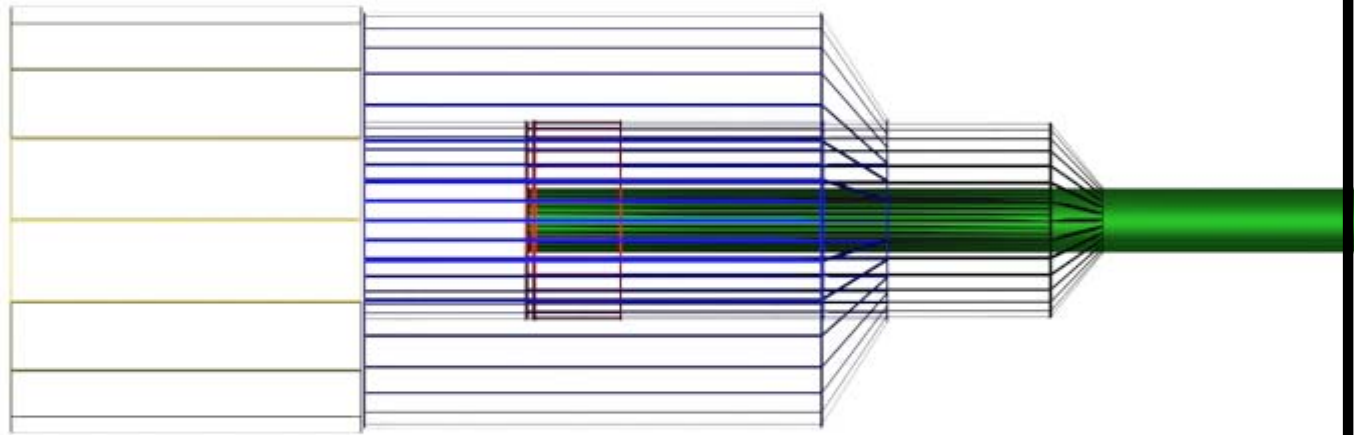


Mythical Journeys

Arrow Building Guide



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SECTION 1: Archery Safety

INTRODUCTION:

Welcome to the Mythical Journeys Arrow Building Guide (ABG). This document has been commissioned and compiled by MJ arms master: Brandon J Boucher in order act as a procedure for safe and acceptable arrow construction. These procedures help to govern combat safety at Mythical Journeys and are considered gaming rules. A violation of the safety rules is an unforgivable offense. Any deviation on the construction of arrows should be noted with the arms master at bjboucher@juno.com. The information contained herein should be read thoroughly before any player considers the archery skill.

Archery is very serious business. Once an arrow is let loose from your bow, it cannot be recalled. Hence, the matter of safety must focus on the construction of safe arrowheads well before the arrow is ever notched and aimed. Please bear in mind that arrows (and other projectiles) are the primary cause of combat injuries at LARPs. Mythical Journeys has enjoyed an excellent track record of combat safety primarily due to the stringent safety standards that is strictly adhered to during weapons check. Safety is without a doubt MJ's number one priority. Leave your substandard weapons at home!

To begin, there are two primary forms of arrows that may be used at MJ. The first type of arrow is built from scratch using "golf-tubes" which is softer yet rigid plastic tubing. These "golf-tube" arrows are safe and relatively inexpensive. You can get the components from many golf and packaging supply places for free (or a small nominal fee). The second type of arrow is a new standard using actual archery parts. Both of these are acceptable at Mythical Journeys, however this guide will only cover the construction of the latter type. For information regarding the proper construction of "golf-tube" arrows, please contact Brandon J Boucher.

SECTION 1: Archery Safety (continued)

Safety Concepts:

There are four main safety concepts to consider when making any LARP ready arrows: impact, bounce, flight, and shaft faults. "*Impact*" deals with the actual blow that is felt by other players when struck by an arrow. The arrow force must be well within human tolerance and should not cause injury even if hit in the head or eye. For this reason, all arrows are padded with a foam process to limit the force of impact to a safe and acceptable level. This guide will review in detail this procedure.

"*Bounce*", contends with the arrow's flight path after striking a rigid object (such as a shield). Ideally, a LARP arrow would fall directly to the ground after striking. This prevents any further danger of someone being accidentally struck in the head or eyes. However, impossible as it may seem, the ultimate goal is always to try and achieve this. Because LARP arrows have foam padding to reduce impact, bounce becomes a factor that must be addressed. For this reason, the new standard of arrow construction operates on multiple layers of foam with varying shock absorbent properties. The first layer at the front of the arrow aids in reducing the amount of bounce that may occur while also reducing impact.

