

The Care and Feeding of your Combat Crossbow

If you want your crossbow to last a lifetime - follow these 10 basic guidelines

- 1) Never use metal gauntlets - They will scar up the stock and may cut the bowstring.
- 2) Always visually check your bow for damage before shooting it. Especially if you have dropped it.
- 3) Do not fire the crossbow without a bolt in it.
- 4) Be aware of the location of the tips of your prod. Make sure that you wont have then swing forward and hit anything when you fire.
- 5) Do not leave your bow our in bad weather. (rain, snow extreme cold or hot weather, etc.)
- 6) Pack your bow into your vehicle for travel in a careful and safe manner.
- 7) Always replace worn bowstrings, don't wait for them to fail.
- 8) Rebind your prod if it becomes loose.
- 9) If your stock needs to be refinished; use a scotchbrite pad to remove the wax coating and any light scratches, then use at least three coats of top quality Tung Oil for the main finish, complete with a thorough coat of furniture Wax.
- 10) Do your preventative maintenance on a regular basis.

Daily

- _____ Examine for damage
- _____ Wipe dirt & grime off with a damp rag & dry it completely before putting it away
- _____ Wax the track
- _____ Wax the bowstring
- _____ Check for and tighten loose screws
- _____ Store the bow in a clean dry place, avoid extreme heat (cars)

After Events

- _____ Examine for damage
- _____ Replace the center bowstring serving if it has experienced extreme wear.
- _____ Wipe dirt & grime off with a damp rag & dry it completely before putting it away
- _____ Wax the track
- _____ Wax the bowstring
- _____ Check the prod binding, rebind if loose
- _____ Check for and tighten loose screws
- _____ Remove inspection stickers applied by marshals

Yearly

- _____ Examine for damage
- _____ Make a new bowstring (It is good to have spares)
- _____ Wax the entire stock
- _____ Replace worn parts
- _____ Repaint the tiller if it needs it
- _____ Polish Brass parts

Binding Crossbow Prods

Binding a prod to the stock of a crossbow is an ancient practice that goes back in time. It can be done in a variety of ways, and I am sure that there are quite a few folks out there who have improved and better methods than the one that I am going to tell you about. This is the method that I currently use, and it is based on an illustration in Payne-Galway's book. I did have to make a few modifications from his method though. Due to a lack of readily available sinew I had to substitute cotton cord. I wanted to avoid man made fibers, due to their typically stretchable nature, and hemp is also a bit scarce.

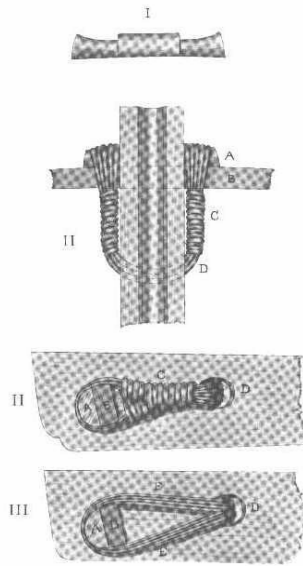
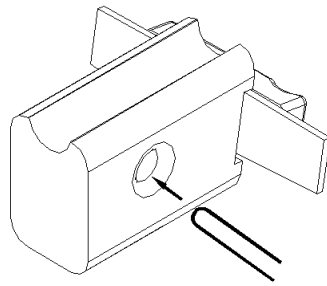


FIG. 28.—THE BRIDLE OF SINEW WHICH WAS OFTEN USED FOR SECURING THE BOW OF A CROSSBOW TO ITS STOCK.

After many experiments with various types of cords, I have found that “# 24 Cotton Cable Cord” by Wellington works very well for the main binding and #18 works very well for the cross binding. Both cords are of sufficient tensile strength that they can be pulled tight without breaking. (I have found that I can get this type of cord at almost any decent hardware store or home center.) If you have to use other types of cord, just try and use something strong, without going overboard. Cords that are too large are hard to get to settle into a tight binding so don't try and save time by going with something closer to being called rope.

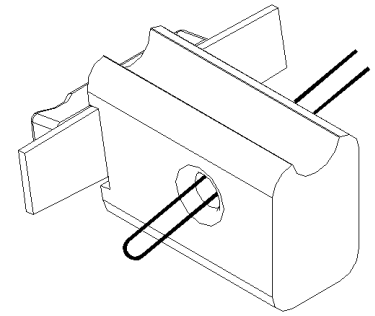
Step #1 – The Primary Binding Bundles

Cut off a piece of cord about 40 – 50 feet long. Double it up and put a needle onto it. (Make sure the needle has both free ends going through it.)



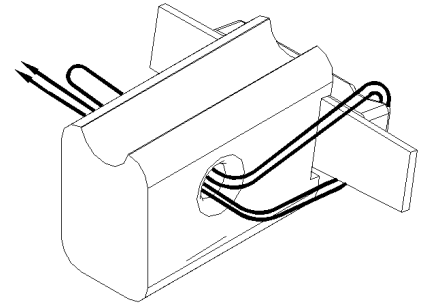
Step #2

Take the looped end and pass it through the binding hole in your crossbow stock.



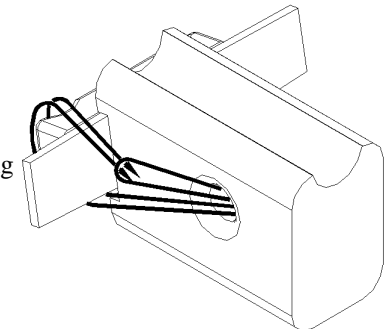
Step #3

Hold the looped end in place and pass the needle end around your prod and back through the binding hole.



