

6.5 Creedmoor Brass Comparative Assessments

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Every year, we see new cartridges come to market that build upon the success of older more established ones. Most of the time they're slight modifications in overall length, width, neck length and shoulder angle to improve feeding, burn rate consistencies, barrel life, and accuracy. The 6.5 Creedmoor has been designed to balance these variables and optimize accuracy.

The 6.5 Creedmoor was born out of need, the need for a better Match Rifle cartridge. How much better? Below is the list that was provided by Dennis DeMille (National Rifle Champion at the 2006 National Matches) to Dave Emary the Chief Ballistician for Hornady:

- Superior ballistics. It needed to be as good as any safe hand loads being used in conventional high power competitions
- Pricing comparable to match grade .308
- Much lower recoil than a .308
- Standard .308 magazine length
- Not a barrel burner
- Loaded version and components readily available should you take this to a large market
- Recipe written on every box – avoid using proprietary powder

The 6.5mm Creedmoor was introduced by Hornady in 2007 as a modification of the .30 TC which was based on the 300 Savage. It was designed specifically for rifle competition, although it is also achieving success in hunting. Bullet for bullet, it achieves a slower muzzle velocity than longer cartridges such as the 6.5-284 Norma or magnums such as the 6.5mm Remington Magnum. However, due to its 2.825 inch overall length, the advantage of the 6.5mm Creedmoor is that it's capable of being chambered in short-action bolt rifles and AR-10 platform rifles.

6.5mm (.264") bullets, in general, are known for their relatively high sectional density and ballistic coefficients and have seen success in rifle competition. For some loads, the 6.5mm Creedmoor is capable of duplicating the muzzle velocity or trajectory of the .300 Winchester Magnum while generating significantly lower recoil, based on lighter projectile weight. As this cartridge is designed for a bolt face diameter of .473 inches (roughly 12 mm), conversion of a short action rifle from another caliber (such as the .22-250 Remington, .243 Winchester, 308 or .300 Savage) with similar bolt face diameter generally requires little more than a simple barrel change.

Background

Let me begin by stating that this is not a total industry comprehensive comparison of all brands. We have attempted to obtain samples from the most well-established brands. For one reason or another a few choose not to or were unable to participate. I will allow the reader to draw your own conclusions, but most had to do with availability of product for evaluation or sale. But, to ensure value to our students and readers, I have obtained product from 2 well-known brands and one OEM who was kind enough to provide sample units for us to include in this comparison.

Participants

Nosler Custom Brass is popular with the tactical and match crowd due to their high degree of consistency in manufacturing.

Here are the advertised benefits provided by Nosler for their brass:

- Fully prepped, ready to load
- Case mouths are chamfered and deburred
- Nosler Brass is hand-inspected and weight-sorted
- Flash holes are deburred and checked for proper alignment
- Each piece of brass is full length sized and trimmed to proper length

Kinetic Industries is our OEM supplier. Their Corporate Offices are located at 7887 Fuller Road #104, Eden Prairie MN 55344. They offer both Match Brass and Loaded Ammo. Designed to compete with the well-established brass makers, we will see how they stack up.

Here are the specs advertised by Kinetic for their 6.5 Creedmoor:

- Primer Pocket Diameter: .208-.209
- Head Diameter: .469-.472
- Head Thickness: .049-.053
- Length to Shoulder: 1.541-1.544
- Overall Length: 1.910-1.917
- Case Neck Concentricity: .001-.002

Hornady

As a co-developer of the 6.5 Creedmoor cartridge, Hornady has a bit of an inside track when it comes to making this product. Created for competition and attempting to squeeze the most out of a short action, low recoil rifle, this caliber has been growing in popularity by the gun writers and the precision shooting crowd alike.