"*Flight*", deals with the weight and direction of the arrow when let loose from the bow. A straight flying arrow is a safer arrow than one that does not fly true. Why? Say for instance you are aiming for someone in the chest (a valid target). But because your arrow veers upwards you end up hitting them in the face. For this reason, quality arrows should be used and they should be regularly checked for straightness in flight. A second person should watch during testing to watch for any extreme flight deviations.

Finally "*Shaft Faults*" deal with how an arrow will behave when broken. All broken arrows are hazards and a caution should be called when one is stepped on and broken. It should be immediately removed from the battleground before action is resumed. The material make of the arrow is important. Wood cannot be used in any MJ arrow because a broken arrow may become jagged. Arrows that merely bend under extreme stress or hold together even when broken are required to make LARP archery safe.

SECTION 2: Construction Basics

Archery Arrow Parts:

First let us consider the natural shaft of the arrow. Arrow shafts must be made of aluminum, fiberglass or carbon. The color should be solid and easily identifiable in short grass. Do not use camouflage arrows. It must be smooth (no ridges or grooves) and must not splint at any time. For this reason wooden arrows are prohibited at MJ. Fiberglass and carbon are acceptable, however they do tend to be rather expensive. Aluminum is preferred. Be prepared to pay \$30-\$60 for a dozen quality aluminum arrows. The shaft length should be roughly 28"-31" long as to help prevent over-drawing. Remember that shorter arrows always fly straighter as there is less possible air resistance (at short ranges).

Next, the natural arrow tip must be blunt. Most pre-constructed archery arrows come with a blunt threaded hole. This is a good start. Any other form of natural tip must be cut or removed to ensure that the arrow has no sharp edge.

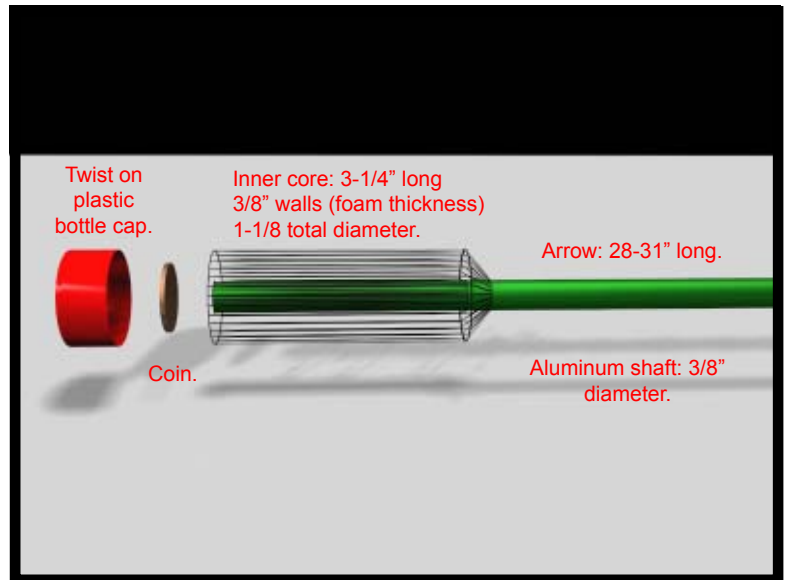
Protective Arrowhead Parts:

There are five main components of the LARP arrowhead standard: the inner core foam, the coin, the bottle cap, the outer core foam, and foam tip. Additionally, there are minor components that are mentionable including duct tape and foam tape. There are many different make, grades and size choices for foam. Choosing the correct foam is essential to the construction of safe LARP arrows.

First let's start with the material make of the inner and outer core. The inner and outer core should be made from polyurethane foam pipe insulation. This is "closed cell" foam that is resistant to shock, moisture, heat and mold. "Closed cell" denotes that the bubbles in the foam are all closed. It is very important that the correct type of pipe insulation material is chosen. The correct material will be resilient to crushing. That is, applying direct pressure will not crush the material and change its protective property over time. It should immediately revert to its original tactile strength after direct pressure. Do not use neoprene foam or rubber foam.