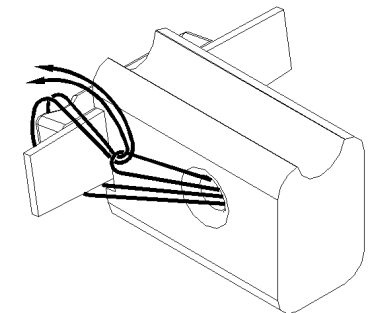
Step #4

Pass the needle around the prod and binding block and back through the loop.



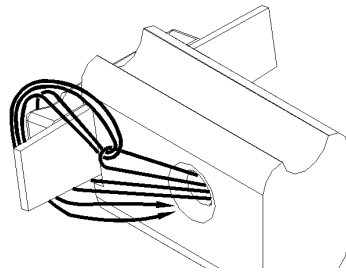
Step #5

Take your needle back around the prod and binding block and pull everything tight.



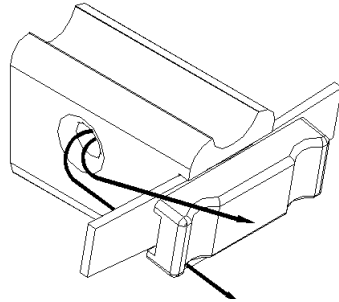
Step #6

Take your needle back through the binding hole. Go back around the prod and bring the needle back through the binding hole. Continue this process until you only have about 12" of cord remaining. Make sure that each pass is pulled tight and is neatly laid next to the previous passes of cord.



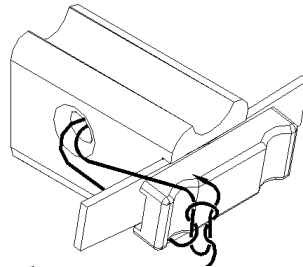
Step #7

When you only have about 12" of cord remaining, separate the two cords and place one on each side of the prod.



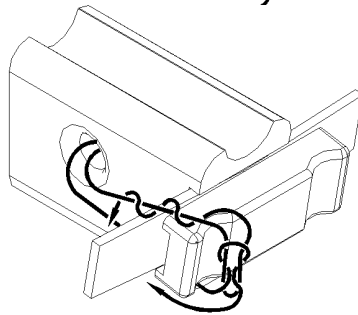
Step #8

Pull the two cords tight and tie them in a square knot.



Step #9

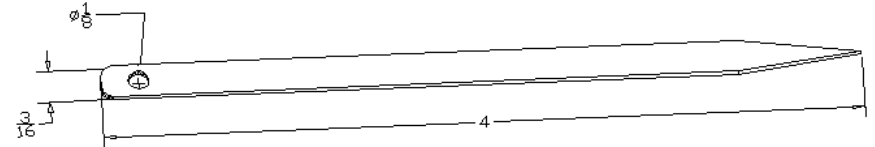
Take the remaining ends of the cord and weave them in among the cord making up your primary binding bundles.



Hang your crossbow up overnight by the prod or foot stirrup. This will allow the binding to settle in and stretch a little. (If you are in a big hurry you can skip hanging the bow up.)

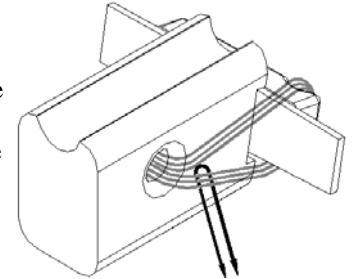
Make yourself a lacing needle from a strip of thin brass. Make sure that you polish all the edges until they are as smooth as possible. Any sharp edges or burrs on your needle will scratch the finish on your bow. The dimensions in the

picture below are just a guideline. It does not have to be exactly this size. (I know that Master Iolo from New World Arbalest likes to use a shorter and wider needle.)



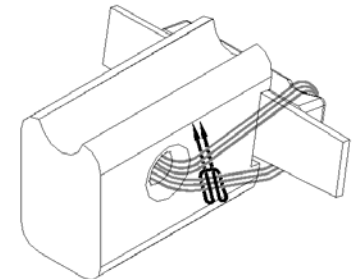
Step #11 – Cross Binding

Cut off a piece of smaller cord approximately 15 foot long. Using your lacing needle pass the doubled up cord under one of the bundles of primary binding cord. Make sure that you leave the looped end free.



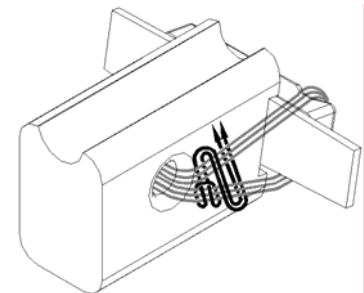
Step #12

Pass your lacing needle through the looped end and pull tight.



Step #13

Go around both main bundles of the primary binding, and pull the cord very tight. Make sure that the cords lay neatly alongside each other.



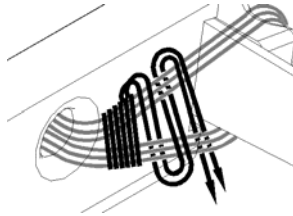
Step #14

Go around both main bundles another 6 – 8 times. Then start working on your “figure eight” by going under the second bundle instead of around it.



