SOME SPECIFIC BULLETS AND HOW TO MAKE THEM

I've already written seven books and my editors tell me I have over 400 articles in print, describing the various things you can do with swaging. It would be ridiculous to try and explain every possible bullet style in this book -- you'd need a flat-bed truck to haul it out and a crane to flip the pages!

Rather than that, I will try to explain how each of several examples of bullets can be made, selecting very simple and very exotic kinds of bullets, including features that shooters find exciting, and designs that appear difficult or impossible until you have seen how simple swaging makes it. From these few examples, you should begin to gain an understanding of the process and how much more you can do with it.

HOLLOW BASE TARGET PISTOL WADCUTTERS

Lead wadcutters with hollow base can be made in a reloading press in the calibers from .25 ACP to .357/.38, up to .458 caliber in the Mity Mite, and up to .75 caliber in the Hydro-press. The reloading press makes as accurate a bullet in regard to diameter control, but for superior weight control, you should use the Mity Mite or larger swaging presses.

Select either a core seating die or a lead semi-wadcutter die. The core seating die should be ordered with a wadcutter nose external punch, and a hollow base internal punch. So should the LSWC-1 die, if you wish to use that one. (I would -- it isn't available in the reloading press system, however.)

Prepare your lead cores by either casting them in the Corbin 4-cavity adjustable weight core mould, or by cutting uniform length pieces from a spool of lead wire. Specific instructions are found with the tools or in other sections of this book. More detailed information can be found in the book "Rediscover Swaging".

To establish the proper weight of core, make one and put it in a scale pan. Then adjust the next few until you get what you want. If you plan to use a core seating die (CS-1) without a core swage (CSW-1), then what you put in is what you will get out in regard to weight. This is the case with reloading press die sets, since there is no core swage for them. It isn't necessarily a bad situation. I shot a lot of good groups when I was in the Navy using bullets that had 3-5 grains variation in my trusty .45 Colt Government pistol.

If you do use the Mity Mite or other special swage press, and plan to use a core swage or the all-in-one lead semi-wadcutter die (LSWC-1), then make the cores from 2 to 5 grains heavier than you want in the bullet. That gives you some extra lead to extrude along with any variation in weight.

Lubricate the core by one of two methods. If you want a clean lead bullet with no lubrication, use Corbin Swage Lube on your finger tip and thumb, and just give each core a little rotation between them as you pick them up to put them in the die. It's simple and natural, no big deal. Let the benchrest rifle fanatics worry about measuring out lube with a hypodermic needle on a special stamp pad: it won't make any practical difference in where the bullet lands.

The other method is for placing a wax jacket on the bullet itself. Instead of lube grooves which apply a little band of lube and let the rest of the bullet scrape along the bare metal contact with your bore, the whole surface of the bullet can be covered by a thin, hard film of high temperature wax.

The product that does this is Corbin Dip Lube. Some call it "Liquid Jacket". That's what it acts like. You dip the core in a small container and put it wet into the swage die. Then apply pressure, swage the bullet, and it comes out nearly dry. Let it cure for fifteen minutes, and you are ready to load and shoot it! No sizing, no lubricating, and more lube contacts the bore than if you had it plastered with conventional drag-producing grooves.

Drawback? Alox-beeswax lube works at somewhat higher velocity levels than Corbin Dip Lube. If you are pushing the bullets toward magnum speeds, you may be in for some leading. On the other hand, that is what Corbin bullet jackets are made to prevent. From 1,200 fps down, I have had excellent results with the Dip Lube. Many commercial firms purchase it in gallon lots for their bullets, so I know that it works as well for their customers. Any lead bullets can produce leading in some guns and with some loads, of course. I certainly do not claim this product is the best lubricant made, but it is one of the most convenient and easily used, especially with swaged bullets.

Before swaging the bullets, you may want to know how to put the dies in the press. For the Hydro-press, you should have the book "Power Swaging" at hand. You need it, period. Without it you will break dies. For the Mity Mite, a brief reading of the instruction sheet that comes with the press and dies should make the installation and operation fairly clear. For the reloading press, ditto.

