

Handloading Tips: Parts 1 & 2a (General Introduction & Brands of Cases)

I. General Introduction

This series of articles represents a major revision of the previous "9mm Handloading Tips" article that I posted several years ago. I felt this revision was necessary for several reasons. First, the original was limited to 9mm, yet almost all of the information applied to other handgun chamberings. Second, after nearly two decades of relative stability, there have been several major upheavals in the reloading industry over the last three to four years. Third, the move to our current hosting service corrupted the text of the original article.

These articles are not intended to replace the introductory and explanatory sections contained in any good reloading manual. I cannot hope to condense that much critical material into a series of internet posts. More importantly, these handloading tips are intended for people who have mastered the basics, yet are looking for some guidance in improving their loads, techniques, etc. I'm afraid that without reading at least one standard reloading manual, a newcomer will not even understand many of the terms and concepts contained in these articles.

Many of these handloading tips also apply to rifle cartridges, but loading rifle cartridges is a separate discipline. I felt that these articles are already long enough by attempting to deal with both semi-auto and revolver cartridges.

I would also like to add a final note on safety. I am conservative by nature; I also have all of my fingers and both eyes. During my reloading career, I have never damaged a firearm or even minimally injured myself. In my experience, there is no such thing as "wasted effort" when it comes to safety, accuracy, and/or ease of loading. To be blunt, many people are lazy and/or incompetent. Which is more likely on an internet forum, someone admitting to laziness and/or incompetence, or justifying their failings with false machismo? Reloading isn't exactly rocket science, but it isn't for people who cannot follow instructions and safety guidelines.

II. Cases

A. Brands of Cases

Metallic cartridge cases are what have made large-scale reloading possible. Cases are the most critical reloading component for several reasons: 1) They are the most expensive; 2) They seem to have the greatest impact on consistent loading and accuracy; and 3) They are important from a safety standpoint.

Once-fired cases (range pick-ups) for the most common semi-auto cartridges tend to be easy to find and/or cheaper in the secondary market. For obvious reasons, cases for revolver cartridges and obscure semi-auto cartridges can be harder to find and/or more expensive.

Range pick-ups can be a mixed blessing. Pitch any case that is in any way suspect. This is good advice in general; take it to an extreme with 9x19mm and .40 S&W. They are way too common to fool with damaged cases. Always inspect range pick-ups before loading them. Ideally, you will want to inspect them as you are picking them up, or at least before you bring them into your reloading room. A good reloading manual will cover all of this, but look for split mouths, split case bodies, cratered primers, ink or marker on the case (usually a sign that the case has been fire-formed into something else), and mystery brands.

The vast majority of brands of metallic cases are suitable for reloading and very high in quality. They have to be, because many foreign manufacturers simply slap a commercial headstamp on their military cases. That said, don't even bother with a headstamp that you don't recognize as a major player. This is not for safety or quality reasons so much as consistency. You may never find another 50 "Dominion" .357 Magnum cases ever again. When you are first starting out, small lots of cases like this are useful, but they aren't worth fooling with when loading in quantity.

In my experience, cases fall into three groups, or what I like to call the Good, the Bad, and the Ugly. This is somewhat misleading, because the "bad" cases are actually worth loading. I would pitch any cases I found that fell into the "ugly" territory. Obviously, even "good" case brands are not equal in all respects, so I will briefly discuss the cases you are likely to encounter.

The Good:

1. Norma (headstamp "NORMA")
2. Starline (headstamp is two stars separated by a line)
3. Dynamit Nobel/GECO (headstamp "GECO")
4. Hornady (headstamps "HORNADY," "FRONTIER")
5. Federal (headstamp "FEDERAL")
6. Speer/CCI (headstamps "SPEER," "CCI")
7. Winchester (headstamps "WINCHESTER," "W-W," "WCC," etc.)
8. Israel Military Industries (headstamps "IMI," "TZ," and "UZI").

Norma cases are the most highly regarded in the world, but they are now extremely rare in the U.S., as neither handgun component cases nor factory ammo have been available for some time. If and when available from retailers, Norma handgun cases are generally the most expensive.

Norma component cases are usually available in the U.S. for high performance rifle cartridges, and I load Norma cases exclusively for my bolt-action rifles. Most people buying Norma rifle cases are reloaders, so you aren't likely to find them on the ground, either.

Starline is only available as new brass. Starline also sells new nickel cases and cases bearing a +P headstamp for identification purposes. Starline makes cases for a number of small ammunition manufacturers. Starline cases are very consistent and seem to be worth the slight premium over Winchester and IMI prices. Be careful, if you find a lot of Starline cases on the ground, they are probably near the end of their useful life. (This also applies to Norma cases.)

GECO cases are not available as new components in the U.S. GECO factory ammunition sold in the U.S. uses Boxer primed cases manufactured by Norma, Hirtenberger, and Dynamit Nobel. These are excellent cases that hold up to several high-pressure loadings. GECO factory ammunition appears to be unavailable in the U.S. at this time. If you find any GECO cases, they are almost certain to be 9x19mm.

Hornady is usually not worth the extra expense for new component cases, as they are higher than Starline, IMI, or Winchester. Hornady also loads factory ammo in the Frontier and Hornady XTP lines, so you may occasionally find once-fired cases.

Federal cases are available as new component cases on an infrequent basis. (I suspect these were overruns, as I haven't seen any in many years.) Basically, you will have to obtain Federal cases from shooting factory ammunition or from the secondary market. Federal cases are the most consistent from the "Big Three." Federal also makes military cases bearing the "LC" or "LAKE CITY" headstamps, usually with an alphanumeric code. These are always Boxer primed, but they may or may not have a primer crimp.

Speer/CCI cases are easier to load with CCI primers. Like Federal, which is now owned by the same corporation, Speer does not offer new component cases on a regular basis. In my opinion, the rarity of Speer cases probably enhances their reputation. I have had good results with Speer cases as a group (especially in 9mm, .38 Special, and .45 ACP), so I believe their reputation is largely earned.

Winchester cases are probably the most common overall. They are readily available as new components, and they are the most common range pick-ups. (Remington-UMC comes close.) Winchester military cases, headstamped with "WCC" and a year code, are always Boxer primed, but they may or may not have a primer crimp.

IMI cases are available from either factory ammunition or as new components.

Widener's Shooting Supply was the exclusive retailer for Israeli Military Industries in the U.S., but they haven't been available for some time. IMI makes quite a bit of the 9mm and .45 ACP cases bearing the Winchester "WCC" military headstamp, as well as some Winchester commercial 9mm cases. In my opinion, IMI cases probably deserve to be ranked ahead of Winchester, but general consensus would place them here. IMI 9mm military cases with the "TZZ" headstamp sometimes have a primer crimp.

The Bad:

1. Remington (headstamps "R-P," "UMC," etc.)
2. PMC (headstamp "PMC")
3. Sellier & Bellot (headstamp "S&B")
4. Magtech (headstamps "CBC," "MAGTECH")
5. PMP (headstamps "PMP," "DENEL")
6. Fiocchi (headstamp "FI OCCHI").

Once again, let me stress that these cases aren't truly "bad," but they are also not in the league of the previous "good" brands. As the comments below will reveal, these cases tend to have significant variation in volume, softer brass, and/or they require additional work to reload. That said, I have loaded, do load, and will continue to load these cases. The "good" cases seem to be a bit more accurate, but this may be more to do with their ease of loading than overall consistency.

Most people would have made Remington the last entry in the "good" category. Sorry Remington, but I had to draw the line somewhere. Remington brass is softer than the other major U.S. brands and has less neck tension. (While this is a major problem in .45 ACP, it is less critical with their other handgun cases.) Most importantly for 9mm, Remington cases are lower in volume than most major brands, and their production lots tend to vary considerably in volume, unlike Winchester. Still, Remington cases are as common as dirt as range pick-ups. Ignoring Winchester, I think I have more Remington cases than all other brands combined. In other words, I load a lot of their cases, but I prefer quite a few brands over Remington.