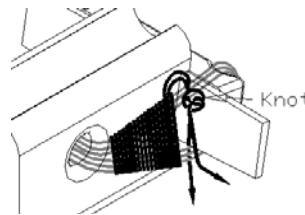
Step #15

Continue working on your “figure eight” until you get to within ½” of the back of the prod. Make sure that you pull the cord tight and that the cord lay neatly alongside each other.



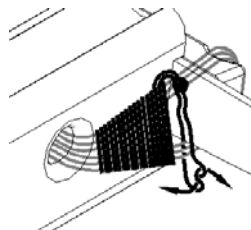
Step #16

Tie a knot in your cord as it comes out from under the upper bundle, then separate the two cords and slide one of them under the second bundle. The other cord should go over it.



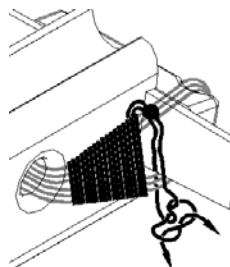
Step #17

Take one cord and going over and under the other cord, pull the pair of cords tight, in the beginning of a square knot.



Step #18

Complete the square knot.



Step # 19

Flip the bow over and repeat steps 11 through 18 on the bundles on that side.

Step # 20

Place a small drop of clear fingernail polish or super glue on the knots to make sure that they do not come loose. After the glue has fully dried, trim off the excess cord. (Do not trim the cord before the glue has dried. I find that I lot more success with my trimming once the glue has dried.)

Making Bowstrings

The very first thing you will need to do is to determine how long you want your bowstring to be. You want your bowstring to be the right size – if it is slightly too long you can take it off your prod and twist it to shorten it. But don't try to shorten a string more than about a ½ inch. If you twist the string to shorten be sure to twist the same direction that the serving is wound, or you will loosen the serving and it will be damaged.

So how can you determine what is the right size? Well, measure your prod from shoulder to shoulder and subtract ½” (The shoulder is the resting place for your string loop ends.) Or you can measure the current string. In any case you want your string to have a fist of about 4”. (The fist is the at rest distance from the prod to the string)

Once you have determined how long you want your string to be – you can move on to the rest of the project. If you want a string that is a length of other than 26” you will need to modify the center-to-center distance on the jig. Everything else will be the same, no matter what length string you are working on.

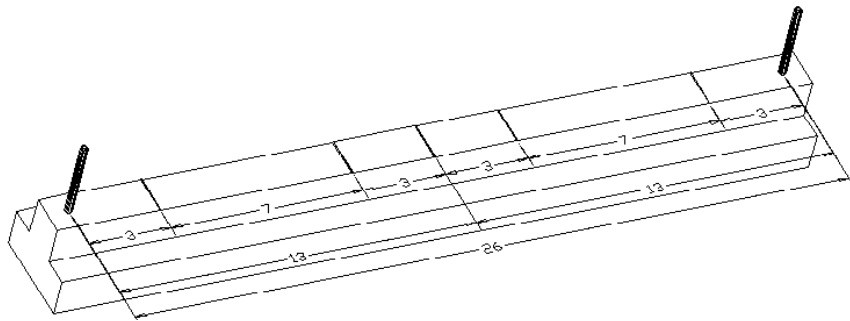
In order to start tying your bowstring you will need to get a decent supply of artificial sinew. In total it takes about 65 yards of sinew to make a bowstring 26 inches long. I like to use two colors when making my bowstring, because if you use contrasting colors for the main body and bindings any wear that occurs will show up quickly. With a moderate amount of maintenance a bowstring should last you a long time. As wear starts to show up during use, switch to a new bowstring. That way when you get home you can repair the damaged string, and put the repaired string aside for use later.

You can get artificial sinew from a variety of places, but I like to get mine from an online company called Primitive Originals. (www.primitiveoriginals.com) They sell sinew in 450 yd spools for 7 bucks. This is enough for approximately 7 strings, so you might want to split this with a buddy.

While you are waiting for your sinew to arrive you may want to start working on your jig. This will not take you very long, but hey – you got to do something while waiting.

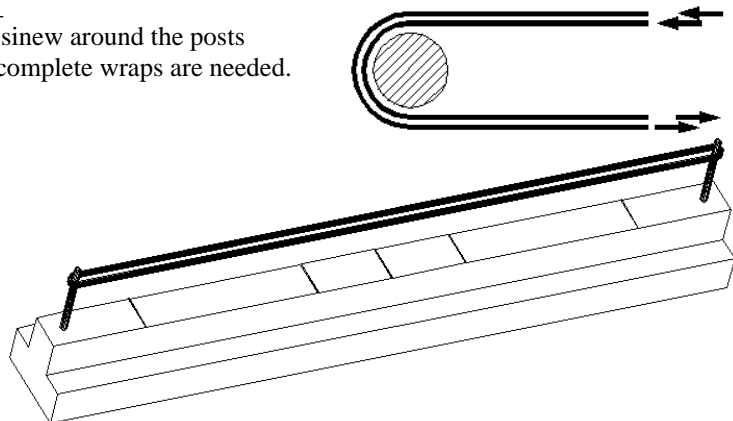
A simple jig consists of nothing more than a board with two ¼” holes drilled in it. (Drill your holes as close to perpendicular to the board's surface as possible at a distance of 26”. I like to add another board to the first one as a base. This gives you the ability to clamp the jig to your work surface. Clamping your jig down isn't required, but some folks find that it gives them a bit more stability, and speeds up the string making process.

