

Making a basic hook tool

By Alan Lacer

The hook tool is essentially a right-angle gouge that enables the woodturner doing inside end-grain hollowing to achieve two goals: work with the grain and use a cutting rather than a scraping action.

Although there are a variety of tools on the market in many shapes — ovals, rings, and tools that look like drill bits — the hook tool is the predecessor of them all.

Follow the steps below to create a simple hook tool from high carbon steel. Although high-speed steel has longer edge-holding properties, the heat-treating procedures are beyond most woodworking shops. Because you will use this tool primarily as a finishing tool, the edge-holding properties of this carbon steel works fine.

WHAT YOU WILL NEED

3/8"-diameter drill rod (comes in 36" lengths) in oil hardening steel (very likely this will be O1 — that is "O" of the alphabet)

Grinder

Needle-nose pliers (cheaper the better, as the heat will ruin a nice pair)

Pint of inexpensive olive oil

Metal can with a lid for the oil (quart paint can works well)

Mill file

Heat source (MAPP gas with head rated for MAPP is quite practical, although a true forge, acetylene or acetylene/oxygen will also work. Propane by itself does not get hot enough)

Tempilstik (optional if you want more precision, get a 1450 degree and 500 degree)

Turning tool handle, 3/8" hole 2" deep, metal ferrule, at least 14" in length

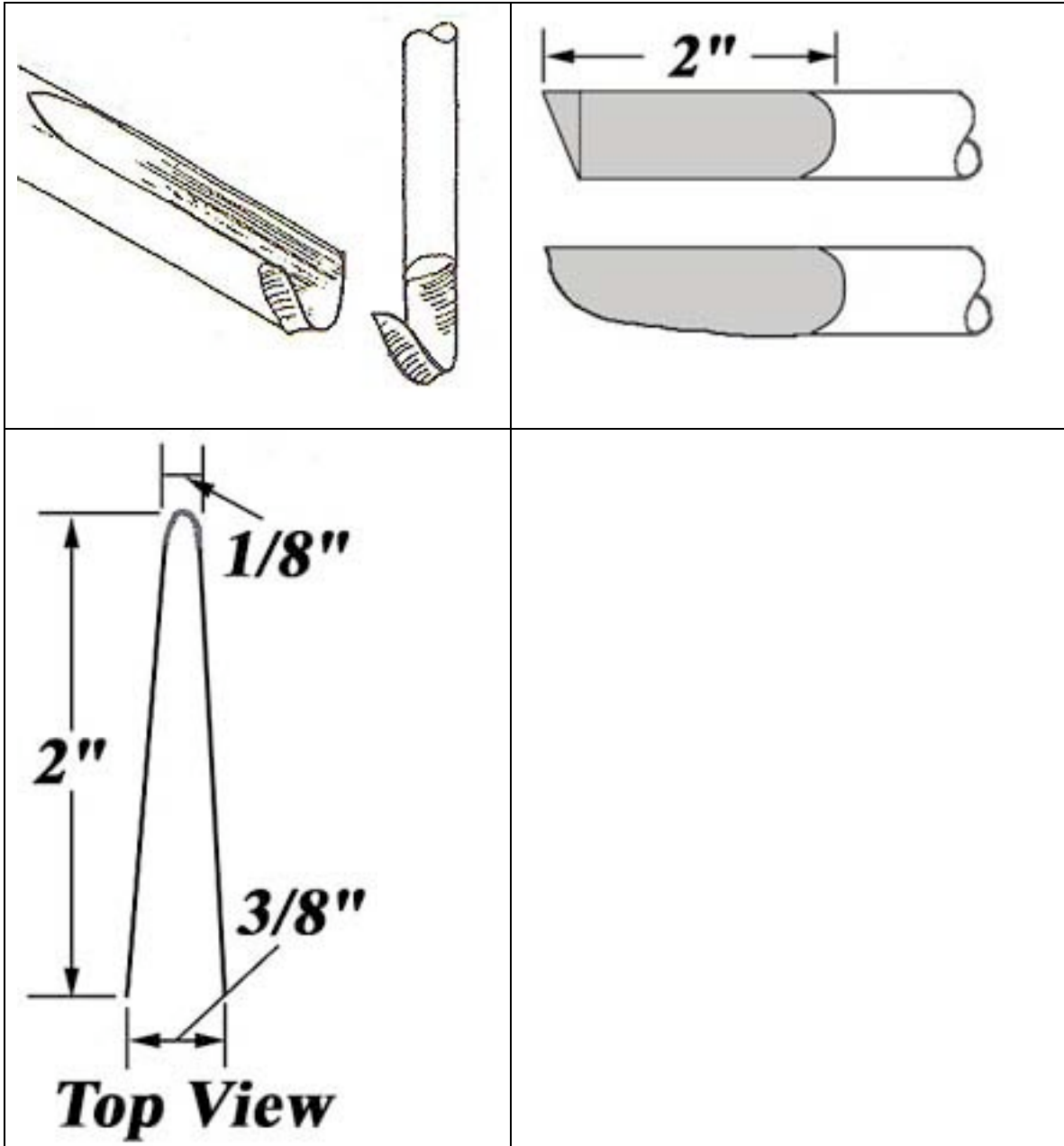
KEY TERMS

Annealed: in a softened state

Hardened: Steel that has been heated to its critical temperature to bring to a very hard and brittle state

Tempering: The process of bringing hardened steel to a softer, working hardness for a particular use.

Oxidation color spectrum: The color spectrum that results from the oxidation of cold steel as it slowly gets hot. First appearing is light yellow moving to bronze, purple, then blues (dark to light), then back to silver.

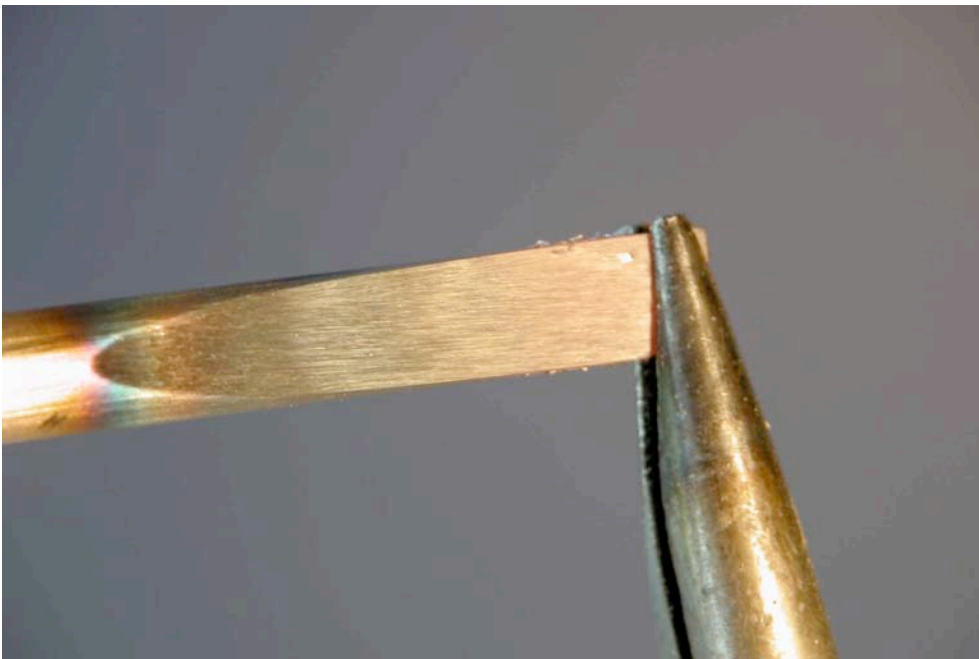


Step 1: Cut the drill rod with a hacksaw to 9" lengths. Process to grind one end to the example shown. You can do this with a wheel grinder, but a belt type grinder is easier and leaves a better finish. Determine the cutting edge side, but don't get it sharp at this point. With the cutting edge down, file the left face to a clean flat face—as this will be the inside flute of your hook tool.