PMC outsources a lot of their cases, from what I can tell. I say this because there seems to be no consistency from lot to lot. Some PMC cases are phenomenal, with thick webs and high copper content. Some PMC cases are obviously low in copper content, brittle, and require chamfering to reload. In their defense, you can usually spot the differences by variations in the headstamps. The very best PMC cases seem to be comparable to Winchester. The worst PMC cases are worth reloading, but I can't say much else in their defense. On average, S&B cases are better.

I deliberately ranked Sellier & Bellot a little too low for several reasons. First, S&B brass cased factory ammunition has a red lacquer coating over the primer and primer pocket. S&B has relatively tight primer pockets, and if you do not remove all of the lacquer from the first firing, repriming can be very difficult. (I will return to this issue later.) Second, there is also some variation between production lots, which seems to be caused by differences in copper content. Slight variations in S&B headstamps benefit from sorting, as these indicate different case volumes by production lot. Third, this makes S&B less desirable for a reloader now that prices have increased. Natchez Shooting Supply once offered S&B primed and lacquered 9mm cases as new component brass, but I have not seen them in years. S&B cases for revolver cartridges are not as good as their semi-auto cases.

Magtech/CBC has improved considerably since I began shooting. New Magtech components have always been very good bargains, but the cases from once-fired factory ammunition were often second-rate as recently as six or seven years ago. Like PMC and S&B, Magtech/CBC cases have varied enough to require some attention to the headstamp and visual appearance. To me, this indicates a combination of multiple suppliers, fluctuations in copper content, and/or improvements to the manufacturing process over time. CBC supplies cartridge cases to other ammunition manufacturers in South America. Pay special attention to Magtech/CBC cases for the magnum revolver cartridges; they do not hold up to as many high-pressure loadings as some other brands.

PMP (Pretoria Metal Pressings) cases from the blue boxes of commercial factory ammunition are fine, but military PMP/Denel 9mm cases have Berdan primers. PMP cases are not available as new components in the U.S. PMP cases are a little soft, and they do not hold their neck tension as well as the "good" brands over multiple loadings. PMP 9mm cases seem to be more consistent from lot to lot than their other offerings, but their biggest issue is availability. During the ammunition import boom, PMP was still only a peripheral player, and it is no longer imported on any scale. I am not sure if this is due to political reasons or outsourcing to other African ammunition manufacturers. In my opinion, PMP cases are actually better than Magtech/CBC cases on average, but the CBC annealing process may have surpassed PMP in recent years.

My personal experience with Fiocchi is quite limited, and this ranking reflects general consensus more than my own opinion. Fiocchi cases have several idiosyncrasies, such as shorter than normal case length. I would guess that this is because Fiocchi accounts for almost all of the world's 9x21mm and 9x23mm commercial ammunition, and their slightly short 9x19mm probably aids in manufacturing convenience and identification. In practical terms, Fiocchi cases cannot be loaded without sorting them out from other brands, because they are short enough that the seating die needs to be set for them.

Over a three-year period, I purchased 400 FIOCCHI 9mm FMJ factory loads from Whittaker's Guns (five boxes of 115 gr. and three boxes of 125 gr.). These were all from different lots, and I was not impressed with the cases. One box had off-center flash holes, for example. To be fair, the factory loadings delivered decent accuracy for the price (about \$6 a box in 2001-2005). As far as I could tell from a reloading standpoint, FIOCCHI cases are either quite mediocre or they require their own load development.

The Ugly:

Do not attempt to reload cases with the "A-Merc" "American," or "AAA" headstamps. They are substandard in every respect, and these cases have caused catastrophic failures when reloaded. No one at CZF has any direct experience with "Ultramax," but their cases are probably similar to A-Merc.

Many people advise against reloading once-fired 9mm NATO brass, unless you can be certain that it is the U.S. manufactured M882 loading. This is brass with the NATO "cross in circle" headstamp. There is usually a primer crimp to remove, and it may be Berdan primed. If it is brass from a high-pressure SMG load, it may not be suitable for reloading. Usually, I only find a box or two worth of range pick-ups a year, so they really aren't worth it just because of the small number of cases available to me.

I do not advocate loading "Glocked" .40 S&W cases. You can identify these cases from the distinctive mark made by the rectangular Glock firing pin. Newer Glock .40 S&W pistols have altered the chamber design to provide more support, but you can't really tell from the cases. If you are finding tons of the stuff, it might be economically feasible to collect it separately and send it away for commercial roll-sizing.

Handloading Tips: Part 2b (Cases)

B. Buying Cases:

The general consensus is that your own once-fired brass is the best source for handgun cases. The best values from a reloader's standpoint are probably value packs of Winchester USA and Remington-UMC. Buying case quantities (1,000 rounds) of some of the less expensive brands of factory ammo, like S&B, PMC, and Magtech, are also a good source for cases. Depending on where you shoot, it may be difficult to avoid mixing up your cases when shooting Winchester and Remington headstamps, which may be another good reason to buy foreign ammunition in case quantities. I would ask around before buying foreign manufactured magnum revolver cartridges, as several of these companies do not have much experience in this field.

CZF members who buy significant amounts of new component cases appear to prefer Starline, Winchester, and IMI, in that order. There is some evidence that IMI makes many of the Winchester cases, but we cannot directly confirm this. IMI/TZ headstamp brass is less expensive than Starline or Winchester, if and when they are available. I prefer IMI cases because no one else at my range uses them. IMI magnum revolver cases are high in quality.

C. Sorting by Headstamp

DO sort cases by headstamp. Whenever you switch headstamps, back your load off by as much as either 10% or at least 0.5 gr of powder if you are anywhere near a max load. Work up the load all over again with the new case type. There are two reasons for this. First, the manuals aren't kidding when they say that different brands of cases vary in volume. It can be dramatic at times. Be especially careful when switching to Remington and Focchi cases; they are lower in volume than other brands by a noticeable amount. Second, accuracy will be significantly degraded when shooting mixed headstamps in the same magazine or cylinder, even if you are just an average shooter.

Since you should always inspect cases before reloading them, I don't really buy into the argument that sorting headstamps is too much effort. Furthermore, different brands will often require different die settings. Clearing a major jam on most progressive reloaders takes more time than sorting the cases at the inspection stage.

NOTE: This is probably the one subject on which reloaders have a significant difference of opinion. Many 9mm and .45 ACP shooters do not sort by headstamp, or at least not for light practice loads. Personally, I definitely recommend this, particularly for new reloaders. I am not a competitive shooter, and I see a major difference in accuracy when shooting mixed headstamps in any handgun chambering.

D. Trimming Cases

Few people trim semi-auto brass. The general consensus is that you lose the cases too often for them to flow to maximum length. Also, it's too easy to mix trimmed brass up with other range pickups. Accuracy does suffer from ignoring case length. I have never found it necessary to trim semi-auto cases when segregating lots of my own once-fired brass. Theoretically, they should all be the same length if each case in that lot was loaded the same each time, the same number of times. In practice, they aren't of course, but this is preferable to ignoring case length all together.

Trimming revolver cases is absolutely necessary, especially when using a roll crimp. You will ruin too many cases otherwise.

From an accuracy standpoint, trimming all handgun brass is desirable. Not all brass is equal length, even new brass from the same bag. On the bright side, you can usually do this just once (before the first loading), and you will rarely need to do it again. As I mentioned previously, if you can keep the lots segregated, the cases should flow to more or less the same length.

In my honest opinion, you can't get away with both ignoring headstamps and ignoring trimming. Safety will become an issue at some point by ignoring both, and your accuracy will become inferior to commercial ammunition. I understand that accuracy is a relative thing. Obviously, no one is hand-weighing primers for practice handgun loads, but at some point you would be better off throwing rocks if you keep cutting corners! In summary, sorting by headstamp should be done for both safety and accuracy reasons. Trimming is necessary for best accuracy and ease of loading in semi-auto cartridges, but it generally will not be necessary for safety reasons if case lots are segregated. Trimming is too important to ignore with revolver cartridges, even if using a taper crimp instead of a heavy roll crimp.

