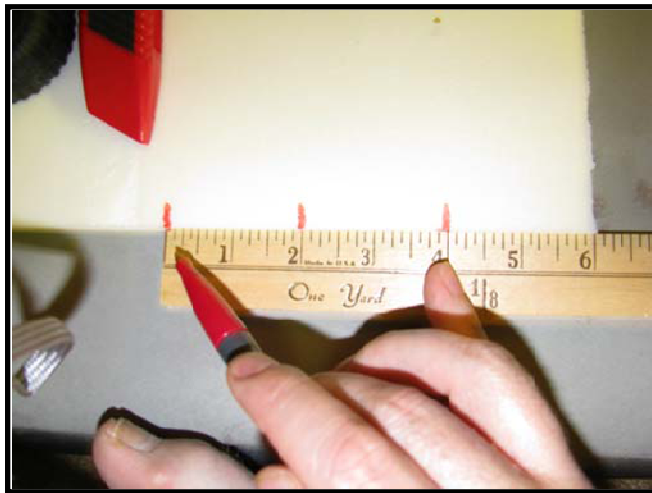


Figure 3: Mark the short edge of the foam at 2", 4", & 6"

2. Use your yardstick & marker to mark the long edge of your piece of foam at 36" (Figure 4).



Figure 4: Mark the long edge of the foam at 36"

3. Using additional marks along the length of the blade (2" apart), and a yardstick or other long straight edge, draw guidelines for three pieces of foam measuring 2" wide by 36" long (Figure 5).

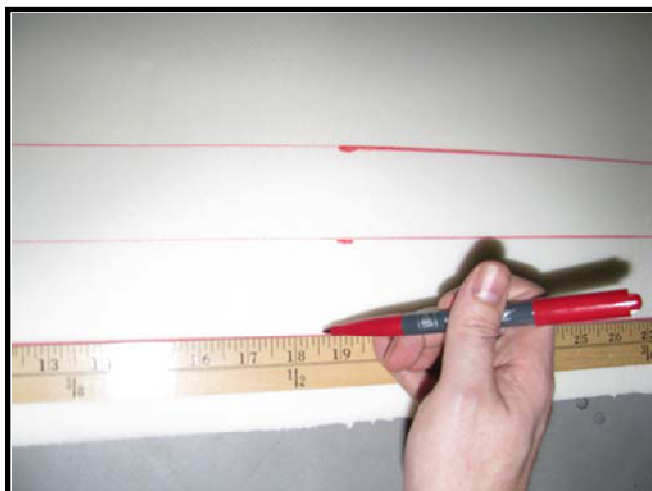


Figure 5: Add marks and draw guidelines

4. Use your scissors to cut along the lines drawn in step 3 (Figure 6).

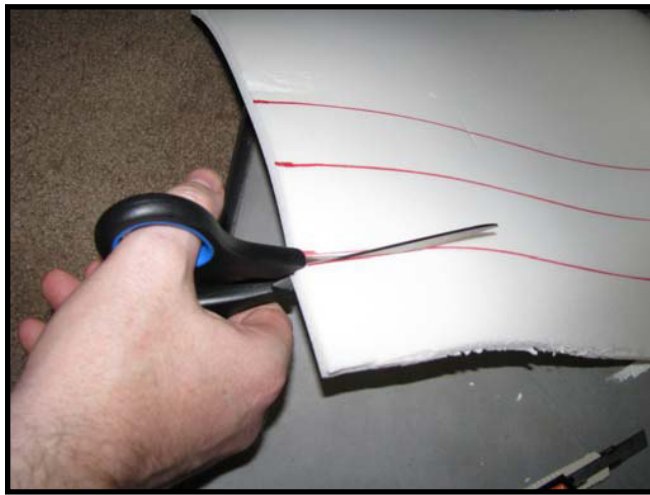


Figure 6: Cut it out!