But here's a quick run-down: the Mity Mite die goes into the ram of the Mity Mite press. The ram is the steel cylinder that moves in and out of the press frame when you pull on the handle. It has a 5/8-24 TPI thread in the working end, and the handle forks attached to the other end.

There are two punches with the die (each and every die has two punches that are required to operate it, except for draw dies). Lead tip dies come with one punch, but use your existing point forming die bottom punch. We are not going to be using those dies now. The reloading press has an internal punch captive inside the black, threaded adapter body. It's external punch slips into the press ram, and the die screws into the pressd head like any reloading press die.

In the reloading press, you would be using the CS-1-R core seating die, and you would have the hollow base internal punch inside the die. If you wanted to install this punch (because the die normally comes with a flat base internal punch, and you order the other base shapes as optional punches), you would unscrew the die insert from the bottom of the die and then pull the original flat base punch straight out of the top of the die insert. You would clean the new punch, and press it gently into the top of the die insert, then screw the die and punch together back into the adapter body.

In the Mity Mite press, you would see that the die has threads on one end and a venturi (funnel-shaped) opening at the other end. This venturi opening helps align the external punch. The threaded end should have a steel cylinder with two diameters protruding from it. This is the head and tail of the internal punch. The tail is about 0.312 inches in diameter, and the head (right next to it) is about 0.50 inches in diameter. The rest of the punch is the same size, minus a tad, as the die bore. It is a diamond-lapped sliding fit.

If you want to change the base shape, you slide this punch out of the die, clean the new one carefully of all grit and dust, and slide it carefully into the die from the threaded end. Flat base, cup base, hollow base, and dish base shapes can all be made this way. Bevel base can be simulated but remember that all end shapes which are formed by pressing against a punch will have some degree of shoulder or step where the edge of the punch contacts the bullet. A true bevel base is not made in this simple kind of die.

Screw the die into the press by hand. In the Mity Mite, screw it in all the way. Don't use tools. Hand-tight is tight enough. Don't confuse the swage die, which is about 3/4-inch in diameter, with the black threaded floating punch holder (FPH-1-M) in the press head! Many people think the punch holder is the die, because it looks like a reloading press die.

The external punch is held in the punch holder. In a previous chapter this was covered with photos and detailed description. The hex bushing unscrews from the end of the FPH-1. Inside is a collar or bushing that slips over the punch. (If the punch is smaller than .375 diameter -- if not, the punch already has the bushing and hex bushing assembled to it. Just remove the one in the FPH-1 and set it aside, take out the round rocker bushing but leave in the solid rocker button. Install the punch as one unit.)

Assemble the round rocker bushing and then the hex bushing over the external punch. If you have any doubt as to what part is the external punch, look for the one part that does NOT fit into the die full length so that it comes to the mouth of the die and fills it completely from end to end with some left over!

The die is the round steel cylinder with the hole through it. You can see through it if you pull out the internal punch. The internal punch will NOT fit into the floating punch holder properly. It has a tail section that keeps it from fitting. The head of the internal punch and the head of the external punch are the same diameter, but the external punch has no projection or tail section. It steps down from the head (about .50 inches diameter) to the shank (about 0.36 inches diameter) to a section that is just below bullet diameter, having a portion that is closely fitted to the die bore.

The punch should be held finger-tight in the floating punch holder at this point. The adjustment of the punch holder is made by putting one of the lubricated cores into the die mouth, and carefully moving the ram forward so that the external punch can be aligned with the die and moved into it. The object now is to adjust the punch holder so that the press handle can be moved to the point where the die is forward as far as it can go. If the punch and holder stops the ram from going forward now, back off the punch holder. If the punch doesn't contact anything yet, that's fine. Just get it into the die.