E. Cleaning Cases

I am not aware of any volume reloader who does not clean his/her cases. Notice, I did not say "tumble their cases," but I would guess that over 80.0% of these people are using a tumbler or vibratory cleaner of some sort.

Obviously, a tumbler, media separator, media, and polishing compound costs about as much as an entire Lee Anniversary Kit, so some people will need to consider other options until they care to spend the money. Fortunately, you have several, but they are all fairly labor intensive. These can be summed up as "dry cleaning" and "wet cleaning."

The simplest dry cleaning technique is to wrap about @200-300 cases in a bath towel. (Too many or too few do not work nearly as well.) Make a rattail and roll the towel around on the floor with medium hand pressure for about five minutes and inspect. If they look pretty clean, you can stop; if not, keep going. If you are patient, you can actually clean cases pretty effectively this way. Remember to shake the crud out of the towel each time you check the cases.

Richard Lee advocates using steel wool or Scotchbrite to clean cases by hand. I have no doubt that this works well, but I can't imagine a more labor-intensive method.

Wet cleaning techniques are more common. There are a number of products designed specifically for this purpose. In the long run, using the Hornady or Lyman cleaning solution will cost nearly as much as a tumbler and its associated costs (media and additive). Fortunately, you don't need to use the Hornady and Lyman cleaning solutions. You can even use soap and water. You will find a number of suggestions for household products for wet cleaning on the internet. Never use products that contain any ammonia whatsoever. These will damage the cases.

Obviously, the cases get wet when using a wet cleaning method; this is a major drawback that cannot be fully appreciated until you try to deal with several thousand wet cases. You have to have some space and patience with this method. Air-drying works best. You should never try to speed dry cases with anything except a lamp or hairdryer. An oven cannot hold a low enough temperature. Cases get very hot upon firing, but they aren't designed to heat up to 175-200 degrees and stay there for a while.

Here is a tip that I picked up from "<http://www.reloadbench.com>." You can obtain excellent results by cleaning cases with diluted or straight cider vinegar. I find that just enough straight cider vinegar to cover the cases works best. Here's how: 1) Deprime cases in a decapping only die (see below). 2) Place cases in a bucket or similar plastic container (has to be plastic or glass). 3) Cover the cases in cider vinegar. It can be slightly diluted, but don't get carried away. The acidity of the vinegar does all the work. 4) Soak for 20 minutes, no longer. Some agitation of the cases helps. 5) Immediately drain away the vinegar. You can reuse the vinegar once or twice, but I don't think it is worth the trouble. Corrosion will begin to occur if you leave the cases in vinegar indefinitely. 6) Rinse the cases thoroughly with water. 7) Drain; a collander helps. 😊 Air dry. This works as well or better than any of the products marketed to reloaders or any of the "mystery formulas" I have seen on the internet (most of which use vinegar anyway). You can buy everything you need for \$6-7 at the Dollar General store.

Cleaning with cider vinegar has been the most effective method I have found for removing Sellier & Bellot lacquer from the primer pockets.

After the cider vinegar method, concoctions of soap, water, white vinegar, and lemon juice appear to work best. Essentially, this just adds acidity to white vinegar, giving it the same characteristics as straight cider vinegar. I don't see much point, as the soap just seems to make the cases harder to rinse off.

In my opinion, you almost have to deprime cases before using a wet cleaning system. There are some potential safety issues (see below in Primers). Perhaps even more importantly, wet cleaning does not work nearly as well with spent primers in place.

Forget ever reusing a batch of cleaning solution; spent primers make a gruesome mess. Using a tumbler or vibratory cleaner with spent primers in place will also require changing the media more frequently.

When using a tumbler, it is possible to save some money as well. Tumbling media marketed to reloaders is typically either finely ground corncob or walnut hulls. This is not necessary, and the products marketed to reloaders are quite expensive. Coarsely ground corncob sells for pennies on the pound at your local pet store. (Buy the brands that advertise as "dust free.") Other people have had success using millet, rice, and other forms of silage as tumbling media. Unless you can get this sort of material super cheap, I would stick with the pet litter corncob, due to the dust and chaff. Kay-Kob brand uses large pieces of cob, which usually won't get stuck in the primer pockets of the cases.

The best media additive I have found is Flitz Media Additive (not the metal polish). This can be difficult to find, but it is relatively inexpensive and highly effective.

F. Lube with Carbide

In theory, you don't need to lube cases when using carbide dies. In practice, several members do lightly lube 1 of 5 or 1 of 10 cases for ease of loading tapered or bottle-necked handgun cases. For example, 9mm has a taper, and this causes new and/or clean cases to gall the carbide on the upstroke. You can see brass deposits on the carbide. This won't hurt anything at first, but over time it will effect the sizing or scratch the carbide insert. You can either clean the sizing die more often, or use a very slight amount of lube. This is usually only a problem with brand new brass or brass that has been polished by a tumbler.

Depending on which brand of media additive is used, this may not be necessary, because some of them leave a slight film on the cases. This is one of the reasons I like the Flitz media additive so much. Cases cleaned with wet methods generally do not have this problem, either. Dirty cases won't need lube with carbide dies, as the nitro fouling acts as a dry lube. Dirty cases do eventually ruin a die on their own, however.

This is a hint I picked up from Richard Lee's *Modern Reloading* (1st ed.), page 56. Dilute 1 part Lee sizing lube with 10 parts rubbing alcohol (or water, alcohol evaporates more quickly). Put the mixture in a plant sprayer. Spray some cases with a light mist, let dry, and space them amongst the other cases to be sized. More than one in five is serious overkill.

Hornady One-Shot case lube is in aerosol form, and it offers similar advantages. Both of these products share an important trait. They are applied wet, but are used after drying. This seems to be the secret to their success. Wet or greasy lubes cause their own set of problems. I no longer use any lube with carbide after switching to Flitz media additive.

G. Summary

1. Once-fired 9mm cases are an excellent source for cases, but some brands are better than others.
2. Sort cases by headstamp for safety and accuracy reasons.
3. Trimming semi-auto cases is probably not absolutely necessary, but there are many benefits of doing so. Trimming revolver cases is necessary.
4. Although the initial expense of a tumbler can be postponed, you need to clean the cases with some other method.
5. Depriming cases prior to cleaning is probably not absolutely necessary, but it is also a desirable practice.
6. Ultra clean cases sometimes benefit from a very small amount of dry lube.

Handloading Tips: Part 3 (Bullets)

III. Bullets

A. Bullet Materials

There are three basic types of bullet materials for handguns: jacketed, plated, and lead. The material that the bullet is made from has a greater bearing on performance than its shape.

Jacketed bullets are pure lead swaged into a cup of gilding metal, and most have exposed lead at base. The main advantages of jacketed are as follows: 1) No fouling from lead or lube; 2) The exposed lead will often cause the jacket to obdurate the bore; 3) Jacketed bullets are best for maximum velocities. The disadvantages are as follows: 1) Some copper fouling; 2) Gilding metal wears barrels faster than lead or copper plating. (This is more of a theoretical disadvantage than a practical one.); 3) FMJ bullets are the most expensive to manufacture.

Jacketed bullets have a variety of subcategories, such as full metal jacket (exposed lead), full metal jacket (enclosed base), jacketed hollowpoints, and specialized types (i.e. semi-jacketed hollowpoints).

Plated bullets are pure lead bullets that have been electroplated with either a copper or a cupro-nickel alloy. The main advantages of plated are as follows: 1) No fouling from lead or lube; 2) No exposed lead at the base, so no airborne lead for shooting indoors; 3) Plated bullets cost significantly less than FMJ bullets, but more than lead. The disadvantages are as follows: 1) Major copper fouling when loaded at jacketed velocities; 2) Minimal obduration (some manufacturers compensate with bullets as much as 0.001" larger in diameter); 3) When reloading, plated bullets do better with data specifically developed for this bullet type, but such data can be hard to find. Many of the Speer premium bullets are electroplated (i.e. Gold Dot and TMJ designs), but the plating used is much harder and higher in copper content than other plated reloading bullets (i.e. Montana Gold, Berry's, and Rainier).

