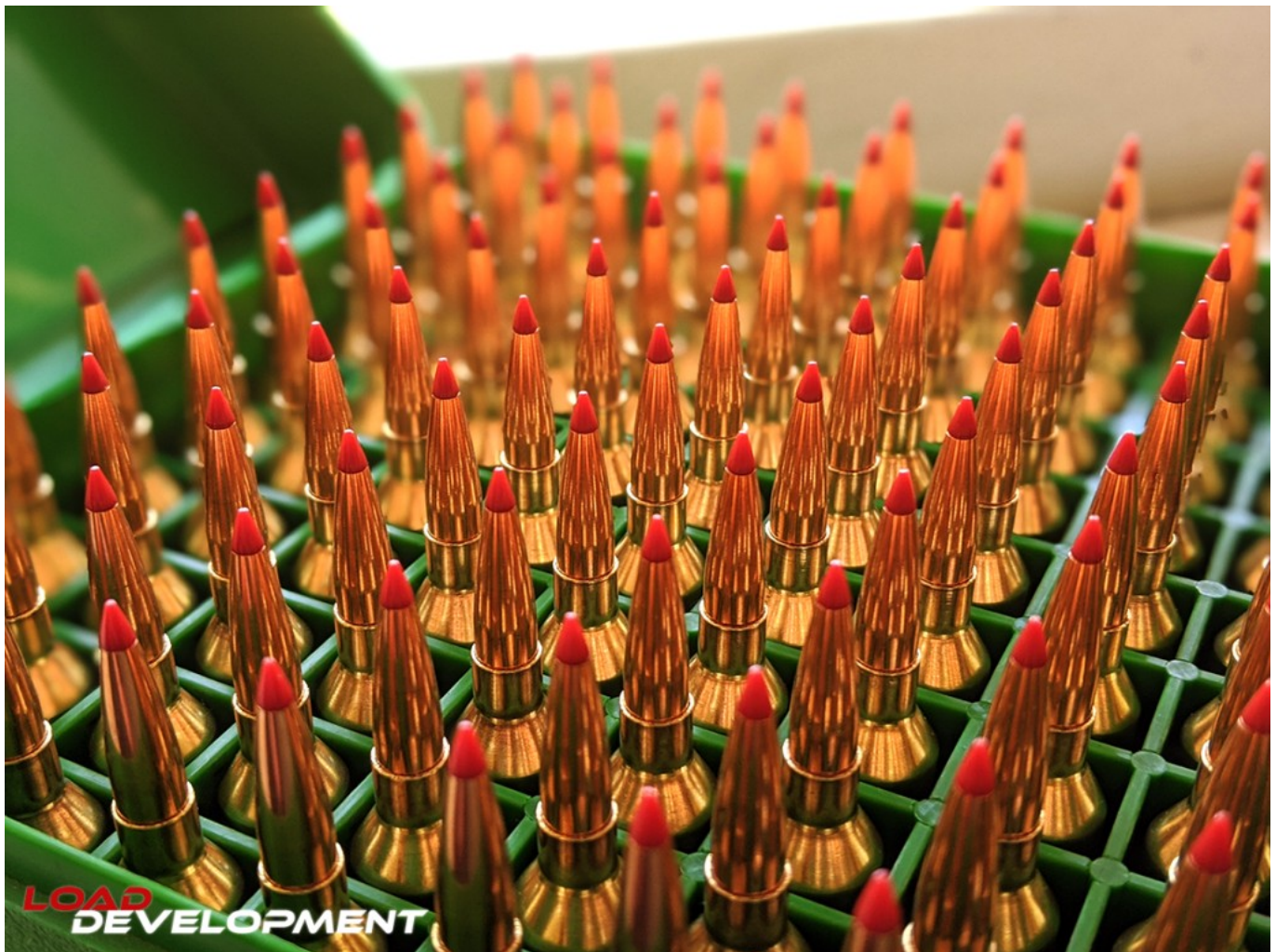


The Pursuit of Precision | Accurate Reloading

by [AJ Deysel](#) [1 Comment](#)

We have already covered the basics of reloading in our [beginner's reloading page](#), so if you are looking to find out how to get started accurate reloading of precision rifle ammo, that is the perfect place to start, no need for expensive reloading ammo classes. Here however we will take it further and progress to the more intermediate and advanced reloading steps for accuracy.

