Lesson One: Drawing Out

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Lesson Number One–
Draw a sharp point on a 1/2” square bar.
The taper should be straight, three inches long and in line with
the axis of the parent bar. The cross section of the taper should
be square. The surfaces of the bar should be smooth with no dis-
cernable hammer marks. The beginning of the taper should be a
crisp line.

Intent:
Students will learn to draw out tapers of specified length and
check their results for accuracy.

Tools Needed:
Forge, anvil, hammer, ruler, square.

Materials:
24” of 1/2” square mild steel bar (this is enough material to
practice the exercise several times).

Method:
When working to a specified length, establish the point first,
then extend the taper to the desired length.

Step One:
Mark the anvil with soapstone or marker three inches from the
anvil step. This is the finished length of the taper you will forge.
Take a yellow-white heat on the end of the bar. Place the bar on
the anvil so that the end of the bar is at the far edge of the anvil
and only the end of the bar is touching the anvil face. This way,
the hammer won’t strike the anvil surface if it overhangs the hot
bar. Strike a blow on the end of the bar with your hammer. The
hammer should strike at an angle. There will be a wedge-shaped
daylight space between the hammer face and

Placement of steel and position of the hammer blow.

90 degrees, hit and turn 90 degrees back again. You need only
turn the bar back and forth as the underside of the bar is worked
against the anvil. Continue this sequence of forging until you
have made a sharp point.

Hint:
It is very important to rotate the bar exactly 90 degrees each
time. Use the original flats of the bar as a reference. If the turn is
either more or less, the bar will become a parallelogram in cross
section and that makes it difficult to attain the desired result.

If the bar does become a parallelogram, hit the corner of the
long diagonal; then return to forging the flats of the bar. The
sooner you catch and correct this error, the better. Keep a square
cross section.

Step Two:
Once the point is established, start working back from the point
Rotation and deformation of the bar by the hammer, and correcting a parallelogram, until the taper is 1/4 " short of the desired length. Work with heavy hammer blows at a bright heat while you are reducing the cross section. Lighter hammer blows at lower heats will help you refine the shape of your taper and smooth the surface. Establish a clear and well-defined beginning of your taper.

**Step Three:**
Now focus on smoothing the surfaces and straightening the taper at the same time. Make the taper straight and true. Refine the shape of the taper with light overlapping hammer blows. Do this as the bar cools to dark orange and red color. The bar scales less at this lower heat and you will get a smoother surface. Sight down the length of the bar for straightness. Straighten with light blows at low heat. Another way to tell if the taper is straight is to stand the bar up with the point on the anvil face and spin it. If it is straight there will be no wobble.

The four flat sides of the taper should be in line with the original flat sides of the bar and the taper should align with the original centerline of the bar. Any deviation should be corrected with your hammer at the anvil.

**Targets:**
Try to draw out and finish the taper in two heats. Beginners may take several extra heats.

Maintain a square cross-section in the taper. Check this with a square.

Hammer-finish with smooth surfaces and without discernable hammer marks.

Maintain a perfectly straight axis in the bar and in the 3" long taper. Check this with a rule and also practice sighting down the length of the bar until you can attain the same results by eye.

Measure your results using a square and a rule. The four flats of your taper should be straight within two or three thousandths of an inch, length within 1/16" and square in cross section. With practice you should be able to forge to this accuracy by eye. Repeating this exercise with care and attention will enable you to achieve these results quickly and consistently.

**Forging Dynamics:**
In this exercise, when the square bar is struck, it gets thinner top
to bottom but wider side to side. When you turn the bar 90 degrees and hit again, (you are restricting the spread of the bar, but allowing lengthwise stretch. Repeating this hit, turn, hit, turn sequence results in creating a taper. You are redistributing the mass of the bar with your hammer. As the bar become thinner it becomes longer. Notice that the thinner steel heats faster. It also chills faster. This is because there is less mass. Also note how much the bar you tapered has stretched in length.