5. Now you have 3 pieces of foam that will later be used to make your blade (Figure 7).

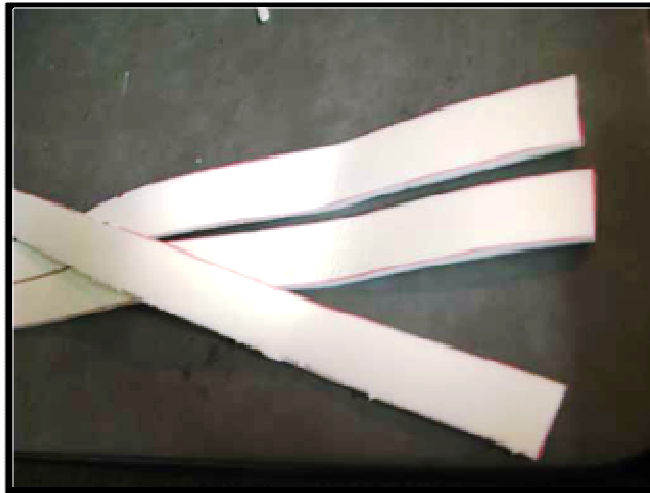


Figure 7: The measured & cut pieces of the blade

Choose a Core

When choosing a core, you must first decide whether to use bamboo or fiberglass. Either material will make an excellent IFGS weapon, and the decision is entirely yours. PVC and wood dowels should never be used to make IFGS weapons; PVC is too “whippy” and generally breaks with sharp edges, while wood dowels are not strong enough to withstand two blades striking each other with force and will likely snap.

Bamboo

You can often find lengths of bamboo at a hardware, home improvement, or gardening store. Select a piece of bamboo that is at least 48” long, as straight as possible, just thick enough to be lightweight, and not so thin that it will “whip” or bend when swung up and down quickly. Generally, appropriate lengths of bamboo are roughly between 5/8” and 3/4” in diameter. You should also inspect the bamboo for any possible cracks, as this will reduce the strength of the weapon. Bamboo doesn’t typically break in two cleanly – it normally breaks and its many fibers hold it together, making it a safer core material.

Fiberglass

The other option, perhaps more preferred by people who have access to it, is a fiberglass kite rod. You can often find these at kite supply stores or online, and should purchase a rod that is .505 inches in diameter (kite stores often call these ‘505s’). Another option is to use fiberglass or graphite golf club cores, which have the benefit of a pre-built handle.

Prepare the Core

In this process, you will use a hacksaw, Dremel-style tool, or table saw to cut your core to the appropriate length. The entire length of an IFGS short sword cannot be greater than 48” long, with a 36” blade and a 12” pommel, grip, and guard.

However, this measurement includes approximately 1.5" of padding on the pommel and 2.5" of padding on the tip. To ensure that your finished short sword will not exceed 48" total inches, you must cut the core to a length of 44".

1. Using a saw or Dremel-style tool, cut the core to 44" in length (Figure 8). If you are using bamboo for the core, you can instead use a table saw to make this cut.



Figure 8: Cut the core to a length of 44"

Create a Thrusting Tip

The thrusting tip of an IFGS sword must have extra padding and protection to ensure safe play. As an added benefit, a well-constructed safety tip can also help produce a long lasting foam-padded weapon. The tip is one of the weakest spots of a foam weapon because almost every strike causes it potential wear or tear. Consider a hard fiberglass or bamboo tip edge striking with force against relatively soft foam over many repetitions; the foam can quickly deteriorate.

In order to protect other people and the tip of the sword against years of fighting, we're going to make a custom safety tip. This extra protection on the tip will provide long-term performance and add extra padding to protect opponents from thrusting-style attacks. By using an extra layer of foam covered with strapping tape, we'll protect the foam blade from the hard edge of the thrusting tip, which would otherwise rub against the foam on virtually every strike, breaking it down over time. Strapping tape is used because it is very strong and durable, yet lighter than duct tape.

Later, we'll also add some protection to the sides of the blade tip, which is where an IFGS Safety Officer will likely check to see if the core is breaking through the foam. This extra layer of padding on the outside edges will result in a slight "pregnant tip" appearance, but the finished weapon will be safe for years.

1. Measure and mark one of your foam blade pieces at 2.5" to ensure that you leave sufficient padding for the blade's tip (Figure 9).



Figure 9: Mark 2.5" to leave as padding for the blade's tip

2. Position the core in the exact center of the marked blade piece while looking straight down at it, and use a marker to mark tightly on the foam around the core (Figure 10).

