Veral Smith Interview, March 29th, 2013

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"Butterknife" (BK): *One of the things that I like to toss out on a regular basis is that, if you're having a hard time getting bullets—especially jacketed bullets—a fallback, a more easily manufactured alternative is to cast bullets. Our standard alloy is wheel weights, although of course there are a lot of variations. If you must go with a factory mold, well, so be it. They have in the past been easily available; they're not so available anymore. If you really want to do it right, you want to take a look at a site called LBTmoulds. Mr. Smith at LBT will work with you to choose a mold and bullet design to suit your requirements and will almost hand-manufacture the mold to you specifications.*

Since he is turning those out on a lathe, not cutting them with a cherry, you will not find a more precise concentric or finely machined mold anywhere. They'll be a little bit more expensive than what you think is normal, but then again so will everything you think is normal be more expensive than what you expect.

If you compare against the RCBS's and the SAECO's and so on, the cost differential is not that much, and I guarantee you will be very, very pleased with the quality of the mold that you get from him.

One of the stimuli that caused me to contact Mr. Smith again—I correspond with him occasionally anyway—is that one of our friends sent me a little email and reminded me of a technology of which I was vaguely aware, but about which I know very little, and that is the paper patched bullet. This is an old technology, and it is one that is still available. Mr. Smith can build you a mold to do that, and can describe the process and the virtues and so on. That's why I asked him on the air this evening, to give us a rundown of that technology, to describe how it works—pluses and minuses versus traditional cast and so on. So let me hand the microphone over and let Mr. Smith educate us a little bit.

Veral Smith: OK, paper patch was used for the last half of the Civil War, at least, almost exclusively on the 45-70 [rifle]. And they were shooting pure lead with no fouling. Now, I've come up with a method where you glue the patch on. I've never been able to do it the way the oldtimers did it, and a lot of people do it today: they spit on the paper and wrap it on. It takes two wraps around. I won't get into the details of cut. That's pretty well known.

For my method, you use 25% wood glue and 75% water. Shake it up in a spray bottle, spray it on your patches. With my method the patches are cut square on the end, wide enough to cover the part you want to paper patch, and two wraps around the bullet. So the bullet has to be cut a little bit undersize to allow for the paper.

Once the glue is dry you can size them like you would a normal cast bullet. No gas check is used. Very soft alloys can be used and can be fired at full power out of… like a 30-06. The barrel never fouls, it will not plug the gas port. Everything is a bright picture as far as performance. The only downside is that they're slower to produce.

The production time is down some—you have to glue that patch on. You can just smear lube on and shoot them, but it's best to size them to exact fit. By the way, if you use the conventional old-style paper patch, you can't size them. It tears the paper off. A glued on patch, you can size.

If you're going to size them, you can use a sharp knife and trim the paper flush with the base.

You do it in any gun there is, any cartridged firearm.

There's a myth that bullet lead on the base, if it's exposed, melts and leads the barrel. This leaves the lead completely exposed. You have just two wraps of paper, and you can't hardly see it when you're looking straight at the base. You get absolutely no lead melted in the barrel.

BK: *The rate at which heat can be transferred is very limited.*

Veral Smith: Yeah, it's very limited. You blink your eye and it's been there a while, out at 300 yards.

BK: *The website is LBTmoulds.com and Mr. Smith has a small book, I would call it a booklet that discusses not so much paper patched, but traditional lead casting. You will never find a more densely packed source of information about casting lead bullets than that book. It has more stuff in there than you thought that you would want to know. It discusses bullet design, lubrication, the front end and diameter of the impact point for terminal ballistics, the alloys that you might use, heat treating, hardening, hardness measurement, changes of hardness with time and temperature. All sorts of things like that. If you have the slightest interest in casting bullets you should definitely jump on that page and order a copy of that book. You will be happy that you did.*

I will also mention that Mr. Smith offers three different stiffnesses of bullet lube compound, the softest of which you can apply by finger if you wish. So you might do yourself a favor by ordering some of his soft lube at the same time, avoiding some of the separate shipping.

Veral: The lube consistency for the soft is about like modeling clay at room temperature. So you can wipe it on your finger, and if you want to experiment—if you've got something else in the lubricator—just leave the pressure off and wipe it on your fingers and size them [the bullets] and it will wipe them clean and do the job. You can get quite a bit of casting with a stick of it. The other two are "Blue", which is medium-hard and then "Commercial" is the hardest. The performance of all of them is the same, it's just the hardness. Where people want it hard so it doesn't come off when they're shipping.

