

338 Lapua Magnum Brass Comparative Assessments

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Accuracy escalates with the refinement of CNC Machining and the extreme tolerances we see in today's rifle actions, barrels and stocks resulting in tight little groups where it matters most - at the target. Last month we released our 6.5 Creedmoor report - and the groups from the range session were simply astounding! This month we release our next report on the "Big Daddy" of true long range rifle calibers, the 338 Lapua Magnum.

The term "Long Range" is relative and means something different to each rifleman. I suspect this is due to the distance at which they hunt and practice. For example, if your local rifle range has a 100 yard maximum and you're hunting the deep thick woods of the east coast, 300 yards might be your definition of long range. But the desert southwest rifleman who has access to a 1000 yard range and can hunt deer well beyond 400 yards, 1000 yards may be long range to them.

For this review, let's agree to the following:

*Short Range is 0-600 yards, Medium Range is 600- 1000 yards and true Long Range is 1000 yards and beyond.
And when I refer to the 338 Lapua in this report – I mean 338 Lapua Magnum*

Most rifles in the magnum class (300 Win Mag, 7mm Rem Mag, etc.) are designed to provide the velocity needed to reach out beyond 1000 yards and reliably impact targets with enough energy to perform the desired task. The 338 Lapua is in many ways an extension of the "Long Range" tool set, only this time it's designed to live and perform at ranges few cartridges are even capable of: one mile *and beyond*.

Background

The current .338 Lapua Magnum cartridge was developed as a joint venture between the Finnish rifle manufacturer SAKO and the British rifle manufacturer Accuracy International along with the Finnish ammunition manufacturer Lapua, or more officially Nammo Lapua Oy, which since 1998 is part of the Nordic Ammunition Group (Nammo). Lapua opted to redesign the .338/416 cartridge. In the new case design, particular attention was directed toward thickening and metallurgical strengthening of the case's web and sidewall immediately forward of the web. In modern solid head cases, the hardness of the brass is the major factor that determines a case's pressure limit before undergoing plastic deformation. Lapua tackled this problem by creating a hardness distribution ranging from the head and web (hard) to the mouth (soft) as well as a strengthened (thicker) case web and sidewall immediately forward of the web. This resulted in a very pressure resistant case, allowing it to operate at high pressure and come within 15 m/s (50 ft/s) of the original velocity goal. Lapua also designed a 16.2-gram (250 gr) .338 caliber Lock Base B408 full metal jacket bullet, modeled after its .30 caliber Lock Base bullet configuration. The result was the .338 Lapua Magnum cartridge which was registered with C.I.P. (Commission Internationale Permanente pour l'Epreuve des Armes à Feu Portatives) in 1989. With the procurement by the Dutch Army, the cartridge became NATO codified.

The .338 Lapua Magnum fills the gap between weapons chambered for standard military rounds such as the 7.62×51mm NATO and large, weighty rifles firing the .50 BMG cartridge. It also offers a tolerable amount of barrel wear, which is important to military snipers who tend to fire thousands of rounds a year in practice. Like every other comparable big magnum rifle cartridge, the .338 Lapua Magnum presents a stout recoil. An appropriate fitting stock and an effective muzzle brake will help to reduce recoil induced problems, enabling the operator to fire more rounds before getting too

uncomfortable to shoot accurately. Good factory loads, multiple projectile weights and factory special application ammunition are all available.

Due to its growing civilian popularity, several high quality tactical and match (semi) custom bolt actions designed for the .338 Lapua Magnum are becoming available. These (semi) custom bolt actions are used with other high grade rifle and sighting components to build custom sporting and target rifles.

This Analysis

Let me begin by stating that this is not a total industry comprehensive comparison of ALL case brands. IL Reloading Labs have attempted to obtain samples from many of the well-established brands, but for one reason or another, a few of them choose not to or were unable to provide us with samples for testing. I will allow the reader to draw your own conclusions, but most had to do with availability of product. To ensure value to our students and readers, I have obtained product from 3 well-known brands and one OEM who was kind enough to provide sample units for us to include in this comparison.

Participants

The following are stated benefits from the participants, in their own words.

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.

“We are a brass casing manufacturer offering an ample line of high quality, private label, match grade brass at competitive pricing. By employing lean manufacturing principals, we are able to provide you with quality product, flexible production processes and customized solutions resulting in a sustainable and valuable partnership.”

