## ABOUT BULLET JACKETS

Bullet jackets are the skin of the bullet. They are what makes it possible to achieve velocities over 4,000 fps and still have no fouling from melted lead in your barrel. But besides elimination of lead fouling, the jacket has another important job. It helps control the terminal performance of the bullet.

Bullet jackets are available from Corbin in packages of 250 or 500 jackets, depending on the caliber and length. Popular calibers are stocked in certain lengths that are most useful. Not all calibers or lengths are available directly. Some you have to make yourself, by re-drawing a more common size. This is done with a Corbin JRD-1 draw die.

Other calibers can be made from copper, brass, or even steel tubing. A reloading press can only use the commercially available drawn gilding metal jackets, which range from 0.017 to 0.032 inches in thickness depending on the length and caliber. The Mity Mite press can form jackets from 0.030 inch thick copper tubing (hard drawn, straight tubing, not the soft coiled type). The Mega Mite can handle tubing in 0.030 and sometimes in 0.049, depending on caliber. The Hydro-press can handle anything, from the thinnest copper to the thickest steel walls (typically 0.050 steel or 0.065 brass is the heaviest practical jacket wall, beyond which you may as well swage solid copper rod).

From .30 caliber rifle down, it is both easier and cheaper to use commercially made jackets and either use them as is, or redraw them for smaller or longer jackets. Jackets can expand considerably during the core seating operation, to become larger in diameter. Jackets for bullet swaging in Corbin equipment are all made several thousandths of an inch smaller than the final bullet diameter, so you can expand them upward for a perfect, tight fit on the core.

This is one reason that it isn't feasible to pour hot lead into a jacket and make a jacketed bullet. The pressure of swaging is needed to expand the assembly to the right diameter inside a die. Another reason is that the hot lead would shrink away from the jacket during cooling, leaving a loose core that would not stabilize in the rifling.

In the calibers from .309 to .338, it is possible to use regular .30 caliber jackets. Special techniques to expand the jacket evenly include seating the core in two short sections, so that the base will form properly. This is done on the .338 and .333 calibers, but isn't necessary on the .311 and .314 sizes. Using this method, it is even possible to expand a drawn .22 Magnum fired case into a nice 7mm (.284) bullet! It works best with a rebated boattail die set and with three or four short cores seated on top of each other, one at a time.

The best known jacket among bullet-makers is the .22 Long Rifle case used for a .224 or a .243 caliber jacket. Corbin makes a die set called the RFJM-22 that turns these rimfire cases into straight-sided jackets of the proper diameter. Vernon Speer, Harvey Donaldson, and Fred Huntington were a few of the well-known experimenters who used this method in the late 1940's. Speer and Huntington both launched major businesses from this beginning.

The process had flaws in those days, because rimfire cases used mercuric priming compound. This left the jackets weak and brittle, so they fouled the bores and often came apart on firing. Today, non-mercuric priming is used in rimfire cases. The jackets you can make for yourself not only are as good as any you can buy for most practical purposes, but they are free!

The disadvantage of making rimfire jackets is that the bullets have very thin skins -- typically under 0.015 inches -- without the thick taper toward the base which commercial jackets have. This means that they are excellent for varmint shooting, because if they hit the ground they normally blow up and do not cause a ricochet. But they are not suitable for high velocity (beyond about 3500 fps they blow up in the air), nor are they suitable for serious game hunting.

You may be surprised to learn that the commercial standard grain bullet has a jacket that matches the length of the drawn .22 Long Rifle case. This is because the first .224 commercial bullets were made from such cases! When bullet makers switched to drawn strip metal, they kept the traditional length. Thus, you do not need to trim your home-made jackets or make excessive weights of bullets to use them.

The jacket material is normally either commercial bronze or gilding metal. These alloys are 10% zinc and 5% zinc, respectively, with the balance of copper. The zinc is for strength and anti-fouling characteristics. A rimfire case is about 30% zinc. It is more brittle, but also less likely to foul the bore at normal speeds. By annealing the case, you can make it just as ductile as the regular jacket.

A 6mm (.243-.244) bullet jacket can be made from the fired .22 case (a Stinger or other long case is best). The head is smoothly drawn off, leaving a diameter of about 0.219 inches at the end. The body of the fired case is about 0.225 inches in diameter. A special punch with a flare or bottleneck, like a bottleneck cartridge, is used inside the case. The jacket becomes slightly longer as it is drawn, and this lengthening forces the mouth partly over the tapered part of the punch. It is this tapered mouth that lets you seat a lead core into the undersized jacket and expand it to full .243 size during the core seating operation. The flared mouth seals the die against lead leakage and makes the jacket expand perfectly.

The .22 WMR case takes a different die (a special type of JRD-1 die is used) to make a long 6mm jacket. By careful manipulation of core weights and seating technique, you can coax this jacket to become a .257, a 6.5mm, or even a 7mm bullet! This isn't something for the beginner to try, but once you have mastered the basics, it is fairly easy to learn.