The "Blue Soft", even though it's called "Soft"—you can carry a lubed bullet in your pocket for a month and the lube is all there. So it's not like Alox.

My molds will cast faster than iron or steel, much faster. And—I think—faster than any other aluminum. That's because of the design of the mold. For example, if the bullet weighs 300 grains or less, I can knock out 800 an hour with one four cavity mold, which is pretty fast. With two cavity, it runs about half that speed. If your bullet's real heavy, then you've got more heat to get rid of. The rate drops off, because you've got to wait for it to cool.

By the way, "LBT" stands for Lead Bullet Technology. That's my trademark. I have technology that I developed. The way I got into this, I started to cast in 1980. I couldn't get results, because the information wasn't there. I bought all the literature available and everything I could find and so I began experimenting. I experimented with a full machine shop at my fingertips. With 25 year's experience rebuilding precision metal working machinery, and building, custom design and all that. So I have a good background in the machine business.

If you spend enough time at it, you learn things. I have a lot of technology that's never been known before, that I discovered. It took me a few years. That's what I am selling, lead bullet technology.

BK: *One of the things that I'd like to touch on, before we miss the topic, is that you use a tracer lathe that you built, a mechanical equivalent of a CNC lathe. For a specialized task like this, a collection of templates and tracers and so on works every bit as well, and is not subject to software bugs and all the other glitches.*

Factory molds will be manufactured in a different fashion. They use something called a "cherry". Could you describe that process so that people can appreciate the difference in concentricity and precision between that process, and using a controlled lathe the way you do?

Veral: First off, to cherry cut a mold, the two halves have to be locked to two moving vise jaws, so that the jaws come in at about the same speed together when they close the vise. So we're subject these two vise jaws getting loose and rattling or any little variable that lets one mold block kick right, and the other one left. The cherry is the cutter that's the same shape as the bullet that you're going to cut. It's positioned vertically, and you close the mold with the cherry spinning. The cherry is kicking one block one way and one the other. When it finally comes shut, the two pins pull it into alignment.

So the cavities are cut eccentric. So when you measure it, you can mike that [mike = use micrometer]. People are happy with that because when they size them they measure round and they think everything's fine. But that extra lead on the side—when you have a a little jaw sticking out there—that's extra lead and when you size it round and it measures pretty it doesn't change the fact that the bullet is out of balance. The out of balance bullet is the cause of inaccuracy. You have to have perfect balance to get perfect accuracy.

Now when I cut them, I custom cut every mold to the customer's specs. The blocks are clamped tight in a lathe with the pins in, everything holding them exact, and a little fine pointed tool—one little point—goes in, ducks in and out, and cuts the entire cavity. It plunge cuts the end of the cavity. So there's no movement [of the mold]. You'll be hard pressed to measure any out-of-round in my molds.

BK: *One thing that's a little counter-intuitive is that if you want to bore a perfectly circular hole, you want to use a single point cutter. We like to think of twist drills as having two or three cutting surfaces, and we think of that as having equalized forces as you've got metal being cut on either side and therefore it's not going to deflect the cutter and so forth. But if you really want to do a precise job, you use a rotating machine and a single point cutter like a boring bar. As it rotates, you are cutting a smooth chip of metal on a continuous basis.*

If you think about the whole cherry mechanism, where they're machining the shape of a bullet out of tool steel and then cutting some grooves in it so they've got cutting surfaces, and then you're closing the two halves of the mold on to it, you've got cutting surfaces banging against, entering, scooping out some metal and then exiting the surface of those mold blanks as they close closer and closer to each other. At first they're just touching and chipping a little bit out of a small area. Then as those mold blanks get closer to each other, then the cutting surfaces on that cherry are going to scoop larger and larger sections. But at every time there's an impact as they enter the metal and then there's a release when it lets go of the metal and it comes out of contact. Only as the two halves of the mold are actually in contact with each other is there any

chance for the cutting surfaces of that cherry to actually be continuously in contact with the metal. Whereas the way you're doing these things with the two halves of the mold clamped together from the very beginning, that single point cutting tool is going to be in continuous contact all the way around, 360 degrees, throughout its entire cut. Therefore you're not going to have perturbations from a circular profile. Is that correct?