Here are the features and benefits as advertised by Hornady:

- Tight Wall Concentricity
 - Concentricity helps to ensure proper bullet seating in both the case and the chamber of your firearm. Higher concentricity also aids in a uniform release of the bullet on firing, for optimal velocity and accuracy.
- Uniform Case Wall Thickness
 - Benchrest shooters have long known that uniform case wall thickness is vital to accuracy. We manufacture to extremely tight tolerances to ensure this critical element is as consistent as possible.
- More Reloads per Case
 - We treat Hornady brass as the foundation for an accurate cartridge, not a commodity. Because we take greater care in its creation you'll get more reloads from Hornady brass.
- Consistent Weight and Capacity
 - Every single Hornady case, regardless of the lot in which it was produced, is virtually identical to other Hornady cases in the same caliber. For you, this means consistent pressures, velocity and accuracy — every time.

Process and tools use for the comparative assessment.

Nosler and Hornady were taken from NEW Sealed packages of 50 (identical to those found in stores). Kinetic, was taken from 5 bags of 10 count samples as provided.

Weight Test

Each sample of 50 cases were numbered and precisely weighed on a Sartorius digital scale calibrated to .01 of a grain. All results were entered in a spreadsheet. Cases were sorted by weight rounding to .1 grain increments (low to high). All cases with the same weight were grouped together. Finally, a chart was produced to show the consistency by weight and range. Also included was the Median and Standard Deviation to show the degree of consistency.

Head Space – Length – Neck Thickness

Next, each brand was measured for Head Space, overall case length, average case neck thickness (thin side and thick side). The results of these are provided in our findings. I have included both the range of measurement and differences found from low to high and the Median and Standard Deviation.

Case Neck Runout

Utilizing task-specific tools, all cases were measured for case neck concentricity/runout. Charts for Median and Standard Deviation are provided.

Flash Hole Uniformity – Primer Pocket Depth

Both were checked and found to be within specifications. Individual measurements were not recorded.

Internal Case Capacity

A sample case was taken from each brand, a fired primer was installed and each was weighed to .01 Grains. Next, the case was filled to the top of the neck with water maintaining a common meniscus. Again the case was weighed to .01 grains. Subtracting the filled case from the empty case provided our Case Capacity number.

Results from the 4 key tests are below. The three were compared and rated from most consistent to least as follows.

Gold Star – Silver Star – Bronze Star

In the conclusion summary, we will provide an overall comparison and recommendation.

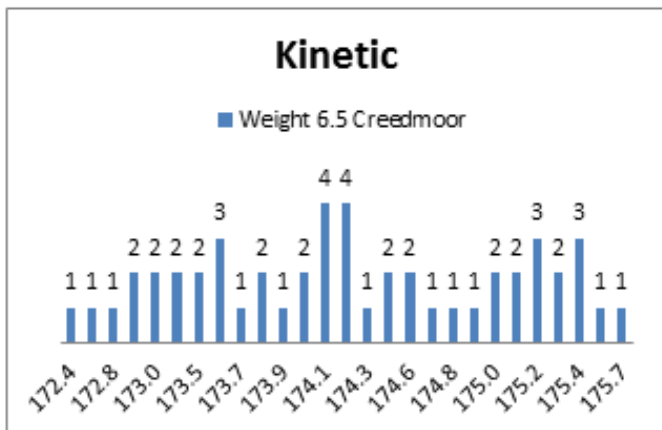
6.5 Creedmoor Weight Comparative Assessment

Case Weight - Why is consistent case weight important?

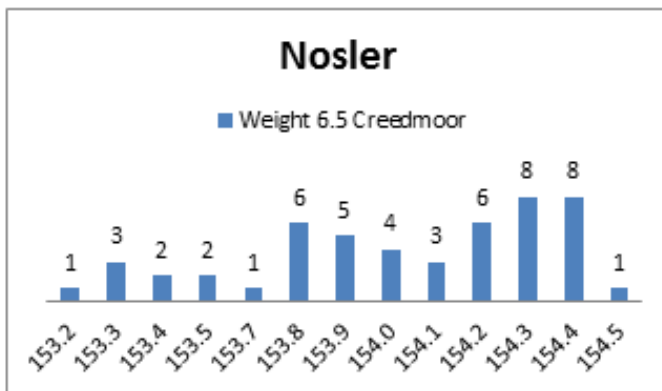
Consider the following.