Once you have the base done, cut yourself two rods $\frac{1}{4}$ " in diameter and approximately 4" long. Round and smooth off the ends. Make the end that sticks up from the jig as smooth as possible. Then stick the rods into the holes. Mark your jig with lines at the center of the string and at 3" from each end and from the center. These lines will be used for reference when you start binding the core together.

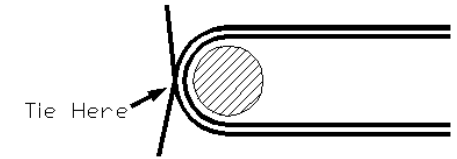


The first "real" step is to start winding the string core onto the jig. You can begin this process only after you calculate how many times around the pins you will have to wrap. You want to have a string that is at least 5 times as strong as the pull of your prod. So take the Pull of your bow and multiply this by 5. Then take this number and divide it by the "test" of your sinew. (If you use artificial sinew from Primitive originals – you probably have 70 lb cord.) This should give you the number of laps you should need. In this case you will come up with needing 6 laps. This is the minimum number, and since I always have a lot of wear on my string I usually double this for a total of 12 laps. (Note: this also gives you a nice medieval looking string, since most strings in period were rather beefy.)

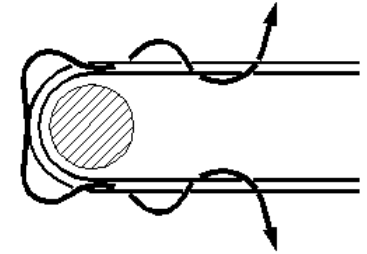
Step 1
Wrap sinew around the posts
– 12 complete wraps are needed.



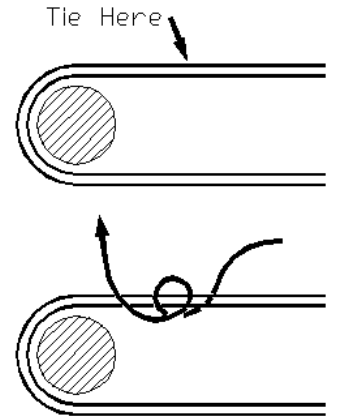
Step 2
Tie sinew off to the starting end with a square knot.



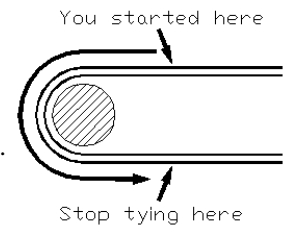
Step 3
Wrap or weave loose ends of sinew into the loops of sinew so that when you cover the ends with a protective layer of sinew (serving) the ends will be permanently secured inside.



Step 4
Cut two pieces of sinew from your roll approximately 36" long. Tie one to the main core with a half hitch. This knot should be placed midway between your 3" mark on your jig and the post..

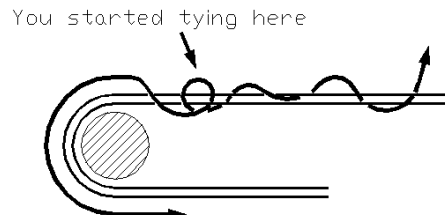


Step 5
Continue tying a series of half hitch knots along the outside edge of each end loop to cover and protect it. Be sure to cinch the knots up tight to each other. Once all the way around, continue out over the shaft of the string until you get to a point across from where you started..



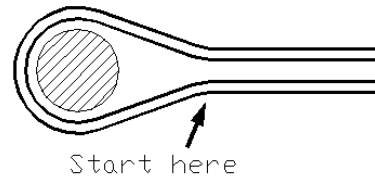
Step 6

Weave your loose starting end in among the loops of the core so that when you cinch the loop into "eyes" and tie the serving around the entire core, you will permanently secure the end.



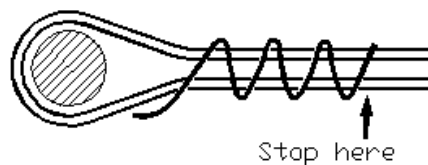
Step 7

Start tying your half hitches around all of the core sinew. This should cinch the bundle together tightly.



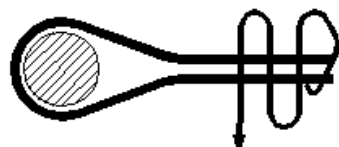
Step 8

Continue this for about an inch. You should stop when you get to your 3" mark on your jig.



Step 9

Using a sharp needle, sew the loose end back through the knotted section a couple times.



Step 10

Pull the end tight and trim off the excess.

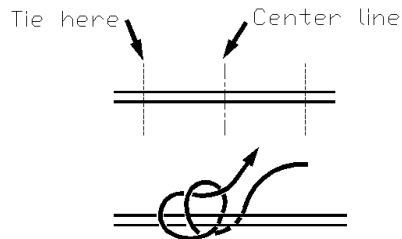


Step 11

Repeat steps 4 through 10 on the other end of the string.

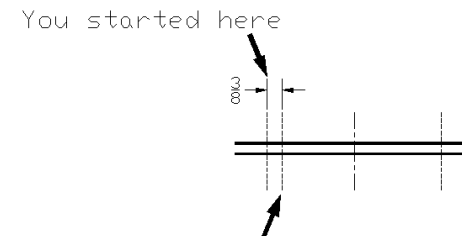
Step 12

The center of the string should now be marked, and a mark made on each side of the center at 3" away. (I use a felt tip pen to mark my strings.)



