Does a MagnetoSpeed Significantly Affect the Precision of a Rifle?

-Greg Piet (Sin City Precision member)

As I have mentioned before I enjoy shooting the breeze about shooting especially while enjoying a few adult beverages. One reason why I enjoy talking about these things is that I really enjoy the activity. I am not referring to just the “trigger pulling” portion as I get great satisfaction in the aspects leading up to being able to pull the trigger and also the analysis done after the last trigger press has happened. Normally during these conversations something comes up where there is a difference of opinion. Being who I am there is a strong desire to have some type of quantitative evidence, or as some like to call it “hard data” to support a claim. In short, a subjective opinion with no data at all (c’mon gimme something tangible) makes me want to go hide in a cave in the fetal position and wait for humanity to fall apart. One of the discussion topics that has come up a few times is how a MagnetoSpeed affects the results and effectiveness when attempting to do load development. It has also been described that the MagnetoSpeed induces “flyers” when checking for precision of a load.

In a recent test I was checking on precision of charge weight and measurable performance advantage. During that charge weight test I was

able to do some checks on performance with and without the MagnetoSpeed hooked up in the same session. In the effort of full disclosure in the past article I did have some rounds that exhibited loose primer pockets. Due to the nature of the tests and how shots were logged (namely I did not map individual shots in order) so I just have to take the data I have and go from there. All I can say is that the shots that were omitted due to primer pockets did not show any blatent “flyers” on those shot strings.

Pretty much anyone who has shot a suppressor will attest that the suppressor does in fact alter the point of impact on a rifle. Certainly in theory there is some contribution to a change of the Point of Impact (POI) by the bayonet of a Magnetospeed simply due to the added weight, but how much does it really play a role? Does this light weight device result in a noticeable change in the Point of Impact (POI) by an average skill shooter? The other item is group size. Is it possible to do load testing while having the bayonet on to test speed as well as group size? Ideally I would burn through the ladder of charge weights with and without the chrono but even I didn’t want to blow through that much of the barrel. I am not even going to try to get into the idea of barrel harmonics and using speed values alone without even looking at the target to attempt to pick the best load for a barrel (That is a neat idea for another article and might be a good use for a spare 308 barrel I have sitting around now that I am typing this).

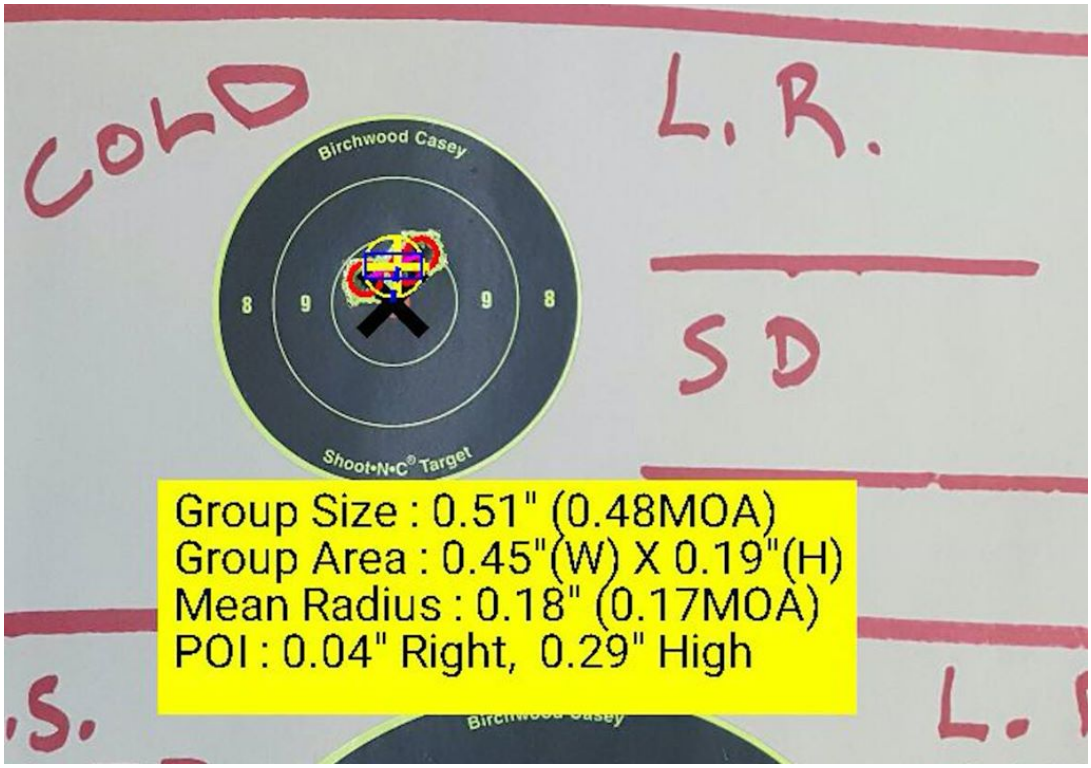
How this was done:

