Alternative
Combat Arrow
Construction Manual

Being the Manual of the procedures for the Ministers of Archery and populace within the Adrian Empire
Created during the reign of Their Imperial Majesties, Sir Eric the Awful I and Dame Elisabeth Grey I
And the reign of Their Royal Majesties Sir Vilhelm Von Seiken and Dame Maedb Hawkins Drakonja, King and Queen of Esperance
Being the year fourteen anno Adriano

By:
Squire Connor O'Riordain.
And
With the help of Greylond Winter of Avernus
Original Manual created by:
Second Skin Designs for the use in the LARP organization.
http://www.here-be-dragons.demon.uk
Re-written and revised for use in the Adrian Empire by Squire Connor O'Riordain

What do we need from an arrow usable Adrian combat? Firstly, and most importantly we need an arrow design which is as safe and durable as possible. Secondly, we do not want to compromise the accuracy of the arrow too greatly with over bulky head designs. We want an arrow that is as accurate as we can possibly shoot. Lastly we want it to be fairly cost effective. Why? Arrows get broken, usually under foot in combat situations. Ready made arrows become expensive, especially if you tend to have a breakage rate of 50%+ per war! They are fairly time consuming to make, and therefore retail at a high price from manufacturers. Many people want to make their own arrows anyway, and many others have to for the above financial reasons. If you can make your own safely and correctly, it will only cost you the price of the materials, and you will be in a position to make new ones whenever you want (and it can be fun!)

In any live combat environment, there is only one safe size for an arrow point to be, and that is large enough to prevent a hit in the eye from being detrimental to that most precious part of the body. The most appropriate size I have found is around 50mm (2" inches) in diameter. If the head is any larger than that, it simply slows down the arrow and spoils its accuracy; Any smaller, and the head becomes a dangerous size for eyes. For this reason, I cannot recommend a head diameter any less than 40mm minimum.

The head of an LRP arrow must be soft enough for a close range shot not to damage delicate areas of the body (to account for unforeseen accidents). It must be constructed to be robust, long lasting, and eliminate all possibilities of the arrow shaft punching through the foam to the outside world. If this were to happen, the possibility of someone being impaled by an LRP arrow would be very real indeed! This must be avoided at all cost as the future of the hobby depends upon it.