Welcome to our advanced precision rifle ammo reloading page, where I share not only the steps to further increase your consistency in precision and accuracy, but also lessons learned from actual reloading mistakes made, so you do not have to make the same mistakes, and you can save money by not buying stuff that do not really work or help you, but are just fluff. If you only bookmark one reloading page to refer back to, this is the page to do it with. Here we get real with reloading, so once you have your reloading supplies bought and ready, read on how to get the job done.



Precision Reloading – The Goal

When shooting accuracy and precision is concerned, consistency and repeatability is the key. When developing your load, your aim is to find the optimal load for the lowest degree of deviance either up or down. The next step further is to lower the degree of deviation between two or three following cartridges, as this provides the consistency that delivers small groups and similar points of impact.

Yes, we know the first step is purely your own shooting technique, method and consistency and that this true precision reloading does not make much difference between a hit or a miss out to 300 yards, but further than that the difference does become critical.

Even if you only aim to shoot either accurately for your own wants or for competitive reasons and it is below 300 yards, what the precision and accuracy gives you, is piece of mind. Knowing that if you miss or are off target, it is you and not the rifle or the cartridge. You also start to then see the difference wind and bullet drop calculation errors start to make. In the end, why do something if your aim is not to master it and do it well.

Virgin Brass

Because you only load new clean brass cases only once in their lifetime which could be between 10 to 14 reloads depending on how you look after them, this means that after that first time, you will always be using fired brass. So because of that we do include the steps to de-prime and clean the casings in the accurate reloading guide as well.

Resizing Brass

Depending on whether you are shooting with a custom made competition barrel or a factory standard rifle barrel, also if custom, how your gunsmith chooses to ream or size the chamber, will determine how much you need to resize your brass casing after each fire, or whether you fully resize, or just shoulder bump them. In general, the less you have to resize, or smaller the change to the casing size you make each time, will determine how many reloads you get out of your brass cases before they fail, as this will determine how much stretching and contracting of their size occurs each round.

In general, when we consider the [Sporting Arms and Ammunition Manufacturers' Institute \(SAAMI\)](#) specifications for caliber casing and chamber sizes and dimensions, the factory standard chamber and cases need to be closer to the limits of each size. This is usually done in an effort to ensure compatibility for the general user. So if we look at a factory rifle for instance, with it's factory barrel, the chamber is usually manufactured on the upper size spectrum of the SAAMI specifications, in an effort to try and ensure that most factory ammunition will fit in that chamber, and most custom loaded ammunition too. Now in contrast, when looking at factory ammunition, the casings and cartridges are usually manufactured at the lower size end of the spectrum for SAAMI specification for that particular caliber, and this is done in an attempts to ensure that the ammunition will fit in most factory chambers from different manufacturers, as well as tighter custom rifle chambers.

So you can quickly see how using factory ammunition in a factory rifle, the brass cases expand quite a lot when shot, so thus when you resize them, if you want them to last longer, it is better to not size them down too far away from the chamber size which they have taken on during firing, so that the next time when that case is fired, it does not change a lot in size again.

Reload Therapy

Reloading ammunition, can be seen not only as an art form, but also as a form of therapy.

The fall of the powder into the scale bowl, the trickling of the kernels as the scale slowly climbs to the precise number desired, the seating pressure of the bullet, the measuring with the caliper. Each step purpose-driven with the goal of precision in mind. This is what accurate reloading is all about.

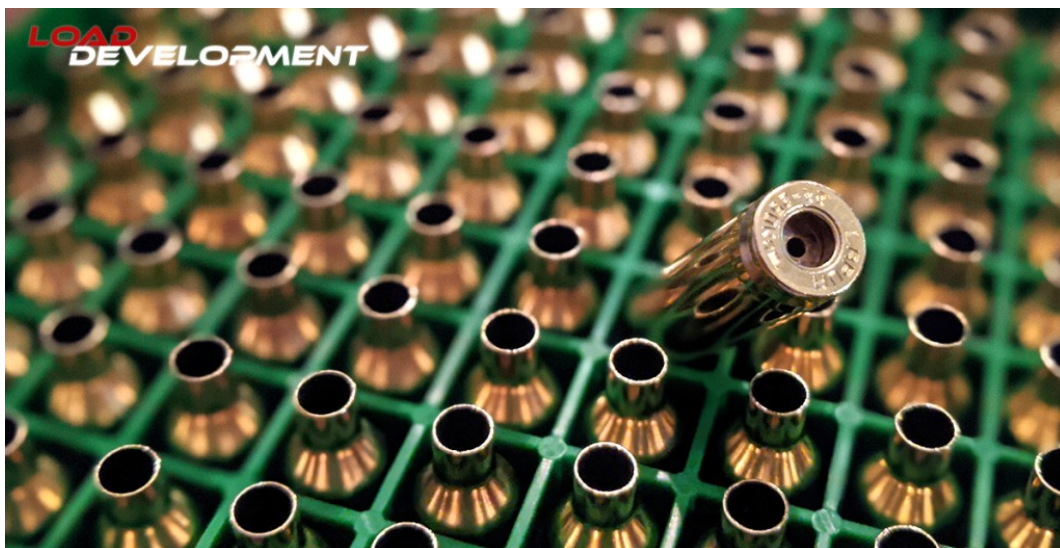
When done well, with a well laid out reloading room or reloading bench, it can be very calming and pleasurable. To some, it is an immense stress relieving activity, putting one more into tune with your ammunition, and shooting, helping you focus on what is important for precision and accuracy. There is nothing in the world of precision shooting, as rewarding as seeing tiny little groups, and precise shots, with cartridges that you spent time on and reloaded carefully and thoughtfully yourself.