Kinetic Industries .338 Lapua Magnum Specs:

Primer Pocket Diameter: .2085 – .0003

Head diameter: .583 – .005

Head Thickness: .0545 – .0055

Overall Length: 2.714 – .005

Length to Shoulder- 2.2515- .0035

Hornady

“Ten bullets through one hole” is the philosophy that brought Hornady® Manufacturing from a two-man operation in 1949, to a world-leading innovator of bullet, ammunition, reloading tool and accessory design and manufacture today.

Change is our constant and daily challenge. We outperform our competitors by ensuring the products we make are the ones our customers need right now, and accurately predict what they'll want in the future. We recognize trends, and respect when to leave well enough alone. Our work force includes an ample number of hunters and competitive shooters, as well as veterans and former law enforcement officers. At Hornady® Manufacturing, ammunition is more than our livelihood. It's a major part of our daily life.

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.
 -

Peterson Cartridge

Peterson is dedicated to producing the best casings for long-distance shooters.

Founded in Pittsburgh, Pennsylvania by Derek Peterson and his two business partners, Peterson Cartridge was built with one main goal. That goal is to produce extremely consistent, American-Made brass rifle casings which are designed around, and for, long-distance shooters.

Unlike most of its competitors, Peterson Cartridge has devoted its entire facility, machinery, and laboratory to producing only brass rifle casings. Specialization is the driving principle behind Peterson Cartridge only producing one component of a multi-component finished product.

In our mind, if you want precision projectiles, purchase them from a company that specializes in projectiles. If you want consistent propellant and primers, purchase them from a company that specializes in propellant and primers. And if you want extremely precise and consistent brass rifle casings, purchase them from us, Peterson Cartridge.

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's brass was a 50 count sample sent in a Tyvek envelop from manufacturing.

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 were 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. We 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

No internal case capacity test was performed for this assessment.

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

Platinum Star - Gold Star – Silver Star – Bronze Star

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

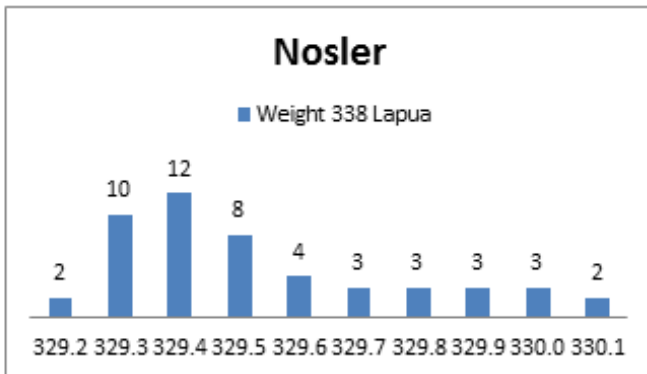
338 Lapua Weight Comparative Assessment

Case Weight - Why is consistent case weight important?

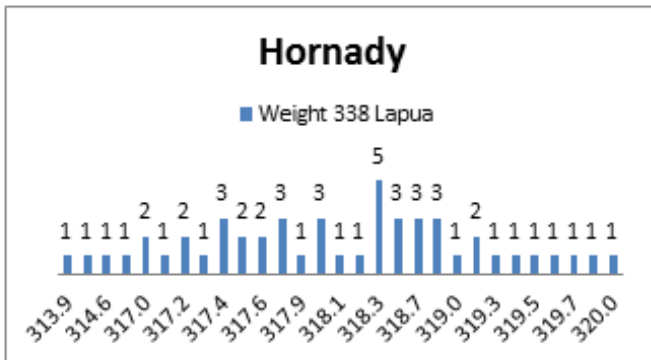
Consider the following.

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.

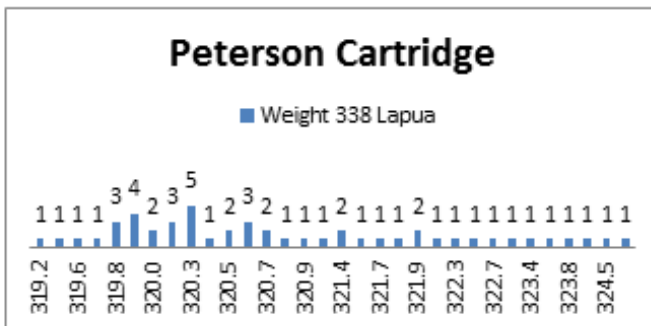
The lower the Standard Deviation the more consistent the weight of the brass will be.