Veral: The cherry has to cut its full length. The groove, the bearing band, the whole thing—is all scraping at one time. Sometimes they have four flutes [cutting edges], and some companies use only two flutes, which really hammer. Each time they cut in and then break away there's a jerk and a twitch. The cutter deflects, it bends some. So there's room for every kind of error with that.

If I'm cutting a mold, I can make a finished cut, take a felt pen and go in there and paint the inside of the mold. Then go in with the same setting and erase about 95% of that ink. You'll see a little bit of color, but it's as uniform as can be, around the mold. That's on a finish that's almost mirror finish. When I first started I wasn't able to get that, but in 33 years you kind of learn a couple things, you know.

BK: *As a cherry is used, when you run from the first mold after you cut a cherry to the last mold in the production run, that tool is also going to wear down a little bit. Therefore the mold that you produce at the beginning of the production run is going to be a little different from the one you get at the end, won't it?*

Veral: Yes, exactly. They resharpen—I've heard—two or three times. I read that about Lyman. I don't know for sure how many times, but they do resharpen. That removes a little metal, makes it smaller. The downside of that is you don't have a choice whether you get one that was cut at the beginning of that cherry's life or at the end of it.

Your rifle is made in the same way. It's made with tooling, so they all vary. Every gun's a little bit different. And then, WHERE is the gun? That changes it.

So if we just take a production run mold, and it doesn't fit the gun, you're not going to get precision accuracy.

BK: *It could be that that mold would work very well in your buddy's gun.*

Veral: We have another factor: for any company to manufacture any product and be able to stay in business on a mass producing basis, they can not have a customer complain. They can not deal with a person on an individual basis. So they engineer their molds so that that they fit any gun. Then nobody says, "That bullet don't fit my gun." If it doesn't shoot accurately they assume it's something they're not doing right themselves. Not understanding what's going on, they don't realize that with cast bullets it is mandatory that they fit.

BK: *In all fairness it's also possible that people DO do something wrong, so it's just another variable to be coped with.*

Veral: Well sure. They do things wrong with mine too. But if a person goes the route that I tell you—I tell you how to fix your gun if the barrel's not right, how to lap it. I supply the stuff to do it. I show you how to tune your gun up. Then I fit a mold to that gun, and if it doesn't work, I'm here, and I talk to you, and you get results.

BK: *Let's take a little bit of load off of Veral and say your best piece of homework is to get a copy of that book and read it a couple of times first. That way you won't embarrass yourself with a question that's already been answered in the book.*

Veral: Yes, I can't hardly take the time to tell everybody the same thing over and over. That's why I've got the book.

That's another issue on my product. I've had an issue with some things I bought where the instructions are too vague. So what I've done, everything I sell, when it's new, I will send out instructions that I think are detailed enough. Then when people call in and ask questions, I change my instructions. And I keep changing them until I quit getting questions. So you might get a little bored reading my instructions but you won't be left out on the information. I want you to know what you're doing.

There are a lot of people calling and apologizing for the questions. They say it's a dumb one or something like that. Well there ain't no dumb questions. A question is a request for information that you don't have. Over the years I've had every question asked many times. The answer can be the same, but it's new to the person asking the question and he needs that information.

BK: *OK, to pull back to the special topic of the day—we started out talking about paper patch. You would construct a mold differently if somebody intends to paper patch their bullets than if they intended to do a traditional cast with or without gas checks. Correct?*

Veral: If you want a gas check I cut a gas check shank. If you want a plain base, I'll make a plain base. Or I'll put a bevel for a bevel base. And then with the paper patch, I can do it depending on the throating of the gun and so on. I can make it undersized the full length of the bearing surface, and you can wrap paper part way up on it. Or I can make the first part of the bullet at groove diameter, or whatever diameter's right for the throat. Then reduce the diameter at the back part of it so that the paper is all held inside the cartridge neck. You can't even see it; all you see is lead outside the case.

Like on a 30-06 for example: 170 grain bullet. I made one with only about a quarter of an inch long section that was wrapped in paper. All the rest was bare lead. And no lube groove, just smooth lead like a jacketed bullet. I could drive that at full power, more than full power.