Precision Reloading Process

1. Decap primers

Using your reloading press with the die and decapping pin fitted, press out the spent primers from your brass casings. You could also get a specific [hand deprimer tool](#) if you prefer to do the depriming in front of the TV or do not have a die with decapping pin. I would recommend either a dedicated universal depriming die for all your cartridges, or a dedicated depriming tool, as the pins and expander balls included with most die sets, firstly are not as precise and often do sideways (believe me, I have broken quite a few), secondly you also do not have that precise feel when pressing out primers to know if they are loose and primer pockets have stretched, or to know if you are busy pressing out a tight primer or you are busy pressing screw and the pin is about to brake or misform your flash hole. Thirdly, you also do not want to size your case necks with an expander ball, and you will see why later on in this post.

Now would be the right time to anneal the brass cases, if you wanted to. I recommend annealing them every 3 to 4 times that you have shot them. Follow our easy [guide on how to anneal brass cartridge cases](#).



2. Full Length Resize / Shoulder Bump

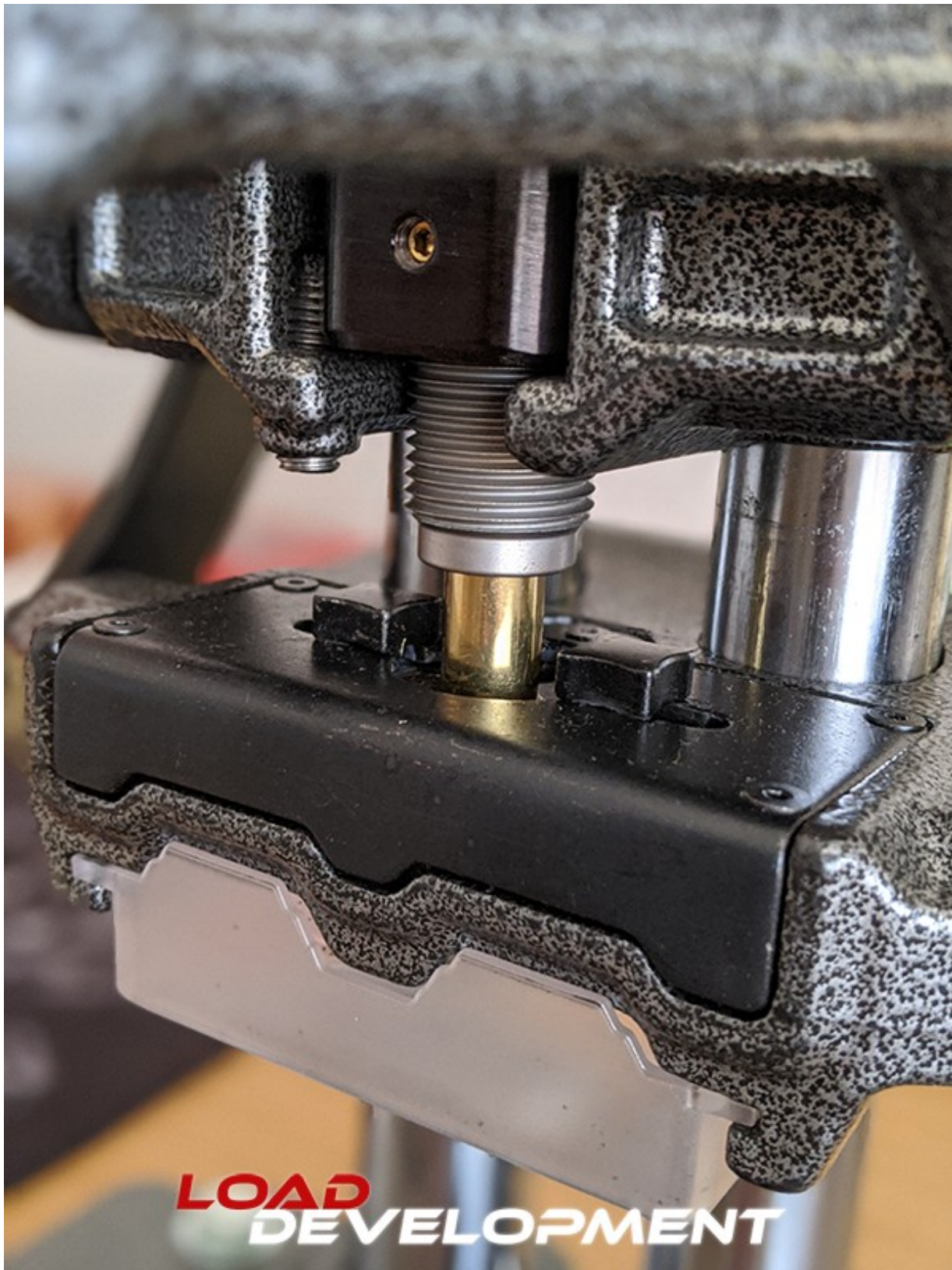


Thoroughly lubricate the necks of your casings with suitable [case lube](#) (lots of seasoned reloaders and precision rifle shooters do not recommend the Hornady One Shot case lube, and rather prefer [Imperial Sizing Die Wax](#), but both work fine for me, the Hornady One shot just takes more effort on the press handle), making sure not to spray it inside the casings. If you use enough case lube on each casing, the effort needed to resize them, or bump the shoulders back, will be less.



Now place the case into the shell holder on the reloading press, and pull the lever to press the full-length resizing die down onto and over the casing. Some people prefer to fully resize the casings after each fire, some after ever second or third fire, depending on how hard it is to close your rifle action when the cartridge is inserted into it.

For well cut custom chambers, which locate the cartridge inside the chamber on the shoulder, it would be best to just shoulder bump the cases every reload, to about 1.5 – 2 thou (thousands of an inch), so they do not expand too much when fired each time. This will prolong the number of times you will be able to reload the same casings.



