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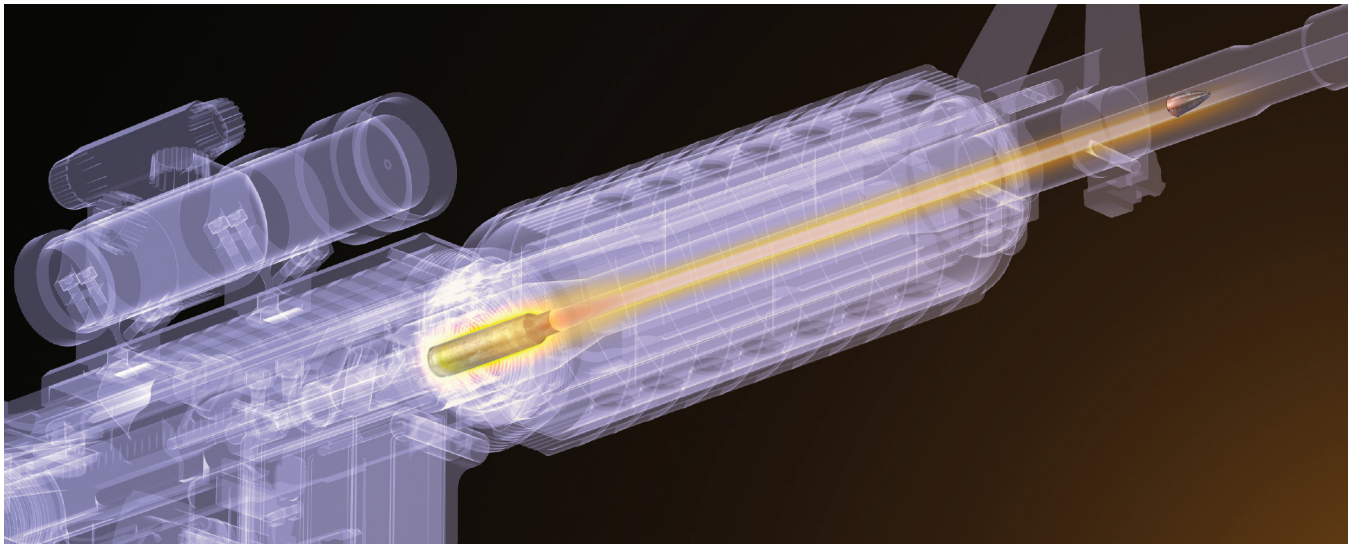
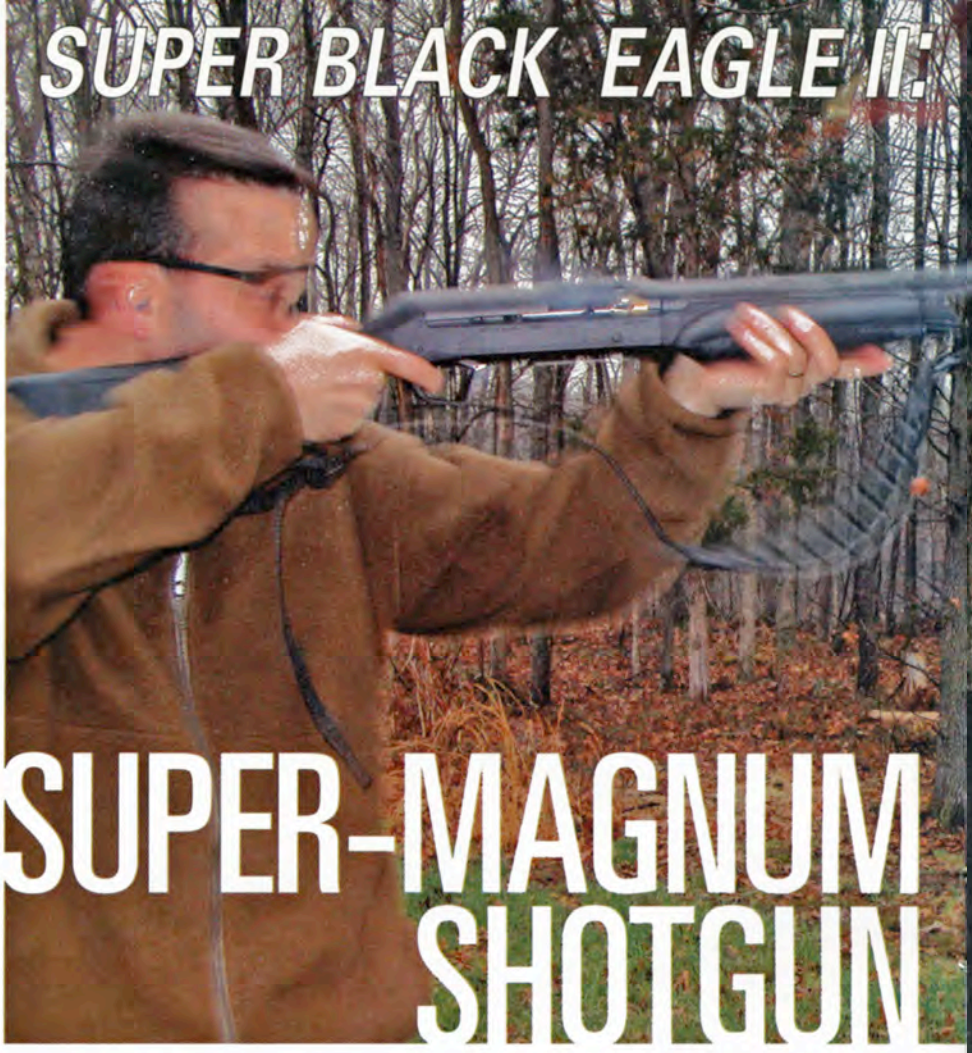