Thicker brass has a smaller inside case capacity. Therefore the heavier case upon firing would have a higher chamber pressure, resulting in the bullet exiting the barrel at a higher velocity. Velocity variations due to case thickness/capacity will show up as vertical stringing on your target.

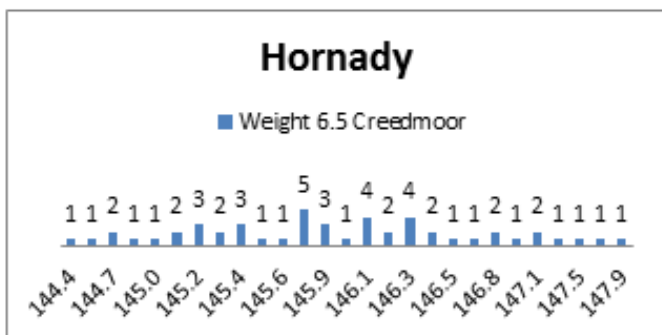
The lower the Standard Deviation the more consistent the weight of the brass will be.



Weight	
Median	174.230
Std. Dev	0.8619



Weight	
Median	154.080
Std. Dev	0.3529



Weight	
Median	145.930
Std. Dev	0.8186

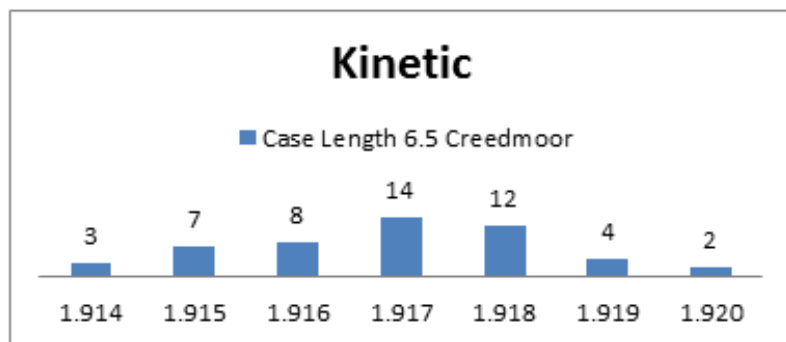


6.5 Creedmoor Case Length Comparative Assessment

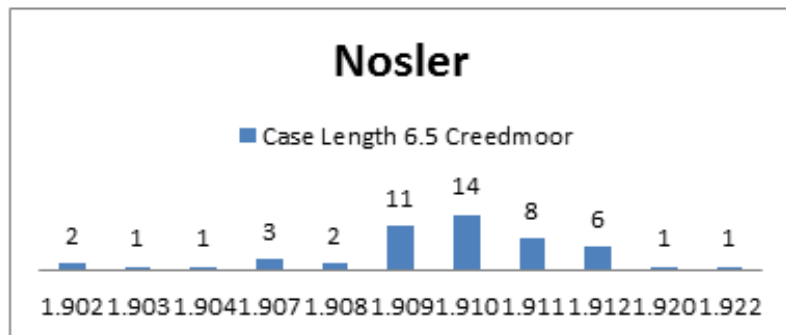
Case Length - Why is consistent case length important?

Brass of varying overall case lengths contribute to increased group size and higher velocity spreads. Longer case necks increase the amount neck tension or hold on the bullet. This measurement presumes consistent headspace and only focuses on base to case mouth length. Also, cases that exceed maximum SAAMI case length need to be trimmed to ensure safe function.