To shoulder bump the casings, you can either use a special or custom body die, or your normal full length sizing die, but with the expander ball removed. You then first press the die down onto the base of the press without a casing in it, screw it down until it touches the base, then simply screw it back out just half a turn. Lock it in place there, measure your case length from base to shoulder with a vernier fitted with a [body comparator](#), then press the die down onto the case to bump the shoulder back once, take it out and measure it again to see the difference. If the difference is less than 2 thou, or your desired difference, screw it down a little more and repeat the process until you reach a 2 thou difference. Lock your die into place there, and then shoulder bump all the remaining cases.

Another method to test if you resized it enough, is if you put the resized case into your rifle action (with no primer, bullet or propellant in it), press your bolt forward, hold down your trigger, then close down your bolt handle. Ideally, it should just take a light press from one finger to close. If it takes a lot of pressure, it needs to be resized more. If the bolt handle just falls closed, it is resized too much.

Resizing too much, if done consistently will not decrease your accuracy, it simply takes away some of your case volume and increases pressure, but the main problem is your brass cases expand too much with every firing, which would cause them to fail earlier, after fewer reloads because of metal fatigue.

3. Clean Casings

From all the different methods and pieces of equipment available, we have found that the best way to [clean used brass for reloading](#), is through tumbling with [stainless steel media](#) in a wet [rotary tumbler](#) (I like the Frankford Arsenal platinum tumbler and the [Lyman Rotary Wet Tumbler](#), as both of them include some form of media separation from the brass, and both have a rubber lining inside the plastic containers, which make them MUCH quieter during tumbling, however I slightly prefer the Lyman one, as it includes two trays, one to separate the media from the brass, and then another finer one to separate the media from the water too, so you don't possibly chuck a whole bunch of stainless steel pins down your drain). This method gets the cases clean both inside and out, and literally looking brand new if done and dried correctly. P.S. – Chuck in some [Lemi Shine](#), with your water into your wet tumbler and you will have the cleanest, shiniest case you have ever seen.