Grind the blank into this shape. Left: the view from above. Center: left face (cutting edge down). Right: what will become the cutting edge.

Step 2: Place the blank in your handle, but don't glue it in just yet. With your heat source, heat about 1" of the ground end to a bright cherry red. Using the needle-nose pliers, grab as near the end as possible and twist to the left to create the hook (cutting edge pointing downwards). I like to have a fairly tight flute on hooks for boxes and goblets. Mine look a lot like a 1/4" to 3/8" bowl gouge flute.



Grip the bright cherry red end of the blank with the needle nose pliers and bend into a hook--grip near the end to produce a smaller hook. If the cutting edge is facing downward, bend the hook to the left.

Step 3: If you want a little offset of the hook, heat further back of the hook (about 3/4"), grab the area just below the hook and bend this time to the right (cutting edge down).

Step 4: Next it is time to complete the first step of heat treating and hardening. Heat only the hook to a bright cherry red. Do this evenly and gradually, and maintain this temperature for at least a couple of minutes. If you want to use the Tempilstick, take the 1450 degree one and either pencil it on the hook area before you start heating or keep touching the heated hook until it liquefies. After a couple of minutes of the bright cherry red, quench quickly into the can of olive oil, stirring rapidly. After about 1 minute, remove it from the olive oil and test with a mill file: the hook area should now be harder than your file. Feel the difference of filing between the unhardened shaft of the tool and the hook area.

Step 5: The second step of heat-treating is to temper. If you have an accurate oven at home, preheat to 490 degrees, then place the hook tool on a piece of aluminum foil inside of a shallow pan or cookie sheet. Bake for about 30 minutes, remove and just allow to air cool. Or, use the oxidation spectrum to temper by eye: wash using soap and water to remove all oil off the tool. Sand or wire brush the entire hook area until it is clean and bright. Heat with your torch (propane works well for this step as it is cooler than MAPP) about 2" below the hook. Watch the colors develop and travel in both directions from the point you are heating. First will be a spectrum of yellows, then purple, then a spectrum of blues. Your goal is to allow the dark end of the yellows—I call it bronze—to reach the hook section. **Go slow**—and when colors approach the hook, remove from heat source and allow conduction to travel the temperature. When most of the hook is a bronze color, quench quickly into water to stop the process. You may also use the 500-degree Tempilstik to better judge the temperature.



After hardening the steel, heat well back of the hook and allow conduction to bring the bronze color up to the hook area. When it appears an even bronze quench quickly into water to halt the process.

Step 6: Sharpen your hook tool. I sharpen these just like a gouge: ground bevel outside, smooth flute inside. The angle you grind on the outside will determine whether you can place the bevel on the wood without hitting the sides of your project—same issues as with bowl gouges. A good starting point is about a 15-degree angle facing away from the hook—cutting edge facing upward. Be careful with your grinding, as bluing will soften the edge—so quench in water frequently.

Honing is essential for this tool to get it truly sharp: hone the outside and finish by honing the inside flute—use a slip stone for the honing process. Complete the process by gluing the tool into your handle with slow-set epoxy. Wait for 24 hours for the epoxy to set before giving it a try.

There you have it. As simple as the process is—and the steel is quite reasonable—you can afford to experiment with different versions to fit the types of projects you are making. Here are several of the key variables: hook shape and size, degree of offset and the ground bevel angle. For large projects such as end-grain bowls, go to larger sizes of drill rod to give greater support.



Experiment with hook shapes, sizes and off-sets. For your first hook do a simple straight tool with no off-set.

Sources:

Steel: MSC (mscdirect.com), Enco Supply (use-enco.com)

Tempilstik: Many welding supply houses or MSC

MAPP gas: most hardware stores and building centers