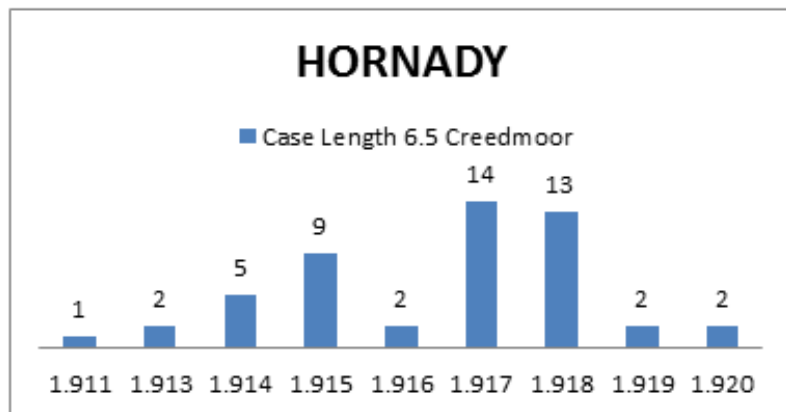
The lower the "Standard Deviation" the more consistent the case length will be.



	Length
Median	1.917
Std. Dev	0.0015



	Length
Median	1.910
Std. Dev	0.0033



	Length
Median	1.917
Std. Dev	0.0019

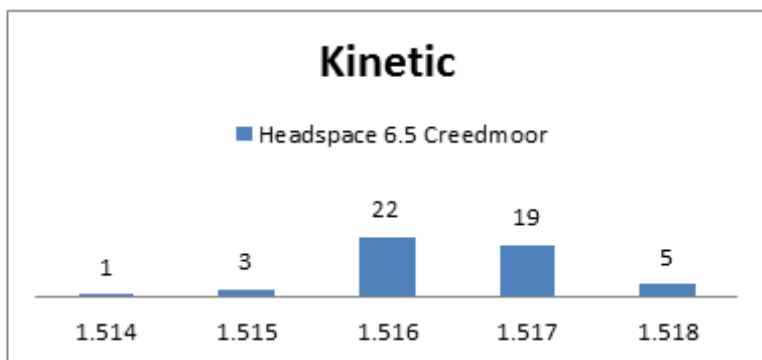


6.5 Creedmoor Headspace Comparative Assessment

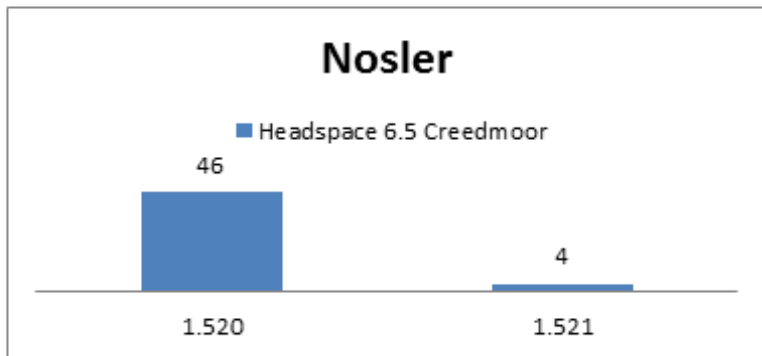
Head Space - Why is consistent headspace important?

Brass of varying headspace contributes to increased group size primarily due to the varying distances between the bullet and the rifling in a chambered round (since this is a bottleneck case, it headspaces on the shoulder / datum line). Upon the first firing all cases will fire form to correct any variations in headspace from the manufacturer, but this assessment is on unfired cases.

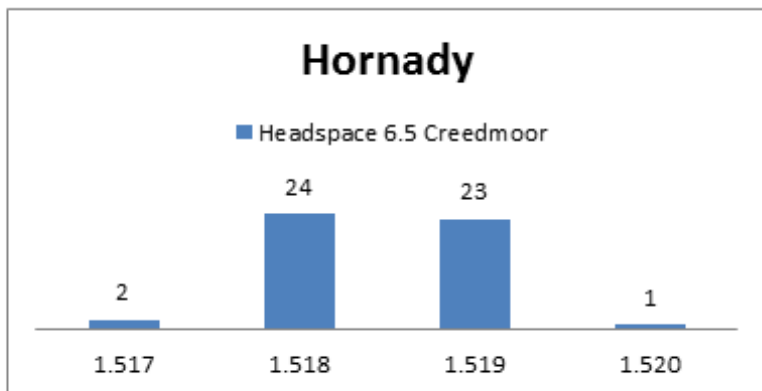
The lower the "Standard Deviation" the more consistent the case headspace will be.