Lead bullets are pure solid lead or lead alloy bullets that have been lubed. These fall into two categories: swaged (pure lead or soft alloy) and cast (harder alloys). Swaged bullets are formed from pure lead or a very soft alloy in a succession of dies; reloaders can also buy swaging dies. Hard cast bullets are made from harder lead alloys that are melted and cast in bullet molds. The primary advantages of lead bullets are as follows: 1) Swaged lead bullets are by far the most economical bullets to manufacture, followed closely by hard cast lead bullets; 2) When the alloy is properly matched to the application, lead bullets are usually the most accurate, as they will fully obdurate the bore. Lead bullets have the following disadvantages: 1) Significant fouling from lead and lube; 2) Potential health hazards, both at the range and at the bench; 3) For all practical intents and purposes, swaged lead bullets cannot be used at velocities higher than 1,000 fps; 4) If the alloy is not properly matched to the pressure/velocity, hard cast bullets will also lead up a barrel at higher velocities. 5) When reloading, lead bullets are less convenient than other types and can make a mess of the seating die; 6) Some brands of lead bullets will lead the barrel no matter what, due to poor designs.

By and large, most experienced reloaders advocate the use of jacketed bullets for new reloaders. I have been reloading for over ten years, and I still find jacketed bullets to be the easiest to load. Jacketed bullets are easier to seat. Jacketed bullets are considered "normal" in for most semi-auto cartridges, so the data is the most developed. In contrast, lead bullets are "normal" for most of the older, low-pressure revolver cartridges, so the lead data is the most developed.

Plated bullets are neither fair nor foul; they do better with data developed for them. Berry's MFG bullets are typically 0.001" larger than FMJ to compensate for the obduration differences, which means that you must use lead data with these bullets.

Rainier bullets are also slightly oversize by an additional 0.0005," so they can be pushed a little faster than Berry's. Using jacketed data with Berry's bullets will cause high pressures and major copper fouling. I see major copper fouling with Montana Gold bullets, regardless of velocity.

Lead bullets are typically 0.001" larger than FMJ, and they require data specifically developed for them. Many CZ owners do not reload lead bullets. Although many people have obtained excellent results, others have found particular brands of lead bullets that simply will not group. The Hornady swaged bullets should not be loaded for CZ pistols. They have a latticework to hold the lube instead of grooves, and the lattice breaks up in the CZ rifling at any speed. In addition to the mess, they will occasionally keyhole. I have obtained my best results in CZ pistols by using lead bullets sized at 0.002" larger than FMJ.

Any pistol will shoot lead well if the alloy and lube are correctly matched to the load. Realistically, this almost requires casting your own bullets or spending some real time and effort working with a particular make/model bullet. Before buying a large quantity of commercial lead bullets, I recommend posting a new thread asking for feedback on that particular bullet. There are too many different issues to cover here.

B. Bullet Shapes

The bullet shape is sometimes confused with construction, as certain shapes are associated with certain materials. For example, the vast majority of full metal jacket bullets are round nosed or truncated cone. Until recently, most lead bullets were also round nosed or truncated cone. Plated bullets are a recent development, and they are available in virtually every shape.

Here is a partial listing of most of the commonly used abbreviations for handgun bullets.

FMJ: Full metal jacket.

FMJ-RN: Full metal jacket, round nosed.

FMJ-TC: Full metal jacket, truncated cone.

TMJ: Total Metal Jacket, actually an enclosed base plated bullet (Speer trademark).

SWC: Semi-wadcutter (available as FMJ, lead, or plated).

FMJ-SWC: Full metal jacket, semi-wadcutter.

LSWC: Lead semi-wadcutter.

LSWC-HP: Lead semi-wadcutter hollowpoint (the "FBI" bullet).

FWC: Full wadcutter (available as lead or plated).

RNSWC: A lead SWC with a round nose where the bearing surface is true caliber and the ogive is started from a smaller diameter.

DEWC: Double-ended wadcutter (available as lead or plated).

BNWC: Button-nose wadcutter (available as lead or plated).

BBWC: Bevel-base wadcutter (available as lead or plated).

HBWC: Hollow-base wadcutter (available as lead or plated).

FP: Flat point (available as lead or plated).

RNFP: Roundnose flat point (basically a RNSWC in FMJ or plated form).

JHP: Jacketed hollow point.

HS: Hydra Shok JHP (Federal trademark).

HP-XTP: eXTreme Performance JHP (Hornady trademark).

FP-XTP: Same with a soft or flatnose (Hornady trademark).

XTP-BT: Same bullet in 9mm 147 gr. with a boattail (Hornady trademark).

GS: Golden Saber JHP (Remington trademark).

JHC: Jacketed hollow cavity (Sierra trademark).

JSP: Jacketed soft point (although usually made by Sierra, it is not a trademark).

GD: Speer Gold Dot JHP, also abbreviated as GDHP (Speer trademark).

SXT: Supreme eXpansion Talon; modified Black Talon (Winchester trademark).

ST: Winchester Silver Tip ("WST" stands for "Winchester Super Target" powder.)

X-Bullet: HP made almost completely of copper (Barnes trademark).

I'm sure that I missed a few, but this list should give you some idea if you run into an "oddball" abbreviation.

In general, powder selection has a greater bearing on accuracy than bullet shape, at least in handguns. Unlike rifle cartridges, the intended ranges and velocities of handgun ammunition do not require aerodynamic bullet shapes. The main concern with bullet shape is the feeding issues in a semi-automatic pistol. Obviously, bullet shape is not a consideration for a revolver, and most of the unusual types, like full wadcutters, are intended for revolver cartridges.

In accuracy terms, the CZs do not have a dramatic preference for a particular bullet shape designed for semi-autos. Additionally, they seem to shoot all of them fairly well. One notable exception appears to be JHPs with a straight ogive and a wide mouth, which few autos will feed in general.

C. Bullet Weights and Safety

In general, heavier bullets pose safety problems to a reloader. Let's use 9mm as an example.

As the bullet weight in 9mm exceeds 124gr, you begin to see a dramatic diminishing return in velocity. The bullet diameter cannot exceed .356-.357", even with a lead bullet, so any extra weight comes from greater bullet length and a less aerodynamic bullet profile (different ogive). Since the loaded cartridge length cannot exceed the maximum of 1.169," the heavier bullets, which are longer, must displace available case volume. 9mm Luger has no case volume to spare; the available volume is only @0.7 cubic centimeters.

All factors being equal, a heavier bullet will travel more slowly with the same powder charge. The problem is that all factors are no longer equal. The case has lost quite a bit of volume, which creates two further complications. 1) It can't hold as much powder anymore. 2) There is less room for the combusting gasses, which quickly raises internal pressures. These factors combine to significantly reduce potential velocity, while dramatically raising the peak pressures.

These general principles apply to other cartridges, but they are critical in 9mm due to the lower case velocity. The same problems start to show up in .40 S&W when going to bullets heavier than 180 gr. For that matter, even 180 gr bullets are intended primarily for use in 10mm cartridges. Newer reloaders would be wise to stick to bullets in the 135-165 gr range for .40 S&W, just as they should probably limit their early efforts to the 115-135 gr range in 9mm.

Most of the other CZ semi-autos are chambered in cartridges that do not pose this issue, or at least not to the same degree. For example, .45 ACP has a very large case volume relative to its pressure, and the newer bullet offerings tend to be lighter than the original specifications (230 gr). Most pocket pistol chamberings like .25 ACP, .32 ACP, .380 ACP, and 9x18mm do not have a wide range of heavier bullet weights available; however, their small case volumes do require extra attention to detail.