BK: *And you could run it out at 2500, 2600 [fps], something like that?*

Veral: Well a little more than that. I took 170 grain, and put the charge for 110 grain jacketed behind it, and pumped out sixteen of them when I first developed the thing. It was just a test. I did one shot at a time and worked up, I didn't just pour in powder and go out and do it.

So it was about 4200 feet per second. I shot 16 shots as fast as I could pump them through. There wasn't a trace of leading. The barrel was so hot that I spit on it, and it bounced off. So there's no fouling at all. I was shooting them—it was deep snow here then—so I waded out to where I could brace on a fence post, in snow up to my belt almost. I shot across the road to a spot in a bank about 350 yards away. All 16 shots went into the same hole.

I never walked over there, but at 350 yards and you're holding that kind of accuracy, shooting that fast—rapid as I could pump them through a bolt gun. That's phenomenal performance for cast. Anybody who has shot cast pretty much knows you don't get the barrel real hot, or you're going to have troubles—say, if you're using gas checks. So it's really a high performance thing, and the people who do do it, really love doing it.

It's more time consuming to produce them, but the real beauty of it is—the way things are across the nation right now, we don't know if we're getting gas checks tomorrow—you don't need

them. It outperforms it [the bullet] with gas checks. You'll probably be able to get paper. Any paper, I even did it with newspaper.

Mark Koernke: *Government forms out of the post office.*

BK: *OK, how long until the BATFeces start raiding people and say, "We found three reams of copy paper. This person obviously had an arsenal!"*

Veral: (Laughs) Well, you know that would be bad, but if they got into the standard paper patch, they'd come and say, "Open your mouth! If you've got spit in there, you go to jail."

BK: *Traditionally the paper patching was done with pure lead—soft lead—that would give you a nice soft splatty bullet that will spread. Can you do the same thing with a harder alloy like the wheel weights that are a little more traditional, or something in between? Is that feasible, have you tried it?*

Veral: I go into depth on that, on what will perform in game, and at what speeds. To drive a soft or a hard bullet at 4,000 feet pet second doesn't pay. It's not practical because the bullet just disintegrates on impact. You can't make it hard enough. Soft is worse.

But you can shoot them soft. When I ran that string there, I had one bullet that I cast, put paper on it and laid it on a wood stove to dry. I had it dry in 20 minutes. So that was air cooled wheel weight, 8 BHN. I saved that one to last, and it shot into the same group. Eight BHN is super soft, if you're going to hunt with the bullet at high speeds. Way too soft. The rest of them were quenched wheel weight, dropped from the hot mold into water, and given 24 hours or more to harden. Those are 20 BHN, which is about the same as Linotype is claimed to be. They claim that's 22 BHN. **Brinnell Hardness Number**, is what BHN means.

Normally, you've got to have a real hard alloy with gas check bullets. With the paper patch, you don't. But I'm glad you mentioned that, because it gives you the capability of shooting at extreme speed. The test that I did was to see if it had that capability. But it's not practical, unless you're shooting woodchucks or ground squirrels.

BK: *Right, the automotive world will test an awful lot of its technology on the Formula 1 track, but we don't actually drive that way going to work.*

Veral: Exactly right. The ideal alloy hardness would be to take wheel weight metal, get your mold good and hot before you start saving bullets. You drop them on a pad with a fan running on it and an air temperature of not over 65° or 70°, although cooler is better, and that will cause the wheel weight metal to come to a hardness of about 14 BHN. At that hardness you can drive them at 2400-2500 feet per second and they will stand up almost identical to factory jacketed hunting bullets.

BK: *You mention in your book that we can't just assume a hardness level based on rules of thumb of the alloy and so on. You really ought to actually measure it. One of the accessories that you offer is a calibrated Brinnell Hardness measuring tool which is considerably more accurate and precise than the others that you may be able to find on the market. So that's available from you as well, isn't it?*

Veral: Yes.

I've done some playing around since lead has become harder to get—the wheel weights are—in a lot of places the source has completely dried up.

BK: *And a lot of them are zinc now. You've got to be careful with that.*

Veral: Yeah. So I've done some experimenting on that. It isn't a subject we can go into here, but there are still some sources where you can your lead pretty reasonable, and duplicate wheel weight alloy. If you use a high antimony alloy, the bullet will disintegrate. They won't mushroom well for game.