Headspace	
Median	1.516
Std. Dev	0.0008



Headspace	
Median	1.520
Std. Dev	0.0003



Headspace	
Median	1.518
Std. Dev	0.0006

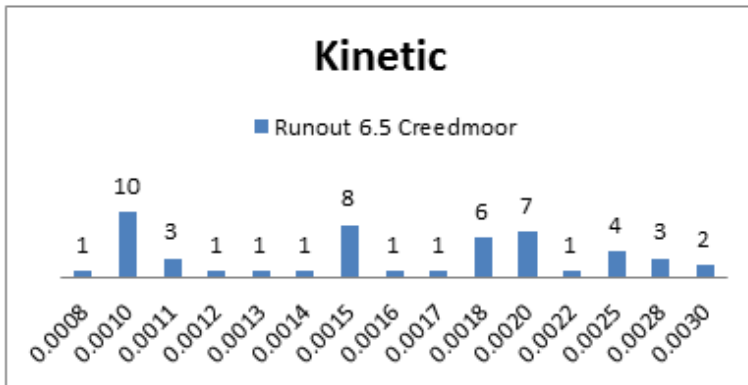


6.5 Creedmoor Runout Comparative Assessment

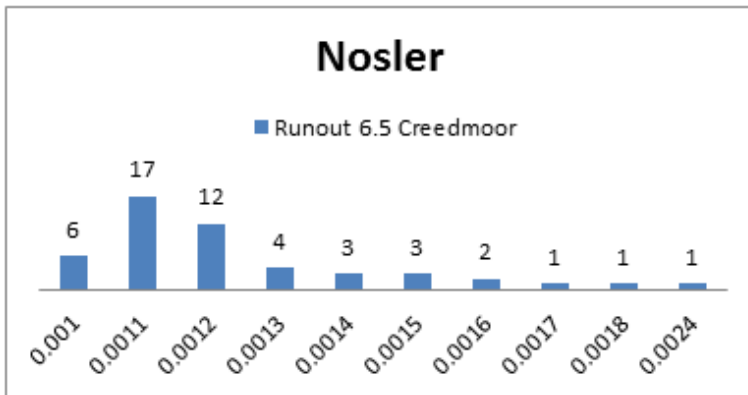
Case Runout - Why is low case runout so important?

Ill Reloading Lab's has conducted many tests on the various factors contributing to concentricity problems with bottleneck cases. We have repeatedly found a correlation between the uniformity of the brass (or lack of it) and the resulting concentricity of the neck to the body of the case.

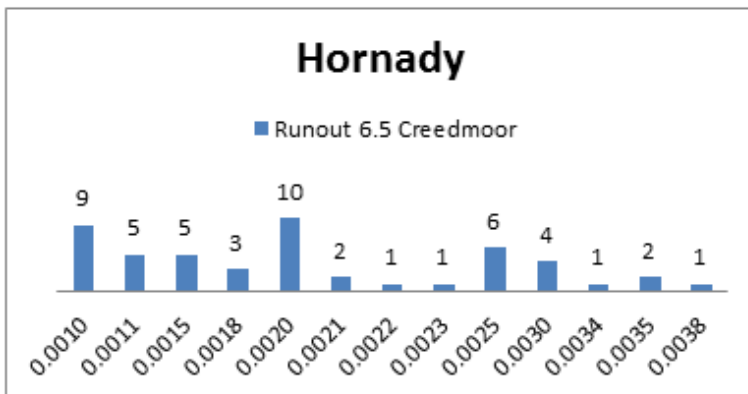
The more concentric the original brass (lower Median and standard deviation) the smaller the corresponding group sizes.