Step 13

Cut a piece of sinew from the roll approx. 36" long. Locate the mark on your jig 3" from the center. Tie the sinew to the main core above the mark. (Use a half hitch knot.)



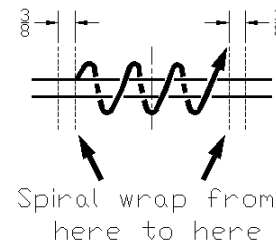
Step 14

Continue tying half hitches for a distance of approximately 3/8". (Work towards the center of your bowstring.)

Stop tying here

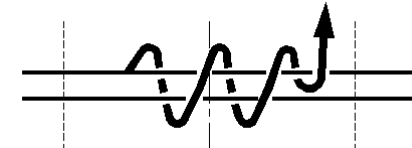
Step 15

Spiral wrap the center portion of your bowstring until you get to a point approximately 3/8" from your other 3" mark.



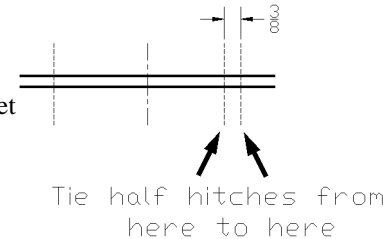
Step 16

Using a needle slide your thread end through the center of the core.



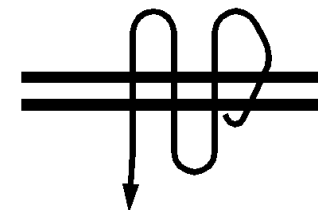
Step 17

Tie half hitches around the core until you get to the 3" mark.



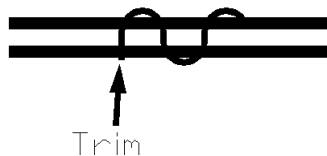
Step 18

Using a sharp needle sew the loose end back through the knotted section a couple times.



Step 19

Pull the end tight and trim it off.



Step 20

Using a tube of commercially available bowstring wax, apply a good coat of string wax to your bowstring.

Step 21

Place bowstring onto prod and adjust as needed. If your combat bows string is too low (rubbing on the deck), the string is too long. Take one end off and twist it a few times, then restring the bow. Recheck the height of the string. It should be about 1/16" above the stock. If you are building a string for a target bow, your string should not be "Flying" at all. It should have minimal down pressure (about 5 lbs). More down pressure only wastes energy and actually causes the string to apply force to the quarrel over a shorter distance. If your string is too short, make a new one...

Making Tubular Bolts with Stopper Tips

Before you begin, it is highly recommended that you decide how many arrows/bolts you want to make. It is much easier to do all that you think you will need for the foreseeable future at one time.

The next thing you need to do is start gathering the materials you will need.

Materials list:

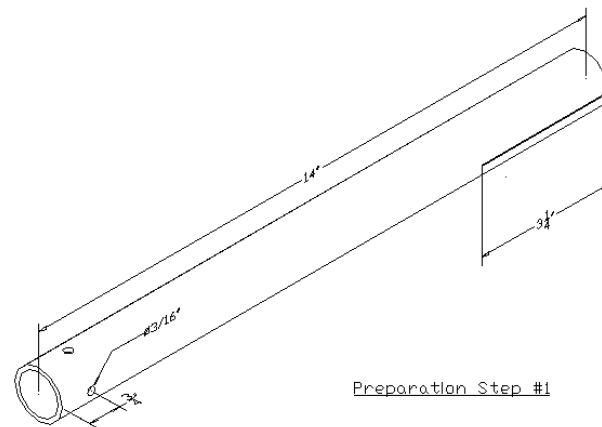
Siloflex Plumbing Pipe (1" ID, 100PSI) 14' - 30" per arrow/bolt
Rubber Stopper (White Gum Rubber, size 6-1/2, without holes)
1/2" Closed cell foam (Sleeping mat foam works very well)
Strapping Tape (3/4" wide) 4 ft per arrow/bolt.
Duct Tape (Red - 2" wide) 18" per arrow/bolt.
Package Sealing tape (Clear, 2" wide) 10" per arrow/bolt.
String (Cotton or other natural fibers) approx 2' per arrow/bolt.
Computer label (Try and use laser printing if possible) 1 per arrow/bolt

After you have gathered all your materials you can begin by preparing all your materials for the final assembly stages.

Preparation Step #1

Cut your 100 PSI tube to length. I use a typical crossbow and as such my bolts use a 14" tube. Check to see what size will work best for your application, and use this for cutting your tubes to length. In order to quickly cut all my tubes to exactly the same length, I set up a stop block on my miter saw. This way I don't have to measure the length but once.

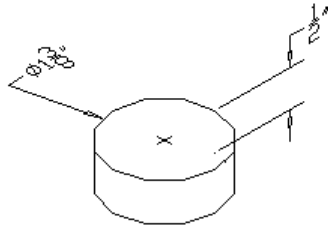
Drill four 3/16" holes equally spaced around the perimeter of your tube at a distance of 3/4" from one end.



Preparation Step #1

Preparation Step #2

Print your labels. Use labels that are for permanent identification. They will last longer. Try and not use an Ink Jet printer, the ink is water soluble. If you do not have a laser printer, have your labels Xeroxed for you. I have a distinctive pattern across the top of my labels. This helps with rapid identification of bolts after a battle.



Preparation Step #3

Cut 1 or more 1- 3/8" diameter discs of foam from 1/2" thick sheet. I use a plug cutter made from a piece of iron pipe to do this. (In order to make a similar plug cutter, get a 3"-4" piece of threaded galvanized pipe from the hardware store and screw a pipe cap onto one end. Using a belt sander or bench grinder taper the other end so that it forms a circular knife edge – Like a cookie cutter.)