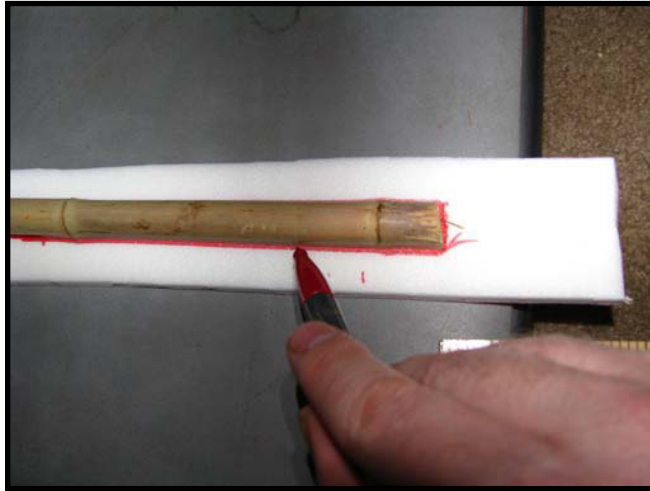


Figure 10: Trace the core onto the center of the foam

3. Remove the core, and cut out the marked center section of the foam strip (Figure 11).



Figure 11: Cut out the marked center portion

4. You now have a blade piece that can later be taped around the core to create the center of the blade (Figure 12); you should set this piece aside for use in a later step. You'll be using the foam strip from the middle in the next step, so don't throw it away.



Figure 12: The marked & cut blade piece

5. Cut a square piece of the foam strip, and position it on the tip of the core. Attach it securely to the core with lengths of strapping tape (Figure 13).



Figure 13: Attach a square of foam to the core's tip

6. Cut a 3" piece of the foam strip, fold it across the tip, and tape it securely with strapping tape (Figure 14).

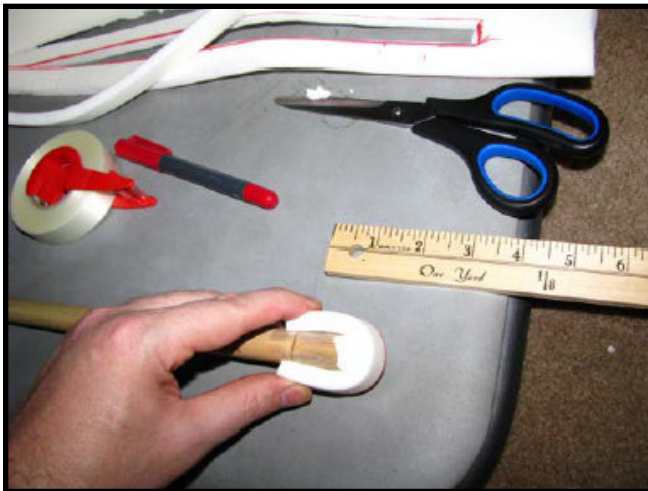


Figure 14: Fold a strip of foam over the tip and secure with tape

7. Return the core to the previously marked & cut piece of blade foam, and mark tightly around the new tip shape with a marker (Figure 15).



Figure 15: Trace around the padded tip

8. Carefully trim the foam to match the shape of the padded tip (Figure 16).



Figure 16: Trim the blade piece to match the padded tip

Attach and Shape the Blade

In this process, you'll attach your foam blade pieces to the core and each other with strapping tape and spray adhesive. Starting with the padded tip, you will first tape the core into the recently cut blade piece.

It is critical during these steps that you keep the foam centered and straight as it is being taped to the core. Get comfortable and take your time! Make marks on the core as guides if you need to. If you accidentally "drift" your tape marks over time, the resulting blade will be uneven or curled. If this happens, you can cut or carefully tear off the tape and start again; however, removing the tape may result in broken or deteriorated foam and cutting the tape will result in extra weight. So try to get it right the first time!

The split piece of foam, once taped to the core, will create a stable platform onto which the other two pieces of foam will be attached.

1. Start by securing the strapping tape to the core at a point 2" below the padded thrusting tip. Without cutting the tape, wrap the tape out around the edge of the blade, across the bottom of the blade, up and around the other edge and then back across the core (Figure 17). You should make a complete loop, but no more. Do not wrap the tape too tightly, or you will create divots in the final blade edge.