Make sure that the ram is capable of going as far forward as possible, unlimited by coming against the punch or holder. No pressure should be generated, no particular force required. The weight of the handle should be more than sufficient to move the ram forward all the way. Have you got that adjustment made? Make sure the ram is free to move back and forth on both sides of its foremost extension. You can tell if it is right, because the pivot pin that holds the ram to the press handle will line up on the same plane as the bolt that holds the handle to the two links.

Now, holding the handle so that the ram is at the furthest position forward, screw the floating punch holder toward the ram. Keep turning it by hand until the punch contacts your lead core and you can no longer turn the punch holder by hand. If, at this point, you are able to screw the punch completely into the die and the die face comes up against the hex bushing on the punch holder, something is not right.

The possibility is that you didn't have enough lead core for the set the way it is. The cure is to obtain a hardened steel bushing to slip over the tail of the internal punch, extending it forward. Do NOT try to machine or modify the external punch or die to cure thholder by hand. If, at this point, you are able to screw the punch completely into the die and the die face comes up against the hex bushing on the punch holder, something is not right.

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Did any lead come out the bleed holes in the side of the LSWC-1 die? Or, did you feel a rather sudden increase in the resistance in the CS-1 die? Back off the ram, eject the bullet, and see if it is nicely filled out. See if it stays in the die, or if it comes back out with the punch.

Normally, the bullet will stay in the die even if it is somewhat undersized at this point. Jacketed bullets often come out with the external punch until enough pressure has been applied to expand them to die diameter. When you run the ram all the way back, the internal punch comes up against the stop pin in the back of the press and pushes the bullet out by holding the internal punch still while the die continues to move back with the ram.

If the bullet is poorly formed, adjust the punch holder a fraction of a turn forward and try another core. When you get it right, the bullet will be properly formed and will measure the correct diameter from one end to the other. The internal punch will have formed a deep hollow cavity and the external punch will have transferred its nose shape to the end of the bullet (in this case, a wadcutter nose).

If you have voids or unfilled edges on the bullet, then you might have a bit too much lube. Wipe the lube off the external punch and try another core without so much lube applied. If that still doesn't come out well, adjust the punch holder slightly forward again. But do NOT keep adjusting the holder forward until you feel an extreme resistance. One hand force is all you should ever need to apply. If it feels like you should be using both hands, something is wrong and you may be on the verge of breaking your die. Stop and find out what is wrong.

If the lead is too hard, this can be a serious problem. Hard lead does not flow or swage very well. Soft lead swages very nicely. The pressure required to swage even a 3% antimonial alloy of lead is at least double that of pure lead. When you first start, it may be hard to judge how much pressure is enough. The press is so powerful that a very light pressure on the handle produces a very great force on the ram. With calibers in the .375-inch range and up, you can break the die without seeming to apply undue effort, so be careful to stop applying force or adjusting the punch holder forward as soon as you reach the point where the bullet begins to form nicely.

With a little pressure on the ram, while swaging a bullet, cinch the hex bushing on the punch holder up snugly by hand. This keeps the punch aligned with the die, so you don't have to do more than check it from time to time. Swage all your bullets with the punch holder set at this position and the locking nut secured against the face of the press head. If you want to repeat this setting soon, lock down the set screw on the punch holder. Having several punch holders gives you quick repeatability by leaving each punch in its own holder with pre-set lock nut.

Now, back to the reloading press. The adjustment is exactly the same, except that you put the external punch in the slotted ram, and adjust the die downward toward the punch, while the punch is raised to the topmost position of the ram. It is important that you realize that the furthest extension of the ram is what controls consistent results. If you swage by feel entirely, you may get widely changing weights. Use feel to judge whether or not a core is a great deal lighter or heavier as you approach the top of the stroke.

Do NOT continue to press if you meet resistance before you normally did on similar bullets during a run. You will probably swage a heavier than usual bullet, at best, and at worst you may break the die or mash the punch flat. Set aside any cores that either developed less or more resistance to swaging than your usual bullet during any given run. Those are light or heavy cores. They can be used for some other weight, or melted down for a cast core.