Bullet jackets have different wall thicknesses, not only between different calibers and makes, but also within the same jacket.

Commercial jackets have a taper, to control expansion. This means that when you seat the lead core into the jacket, the core has to be small enough to fit easily into whatever jacket you are using. If you buy a set of dies that is made with punches for a certain jacket, and then change to another jacket (such as going from a commercial drawn jacket to a copper tubing jacket), you will probably need to obtain a different core seating punch.

The core seating punch fits inside the jacket, rather than the die itself, whenever you want bullets with the lead seated down past the jacket mouth. (Bullets with large lead tips, such as semi-wadcutters and lead round nose bullets, are made using a core seating punch that fits and seals pressure against the die wall instead of inside the jacket.) If you change from a 0.020 inch wall jacket to one with walls of 0.050 inch thickness, then you need a punch that is considerably smaller in diameter to fit the new jacket. When you order dies, either let Corbin supply the right jacket to fit them, or send a sample of the jacket you want to use. If you want more than one jacket, remember that you may need more than one core seating punch.

The other part that you may need for different jackets is the core swage die. Core swage dies make the core the right size and weight, starting with an undersized piece of lead. Reloading press dies don't use a core swage for technical reasons. Special swage presses almost always use die sets that can have a core swage as the first die of the set. When you order a set of dies for jacketed bullets, the diameter of the core swage die is important to the diemakers. The core that is produced must be small enough to fit inside whatever jacket you are going to use. If you later add copper tubing, or change to a thicker wall jacket (such as drawing down a larger caliber to get a longer jacket for a heavier bullet), it may require another core swage die of smaller diameter.

The right size of lead wire or core mould for a certain caliber depends on the jacket you plan to use. Most standard jackets that are available from Corbin take standard, off-the-shelf diameters of lead wire and core moulds. If you furnish your own jackets, you may need to send samples to get a special size made to order. Core size for the jacket is not terribly critical: as long as the core fits and the weight is about right without being so long that the core sticks out the die mouth, you can use any size.

One exception is that your core shouldn't normally be a press fit into the jacket, so that it traps air in the bottom. The short, thick half jackets for .38 caliber sometimes fit a bit snugly on the standard core, but they don't cause any problem. It is the long, tapered jackets of larger caliber handguns and of rifle bullets that create a potential problem with too snug a core.

The problem arises when the core fits so tightly that air is pushed into a highly compressed disk at the bottom of the jacket. If the bullet is finished with the jacket brought around the nose or ogive section, you don't notice any problem. Accuracy is usually good because the air is normally quite highly compressed and centered rather well. But if you make a semi-wadcutter style bullet (and by that, we in the bullet-swaging field refer to ANY style of nose, be it round or flat, hollow or pointed, so long as the nose is entirely made of lead projecting from the jacket, and the jacket is NOT curved at all to lock the core in place), then the trapped air can expand when the bullets are brought into the hot sun. Sometimes, the cores will pop out with a loud bang and jump harmlessly across the room!

The answer is to use a core that slips to the bottom of the jacket without force. Or, if you want to use a core swage die that is nearly but not exactly right, you might want to have the die-maker machine a special internal punch with a cavity in the shape of a boattail or Keith nose in its end. The cavity would form a mirror image of itself in the lead core, so that a section of the core would then fit nicely

into the bottom of your tapered wall jacket without trapping any air.
This technique lets you use the same core swage die with several calibers and with several different styles of jacket in the same caliber.

The right core mould for heavy wall tubing jackets is much smaller in diameter than the right core mould for a standard drawn commercial jacket. In fact, the next smaller caliber of mould is normally used. For instance, a .30 caliber core mould might be used with a tubing jacket bullet in .358 caliber, whereas a .38 caliber mould would be used if you were to make commercial jacket bullets with those same dies. When you order, we supply the size of equipment needed for standard popular jackets that we stock unless you specify otherwise, or unless we know that tubing jackets are going to be used.

Bullet jackets can make a wide range of weights even with the same length. The exact weight range for any given caliber and length of jacket depends on the ogive shape and base shape, as well as the degree of hollow point or hollow base and the lead density used, and the thickness of the jacket. There is no single "right" weight for a given jacket because of all these variables. But that means you, as the bullet-maker, can manipulate the variables and produce all kinds of different weights using a limited stock of jackets.

For instance, in the .44 caliber, a 0.54-inch long drawn jacket is very popular with shooters who have 3-die sets, such as the FJFB-3 type, to make bullets with the jacket curved around the ogive. By adjusting the amount of lead used in the jacket, you can make any weight from 180 to 250 grains with this jacket. The lighter weights have open points, and the heavier weights have more and more lead exposed at the tip.

