SWAGING WITH THE HYDRO-PRESS SYSTEM

The manufacture of custom bullets has grown tremendously in the past decade: people with a diverse range of jobs (and quite a few who were between jobs), people who had successful professional careers, have found custom bullet manufacture to be pleasant, profitable, and a wonderful way to plan a comfortable retirement income or to build a business at low cost that can be turned over to a son or daughter.

There is no typical custom bullet maker, as far as I can tell. I know doctors, carpenters, locksmiths, attorneys, laborers, people who had severe physical handicaps, people who are the picture of a robust outdoors athlete, people with gruff personalities and a lot of mechanical aptitude, and people who are extremely pleasant, quiet types who have a hard time with a screwdriver. All of them seem to be doing quite well in the custom bullet field.

Today, you can purchase a complete package, ready to start production of bullets so advanced, and so difficult for mass production, that none of the big names in bullet making can compete with you. It may seem hard to believe, but none of them have machinery capable of forming some of the extremely tough, thick jackets, in heavier weights of large calibers, that you can easily make on a small machine that fits in your den or garage.

The reason they don't (and can't) compete in so many areas is their committment to volume. Their very size dictates that limited production items are not profitable to them. The wiser executives at these firms welcome my customers into the field: they know that the need for quality specialty bullets can be met by custom bullet makers and that there is no direct competition, but in fact a benefit: they can now forget about pressure to make unprofitable (to them) small runs, and just refer clients to you, the custom bullet maker.

Besides, the kind of equipment needed to mass produce heavy walled jackets in larger diameters is extremely expensive. The stroke length and tonnage of the multi-station presses for high speed production is quite beyond anything used for ordinary target and smaller diameter hunting bullets. It would cost a minimum of half a million dollars to install the equipment required, and the market for specialty bullets of this kind is far too small to be investing even that kind of money, not to mention the promotion, inventory, and special materials required.

On the other hand, what is unprofitable to a big outfit is enough to keep a family or two living in high style! A custom bullet typically is sold for prices from 50 cents to over two dollars per bullet. They are NOT price competitive with mass produced bullets, and they don't have to be. Even at twice those prices, there are between ten thousand and one hundred thousand (typically fifty thousand) bullets sold in any given specialty size and caliber each year, on the average.

Who pays that for bullets? People who own exotic calibers. People who like to hunt big game and have experienced repeated failures of cheaper mass produced bullets. People who want a specific weight or style in some caliber and don't mind investing a little more than usual to try it. People who... well, basically, people interested in something better, different, or unavailable elsewhere at any price.

You don't sell a lot of these bullets to local plinkers, of course. But serious competitors, people spending five thousand dollars or more to make a trip to Africa for hunting, special police teams who need bullets of unusual design for tactical situations, and the everyday handloader with a spark of curiosity in his soul -- these people are the ones who produce backlogs for my customers, often cleaning out their entire supply at trade shows or by magazine advertising sales.

The machine that makes it possible is the Corbin Hydro-press. Everything about the machine is designed so that you can get into the field at minimum cost, and grow without having to worry about outgrowing the capacity of the equipment. It is capable of forming solid brass bullets in one stroke, making a 10-gauge shotgun slug from a chunk of raw lead, forming partitioned jackets in heavy tubing, making brass, copper, or even steel jackets with thin or heavy walls, and extruding lead wire in any diameter.

It can turn right around and reload some ammo for you, too, using regular RCBS type dies and shell holders. When you suddenly realize that all your reloading presses are now complex progressives or turrets and you have lost the old rugged simplicity of a powerful single-station machine, the Hydro-press greets you with a "can-do!" and barely begins to unleash its tremendous power on jobs that would shatter the fragile parts of modern reloading machines.

It's not large -- only 34 inches tall, 23 inches wide, and 15 inches deep (about like a small refrigerator). But the design is the essence of rugged simplicity. We use a Hydro-press to cold-forge steel parts (used in other Hydro-presses, by the way!). It can stamp, blank, coin, trim, and punch steel, in addition to its regular duties as a profit center for your bullet making.

