

NAIL TOOLS, STAMPS AND REPOUSSE

INTRODUCTION

3/13/99 WLH

My name is William L. Howard, Bill for short, and I have made my living as a metalsmith for the last 30 + years. I am considered a master goldsmith by those who care about such things, and I also engrave, sculpt, mint, cast, forge, make prototypes, teach, consult, appraise, drink single malt scotch occasionally, weld, do seminars and most anything else which is legal, fun, informative and earns fair wages. I live with my wife, Kathy, and our children, Aaron and Missy, in Stoughton, Wisconsin, where we operate our school and do all the usual stuff.

I've had to do some pretty weird things with metal in the course of making custom orders, and one of the most useful skills I ever learned was how to make those special tools you couldn't buy if you wanted to but really make the job happen faster.

Not everyone has vast resources of cash or tools so I have presented this information based on a low tech, low cost approach. You will need some concrete nails, a belt sander or grinder, a heat source, hammer, striking surface, a can of water, a vise and about 20 minutes.

NAIL TOOLS

Making an engraving chisel:

1. Heat the heads of several concrete nails (bigger is better) and let them air cool to anneal (or soften) the striking surface to avoid chips, etc.

Heat only about 1/4" to red/orange or until it's nonmagnetic. If you overheat, the steel will emit sparks which means you are losing carbon content which you don't want to do.

2. Heat the pointed end to red/orange and forge flat as shown in figure 1. If you're quick you can hold this with your fingers. During the same heat, hammer a slight bend near the tip as shown in figure 3. This will save you some grinding later.
3. There are three basic parts to an engraving tool - FACE, HEEL & SHAFT
 - a. You sharpen the face
 - b. You shape the heel for the cut shape you want
 - c. You hold or mount the shaft

The cutting edge is where the face and the bottom of the heel meet. The profile of the face is a cross section which has been ground off the tip, above the heel, at an angle. This will cut different shaped grooves into your work. The best one to start with is the 1/2 round.

4. Grind the heel slowly with the point up to make the bottom edge 1/2 round. If you rotate it back and forth too fast, you will get a pointed shape instead of rounded. When you're happy, smooth it off with a little wet or dry sandpaper as this will make a smoother cut.
5. Next grind the angle you want for your face. Eyeballing is good enough. Grind with the heel up if you can as this will reduce burrs and try to get the plane of the face ground perpendicular to the shaft. If it's off to the right or left it won't cut straight. See large figure.
6. So far you have been working with annealed or softened tool steel which you will now harden by heating the business end to red/orange or nonmagnetic and quenching vertically in water. Don't stir, swirl or move it.
7. Your tool is now hardened and ready to sharpen. Use a light touch and avoid overheating by quenching frequently in a can of water. If you can, keep the face flat and true to the original angle. If it cuts your fingernail, it will cut mild steel or annealed tool steel.
8. To cut steel, hold at a steep angle and enter the metal with one tap. Continue tapping with a light hammer while lowering the other end until the face starts to cut through the metal.
9. To cut continuous lines hold your tool at a constant angle. Too high and it dives into the metal; too low causes it to surface. With a little practice you can cut a straight line at even depth.
10. To cut curved lines you must either rotate your vise or move around the work piece as you tap the tool through the metal.

IS IT RIGHT? If your tool has developed a mushroomed tip and won't cut, it is too soft. If the tip has chipped or fractured, it is too hard. Anneal & re-harden. The nail will stand this a good number of times as long as you don't overheat and burn out the carbon (emitting sparks during a heat).

SPARK TESTING TOOL STEEL

Take the suspect stock and grind it hard enough to create a shower of sparks. If the sparks are straight and not too bright, you have nontool steel or iron. If the sparks fork and fan out in a bright pattern, you have tool steel. Use a wood nail and an old drill bit for comparison. Compare a wood nail (bends) and a concrete nail (breaks) for spark patterns. This is a scroungers' test and will not provide an alloy number or hardening information but can lead to results with a little trial and error experimentation. Junk is cheap, high tech tool steel ain't!