SECTION 2: Construction Basics (continued)

The dimensions of the inner core are as follows. The walls of the insulation are $\frac{3}{8}$ " thick and the ID (inner diameter) is $\frac{3}{8}$ ". Most plumbing supply stores only stock a $\frac{5}{8}$ " ID. Finding pipe insulation at $\frac{3}{8}$ " ID is fairly difficult. If needed trim the $\frac{5}{8}$ " ID foam to fit the arrow correctly. The ID after trimming must always be $\frac{3}{8}$ ", even if the arrow is smaller (this will be addressed later in this document). With the $\frac{3}{8}$ " walls completely surrounding a $\frac{3}{8}$ " center shaft, the total diameter of the inner core will be $1\text{-}\frac{1}{8}$ ". This must fit snugly into the outer core. The length of the inner core is $3\text{-}\frac{1}{4}$ " long.



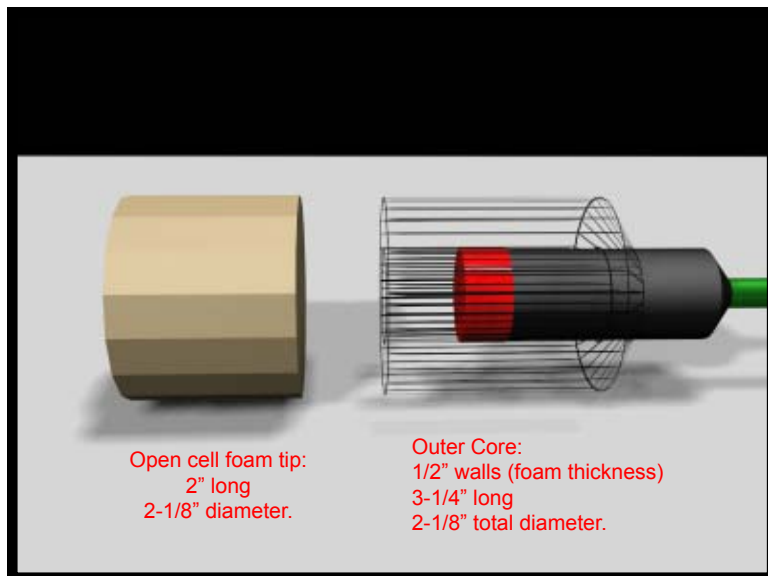
The length of the inner core is $3\text{-}\frac{1}{4}$ " long.

The dimensions of the outer core are as follows. The walls are minimally $\frac{1}{2}$ " thick and the ID is $1\text{-}\frac{1}{8}$ ". If you have access to slightly thicker walls, it is permissible. The length of the outer core is also $3\text{-}\frac{1}{4}$ " long. If you have difficulty locating the correct foam or you are uncertain of the material correctness then ask your material supplier for **IMCOLOCK** brand pipe insulation (see <http://www.imcoa.com>).

The coin should be a simple penny. A nickel will not provide five times the protection. The bottle cap is what you would regularly see from a two-liter soda bottle. It should be threaded and have a small plastic insert inside. Please note that many smaller bottles (although of similar size) do not have this insert.

The material of the foam tip is also very important to choose correctly. The foam tip is "open cell" meaning that the structure of the foam is like a sponge with holes and grooves. It is 2" thick to promote protection. Foam grade is basically measured using three properties: HR (high-resiliency), density and ILD. *HR* status is given to foam that will resist a multitude of environmental conditions including heat, mold and moisture. All open cell foam is susceptible to these factors, but HR foam has been manufactured to be more durable. HR foam should be used in all weapons.

SECTION 2: Construction Basics (continued)



The *density* of foam is not what most people think it is. Density does not denote strength or feel of foam. It is merely a way of gauging the amount of actual foam chemical material to air ratio. Foam density (commercial packaging and furniture foam) is measured between 1.0 and 4.0 pcf. This number means that for a piece of foam that is 12" x 12" x 1", there is X pounds of chemical per cubic feet. For the purpose of LARP arrows (not necessarily

other weapons) lower density foam is used. This allows for protection that does not hamper the weight of the arrow. Aim for foam that has a density rating between 1.5 and 2.4 pcf. An additional advantage to lower density is that it minimizes the potential for bounce.

ILD stands for Indentation Load Deflection and measures the resistance of foam to compression. ILD is measured by a "poundage to one-quarter-volume rate". For instance if you have a 4" foam that is rated at 30 ILD, this means that it can withstand 30 pounds of pressure before it is compressed to 3". Because the surface area of the foam tip is roughly 3.8 inches with a thickness of 2 inches, a good ILD is determined to be between 18 and 25 ILD. Note that this property will change when reinforced with duct tape.