For each particular load, 5 rounds fired with the MagnetoSpeed attached, and data being taken with using both the MagnetoSpeed and the LabRadar. Allow for a cooldown after each 5 round string. The same test will be done without the MagnetoSpeed attached and data will still be recorded using the LabRadar.

The test rig is a Remington 700 sitting on an AICS, a Bartlein #13 barrel 26” chambered in 6.5 Creedmoor with a ThunderBeast 30P-1 can, a

Timney 510 trigger, and until my other scope is in stock (c'mon Vortex where is my AMG) a Vortex Razor Gen2.
The loads were a factory Hornady AMAX match 140gr ammo, and then once fired brass all prepped at the same time with 42.4gr of IMR4451 and corking them with the 140gr ELD-M bullet. For the IMR4451 loads the difference between the two was that one was charged with just an RCBS scale and Chargemaster while the other was charged using a very fancy Lab scale and an automated charging system capable of metering down to the kernel of powder.

POI Shift:



Yep it's there! I changed my elevation to 0.5MIL up so I didn't shoot out my center dot, so lets look at this comparative, and not using the dot as the intended POI, but rather the calculated value from actual zero and the dialup of 0.5MIL being considered. The end result would be an expected POI of 2.09 inches up from the dot.

What I saw after dialing up 0.5MIL Using this as a reference of where impacts should be.

With the MagnetoSpeed attached it shot 0.79 inches lower than it should ideally at 100 yards on average, and about 0.42 inches right. On average with the LabRadar measuring alone my average impact was within 0.06 inches of the expected location for height and width(not too bad for a regular guy).

Theoretical + Zero vertical of 0.5MIL				Theoretical Horizontal Zero after Dialup			
2.09	in			0.49			
Average Vertical With Magneto				Average Horizontal With Magneto			
1.3	in	DEVIATION	-0.79	0.075	in	DEVIATION	0.415
Average Vertical NO Magneto				Average Horizontal NO Magneto			
2.0325	in	DEVIATION	-0.0575	0.43	in	DEVIATION	0.06

Measured average values of POI. The deviation is the difference between measured average and the ideal value determined from dial and zero data.

Group sizes:

Lets look at the data. Since people like pictures I will have a picture of the impacts available but it is quite a bit more succinct in the table below. Looking at the mean radius and to a lesser extent the group size(which really only uses the two worst data points) between the same load, it is pretty safe to say any changes in precision is due to other factors than when the bayonet is attached. During a ladder test of another rifle I ran groups with and without the Magnetospeed and in a less than quantitative method (translation: I shot it both ways, looked at the holes, and eyeballed a conclusion) I determined there was not a noticeable change in precision if the bayonet is attached. Looking at the data below the mean radius does not trend by opening up groups at all. Quite the opposite as a matter of fact because in two of three different “loads” the groupings were tighter with the bayonet attached. Also of note for group size the MagnetoSpeed won three for three for being “more precise.”

AMAX			RCBS			LabScale			AMAX	
LabRadar	Magneto		LabRadar	Magneto		LabRadar	Magneto		ZERO	INITIAL 0.5up
Mean Rad	Mean Rad		Mean Rad	Mean Rad		Mean Rad	Mean Rad		Mean Rad	Mean Rad
0.35	0.24	MOA	0.33	0.4	MOA	0.33	0.25	MOA	0.17	0.28
Group Sz	Group Sz		Group Sz	Group Sz		Group Sz	Group Sz		Group Sz	Group Sz
0.92	0.58	MOA	1.02	0.93	MOA	1.06	0.71	MOA	0.48	0.83
POI Shift UP	POI Shift UP		POI Shift UP	POI Shift UP		POI Shift UP	POI Shift UP		POI Shift UP	POI Shift UP
2.37	1.4	in	1.84	1.18	in	1.96	1.32	in	0.29	1.96
POI Side	POI Side		POI Side	POI Side		POI Side	POI Side		POI Side	POI Side
0.36	-0.03	in	-0.49	-0.11	in	-0.44	0.16	in	0.04	-0.49

Dispersion from intended target using Android RangeBuddy app for measured deviations. I wish mean radius was used more frequently by people as it accounts for all your shots and not just the two outlyers.