Runout	
Median	0.00155
Std. Dev	0.0006



Runout	
Median	0.0012
Std. Dev	0.0003



Runout	
Median	0.0020
Std. Dev	0.0008



How do variations affect accuracy?

Accuracy and consistency are not always dependent; therefore a very consistent load (velocity) may not be accurate, but an accurate load must be very consistent. Why? Because accuracy is the result of the right combination of components for a specific rifle/pistol barrel that places the bullet on target. Consistency is the ability to print all shots within the smallest possible group. Therefore any variation in the rifle brass will affect the pressure/velocity of each round fired, which will in turn place the bullet outside the intended point of aim/group. The larger the amount of variation in the brass, the larger the fired group size will be.

Which measurement has the greatest impact on group size?

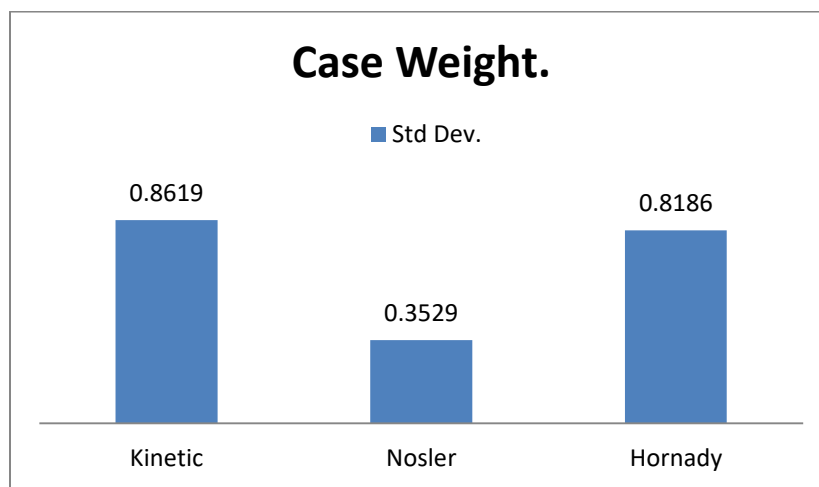
This is a hard one to answer. The effects on group size are cumulative for each variation in the brass. Based on our field research conducted over the past few years, I would say Case Weight/Thickness variations (generally speaking) has the most obvious impact on velocity spread. Since for a given load, if all other aspects are highly consistent, pressure is relative to the internal case capacity. Thicker brass (smaller internal capacity) will result in higher pressure/velocity than thinner brass. But, any significant variation in any of the other measurements can also result in consistency/accuracy issues.

There are other considerations that I won't address in this assessment such as seating depth, bullet shape, powder type, temperature (and more) that will be explored during our field testing of these cases (Phase 2). Our focus for Phase 1 of the study is strictly on the brass case itself.

Conclusions

Each brand had unique advantages in the assessed criteria, with overall performance reinforcing their inclusion as high-quality manufacturers:

If **weight** is key, Nosler wins with the lowest Standard Deviation among the 3. Both Hornady and Kinetic nearly tie for second with Hornady just edging out Kinetic. The rule of thumb for most precision reloaders is to keep the weight variance below 2% of the case weight (assuming +/- 1.0% is our pre-determined criteria). *All three providers fall into our preferred range.*



We also completed an **internal case capacity test** and the results were:

Hornady - 53.00 grains of H₂O, Nosler - 52.52 grains of H₂O and Kinetic - 49.80 grains of H₂O

Headspace, case length and runout are all critical to consistency.

Unlike case weight, once fired brass will exhibit changes in all three of these measurements in direct relation to the utilized rifle's chamber dimensions. We have included these measurements, as they are another indication as to the degree of precision in the manufacturing process. Below, as in the weight chart, are the standard deviations for each group of measurements. As before, the lower the standard deviation the more consistent the cases are.