IF YOU CAN'T BE BOTHERED TO MAKE YOUR ARROWS CORRECTLY AND WITH CARE...DON'T BOTHER MAKING THEM AT ALL

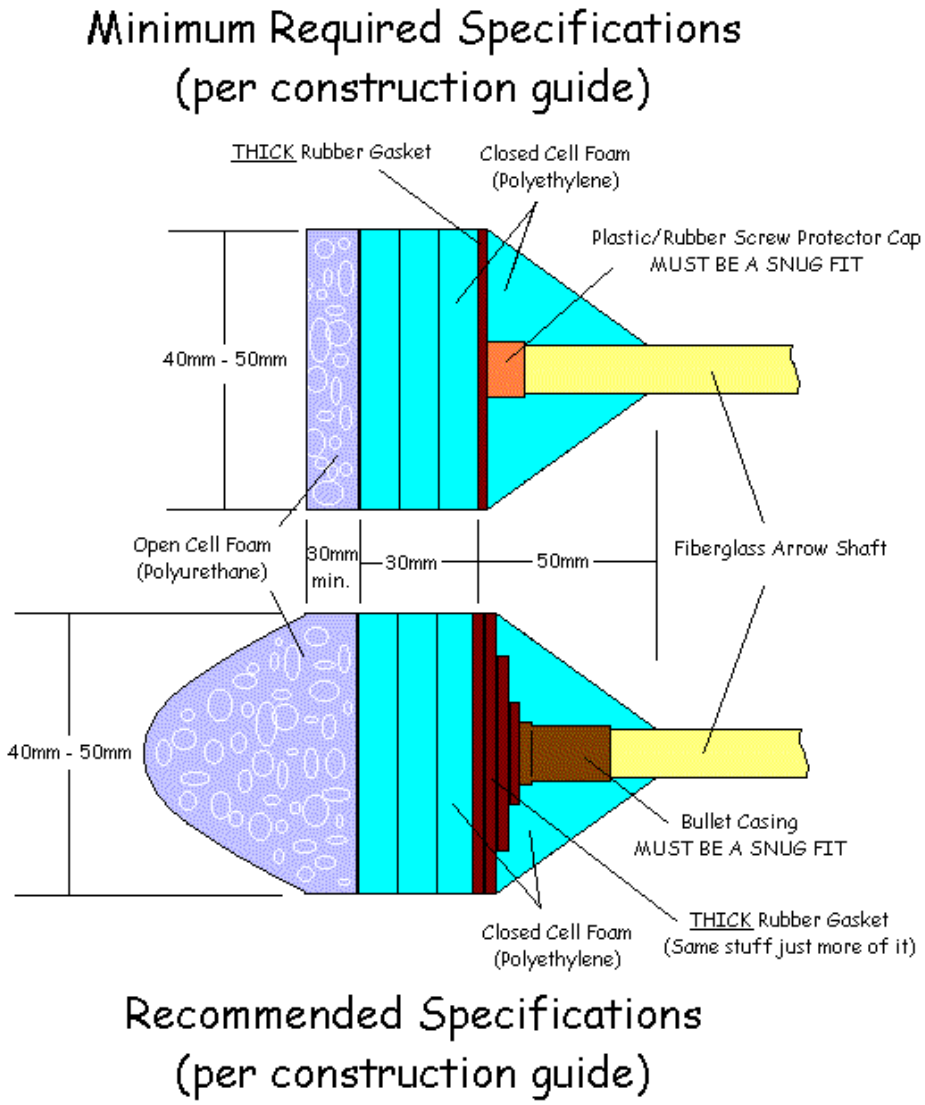
For the sake of this guide, we will call the foam point on the end of the arrow that we are going to make - THE HEAD. This way nobody can get too confused about sharp points, foam points etc! In most cases I will be referring to arrows in LRP, but of course, much of the following information is equally pertinent to crossbow bolts also.

Incidentally, if you have never shot a bow before, why are you reading this? Please, for the sake of everyone concerned, take some lessons from someone who knows what they're talking about with respect to archery before you start shooting at people with LRP arrows! Oh, but please, don't fall for the old classic of "I'm a trained instructor". Use your judgement when choosing a mentor; certificates and courses are all very well, but they're a poor substitute for aptitude and common sense.

To be a safe archer, you need to be a competent archer. Knowing one end of a bow and arrow from the other, and being able to generally hit what you're aiming at is competent. Hanging great big stabilizers and sights off a £300.00 bow in fancy competitions does not necessarily mean you're competent; it means you're rich! Shooting a bow is not as easy as shooting a gun. It will take you a little time to get the hang of it, but if you're keen enough, you'll grasp the concept soon enough...Have patience, and have fun.

REMEMBER, YOU ARE RESPONSIBLE FOR YOUR OWN ACTIONS! IF YOU ARE IN DOUBT ABOUT ANYTHING...CHECK IT OUT! - PLEASE FEEL FREE TO CONTACT ME FOR ADVICE

Nothing in this world is guaranteed. Bows and arrows are killing tools and must be treated with the utmost seriousness and care. Once you let that arrow fly it's out of your hands, and no matter how good you are at archery, fate will play it's part one way or another.



As you can see there is a minimum and maximum requirements for construction. I would like to see everyone strive to build to the maximum specs. As stated before. If you can be bothered to take the time and make these properly, don t bother making them at all.

Combat Arrow Construction Guide.

These arrows, when made properly, will be more durable and have better flight characteristics than the current, golf tube and tennis ball arrows we have now.

IMPORTANT PLEASE READ! The marshals will be tasked with the responsibility to weapons checks to ensure the safety of the arrows. Any cracked and/or nicked arrows should be removed from the field as they create stress raisers, which will increase the likelihood of breakage. Furthermore, the Marshall is responsible for checking bows for their draw weight. This is usually found written on the bow somewhere. The Marshall should not allow a bow with a draw weight heavier than 35lbs at 28". These arrows have been tested in a safe environment with a bow that had a 45lbs draw and although they were still safe, hit pretty solidly. Safety First!