If you looked at the literal “big picture” of the target results you might have identified a trend and think I am ignoring the elephant in the room. That trend would be the apparent induced vertical spread associated with having a MagnetoSpeed attached to the rifle. In theory it makes sense, the bayonet is only a moderately sturdy plank on the “deck” of the bullets path as it is exiting the barrel. Since it is only on one side it could cause fluctuations in vertical. Lets look at those numbers and see what the measurements suggest.

AMAX			RCBS			LabScale		
LabRadar	Magneto		LabRadar	Magneto		LabRadar	Magneto	
Var Vertical	Var Vertical		Var Vertical	Var Vertical		Var Vertical	Var Vertical	
0.28	0.55	in	0.26	0.89	in	0.45	0.44	in
Var Horiz	Var Horiz		Var Horiz	Var Horiz		Var Horiz	Var Horiz	
0.92	0.5	in	1.05	0.48	in	1.1	0.67	in

Measured variances in the Horizontal and Vertical directions for each string.

The table above is just the dispersion in the vertical and horizontal directions for the different targets. Before we look at the data I must confess I did take video of all these tests and used that to make verbal notes while I did the tests. These notes were things like if I pulled a shot, I read off the speed values in case of data loss, commented on equipment performance, and I discussed external factors like excessive mirage from the suppressor. Specifically the RCBS with MagnetoSpeed test there were two good shots and then three shots with excessive mirage. Without measuring it is pretty apparent on that target there are two different "groups" and those groups correlate to the observation of induced mirage. In addition for the LabScale test without the MagnetoSpeed I was having to get up off the gun almost every shot due to issues with the LabRadar and that had some influence on getting back on the gun the same every time. With that comes into play the ethics of data analysis and what is acceptable to throw away. For the table above that is just the raw variances counting every hole and seeing where the results fall and not ignoring anything. Using the table above there is a strong suggestion that the vertical variance increases or at best remains the same (in the case of the LabScale loads) when the MagnetoSpeed is attached. My ego really likes having a quarter inch variance at 100 yards especially when my Standard Deviation values were in the 20+ fps range, but that isn't entirely fair. Looking at the Horizontal variance the MagnetoSpeed appears to have cut the width of my groups in half. So with the data present and considering the mean radius values are extremely close, the MagnetoSpeed is affecting the precision of the rounds, however in the most general sense the contributions seem to average out when looking at overall group size.

On a whim I looked a bit closer at the one target where I noted a distinct change in mirage after two shots and decided to just look at the last three shots. The analysis target is below and as you can see for just having three shots the MagnetoSpeed seemed to group rather well in that instance. The horizontal variance was almost identical but the vertical was extremely tight. But this comes down to data ethics, and although I can explain why there are two distinct groupings on the target an ethical experimentalist will run the test again to validate the findings. With knowledge that mirage was witnessed after two shots the question must be asked whether the other vertical dispersions were due to mirage like this one and the shooter (remember the trigger jockey is just average at best here) just didn't realize it. If in fact the vertical dispersions were due entirely to not having a mirage cover on the front of the can and mirage was causing the optical shift, the data still shows an improvement in horizontal deflection with the MagnetoSpeed bayonet attached.