We have covered a lot of elementary material here. Refer to this basic bullet and adjustment procedure for just about any other die. The concept is the same: approach the right adjustment from the loose side, where you have no pressure, and increase it in small bits until you achieve the desired result without exceeding moderate efforts on the handle. It is a lot like experimenting with a new powder charge: build the load in small increments and watch for signs of pressure. Here we are dealing with pressures that could destroy a rifle when they are normal. But they don't contain much total energy, so no parts fly around when a die breaks. You hear a crack, and you see one in the die. That's about it. With just reasonable care, you'll never know what a broken die sounds like.

For the rest of the bullet styles, I will give only a brief description of the process, detailing only the unusual aspects of making the bullet. Please remember the basic rules: swage dies increase diameter, never reduce it. Lubricant is required for every swaging operation (I won't keep mentioning it). The punch must fit easily into the die, or it is the wrong one to use. The force you feel should on the handle should be mild, never requiring double-handed effort. And while you can experiment, do get a good understanding of the basic operations for each die first.

HOLLOW POINT JACKETED HANDGUN BULLETS

The hollow point is made during core seating. Instead of using a flat faced punch to push the core into the jacket (in the core seating die), you need to order the optional hollow point external punch. This punch has a conical probe on the face, which presses down into the lead core and forms a cavity at the same time that the lead is pressurized to move the jacket walls out and meet the die.

A more uniform hollow point can be made if you first seat the lead core with a flat punch, then change to a hollow point to form the cavity. This step is for the perfectionist, and may be unnecessary even then, depending on how deep the lead seats in the jacket and other factors.

In any press, this operation takes place as a result of using a hollow point punch during the core seating operation. The dies themselves are the same, regardless of whether you select a hollow point or a soft point, an open tip or a full jacket. In a single core seating die, for making semi-wadcutter or wadcutter hollow points, you can use the HP punch either before or after using another nose punch.

The key to successful use of more than one punch on the same bullet is to realize that you do not have to press the punch all the way into the die. Using a portion of the possible extension into the die and lead gives you almost total control of how deep and how big the cavity will be. Whether you swage the HP first or use another punch, such as a Keith nose punch, first, determines the cavity size and the shape of the bullet.

A Keith punch and a hollow point punch can produce a wide range of shapes, including a simulated round nose! Experiment with various insertion depths. In other words, adjust one punch to go in further and the other one to stop short of going in all the way. Using both to the full extent possible only means that the bullet will be primarily formed by the last punch you press against the lead. Whichever punch is pushed in hardest and further against the lead is the one that gives the bullet most of its final shape.

If you use a point forming die, then of course you do not need to experiment with semi-wadcutter nose punches. The point forming die will shape up the ogive for you. It will also smoothly close the hollow point to a more long and narrow shape, depending on how far into the point forming die you wish to push the bullet. If you adjust the press and die so that you just barely push the bullet into the point forming die, then you will have a very large hollow point.

On the other hand, if you push the bullet into the die as far and as hard as you reasonably can, you may well close the hollow point completely. This can produce an unusual result: you can fill the hollow point cavity with a fluid or powder, or a steel ball, and then cause the end of the bullet to roll over this material and trap it in the cavity. If the hollow point is much deeper than the ogive length, a good portion of the cavity will remain at its original size while the part toward the end of the bullet becomes more narrow.

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your more experimental designs.

BOATTAIL HANDGUN BULLETS

With a long shanked rifle-style bullet, a special set of dies is required to manufacture a good boattail base. At Corbin, we make the rebated boattail base, popularized by the fine Lapua match bullets. But in a short, stubby handgun bullet, it is easy to make a rebated or a regular boattail using only a special punch (and not really all that special).

Usually, it's necessary to seat a lead core in the jacket using a core seating die. The die is sealed on both ends by punches, so pressure can be built up inside the jacket to expand it like a balloon. If you turn the jacket over so the closed end is toward to top of the cavity in a point forming die, then you can apply a fair amount of pressure inside the jacket with an external punch that fits down into the jacket. The fit must be close, to keep the pressure from extruding lead around the punch. But it is practical and works well.

