Kata Kama Yari and the Finishing Bench

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Japanese spear (or lance) points come in a number of shapes and styles. The most common is the su-yari with a straight single blade (Fig.1). Being Japanese, that's not good enough, so crossbars were added to create the kama yari which comes in two flavors - the Jumonji Yari has symmetrical arms, typically curving slightly towards the point and the Kata Kama Yari which has a single arm, typically straight and at right angles to the main axis of the blade (Fig.2).

Fig.1: Su Yari (and associated components)

While there were socketed yari, the most common form has a long tang, typically longer than the actual blade.

A friend who is one of the curators at the Carnegie Museums of Pittsburgh sent me a picture of a Kata Kama Yari in their collection (Fig.2). From a knifemaker and smith viewpoint, the obvious question is "HOW?".

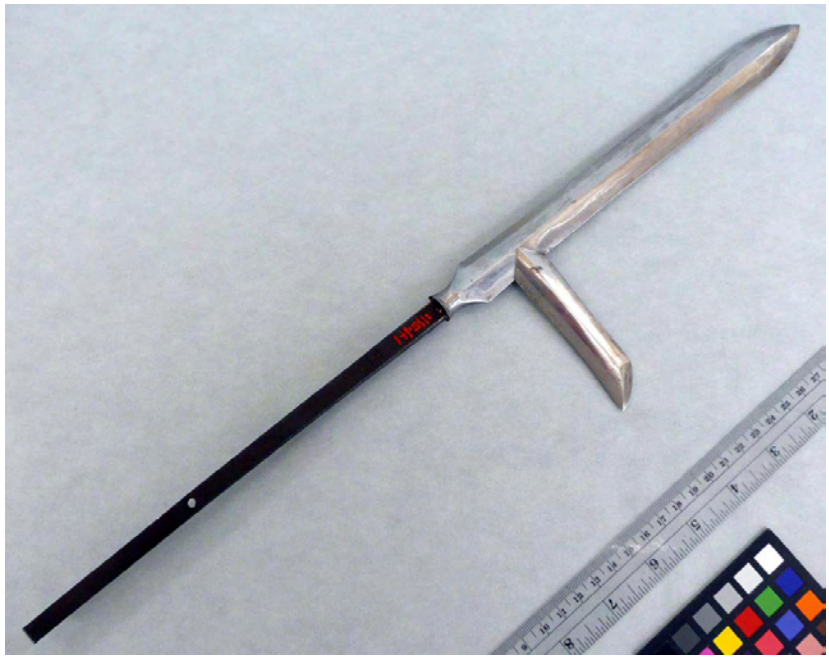


Figure 2: Kata Kama Yari (in the Carnegie Museums of Pittsburgh)

The first step was to determine the actual dimensions. The folks at the Museum were kind enough to include a ruler in the image, so with a bit of digital slight of hand, the dimensions are shown in Figure 3. The overall length is 18" with a 10" tang , an 8" blade and a 4" side arm. The blade and side arm are approximately 1" wide. Unfortunately, there is no way to determine the thickness of this particular blade from the image but based on other Japanese blades, something between 0.25" to 0.375" is likely.

The real question is how did they do that sidearm? There is no evidence of welding and to saw or chisel the shape from a

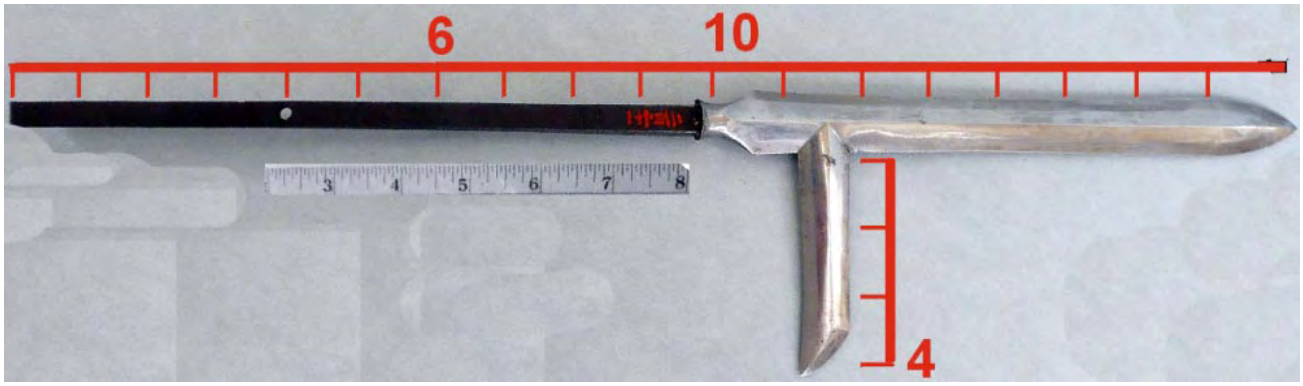


Figure 3: Dimensions of the Kata Kama Yari

sheet of material is highly unlikely.