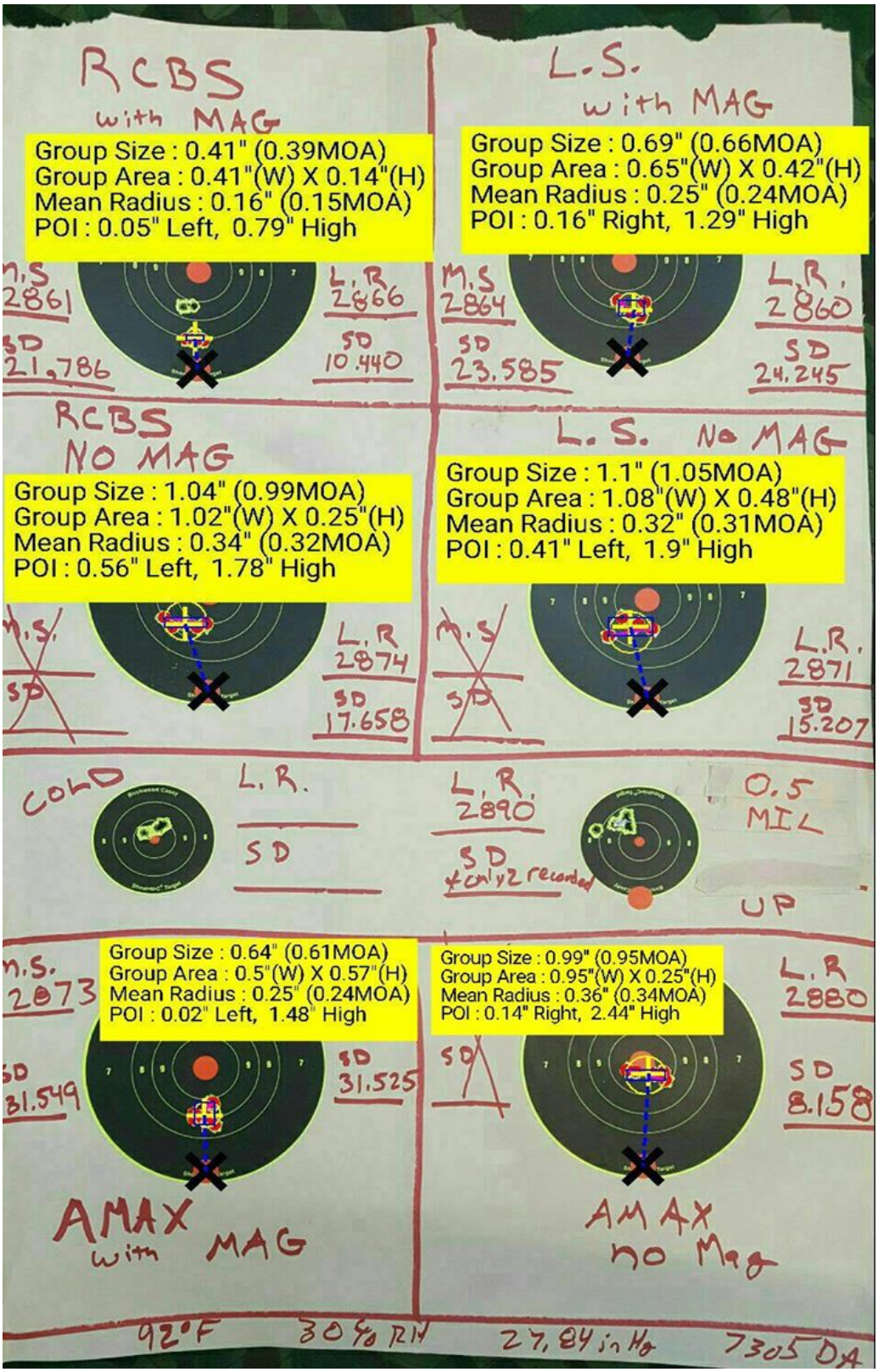
The video logs reminded me that I had these two distinct groups and I witnessed a dramatic increase in mirage between shots 2 and 3. Looking at only the last three shots that is a decent little grouping for having a bayonet attached.

Final Ramblings:

Ok, so why would one be more desired than the other? Well with people stating that the MagnetoSpeed throws off all barrel harmonics and makes load development impossible it would remove the ability to determine a sweet spot for precision and know speed at the same time. A LabRadar lets you zero/determine harmonic node/determine load speed all at once, and for a data junkie like me that makes it all worthwhile. So looking at the targets with and without the MagnetoSpeed you can see the groupings mean radius varied on average by a tenth of a minute difference.

Why any of this might matter would be entirely due to what locations you have at your disposal. Most don't have the time to go out to a remote area to pound off test loads and such, so typically people are relegated to a range with lots of people around me. Due to all those other shooters, I simply cannot use the LabRadar because it would get triggered by the other shooters and I would get so many false starts I would be going mental trying to determine which reads were mine and I would always be getting off the gun to press the reset button.

So there you have it, some hard data supporting the idea that the MagnetoSpeed can be used when determining best group size(at least for an average shooter), and also supporting the idea that you cannot zero a rifle while the bayonet is attached. Honestly I would have felt better writing this had my groups been a bit smaller and the SD's on the loads were tighter but looking at the external conditions I think a lot of the opening up of the groups was due to shooter more than anything. Stay tuned for part three of this series which will discuss the journey using different chronographs, what is good, what is bad, and what is ugly about them.



The entire target with holes. I re-did the analysis for effect in the article so the numbers are off a hair as this is all done on a cellphone and I have fat fingers. **original analysis targets on file**