Is there such a thing as too much precision while doing your hand loads for the average shooter?

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-Greg Piet (Sin City Precision member)

The Story:

One of the best things since I became one of the crew here at Sin City Precision is getting together and shooting the breeze with the other folks about all things precision shooting. We have not always seen eye to eye on the best way to attack a course of fire, what reticle is the best, who makes the best glass bar-none, the best bullet, and one item where no one seems to agree on is best reloading practices.

Yes that's right, the black art of reloading. Being an experimental physicist turned GoodWillHunting there is still a part of me where I need scientific evidence on why something is so much better than something else. With everyone having their own method, order of operation, magic case prep

sizing lube, etc… there is hardly ever a time when you can directly compare between two reloaders and make quantitative comparisons.

I acquired an RCBS charge master and comparing the RCBS to my previous method of dropping a load, and trickling powder charge by hand on a $30 EBAY no name jewelers scale this thing was amazing as far as I was concerned. It was so much easier and I could get things done so much quicker. I thought I was all that and a bag of chips and there was no way I would ever need anything better.

So lets set the way back machine to a time while hanging out with some of the crew doing Cerakote work on some rigs. While waiting for the paint to dry and enjoying some adult beverages the discussion about the "Prometheus killer" came up. This "Prometheus killer" is actually the auto trickler marketed at http://www.autotrickler.com/. Now I am all for the best whizz bang widget to get the job done, but with all the variance possible in the brass itself between annealing, neck tension, wall thickness, trim length, concentricity, primer pocket fitment, bullet jump, as well as variance between primers and variance between kernels of powder **I was not convinced that measuring powder charge down to the kernel was going to be a measurable variance or even remotely necessary to have some great hand loads.**

A month or so later, someone in the club acquired one of these "Prometheus killers" and I wound up doing a little troubleshooting to get the thing working properly with his quite impressive lab grade scale(an A&D FX-120i). Looking at the scale it reminded me of the quality equipment I used to use for research. I just thought to myself "Self… this is complete overkill for slinging some lead down range when there are so many other external factors." With that said the science guy started working in my wee brain and I was determined to do a test to see if having all that precision in dropping a powder charge in a bunch of different tubes of brass with each using a piece of copper and lead to cork it off was really

necessary or was this super precise charge weight just some placebo making people think their hand loads were amazing thereby making them have the confidence to shoot better.

The Prep:

I decided to start my standard routine on once fired brass and load up some rounds with my RCBS, and then load some up with this fancy "Prometheus killer." If I were to completely eliminate every other variable that would require a very controlled set of conditions and in order to satisfy my standards to eliminate every other factor I would need to take measurements well beyond what an "average reloader" would do.

I am in no way saying this method is better or worse than any other method. Looking at the data below I would say quite the opposite as for this experiment my Standard Deviation values were garbage even by my standards. This is just for information as to what I did so you can use this to judge against your process. I haven't won a National level match, and I am not employed by a major ammo manufacturer so what do I really know?

Here is the brass/load prep for this test.

1) Decap once fired Hornady 6.5 Creedmoor brass
2) Sonic clean brass
3) Dry tumble with Lyman media (red)
4) Using air compressor to blow out all cases and ensure pockets are all clean/clear
5) Trim brass to minimum length chamfer and deburr (Frankford Arsenal)
6) Anneal brass (Annealeez machine). Junk Hornady 6.5 CM brass used to calibrate heat with Tempilaq 750DegF inside neck
7) Brass rests for at minimum 6 hours.
8) Using Hornady Unique case lube full length resize all brass using: a. Hornady Match FL resizing die b. 0.289 Redding TiN bushing for the neck

c. Shoulder bump restoring it back to factory brass dimensions (which in this case is about a 0.004” bump)
9) Tumble brass in plain walnut media cleaning all lube
10) Using air compressor blow out all cases and ensure pockets are all clean/clear
11) Verify that case trim has held true
12) Prime using RCBS hand priming tool (CCI BR-2)
13) Powder charge (IMR 4451 with goal weight of 42.4gr)
14) Bullet seating (Hornady 140gr ELD-Match) COAL=2.805 and OGIVE=2.189
Now the shoulder bump this time compared to other reloads is a bit excessive. I did this for the express purpose to have near the same dimensions as my control ammo (140gr factory Hornady AMAX match)

The Test:

10 rounds of factory Hornady AMAX ammo.
10 rounds loaded with the RCBS chargemaster where the weight has to have read 42.4gr
10 rounds loaded with the “Prometheus killer” where the weight has to have read 42.40gr to 42.42gr.
Using a LabRadar and a MagnetoSpeed chronograph measure the speeds of the rounds, record the SD, ES, individual speeds and all the other fun statistics I think I need. The test Rig is a Remington 700 action with a DMR LLC cut Bartlein #13 barrel 26”, a TBAC 30-P1 suppressor, Timney 510 trigger just under 2lbs, and until my other scope is in stock (c’mon Vortex where is that AMG) a Vortex Razor Gen2. On this particular rig I have not measured a definitive variance of precision with the MagnetoSpeed attached, however a future article will discuss any changes in groupings (both POI and group size) with and without the Magnetospeed.

Results(LabRadar/Magnetospeed):

Lets start off with some flaws in the tests, and anomalies discovered. The once fired brass was from some load development where I was making up a very fast load and some of the brass was overworked(yes I was doing tests well beyond the "safe and sane" point). Because of this there were some loose primer pockets in that brass. I have selectively omitted those rounds as the loose primer pockets masked any effect the precision of the scale would indicate. I have logged the pertinent values with the overall LabRadar values as well as the values for each string of fire.