After a bit of head scratching, I came up with the pattern shown In Figure 4. I know that Japanese sword smiths (who also made the yari) created slabs of material about 2" wide during the normal welding of katana. They not only fold the steel along the long axis (tang to point) but also fold the material left to right when the billet is getting too broad. Given that, a slab of material could be cut in the pattern shown. The blocks marked "X" are discarded (or never existed) and the short section on the right could then be forged into the basic side arm. After that, a point could be drawn on the main blade and a tang driven out of the base of the material. Ok - fine thought but is it really doable?

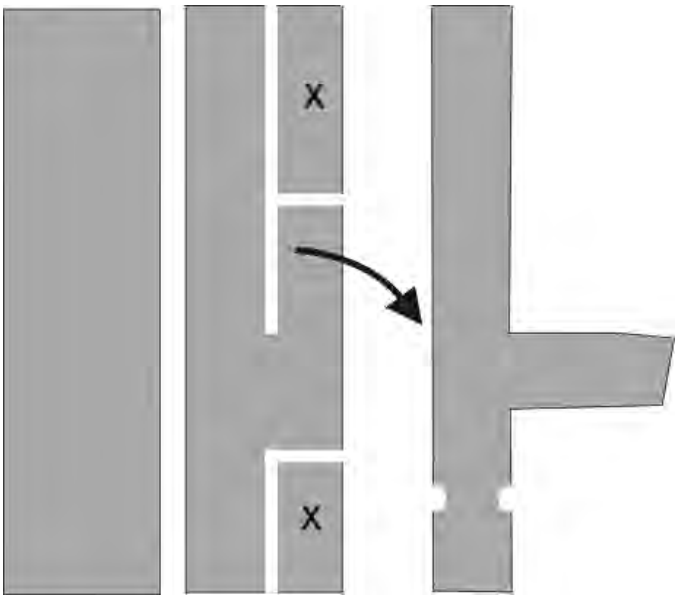


Figure 4: Cut pattern

I had to try. I started with a slab of 5160 - 2" x 3/8" thick (you're right - a piece of a leaf spring). I torch cut the slots as shown and using the hardy hole in the anvil, the forging of the side arm was actually fairly easy. The forging of the tang involved a guillotine swage and a lot of hammering (remember - the tang is 10" long). Bevels were forged into the material in the usual manner. Now comes the fun part - refining the shape by hand.

If you look at the images on the first page, you will note that five planes of material come together at a single point on either side. The usual "jump-over-to-the-grinder" just won't hack it. The approach taught by Don Fogg is about the only feasible way to go -- use files, draw-files, stones, and sand paper for many hours. The work is greatly aided by a bench made to support this type of hand work (see below). The bench is a simple sturdy bench made of 2x6 pine with 2x4 legs and a lower shelf to hold miscellaneous materials. There is a 2x2 support running the length of the bench and centered under the crack between the two boards making up the deck of the bench. None of this is sacred - anything that is sturdy, easy to sit on and about 3' long will do. Since hand finishing implies lots of little items (files, stones, oil, sand paper in a lot of grades, etc.), I found that a tool box with many drawers was a good idea - the prime advantage being that everything you need is in one place and that it is a lot easier to remember one or two big items than dozens of small ones.

Once you have the bench, the next step is to somehow support the work so you can work on it from a number of angles while sitting in one spot. This is accomplished with the components shown in Figure 6. There is a Base ("B") consisting of some angle iron with 3 1/2" holes, a section of 3/4" black pipe with a 1/2x13 nut welded in the bottom of the pipe and then welded over the center hole in the angle, a couple of 1/2" bolts to go into the other 2 holes. A long 1/2x13 bolt runs through the 2x2 support and screws into the base. The base is locked down and the short bolts are dropped into the lateral holes to prevent the base from rotating. As with the bench, all you really need is someway to attach a pipe to the end of the bench so it cannot rotate. A holder ("H") slips over the base and is locked in place with a 3/8x16 bolt. The top of the holder is essentially the same as a carpenters wood clamp except it is made from steel. A board (usually 3/4" thick, 1.5" wide and as long as the work) gets clamped onto the holder. This design allows you to position the work on the board (using clamps ("C") and maybe a wooded wedge or two ("W") to prevent marring) at any angle you like.