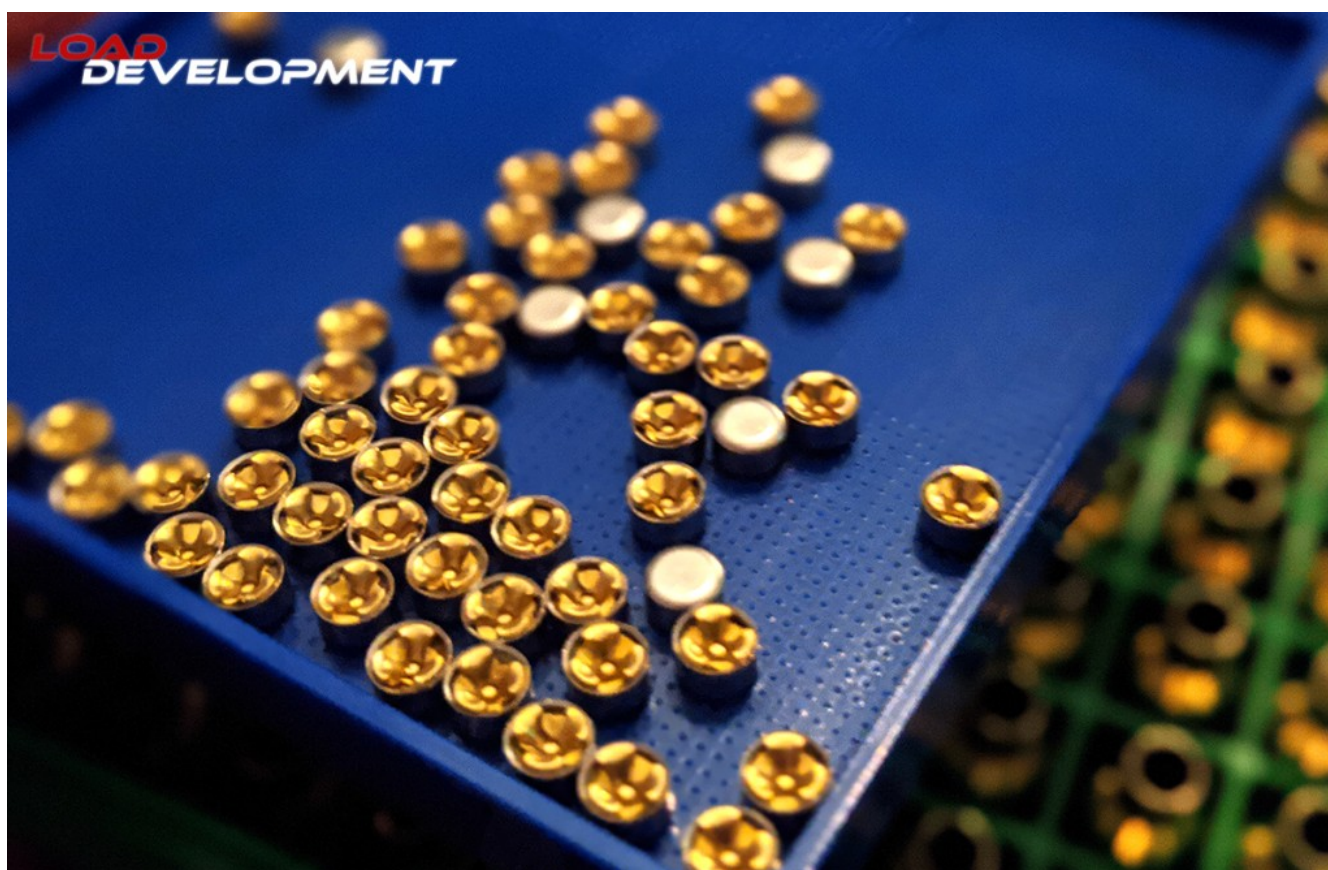


There is another small industry secret used by many bench rest shooters as the best way to clean used brass for reloading when they are in a hurry, or at the range. That is by spinning the case mounted on a chuck case holder or case holder and [lock stud](#), on a cordless drill, with a cut strip of [3M Microfine](#) wrapped around it, and then simply cleaning out the primer pocket with a [primer pocket cleaner](#) (not the reamer), then you reload and shoot. Simple as that.

