MAKING THE LEAD CORES

The two main components that go into most bullets are the lead filling, or core, and the outer skin, or jacket. We'll talk about jackets in the next chapter. Right now, let's make some cores.

There are two main sources for lead cores. You can purchase a spool of lead wire in the proper diameter, along with a core cutter, and chop off accurately-measured lengths. Corbin has lead wire in pure 175,000 grain spools (LW-25), and the PCS-1 Precision Core Cutter to cut them. The core cutter has an adjustable stop screw that adjusts the amount of lead cut on each stroke of the tool.

The second source is your own supply of scrap lead, the same as you might use for bullet casting. Corbin makes a 4-cavity, adjustable weight core mould that mounts to the reloading bench. You don't have to pick it up, and there are no handles required. Four pistons, precision fitted to four cylinders, slide up and down to eject the cores. The bottom position is set by a rest plate. This steel plate rests on a pair of nuts, fastened to two threaded rods at either end of the mould.

Adjusting the nuts upward decreases the volume in the cylinders, and gives you a lighter core. Pouring molten lead into the top of the mould fills all four cavities. Moving a long sprue cutter chops off the lead at the top of the cavities, leaving even lengths of lead to be ejected straight up from the cylinders. The process is very fast, making it possible to produce at least 1000 cores per hour.

Lead wire can also be manufactured at home. Corbin makes a lead wire extruder kit for the Hydro-press, capable of making lengths of lead wire from lead billets. Lead wire can be extruded in special shapes, as well, for use in stained glass work or as hollow tubing used for fishing sinker wire. The LED-1 Lead Extruder Die set comes with a selection of popular diameters of interchangeable dies, all of which fit into a master body. Included with the kit are billet mould tubes to form the proper diameter of lead cylinders for extrusion. These special forms can be the basis of additional income for the Hydro-press owner. Hand presses do not have sufficient stroke or power for commercial lead wire extrusion.

Small diameter lead wire for the sub-calibers (.14, .17, and .20) can be produced in the Corbin hand presses with the LED-2 extruder kit. Only relatively short lengths are made at one time, but they are very economical sources of cores for the tiny sub-caliber bullets.

For those who wish to make commercial quantities of lead wire, Corbin manufactures the EX-10 lead wire extruder, a dedicated, single-purpose machine to produce any size or shape of lead wire in 10 pound spools. The EX-10 uses lead billets of 2-inch diameter, which can be cast using Corbin's tube moulds. Write for specific information on this product.

Lead wire for bullet cores can be used in two ways, and the diameter depends on what way you plan to use it. You can simply swage the lead into a finished bullet, with no jacket. In that case, the lead only has to slip easily into the smallest die bore in the set you are using. Dies made only for lead bullets are at final diameter of the bullet, and consequently your lead core should be just a little under bullet diameter.

If the lead is too small in diameter, it will stick out the die mouth before you have enough of it to make the weight you desire. That is a situation to avoid -- never apply any pressure to a component that isn't completely contained within the die. The punch will probably slip off to one side and be damaged by striking the mouth of the die. The exact diameter isn't important as long as the core fits into the die easily and doesn't stick out the die mouth.

But if you want to make a jacketed bullet, then the core has to fit inside the jacket (obviously!). You cannot start with a .357 caliber lead bullet and somehow "put a jacket on it" to wind up with a .357 caliber jacketed bullet. Instead, you use lead wire or a cast core that fits inside the .38 jacket, and expand it upward in the die. The lead pressure expands the jacket right along with it, resulting in a tight, uniform assembly.

The walls of a .357 or .38 caliber jacket are usually about .017 inches thick. There is a wall on both sides of the core, and the jacket normally is made small enough so that it will work for .355 (9mm) as well as .38 caliber. Bullet jackets are almost always considerably smaller than the final bullet diameter so that they can be expanded upward from core seating pressure.

This means that you have a jacket with an outside diameter of about 0.354 inches, minus two walls of 0.017 inches, for a remaining inside diameter of about 0.320 inches. Better quality jackets have tapered walls, so that the base is even thicker. In practice, a 0.318 inch core will fit inside most .38/.357 caliber jackets properly.

But for higher precision, a die set for the Corbin presses usually includes a separate core swage die, which accepts the raw lead core and reshapes it to a more perfect cylinder, flattens the ends nicely, and expands the core diameter very slightly in the process. The die also extrudes a small amount of lead from the core to adjust the weight.

Because of this extra die, it is necessary to use a bit smaller diameter of core. A 0.312 inch lead core fits nicely into the standard 0.315 to 0.318 inch core swage die, allowing for any bending or denting that the core might receive in handling. And that is how we arrive at the proper diameter of lead wire to use for any set of dies, in any caliber. For jacketed bullets, the core must fit into the jacket and it must also fit easily into any core swage die that is part of the set. For lead bullets, the core must at least fit into the final die and not be so long that it sticks out the die mouth.