The arrow shafts can be made or bought at a local archery store. The arrow shafts must be made of fiberglass NO EXCEPTIONS! If you do buy whole arrows be sure to cut the arrowhead off. Kind of pointless to build a safe arrow if you leave the arrowhead attached! Be sure that the end of the shaft is flat with no sharp edges to it. This manual is written with the minimum specifications in mind which are sufficiently safe. However, maximum efficiency is encouraged and are included here. I encourage you to build them to the maximum specifications.

There is 2 different types of foam we will be using to construct the arrows. The first type is known as polyethylene foam. It is a very common material in camping mats. It is rubbery in texture. This foam is the main bulk of our arrow as it is medium soft, resilient, easy to carve and hard wearing. If you can find it from the manufacturer, it would be ideal to buy the foam in 25mm thick sheets. Camping mats made of polyethylene are usually 10mm thick.

Creating an arrowhead with Polyethylene sheets

First and foremost before you cut the foam, you MUST attach a blunt cap to the end of our arrow shaft. Make sure the cap is a tight fit. Glue on the cap with some contact adhesive or hot glue. Ensure that the cap is secure and pushed on fully. The cap helps to spread the load exerted on impact against the inside face of the foam. It also eliminates any potential sharp edges on the end of the shaft and increases the gluing area of the foam. Plastic caps are ideal as they don't add any weight to the arrow, thus maintaining it's flight characteristics. There is one advantage to using rubber blunts. Provided the blunt is glued down, when the foam is built around it the likelihood of anyone be impaled by that arrow, if the foam were to fall apart is very slight indeed. Better to get a bruise than have vital organs punctured.
For maximum efficiency a bullet cap is the best. Whichever kind of cap you use, please make sure the cap is a snug fit. Caps that are too big for the arrow shaft can adversely alter the characteristics of the arrow and could potentially make them dangerous.

NEVER EVER build the foam heads around an unglued blunt. If the arrowhead is removable by hand, it stands to reason that it can be removed during flight!!

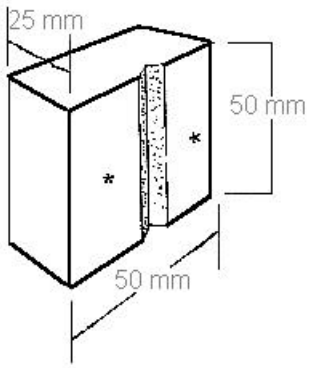
To build the head you will need a ball point pen, steel ruler and a craft knife. The knife should be one of those that has the extendable blade. A knife sharpener is a must as well, because as you start cutting the "rubberness" of the foam makes it more and more difficult to carve, causing mistakes.

If you have a sheet of 25mm thick Polyethylene foam, cut out 3 50mm blocks.

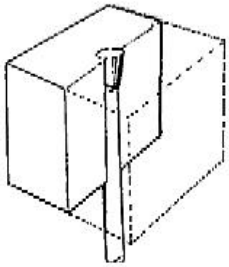
If you have 10mm thick Polyethylene foam in the form of the camping mat, cut out 9 50mm blocks. Using contact adhesive glue the blocks together in groups of 3, you will then have 3 blocks of foam 30mm thick.

Set aside 1 50mm block, you will be left with 2 50mm blocks. These will be the sides of the conical arrowhead, the third piece that was set aside will make up the padded head. With your craft knife cut a "V" groove the width of the arrow shaft and half as deep in the middle of these 2 blocks. This will provide a location joint for the 2 halves to glue on to the shaft.

Now turn on your hot glue gun.

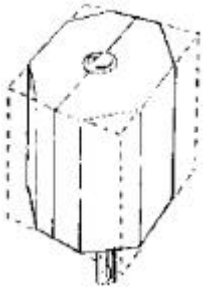


Once the glue gun is ready, spread contact adhesive on the faces (marked with an "*" in the diagram) of the 2 blocks and allow to dry.