Platinum	Weight
Median	329.47
Std Dev	0.2459



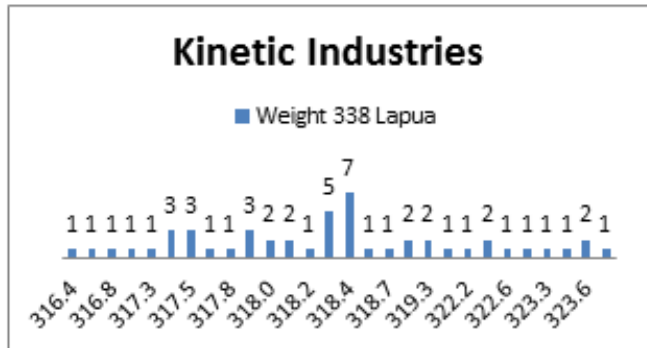
Gold	Weight
Median	318.16
Std Dev	1.2746



Silver	Weight
Median	320.600
Std Dev	1.4166



338 Lapua Weight Comparative Assessment



Bronze	Weight
Median	318.33
Std Dev	2.3287

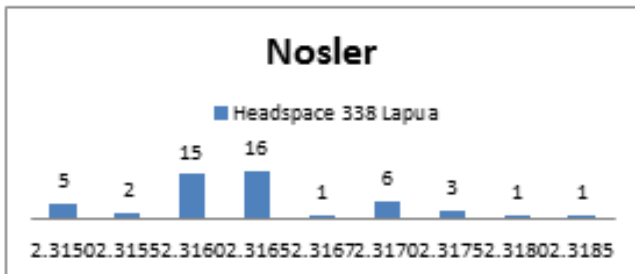


338 Lapua Headspace Comparative Assessment

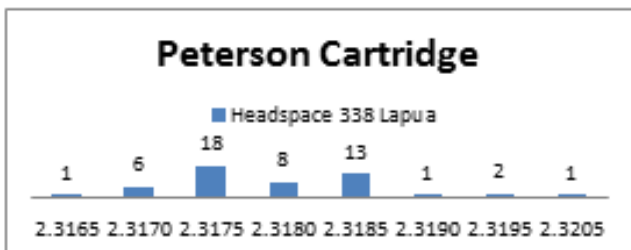
Headspace - Why is consistent headspace important?

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.

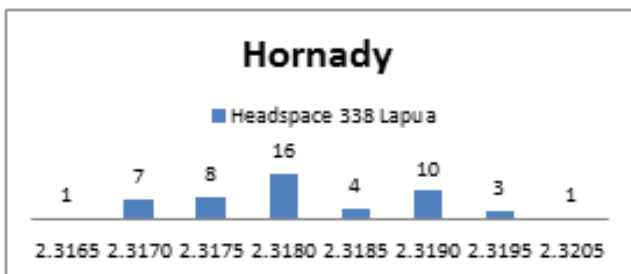
The lower the "Standard Deviation" the more consistent the case headspace will be.



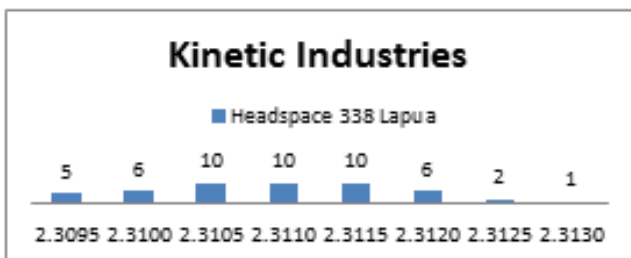
Platinum	Head Space
Median	2.317
Std Dev	0.0007



