**INTRODUCTION TO PLAITED JEWELRY**

**A look at plaited jewelry in the Viking age and the process used to make it**

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A good portion of many hoards throughout the Viking age are bracelets, arm rings, upper arm rings, neck rings, and finger rings – personal jewelry that would have been important to the wearer. These range in style from simple twisted items to the more ornate plaited style. Plaited jewelry derives its name from the method used to create it – strands of wire are twisted together into sets in one direction, and twisted together in a bundle in the opposite direction. This creates a plaited, or braided, look. Plaited jewelry is striking and beautiful in look and design, mesmerizing to follow as it winds around itself to create a beautiful piece of jewelry.

The following information is designed to both display period examples and to teach you how to create your own jewelry using this method. There are several terms in this class that will need to be defined prior to beginning.

**Strand:** A strand is a single piece of wire. This will also be referred to as **wire.** These terms are – for the most part – interchangeable.

**Set:** A set is a number of wires twisted together. This tutorial specifically focuses on using 2 strands twisted together in a set.

**Bundle:** A bundle is 2 or more sets twisted together. For this tutorial, this means 3 sets.

**Anneal:** Annealing is the process of heating the wire and rapidly cooling in a quench bucket to make it malleable. As you work metal it will work harden, and this process makes it softer and easier to work.

**Fuse:** The process of heating metal to its flowing point and melting it together.

The arm ring we will be looking at making is a 3x2 (three by two). When we look at this name, we see two different numbers, and understanding the meaning is the first step to creating the arm ring. The first number of this denotes how many sets are in the piece: in this case, that is 3 sets of wire. The second number is how many wires per set: in this case, 2 strands of wire per set. So, we end up with 3 sets of wire with 2 wires each, which is shortened to 3x2.

This method was shown and taught to me by Dux Eikbrander and Master Svein Tunheim and has been adapted by myself to work in my shop set up, and to adjust for what worked best for me.

Please always wear proper safety gear and protection when handling heated metal. This process will be using several items that will require careful attention and safety precautions, so please stay safe.

**TOOLS AND MATERIALS:**

You will need several tools and materials to get started.

**Wire:** First and foremost, you will need wire. There are several options for wire depending on preference.

**Copper:** Copper is relatively easy to work, and is a great beginning wire. It is soft and anneals well. However, copper does not fuse easily so you will need to solder end caps to the arm ring (this class will not go into soldering).

**Bronze:** Although a little harder to work, bronze is an excellent choice to work with. It will require more annealing cycles than copper, but it fuses easily using a torch and is preferable for finishing the ends. We will be using bronze today.

**Silver:** By far the easiest metal, silver is the best choice. It is very soft to work with and fuses easily. It anneals well. It does work harden more than bronze or copper, but can easily be annealed. Because of the cost, I do not recommend starting with silver.

**MAP-Pro Torch:** This torch is used to anneal the metal and fuse the ends together. Propane can be used, but MAP-Pro is preferable; it burns hotter than propane and makes the process easier.

**Vise:** The vise is used to clamp one end of the wires and bundle while twisting

**Vise Grips:** These are used to clamp the other end of the wire and bundle while twisting.

**Wire Cutters and pliers:** Wire cutters will be used to cut the wires to length, and pliers will be used to handle the hot wire. Please do not attempt to handle the hot metal bare handed.

**Measuring tape:** Used to measure the wires

**Fire Brick:** Annealing and fusing will all be done on the fire brick. The fire brick refracts heat around the wire, sets, and bundle and creates a more even heat distribution during annealing and fusing.

**Bucket of water:** This will be used to quench the hot metal during annealing.

**Hammer:** You will need a hammer to finish the terminals

**Anvil:** This will be used for shaping and finish the terminals, straighten if necessary, and can assist in shaping.

**Examples:**


The Sejero Hoard found near Zealand, featuring several plaited pieces (National Museum of Denmark


Perhaps one of the most important hoard finds to date is the Cuerdale Hoard. Discovered in 1840 on the banks of the River Ribble, it contains some 8,600 items deposited somewhere around the early 10th century. Included in the hoard are coins, hacksilver pieces, and several plaited neck rings, two of which can be found in the lower right of this photo. (British National Museum)

