

Cutting a Bar

by Dan Nauman

Illustrations by Doug Wilson

Lesson #13

Definition: Cutting a hot bar using the hot cut hardy.

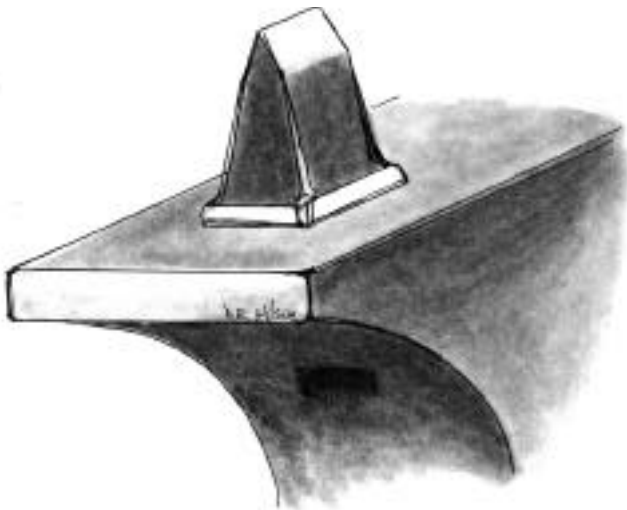
Note: A hot cut hardy has a cutting edge of about 25 to 30 degrees. A cold cut hardy has a cutting edge of about 60 degrees.

Intent: To learn to cut through a round, square, or rectangular bar using the hot cut hardy on the anvil, making a clean and even cut, with the resulting burr located in the center of the cross section of the bar. With the burr in the center of the bar, it will make life easier for following forging operations such as upsetting the end of the newly cut bar.

It must be said here that this method is not necessary for all cutting applications. A bar can be cut faster (and easier) by driving the bar down into the hardy from one side. This procedure will leave a burr on one side of the bar, and will also create an angled edge on the end. This edge may be desirable in some circumstances, i.e. starting a taper on the end of the bar, or an intentionally angled end of the bar to form a scarf.

Tools: Anvil; hot cut hardy; hammer; soapstone or chalk.

Material: 1/2" square x 12" mild steel.



A hardy, with the cutting edge parallel with the anvil's edge.

Forging Dynamics: The angle of the cutting edge of the hardy is important when cutting hot metal. With the narrower cutting edge of the hot cut hardy at 25 to 30 degrees, the material being cut will not only distort less, but the act of cutting will be more rapid. The wider 60 degree cutting edge of a cold cut hardy will tend to distort the material, i.e. creating a wide v-notch, and also potentially reducing the cross section of the bar from the additional hammer blows necessary to drive the bar through a thick wedge.

Step One

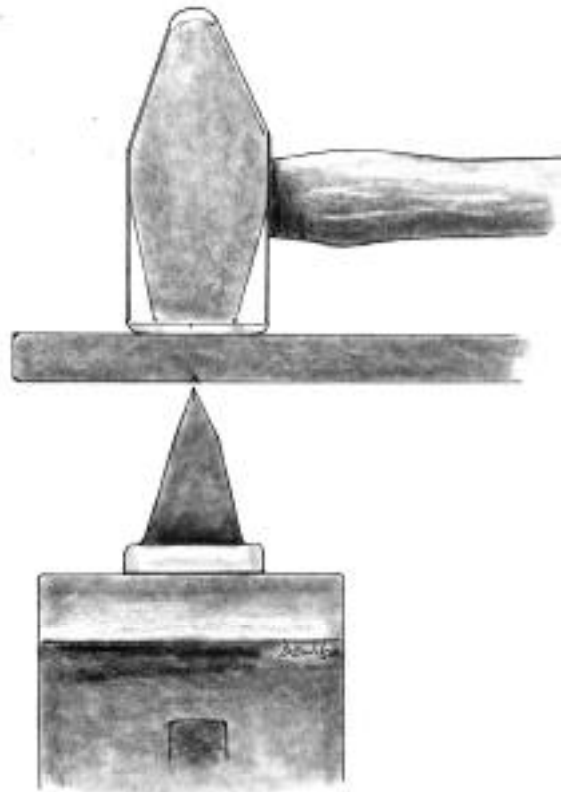
Measure 2" from the end of the bar and mark that distance with soapstone on the bar. Place the cold bar on top of the hot cut hardy edge, with the 2" mark directly above the cutting edge. Turn the bar up onto its corner. With your hammer, strike the bar down onto the hardy, hard enough to make a good nick. This nick will be used to indicate where the bar will be cut when hot. (For alternative marking methods, see "Notes" at the end of this lesson.)

Caution: Nicking the corner of a bar on a hot cut hardy as in the manner of Step One could damage your hardy's cutting edge if you are using cold rolled steel. Cold rolled steel (as milled) is harder than hot rolled steel of the same type. Once heated, or normalized, the cold rolled steel's properties match that of hot rolled steel.

Also, this method is never a good idea if forging high carbon steel. Review the alternative marking methods at the end of this lesson, and use good judgement.

Step Two

Heat the area to be cut to a yellow heat. Place the bar on the hardy, and move the bar back and forth to find the nick. Turn the bar onto its flat side (side "A") and hit a solid blow.



