

Forging a Fishtail

Text and photos by Dan Nauman

Drawings by Tom Latané

Lesson #20. Unit: Forging a Fishtail

Definition: Drawing down is the reduction of the cross-sectional area of a bar.

Intent: To continue learning aspects of using the cross peen accurately for controlled tapering and even spreading.

Tools: Basic forging tools.

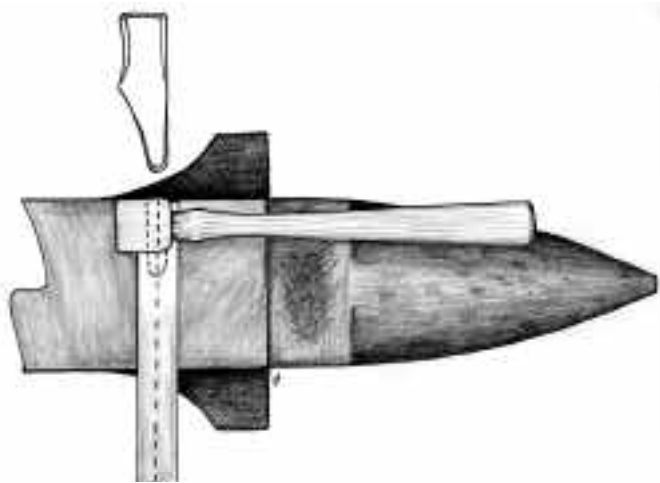
Material: 1/4" x 1" x 18".

Note: You may wish to review Lesson #19 which explains how the cross peen should be dressed, basic cross-peen forging, and cross-peen forging dynamics.

Step One

Heat 3" of the end of the bar to a full yellow heat, then lay the bar flat on the anvil with the end of the bar 1/8" in from the far edge of the anvil. You should be standing with your hammer arm's shoulder next to the anvil, and your body perpendicular to the anvil.

With the peen pitched down about ten degrees towards the end of the bar, and with the peen parallel to the length of the bar, begin striking the middle of the bar. (See image #1.)



1. With the bar held perpendicular to the anvil and its end even with the far edge of the face, the first blows of the peen land in the center of the bar.

The reason the peen is pitched is to begin forming the taper. The bar is near the edge of the anvil to reduce the chance of an errant blow damaging the face of the anvil. (See image #2.)

When the middle of the end of the bar has been reduced to 1/16" in thickness, slowly begin working the peen back into the



2a. The hammer head is tilted so the peen strikes the bar at the angle of the desired taper.



2b. Because the bar is held even with the far edge of the anvil, the corner of the hammer peen should never come in contact with the face of the anvil even if the blow lands a little wide of the mark. Working at a slightly rounded edge will prevent damage to the squarest edge of the anvil, should the bar slip back from the edge.

bar, taking overlapping blows and creating a trough down the middle of the bar. Continue to work back into the bar with the peen pitched. As you work back, begin to lighten your blows so that the trough feathers out to the full thickness of the bar. The trough should end about 2 1/2" from the end of the bar. (See image #3.)

Step Two

Heat 4" of the bar to a full yellow heat, being careful not to burn the thinned middle section of the bar. You can tilt the bar on edge to keep the thin middle section out of the direct blast of the fire. Place the bar on the anvil as in Step 1. Continue peening the bar, starting from the middle of the bar, then gradually moving out to the far edge. As the middle is already thinner from step 1, be careful not to get the middle of the bar any thinner than 1/16". Always maintain the peen parallel to the length of

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3. Centered trough formed by cross peen, 2 1/2" long.

the bar. Move the peen in small increments, overlapping the track of each previous blow. Continue until you reach the corner. It is interesting to note that the length of the bar doesn't change dramatically in this process, because the shape of the peen is primarily forcing the metal to change the bar's width. Correctly executed, you will develop a corner as seen in image #4.

Step 3

Heat 4" of the bar to a full yellow heat (remember to tilt the thin side away from the fire blast), placing the bar on the anvil as you did in prior steps. This time begin striking the bar again in



4. After Step 2, the far corner should look like this.

the middle, but now gradually work the peen towards the near edge of the bar, maintaining the peen parallel to the length of the bar. Again, move the peen in small increments, overlapping the track of the previous blow. Continue until you reach the corner.