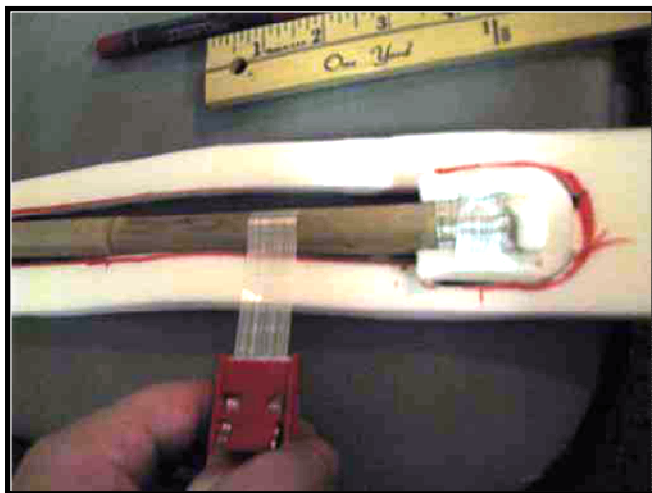


Figure 17: Secure the blade to the core with strapping tape

2. Continue taping the blade to the core in this manner, leaving between 3 & 5 inches between the pieces of tape (Figure 18).



Figure 18: Continue to add tape every 3 to 5 inches

3. Cut two pieces of 1/8" thick closed-cell foam, approximately 1.5" x 2" each. Use strapping tape to attach one of these pieces to the blade, entirely covering the thrusting tip and extending up slightly onto the blade foam above it. The strapping tape should extend to within 1" of the end of the blade foam, and continue onto the core below the thrusting tip. Repeat this step on the back of the blade. After both pieces of 1/8" foam are loosely attached, secure them with an additional piece of strapping tape that is wrapped entirely around the blade (Figure 19). This creates an extra layer of padding on the side of the blade tip that will help prevent the tip from breaking through over time. Don't worry if it looks odd at this point, when the blade is complete the foam will compress and look more natural. Again, make sure to keep the foam tip as level and centered as possible.



Figure 19: Attach 1/8" foam to cover the thrusting tip

4. Spray a liberal amount of adhesive onto one entire side of the taped core and blade (Figure 20). Remember, spray adhesive must be used outdoors or in a well-ventilated area, preferably against a throwaway background like newspaper or cardboard.

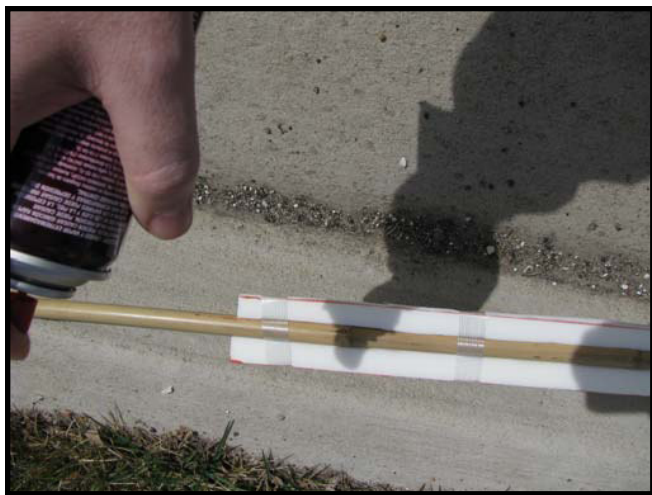


Figure 20: Apply spray adhesive to one side of the core & blade

5. Spray a liberal amount of adhesive to a single side of each of the two remaining blade pieces (Figure 21).



Figure 21: Apply spray adhesive to one side of each blade piece

6. Carefully align and attach one of the (now very sticky!) blade pieces to the core & blade, starting at one end and aligning and pressing together as you go, working all the way down to the other end (Figure 22). Don't worry if it's not exactly perfect, but do your best to align them (looking down from above).



Figure 22: Attach one blade piece to the core & blade

7. Spray the other side of the core & blade with adhesive, and repeat this step for the other side (Figure 23). Continue pressing and holding down on any section that tries to separate. Repeat this process for as long as necessary during construction and eventually the foam adhesive will dry together enough to hold in most cases. Don't worry about appearances at this point – later, the blade's fabric covering will compress and average out any irregularities.