IF YOU CAN DRAW IT, YOU CAN ENGRAVE IT. Can't draw? Use this trick!

1. Draw or trace your pattern on paper.
 2. Using the copier, enlarge or reduce as you wish.
 3. Clean your metal with Acetone or Lacquer thinner.
 4. Tape your copy face down on the work surface.
 5. Rub the back of the copy with a rag which is damp with Acetone so the paper looks translucent and you can see the pattern through it.
 6. Before it dries or gets moved, press down with the dry end of your rag on the design until it is dry (60 seconds max).
 7. Peel the paper, which will stick a little where the toner transferred, away from your work piece and see if the design is all there.
 8. This produces a durable pattern which you can spray clear lacquer over for longevity of complicated designs. It will not rub off easily and can be transferred to anything the solvent won't eat!
- NOTE:** Your pattern is a mirror image of the original! You may want to trace the back of your design and copy that to allow the lettering to transfer as readable, etc. It works great for making stamp or die patterns which must be reversed anyway.
10. If you want to do it over, just clean the metal with acetone and repeat.

SAFETY TIPS

For those of you who have lawyers please observe the following advice. You are responsible for your own safety and work habits. Use safety glasses when using grinders, torches, hammers and all potentially dangerous (especially rotary) power equipment and tools. Avoid burns, if it gets hot let go! Remember that black heat (not glowing red) can burn you. You can hold work with your hands while forging but if you're not a quick worker be prepared to let go quick. Enough said about the obvious.

HELPFUL TIPS

If your Xerox transfer smears, you either got it too wet or your copy moved during the rubbing procedure. This transfer will not resist heat like soapstone lines will for cutting purposes.

Once you have a good pattern, you only have to follow the lines until you have cut them all to your satisfaction. Beware brushing off your work surface with your hand as the burrs you have raised at

the end of your cuts will cut lines in your hand until they are removed with an exit cut. (SEE ILLUS.) This is designed to get rid of them and save your hide from damage.

While cutting, your graver acts like a plow or a wing according to the angle of attack. Steep angles cut deep and vice versa. The more taps per inch of line cut the smoother your cut will appear. Numerous light taps will work better than heavy blows for delicate line work.

If you find that the shank of your graver is bending, it is because it got too hot during forging or some other part of the process and didn't get hardened later. Heat the center and quench to try and remedy this. Take care to keep the ends cold or you will have to fix them next.

Engraving and penmanship have much in common. Everyone has a different style, so experiment with face shapes and angles as well as heel angles. Use the bottom and sides to create compound or beveled cuts and tapered lines, etc.

These tools can be hammered, which is the usual method for cutting steel or they can be mounted in handles for cutting softer metals and fine work in steel by hand. The plates for printing our money are hand cut in steel for example. This is highly advanced work not recommended for beginners or amateur counterfeiters. A clever combination can be had by mounting your shaft in a handle you can use and including a short steel striker of smaller diameter which contacts the shaft through the other end of the handle. This allows you to cut by hand or hammer cut with the same tool.

Handle shapes are usually shaped like a mushroom cut in half from cap to stem. The shaft is mounted in the stem end with the heel and the flat part of the handle on the down side.

Stamps, dies and trademarks can be made with your new skills. Coining dies, embossing dies for shaping thin metal and a multitude of other techniques are now available to you. You can also do decorative gun engraving, inlay work and a variety of other things which I highly recommend you practice first before you cobble up a valuable shotgun, etc.!

Steel is hard, and mistakes you make are hard to erase! Try planning your cuts, working some from two directions. This works well with curves. Most cuts work well if you cut from right to left (southpaws may ignore) and you don't have to make a cut all at once. It can be segmented and cut from different angles and directions as with lettering.

Last but not least, use finesse. Most novice engravers try to make a deep cut all at once when a better and more controllable approach is to shave it down in stages. A power slip can spoil hours of work or require the removal of a sharp tool from some part of your body. I know. I've done both. Try and plan your mistakes with the "what if game."

