

Benchrest Reloading Techniques

By James A. Boatright

The following procedures are recommended for preparing and reloading precision ammunition for use in benchrest competition. I am not including any steps uniquely related to the use of moly-plated bullets, nor am I going into “group therapy” or load adjustments for specific range conditions. Mostly, I am explaining how to prepare and reload the brass cases. Forming 6mm PPC cases from *Lapua* 220 Russian cases is specifically the task in mind.

- A. Sort your new *Lapua*-made cases by weight (to 0.1 grain), segregating out any unusually light or heavy cases. This step is not really necessary but is too easily done to justify skipping it.
- B. Trim all cases to *longest safe* “trim to” length. Cases must all be of equal length for firing into the same group, but “nasty gap” from end of case neck to end of neck reamer cut should not exceed 10 mils. A least 5 mils of gap is required as a margin of safety.
- C. Expand case neck ID’s to **0.8%** larger than neck-turning mandrel OD. This allows for proper lubricated clearance after “spring-back” of neck ID’s. If you expand your 6mm cases to 0.244-inch and use a mandrel of 0.242-inch diameter, this difference of **2 mils** would be correct.
- D. Select the desired neck wall thickness:
 1. Subtract your *bullet OD* from your chamber *neck ID*.
 2. Subtract desired diametral clearance (between 0.5 mils and 1.5 mils).
 3. Divide the remainder in half.
- E. Turn all case necks to a thickness approximately 1.0 mil thicker than this desired thickness (coarse neck turning). Lubricate the mandrel with case sizing lube.
- F. Carefully use your good neck-turning tool, with its carbide end-cutting mandrel (that cleanly removes the “dreaded dough-nut”), to “finish-turn” your case neck OD’s to final thickness, moving very slowly. Cut “into the case shoulder” by a slight amount with the 45-degree beveled leading edge of the neck turning blade. Finish by *lightly* rubbing 0000 steel wool over case neck OD, just barely long enough to knock down the high spots left by the turning.
- G. Chamfer inside and outside of case mouths by hand:
 1. *Lightly* chamfer neck OD with standard 60-degree chamfer tool.
 2. Use a 4-degree per side ID reamer.
 3. Set depth stop for 20-25 mils width of ID reamer cut.
 4. Guide hand-turned ID reamer via central rod through flash hole or using a tapered tape-wrap below neck ID over reamer blades.
- H. Ream the flash hole to uniform the ID, to remove any remaining punch-flashing, and to install a very slight 60-degree “nozzle” in opening into powder chamber.
- I. Uniform the primer pockets to *minimum* depth (between 0.118 and 0.122-inch for small rifle primers) at which they all clean up using an (only) end-cutting tool. Be sure you remove any fillet in the bottom inside corner of primer pocket with uniformer for improved “feel” in primer seating.

- J. Fire-form the cases:
1. Size the case (neck-size only or F/L-size) using bushing-type neck sizing.
 2. Insert the primers using a consistent added seating pressure after bottoming.
 3. Meter powder by volume and dump powder charges directly into cases.
 4. Insert bullet and seat to about half the desired depth using concentric seating die. [The final seating on chambering the round will *jam* the bullet into the rifling by a consistent amount, while minimizing “cold welding” problem.]
 5. Check loaded-round neck OD’s over seated bullets. [Not to exceed chamber neck ID.]
 6. Fire a five-shot group as in competition, using wind flags and sighter target.
 7. Clean the bore of rifle barrel until all carbon and copper fouling are removed.
 8. De-cap cases over waste container. Keep grit from fired primers out of chamber and dies.
 9. Re-uniform primer pockets with same tool for cleaning and “re-deepening.”
 10. Clean inside of case necks with brass brush, clean and polish cases, and check that flash holes are clear.
- K. Re-load the cleaned, fire-formed cases:
1. Check case lengths again. Re-trim and chamfer again if necessary.
 2. Run the cases through the final neck-turner with its end-cutting mandrel again.
 3. Re-size the cases again with careful attention to headspace. Ideally, the headspace should be increased by 0.5 mils during each re-sizing.
 4. Neck-sizing bushing should be labeled about 2 or 3 mils smaller than loaded round neck OD’s. Leave about 50 mils of neck length unsized for case centering on next firing.
 5. Install primers and powder and seat bullets carefully as before. Pay special attention to the “feel” of seating the primers and bullets. If anything feels unusual in any way, set that round aside for use as a fouling shot.