Figure 23: Attach the final blade piece

8. Using a straight edge and marker, draw a pointed tip for your blade. Be sure to stay as close to the end of the foam as possible, to ensure that the thrusting tip has sufficient padding (Figure 24).

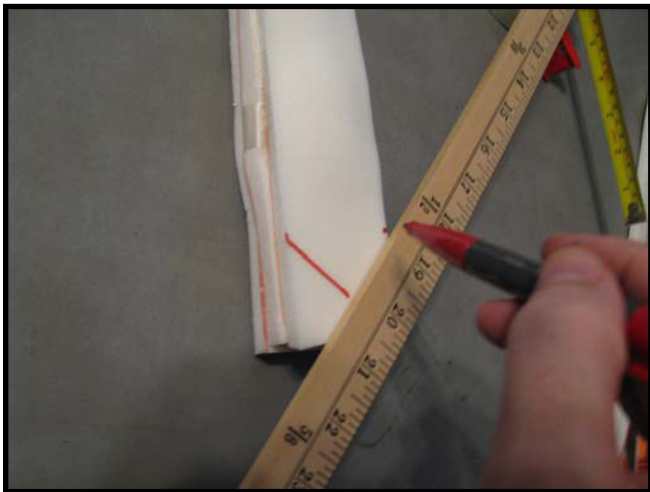


Figure 24: Draw an angled tip for the blade

9. Using an X-acto or box knife with a sharp blade, cut through the layers of foam along the lines (Figure 25). Make certain to look down on the cut from above as you are cutting it – looking at it from any other angle may result in a cut that is not straight up and down. Be extra careful while using razor blades, and keep your fingers away from the cuts! Remember to press and hold areas where the foam may begin to separate. The blade will conform to a nicer and nicer shape as work progresses.

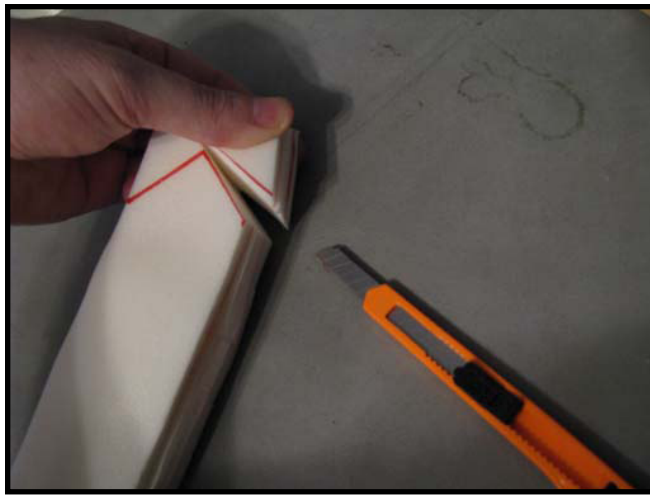


Figure 25: Cut the angled tip with a sharp blade

10. Now we need to cut bevels into the outside layers of foam, using the inside (core) piece of foam as a guide. Cut a beveled-edge into all sides of the tip (two per side) at a 45-degree angle; don't cut much, if any, into the core foam (Figure 26).



Figure 26: Cut a beveled edge into the outside layers of the tip

11. Our blade is finally taking shape (Figure 27)!



Figure 27: The beveled tip

12. Now you'll repeat this process for the long edges of the blade. Take your time, and make certain you have an ample supply of new razor blades. Razor blades cut closed-cell foam very easily for about a minute, and then quickly get dull. Once a blade is dull, you have to force it through the foam, resulting in jagged cuts, bad angles, and potentially damaging cuts into the foam blade. So as soon as you notice that the razor blade is getting dull, replace it and continue. Remember to use the inside (core) foam as a guide, and cut at 45 degree angles (Figure 28). Keep your fingers away from the cutting area.



Figure 28: Cut a beveled edge into the outside layers of the blade

13. Bevel all angles of the sword blade as shown (Figure 29). Don't worry if it appears rough or doesn't conform exactly – when the blade “sock” is placed over the sword, it will conform and average out the shape.



