



Cartridge Case Sizing, Stretching, Trimming & Lubing

By [Mark Trope](#) & [R. Ted Jeo](#)

WARNING!

This article addresses issues that deal with reloading firearm cartridges. The information presented is a result of our experimentation and experience. We offer no guarantee or warranty of any kind on the information presented and you should proceed with caution if you choose to try the techniques or products that we present. Reloading is not an exact science; we have no control over what you do or what you use. Therefore, you assume any and all risk involved.

General Background

The brass cartridge case is a wonder of design. A lot gets asked of the one loading component we can take home after a trip to the range. Consider this, it gets subjected to upwards of 50,000 lbs pressure on firing! It must expand, release the bullet, contract, then be dragged out of a hot chamber, (*possibly hit the ground!*) and still have enough integrity to be reloaded.

Adding to the demands placed on cartridge cases is the size of rifle chambers. Commercial sporter rifles have chambers sized somewhat above the minimum specifications. Mil-surp rifles usually have chambers crowding the maximum side of tolerance. Mil-surp chambers must be large. The rifle must be able to chamber ammo produced under the stress of war. Often, rifle chambers, ammo or both will be dirty in the field. To a government, a rifle cartridge is to be used one time only. Not so with the likes of dedicated Mil-surp shooters. We consider a boxer-primed case to be a jealously guarded family heirloom!

Usually brass is resized, reprimed, a powder charge

added, bullet seated and fired again.

However, how much thought do you really give to what happens when that case is pushed into and out of a die? What about when the expander assembly expands the case neck? Is that all the expander does? How does resizing and expanding change the dimensions of your brass? Is there a way to reduce case stretch? What about case trimming? Price aside, what features make a trimmer desirable? What about lubes?

These are some of the questions that ran around in my mind recently. I decided to examine these issues, and spent quite a bit of time with dies, a case trimmer, caliper, and various other tools and supplies experimenting. My experiments yielded more than just a pile of brass shavings. Answers were forthcoming, and I think we can recommend certain tools and supplies to get the best service from our reloadable brass

Consider what happens when we fire a new cartridge. Upon firing, the case expands to fill the chamber because of pressure of the expanding gases. As pressure decreases, the case contracts back a bit, however, it does not contract to its unfired state. Hence, in order to use the case again, we have to resize it with pressure and trim it back to its original form if needed.

Brass is a relatively soft and malleable metal. Brass flows when it is acted on by pressure. That pressure can either be from expanding gas, or, mechanical pressure of a loading die. We would like to keep the degree of stretching and flowing of the brass minimal to prolong the life of our cartridges. While we have no control over expanding gas pressure, except to use a lighter load, we can control the amount of pressure and stretching the case is subjected to from reloading through the use of our dies, lubes, tools and procedures.

Discussion

I wanted to see examine two things. First, try the various methods recommended for lubing and trimming. Second, see which method and supplies gave the least case stretch, and most consistent case conditions after resizing. Reduced stretch will allow us to get the maximum life from our brass.

Tidbit: Accuracy vs. Precision
<i>You hear and see these two words used a lot on the subject of reloading and shooting. A quick overview would be of value.</i>
<i>Accuracy is when you hit what you aim at, in other words, your shot goes right where you want it to be.</i>

Precision is not interchangeable with accuracy. You can be precise time and time again, but not accurate at all. If we use our shooting example, precision would be like you are aiming and wanting to hit the X ring, but every single one of 5 shots goes 3 inches high, and 2 inches to the left, forming a nice 5 shot sub MOA group...your group is precise, but not accurate (being that you were actually wanting all the shots to hit the bull). In other words you can repeat your error really well!

So, a shooter or a reloader really strives to be both accurate AND precise. That is, you are aiming at the X ring and every single shot you put down range goes right to the X ring.

In my opinion, the best manual case trimmer on the market is the trimmer produced by L E Wilson. The Wilson is simplicity itself. It is built on true lathe principles. The case length is set by loosening one lock-screw and adjusting a stop bolt. Because the stop bolt is threaded, it simply cannot get out of adjustment once the lock-screw is tightened. Brass cases are pressed into round, cylindrical case holders which sit on rails. No collets or pilots are required; instead caliber-family specific case holders are used. For example; the .30-06 holder also services the .270 Winchester and .280 Remington. The case holders hold the brass by the case body; so, the mouth always gets a straight cut. The L E Wilson Trimmer can either be clamped in a vice; or an accessory base can be acquired. I have a base from [Lock, Stock & Barrel](#).



Wilson Trimmer on Lock, Stock & Barrel Base

This base also has a clamping device to hold the case holders down. If the trimmer is clamped in a vice, the

fingers can press down the holder onto the rails. The cutter and crank assembly on the Wilson can be slipped out and reamers to remove military crimp can be slipped in. If cases have been fired in a semi-auto that caused bent rims, the holder can be reversed in the rails and the rim can be cleaned up. Any case with a bent rim will vary in its trim length. There is also a neat 30-degree inside deburring tool that slips in the Wilson for perfectly chamfering of case mouths. Wilson has an extensive list of case holders they produce.