Revolver cartridges also tend to have relatively large case volumes, since most are variants or redesigns of older blackpowder cartridges. Still, there are a lot of ultra-heavy bullets available for the magnum revolver cartridges, and the same concerns will be presented in those loadings.

D. Summary

1. From the standpoint of reloading handgun cartridges, bullet construction and weight are more important than shape.
2. Jacketed bullets are easier to reload.
3. Plated and lead bullets are good values for the volume shooter, but they are slightly more difficult to load for the novice.

4. Heavy bullets are generally not as safe as light to midrange bullets from a reloading standpoint.

5. There is no specific bullet weight and/or shape that will compensate for poor powder selection or loading technique in handgun cartridges.

Handloading Tips: Part 4 (Powders)

IV. Powders

A. Introduction

Smokeless powder has several characteristics that affect performance. The two most significant are density and burn rate.

Powder density has two separate meanings to the reloader. Volumetric density is an expression coined by Richard Lee, because "density" can be somewhat ambiguous. Load density refers to how much powder is in the case. Volumetric density is the volume displaced by one grain of a particular powder, or the density of that particular powder. Both are critical, which will be explained below.

Burn rate refers to how fast a particular powder combusts into propellant gases. In general, fast-burning powders are better suited to low pressure loadings. Slower-burning powders give higher velocities and more consistent results, especially in high pressure loadings. Essentially, a slower burning powder also builds pressure more slowly, which keeps the peak pressure lower. Slower powders tend to yield maximum load density. In handgun cartridges, powder burn rate seems to be the single most important characteristic for top accuracy, assuming correct loading techniques and suitable cases.

B. Powder Density and Volume

The most important property of either blackpowder or smokeless powder is that it also occupies volume in the cartridge case. In other words, one can think of powder in terms of charge weight and/or volume. Charge weight is a convenient way to measure powder, and it is usually the most accurate with current equipment. However, thinking solely in terms of powder weight will limit your results. Consider the fact that all powder measures and similar equipment dispense powder by volume, not weight.

The relationship between available case volume and the volume of the powder is known as load density.

A high load density means that there is little or no airspace in the case. A low load density means that the powder occupies less of the case volume, resulting in some airspace. Slower burning powders tend to yield higher load density, because they require heavier charge weights and are "bulky" (lower volumetric density). In other words, the charge weight is heavier (more grains), and each grain also takes up more space as compared to most fast-burning powders.

It is very important that the reloader understands the relationship between mass and volume. As the charge weight increases, the load density increases, so there is less airspace. Either factor alone would raise pressure significantly. Obviously, more powder generates more energy, raising pressure. Less obvious is that more powder occupies more space, which also raises pressure, as the expanding gases have less available volume. Certain fast-burning powders can cause dangerous pressures with extremely small increases in charge weight.

9mm Luger was designed for use with smokeless powder. In practical terms, this means that most powders intended for handgun use will work in 9mm and yield decent load density. For purposes of comparison, let's look at .38 Special, which was designed for use with blackpowder. Blackpowder has a low volumetric density (a grain takes up more space) and a high charge weight, as compared to the more efficient smokeless powders. This means that .38 Special and similar cartridges (.44 Special, .45 Colt, etc.) have too large a case volume for many smokeless powders. .38 Special is also low in pressure, which means that a faster-burning powder will be required. Faster powders use lower charge weights and yield a low load density. All this adds up to a problem. Typical .38 Special charges are less than 4 grains of powder, creating far too much airspace. Low load density of this type can cause major problems. If the powder is strung out through the large case, it may not all ignite at the same time or at all. If it does, it will burn unevenly, or more like a fuse. Powder may not even contact the primer at all.

Again, this is never a major concern with 9mm, as the case volume is so small, less than 0.7 cc (cubic centimeters). Fortunately, this also means that it is fairly easy to find an optimal load. A higher load density, or even slight compression, tends to yield better accuracy with extruded powders. The powder position issues discussed above are not a factor. Since 9mm is a fairly high pressure cartridge, or 35,000 psi max SAAMI standard, it is better suited to medium to slow burning powders. This means that maximum load density (little or no airspace, no compression) is obtainable with most powders commonly used in 9mm. The only downside is that 9mm is that has so little volume that it becomes potentially dangerous with even small (0.1 gr) increases in charge weight with the faster-burning powders.

Most other handgun cartridges do not fall victim to these extremes.

Since .40 S&W is essentially a reduced volume version of 10mm, it should probably be considered in the same category as 9mm. Avoid faster-burning powders that do not overflow the case with a double charge.

Nobel-Vectan ball powders must never be compressed. There must be some airspace in the cartridge case even if it is only the infinitesimally small spaces between grains of powder. Nobel-Vectan specifically warns against compressing their ball powders, as their smaller spheres will pack too densely. Instead of igniting consistently, the primer drives the charge like a piston, which can create dangerously high pressures. 9mm data using ball powder will sometimes seem artificially conservative; this is because some publishers also do not list compressed loads. In particular, I have noticed that Winchester itself no longer lists compressed loads with W-231. Extruded and flake powders can be compressed, and accuracy may even improve with slight compression. The shape of the powder prevents it from packing tightly into the case.

C. Powder Burn Rates

Before proceeding, it may be helpful to consult the following link:

["http://www.reloadbench.com/burn.html"](http://www.reloadbench.com/burn.html)

This webpage provides some definitions and a burn rate chart to which I will refer.

The *Norma Reloading Manual* contains an article on smokeless powders written by Sven-Eric Johansson of Nexplo/Bofors. I mention this because it is by far the best treatment of the subject I have ever seen; it even includes photographs detailing every step of the manufacturing processes.

Mr. Johansson defines burn rate as follows:

"The linear burning rate of a propellant is the rate at which the chemical reaction progresses via both thermal conduction and radiation. The burning rate is equivalent to the distance (normal to the burning surface of a powder grain) burned through in a unit of time. This varies not only with composition, pressure, temperature, and physical structure of the powder (i.e. porosity, density), but also with the shape of the powder grain. Powder with a high calorific value burns faster than powder with a low calorific value" (102).

Due to their higher calorific value, fast-burning powders also tend to produce more heat as a form of wasted energy. There is a direct geometrical progression between maximum chamber temperature and burn rate as the burn rate increases (becomes "faster"). Environmental factors such as ambient air temperature and relative humidity also affect burn rate. Ammunition generates higher peak pressures on hot, dry days by increasing the powder's burning rate. Leaving loaded cartridges in direct sunlight has a similar effect.

In ballistic terms, the slowest practicable powder will generate more uniform internal ballistics, lower chamber pressures, lower chamber temperatures, and higher velocities. Slower powders require heavier charge weights and often have a low volumetric density. To clarify, this means that the heavier charge is also relatively bulky, because one grain of the powder also takes up more space. Some powders are too slow-burning for some handgun cartridges, because the case cannot hold enough of that particular powder or it will not burn completely.

The working pressure of the cartridge is the most important factor in selecting the correct burn rate. A higher peak pressure equates to a slower burn rate. 9mm has a relatively high peak pressure for a handgun cartridge: 35,000 psi SAAMI and 38,500 psi SAAMI +P. This means that the slower-burning powder can combust more slowly and build pressure in a slow, uniform, geometric progression. This allows for more gradual and complete acceleration at a lower relative pressure and temperature. Conversely, a low pressure cartridge like .38 Special requires a faster-burning powder with a higher calorific value. Slower powders will not ignite and combust evenly at such a low working pressure.

By consulting the burn rate chart at "<http://www.reloadbench.com/burn.html>" and comparing it to your reloading manuals, you will make some immediate observations. Although you will find published loads using Norma R-1 (#1, the fastest-burning powder) to Alliant 2400 (#67, extremely slow for handgun applications), the vast majority of handgun cartridges use the powders in the #6 to #63 range, or Alliant Bullseye to Accurate Arms No. 9.