4. Prepare Brass for Reloading

Preparing the brass for consistent reloading would usually include to chamfer and debur the brass cases, then brush the inside necks for the cases, you can read more in our [preparing brass for reloading guide](#).

5. Prime Casings



Although most modern reloading presses includes the ability to press primers into the cases, we much prefer [hand priming tools](#) for pressing the primers in. There are two reasons for that.

1. The [hand priming tool](#), presses primers into the cases very quickly so it speeds up your reloading process.
2. The feel and feedback you get with a hand priming tool, helps to ensure that you consistently press the primers into the cases at the same depth, which is a crucial part of accurate reloading. You also easily feel if any of your primer pockets are stretched as the primers slide in without any resistance whatsoever.



Because we use a hand priming tool to press primers into the casing, this allows a person to be able to do so anywhere, not just at your reloading bench. So I usually press my primers into all my cases at night whilst sitting in the lounge with my family watching TV.

6. Expand Necks / Neck Size



Because the neck expander ball is removed from the full length sizing die or if using a body die, it does not have an expander ball, the necks then still have to be expanded or sized up to the correct size for the bullets to be able to fit into them, and be seated. The reason we do not prefer using expanding balls that come with the FL-sizing dies, is because they often do not track perfectly straight when pulling them out, causing your necks to not be sized perfectly straight or symmetrical.

The reason we prefer a mandrel to expand the necks, is because they are very accurately concentric, so when expanding the necks with one, it pushes imperfections or uneven points inside the necks outwards, and helps to keep the inside of the necks concentric, ensuring even neck tension all the way round, negating the need to inside neck turn your cases. Concentric necks and neck tension is a critical part of accurate reloading. In fact, according to some of the top benchrest shooters, more critical than even powder weight. These mandrels can also be ordered in various different sizes from 0.5 thou to 2 thou so you can choose the neck tension you prefer to have on your bullets.



7. Dispense Powder Charge



There are a few different ways how to measure powder for reloading, either with a [auto dispenser](#), [auto trickler](#) or normal [powder dispenser](#). Most manual powder dispensers have a micrometer on them, so you can set the amount of gunpowder it should dispense with each pull of the lever.

These micrometers tend to differ from accurate to very inaccurate depending on the brand of dispenser, and then the type of gunpowder used. We tend to find the most inaccuracy when the using stick type gunpowder. The good part is that you only need to adjust the micrometer a few times throwing the first pour and weighing it until you find the correct setting that dispenses slightly under your target charge, and then leave it there, it should fairly consistently pour the same charge every time thereafter. Some of these micrometers do not work so accurately with ball or stick powders, like this Frankford Arsenal model often chops some of the sticks (which isn't a big deal, just not as precise), and the micrometer amount also does not then pour the amount selected on the micrometer. But, it does pour the amount you weigh and set it to, relatively consistently.

8. Weigh & Trickle Powder Charge



You then place your scale bowl with the powder charge in it on the scale, and then trickle a few more grains of gunpowder into it, until it is precisely at the charge you want to reach.

9. Pour Powder Charge



You then gently hold your funnel tightly on your casing, ensuring there are no gaps between the funnel and the neck of the casing, and then pour your powder through the funnel into the casing. Make sure all the gunpowder passes down the funnel into the case, and that there is no gunpowder stuck to the sides of the funnel. [Aluminum reloading funnels](#) tend to suffer less from static electricity build up and cling, than plastic funnels.

10. Seat Bullets



Place the case with powder charge into the shell holder of the reloading press, and then place a bullet into the casing.



Making sure the bullet stays fairly straight, pull the lever on the reloading press, to lower the seating die onto the bullet, and press the bullet into the casing. Then lift up the lever again halfway, just so the seating die is off the bullet, rotate the bullet 180 degrees, and press it down again, just to ensure concentric bullet seating (maybe overkill with modern single stage reloading presses, but it just gives me piece of mind for accurate reloading).



Measure your cartridge base to ogive length with your [caliper](#) and [bullet comparator](#), to ensure the bullet is seated deep enough and the COAL of the cartridge is correct, then move on to the next cartridge. After measuring the first one or two cartridges, and provided that your press and die is set up tightly and correct, all cartridges thereafter should be the same length once your seating die is locked in position. Measure every 5th or 10th cartridge just to ensure the COAL and seating depth has still remained constant.