Gold	Head Space
Median	2.318
Std Dev	0.0007



Silver	Head Space
Median	2.318
Std Dev	0.0008



Bronze	Head Space
Median	2.311
Std Dev	0.0009

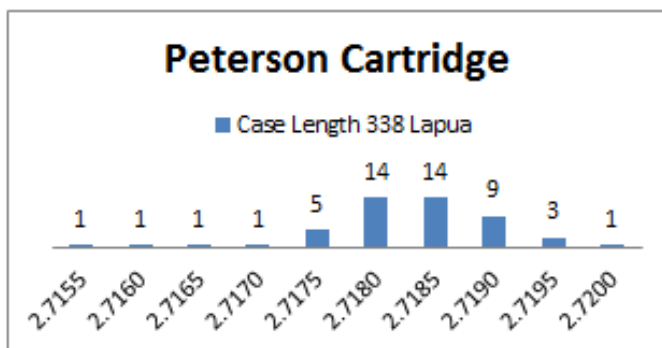


338 Lapua Case Length Comparative Assessment

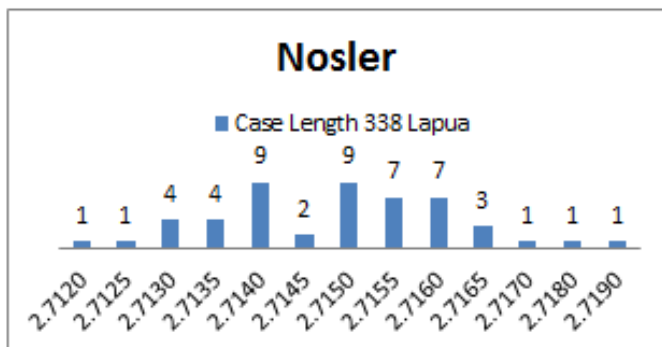
Case Length - Why is consistent case length important?

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.

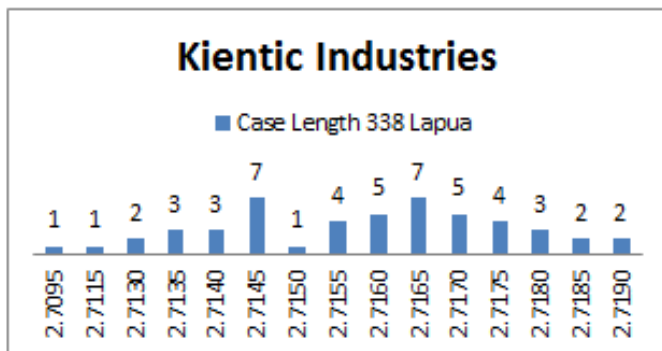
The lower the "Standard Deviation" the more consistent the case length will be.



Platinum	Length
Median	2.719
Std Dev	0.0008



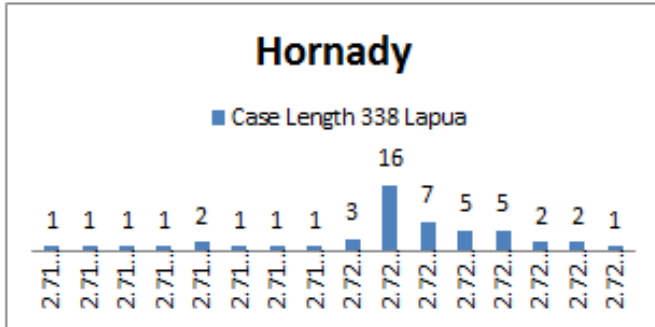
Gold	Length
Median	2.715
Std Dev	0.0014



Silver	Length
Median	2.716
Std Dev	0.0019



338 Lapua Case Length Comparative Assessment



Bronze	Length
Median	2.721
Std Dev	0.0022

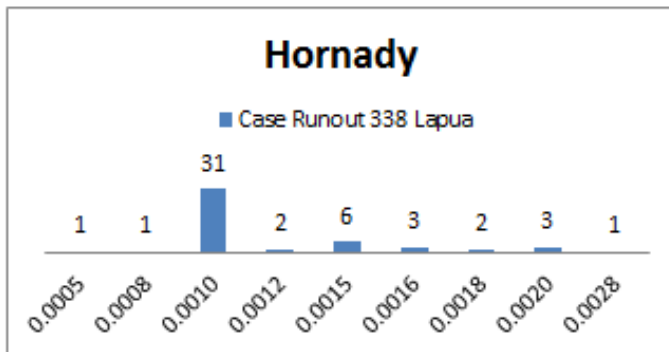


338 Lapua Runout Comparative Assessment

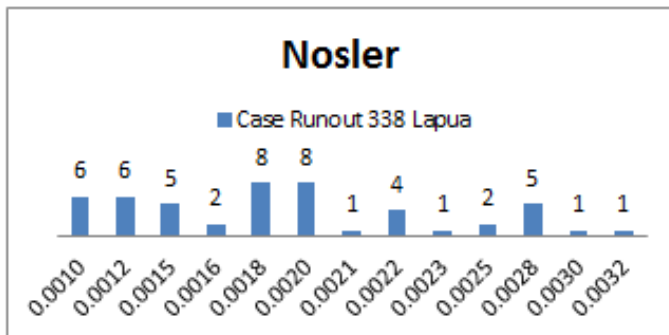
Case Runout - Why is low case runout so important?