A rather notable find for neck and arm rings is the Vester Vedsted hoard. This hoard was discovered in 1859 just south of Ribe and contains several instances of plaited jewelry, specifically the piece seen in the lower left. The hoard was deposited sometime in the latter half of the 10$^{th}$ century. (National Museum of Denmark)

**Period Construction:**

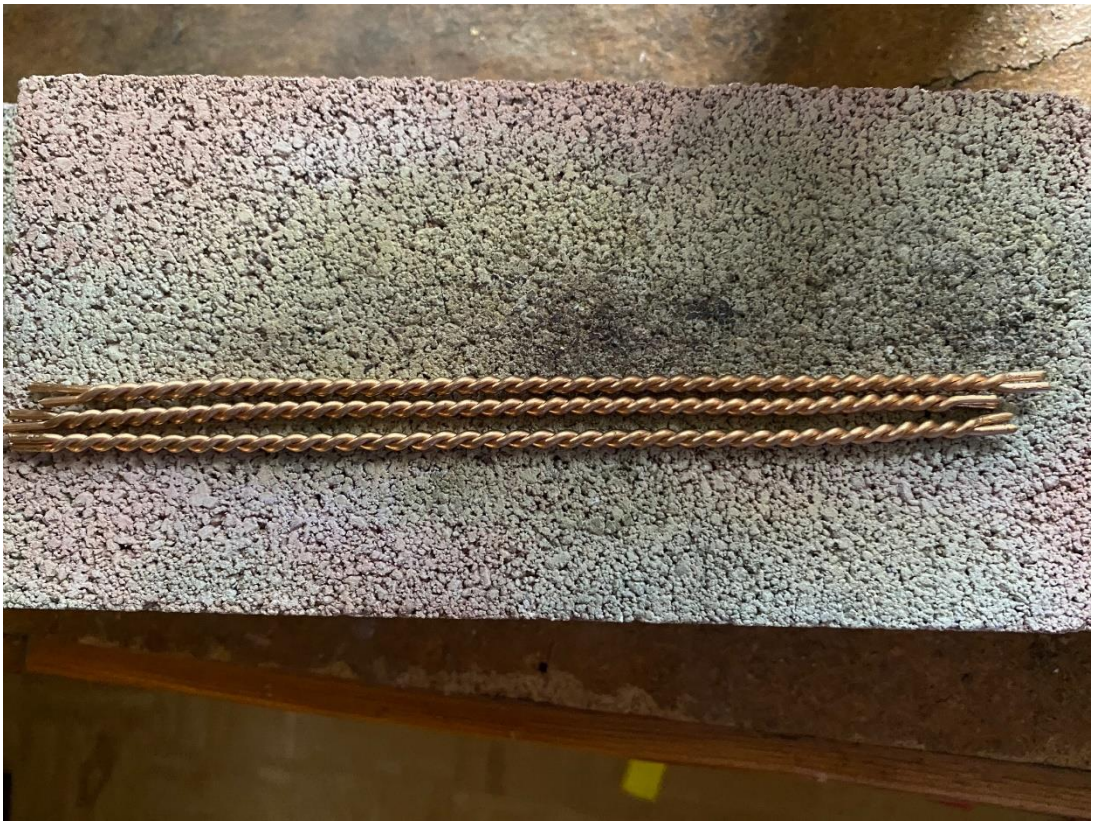
Unfortunately there is not much surviving evidence of how these pieces were constructed. Much of the construction methods have been lost to history, but from the results of this construction method and the examples provided, it can be extrapolated that the method below is reasonably close to the methods that would have been used. Our examples and the period artifacts that have been found have a similar look to the finished product, so it can be reasoned that we are relatively close to the original method of construction.

**My Construction Method**

First, cut 6 wires of equal length. Take two of the wires and place one end in the vise and the other in the vise grips. Make sure the vise and the vise grips are keeping hold of the wires nice and tightly. Begin twisting clockwise.