Congratulations, you have now reloaded a batch of consistent precision cartridges ready to hit the range or hunting field with. Now you see, there is no need to pay for a reloading manual, or search Google for “reloading manual pdf free download”, simply bookmark this page, and refer back to it whenever you want, it is completely free and evolving. We will be adding more info on new equipment as they become available and better than old methods or equipment, we will also be adding more info from mistakes made and learnt from as we go along. The main aim, is for this to become a reloading bible, or encyclopedia of modern reloading techniques and precision rifle reloading, a complete accurate reloading guide.

Reloading Tips

How to Store Gunpowder?

Knowing how to store gunpowder becomes important when humidity in the environment it is stored in rises. Humidity has a significant impact on the burn rate of gunpowder, and it is quite frustrating to a advanced reloader, if you go through all the trouble and care to load consistent precise cartridges, but the gunpowder proves inconsistent and causes your precision to fade because of moisture in it. Always ensure to keep your new gunpowder containers sealed until you need to open and use them. When

opening your gunpowder containers, do so quickly, pour out only the rough estimated amount you are going to need in your powder dispenser and immediately put the lid back on and close it tightly. Check the storage room or cupboard for excessive humidity levels and if necessary, install a de-humidifier or place absorbent sachets in the storage cupboard. With these tips on how to store your gunpowder, you should not have much trouble with moisture build-up inside your gunpowder containers.

Neck Turning



Many custom built rifles have smaller or match chambers, which often are very tight fitting around the neck of the cartridge and require the reloader to neck turn the casings. Neck turning involves a process of cutting back or removing material from the outside of the case neck, so essentially making it thinner, with the goal of maintaining perfectly uniform neck thickness all around. Personally we have had custom competition rifles with tight neck chamber which require neck turning of the cases and custom competition rifles which do not. Whether or not you do it will depend on the chamber of your rifle. Be aware though that if you make the neck thickness of the casings smaller, you will also possibly get fewer reloads out of those same casings.

Reloading Terminology

Extreme Spread – ES

Once an accurate load has been developed for a given rifle, the main goal for precision becomes the Extreme Spread between all loads in a session and getting it as small as possible, this shows how successfully consistent your accurate reloading method is.

Standard Deviation – SD

Standard deviation refers to the variation in a set of data. So for load development and shooting purposes, it is the measure of how much the muzzle velocities of different shots in a string differ from the average or deviate from the average. The goal is to get the SD as close to 0 as possible, indicating consistency.

Moly Coating

Coating of bullet has been done for quite a few years by shooters for a number of reasons. The first reason moly coating of bullets is done, is in an effort to reduce neck tension and in doing so, get more consistent velocity out of each round fired, thus bringing down the extreme spread and in theory, also tightening up the groupings.

The second reason moly coating of bullets have been done, is in an effort to protect the barrel, and prolong barrel life. This is a valid concern with newer wildcat calibers that are known barrel burners. An extra 5-10% of barrel life, could easily mean a few hundred rounds extra per barrel, and over the course of 5 or 10 barrels, the cost and time saving quickly adds up.

Moly coating is somewhat of an older science, as it is generally found that hBN (hex Boron Nitride) coating is now more common and [superior](#) in friction reduction ability, clean handling ability, no moly build up or added wear in barrel. Some have found that hex-Boron, or Boron Nitride or Boron coating as some call it, have reduced their [extreme spread](#) in a string, while others like myself prefer it merely for barrel life extension.

The biggest benefit we have found with hBN coating bullets, is the accuracy and consistency of the first, cold-barrel shot, when usually you first have a flier (a shot that is slightly off from the rest) when shooting the first shot in a cold barrel after a day or two of not shooting the rifle. This is only a major concern in long range hunting or shooting, where the first shot counts and you cannot take a practice shot before that first counting shot.

Neck Tension

The neck tension of a cartridge, is the amount of tension or force with which a case neck holds on to the bullet. This is determined by how large the case neck is before the bullet is seated into it. The best neck tension is a hotly debated topic and varies from purposes of bench rest rifle shooting to hunting. Generally competition precision shooters and bench rest shooter prefer as little neck tension as possible, and hunters prefer more, as with hunting you usually keep the cartridges longer, and they can travel in and on the back of vehicles with you on rough roads, so you do not want the bullets to shift, move deeper in or even fall out of the casings.

What is equally important during accurate reloading for both though, is having as uniform and consistent neck tension as possible on a batch of cartridges to ensure consistency.

Jump

The jump, is the distance a bullet travels when leaving a casing before making contact with the lands of the barrel rifling. After finding your sweet spot, or optimal barrel time during load development, start experimenting with different jumps to get your groupings smaller.