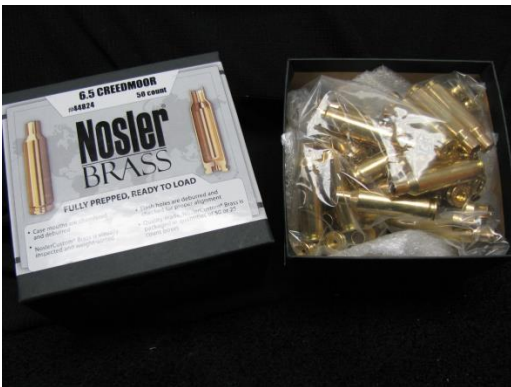
Nosler wins for most consistent headspace measurement, again nearly a tie for second with **Hornady** coming out ahead.

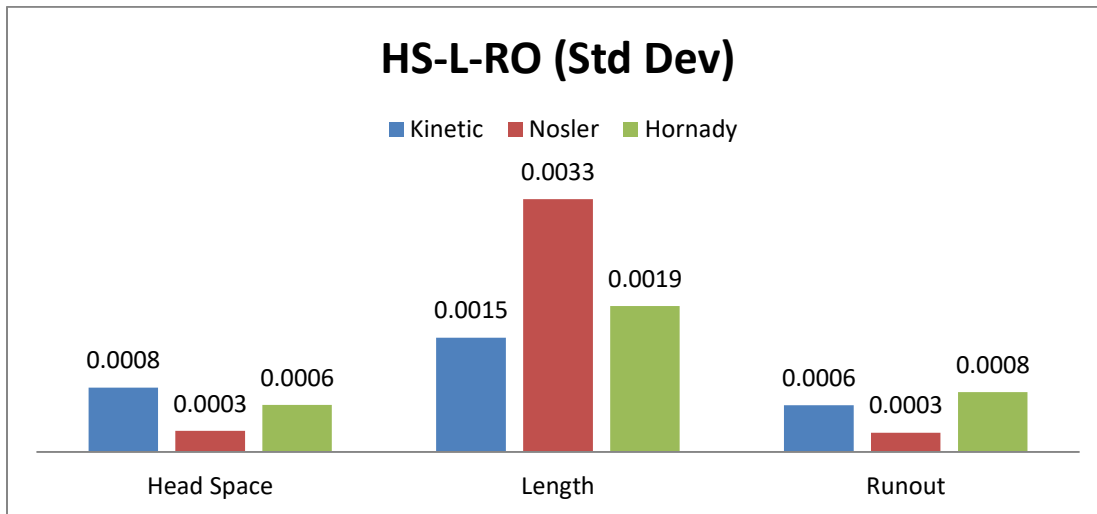
Kinetic wins for most consistent case length followed by **Hornady** then Nosler

Nosler wins for lowest deviation in case neck runout, with Kinetic in second and Hornady third.

CONCLUSION - Summary

Overall, *all three of these brands produce high quality rifle brass.* Care in manufacturing, finishing, annealing, trimming, and packaging were excellent.





Weight – Kinetic had the thickest cases of all three, with Nosler in the middle and Hornady the thinnest. Neck thickness followed in the same order. Thick case necks can cause higher neck tension, so precision reloaders may wish to reduce the necks to achieve their preferred tension with this brand. Nosler turned in the most consistent cases by weight for the batch and also fell between Kinetic and Hornady for overall weight. Hornady was the second most consistent by weight.

Length – All cases provided by Nosler, Hornady and Kinetic measured below SAAMI spec (1.920) for safe reloading without any need for trimming. Kinetic wins the Gold Star for most consistent overall length! Great job all!!

Headspace – Nosler had the longest headspace measurement with Hornady in the middle and Kinetic the shortest. The closer the headspace is to the actual chamber dimension the less case stretch upon the first firing. Less stretch means longer case life.