Figure 5: Finishing Bench & "Tool" Box

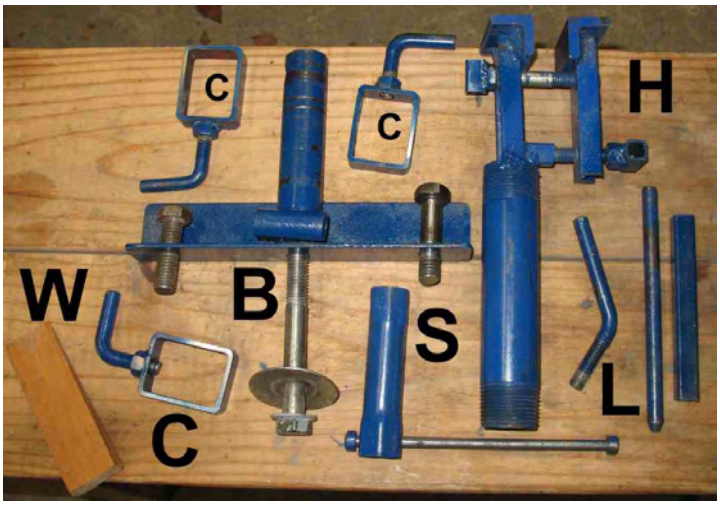
If you look closely, you'll note that with the exception

of the long base bolt, all other fasteners are either bent threaded bars or have square tube sections welded onto their heads. This means that you do not have to keep looking for wrenches - all you need is a single piece of 3/8" rod stock and maybe a section of tubing ("L") to lock and unlock all the components.

Figure 7 shows the rig being used to finish a kodachi, (also known as a chisakatana or "castle sword"). The blade length is approximately 24". Swords of this length were carried by the merchant class, samurai servants, and reputedly, by guards in castles where the longer katana might be a hinderance.

One of the advantages of this unit is that blades of different lengths and configurations can be accommodated by using different support ("S") boards. Note "K" at the base of the bench. That was the unit used for supporting the kata kama - the lateral branch was a pressure fit and could be moved along the main support or removed as needed. Also shown in Figure 7 is the oil container ("O") and a set of EDM stones (220, 320 & 600 grit) . Just a word to the wise - if using EDM stones, drill shallow holes in one of the sides to code the grit (for example: 1=220, 2=320, 3=600). Once you use them for a bit, there is no way to tell which is which without a bit of help.

The yari will eventually be completed with a full length pole, a butt-end counter weight (also cast from bronze) and an appropriate sheath (saya). The next project will be a naginata -- it has to be easier than this yari since there is no side arm but that blade will have a hamon to justify the hand finishing.



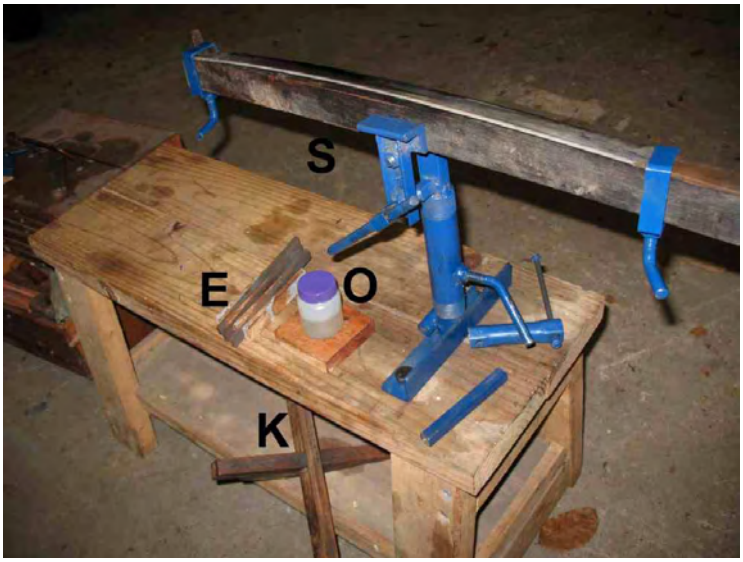


Figure 7: Finish bench in use

Figure 8: Kata Kama yari with a "stand-in" for the 6' pole