Illinois 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.

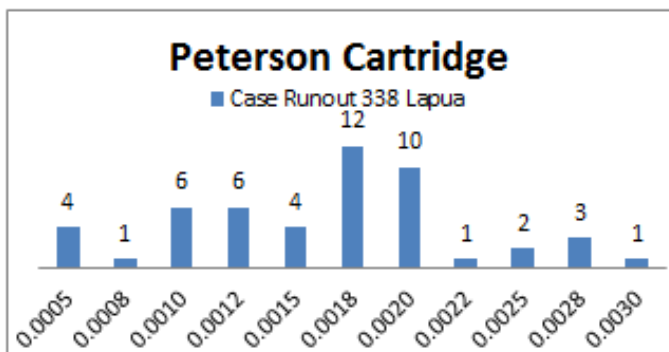
The more concentric the original brass (lower Median and standard deviation) the smaller the corresponding group sizes.



Platinum	Runout
Median	0.001
Std Dev	0.0004



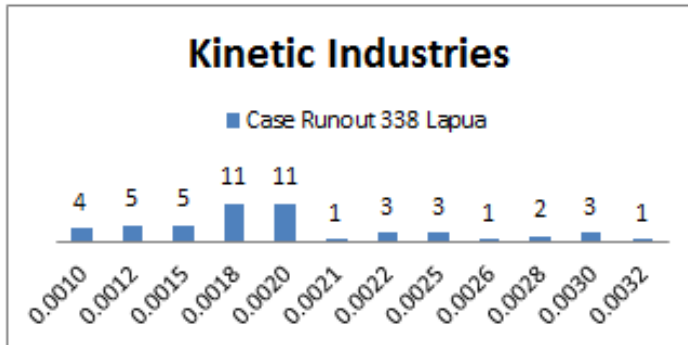
GOLD	Runout
Median	0.002
Std Dev	0.0006



GOLD	Runout
Median	0.002
Std Dev	0.0006



338 Lapua Runout Comparative Assessment



Silver	Runout
Median	0.002
Std Dev	0.0006



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 reliably 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?

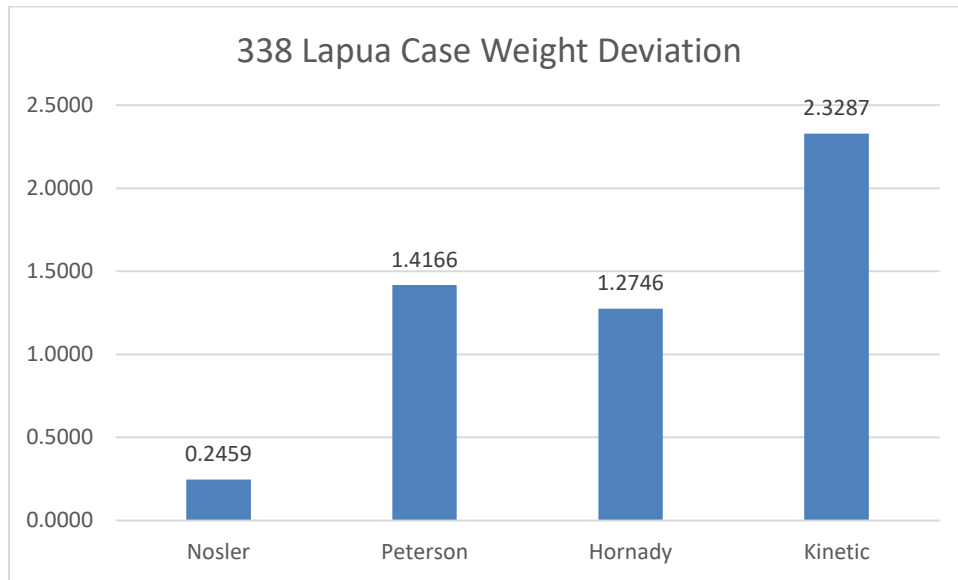
This is a hard one to answer. The effects on group size are cumulative for each variation in the brass. Based on our field research conducted over the past few years, I would say Case Weight/Thickness variations (generally speaking) has the most obvious impact on velocity spread. Since for a given load, 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 4. Both Peterson and Hornady nearly tie for second followed by Kinetic Industries. 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 four providers fall into our preferred range.*



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, with nearly a tie for second with **Peterson** and **Hornady** followed by **Kinetic**.