Pressure Signs

Pressure signs are signs on your casings that become visible when you start reaching your maximum pressure for the cartridge or caliber you are shooting, which starts getting dangerous. Common pressure signs are cratered primer strikes, primer pockets stretching so the black powder escapes around the primers (which is also usually accompanied with a different smell than normal shots), extractor pin mark on the head of the casing, and a rifle bolt that is hard to open after the shot. When you see any of these signs, stop shooting those cartridges immediately, and back off a little on your charge that you load in those cartridges.

Concentric Cartridges

Concentric cartridges, are cartridges which are straight, so when turning them, the casing or bullet is not tilted to one side or the other. Slight concentricity problems are not normally visible with the naked eye, and require a [concentricity gauge](#) to notice. Getting your cartridges as concentric as possible, helps improve consistency and so also precision, the main goal of accurate reloading.

Which is Better?

Digital or Bench Scale

This is a personal preference point, where the right answer will depend both on your own personal preference, and the external environmental factors of where you are reloading. We actually prefer both, whereby we use an accurate [electronic scale](#) for reloading during summer when the humidity is better and closer to 50%, or if we have a humidifier in the reloading room during the dry season keeping the room humidity close to 50%, as then the electronic scale is not affected by static electricity.

We also still have and often use our [old school \(but quite new as we bought it in 2019\) bench scale](#) when the static or other elements bother the electronic scale like mentioned in our [static electricity post](#). So the choice is up to you and both deliver accurate results, however, just make sure you get a reliable and accurate reloading scale whether electronic or bench.

Powder Dispenser or Autotricker

Save time, without sacrificing precision no matter the cost, the [autotricker](#) will do so. Enjoy the therapy and art of precision reloading and measuring of powder for each charge, at the same time saving a bunch of money, then the manual [powder dispenser](#) and separate reloading scale is the way to go.

Single Stage or Multi Stage Press

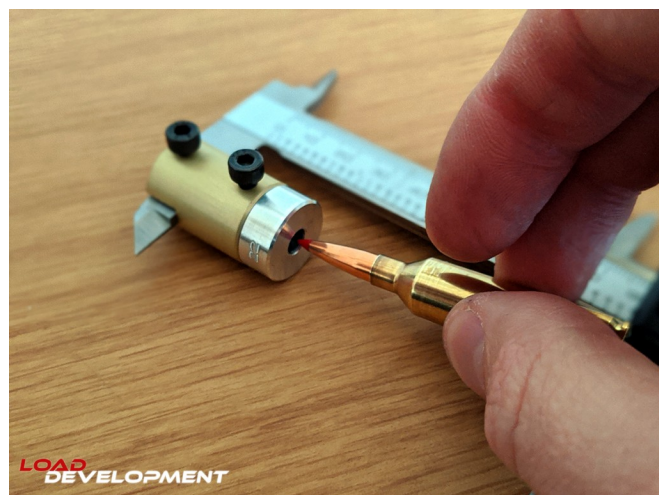
As stated in our [reloading press review](#), the multi stage reloading presses often sacrifice precise

tolerance and alignment for the added functionality of having multiple stages which can quickly be switched between. However, as you can see on the modern single stage reloading presses we have reviewed and recommended there, the benefits of a multi stage press, have been overcome in the single stage presses that now offer quick-change blocks which allow you to change out dies and stages as fast as any multi stage press, and still keep the tight tolerances and alignment offered by a single stage press. So the single stage reloading press takes our vote here.

OAL or Ogive Measurement



Overall Length (OAL) or Cartridge Overall Length (COAL) of a cartridge is sometimes used to determine the length of a cartridge, in order to be able to repeat the load in future, however, with soft-points and hollow points, the inaccurate tolerances of the tip material cause them to vary, so this is not a good measure of length to work from. Also when determining the max cartridge length of your rifle, the OAL is also not the best, as the lands of the barrel (where the grooves and rifling starts) does not catch the tip of your bullet, but rather the first point where the diameter of the bullet is the full width for that caliber. This point is referred to as the ogive.



Because various different weight and length bullets of the same caliber has different length from base to tip, is an overall length will still not provide for a consistent jump (the distance a bullet travels from the case to the lands of the barrel when fired) for different bullets, so the base to ogive measurement is much more accurate and consistent especially between different bullets. To measure the base to ogive length, you simply attach a [bullet comparator](#) to your [caliper](#) and re zero your caliper on the comparator.