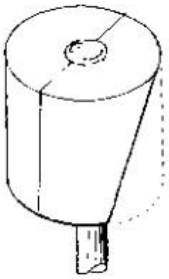


Spread a line of hot melted glue in the "V" groove of one block and place onto the end of the arrow shaft flush with the top of the cap. Hot glue the "V" groove of the second block and place against the first block with the faces (*) together. Press both pieces firmly together. The contact adhesive will hold the 2 blocks together while the hot glue cools. The hot glue will hold the foam strongly to the shaft while the contact adhesive seals the halves together. You now have 1 50mm block of foam.

DO NOT USE HOT GLUE TO BOND THE BLOCKS TOGETHER, THE JOINT WILL NOT BE AS ACCURATE AND IT IS EXTREMELY DIFFICULT TO CARVE THROUGH.

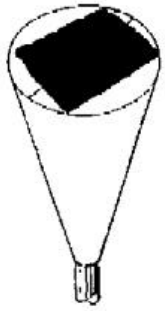


Using your carving knife at almost full extension, carefully slice off the corners of the 50mm block. Then cut off the corners of the octagon you just created. You will be left with an approximate cylinder, which will require some bulk removing from it.



Carefully, slicing a small amount at a time, trim the circular shape, tapering back the foam head down to the shaft, creating a cone shape. Ensure you do not cut the shaft as this will create a stress raiser, weaken the head, and therefore it will be more likely to break off during use. For obvious reason this can be VERY dangerous!

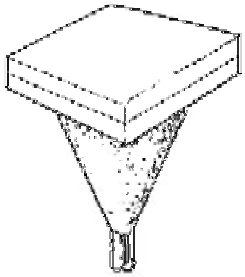
IMPORTANT STEP!



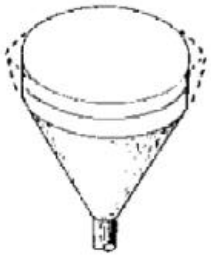
To prevent the shaft from forcing it's way through the foam during impact cut out a 50mm circle of THICK rubber. Plumbers rubber gasket is the only real choice here as it provides the greatest strength. Hot Glue this to the top of the cone, centered on the shaft. You can use as many layers as you feel comfortable with as long as you use at least 1 layer. 3 layers has been shown to be the best for maximum protection that does not over weigh the head.

CARPET TAPE, DUCT TAPE, CLOTH, FOAM, OR LEATHER (UNLESS IT IS VERY STRONG AND THICK) ARE NOT ACCEPTABLE AS A REPLACEMENT FOR THICK RUBBER OR COIN, THEY ARE SIMPLY NOT STRONG ENOUGH. DO NOT USE A PIECE OF ORDINARY METAL WHICH MAY HAVE SHARP EDGES. DO NOT USE A PLASTIC SHEET WHICH MAY CRACK.

IF IN DOUBT, SEEK ADVICE.



Using contact adhesive, glue the last 50mm block to the end of the cone.



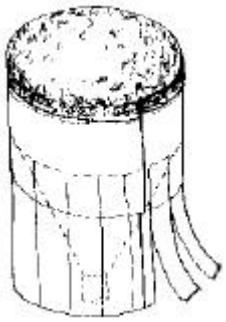
Following the shape of the cone, carefully cut the foam block into a circular shape with the craft knife. Insure you do not get the knife at an awkward angle, otherwise the shape will be uneven. Affecting it's flight.

Finally, cut a 50mm square of upholstery sponge/foam, about 30mm thick, thicker if you want. Using contact adhesive, glue onto this end of the head. With a pair of scissors or the craft knife, trim the square to follow the cylindrical shape of the arrowhead. Using a tapered arrowhead is the best as it allows the air to flow aerodynamically around the arrow in flight, the cone part of egg crate cushion is a good choice as the tapered shape is already done for you, however you can shape the head that way yourself if you want.This foam is not essential, but helps greatly to act as a buffer upon impact.