Runout – Concentricity of the case neck is critical to accuracy. Out of our three brands, Nosler won hands down, followed by Kinetic and Hornady. Most match shooters consider cases with .001 or less runout to provide excellent consistency and small group size. Cases measuring under .002 are still considered very good. All three had the majority of their submitted unfired cases well under .002 runout.

Case Mouth – All three brands had nicely chamfered and deburred case mouths. Very few of the cases we inspected were out of round or would require resizing to fix dings and such often found in retail bags of brass.

Packaging – Nosler packaging was very secure and well cushioned. The hard-exterior box was shrink-wrapped and sealed to prevent damage and any tampering with the contents. There is a series of numbers printed on the box (bottom), but the LOT# was not discernable. I suggest that Nosler correct this to allow customers to select cases from the same lot in a retail setting. Hornady had a heavy paper sleeve holding a thick ziplock type bag containing their brass. The sleeve was sealed across the top securely with their sticker preventing tampering. Hornady clearly marked the Lot# on its label! Cases were a bit more susceptible to damage as the paper sleeve could be crushed if subjected to heavy force. A few of the Hornady case mouths were very slightly out-of-round, but not damaged. Kinetic reports that they will focus on retail packaging in the future, but nothing to show us at this time.

Prices - Quantity 50

Nosler	\$66.99 or \$1.34 each
Kinetic	\$50.20 or \$1.00 each
Hornady	\$37.99 or \$0.76 each

NOSLER CUSTOM – Known for their highly consistent brass and bullets, this box of 50, 6.5 Creedmoor did not disappoint. With excellent stats and 3 out of 4 gold stars for case weight, headspace and runout, they take the top spot in this analysis. High quality typically commands a higher price and Nosler was the highest price of the group, but did offer real value in return. This is the second review of Nosler Custom Brass we've done in the past 12 months and it's great to see them continue to perform consistently well.

HORNADY MANUFACTURING – A full service reloading supplier offering everything from exceptional presses, dies, tools, bullets and more offers their full line of cartridge brass including the highly sought after 6.5 Creedmoor. Even though Hornady didn't take a Gold, they placed Silver in 3 of 4 with 1 bronze for runout. Also, to their credit Hornady came in at the lowest price for all three providers. So the price to value award goes to Hornady.

KINETIC INDUSTRIES – Our OEM manufacture performed well in this assessment, taking 1 Gold, 1 Silver and 2 Bronze. Providing rifle brass to cartridge makers requires less focus on retail packaging and more on their ability to deliver quality in staggering quantities. Here consistency is king, as the cases must be "ready to load" when they arrive at the customer. Highly consistent case length ensures that the seating depth of the loaded ammo is optimal. Here's where Kinetic won the Gold. We look forward to seeing how well these group on paper in Phase II of our testing in 2017.

Illinois Reloading Lab would like to thank **Nosler Hornady and Kinetic Industries** for participating in this assessment and demonstrating the qualities needed for producing optimal precision rifle ammunition. Be sure to follow our lifecycle assessment of this brass as its loaded, fired and processed through multiple iterations in our (Phase II report). We'll be posting these results and continued assessment of 6.5 Creedmoor and other select calibers in 2017.

REFERENCE

SAAMI Specifications of the 6.5 Creedmoor case:

Parent case	.30 TC
Case type	Rimless, bottleneck
Bullet diameter	.2644 in (6.72 mm)
Neck diameter	.2950 in (7.49 mm)
Shoulder diameter	.4620 in (11.73 mm)
Base diameter	.4703 in (11.95 mm)
Rim diameter	.4730 in (12.01 mm)
Rim thickness	.054 in (1.4 mm)
Case length	1.920 in (48.8 mm)
Overall length	2.825 in (71.8 mm)
Case capacity	52.5 grains
Rifling twist	1-8" (203 mm)
Primer type	Large rifle
Maximum pressure (C.I.P.)	62,150 psi (428.5 MPa)
Maximum pressure (SAAMI)	62,000 psi (430 MPa)