These statements are all generally true, but some powders have peculiar characteristics. For example, Alliant Unique generates relatively high chamber temperatures for its burn rate. Universal Clays, which is theoretically identical to Unique, does not generate as much heat, but tends to generate a higher peak pressure. Unfortunately, this can be load or cartridge specific, and you will have to learn by experience which powders will work best in your particular pistol. However, this is half the fun as well.

In summary, best accuracy for handgun loads are usually obtained by using one of the slowest applicable powders that allows for a high load density. With a Nobel-Vectan ball powder or any powder with exceptionally small grains or spheres, some airspace is desirable for safety reasons. With an extruded powder, maximum load density (little or no airspace) or even slight compression usually yields the best accuracy at a velocity higher than most factory loadings. This is due to the fact that powder position has been completely removed from the equation.

D. Other Considerations

The above section is an oversimplification, because one cannot select a powder based on burn rate and load density alone. Powder manufacturers deliberately alter the characteristics of powders by adding deterrent coatings, decreasing volumetric density with cellulose, etc. to provide the reloader with more options. A brief discussion of some of the other considerations follows.

Availability is obvious, but often ignored by some well-meaning folks. A casual glance at the burning rate chart reveals that several of the powders suitable for handgun use are manufactured by Norma (Sweden), VihtaVouri (Finland), and Nobel-Vectan (France). Odds are, you may not be able to walk into the corner gun store and buy these in 1 lb. canisters. As of 2006, the Nobel-Vectan powders were no longer imported into the U.S.

Economy is a major factor for many. Slower powders tend to use heavier charge weights, and powder is sold by weight, not volume. Some of the slower handgun powders, such as Alliant Blue Dot, also cost more by the pound than other powders.

Metering is a major concern for most handgun reloaders, because they shoot so many cartridges in a month. Metering refers to how well equipment can uniformly dispense the powder. Ball powders meter extremely well, because the spheres are so small and uniform. Older extruded and flake powders do not usually meter well.

Cleanliness is a major concern for some shooters; some could not care less. Generally, selecting the correct burn rate will equate to a complete and clean burn. Some older powders, such as Unique, are relatively sooty despite this fact.

Powder selection is somewhat dependent on the intended use. If you want to load high performance ammunition, you will need to use a slower-burning powder, especially in the magnum revolver cartridges or cartridges with limited volume, such as 9mm and .40S&W. If your goal is to assemble accurate ammunition of a particular velocity (i.e. to make Minor PF) and do so economically, a faster powder with a higher calorific value and lower charge weight may be adequate.

When compressing an extruded or flake powder, you are essentially wasting some powder to gain uniformity. The minute cartridge-to-cartridge variations do not factor into the equation, because only X amount of powder ignites. Similarly, you have eliminated the variable of powder position relative to the primer. Some of the older powders that are less popular today, like Alliant Herco, can be surprisingly accurate.

F. Summary

1. Smokeless powders have several characteristics that influence performance. The most important are powder density and burn rate.
2. Faster burning powders are more efficient for low pressure handgun cartridges, but their use limits potential velocity.
3. Higher load density usually gives better results in handgun cartridges.
4. A burn rate chart may be helpful in selecting a powder, but it does not provide the entire picture, as factors such as availability, economy, metering, and the like should be considered as well.

Handloading Tips: Part 5 (Primers)

V. Primers

A. Primer Types and Characteristics

Unlike smokeless powders, which are merely propellants, primers are in fact mild explosives. Primers should be stored in their original packaging and handled in small quantities when possible. Handling primers is by far the most dangerous aspect of reloading, but it is perfectly safe when done according to the manufacturers' instructions.

A handgun reloader should only be concerned with four types of primers: 1) small pistol; 2) large pistol; 3) small magnum pistol; and 4) large magnum pistol. Since most people will eventually load or be exposed to other cartridges, we will examine primers more generally.

There are two basic primer designs: Boxer and Berdan. In the United States, the Boxer system is used for 99.9% of all military, factory and reloaded ammunition. The Berdan system is popular for commercial ammunition overseas, but the Berdan system is primarily associated with military ammunition. Boxer primers are self-contained; the primer is essentially an anvil surrounded by a cup of priming compound. In the Berdan system, the anvil is part of the case. Boxer cases have a single flash hole in the center of the primer pocket. Berdan cases have two or more flash holes near the edge of the pocket; the center of the pocket is a metal nipple that acts as an anvil. Occasionally, you will hear people say that Berdan cases are not reloadable. This is not strictly true, but the equipment to reload Berdan cases is highly specialized, expensive, and difficult to obtain in the U.S.

The following discussion is therefore limited to Boxer primers for metallic cartridges. Boxer primers are classified by their size (large or small), application (pistol or rifle), and power (standard or Magnum).

Regardless of their other characteristics, Boxer primers only come in two diameters: small (0.175") and large (0.210"). Another way to look at this is that primer pockets only come in two diameters: small and large. Handgun cases up to and including .40 S&W use small pistol primers. Starting around 10mm, .41 Magnum, and up, large pistol primers are used.

Although they are the same in diameter, pistol and rifle primers are very different. Rifle primers are designed for much higher working pressures. They have a hotter burn and thicker primer cup, which actually degrades performance in a handgun. Rifle primers should never be used with handgun cartridges, the cases are far too small for the higher pressure that the rifle primer could potentially generate. Also, a rifle primer may not ignite consistently (handgun firing pins are usually too light), creating a dangerous low pressure situation.

Finally, primers come in two versions: standard and magnum. This distinction is often misunderstood. For example, all .357 Magnum loads do not use small magnum pistol primers; in fact, the vast majority use standard primers. True magnum primers have both a thicker primer cup and more priming compound. This provides a hotter burn, which is intended for use with certain slow-burning powders to help provide more consistent ignition. Normally, true magnum primers actually degrade performance unless the data specifically calls for their use. Most powders suitable for handgun cartridges either will not benefit from a magnum primer or will not benefit enough to justify the added expense. Some primers marketed as magnum primers are not "true" magnum primers, which will be explained below.

B. Primer Brands

Any theoretical difference in accuracy that one brand may offer over another is much less important than how well they seat in a particular brand of case. In other words, consistent primer seating is the goal; other considerations are always secondary. Some makes and models of equipment operate better with certain brands of primers. As this is somewhat beyond the scope of this article, I recommend starting a new thread asking owners about particular priming systems as needed.

A brief discussion of the available brands follows. I have also provided the product numbers or identifiers used by each brand.

Winchester primers are the most commonly used by most reloaders in the U.S. They will work in all or virtually all makes/models of equipment, and they fit well in most brands of cases. Winchester primers are typically the least expensive. Winchester does not offer both standard and magnum large pistol primers; their large pistol primer is intended for both applications. In other words, it is not a "true" magnum primer.

Winchester Small Pistol: WSP

Winchester Large Pistol: WLP (marked "suitable for standard or magnum pistol loads.")

Winchester Small Magnum Pistol: WSPM

Many consider Remington primers less desirable than Winchester, but they are virtually identical in performance. Remington primers are not as well distributed as Winchester; only Remington shotgun primers are widely available in my area. I have noticed other reloaders in the Midwest and Midsouth making this comment. Remington does not offer a large pistol magnum primer at all. The Remington small magnum pistol primer is not a "true" magnum primer; it only has a thicker primer cup.

Remington Small Pistol: 1-1/2

Remington Large Pistol: 2-1/2

Remington Small Magnum Pistol: 5-1/2

CCI primers used to be slightly larger in diameter than all other brands. Speer and CCI cases have correspondingly larger primer pockets to match. CCI primers are most useful when reloading Speer/CCI cases or older cases with loose primer pockets. The general consensus is that CCI primers are somewhat milder than other brands. I am not sure if this is due to their construction or a side effect of being forced into primer pockets. At any rate, CCI now appears to have switched to the same dimensions as Winchester, Remington, and Federal. CCI primers have a nickel coating that helps with feeding in some priming systems (this may have explained their size difference). CCI primers typically cost more than Winchester and Remington, but less than Federal. CCI magnum pistol primers are all "true" magnum primers.