Finishing touches

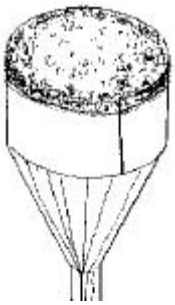
Using a brush, coat the head with 2 layers of liquid latex rubber. Letting the first coat dry before applying the second coat. This helps to seal the head, and make it more presentable for use. Paint the just on to the arrow shaft about 10mm. 2 layers is enough to create the seal and will last for as long as the arrow will. Any more will just waste your time and add needless weight to the arrowhead. Black latex is preferable as it covers better and is less obtrusive in color than others in the spectrum. Stipple the second coat with a brush or piece of sponge in order to create a cast metal image and eliminate brush strokes. You may if you want, dry brush the latex with silver acrylic paint to add a metal effect when the latex is dry. If you don't, dust the heads with talcum powder to prevent them from sticking together. Fresh dry latex rubber can act a lot like contact adhesive. DO NOT latex the upholstery sponge foam end of the arrowhead. Doing so does not allow air to escape on impact thus negating the effectiveness of the sponge buffer.

If latex is not available, carpet tape may be used.



Cut two strips to wrap around the arrow and slightly overlap. DO NOT wrap the tape level with the sponge tip. This tend to stiffen up the end, so set it back a few millimeters. Holding the arrow upright, slice the tape from the edge all the way down to the end of the cone, creating a fringe.

And if you can't get a hold of carpet tape, fiberglass packing tape (The kind with the threads in it) is also acceptable.



Take a piece of fringe at a time and press down onto the cone and just onto the arrow shaft.

As an alternative you can use ¼" wide fiberglass packing tape. Cut off strips and press them down vertically onto the head, remembering not to set it flush with the top of the arrowhead, and just onto the shaft, very similar to the fringe procedure stated above. Once done you would wrap the bulk area (not the cone area) with another layer of packing tape to prevent the first layer from flaying off during use.

That's it. All you have to do is practice and make as many arrows as you like.

An alternative to cutting squares would be to cut circles instead. To do this you would glue 6 of the 9 circles together and then cutting it in half directly down the middle. Once cut you would cut the "V" grooves, apply contact adhesive to the 2 halves and then, putting hot glue in the groove, glue them to the shaft the same way as above. Once this is done you can continue on from point where you cut the cone.

Materials

Arrow shafts	Fiberglass only, any archery store should carry this stuff. Commonly known as Thunderglass
Polyethylene Foam:	25mm thick or 3 layers of 10mm camping mat foam. Must be made of Polyethylene. Can be found at Foam Plastics manufacturers or camping stores like Big 5 or REI
Upholstery Foam/Sponge	Can be found at most furniture stores, Shipping places or any place where packing material can be found
Ball point pen	
Steel Ruler	
Craft Knife	Must be the extendable, snap off blade type like Olfa. Can be found at craft shops like Jo'Ann's crafts.
Contact Adhesive	Can be found at craft stores like Jo'Ann's. Read label and make sure it can be used on Polyethylene foam. Most have a bad chemical reaction to polyethylene foam or it will not adhere at all. 3M seems to have the best all purpose adhesive.
Cutting Mat.	Keep your floors and counter tops safe from cuts. Can be found at most craft stores.
Hot Melt Glue Gun	Best method for gluing joints, craft stores have these.
Latex Rubber	I have yet to find this stuff. Do not use water based adhesives as they will fall apart in climatic (damp) conditions.
Carpet Tape	Acceptable substitute if you do not have latex rubber. Can be found at do-it-yourself stores or carpet stores.
Scissors	Craft stores
Thick rubber	Tire shops are a good place for the rubber. Found some plumbers gasket rubber at Lowes Hardware for about .78$ per 6"x6" sheet. There are 2 thickness 'get the thicker of the 2

Resources used.

LRP arrow making guide made by Mike Stringer and Caroline Hayes of the Second Skin Company based in the U.K. This company has spent many years developing weapons for use by Live Action Role-players. And have been able to prove their safety in conditions where combat takes place where the combatants wear no armor! Provided the instructions are followed exactly.

Special Thanks to Greylond of Avernus (a.k.a. Clint of Ridgecrest) for finding the web site that allowed me to build these arrows.