If you put a core inside a handgun jacket, then use a punch (ordered as an open tip core seating external punch) that fits into the jacket to press against the core, and put the assembly into your point forming die (base first), you will produce a full jacket, open base handgun bullet.

Should you have a truncated conical point forming die, rather than a round nose shape, you will actually have what could be considered either a nose or a boattail base! To use it as a base, eject the bullet and change the external punch to a regular Keith nose punch that fits into the point forming die by hand. (Remember, in your experiments, to try each punch by hand first -- you don't want to fit the punch to the die permanently!)

Now, with the Keith nose punch installed in die, rather than a round nose shape, you will actually have what could be considered either a nose or a boattail base! To use it as a base, eject the bullet and change the external punch to a regular Keith nose punch that fits into the point forming die by hand. (Remember, in your experiments, to try each punch by hand first -- you don't want to fit the punch to the die permanently!)

Now, with the Keith nose punch installed in point (depending on how much lead you moved forward) TC nose, a short shank, and a rebated boattail base -- what a combination! But give it a try. You can load it either direction. I like to make these bullets with about one caliber length of straight shank. That usually means a bullet with one of the longer jackets and toward the heavier end of the weight scale. But as you can see from some of the tests in the magazines (one of which is reproduced in the Corbin Technical Bulletins) this design can result in a 40% improvement in ballistic coefficient and as good or better accuracy than conventional shapes!

SHOTGUN SLUGS WITH ATTACHED BASE WADS

This is a task for the Hydro-press system. There are many possible kinds of highly accurate slugs you can produce. One is a slug that fits inside the Winchester Red Wad, and is thus made slightly under normal diameter to use the sabot effect of the standard plastic wad. Another is the slug with wad attached to it. This operation is quite simple. A die set can even be produced to stamp out excellent wads from various materials. The details of operating the press are in the book "Power Swaging".

I will just outline the process here. The wad is made with a hole through the center. The hole is precisely centered as a result of the die-forming process. The pre-swaged core and wad are put into a die with a nose cavity punch in the die, and a base punch having a slight depression in the face, like a smooth rivet head, follows the wad into the swage die. A core seating or lead semi-wadcutter type die is used.

As pressure is applied, the lead flows up into the nose punch cavity and forms any desired shape of nose. Usually a conical flat tip or a domed shape is made. The lead also presses hard against the wad, and finds a pressure escape through the hole in the middle of the wad. The lead flows through this hole, and fills the cavity in the head of the punch that is backing up the wad.

The wad is compressed under tons of pressure, and so is the lead. The lead extrusion through the hole in the wad forms a perfect rivet head on the other side of the hole. When the bullet is ejected, you have a lead slug firmly attached to the wad, which now tries to spring back to original size and keeps pressure on the base of the slug.

Another unique twist on this is to form a hollow base cavity with a post in the middle, and with a hole in the middle of the post that will take the threads of a number six or eight metal screw. It might seem very complex, but in reality all you have to do is imagine a punch having a mirror image of this cavity and post and hole formed into the steel face. The reamer and polishing work required is, of course, somewhat expensive. But it is well within reason for anyone who wishes to manufacture a unique kind of slug.

The idea is to shift the weight forward, maintain a longer bearing surface for alignment, without having a massive weight, and provide solid support in the middle of the cavity so that the wad is not blown into the cavity upon firing. The screw attaches the wad to the post. It might even be possible to fill the cavity with cornstarch and then swage the wad to the slug, but this has not yet been tried (maybe by the time this book has been out a year, it will be common).

PRECISION AIRGUN PELLETS

Airgun pellets are really no different from any other hollow base semi-wadcutter bullet. The dies have smaller punches and cavities than most calibers. Corbin makes .20, .14, .17, .224, or anything else you like. Diameter is critical. Rather than the waisted design, these are like a precision handgun bullet in minature.