Figure 29: The beveled blade

14. Notice the center of gravity (balancing point) for this blade is pretty far from its base (Figure 30). We'll be able to adjust the balance of the blade later. Now we're done with the blade portion of our sword except for the sock.

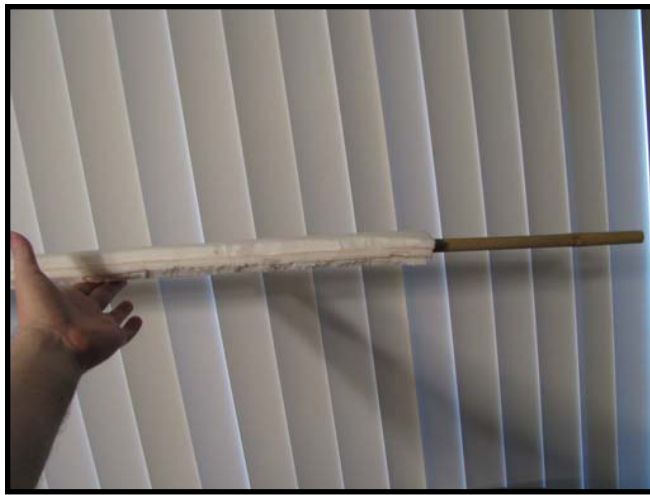


Figure 30: Current balance of the sword

Create the Sock

In this process you'll create a fabric covering, or sock, for your sword. Not only is this sock an IFGS safety requirement, it will protect the weapon's foam from some of the normal wear and tear.

You'll need a piece of light, stretchy, non-abrasive fabric measuring at least 6" wide and 40" long. Spandex is best for ultra-light blades, but for this blade I chose a thicker stretchy fabric that has a matrix of shiny silver on one side. It gives the blade a true metallic look while still providing stretch and a non-abrasive surface. It just comes at a cost – its weight. Always consider the weight of a fabric, as it can greatly affect the balance of your weapon.

You will need a sewing machine or needle and thread. In terms of sewing, creating a sword sock is about as simple as it gets!

1. Measure, mark, and cut a 6" x 40" rectangle of fabric.
2. Fold the fabric in half along its length, with the right (silver, in this case) sides together. Later, when sewing is complete, you will turn it inside out again before putting it over your blade. This results in a clean appearance without visible seams and thread knots. Pinning the folded fabric at a few points will help to ensure that things don't slip later while you're sewing. Mark one end of the fabric with the angle of your trimmed blade tip, allowing $\frac{1}{4}$ inch on the cut edge for the seam.
3. Sew a line (medium "V" style, medium tension if you have a machine; loop if you are sewing by hand) down the cut edge of the sock, about $\frac{1}{4}$ inch in from the edge. Make sure to use strong thread that can hold up to combat impacts. Don't use common, weak cotton thread – find something stronger. Sew along the marked angle for the blade's tip.
4. Turn the sewn sock inside out. Carefully, starting from the tip downward, stretch the sock over the foam blade about 6 inches at a time (Figure 31). Do not apply too much force or you might break your threadwork. I prefer to place the sewn edge of the sock at the top of the blade (most strikes are downward and this will help ensure your threadwork doesn't break during combat). It also helps produce a smoother surface for when you're hitting other people. If you haven't yet decided which edge of the blade is the top, just remember to take it into account when adding your guard and hilt.



Figure 31: Carefully stretch the sock over the blade

5. A shiny blade (Figure 32)! Unfortunately, due to technical difficulties I was forced to hand sew the sock. This resulted in somewhat uneven edge (even turned inside out). A sewing machine can make a perfect, almost imperceptible line.



Figure 32: The completed and covered blade

6. Notice the extra padding on the tip (Figure 33). While some people might skimp on this padding, this is a blade that will pass years of safety checks.



Figure 33: View of the well-padded tip

Create and Attach a Guard

In this process you'll add a guard to your blade. As with the overall design of your weapon, you can reproduce almost any type of design.

A katana-style guard is one of the simplest to make. Simply cut out a circle or square (perhaps 2 pieces of foam sandwiched around some wire to strengthen it), cover it in duct tape and slide it on.

You can wrap thick wire with foam, tape it, shape it to be almost anything you want, and then add additional foam padding and duct tape to areas that could potentially hit someone (like the outside points). It's areas like this that a Safety Officer will usually check for sufficient padding.