The hammer correctly placed over the bar and hardy.

CONTROLLED HAND FORGING

Note: Keep the bar parallel to the face of the anvil, and 90 degrees to the hardy, at all times during this process.

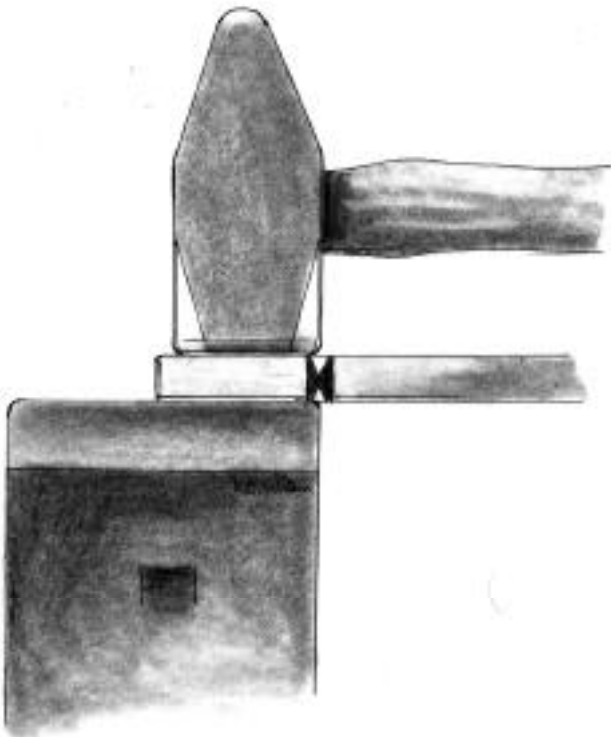
Turn the bar 45 degrees (right or left), and strike again lightly to mark the corner. Continue to turn the bar in the same direction to mark the next face with a sharp blow.

Reversing the direction you have previously turned the bar, turn the bar back to side "A", and then turn 45 degrees and lightly nick the corner. Proceed in the same direction to the next face, and mark this face with a sharp blow.

Next, turn the bar 90 degrees to the fourth face. Look down at the bar from a bird's eye view, and you should be able to line up the nicks on the bar with the cutting edge of the hardy. Once you have lined up the nicks, proceed to strike the bar solidly.

Continue rotating the bar to each face, and continue cutting into the bar. Cut until the thickness of the area uncut is roughly 1/8".

Note: Do not cut the bar all the way through...as you may sever the bar, and you may damage both your hammer as well as the hardy. Severing the bar could also send the very hot, cut-end of the bar sailing across your shop.

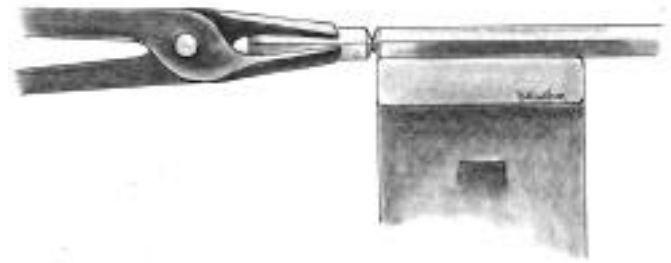


Weighting one end of the bar with the hammer to twist the bar.

Step 3

There are several methods to break off the end of the bar. You may:

A.) Hold the short end of the bar with tongs or hammer and bend up and down or twist until the end breaks off.



Alternate method of holding the short end with tongs to twist the bar.

B.) Shear the end of the bar by lining the cut up with the far edge of the anvil and strike down on the protruding end with your hammer.

C.) Quench the area cut with water. This will mildly harden the bar so that the bar can be snapped off easily.

Targets:

-You should be able to cut the bar in one heat.

-The cut should be even. No "corkscrewing" or misalignment of cuts.

-The bar should remain straight.

-The burr left on the end of the bar should be centered in the cross section of the bar.

Notes:

Some alternatives to nicking the bar on the hardy to mark where the bar is to be cut:

A.) For shorter cuts, you can draw a line on the face of the anvil. The line should indicate the length of bar you wish to cut. Measure from the near side edge of the anvil with chalk, soapstone, or for longer lasting lines, a felt-tip pen. Place the end of the bar even with the chalk line. Use the edge of your hammer face to indicate the line to be cut by lining it up with the edge of the anvil (with the hammer on top of the bar). Now carefully bring the bar and hammer to the hardy. Line the hammer edge up with the cutting edge of the hardy. Apply some downward pressure so the bar does not slide off the mark. Strike solidly and proceed as indicated in the lesson.

B.) Some smiths prefer to use a center punch, and others a chisel to mark where bar is to be cut. If using a center punch, make sure the punch mark is deep enough so that you can see it when you bring the glowing bar out from the fire.

C.) For marking cold rolled or high carbon steels, use soapstone to mark the cut, then take an initial low heat (bright red). The soapstone mark should still be easily seen at this temperature. Nick the bar, (with a hardy, chisel, or center punch) then reheat to make the final cut as outlined in this lesson.