The major advantage of the Hydro-press is its built-in electronic controls and logic circuits: the "brains" of the press and the sensitive transducers that tell it what is going on in the world. Anyone can assemble a hydraulic cylinder to a ram, somehow adapt it to a set of dies, and let it slam blindly back and forth. That won't make good bullets, however. The ability to control pressure in the die, exact position of the punches, and precise amount of time that the pressure is being applied, is needed in order produce a consistently good product.

The Hydro-press uses transducers that sense the position of the ram and control its movement though logic circuits. The earlier versions used high quality limit switches to tell top, bottom and loading position. Current versions use electronic proximity detectors that have no moving parts and do not contact the ram. Solid state timing controls the application time of the pressure. Pressure transducers control the level of pressure applied. All this is automatic, locked away in the steel innards of the cabinet.

What you see is a colorful Lexan-laminate-on-steel top panel, with a digital counter, adjustable inspection light, key-locked power switch, selector switches for various modes of operation, and brightly colored oversize push-buttons to cycle the press. At the left rear corner of the cabinet is a massive steel press head with inch-thick plate for a base and head, and hardened, ground tool steel ram and guide rods running on bearings.

As powerful as it can be, the Hydro-press is also sensitive. You can set the pressure, speed, and timing in seconds. It can reload a .25 ACP case just as easily as it cold-flows a solid hunk of copper. Blind force cannot begin to accomplish the tasks you can handle with the intelligent Hydro-press system. The dies and tooling for the Hydro-press are capable of sustaining much higher pressures than smaller dies for the reloading press or Mity Mite. They use 1.5-inch diameter blanks, with 1-12 TPI threads. The press head accepts a floating punch holder with 1.5-inch by 12 TPI threads, and an adapter for standard 7/8-14 TPI dies as well. The ram can be adapted to 7/8-14 TPI, or to a conventional shell holder. Shell holders for 20 mm and for 50 Browning Machine Gun cartridges are also available.

Fifty caliber MG dies (for reloading) are made by C-H Dies and they fit directly into the head of the Hydro-press. I recommend them.
Corbin builds a lead wire extruder kit, jacket maker kits, and of course the full range of bullet swaging dies for the Hydro-press.

Calibers are virtually limitless. No small arms bullet is too large. Weights and styles are also quite open to a wide range of designs. If you want something that cannot be made in a hand press, this is the system that is most likely to handle it. (If the Hydro-press won't handle it, chances are it cannot be done.)

The dies and punches are massive, far too large for use in a reloading press or the Mity Mite. And smaller dies do not fit into this press for good reason: it would be too easy to destroy the dies by using pressures only a Hydro-press die of that caliber could sustain. All of the kinds of dies previously discussed are available in this system. They work the same way. The only difference is that the die goes into the ram so it faces straight up, and the external punch fits into the floating punch holder so it faces straight down.

This arrangement makes it possible for you to drop a component into the open mouth of the die, then move your hands back to the two-hand, safety controls to start the stroke. In the key-locked manual start mode, it would take a contortionist to put a part of their body in the way of the moving ram. (An automatic mode, controlled by the key switch, is also available -- you need to know the code sequence to start it. It is handy for sizing long runs of cartridge cases with the ram set for a moderately slow travel).

Rather than describe all the modes and controls of the Hydro-press here, I will refer you to the book "POWER SWAGING", which is all about the use of power presses including the Hydro-press. Basically, the adjustment is still done with the punch holder, just as it is in the Mity Mite. The main difference is that you can control exactly where the start and stop of the stroke takes place, so that the stroke length is adjustable to precisely what you need for any job. (Up to six inches of stroke can be used, if need be!)

The press can stop and reverse itself, after a applying pressure for whatever time you tell it (0.1 to 10 seconds). It will continue down, eject the bullet gently to the top of the die, and then raise slightly to retract the internal punch so you can put another component into the die. The point at which it reverses can be a physical location set by the position transducer, or it can be a pressure level achieved by the compression of the material, sensed by the pressure transducer.

Naturally, if you set the press to stop when it reaches a certain position, it is possible to adjust the punch holder so that the bullet has yet to be contacted, or so that it is pushed too far for the shape you want. I like to set the stroke length first, leaving myself enough room to easily put components into the die but not wasting time moving the ram any further than it needs to go. Then, after I have a pleasant working stroke length set up, I back off the punch holder, put a component into the die (core, jacket, whatever I might be doing at the time), and run the press ram up to the top of its stroke.