STOCK FOR MAKING A STAMP OR TOUCHMARK

If you want to avoid the trial and error method of finding junk to make a stamp with and you can spare a few bucks, call your local tool and die or machine shop. Ask for W1 or W2 water-hardening tool steel. It is adequate for our needs here and comes in a variety of shapes. I recommend round or square about 3/8" to 3/4" for stamps. It depends on what size your finished mark is to be. Water hardening is simple and easy. For those of you with the right stuff there are other steels with oil and air-hardening properties which are useful but more high tech. Size and cut your stock to a length which is appropriate to the use. Don't hit a stamp 3" x 3/16" with a sledge, use a tap hammer. Old chisels and punches are a good source for heavier duty stamps. Drill bits will work fine for light work but tend to be brittle unless tempered for heavy use.

MAKING A STAMP OR PATTERNED PUNCH

1. Heat red/orange and forge work end to shape desired. Soften striking end. I recommend forging a short taper towards the work end-- approximately 1/3 the total length or as required to shape and size the tip.
2. Heat and air cool to anneal and normalize (even out hardness of forged portion) the working end of your stamp.
3. Trim off the end of your stock so that the face of your stamp is perpendicular to the shaft and as flat as possible (90 degrees). If it will stand on the face on a flat, level surface you got it right.
4. Engrave or punch designs into the end of the stamp. Letters and numbers must appear backward like a mirror image if the mark from the stamp is to come out right. Don't cut or punch too deep as 1/32" is usually adequate to produce a legible mark. Keep your cuts neat and to an even depth so the resulting mark will have an even height. Use modeling clay, wax or lead for test strikes and to check your progress.
5. Grind or file an even bevel all around the edge. This will make a nice "frame" around your maker's mark.
6. Clean up the face and make sure all burrs are neatly removed. Double check your work. A good stamp will make thousands of impressions for you, and if there is a flaw it will multiply.
7. Cover fine engraving with flux to protect the detail and harden by heating to red/orange or (nonmagnetic) heat and quenching vertically in water. Just hold it still until it quits steaming and is cool to the touch.
8. Clean up with a fine steel brush and test strike in lead or soft metal.
9. If you are going to mark iron work, stamp the work while at least cherry red or hotter. Nonferrous metals such as copper, brass, bronze gold, etc., can be stamped cold. If you worked it hot, stamp it hot.
10. QUENCH your stamp after using it on hot iron or you will eventually ruin it through gradually softening the face. Air hardening steel eliminates this problem but water hardening steel is just fine and a bit easier to work for your first stamp.

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MAIL TOOLS GRAVERS

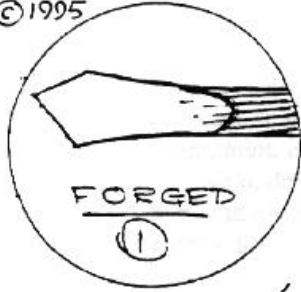
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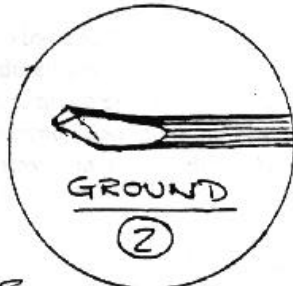
2 1/2" - 4" CONCRETE NAIL

STOUGHTON, WISCONS. 53089
608-873-5199



FORGED

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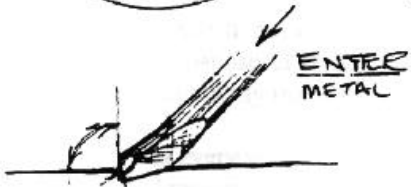
GROUND

②



SHARPENED
HARD

③



ENTER
METAL



CUT
METAL



EXIT
METAL

FACE DESIGNS:



FACE

SIDE

SHAFT

HEEL

HEEL
ANGLES

20% TO 40% FOR HAMMER WORK
5% TO 10% FOR HAND WORK

PUNCH (STAMP)

1 CUT LETTERS ETC., REVERSED
IN ANNEALED STOCK

2 HARDEN AND
TEMPER PUNCH

3 SHAPE AND DRESS
FACE PERPENDICULAR
TO PUNCH SHAFT