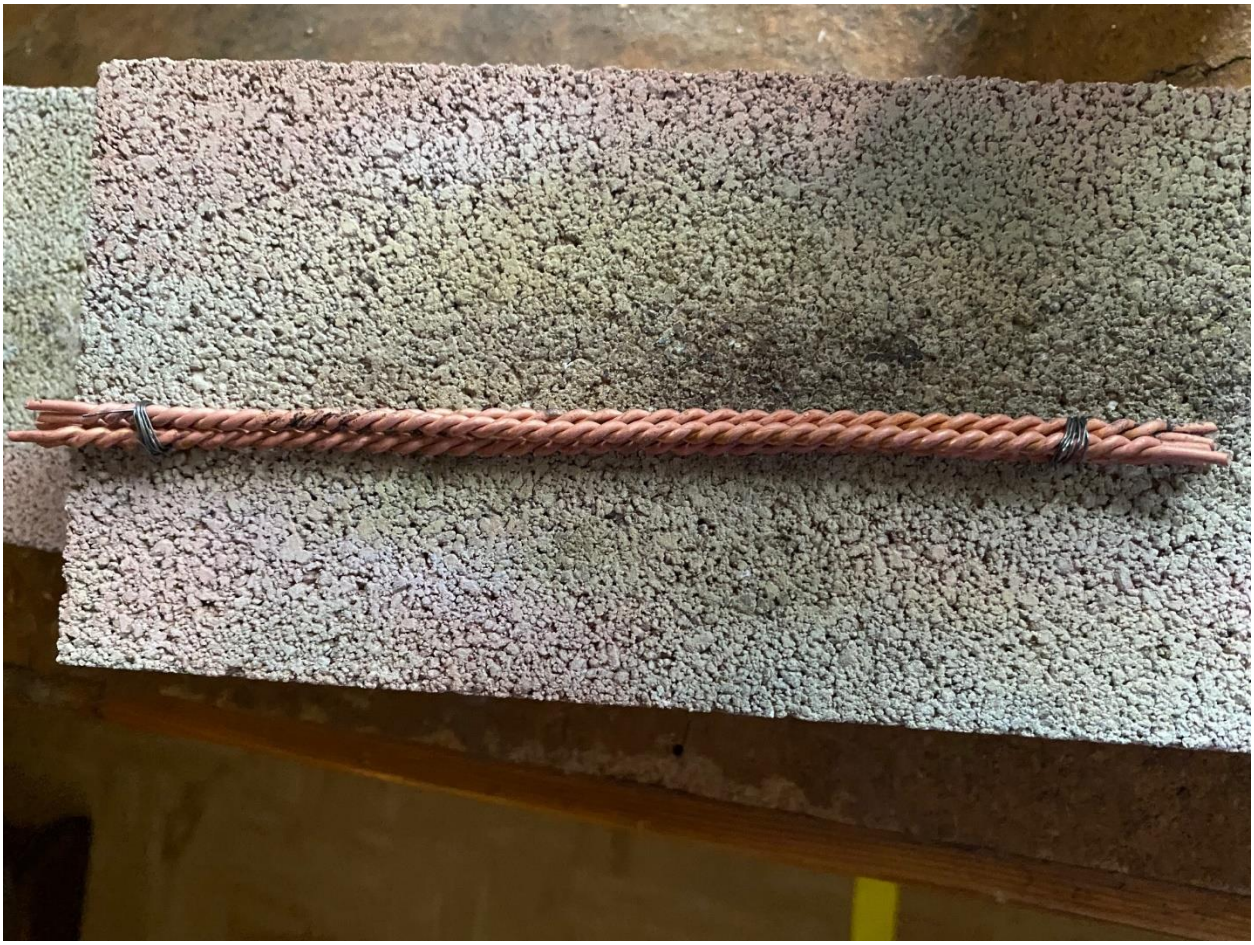
It is imperative that the sets have as close to an equal twist as possible. The easiest way to do this is count the twists. As you twist, pull gently on the vise grips to keep the tension even. Twist until you are satisfied with how tight the twist is and set this aside.

Twist all 6 wires into 3 sets.



Once these pairs are finished, it is time to start annealing. Annealing is the process of heating bronze to red and glowing, and quickly quenching into a bucket of water to rapidly cool. This process changes the molecular structure of the material and makes the bronze easier and more pliable to work. If this is not quenched, the entire process falls apart. Bronze is a harder material, and will require several annealing cycles of heating and quenching. My personal preference is 6 annealing cycles per set.

Once you have finished annealing the sets together, create the bundle. There are several ways to do this. I prefer to take a piece of thinner wire and wrap both ends to create a bundle. You will see that it stacks as a triangle.