The bullet-maker who uses a semi-wadcutter die limits himself somewhat on the range of weights possible with a given jacket, since he cannot take up any jacket length by curving jacket material around the nose. He can, however, change the amount of nose by selecting different punches, or change the amount of lead used by selecting hollow point or cup base punches and adjusting how far he presses these into the die. Then, he can follow with the regular Keith or other semi-wadcutter type of punch to shape the lead that is moved forward by the hollow point punch.

This technique lets the bullet-maker adjust weight even on semi-wadcutter style bullets with the same jacket length and still have the same amount of lead showing! A technique not widely known is the use of ordinary cornstarch as a filler in the base of the jacket. By placing cornstarch in the bottom of the jacket and seating a lead core over it, you can produce very high velocity, light weight bullets in jackets that everyone else thinks only make heavy weight slugs.

In the .25 ACP caliber, you can make jackets from fired shotgun primers using the SPJM-25 die set. This kit lets you push out the anvil and cap, and draw the top hat battery cup into a smooth-sided jacket for a 45-50 grain .25 caliber bullet. Jackets for sub-calibers, such as the .14, .17, and .20 caliber, can be made from ordinary .224 commercial jackets using three drawing dies. The jackets need to be annealed by heating to a dull red briefly, so that the bottoms won't crack out when you draw them to .14 caliber.

Dies that use larger caliber jackets, such as the sub-caliber draw dies, can be made with a pinch trim punch so that surplus material is pinched off as the jacket is drawn. In order to pinch trim a jacket, there must be a reasonable amount of reduction taking place. It is difficult to pinch trim a .38 jacket being drawn to .350, for instance, because most .38 jackets begin at .3545 diameter. That doesn't leave enough difference for a pinch trim punch to work. But drawing from a .308 to a 7mm, or from a 7mm to a 6.5mm, leaves plenty of metal for pinch trimming to any desired length.

You don't have to use a jacket. Many handloaders don't yet realize that bullet swage dies can be used with or without jackets, and that a swaged lead bullet can be made faster, more precisely, and with far greater control of weight and style than a cast bullet. The same dies can be used for jacketed bullets or lead bullets. (This doesn't necessarily work in reverse: if you buy a LSWC-1 lead semi-wadcutter die, designed just to make lead bullets, it won't make fully jacketed bullets because the bleed holes in the side of this die would then be covered by the jacket.)

Lubrication on a swaged, smooth-sided bullet is accomplished by changing from Corbin Swage Lube to Corbin Dip Lube. Dip Lube is a liquid wax that is applied to the core before swaging a lead bullet. The pressure of swaging forms a hard, tough film of wax all over the bullet. The wax doesn't melt or affect the powder like bullet greases do. Since it covers the whole bullet, no lead is exposed to the air or to the bore without having some lube between the bore and the lead.

Naturally, this "liquid jacket", as some people call it, doesn't stand up to the torque and heat of high velocity firing like a regular jacket would. It does serve well for most shooters using loads up to 1,200 fps, and cuts the cost of shooting by eliminating the jacket as well as speeding up the whole bullet-making process. Corbin Dip Lube is available in pint cans or gallons. A sample 2-oz. bottle is available as well.

Re-forming jacketed, factory or military surplus bullets in a standard swage die (the point forming die, usually) is also possible. There are some cautions and limitations. The bullet must be smaller than the final diameter desired, because you cannot expect a .308 bullet to fit easily into a .308 diameter hole and eject easily after reforming. It should be a 0.3085 to 0.3090 inch die in order to use a .3080 inch diameter bullet for reforming. Also, there are some minor problems with lead coming forward out the nose of a finished bullet when you change the ogive shape to reduce the total internal volume.

But, on the other hand, we have made hundreds of single-die swages that turned rather inaccurate military surplus bullets into soft points of very good accuracy simply by swaging them backward, so the base became the nose and the pointed nose became a solid base! And in other cases, we have made 5.56 and 7.62 mm bullets shoot twice as well by simply bumping them up half a thousandth of an inch while making their open bases more perfect and even. These transformations are quick and easy when they can be made to work with a standard die. I would not recommend putting a lot of money into tooling specially built for it unless you have a tremendous number of surplus bullets to reform.

Bullet jackets can be made that have partitions, variations in thickness (selective heavier base sections), completely closed bases, solid copper bases, and multiple jackets stacked inside each other.

Most of the heavy duty jacket making, using copper or brass tubing and such styles as the partition or H-mantle, are done on the Corbin Hydro-press. Hand presses and dies made for them do not have the ability to produce or withstand the extreme pressures used. Within a more limited range, however, you can still make exotic jacket designs by using the telescoping jacket idea: putting smaller calibers inside of larger ones is a very effective way to control performance.

A thorough discussion of bullet jackets can be found in the book "REDISCOVER SWAGING", and the various technical bulletins published by Corbin Manufacturing have further details on making tubing bullet jackets, rimfire cases into jackets, and even the use of fired brass cases as bullet jackets.