Wheel weight has about 1% antimony, a little bit of tin—maybe a half a percent, and a trace of arsenic. The arsenic causes the tin and antimony to be heat treatable, which doubles the hardness compared to if you air cooled. You can heat treat by heating in an oven or just from a hot mold you can quench it. The oven gives the highest hardness.

That is a near perfect alloy for hunting because it doesn't fragment so bad. It's more ductile. When the hardness of it goes over about 14, then it begins to crack up when it tries to form a mushroom. Or if the antimony content goes higher than about 1% it becomes brittle, where it breaks up the same way. The higher the antimony, the more brittle it is. So if you were to buy lead from a smelter, none of them are allowed to put any arsenic in it, where a wheel weight does have arsenic. And shot—Lawrence brand shot have 5% antimony, 1.5% arsenic. No tin, the rest is lead.

BK: *So if you wanted to use that as a salt to season your pot, you wouldn't have to go with that as a pure melt, but you could affect your pot with an inclusion of some of that.*

Veral: Sure. Arsenic is toxic, if you breathe the fumes when there's no tin. Tin ties that up to some degree. So if you were to add a little tin, if you wanted to call that a salt alloy (your shot). Put in 4% tin, and then use that as the hardening alloy with any soft lead: pure lead, lead pipe, sheet lead. Put in one part of the sweetened-up shot to five parts of the soft lead and you'll be real close to the wheel weight.

BK: *And I will mention that you can get tin, effectively pure tin, because of a lot of no-lead rules, in the form of spools of solder, brand new off the shelf. Also traditional pewter is mostly tin and modern pewter is basically all tin, also because of the no-lead rules. So those are two sources of tin you can use for adjusting your alloys if you need to.*

Veral: Yes, the best no-lead plumber's solder you could get is silver bearing. It will say "silver bearing no-lead plumber's solder". I haven't seen one that declares the amount of silver. Silver is called "rich tin" by lead metallurgists. It has a far more powerful effect to do what tin does: to make the alloy runny—the alloy with the antimony and everything else. It's about the same price no matter where you buy your no-lead plumber's solder, so just go to different places. The best place is to go to a commercial plumber's supply, and they'll have a high grade brand.

BK: *And what's more, electronic no-lead solder tends to be about 2.5-3% silver as well, nowadays.*

Veral: Is it that much?

BK: *Yeah, that much. That's one of the reasons why silver is being consumed so rapidly on the market.*

Veral: I didn't know it's that high. That's good.

Mark Koernke: *Guys, we are just at the top right now. We're covering a good subject. I know one of the questions was about a Martini-Henry. Remember, the patched bullet and Martinis, 45-70, 50-70s. Patched bullet was traditional for all of those for the longest time, wasn't it?*

Veral: That's right.

Mark: *So it would be appropriate for the guys that are buying these Martini-Henry rifles from some of the collector's armories. Right now you can get one of them for $179, and the bores are actually in excellent shape. These are the ones that are from Tibet. Amazingly enough, the rifle outside looks... up & down, condition-wise, but they used a special early preservative that the British came up with, and the bores are actually in good shape. So combine that rifle, some decent cartridges, a loading set, and the right cast bullet with paper patching and you've got yourself a tack driver.*

Veral: You bet. If you do get one and you find it isn't accurate, get my lap kit. It will smooth out the bumps and any cloudiness, which is rust. It will smooth it out. Any time there's a screw or a cut or anything put into a barrel on the outside, it shows up inside and changes the dimensions. That affects your accuracy, and the lap kit fixes it.

If you're using smokeless powder, these old guns don't have to have a paper patch. With my lube they'll work fine at their rated power, using smokeless powder and just a plainbase bullet.

Mark: *Give us the web page, one more time.*

Veral: LBTmoulds--and you spell that m-o-U-l-d-s—dot com. [**LBTmoulds.com**] If you hit "LBT" you'll get all kinds of stuff. And if you hit "Veral Smith", you'll get pages and pages of STUFF. It'll guide you in there, anyway.

Mark: *All the information we need to keep us shooting, and also, with your molds, continue to reload and reload and reload again, guys.*

Veral: You bet.

Mark: *Thank you, sir.*

Veral: Thank you.

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