CCI Small Pistol: 500

CCI Large Pistol: 300

CCI Small Magnum Pistol: 550 Mag

CCI Large Magnum Pistol: 350 Mag

Federal primers use an older priming formula known as "basic compound." Basic is easier to ignite and has higher brisance (flame) than the modern formula in Winchester, CCI, and Remington. I would imagine that some of the primers made overseas might also use basic compound.

You will sometimes hear people claim that the Federal primers have a thinner primer cup. This is not true; they are easier to detonate due to the priming compound. (See Lee's *Modern Reloading* for more information.)

The main advantage of the Federal primer is a slightly hotter and brighter burn. This is very important for consistent ignition in certain powders. I use Federal primers almost exclusively when loading older flake powders in the medium to medium-slow range with certain cartridges. For example, I have had better accuracy results in 9mm with Alliant Herco using Federal standard small pistol primers, but I have not seen any appreciable advantage in 9mm otherwise. I would advise the use of Federal standard pistol or their Gold Medal Match standard pistol primers when a hotter burn is deemed necessary. Match primers are slightly hotter still, but do not generate as high of a peak pressure as a true magnum primer.

The biggest downside of Federal primers is all that comes from the easier and hotter ignition: slightly higher pressures and more accidents. Federal primers will raise pressures slightly, but they do not usually increase velocity. Several manufacturers advise against using Federal primers with their equipment. Federal primers are typically the most expensive. Gold Medal Match primers are even higher at an additional \$2-\$3 per thousand.

Federal Small Pistol: 100

Federal Large Pistol: 150

Federal Small Magnum Pistol: 200

Federal Large Magnum Pistol: 155

Federal Gold Metal Match Small Pistol: GM100M

Federal Gold Metal Match Large Pistol: GM150M

Federal Gold Metal Match Small Magnum Pistol: GM200M

Federal Gold Metal Match Large Magnum Pistol: GM155M

Magtech also offers component primers, which are slightly less than Winchester via mail order, but they are not widely distributed in retail stores. Magtech/CBC loaded ammunition, component brass, and bullets are all quite good, so the Magtech primers are probably a good buy as well. I have used their standard small pistol primers with good results. Magtech does not offer a large magnum pistol primer, but they do offer a lead-free small pistol primer

Magtech Small Pistol: PR-SP

Magtech Large Pistol: PR-LP

Magtech Small Magnum Pistol: PR-SPM

Magtech Clean-Range Small Pistol: PR-SPCR

Some Magtech packaging uses the same numerical designation as Remington primers.

I am not familiar with Wolf primers, which have only been available for a few years. I have heard of some complaints of poor ignition due to hard primer cups. By the way, primers are the most critical and difficult component to manufacture; be wary of "bargains" or "mystery brands." Wolf primers are almost always available online, even now during the relative shortage. This suggests that some people simply will not buy them.

Wolf Small Pistol: NCSP

Wolf Large Pistol: NCLP

Wolf Small Magnum Pistol: NCSPM

Wolf Large Magnum Pistol: NCLPM

PMC also offers component primers, but they are not widely distributed. PMC primers have a bad reputation on the internet for crushing when seated and erratic ignition. PMC also offers a range of lead-free primers, which may be worth the risk when available.

Fiocchi, RWS, and Hirtenberger are European firms that manufacture high quality primers. Their products are only available on a limited and infrequent basis in the United States. Often, the RWS and Hirtenberger primers that are imported are Berdan, not Boxer (both companies offer both basic types). Fiocchi shotshell primers have a good reputation, but I can't find much information on their Boxer metallic cartridge primers. Although their cases do contain 1,200 primers, rather than the standard 1,000 (8x150 instead of 10x100), Fiocchi primers are still relatively expensive. I would avoid these brands, but only due to their expense and supply problems.

In perfecting certain types of loads, experimenting with primer brands may be beneficial. However, switching primers will usually degrade a near-perfect load, as it was virtually perfect with the other brand of primer and could not be readily "improved." Generally, a major increase or decrease in group size when switching brands indicates that your equipment works better with one brand. Remember, consistent seating is much more important than brand names.

C. Primer Seating

Consistent primer seating is absolutely critical. Considering the wide array of available brands and options (i.e. bench rest and match primers), the novice may believe that the secret is selecting the correct brand or model for the load. In handgun cartridges, this is rarely a critical factor, while primer seating is often misunderstood.

There are two issues with primer seating: safety and accuracy.

High primers may cause slamfires and other dangerous conditions in a semi-auto. They will also bind revolvers. Low primers may be crushed and ignite unpredictably, even causing squib loads.

From an accuracy standpoint, seemingly minor inconsistencies are extremely important. If the primers are not 100% seated, a portion of the hammer blow actually seats the primer before or during ignition. This ruins your group and usually causes vertical stringing. No two cartridges ignite identically, which prevents top accuracy.

From a safety and reliability standpoint, primers must be seated so that they are at least flush with the case head. From an accuracy standpoint, primers must be fully seated, which is slightly below the case head. The exact measurement will vary according to the components, assuming you have a micrometer. Calipers are not practical for measuring seating depth, IMHO. Generally speaking, you will be able to obtain good results by feel or simple consistency (all primers seated 95% is better than a range of 96-100%).

D. Safety Concerns

As was mentioned above, primers are the most dangerous component. A primer contains an explosive, while smokeless powder is merely a propellant. Always follow all of the manufacturers' safety recommendations when handling primers. If you do not wear eyeglasses, wear safety glasses. I have been reloading for over ten years, and my father has been reloading for nearly forty years. Neither one of us has ever had a primer detonate while loading nor had a gun damaged by a handload. However, we both follow standard safety practices, which are outlined in any reloading manual. Reloading is not dangerous, provided you have the temperament to follow instructions.

There is another safety concern with primers that is much less understood: lead styphnate. In general, the shooting public is aware of the dangers of airborne lead. The main concern with vaporized lead is that the body can absorb lead in several different ways. Lead inhalation causes greater absorption than contact with the skin. In fact, lead poisoning through the skin is virtually impossible, but there are always concerns with cross-contamination (eating with lead on the hands, etc.).

Primers use lead styphnate as a binder and base for the priming compound. This is more or less inert before the primer is detonated. The black granular material left over inside a spent primer is almost entirely lead, because the explosive materials are consumed. This material is highly dangerous, because it easily breaks down into a dust that is readily inhaled. Most rifle shooters never handle spent primers in gigantic quantities; handgun reloaders often do.

I highly recommend the use of a dedicated decapping die. My routine is as follows. Cases go straight from the ground to an old plastic shopping bag. When I get home from the range, I more or less go straight to the decapping die and deprime all of the cases. The spent primers go into the same plastic bag, which is usually pretty nasty by now. The bag goes straight into the outside trash. I go straight into the shower, unless I have some serious gun cleaning to do. This gets the majority of the problem out of my home as quickly as possible, and it seems to prevent the lead styphante from getting into the cases as much. You may have noticed that dirty cases that sit for a while get dirtier; this is the styphnate breaking down and getting all over the cases.

E. Summary

1. Although there are many different brands and types of primers, the handgun reloader only needs to be concerned with large and small pistol primers (standard or magnum).
2. Consistent primer seating is much more important than brand name. Consistent primer seating is absolutely necessary for safety and accuracy.
3. Usually, you will select a primer brand based on the requirements of your priming equipment or the brand of case being loaded.
4. Primers, whether new or spent, are the most dangerous component for the handloader and his/her family.

Handloading Tips: Part 6 (Loading Tips & Techniques)

VI. Tips and Techniques

In the previous sections, we have focused on the components themselves. This section addresses specific loading techniques and equipment recommendations.

A. Powder Selection and Safety

Although it may seem like we have beaten this horse to death already, a few topics were alluded to that would benefit from clarification. For the volume handgun loader, metering may be the most important powder characteristic. Some powders, which may be less than ideal for many handgun applications on paper, have a reputation for accuracy.