Put one end back in the vise, and clamp the other end with the vise grips.

Take the entire bundle and twist counter-clockwise. This is what creates the plaited look. Twist this until you are satisfied with the finished look. Be careful of overtwisting, because the piece can begin to buckle. Buckling occurs when the piece is twisted too tightly and the piece begins to twist in on itself.

Now it’s time to begin the fusing. Fusing is the process of bringing the metal to flowing and melting it together; this will permanently join the material together. To fuse, focus the torch on one area until it gets hot. As it heats up, you will begin to see the metal glowing and becoming liquid. This liquid will flow down the rest of the piece to join. The fusing must be done on a firebrick that is slightly elevated and at an angle. This photo shows how my brick is set up to allow for the correct angle for the piece to flow and fuse well.

Fuse both ends. Don’t worry about how they look now, we will clean it later.

Once the ends are fused, square them off. For this process, you will need to anneal the ends and hammer the ends into a square shape.

Anneal the ends.

It is easier to start with one end, then the other. You will need to continue annealing often for the next steps, as this will keep the material easy to work. Bronze will work harden, so keeping it pliable is crucial.

Round the ends and draw them out slightly.

This is a two-step process, so we will start with drawing them out.

You do not need to draw them out if you don't wish to, but I prefer to draw them out and give them a slight taper. To draw them out, anneal the ends and start hammering them. You will want to strike the surface of the terminal with a small portion of the hammer face and pull toward you as you strike. The pulling motion will start moving the metal and making it thinner. Move down the terminal doing this motion until you are satisfied. Be sure to strike all the square faces equally. Anneal often during this stage, as we do not want the metal to crack or flake.

Once you are satisfied with them, we will need to round them out. First, we will begin by taking our square and rotating one half turn to set it on its edge. Hammer this edge. Rotate to the next edge and repeat all the way around. We will now have an octagon. Start hammering on the surfaces while rotating the entire piece in your hand so the terminals are turning on the anvil. This motion ensures that all faces are struck equally, and as we turn the edges will start to become smooth. As you continue, you will see the terminal becoming round. If you are not satisfied, you can roll the piece between the anvil and the hammer to smooth it out.

