

Lesson 1: Working With Cold Metal

Techniques for Bending Cold Metal

Objective: Students will observe how to bend cold metal.

Directions: Use a vise and common metalworking hand tools to bend cold metal.

Materials and Equipment:

Bench vise

Safety goggles or glasses*

Gloves

Ball-peen or blacksmith's hammer

Adjustable wrench

Straightedge

Soapstone, scratch awl, permanent marker, or other marking tool

Flat, round, or square metal pieces to be bent, selected by the instructor

Small piece of sheet metal

Pipe or round stock, to be used as a form for rounding a piece of metal

Angle iron, to be used as jaw caps on the vise

* Everyone participating in or observing the demonstration should wear appropriate protective eyewear and any other protective clothing as needed.

Note: The following demonstrations are intended to illustrate bending techniques covered during the classroom discussion. The demonstrations below are of some of the techniques presented in the lesson. If additional or different techniques were covered in class, they should be added to or substituted for those below.

Procedure:

1. Wear appropriate safety equipment.
2. Demonstrate the correct procedure for using a hammer and a vise to bend flat, square, or round stock approximately 1/2 in. thick or less.
 - a. Using the layout tools, mark the metal at the point where the bend is to occur.
 - b. Secure the work in the vise with the mark for the bend at the top of the jaws and the longer portion of the stock extending above the vise.
 - c. Push the metal with one hand using a hammer just above the vise to form the metal into the desired angle.
 - d. Be sure to bend the metal sharply at the jaws of the vise, not above it.

3. Demonstrate the correct procedure for rounding metal of a similar dimension.
 - a. Select a piece of pipe or round stock the same diameter as the desired bend.
 - b. Secure the end of the work to be bent and the round stock tightly in the vise.
 - c. Push and hammer the metal to bend it around the stock.
 - d. Loosen the vise and adjust the work to continue the bend, tighten the vise, and continue pushing and hammering.
 - e. Repeat until the desired bend is obtained.
4. Demonstrate the correct procedure for twisting metal.
 - a. Mark where the twist is to begin.
 - b. Make a second mark above the first equal to 1 1/2 times the width of the metal.
 - c. Place the metal in the vise with the point where the twist is to begin at the top of the jaws.
 - d. Position the wrench on the metal so that the bottom of the wrench is even with the second mark and the jaws extend the width of the metal.
 - e. Hold the metal perpendicular to the vise with one hand and turn the wrench with the other hand until the desired amount of twist is reached.
5. Demonstrate the correct procedure for bending small pieces of sheet metal.
 - a. Lay out a line where the bend is to occur.
 - b. Place the angle iron over the jaws of the vise to serve as jaw caps and to extend the work surface.
 - c. Put the stock between the pieces of angle iron and tighten the vise.
 - d. Bend the metal over the angle iron using a hammer.
6. If there are any machines in the shop that can be used for bending, such as a box and pan brake, demonstrate the correct use of the machine or machines. Discuss all safety procedures students must observe for working with the machine.
7. Demonstrate the correct cleanup procedure.