

When 6PPC asked me to write an article on precision hand loading I was going to write it all in one hit, as I have progressed I found that there is quite a lot of complex information to get across. I have decided to compile the article in two parts, Pt1 covering the intricacies of case preparation and Pt2 actually loading these beautifully prepared cases, bullet seating depths, neck tension pressure and loads etc.

One of my shooting buddies is on the verge of tripping into the realms of Precision Hand loading. He has commissioned a custom 6.5-284 based on a BAT action. Standard re-loading like I explained in my previous article will do but to extract the best possible performance from his new rifle he will have to Hand load.

I refer to it as Hand loading rather than re-loading because the shooter starts with brand new components of his choice and assembles the ammunition to his specifications, there is no purchase of factory ammo. My friend has many years of reloading experience, has loaded for Ackley improved cartridges although the case prep was carried out by another of our friends, he is aware of some of the techniques involved in producing precision hand loads.

I am going to write this article as if I were explaining to my buddy the ins and outs of hand loading for consistency and accuracy.

The key to this accuracy is consistency and one of the main factors for achieving this consistency is case preparation. What we are trying to do is to reduce all variables to an absolute minimum, we cannot completely eliminate all variables because there will be factors beyond our control, such as case batch to batch variation and variations in case hardness, brass quality etc.

We have to concentrate on reducing the variables that we can control.

What we are going to do is use techniques honed by Bench rest shooters, so to start with we need to buy the best possible quality brass on the market for our chosen calibre in this case it will be Lapua 6.5-284 cases. These are excellent cases, and intermediate hand loaders will be quite content to load these cases as are but if you want the best you will have to batch, weigh, trim, uniform, ream, size, turn and chamfer your cases before dropping any powder or seating any bullets.

Start with your batch of cases in front of you, weigh them and place them into columns according to their weight. You will soon see a pattern emerge of the extremes of weight on your left and right with a larger batch of same weight cases in front of you.

Take this batch of weighed cases as the basis for your "accuracy loads" and pack the others into bags marked with the weight for future loading.

At this stage it is usual to check the case neck thickness, although it is not absolutely necessary because some neck turning will take place later which will iron out any neck inconsistencies, although neck thickness will have to be measured at a later stage.

This is usual accomplished with a tube or ball micrometer but acceptable measurements can be obtained with a digital vernier and a few simple sums to establish neck thickness.



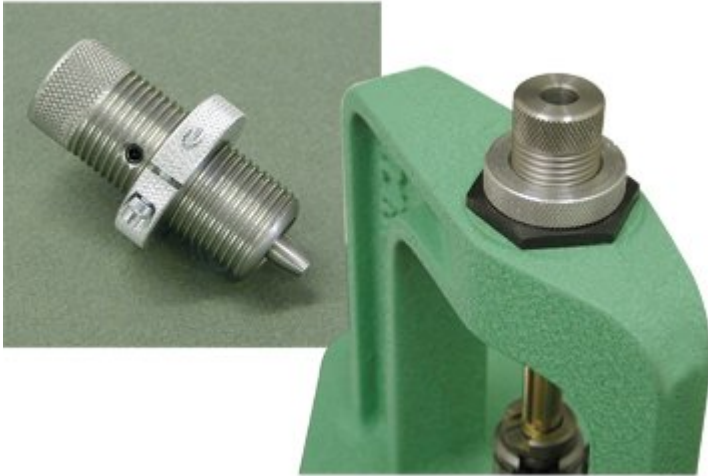
MITUTOYO BALL MICROMETER

Some shooters advocate the measuring of case capacity with water, IMO this should left until the case has been fired in the new chamber, although I think it is an extreme procedure and is not necessary at all.

This next step is to expand the necks for neck turning but the cases will be trimmed to length before turning as the tools I use locate off the case mouth, so uniform case length is most important.

I would like to mention at this point that the order of operations I am explaining is not "gospel" as to how it is done. Experienced hand loaders will all have their variations on these procedures and how they execute them.

Myself and many shooters like to use the case prep tools provided by K&M precision although similar tools are available from Sinclair and to a lesser extent RCBS.



NECK EXPANDER WITH MANDREL

From now on I will describe the operations using K&M's tools.

Take your expander on die and expand all of your case necks, having lightly lubed the mandrel or in my case I like to dip the case mouth in powdered graphite or some other dry lubricant.