With the position switch and pressure switch both turned off, the ram will simply stop when it reaches this point. It is now as far up as it will go during this particular job. Then, I screw the punch holder down by hand, until the punch contacts the material within the die. I back the ram down slightly (press the green "ENERGIZE" and yellow "DOWN" buttons, then release them after the ram moves down a bit). Then I give the punch holder another quarter to half turn downward, just to put some compression on the component on the next up stroke.

The ram is then moved up (press the green "ENERGIZE" and the red "UP" buttons). Again, with pressure and position switches turned off, the ram will do one of two things: if the component is being compressed and is resisting with pressure equal to that of the press (as read on the gauge), then the ram will simply stop and hold the pressure. I can read it on the gauge, and I can hear the motor and pump inside the cabinet as it pushes oil over the by-pass valves. Or, if the pressure I have set is great enough to move the component into a more compact shape, so that the position sensor is activated, then the pressure gauge will drop to zero, the red LED light on the top position sensor will come on, and the ram will stop. The motor and pump will make their usual idling sound.

It's easy to tell whether or not you have formed the component to a limit that was set by position or by resistance to the pressure. In some jobs, you want consistent pressure. This would be true of a core seating operation. The Hydro-press can form seated cores far more accurately than you can do it by hand, on the larger calibers. (On small calibers, I still think a person can do it better -- given enough experience).

But on a core swage operation, or when making a lead bullet with a LSWC-1-H (note that the die designations are the same as the Mity Mite, except that the letter "H" is added to indicate the big Hydro-press design), using constant pressure would simply move all the lead out through the bleed holes! It would come out very consistently, under the precise control of the pressure and logic circuits, but there would be no indication of when to stop pressing.

In this operation, you adjust the pressure sensor to a value lower than that listed in "POWER SWAGING" as maximum safe pressure for the caliber of die. Then, you actually stop the ram using the position sensor (turn on the "POSITION" switch). The location of the top position transducer will control the length and weight of the bullet in this case. It is extremely important to use sensitive, high-quality transducers for this kind of work, because variation in their range of sensing will cause variation in bullet weight. I use a highly precise electronic proximity detector that can sense position within millionths of an inch, far better than the human eye.

In manufacturing a bullet jacket with the Hydro-press, the same basic steps are used as with thinner materials in the Mity Mite. First, a piece of tubing is cut to length. The length is determined experimentally and is different for various weights, styles of tip, ogive radius, and kinds of bases, as well as for partitions or conventional cup jackets. (We work this out when we build the dies -- design is a large part of the making of a tubing jacket set).

Tubing is cut to length using a turret lathe with air feed, or an automatic screw machine. Corbin cuts tubing for customers, and furnishes the correct temper and wall thickness, alloy and length to make the bullet you order. Or, you can farm this out to a local job shop, or cut the tubing yourself with a fine-tooth saw (bandsaw, circular saw, or even a hand saw, using a V-block and a stop to get even, square cuts).

Boxes of from 100 to 5000 pieces of tubing are normally purchased with the dies. One end has been deburred and chamfered. The other is left with as much of the cut-off burr as possible on it. It will form the base, so any extra metal is welcome and causes no problem. The piece of tubing is placed over a punch that fits precisely inside, with a length that allows at least half the caliber length of tube to protrude beyond the punch tip, unsupported.

The punch has a shoulder that presses on the other (chamfered) end of the tube. One simply installs the END ROUNDING die (or, as some call it, the JACKET MAKING die) in the press, making sure that the steel pin that passes through the punch head is indeed installed correctly (on top of the knock-out bar, but under the retraction spring -- pictures in POWER SWAGING illustrate how). Thof tube to

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The next step is to draw that piece of rounded-end tube to a diameter that will fit into the core seat die for your caliber. Draw dies are part of the jacket-maker package if they are required. Again, it is the working system you are purchasing, with all the development and testing that went into making it work with as few steps as possible, not a specific number of parts. We provide what it takes to make the jacket. Sometimes it takes thousands of dollars worth of die-maker labor to develop some little change that you might desire, but we don't charge you for it. On the other hand, if we can come up with a process that eliminates one or two steps by putting in all this work, then I think you can see that it's a better deal even if you don't need some specific die or punch that might otherwise be included.