They have a deep hollow cavity and thin skirts to give a good seal, and they usually are made slightly smaller than a waisted pellet so that the bore friction is reduced. Swaged with a Dip Lube coating, they provide good lubrication that is consistent and dry in all temperatures. The nose can be conical or of the Keith style with equally good results. Such pellets in .2235" diameter make excellent indoor practice bullets or mouse shooters in a conventional centerfire rifle used with a primer only.

There are complex ways to swage the waisted pellet, but it isn't usually worth the effort compared to the results you get with the simple single die method in either reloading press or Mity Mite. In the reloading press, only a .22 pellet is offered, unless a run of at least 100 dies is ordered (for resale). But in the Mity Mite, you can have anything you wish.

PLASTIC TIP RIFLE BULLETS

Several of the common plastic rod materials swage nicely to form lead tip replacements in any conventional rifle caliber. Nylon, polyethylene, and other "soft" plastics that can be shaped by pressure and retain that shape after pressure is removed make nice tips for your hunting bullets. The idea of the plastic tip predates the current Nosler design by many years, as seen in the early Norma nylon tips and in home-swaged bullets using Nylon tubeless tire patches (plugs) in stark black or white.

The FBI once contacted Corbin about making Nylon bullets for handgun use in an indoor training facility. The idea came about because a conventional Speer Nylon bullet had a sharp shoulder that prevented the use of speed loaders. When these bullets were re-swaged in a simple Corbin point forming die, right off the shelf, they acquired a more bullet-like profile and worked in the conventional speed loader.

A side benefit turned out to be that the agency could reload these plastic bullets seemingly without end, after reswaging to remove the rifling and other impact marks. I have one left in my collection that was shot and reloaded and reswaged over 25 times, and it could still go on without any apparent change.

Nylon rod can be obtained from most plastic suppliers. It can be cut to short lengths in a lathe or bandsaw. The bullet is made in the same way as any open tip design, by seating the lead down inside the jacket with a punch which fits into the jacket. But before the point is formed, the short piece of Nylon is placed inside the jacket. The diameter should be close to the jacket ID.

When the point is formed the jacket and Nylon plug smoothly swage into one profile. The ogive locks the plastic in place (it crimps into the material since the plug is larger inside than at the external tip).

FRAGMENTING BULLETS

Bullet swagers have been making their own fragmenting defense bullets for years. It is extremely simple. Just dipper a charge of number twelve lead shot into a jacket, and seat the shot like it was a solid core. Press a bit of soft wax or a thin cardboard wad over the shot. A wad can be made in a regular swage die of smaller caliber by putting a bit of cardboard between the punch and die and pushing through it.

Then, form the ogive in a point forming die. To increase the fragmenting effect, first roll or tumble a quantity of shot with a little dab of Corbin Swage Lube. This lube keeps the shot from sticking together -- it may appear solid when you swage it, but on impact it break up nicely.

HYPERSPEED BULLETS

What would you call a bullet that goes 2000 fps from a snubby .38 Special? Impossible? No, you can develop an ultra-light bullet in any caliber and then find a fast-burning charge of the right powder to propel it at unbelievable speed. Some of the effects are dazzling.

Here is how you retain enough bearing for a semblence of accuracy and still keep the bullet weight down: use cornstarch as a core!

The secret is out...but only bullet swagers know about it.

Cornstarch swages under high pressure to form a sort of hard plastic material that is much lighter than any conventional jacket filling, yet expands the jacket as well as lead under swaging pressures.

Because of the low density of the material, even when swaged to a plastic state, you can make a regular length bullet that seats and balances as it should, yet has very low inertia. The sectional density is very low, which means it doesn't penetrate very far and it also doesn't fly very far before losing its speed. Those can be good features in a defense bullet used in populated areas.

When you top the cornstarch with a small amount of lead, you can produce a method of delivering a devastating high velocity projectile without nearly as much danger to people behind the intended target. Make the filling out of swaged lead shot of small diameter, rolled with Corbin Swage Lube, and you have just produced a superior fragmenting bullet with ultra-high velocity. You need nothing special to do all this, except the right punch to fit into the jacket at the depth where you want to swage the material.