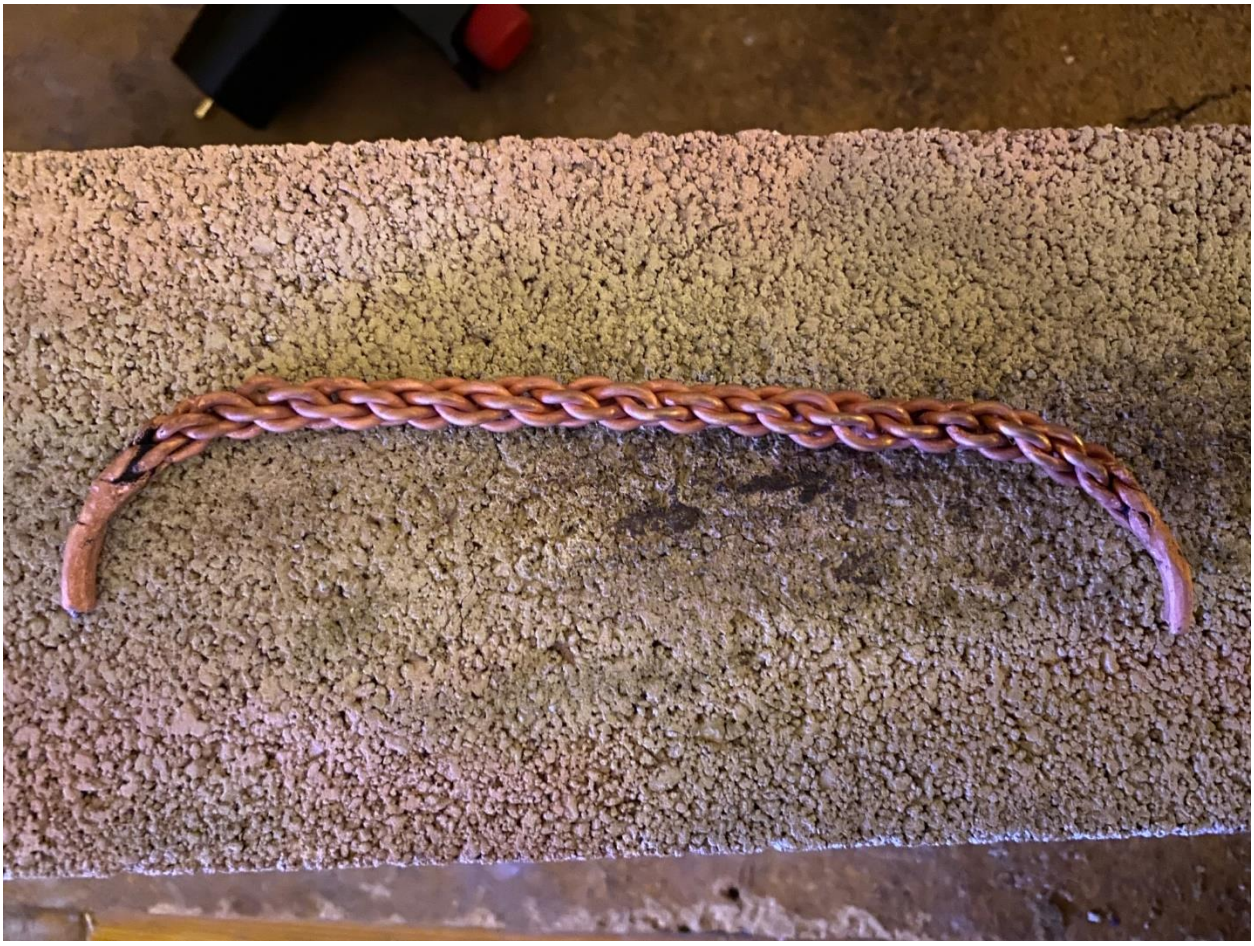
We will now need to shape these ends. Anneal the ends again and place your terminal on the horn of the anvil. Begin hammering the terminal on the horn of the anvil to give the ends a slight curve.  This will help the arm ring sit on the wrist better and curve with the curvature of the wrist.

Anneal the entire piece.

It is now time to clean the piece. The first step is to pickle the piece. Pickling is a method of cleaning that uses a chemical reaction to clean firescale from the piece. Firescale naturally occurs as we heat the piece and is the residue left over on the piece from the heat. There are several commercial options available, but I prefer the following homemade method. It uses ingredients you can find at the grocery store.

Take 2 cups water and two cups vinegar and put in a small pan. Bring to a boil. Once it is boiling pour into a glass or ceramic container. I use an old Pyrex casserole dish. DO NOT USE THE CONTAINER FOR FOOD AFTER YOU HAVE USED IT FOR PICKLING. It will now be your pickling dish. Once you pour the water/vinegar combo in, add 4 teaspoons of salt to the liquid and submerge your piece. Let sit for 5 minutes and rotate with a pair of wooden tongs. Let sit on the other side for 5 minutes. Remove the piece from the pickle solution and rinse with water, then dry thoroughly.

Remove and dry. It will not look the same as the beginning, it will be discolored.



Now, we will begin the cleaning and polishing process. I use sandpaper blocks, one coarse/medium and  one medium/fine. Begin with the coarsest and rub the entire piece down. Cycle through all four sides, then move to the medium/fine block. Do the same thing.

Next, I take the piece to a buffer. Using a hard wheel and white rouge, I give it a first pass. Then I move to a floppy wheel and red rouge. This gives it a high luster.

Use sandpaper on the ends to smooth them out to avoid any injury or discomfort when putting on and taking off. They should be smooth when you are finished.

Shape the arm ring to the desired shape. I shape by hand, but you can shape with a soft mallet and an anvil or with a scrolling fork – a tool designed to bend metal into a round shape.

Try it on! Once you have finished, congratulations! You have successfully made a beautiful piece of Viking age jewelry.

**Types of Plaits**

This method created a 3x2 arm ring, but it can be altered and used to create other types of arm rings. The most prevalent were 4x2, 4 sets with 2 wires each.

Less prevalent, but also found, was a 3x3 pattern. This is 3 sets with 3 wires per set.

Each plait style gives a slightly different look, and is largely based on personal preference. Experiment with different types of plaits to see which you like best!