Duct tape should be silver in color. Please check with the arms master before you use other colors. Duct tape should be of good quality and not tear under stresses. The LARP arrow tip will regularly hit the ground and trees throughout the event.

Foam tape can be purchased at sporting good stores. It is used to wrap limbs/flesh before sports tape or medical tape is applied. It is very light and has a high friction property that makes it idea for fitting purposes (without adhering).

SECTION 3: Building Procedure

Procedure for Making LARP Arrows:

Now that we have examined the materials, we can start to assemble arrows. Some tools that will be needed are: a utility knife and measuring utensil (ruler or tape). It is very important to be careful with sharp instruments. This document assumes that you have an excellent proficiency with tools and can take the necessary precautions to avoid injury. Mythical Journeys is not responsible for any injury brought by the accidental misuse of tools while creating LARP arrows. Children should not attempt to make LARP arrows without the supervision of a parent or guardian.

The knife of choice is a extendable painter's knife that can be purchased at Home Depot or other supply store. This knife makes for an excellent investment for any LARPist. It is very sharp and extreme caution should be used.

Step-by-step Procedures:



Step 1:

The first step is to measure and cut the foam for your inner core. Cut a piece of pipe insulation to 3-1/4".

The main part of the inner core will be 3". An additional 1/4" is used for tapering the core. Tapering is important because it will give the duct tape the best angle to hold the foam in place.



Step 2:

To create a good tapered end, first you need to make a slight cut around the entire circumference of foam at the 1/4" mark.

The cut should barely penetrate the foam (a process called 'scoring'). In this case, a slight penetration is preferable over merely indenting the foam.

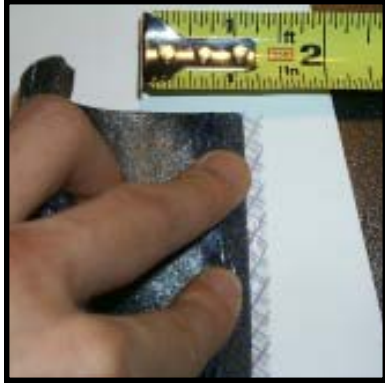


Step 3:

Now take the utility knife - and cut from the bottom of the foam (in about 1/8") up to the scored mark.

A sharp knife is essential for a clean cut in this case. Dull knives may gouge and tear at the foam.

SECTION 3: Building Procedure (continued)



Step 4:

Next, the 5/8" ID must be cut to securely grasp the shaft, which is ideally 3/8". ID 5/8" = 1.96" (C). Diameter of 3/8" = 1.18" (C). Hence .78" (or 25/32") must be cut. The next step tells you how to account for minor variances.



Step 5:

Standard hunting arrows are 3/8" in diameter, but this varies with make and model. If for some reason your arrows do not fit snugly into the cut inner core, you can wrap the shaft with several layers of foam tape (pulled tightly) to increase the girth.



Step 6:

Place the inner core securely in place. Many pipe insulations will have pre-slit self adhesive.

You will now need to place the coin at the top. This will prevent any chance of the naked arrow shaft piercing a target.



Step 7:

Use strips of tape to secure the entire inner core to the shaft. The inner core must be completely secured twice over onto shaft.



Step 8:

If done properly, the inner core will not turn. At this point, if you used the correct foam material, you should not be able to feel the naked arrow shaft when the core is squeezed.



Step 9:

Secure the tape flush by using a single thin strip of duct tape at the bottom of the inner core.

SECTION 3: Building Procedure (continued)



Step 10:

Finally to complete the inner core, screw on the bottle cap all the way to the end so that it is flush with the tip of the inner core. Secure it with tape.



Step 11:

At this point you should mark the 2" point from the tip to denote where the outer core will meet.



Step 12:

The outer core is very much like the inner core. Measure and cut a 3-1/4" piece of foam pipe insulation.



Step 13:

In order to facilitate the sizing of the 2" thick foam tip, trace the edge of your outer core onto the open-cell foam.



Step 14:

The ability to cut the foam easily is reliant on the sharpness of the knife. Cut out a cylinder of the same size (or very slightly larger) as your outer core.



Step 15:

Score and taper the 1/4" end of the outer core using the same technique described. Match the outer core to the line drawn at the 2" mark of the inner core.

SECTION 3: Building Procedure (continued)



Step 16:

Like the shaft, if the inner core does not fit snugly into the outer core a small layer of foam tape can be employed.



Step 17:

After the two cores are fitted together, there is empty space inside the outer core. This space is filled with excess foam from your trimming and sizing.



