Making Solid Copper Bullets

Solid copper bullets present a challenge in regard to the pressure required to expand the material without exceeding the tensile strength of the die or the bending moment of the punches. To reduce pressure, the copper rod needs to be prepared prior to forming.

First, using a lathe, drill a hole for at least the length of your anticipated ogive or nose curve through the center of the rod. The diameter of the hole should be at least 30% of the caliber, but it can be larger. For instance, a .452 caliber bullet should have a hole of at least 0.1695 inch diameter for the length of the ogive. Then accurately cut off the rod for the anticipated weight of the bullet.

Heavier or lighter weights can be made with the same length by using larger holes (lighter weight) or by filling the hole with ductile material such as lead. Otherwise the weight will be controlled by the length of the rod that you cut. There is no practical way to extrude copper "bleed" from the rod the way that lead cores are adjusted by extrusion.

Lubrication with Corbin Swage Lube is a necessity for every drawing and swaging step that follows. Failure to lubricate will likely result in a stuck bullet or improper forming, wrinkles, or excessive wear and fouling of the dies. A light film is all that is required.

The diameter of the rod may have to be whatever is commercially available, so use the closest larger size, and then draw this diameter down after the rod is cut, by using a proper bullet reducing die (BRD-1). The diameter should be made exactly at or just .0001 to .0005 below finished diameter. This is best determined experimentally, as it may vary with required pressure for the ogive shape and bullet length. The rod must not be larger than the final diameter at this point, or it will stick in the point form die.

Once the rod is drawn down to correct size, it can then be put into the point forming die. The point forming die may have to be made slightly larger than one which would be used with jacketed lead core bullets. This again is determined experimentally by the bullet ogive, length, and the material itself, and is influenced by the size of the hole in the center of the rod. For instance, a .3081 die might produce a .3080 jacketed bullet but only produce a .3079 solid copper bullet (for illustration only, actual diameters depend on pressure required for a specific design). One should not order a die for conventional jacketed bullets and expect it to make the same size in a solid copper bullet, even though this could work in some cases.

The ejection pin diameter for a solid copper bullet usually must be made much larger in diameter than it would be for the same caliber of jacketed bullet, due to the much higher ejection pressures usually encountered. A pin of .081, for instance, may be fine for a jacketed 308 but bend and stick in a solid copper bullet. A pin of .105 might be required for reliable solid copper ejection. Again, these are experimentally determined by the die maker when building your dies.

In most cases, the forming operation should take place in a fairly quick, steady push in one single stroke. Attempting to go back into the same die several times to adjust the same bullet shape may fail because the solid copper will work harden quickly, and cause greater resistance. In some designs, it may be necessary to heat the copper rod after it is cut and drawn to size, in order to anneal it and reduce the amount of stress hardening that takes place during ogive formation.

However, avoid sudden impacts and extremely fast operation, as this can cause shock waves in the material that exceed the normal die tensile strength and break the die or bend the punches. A moderately quick smooth push is preferred. The more pointed the bullet, the more difficulty and higher pressures will be encountered in forming the ogive in solid copper.