Do not get frustrated if the shape in this step starts out somewhat lopsided, as this is actually how the shape should look at this point, and through controlled blows, will begin to blossom

into a fine and symmetric fishtail shape. (See image 5.) Note that the end of the bar remains fairly straight and perpendicular to the sides of the bar when properly executed. Though you should strive for this feature, do not get overly concerned if the end is not perfectly straight and perpendicular, as refining it will come later in Step 5.

As you get more experienced, you may choose to perform this step in the same heat along with Step 2.

If you encounter shapes as seen in images 6 and 7, you can work the area lightly with the cross peen to fill in the gaps in image 6, or to straighten the edges of image 7.



5. Both corners have been peened out in this photo. This is what the fishtail should look like before refining with the face of the hammer.

Step 4

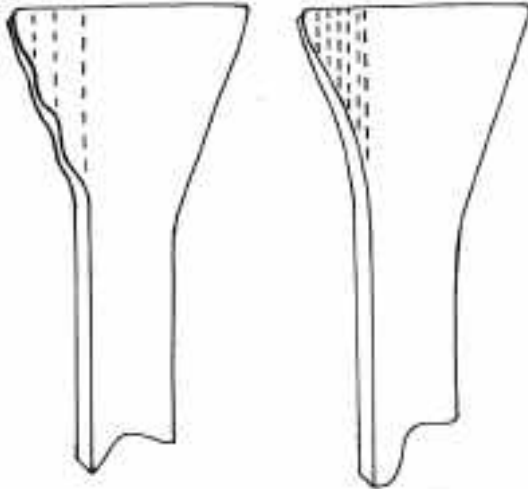
Heat the entire fishtail to a full yellow heat. With the face of the hammer, smooth out the cross-peen marks, maintaining an even lengthwise taper.

Step 5

In this step we are going to refine the fishtail, by making the rounded corners of the fishtail more crisp and sharp, and refining the end and sides to straight lines. We will use the hammer's face to do the work.

Take a medium orange heat on the entire fishtail. Lay the bar across the anvil with the fishtail extending two inches beyond the far edge. Holding the cool end of the bar tightly against your thigh to help absorb shock, direct rapid light blows upon the end of the fishtail, driving the material toward yourself. If the fishtail buckles during this upsetting process, move the fishtail to the anvil surface to flatten. There may need to be several alternate rounds of upsetting and flattening blows before the end of the bar is straight and perpendicular to the centerline of the bar, along with a consistent lengthwise taper.

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6. A wavy-edged flare results when the blows of the peen are too far apart. Narrow portions of the edge are thick portions of the taper. Direct blows at these spots.

Take another medium orange heat. Lay the bar on edge, with the beginning of the fishtail at a rounded portion of the near edge of the anvil, making sure the straight portion of the bar is off the anvil (See image 7.) Lightly hit the side of the fishtail to sharpen the corners. You will note that the corner you hit with the hammer sharpens faster than the corner on the anvil. Alternate sides so the corners sharpen evenly. If the fishtail begins to fold, stop hitting the edge, and flatten the fishtail back down with taps just hard enough to flatten, but not to squeeze the metal, which would further thin your work.

You may need to repeat this step, and take several heats to accomplish the desired shape (See image 8.)

Note: You do not want to get the metal any hotter than medium orange, as the material needs to be stiff enough to support the refining blows without folding over readily. This is one of the few times when cooler material is better.

Forging dynamics: Image #9 shows the finished fishtail shape



7. This is the position of the fishtail on the anvil to refine the shape. Refine at a low heat to reduce buckling.



8. The refined fishtail shape. Note that the centerline of the parent bar is centered also in the fishtail.

(left) that was made by the cross peen. The forging on the right, made by only the hammer face, has the same taper and end thickness, but not the same width as the forging on the left. Because the hammer face spreads material in all directions, for this exercise, it cannot forge the material as wide as the cross peen.

Targets

- Try to perform Steps 1-3 in one or two heats.
- The length of the fishtail should be 2 1/2" .
- The width of the end of the fishtail should be between 2 3/16" and 2 3/8" .
- The flared sides of the fishtail should be straight, and the end should be perpendicular to the length of the bar.
- The centerline of the fishtail and the parent bar should be the same.
- The fishtail should have a slow and even taper in its lengthwise cross-section.
- There should be no cross-peen marks in the bar.



9. The forging on the right was made using only the hammer's face. It has the same taper and end thickness as this lesson's forging on the left, but could not achieve the desired width without sacrificing the other two dimensions.