Step 18:

Pack a good mixture of foam inside as this will become a primary area for reducing shock and the final protection should the inner core ever come loose.



Step 19:

Tape it once in order to secure all the contents.



Step 20:

Now use strips of tape to secure the entire foam tip and the outer core onto the inner core and the shaft of the arrow.



Step 21:

Smaller strips provide less coverage at a time but will be easier to secure at the ends. All parts of the foam tip and outer core must be covered at least once.

SECTION 3: Building Procedure (continued)



Step 22:

Finally, a piece of trim duct tape is used to make the adhesives flush.



Step 23:

It is a good practice to gently push down all over the arrowhead to ensure that the duct tape is securely adhering to the foam. This is important because if the tape breaks loose after compression it often adheres to a different portion of the foam and ruins the tip.



Step 24:

Press down on the foam tip to check that air flows freely to the foam and back out. A good arrow tip will compress without shifting the outer and inner cores.

Add pin holes as necessary to achieve good air flow.

At this point, you should not be able to feel the inner core from the outer core. The inner core should not turn at all inside the outer core and should be very secure on the arrow.

Though the excitement of launching the arrow mounts, continue to use caution. There are many ways to test LARP arrows. The first test should always be against a wall or other object from a safe distance. Never test a brand new arrow on a person. Examine the arrow after repeated shots before testing it on people. At that time, have an experienced LARP archer first shoot softly into the back of a volunteer.

Following these procedures will help your arrows pass and keep the LARP safe. Please continue to the next section for some other combat and safety tips.

SECTION 4: Tips and Suggestions

Additional Tips and Suggestions:

Arrowheads should be routinely rebuilt to ensure their level of safety. It is considered negligent if you do not replace arrowheads that have become too old and tattered. If you come to an event with old and tattered arrows, they will not pass and may be held for the duration of the event to prevent accidental usage.

Arrows should be marked on the shaft to denote where is the maximum proper draw length for your bow. This will help remind you of the safety limitations while in heated combat. If you overdraw, this is considered the same as intentionally swinging a weapon too hard. This form of cheating is unsafe and you may be required to retire your bow or even be removed from the game!

The maximum poundage allowance for any bow is 25 lbs. You **MUST** check with your bow manufacturer to determine the length of the draw needed to achieve this force. Then use tape to mark where **LESS** than this length is. This will ensure that you do not accidentally overdraw and endanger your fellow players.

It is advisable to write your character name on the arrowhead in permanent marker. If you should want to, you can even write your cabin number for the event. This will allow those who find your arrows to return them to you. A small boon (such as a copper) is considered polite when people return your lost weapons, but do not necessarily expect it if you do so for others.

Be prepared to build an arrow from scratch during the weapons check-in. This will require that you bring the necessary raw materials to do so. You can bring all the items pre-cut to save time. The purpose is to allow the arms master to review your construction technique for safety - a very necessary step. If you do not do so, be prepared to have a single random arrow dissected to review your construction for safety guidelines.

Thinner, lighter arrows fly faster and straighter at close range. These arrows were most likely designed for 20-30 lbs bows. Heavier arrows, such as hunting arrows were designed to be shot from 50-90 lbs bows. They fly slower, but tend to fly straighter over longer distances.

SECTION 4: Tips and Suggestions (continued)

Lighter arrows pay big dividends when you do not draw heavy - even well under 25 lbs. This is because lighter arrows shafts must compensate for the heavy foam tip. It will react more drastically to misfire. However they will work very well when launched gently.

Arrows should be stored vertically when not in use to keep them straighter longer. If stored incorrectly, the weight of the foam tip can slowly bend the shaft over time.

Mole skin is a felt-like adhesive that is used to protect the fingers when shooting. This and other safety items should be considered when adventuring. Always wear gloves.

An effective combat range for an archer is roughly 20-30 feet. This will vary based on skill. To emulate combat scenarios, practice hitting stationary object while walking/moving. Then do the opposite, practice on moving targets while stationary.

Good archery tips can be found on the Web. Many sports and hunting techniques apply directly into combat archery.

Brighter arrows are safer and easier to find. Consider brighter color feathers. Balance this with what will look good "in period".

Archers must be responsible with their bows. A bow is never a melee weapon (even if defensive). Most NPC will give you the courtesy of first dropping your bow at a safe distance if close combat occurs.

Don't take chances, a marginal arrow found during the LARP should be stowed.

The weight of the arrowhead changes the flight characteristic of arrows. Practice should be used in order to compensate for this (not overdrawing).