This sword, which was made with bamboo that is slightly thicker than normal, will make an ideal off-hand blocking weapon; therefore, we'll give it a full basket guard. If I were making an "ultra-light" sword for speed, I would use a thinner, lighter core like fiberglass, and create a lighter guard. This guide will show you how to make one kind of enclosed basket guard, although you can create any type of guard that you desire.

1. Grip the blade, with your thumb extended along the core for support. Align a larger-than-needed rectangular piece of 3/8" closed-cell foam with the core, and mark the size you want your basket guard to be (Figure 34).



Figure 34: Determine the size of the basket guard

2. Using an X-acto or box knife, carefully cut two small, centered holes for the core (Figure 35).



Figure 35: Cut small holes for the core

3. Cut out the guard that you've marked, slide it onto the core, and test it out (Figure 36)! This is just big enough to fit my hand with gloves on.



Figure 36: Put it on the core and test it out for size

4. Use your marker to mark the size and shape of a side protection panel (Figure 37).

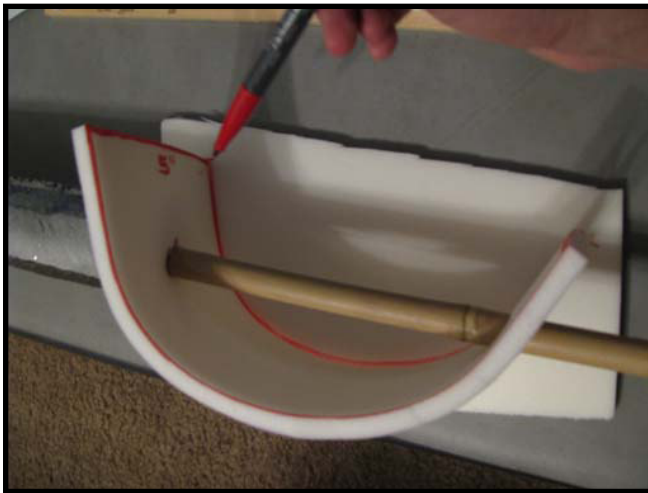


Figure 37: Mark a side protection panel

5. Cut out the marked shape, and then use it as a template to trace a second one (Figure 38).

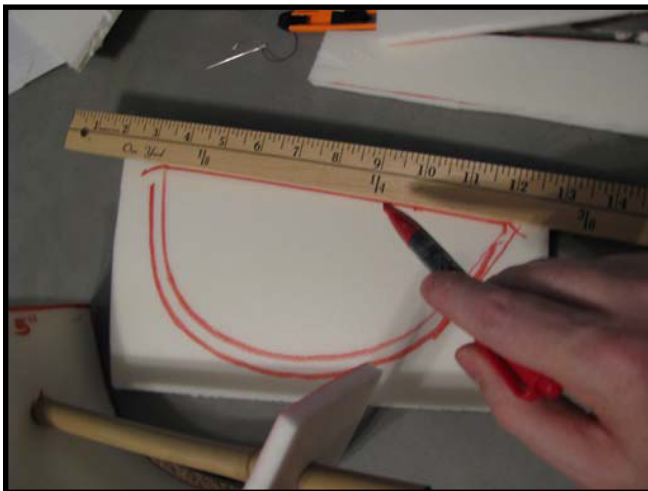


Figure 38: Use the first side panel as a template for the second

6. Completely cover the three basket pieces in duct tape (Figure 39). I prefer to do this with lines of tape all facing the same direction. When this tape overlaps an edge (even a curved edge), I make slices up to the edge with a razor blade and then wrap the tape around the foam – always at a 90-degree angle. This way, you don't have any seems or creases in the tape, which creates a smooth surface and has a more professional look.



Figure 39: Cover the guard pieces with duct tape

7. Assemble the basket on the core (Figure 40), starting with the long curved piece first, and then attaching the side panels last. Make sure to tape multiple strips of duct tape from the foam pieces to the core at different angles.