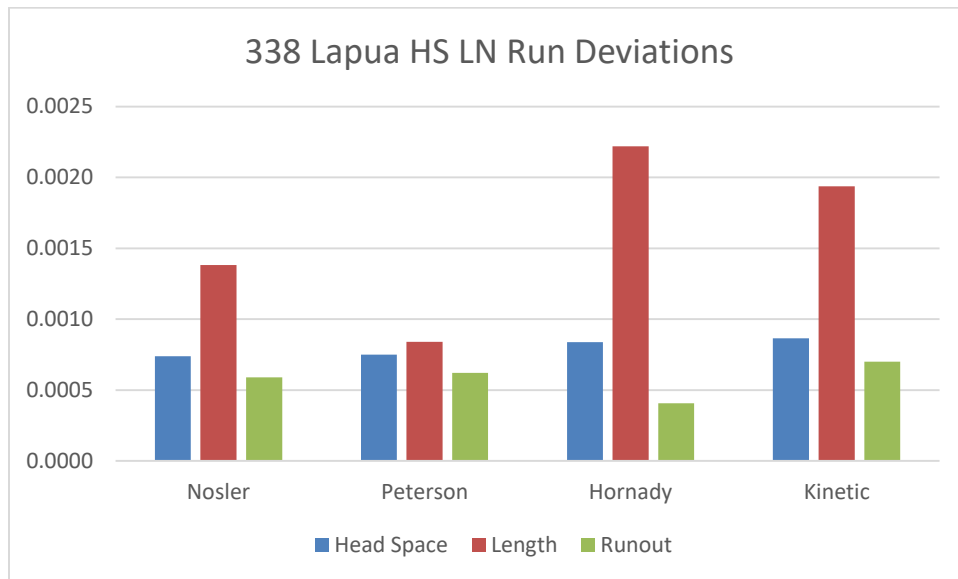
Peterson Cartridge wins for most consistent case length, second place is **Nosler** followed by **Kinetic** then **Hornady**.

Hornady wins for lowest deviation in case neck runout. Second place is a tie between **Peterson** and **Nosler**, followed by **Kinetic** in 3rd.

CONCLUSION - Summary

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

Head Space – Case Length – Case Runout Measurements/Deviations



Weight – Nosler had the thickest cases of all four, followed by Peterson, with Kinetic and Hornady basically tied for lightest. Neck thickness followed in the same order. Thick case necks can cause higher neck tension, so precision reloaders may wish to remember to always begin load development with the starting load identified in your reloading manual and work up from there. Nosler turned in the most consistent cases by weight for the two boxes provided (same lot), followed by Hornady, Peterson and Kinetic.

Length – All cases provided by Nosler, Peterson Hornady and Kinetic measured below maximum length per SAAMI spec (2.724) for safe reloading without any need for trimming. Peterson Cartridge wins the Platinum start for most consistent overall length! Great job all!!

Headspace – Peterson Cartridge had the longest headspace measurement with Hornady, Nosler 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 four brands, Hornady won hands down with .001 runout, followed by Kinetic, Nosler 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 four brands had a median runout of their submitted unfired cases at less than .002 of an inch.

Case Mouth – Of the four brands, all had nicely chamfered and deburred case mouths. A few of the cases from Nosler, Hornady and Kinetic that we inspected were slightly out of round and would require lite neck resizing to fix dings often found in retail packaged brass. Only Peterson Cartridge brass was received in a very nice reusable cartridge box with a foam top insert which prevented case mouth deformations during shipping and handling. Note the photo.

Packaging Photos for Retail Sales



Hornady



Nosler Custom



Peterson Cartridge

Packaging – As stated earlier, **Peterson Cartridge** brass was received in a very nice reusable cartridge box with a foam top insert which prevented case mouth deformations during shipping and handling. What a nice touch, since 338 Lapua brass is noticeably larger than more common calibers and won't fit in their other cartridge boxes. **Nosler Custom** packaging was very secure and well cushioned in boxes of 25. The hard-exterior boxes were 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 by clearly marking the words LOT# to allow customers to easily select cases from the same lot in a retail setting. **Hornady** packaged their Lapua brass in boxes of 20 using similar packaging as their loaded ammunition including the plastic sleeve to prevent cases from contacting each other in normal handling. Hornady clearly marked the Lot# on its label! **Kinetic** reports that they will focus on retail packaging in the future, but had nothing new to show us at this time.