In the CM-4 Core Mould, six diameters cover most of the bullets you might wish to make. The .224 mould makes a core of about 0.185 inch diameter, which works well in the 6mm and .25 as well as the 6.5mm caliber. The .257 caliber mould crosses over slightly into the .25 and

6.5mm caliber range, but since different jackets have different wall thickness, it is useful for thinner wall .25 jackets and thicker wall .270 and 7mm jackets.

The standard 7mm jacket takes a 0.218 inch core, so a 7mm core mould is made in that size. The .30 calibers all take a 0.250 inch core, as do most of the .32 and .338 jackets. Heavy walled tubing jackets in large bores can use the same core size as a standard jacket might in a smaller caliber. A pair of standard sizes cover the .38 and the .44-45 calibers. These are 0.312 inch and 0.365 inch, respectively. A slightly smaller size is made for the .41 caliber and the .40 Bren 10 caliber.

Using the next smaller size normally serves quite well, without the expense of having a custom mould built. However, custom moulds CAN be made to order if desired. For large diameters of lead, Corbin builds special moulds to order at a correspondingly higher cost than the CM-4. Moulds for billets of half inch diameter can be used for shotgun slugs. Tube moulds, which have a steel base with a plug that slips into the bottom of a honed steel tube, are generally used for large diameter billets.

Lead cores are discussed in great detail in the book, "REDISCOVER SWAGING". The advantage of using a lead core mould is the lower cost of using scrap lead. The advantage of using lead wire is the neatness, safety, speed, and ease of use. There is not much difference in potential accuracy. Lead wire has a slight edge over cast cores because of the great uniformity of the extruded product.

You probably wonder about the hardness of the lead: can you use wheelweights, or casting alloys to swaging bullets? The answer depends on the caliber, and the system of swaging you plan to use. In most reloading press dies, you can't quite generate enough pressure to swage any lead harder than about Brinnell Hardness 8 (or about 3 percent antimony/lead alloy) before breaking either the die or the punch. But in certain circumstances, you can even swage linotype alloys of

Brinnell Hardness 22. The Corbin Hydro-press can swage any alloy of lead ever made, or even solid copper if you wish.

The reason that you can swage hard alloys in some calibers and not in others, in some shapes and not others, and in the Hydro-press but not in a reloading press has less to do with the power of the press than it does the strength of the dies and punches. If you are curious about the mathematics involved in engineering dies to withstand certain pressures, the book "POWER SWAGING" is full of revealing data, formulae, and charts that will make it all clear.

As a rule of thumb, it's safer to use soft, pure lead for swaging in all circumstances because pure lead flows more easily at lower pressures, and thus puts less strain on the dies. But, if you have a need to swage hard lead for some reason, don't give up just because of a rule of thumb! We have a way to do it in every case, if you are willing to purchase the correct kind of tooling. Your stock of casting alloys can be used if the caliber, die, and press system is selected with proper specifications for hard lead. Tooling made for hard lead may, in some circumstances, not be as useful for soft lead because of the different size bleed holes. That is one reason why you need to talk to the die-maker before jumping in head first with a bar of hard alloy in hand!

If you use Hydro-press dies, hard lead is perfectly acceptable in calibers up to .500 diameter, unless very deep and thin base skirts or other special designs are planned. The dies are so strong that they can handle any lead alloy. In the Mity Mite system, hard alloys can be handled if the die-maker knows in advance you plan to use them. In calibers above .358 diameter, they are a bit risky because of the die wall in the smaller Mity Mite series -- an imprudent stroke of the handle could crack a .45 caliber die used with too hard an alloy. In the reloading press, calibers of .243 and .224 work reasonably well with hard lead, but anything larger should be used with alloys of

Brinnell Hardness 6 and under. Corbin supplies pure lead in billets and in lead wire form, but does not furnish alloy lead except on special order.

A potential objection to lead wire is the cost of shipping. At the time of this writing, it costs about $10 to ship a spool of lead wire completely across the country. A spool of .22 caliber wire makes over 4,000 .224 bullets. The cost of shipping, then, breaks down to a mere 0.0025 cents per bullet (that is a quarter of a penny per bullet). This amount is not prohibitive, and consequently most people choose to use lead wire for the smaller calibers. In the larger calibers, the cost per bullet increases since there is more lead consumed in each bullet, but the trade-off of convenience and safety still results in a majority of bullet-makers using lead wire.

Corbin has lead billets in 0.795-inch diameter for use in the LED-1 extruder die (in case you don't care to cast billets), and can furnish lead in just about any size of billet. Alloys can be furnished only in minimum lots that generally are 100 to 250 pound, because of the minimum billet required for a commercial extruder operation. Many of our customers can provide you with the smaller quantities of alloy leads: check the "WORLD DIRECTORY of CUSTOM BULLET MAKERS" for addresses and phone numbers.