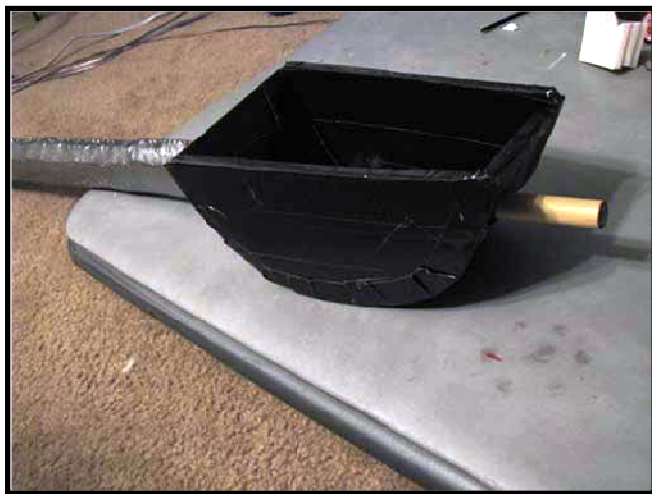


Figure 40: Assemble the guard and attach it to the core

8. Once you have secured the guard pieces to the core and each other, you should add duct tape to the handle where your hand will rest. Some people like to add extra width by attaching something like Popsicle sticks or pieces of split bamboo, or simply wrap additional tape around the core to make a larger and more manageable handle. I always like to add a final layer of athletic tape to the grip to ensure the best grip possible.

Fine-Tune the Balance

This process is entirely optional. If you like the way the sword feels now, skip this process and finish off the pommel without extra weight.

Because I decided to create a heavier blocking sword, with a center of gravity close to the hilt, we'll add lead tape (or some other heavy material than can be safely applied to the pommel) to adjust the balance.

1. Wrap lead tape around the core until the sword is balanced the way you want it (Figure 41). Alternatively, you can use some other heavy material if you can find a safe way to apply it. Lead tape is safe if used properly – just don't get it into your mouth or eyes, and wash your hands immediately after use.



Figure 41: Wrap the core with lead tape to adjust balance

2. Cover the lead tape with duct tape, and secure the duct tape to the hilt and core from various angles. This will ensure that the lead tape stays secure over time, and also that no one will ever come into contact with it.

Pad the Pommel

In this process, you'll create a padded pommel on the bottom of the sword. This is another part of the sword that is typically checked by the Safety Officer for sufficient protection.

1. Cover the core (and any weight you have applied) with foam. Extend the foam at least 1 1/2" beyond the core. I use round pipe insulation foam and then stuff the inside of it with scraps of the 3/8" blade foam we used previously (Figure 42).



Figure 42: Cover the pommel with foam

2. Measure the guard and pommel, and make sure you are within the 12" limit allowed by the IFGS. This one turned out just under 12" (Figure 43). Now secure the pommel to the guard with duct tape, attaching multiple strips of tape from the pommel to the guard to ensure a long-term adherence. Completely cover the entire pommel with duct tape.



Figure 43: Make sure the guard & pommel aren't longer than 12"

3. Congratulations! You just made a foam-padded short sword, suitable for us in an IFGS event or weapons practice. Notice the center of gravity of the final blade has moved down toward the hilt (Figure 44).



Figure 44: The completed and balanced sword

Add Trim and Options

Now that you have a completed weapon, you can take the design even further by applying symbols, trim, gilding, embedded gems, and other creative additions that make the sword unique to your character. Just make sure it's going to pass a Safety Officer check – nothing that could touch another player can be abrasive or sharp.

Now that you've successfully built a sword, you will be able to make any type of IFGS foam-padded weapon. By applying the principles from this guide in different ways, you could even make a spear (Figure 45).



Figure 45: Applying this guide to construction of a spear

Safety and Maintenance

All IFGS foam-padded weapons must be inspected and approved by a designated safety officer prior to use in any official event. If you have any questions about weapon safety, contact your local chapter safety officer or visit <http://www.ifgs.org> for additional information. The following suggestions will help to extend the life of your foam weapon:

- Always rest your blade pommel-side down, not tip-side down
- Never leave your weapon inside a hot car – the foam, duct tape, and adhesives will break down in the heat and shorten the lifespan of your blade
- Remember that a light tap causes just as much in-game damage as a hard hit, and will cause less damage to your blade. A hard swing with “follow-through” can introduce forces on your blade that may crack or break it if your opponent swings the same way and your blades meet.