PARTITION STYLE HANDGUN OR RIFLE BULLETS

Putting a partition across the middle of a bullet is as easy as telescoping two different diameters of jackets together. This is covered in some detail in the book "Rediscover Swaging". Basically, the inside jacket is of smaller caliber and is about half the length of the outside jacket. When jackets do not exist ready-made to fit this way, a Corbin JRD-1 draw die can turn some available jacket into the right size.

In the Hydro-press system, it is possible to make partitions by folding and pressure-welding the actual jacket wall material into a band across the jacket at any desired point. Copper tubing is normally selected, so you have both the benefit of the soft copper tubing and the partition effect. If you want to go one further, add Corbin Core Bond and a little heat, and you have a bonded core, partitioned, copper tube bullet -- something none of the famous firms who are known for making one of these features apiece have managed to combine.

PENETRATOR CORE OR LIQUID FILLED CAVITY BULLETS

I group these two styles because they are made the same way. A set of special punches is made to seat a very light core in the bottom of the jacket. One punch seats the core, and the other puts a center in the core. Then a long hollow point punch slips down into the jacket, finds the center, and starts extruding lead up along the punch sides. Plenty of good lube is required on the punch.

The punch is withdrawn, leaving a long, deep cavity precisely centered in a lead sheath inside the jacket. A carbide, uranium or other heavy metal core can be placed in this cavity. It works best if the insert material is slightly larger than the cavity for a gentle press fit. A punch can also be made to do this.

Corbin does not provide these heavy metal cores. Most of the people who do this work are able to obtain their own from defense agencies or suppliers. Such bullets are usually made for special projects within the military and are discussed here only to show the possibilities. Liquid filling for the same cavity can easiy be substituted. A lead ball is placed in the end of the cavity to help seal it, and then the bullet is put into a point forming die and the ogive shape extrudes lead over the widest part of the ball and locks the assembly together.

ULTRA PRECISION BENCHREST RIFLE BULLETS

The quality of the bullets you can make in a typical Corbin swage die for the Mity Mite or Hydro-press will equal or exceed that of any bullet made today. You do not need to pay thousands of dollars for special "benchrest" quality. The best quality that money can buy comes far less dear than some folks imagine possible.

On the other hand, I do not recommend the die sets that we manufacture for use in a reloading press as benchrest bullet dies. They are good dies, and have often been used to make match-winning bullets. But the system does not lend itself to what I would call the ultimate control over the bullet weight and style.

Reloading press dies are made to work in a press that was not designed specifically for bullet swaging. Corbin Mity Mite and Hydro-press dies were designed along with the press, without having to consider factors necessary for reloading. The Hydro-press and the Mega Mite press both handle reloading as a side benefit, not as a primary goal that might restrict optimum design for bullet making.

Alignment, sensitivity of control ("feel", if you like), balance of the forces that tend to produce ram torque, amount of press head movement under stress, maximum leverage potential, and other factors from how ejection is handled to where the top of the ram comes to rest in relation to the press head, are all optimized for bullet making the the special swaging presses. These things simply are not there, in a reloading press. It doesn't matter how big or strong or expensive the press is: if it was made primarily for reloading ammo, it wasn't optimized for making bullets.

I have had a few perverse clients shoot winning matches with bullets made in our standard reloading press dies, and they enjoyed telling their fellow shooters (who had spent thousands of dollars, in some cases, for the "right" benchrest equipment) how little their equipment cost (usually under $250 for everything -- dies alone cost about $160). But while it can be done, I certainly feel that you are better advised to use equipment made with all the benefits of the special swaging press in mind.

There are two secrets to making benchrest bullets. First, the jackets themselves must be very concentric and should be weighed so that you can cull out any over or under a nominal value. Different weight by itself has little effect on the bullet path, within a factor of from 1 to 2 percent of the total bullet weight. (Calculate the drop difference and you will see that one-hole groups at 100 yards are still possible with bullets that weigh plus or minus half a grain in a 55 grain .224 caliber, or bullets that have 1.5 grain variation in a 150 grain .308 caliber).