Preparation Step #3

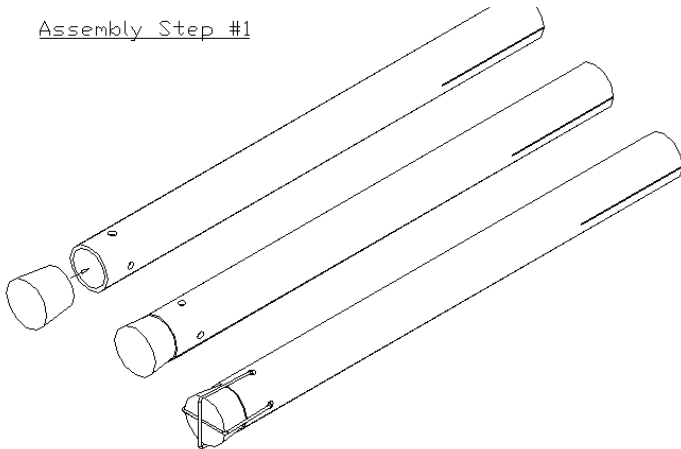
Now that all the time consuming parts have been produced you can start to assemble them into a useable form.

Assembly Step #1- Attaching the Rubber Stopper

Stuff the rubber stopper into the end of the 100PSI tube with the 4 holes. Make sure that it is pressed in tightly.

Using a long needle and your string, tie the stopper firmly in place. Make sure that your knots are along the side of the tube. They must not be on the end of the bolt/arrow, this would leave a projection that will get your bolt/arrow rejected by the marshals. (The reason for the natural fiber string, is that it will stretch less than most man made products.)

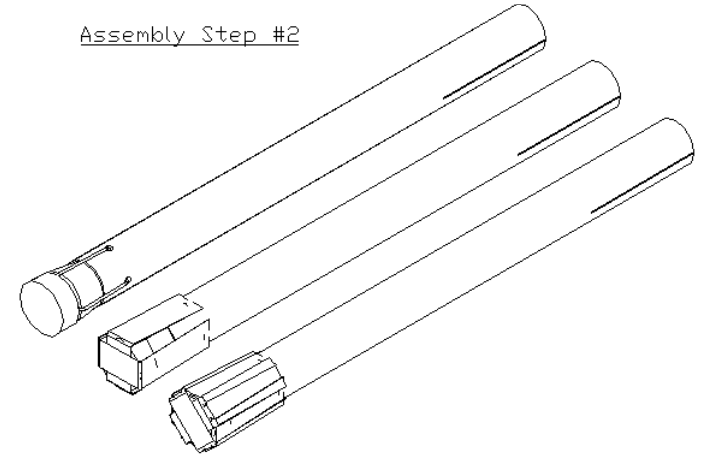
Assembly Step #1



Assembly Step #2 – Attaching the Foam Tip

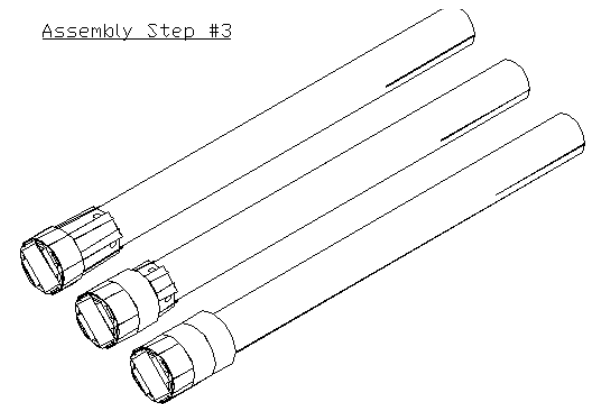
Place a 1/2" thick disc of foam (1-3/8" in diameter) on to the end of the rubber stopper. (two disks are preferred for a total thickness of 1" before taping) Using two pieces of strapping tape approx 7" long tape the foam disk into place. (Make sure that the foam is secure – but do not compress the foam) Rotate the shaft 45 degrees. Use two more pieces of strapping tape to finish securing the foam into place.

Assembly Step #2

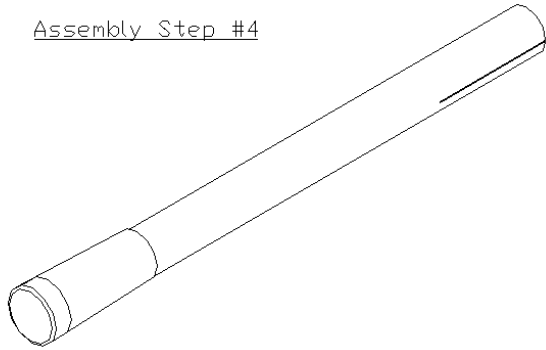


Assembly Step #3 - Additional Taping and Wrapping On top of the strapping tape, spiral wrap the last 2-1/2" of the tube's end with strapping tape. This will help keep the end from mushrooming under impact stresses.