Do they make holders for ALL calibers?

As many Mil-surp shooters have rifles in obscure calibers, I wanted to know if Wilson would make a custom case holder.

I contacted Joe Hills, the Shop Manager at L E Wilson. He advises that, "Wilson Tools does make custom Wilson Case Holders for almost any caliber if the customer can provide us with two fired cases. The time frame for the custom case holder is usually same day turn around upon receipt of the cases. We charge \$12.00 plus \$6.75 for S/H."

The folks at Wilson are enthusiastically committed to customer service. They make many products for the shooter and reloader. Their line of benchrest items set the standard for benchrest shooters. [L E Wilson](http://www.lewilson.com) can be contacted at: 404 Pioneer Ave. Box 324 Cashmere, WA 98815. Phone 509-782-1328 or Fax 509-782-7200 or at www.lewilson.com

Other brands of trimmers are available, and they generally work well. As all other trimmers rely on collets and/or pilots to retain cases, a bent rim will cause case length to vary the same amount as the bend in the rim. If a rifle chamber is slightly eccentric, it will cause the case mouth to be cut at a slight angle. Collet/pilot type trimmers will not straighten an eccentric case.

Some of the other trimmer manufacturers will make custom pilots. Forster will make special order pilots. They can do it with customer supplied specifications, or with a fired case. The turn around time would be a few days and the cost would be \$11.10 + actual shipping cost. Forster has many accessories for its trimmer.

See www.forsterproducts.com to get the story on their complete line.

Hornady is also willing to make special order pilots. They require 2 fired cases. The turn around time is 3-6 weeks at a cost of \$30.00

In the case of Lee, they offer caliber specific trimmers.

Their system uses a common lock stud and trimmer. Each caliber then requires a shell holder (*different from reloading press holders*) and the trimmer gauge. The trimmer gauge is the specified length allowable for the cartridge and uses a “pin” that passes through the primer hole for guidance and concentricity. This system is unique in that no bench mounted lathe like cutter device used. The lock stud can be mounted to a cordless drill for power cutting, or a “zip pull” device may be used to power the cutter. The technique is simple, however, we have found that the devices are small in hand and cause some cramping of the fingers and hands when in use. Lee does offer a ball grip to help with this issue.

It's time to select loading dies from the collection on a rack above the loading bench. There are dies from several different companies on hand. Some are benchrest dies. However, to make this experiment most valid, it was decided to use the brand of dies most mil-surp shooters are likely to use.

[Lee Precision](#) dies were chosen. Lee dies are excellent quality, and openly court the mil-surp shooter. Lee has many calibers in their standard lineup that other companies put in a their “limited production” class. The resizing die was set up per Lee's instructions in a Redding Ultramag 700 press. Before we get into the resizing, we need to discuss case lubes available.

Up until 20 years ago, the only case resizing lubes supplied by the reloading companies were petroleum base products, somewhat on the order of STP and motor oil. After resizing, the only way to remove such lubes was with lighter fluid or other petroleum solvents. If the reloader had lubed the inside of case necks to ease the passage of the expander ball, then removal of the lube became extremely important. Any petroleum product in the case can quickly contaminate the powder charge. Some companies came out with dry powder mica and graphite lubes to be used inside of case necks.

Then Lee came out with their wax-based product. Gone was the messy cleanup. The wax-based lube cleaned up with a water-dampened cloth. A brass case prepared with Lee lube could be processed with the lube wet or dry. Since the wax has no effect on powder, leaving it inside case necks after processing was perfectly acceptable.

The other reloading companies saw the overwhelming acceptance of Richard Lee's wax lube. Soon, every company offered a non-petroleum resizing lube. Wax-based lubes come in various containers today, including tubes, tins, bottles, both squeeze and pump spray and aerosol spray cans. The least expensive case lube is Lee; the original 2oz tube is priced at about \$2.00 from

most web based supply houses. Many reloaders opt for 2oz tins sold by Imperial Sizing Die Wax. Though expensive, about \$6.50 per tin, many swear by Imperial.

Ted and I, being rather frugal, prefer something outside the realm of reloading, namely GB (*Gardner Bender*) Wire-Aide, Wire Pulling Lubricant, (*Part # 79-006*). GB is available at most home center or electrical supply stores. It's the same creamy, wax-based product as offered by the reloading companies. BUT, an entire quart of GB is less than \$5.00! (*\$3.60 at Fleet Farm in the Twin Cities*) As I said, Ted and I are frugal.