AICS 6.5 Creedmoor Razor G2 TBAC 30P-1 Bartlein 26" Timney 510 Rem700action							
AMAX			RCBS			LabScale	
LabRadar	Magneto		LabRadar	Magneto		LabRadar	Magneto
2889							
2891			2855	2858		2880	2884
2841	2841		2865	2872		2873	2874
2853	2855		2883	2889		2860	2865
2930	2932		2861	2865		2876	2880
2855	2861					2883	
2874	2875		2892			2856	
2870			2859			2890	
2886			2893			2857	
2870			2879				
2884							
2889							

Shown are the data points that remained after omitting the loose primers discovered upon post shoot inspection. The loose primers result in low speed issues and would essentially mask any data usable for scale variance benefits.

In this particular series of tests eight of ten shots under the LabRadar were being considered (one shot was lost due to a battery issue where I never got a value), and four of five shots were being considered with the MagnetoSpeed for each loading method.

AMAX LabRadar	AMAX Magneto		RCBS LabRadar	RCBS Magneto		LabScale LabRadar	LabScale Magneto
SD	SD		SD	SD		SD	SD
23.122	35.273		15.231	13.292		12.822	8.261
AVG	AVG		AVG	AVG		AVG	AVG
2878	2873		2873	2871		2872	2876
ES	ES		ES	ES		ES	ES
89	91		38	31		34	19
SD STR1	AVGSTR1		SD STR1	AVGSTR1		SD STR1	AVGSTR1
35.25	2871		12.06	2866		8.66	2872
SD STR2	AVGSTR2		SD STR2	AVGSTR2		SD STR2	AVGS2
9.12	2880		15.84	2881		17.56	2872
ES STR1	89		ES STR1	28		ES STR1	20
ES STR2	19		ES STR2	34		ES STR2	34

LabRadar Data labeled STR1 was taken on the same shots as the MagnetoSpeed. Generic LabRadar results combine both strings of data and a couple sight in rounds with the factory AMAX shots.

As can be seen by the results no one load stood out as having a lower standard deviation over the other. The LabRadar data labeled “STR1” were the shots taken when both the MagnetoSpeed and the LabRadar were taking data on the same shots so those pieces of data may be used for direct comparison between the two devices.

Comparing the overall results with all valuable rounds it shows the LabScale method results in an improved standard deviation of about 2.5fps. As one can see in this limited test individual strings go back and forth as to which powder charging method provides a better result.

Conclusion:

If I had to assess the value of a $1000 plus powder measuring setup, time saved would be a larger factor than any improved extreme spread in speed. The RCBS is quite a bit slower than just dumping a charge and letting the auto trickler finish the job if you can get the timing right. I never got the timing down to make it faster and I only run one ChargeMaster so my consistency is better than those running two RCBS ChargeMasters. Based on my findings the RCBS produces adequate rounds for this particular shooter, and with my limited usage of the auto trickler I would much rather

use my RCBS due to the simplicity. Depending on a rhythm you get in with reloading the time savings may or may not be worth it to get your ammo loaded up faster. I believe brass prep plays a much larger role than a kernel of powder, but brass prep will have to be addressed at a later date in a different series of articles and I will have to wear full body armor when discussing the ideal brass prep methods.

It looks like there is a trend showing benefit to using the LabScale method of powder charge with both pieces of measuring equipment. After the omissions the RCBS loads resulted in a SD of 15.231/13.292 on the equipment and 12.822/8.261 with the LabScale. These values are quite typical for my hand loads in the past so going by previous data it trends properly and suggests that the “bad data” from primer pocket issues was warranted. This trend suggests the LabScale method reduced the standard deviation by about 2.5 fps. In addition the extreme spread was only reduced by 4fps when considering all the remaining data points (meaning using the LabRadar data). The MagnetoSpeed data makes the LabScale method even better however it only has half the sample size. As a way to emphasize how small of a factor this powder charge difference is look at the NON MagnetoSpeed data (STR2) for both the RCBS and the LabScale and you can see the SD favors the RCBS and the ES is the same.
So if I can trust the reasoning for removal of a few data points, the LabScale does help ever so slightly in making a more accurate round. Only an individual hand loader can determine if they are detail oriented enough in all their other methodology to make the very careful powder charging method down to the kernel beneficial. Personally, if I can let loose primers get through and skew the data here, I obviously am not skilled enough on a regular basis to warrant such a precise method for charge weight as the LabScale method.

For my purists out there I feel obligated to provide the raw data and pictures of the targets so one can see what was omitted. If you are compelled to run the numbers you will see those “outlyers” really opened up the variances and easily masks any benefits that can be seen above.

AICS 6.5 Creedmoor Razor G2 TBAC 30P-1 Bartlein 26" Timney 510 Rem700action

AMAX		RCBS		LabScale		42.4 OLD LOAD FOR ZERO AND AMAX
LabRadar	Magneto	LabRadar	Magneto	LabRadar	Magneto	LabRadar
2889			2823	2814	2819	2942
2891		2855	2858	2880	2884	2904
2841	2841	2865	2872	2873	2874	2840
2853	2855	2883	2889	2860	2865	2926
2930	2932	2861	2865	2876	2880	2914
2855	2861	2849		2883		2848
2874	2875	2892		2856		2877
2870		2859		2890		2951
2886		2893		2857		2919
2870		2879				2876
2884						
2889						

Raw data. Note missing values on Labradar where there is data on Magnetospeed causing variances in statistical calculations.

Just the raw targets punching holes in paper. I have video and commentary denoting oddities, like the upper left target getting a pile of can mirage after two shots.