Assembly Step #3



Assembly Step #4



Assembly Step #4 – Final Taping

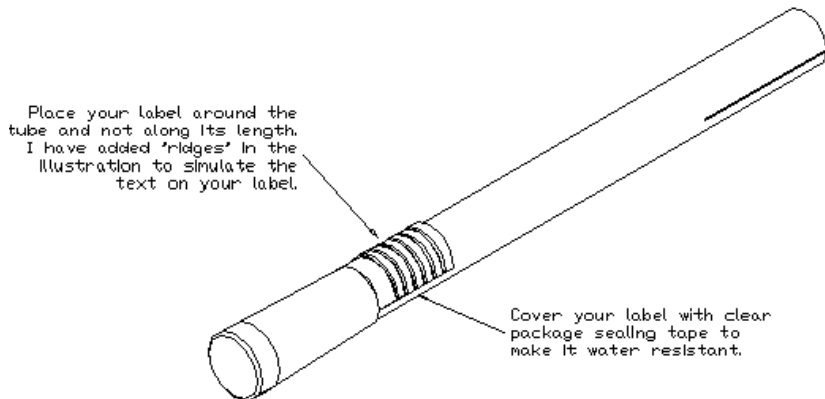
Cover the end of the bolt with red tape of some kind. I prefer to use red duct tape (but if you cannot find red duct tape, red electrical tape will do). Make sure that you do this neatly. A smooth tape job will help ensure straight flights.

Assembly Step #5 – Labeling the Arrow/ Bolt

Place your label onto the shaft of the bolt/arrow. If you place your label around the shaft instead of along the shaft, it will work better for two reasons.

1) You can see your label better when gleaming & 2) It will not unbalance your shaft. (I have added “ridges” to the illustration to simulate the text in your label.) Cover the label with clear package sealing tape. If your label is large it may take two pieces.

Assembly Step #5



Fletching your Bolts

Note: The following steps illustrate a method of fletching siloflex bolts that is currently considered to be experimental. At this point there have been no safety issues that indicate any problems with the design, but if they are not constructed with attention paid to quality – there are increased risks of the bolts failing. Make sure that you use siloflex for the plug in the end – PVC is in the process of being phased out.

Materials list:

Siloflex Plumbing Pipe (3/4” ID, 160 PSI) 3/4” per arrow/bolt
 Craft Foam (2mm thick) approx 1/8 sheet per arrow/bolt.
 Artificial Sinew (waxed, any color) approx 15” per arrow/bolt

Note: If you need some type of nock for your bolt or arrow, you will need to modify these plans in the following way.

Cut the slot for the fletching an additional 1/2” deeper.

Make the Plug tube 1-3/16” long.

Move the holes used to sew the plug tube into the shaft further in.

Cut a nock into the fletched end right after you sew the plug tube into place and before you mark the tubes with the paint pen.

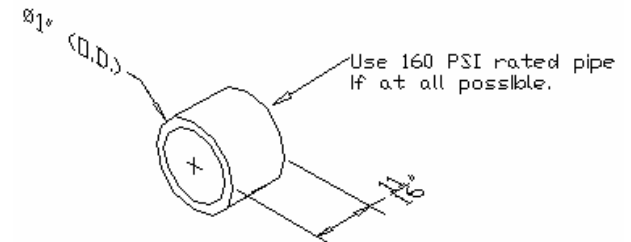
Preparation Step #1

Using a band saw, cut a slot in the back end of the tube to a depth of 3 1/4”

Preparation Step #2

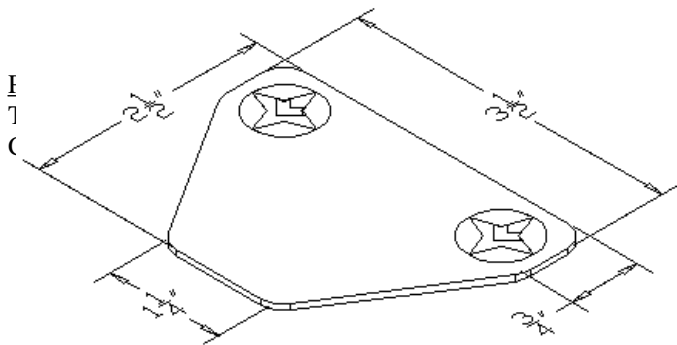
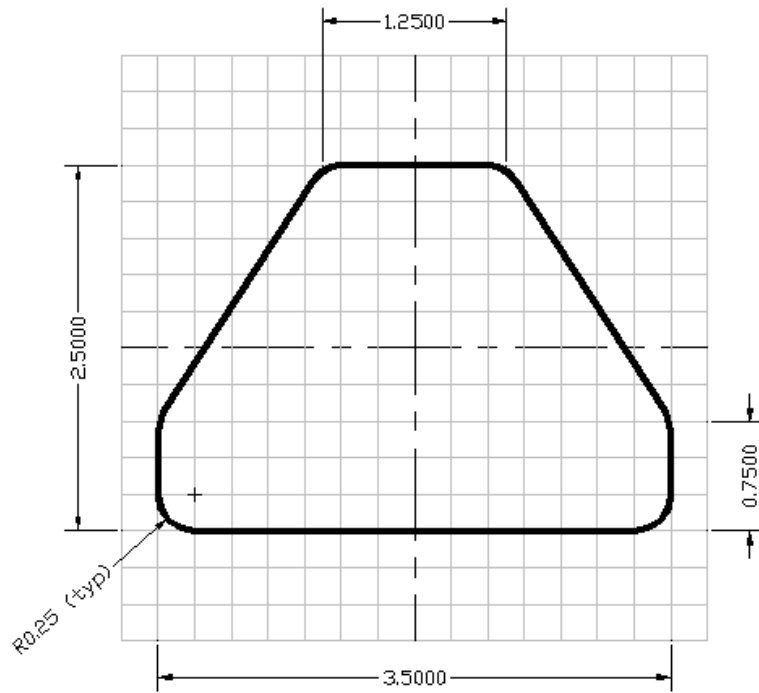
Cut your 160 PSI tube into 11/16” sections. Make sure that the outer diameter is 1”, if it is not – it won’t fit into the 100 PSI Pipe. This length can vary slightly. Make sure that it will fit fully into the tube behind the fletching, when you assemble the bolt. If the piece is too small – it will not be of sufficient strength once you drill the lacing holes.