The problem with weight variation is that it can be caused by a thicker base, thicker walls, or even a difference in wall thickness from one side to the other. If it is merely a bit longer jacket, it won't have much effect. And the heavier or lighter jackets, by themselves, do not cause bad groups. It is a mixture of different jackets that can throw off the group size. A heavier or lighter wall is not bad, it just can't be used with something different in a benchrest match.

The next secret is consistency in the method of making the bullets. The little rituals and weird theories about what makes a bullet shoot are a lot of fun for the people who believe in them, and even if they make little sense to rational people, I see no harm in following the latest fad in regard to many of the rituals. But for a person who is mainly interested in fact, and wants to see what really does and does not make a difference, it doesn't take too long to see that a machine rest in an indoor tunnel easily proves that consistency makes more difference than any specific method.

In other words, whatever you do in regard to how you apply your lubricant, whether or not you "rest" the cores overnight before swaging, or whether or not you spin and weigh each bullet in some questionable fixture or tool made to point up some mysterious accuracy factor, the real effects will come from doing things the same way each time, so all the bullets do indeed come out looking and shooting the same way.

Some of these rituals help produce a more consistent bullet, often for reasons not entirely related to the goal that the shooter feels he is trying to reach by that ritual. Benchrest shooting originally brought a great many serious benefits and pointed out errors in how bullets were being made during the 1940's and 50's. To some extent, a level of mystique and fraternalism has moved into the place that used to be held by serious investigation, with the quirks of the latest winner being slavishly repeated by next year's would-be winners.

But this is true in all competitive sports. Winning matches does not necessarily make the shooter an expert on every aspect of the tools and equipment used to win. Sometimes a good deal of winning is attitude and practice, especially when equipment differences become very slight at the top levels. All of this is merely to point out that making benchrest quality bullets is not necessarily the exclusive realm of a white-bearded wizzard who knows cosmic secrets which you, mere mortal, can hardly be expected to understand.

As a matter of fact, nearly anyone with a reasonably good set of dies and careful attention to what he is doing can turn out bullets capable of one-hole groups. Then it is up to the rest of the system, including the handload and the gun, the shooter and the fates that blow the winds, to let that one-hole group appear on any given day.

This information doesn't play well with those who would like to have you believe there are dark secrets beyond your reach, which only certain people (who happen to have something they might -- hold your breath! -- be persuaded to sell you) have in their posession. But you can prove it to yourself, and to anyone else who doesn't have too big a stake in keeping it quiet! There is no fundamental difference in the potential quality of a .458 bullet, a .600 Nitro bullet, or a .224 benchrest bullet made by the process of swaging outlined here.

All swaged bullets made by hand on good equipment, using consistent components, can be made carefully and well. They can all be benchrest bullets of their caliber. A heavy recoiling .458 isn't likely to produce as tight a group as a conventional .224 short case benchrest cartridge using specially selected primers, but if you compare similar kinds of guns and loads, you will soon see that your own home-built bullets stack up in the same way as benchrest .224 bullets stack up against the average factory offering.

You have nothing to fear in the accuracy department, in regard to the dies or the bullets you can make, given the material and care necessary. Do not, however, make the error of assuming that a perfect bullet will turn an average rifle into a benchrest gun. It will not. The errors caused by poor bedding, a light barrel, gas cutting in the throat or leade, improper powder charges, or even a less than steady shooter, will completely overwhelm the slight errors produced by a bullet of average quality. No difference between a perfect bullet and an average one could be told with most of the guns that are capable of being carried afield, if the load is right and the shooter does his part.

A good discussion of accuracy and bullet design can be found the the textbook, "Rediscover Swaging". The techniques for obtaining greater than usual core weight consistency and proper core seating are also discussed in this book. Multiple passes at core swaging, holding the pressure for a consistent length of time, application of a precision film of lube rather than the usual transfer of lube with the fingers, and other factors that increase the consistency of results are discussed.