Winchester 231 comes to mind, and I think it is no coincidence that this powder meters exceptionally well in all equipment.

Consistent powder charges become even more critical in small capacity handgun cases like 9mm or .40 S&W. A variation of one tenth (0.1) of a grain may represent as much as three percent (3%) of the charge weight.

Alliant and Winchester powders are generally cheaper by the pound than the offerings of Accurate Arms, Hodgdon, and others. When you are first starting out, avoid buying powders in large quantity. Although volume purchases are definitely the best way to save money on components, you don't want to get stuck with a powder that doesn't work out in your pistol. Powder is also the one component that has not gone up significantly in price in the last three years.

Beginners should also avoid military surplus or pull-down powders; these are not cannisterized grade. "Cannisterized" powders are manufactured in such a way that each new production lot is theoretically identical to the last.

Wear safety glasses if you do not wear eyeglasses. Make a special place for the current powder you are using, and remove all others far away. You can't grab the wrong powder if you only have the right one nearby.

Weigh your charges early and often. When getting the hang of your powder throw from a measure, fill 10 cases (no bullet), then go back and weigh each one and look for consistency. This costs nothing, and it reveals potential problems with your powder selection or equipment setup.

For new reloaders, I recommend IMR SR 4756 when it is appropriate for the working pressure of the cartridge, because most handgun cases will overflow with a double charge of SR 4756. In particular, 9mm cases cannot hold enough of this powder to create a dangerous pressure situation. SR 4756 is also extremely accurate in 9mm.

B. Die Selection

First of all, always buy carbide dies for handgun cartridges when they are available. Steel die sets are a false economy in handgun cartridges. You will spend much more money on case lubricant in short run, much less the long run.

Virtually every die manufacturer offers at least one specialty die that does the job better than the other manufacturers' offerings. Obviously, die sets from the same manufacturer are more economical. For this reason, I would recommend either the Lee tungsten carbide four die set or the Redding titanium carbide three die set.

The vast majority of reloaders use Lee carbide die sets for handgun cartridges. They are less expensive than other manufacturers' steel sets, and they work. I can also recommend the Redding titanium carbide die sets, despite the hefty price tag. The RCBS, Hornady, Lyman, and Dillon dies cost much more than the Lee and are more comparable to the Redding in price. However, they are not comparable in overall quality to Redding.

Only the Redding uses an entire titanium carbide insert, rather than a titanium carbide coating or tungsten carbide insert, for their sizing dies. Redding sizing dies have a lifetime guarantee and do not gall brass like tungsten carbide.

Only the Lee sets are available in a four die set, which includes the Lee factory crimp die (FCD) and a shellholder. I will be discussing the Lee FCD below, but it is worth mentioning that only Lee gives you a shellholder with every set. Otherwise, this is another \$5-\$7 to add to your bottom line.

Regardless of the brand of dies, the expanding die is what determines how straight the bullets seat. The Lee expanding die works the brass harder when used with their disc powder measures, but works alright alone. Lyman makes an "M" expanding die that is highly regarded for easing bullet seating. In my honest opinion, most RCBS expander and seating dies do a poor job. The Hornady and "normal" Lyman expanders are very similar. The Redding expander works better than anything except the Lyman "M" in my experience.

Semi-auto cartridges absolutely require a moderate taper crimp, due to headspace considerations. You don't want to get carried away, but you shouldn't skip this step either. Many older reloaders do not crimp at all with lead bullets in semi-autos. You can get away with this in some instances, but it seems to limit accuracy, if nothing else. The separate Lee factory crimp die is not absolutely necessary, but it has the welcome side effect of post-sizing your cartridge. This fourth die has both a crimper and a small carbide insert; the cartridges are virtually guaranteed to feed. The Lee FCD will also remove the curious "Coke bottle" effect often seen in reloaded 9mm cartridges. If set correctly, all manufacturers' 3 die sets for semi-auto cartridges taper crimp in the seating die.

There has been a tendency in recent years to taper crimp revolver cartridges. This is usually the best practice for lighter lead loads. A heavier roll crimp should be used for jacketed bullets than have a crimping cannelure. This is especially true with magnum revolver cartridges. Otherwise, the bullets tend to "creep" out of the case under heavy recoil. Since revolver cases will headspace on the rim (some models are intended to headspace in the chamber, but they will still headspace on the rim), you have a lot more freedom when deciding how to crimp.

The Lee four die deluxe carbide sets are probably the best buy. If you are experiencing problems with seating a particular make/model bullet or something similar, trying another brand's specialty die may help. I learned that switching to a massive single-stage press (like Redding or Pacific) may prevent the use of Lee dies, since the Lee die body is slightly shorter than other brands. I have sets of Redding dies for this reason, but I still prefer the Lee sets for volume reloading.

C. Press Selection

This topic is somewhat beyond the scope of this article, but I feel that a few comments may be desirable.

Any press or tool on the market is more than adequate for loading handgun cartridges from a mechanical standpoint. Sizing handgun cases does not require much force.

Obviously, the Lee and Lyman hand tools are too slow to even consider for most handgun shooters. (I am referring to the classic Lee Loader, not their hand press.) The Lee hand press may have some use for loading at the range and the like, but it is also too slow for handgun quantities. From this perspective, all single stage presses are more or less equal. They are much faster than hand tools and hand presses, but they are still relatively slow.

With the exception of several Lee models, turret presses are not truly semi-progressive. They are basically single stage presses with movable die storage. This is still faster than a single stage when the turret is set up properly. The Lee turret presses with auto index actually have a rotating turret that indexes to the next die station with each lever stroke. While not as fast as a true progressive, this arrangement is much faster than any other turret press.

The majority of volume handgun shooters eventually end up with a progressive press of some type. The general consensus is that the Dillon models are superior in virtually every respect. These are not cheap, so I do recommend starting out with a single stage press. Some tasks will always be easier on a small single stage, and most people are interested in a relatively small initial investment.

My honest recommendation for a first press would be one of the Lee single stage or turret press kits. When loading handgun cartridges, almost all single stage presses are identical from a practical standpoint. Their relative strength is a non-issue. You really don't need a massive single stage press. If you are financially committed to reloading, there is no reason why a beginner couldn't start on a progressive. Admittedly, it is easier to learn on a single stage, and you will always have a use for a single stage (such as loading a handful of check loads). Your priorities may be slightly different if you know you will also load high-powered rifle cartridges at some point.

D. Bullet Selection and Seating

In addition to their ballistic and performance characteristics, which we have covered above, some bullets are much easier to seat than others.

Seating 9mm bullets is fairly challenging. (It is usually the most difficult step with any cartridge.) The sizing die tapers the entire case length, which makes the case mouth somewhat undersized. Consistent and concentric expansion is necessary, which can require case trimming for uniformity. The bullets are relatively long and narrow, which does not help matters, either.

Full metal jacket bullets with a rounded nose and ogive have a reputation for accuracy in most semi-auto chamberings. This is not due to their ballistic or aerodynamic characteristics, but because FMJ-RN are relatively easy to seat. However, FMJ-RN do vary considerably by brand, and heavier bullet weights tend to have straighter ogives. .

Some hollow point designs have round ogives, and they seat fairly easily. Conversely, hollow point bullets with straight ogives are incredibly difficult to seat. Hornady XTPs can give you fits, while the Speer Gold Dots do well. Remington Golden Sabers have a driving band that seems to aid in seating. (You cannot use the Lee FCD with the GS driving band, however.) The generic bulk JHPs from Remington, Winchester, et al. vary considerably, but they generally have rounded ogives.

Due to the long bearing surface and ease of seating, LSWCs have a reputation for accuracy in most revolver chamberings. In my honest opinion, the FWCs reputation for accuracy has more to do with the powder-puff charges used and the reduction of extra airspace, not the bullet design itself.

Written by: Radom

Full member of: CZ Forum

<http://www.czforumsite.info/index.php>