I mention this because not every jacket design is made the same way. Some alloys, thicknesses, calibers, or combinations of jacket features take differnt paths during production. Because this is almost entirely unique, one-of-a-kind development work done just for you, to make your bullet, it is impossible to predict whether your set will include any given number of punches, dies, or whether certain steps will be necessary in advance. Instructions are written after the set has been developed and tested. Generally, they all follow the process oulined here. Sometimes there are radical exceptions.

Rather than charging you for full shop time every time something requires a lot of working out, we just have one standard price for a package of tools we call the "Copper Tubing Jacket Maker Set", or "CTJM-1-H". This set is NOT a fixed physical number of parts, but varies with whatever is needed. You are purchasing the completed concept, the process of manufacturing something that no one else in the world has worked out quite this way. If it takes an extra die or two, then the extra material you got may be considered a bonus -- I would consider it unfortunate, since it makes the bullet manufacture a little slower. On the other hand, if we were able to eliminate everything but one or two dies in the set, you might consider it an over-priced set if you just looked at the parts received and not at the time that went into developing this faster, easier method for you. I would consider it a blessing that someone had eliminated all the extra steps in my bullet making operation!

But, as I was saying, the next step is usually to draw down the end-rounded tube. For this, a die is provided. The die fits into the head of the Hydro-press, using an adapter that takes it from 7/8-14 TPI to the 1.5-inch by 12 TPI press head. Adapters are available separately, if you want to permanently install one on each die for convenience, or you can use the one that comes with the press, and simply change the dies.

A very long punch is provided, with a base that looks like a die. It screws directly into the press ram. This drawing operation is exactly a mirror image of the usual swaging set-up. The die and punch positions are reversed, and of course there is no internal punch since the draw die is an open, annular or ring die. The tubing is simply dropped over the punch and pushed through the die, coming out the top.

After drawing, the tubing normally must be annealed to avoid cracks in the base. We make a very nice electronically controlled furnace for this, which can be optionally equipped with a Nitrogen atmosphere for even greater control (no scale, no oxidation). If you don't feel ready for the electric furnace (which is the same quality that we use to make our dies, by the way), then a propane or gas welding torch will do. Heat the tip red and drop the jacket in water. The water quench is to knock off scale. It doesn't do anything for the anneal.

Now remove the draw die and punch, replace the floating punch holder, and install the regular core seating die from whatever swage set you plan to use with these jackets. Some kinds of jackets, especially partitioned ones, have a different internal punch to install. Instructions will be included with those sets to tell you how. Otherwise, just use the normal flat internal punch. The external punch is a special one in all cases, however.

The external punch is made for a specific wall thickness and length of tubing. It fits into the jacket, supporting the walls while pressing on the open mouth. The length of this punch is a bit shorter than the end-rounding punch, but otherwise they appear to be similar. The END-FLATTENING punch, as it is called, fits inside the drawn jacket snugly, but it does fit. The end-rounding punch only fits inside the tubing, before drawing.

As with most swaging tools, sorting out the parts is just a matter of knowning what they are supposed to accomplish, then seeing if they fit into the parts they are supposed to fit. If they don't fit by hand, chances are they are not the right parts. If they do, then they probably are!

The purpose of the end-flattening punch is to flatten the rounded end of the tube, and make a closed jacket. Application of the recommended pressure, as given in the instructions that come with the set, will produce a flat base. The jacket is now finished! It can be used just like any other jacket. The operation just described can be applied to the Mity Mite system, using the 0.030-inch wall tubing suitable for this press. Tubing jacket manufacture is considerably easier and faster on the Hydro-press, even with thin jackets, since the stroke length is considerably greater and the press has full power anywhere in the stroke.

The Mity Mite and the Hydro-press systems both use different size dies, and do not interchange. The Hydro-press can use reloading press swage dies, though I don't recommend the practice: it's too easy to over-stress a swage die by applying more pressure than the recommended limit (the charts in POWER SWAGING are for Hydro-press dies, not the smaller diameter reloading press dies). However, the Mega Mite press is a common ground for all Corbin dies.