Prices – Price per case

Kinetic	\$1.99 each q100
Peterson	\$1.99 each q50
Nosler	\$2.12 each q25
Hornady	\$2.25 each q20

NOSLER CUSTOM – Known for their highly consistent brass and bullets, these 2 boxes (25 per box) of 338 Lapua cases did not disappoint. With excellent stats and 2 Platinum and 2 Gold stars 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 third 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.

PETERSON CARTRIDGE – New to our review process, Peterson Cartridge was founded in Pittsburgh, Pennsylvania by Derek Peterson and his two business partners. Peterson Cartridge was built with one main goal: to produce extremely consistent, American-Made brass rifle casings which are designed around - and for - long-distance shooters.

Unlike most of its competitors, Peterson Cartridge has devoted its entire facility, machinery and laboratory to producing only brass rifle casings. Specialization is the driving principle behind Peterson Cartridge only producing one component of a multi-component finished product.

Peterson's 338 Lapua brass performed very well in our assessment finishing in the number 2 spot with 1 Platinum, 2 Gold and 1 Silver star and tying with Kinetic Industries for lowest price per case! Also, we must note the exceptional packaging and presentation of the finished product. As you will see in the photos, the Peterson brass arrived in a reusable hard plastic load box with load data sticker and foam inside cover to protect the brass in transit. This really differentiates their brass from all others we've tested.

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 popular 338 Lapua. Hornady had a great showing in this highly competitive assessment. Taking Platinum in runout, Gold in case weight, Silver in headspace and Bronze in case length. Hornady was our highest price per case based on street retail pricing but was packaged in 20 count reusable case blocks. This allowed shooter to purchase the lowest minimum number of cases at one time compared to other brands.

KINETIC INDUSTRIES – Our OEM manufacture performed well in this assessment, taking 2 Silver and 2 Bronze while tying for the lowest cost per case with Peterson Cartridge. 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 and runout ensures that the seating depth of the loaded ammo is optimal. In both of these areas, Kinetic took silver. We look forward to seeing how well these group on paper in Phase II of our testing in 2017.

SPECIAL THANKS

Illinois Reloading Lab would like to thank **Nosler, Peterson Cartridge, 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 .338 Lapua and other select calibers in 2017.

REFERENCE

SAAMI Specifications of the .338 Lapua Magnum case:

Parent case: .416 Rigby, .338/416
 Case type: Rimless, bottleneck
 Bullet diameter: 8.58 mm (0.338 in)
 Neck diameter: 9.46 mm (0.372 in)
 Shoulder diameter: 13.82 mm (0.544 in)
 Base diameter: 14.91 mm (0.587 in)
 Rim diameter: 14.93 mm (0.588 in)
 Rim thickness: 1.52 mm (0.060 in)
 Case length: 69.20 mm (2.724 in)
 Overall length: 93.50 mm (3.681 in)
 Case capacity: 7.40 cm³ (114.2 gr H₂O)
 Rifling twist: 254 mm (1-10")
 Primer type: Large rifle magnum
 Maximum pressure: 420.00 MPa (60,916 psi)

Ballistic performance :

Bullet mass/type	Velocity	Energy
12.96 g (200 gr)SP	1,005 m/s (3,300 ft/s)	6,734 J (4,967 ft·lbf)
16.20 g (250 gr) Partition	897 m/s (2,940 ft/s)	6,516 J (4,806 ft·lbf)
16.20 g (250 gr) Lapua Scenar GB488 VLD	910 m/s (3,000 ft/s)	6,634 J (4,893 ft·lbf)
19.44 g (300 gr) Sierra HPBT MatchKing	826 m/s (2,710 ft/s)	6,632 J (4,892 ft·lbf)
19.44 g (300 gr) Lapua Scenar GB528 VLD	837 m/s (2,750 ft/s)	6,810 J (5,020 ft·lbf)

Test barrel length: 700 mm (27.5 inches)

Source(s): Vihta Vuori Powder Lapua (700 mm; 27.5 inches) barrel