GB Wire-Aide Lubricant with Group 1 Cases in Case Block

Methodology

The idea is to see what, if any, effect lubing the inside of case mouths has on case draw out (*lengthening*) when it is resized and which method of lubing seems to work the best. Only the GB lube and graphite (*dry lube*) were tested, as neither of these would contaminate powder loads.

Our first step, prior to cleaning cases in a vibrating tumbler loaded with corncob media, was to deprime 64 Winchester .30-06 cases (*from the same lot*) using a 7/8-14 threaded Lee universal decapping (*primer removal*) die. Decapping cases first allows the media to get to the primer pockets, and would insure the next step was done accurately.

**figure 3****mnm****Cleaning Brass Cases with Vibrating Tumbler**

For the experiment to be valid, after the cases were decapped and cleaned, it was necessary to insure the cases started exactly at the same length. Of course; it begs the question, why wouldn't the cases be all the same length if they were from the same lot and fired in the same rifle? The answer is twofold. First, the cases may not have all been exactly the same length to begin with when they were loaded at the factory. Second, each piece of brass is an individual, and the expansion and contraction from firing may affect each case in a slightly different way. To bring our cases to the same experimental start length we used the aforementioned Wilson trimmer. All the fired cases were quickly trimmed to length and then the mouths were inside deburred with Wilson's new 30-degree cutter, and outside deburred with a standard deburring tool. Now our cases are ready for lubing and resizing.

**figure 4****mnm****Lubing Case with GB on Case Lube Pad**

The trimmed cases were placed into one of four groups,

with 16 cases per group. In all four groups the outside of the case was lubed with GB, accomplished using an RCBS lube pad where a small amount of GB was spread to cover the center 2 inches of the pad. Just a slight coating, enough to give the brass a "shine" is plenty. Excess lube is wasted.

Group 1	Lubed inside neck with GB and sized WET.
Group 2	Lubed inside neck with GB, allowed to dry and then sized.
Group 3	Control. No neck lube used prior to sizing.
Group 4	Lubed inside neck with graphite and sized.

The inside of the neck of Groups 1 and 2 were lubed with GB using a cotton swab. The inside neck of Group 4 was lubed with graphite using a Forster graphiter brush system.

To insure accuracy and validity, the expander rod was removed from the die between groups and cleaned before a new group of cases were processed.



Lubing the Inside of Case with GB using a Cotton Tipped Swab



Lubing Inside Case Neck with Forster Bonanza Case Graphiter

Results and Conclusions			
Group 1	Group 2	Group 3	Group 4
<i>Inside of case necks lubed w/ GB. Resized while GB wet.</i>	<i>Inside of case necks lubed w/ GB. Resized after GB dried.</i>	<i>No lube in case necks.</i>	<i>Case necks lubed w/ a dry powder lube. Forster Case Graphiter.</i>
<i>Case Stretch</i>	<i>Case Stretch</i>	<i>Case Stretch</i>	<i>Case Stretch</i>
<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>
<i>+ .0035</i>	<i>+ .006</i>	<i>+ .007</i>	<i>+ .00725</i>
<i>*caliper is +/- .0005 inch</i>			

The results of the experiment show that lubing the inside of the case with GB and then resizing the case while the lube is still wet appears to yield the least amount of case stretching. Not surprisingly, **Group 1** was the smoothest and easiest to resize as the case mouth passed over the expander. **Group 2** felt as smooth as Group 1, however they required a bit more pressure to pass over the expander. **Group 3** (*the control group*), felt smooth as well but required the most amount of pressure to overcome the expander. The final **Group 4** using the powdered graphite in the case mouth was easier to pull through than the control group, but in this case the motion was “jumpy” in feeling. This method also yielded the most case expansion.

Of course there are factors here that are beyond the scope of this informal experiment. For one thing, only one sizing die was used. Any subjectivity on how the case “felt” going over the expander could be the result of the dimensions, age and/or metal wear of just this particular resizing die.



Measuring Case Length with Digital Caliper

GB, being non petroleum based, can be left in the case neck after resizing. It will not harm the powder once dried, and no difference was seen in group size on paper targets. Cases used with no lube in the necks, and cases that had dried GB, grouped the same.

NOTE

It should be noted that most old Mil-surp rifles are not designed to be super accurate sniper rifles. Therefore, they have tolerances (as stated before) that allow for a factor of dirtiness in the chamber and ammo. The fact that we are measuring down to the 1/1000 of an inch should not suggest that you HAVE to be that precise. Rather, we are presenting this information more as a means of being CONSISTENT in your technique for CONSISTENT shot to shot results, as well as a method of PRESERVING your mil-surp brass for a long life of reloading.

Brass requires trimming to remain safe, and for best accuracy. A lathe type trimmer is best for someone who loads for more then one caliber.

The results in the table shows that using certain procedureds will reduce case stretch.

Reduced stretch translates into extended case life. Ah yes! Getting more for less...I'll say it again, Ted & I are frugal (*cheap*).

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