Liquid lubricants require clean-up of the inside of the case neck to avoid clinging of individual powder kernels during charging.

After expanding you can either trim to length or uniform the primer pocket depth.

Primer pocket uniforming cuts all the pockets to the same depth enabling primers to be seated to the same level below the case head.

This ensures proper contact of the primer anvil against the back of the primer pocket for consistent ignition of the primer upon firing.



PRIMER POCKEY REAMER

Lets take it then that you have uniformed the primer pocket, you now need to trim the case to length.

Measure the length of all your cases and identify the shortest, set your trimmer to just clean up and square the mouth of the shortest case, trim all your cases to this setting.

In order to aid bullet seating and allow a smooth passage over the neck turning mandrel the case mouth must be de-burred inside and out.

As an added extra I also rotate the case mouth against some fine steel wool to remove any sharp edges left by the de-burring.

Personally I like to de-burr the inside of the case mouth with a 17 degree VLD cutter, this puts a much steeper chamfer inside the case mouth.

It allows smoother seating of VLD type bullets by reducing the possibility of the chamfer scoring the bullet.



VLD NECK DE-BURRING TOOL

After trimming it is time to de-burr the flash-hole, this is again accomplished with a tool by K&M. Lapua brass and cases of equal quality have their flash-holes drilled rather than punched so do not have a huge burr left by the punch, but there is still a small sharp edge which will benefit from being de-burred. This tool automatically locates and de-burrs to the correct depth by a fixed collar over the cutter.



FLASH HOLE DE-BURRING TOOL

Other tools locate on the case mouth and are adjustable for depth of cut. A point of note here, if you have PPC or BR cases the flash-hole is smaller than the standard .081" and is dimensioned out at .0625", so it is imperative that correct tool is selected. Also worth pointing out is that the flash-holes in Lapua 220 Russian (used to form PPC cases) and BR cases are drilled .058" to .063", it has been advised by some experts not to ream the hole to a constant size but I have reamed mine to .065". I believe that reaming all the holes to the same size cannot do any harm, and so far through shooting, I have found that to be the case.



.0625 FLASH HOLE REAMER

It is now time to neck turn the case, this is done for several reasons but mainly to accommodate the case neck into a custom cut chamber. Many accuracy minded shooters like to specify a tight or fitted chamber neck on a custom barrel to a set dimension. Cases will then have to be turned to give adequate clearance for the neck to expand upon firing to release the bullet. Not having enough clearance can be potentially dangerous due to a huge build up in pressure upon ignition. A consistent neck thickness is also needed to ensure equal neck tension on all cases with the use of bushing type dies, a small clean up cut usually accomplishes this.



NECK TURNING KIT

The factors governing how thick to turn the neck are the relationship between the bullet diameter, the chamber neck size and the amount of clearance required between the neck and the chamber wall..

For a standard minimum spec custom chamber .003" to .004" is desirable but for fitted necks .001" to .0015" clearance is usually asked for.

When you have your chosen bullet and chamber neck size, with a few simple calculations you can easily determine how much to turn off your necks to give you the correct clearance and finished round neck size.

If you are setting your neck turning tool for a simple clean up cut this can be done in one hit, but if you are turning to a given dimension it is advisable to turn the neck in several passes.

The depth of the cut is controlled by the shoulder on the neck turning mandrel and the trim length of the case, this mandrel is adjustable within the body of the neck turning tool and should be set so that the radius of the cutter just contacts the radius at the juncture of the case neck and the case shoulder.

Cutting this depth short can result in a condition where the inside of the neck/shoulder juncture becomes swaged down upon sizing resulting in an internal ring called a "do-nut".

This swaging will then have to be removed with a special do-nut cutting tool otherwise bullet seating will become ineffective as the bullet will only be gripped by the tighter internal ring.

After neck turning sharp edges should be removed again.

You will now have a set of meticulously prepared cases ready for loading with your chosen bullet/powder/primer combo which I will be explaining in the next part.

From the above description you can see that there is quite a lot of equipment needed for the preparation of cases to bench rest standards, this together with the correct aptitude will result in precisely crafted cases where all the of the variables that we can control have been removed,

Mated together with quality bullets and other components, ultimate accuracy is all but guaranteed.

In Pt2 I will be looking at die selection and use, priming tools, accurate powder dispensing, bullet seating and COAL neck tension, bullet selection and other techniques of interest to the advanced hand loader.

Ian.