Preparation Step #2

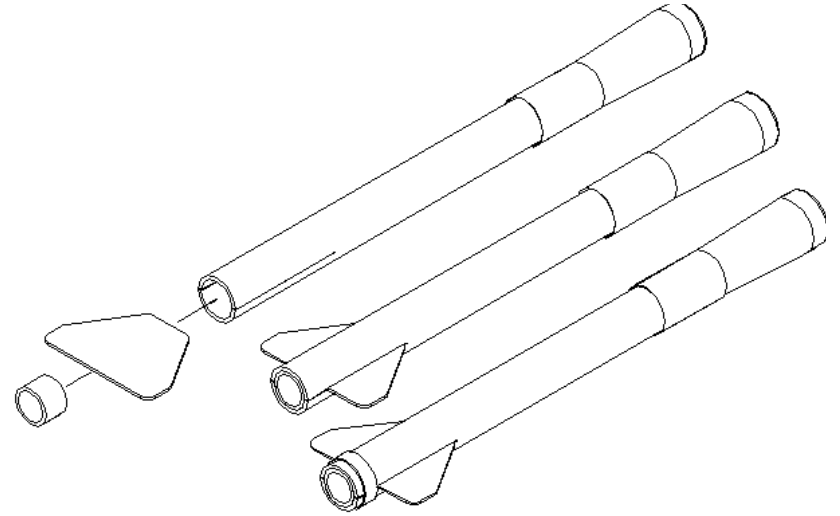


Preparation Step #3

Layout the pattern onto a piece of cardboard or thin sheet metal.
Cut out the cardboard pattern.



If you want to mark your fletches, use a rubber stamp with your preferred decorative pattern. This is not necessary, but it looks nice and makes it a lot easier to find all your bolts/arrows when gluing.

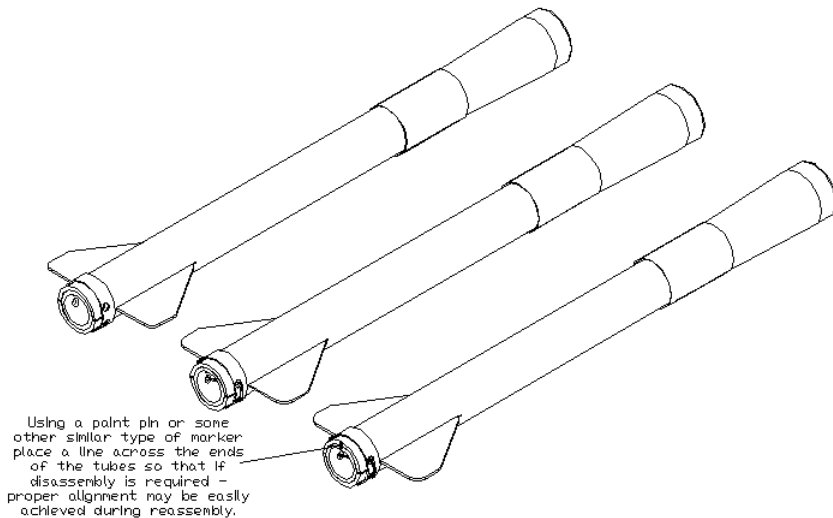


Assembly Step #1 – Attaching the Fletching and End Reinforcement.

- Spread the split end of the shaft with two fingers.
- While holding the end open, slide your foam fletching as deeply into the slot as possible.
- Make sure that the fletching is centered.
- Slide the plug tube (small piece of 160 PSI tubing, approx 3/4" long) in after the fletching.
- Using a narrow piece of strapping tape, tape the end of the tube shut. Your strip of tape should go around the tubing at least 1-1/2 times, aft of the fletching. This closes the cut, and will temporarily hold the fletching and plug tube in place.

Assembly Step #2 – Securing the End Reinforcement

- A) Drill four holes into the fletched end of the bolt. Make the holes as small as possible, but still large enough that your needle and thread will be able to pass. (Your hole size will vary depending on the diameter of the needle that you plan on using.) You want your holes to be located at least 1/8" away from the edges of the slot. If they are too close they may not hold as well as you might like. (Ideally the holes should end centered width wise along the plug tube)
- B) Using waxed artificial sinew sew the plug tube into place. Your sinew should form a figure eight. Make sure that you lace it twice. (The reason you should not use natural fiber thread, is that it isn't as abrasion resistant or as strong as artificial sinew. The tendency for it to stretch can be offset by pulling the thread as tightly as possible.)
- C) Tie the sinew as tightly as you can & trim it off.
- D) Place a drop of super glue on the knot to prevent it from coming loose.



Assembly Step #3 – Marking the End Reinforcement Ring

Using a paint pen or other similar marker, place a mark across both pieces of tubing at the fletched end of the bolt/arrow. This is to ensure that if you ever have to disassemble the bolt/arrow for fletching replacement, you can get it back oriented the same.