How To Measure Recoil Force of Firearms

Super Magnum Shotgun

Written By
Scott E. Mayer, Field Editor

SUPER BLACK EAGLE II: SUPER-MAGNUM SHOTGUN



Benelli has seized the 3 1/2-inch 12-gauge spotlight with its new semiautomatic Super Black Eagle II shotgun. It's a heavy-duty hunting machine with a sensitive side—the new ComforTech System.

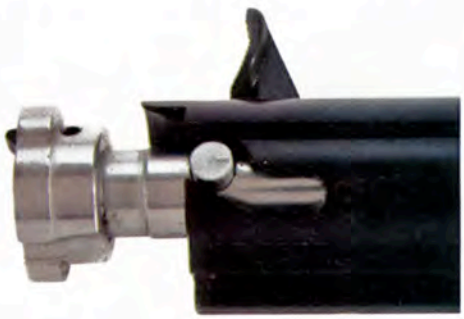
By Scott E. Mayer, Field Editor

Among the many things ushered in during the 1980s was a serious attempt to correct the deficiencies of early steel-shot loads. First came the loading of larger size shot, followed by new hull designs. Those hulls had larger interiors that permitted the use of heavier wads with larger shot cups. And new powders pushed those larger payloads with less pressure. On the heels of those changes came the 3 1/2-inch 12-gauge shell introduced in 1988. The "Long 12" was powerful and versatile when chambered in fixed-breech guns, such as over/unders, because you could still use 3-inch or 2 3/4-inch shells without a problem other than the severe recoil, but semiautomatics were another matter. Trying to get gas guns to cycle reliably with everything from standard 2 3/4-inch field loads to the heaviest 3 1/2-inch waterfowl loads without having to change anything on the gun isn't easy and probably kept more than one gun designer awake at night. But Benelli (Dept. ST, 17603 Indian Head Hwy., Accokeek, MD 20604; 301-283-6981; www.benelliusa.com) managed to do what so many other gunmakers were struggling with when it introduced the Super Black Eagle in 1991. Rather than use gas generated from the fired shell to operate the gun, the Super Black Eagle has a short-recoil system with inertial locking system. That means reliable functioning with just about any shell powerful enough to make the gun kick. Add to that a spring-loaded ejector with a range of movement to accommodate different length shells, and the Benelli Super Black Eagle faithfully digests nearly any 12-gauge shell you feed it.

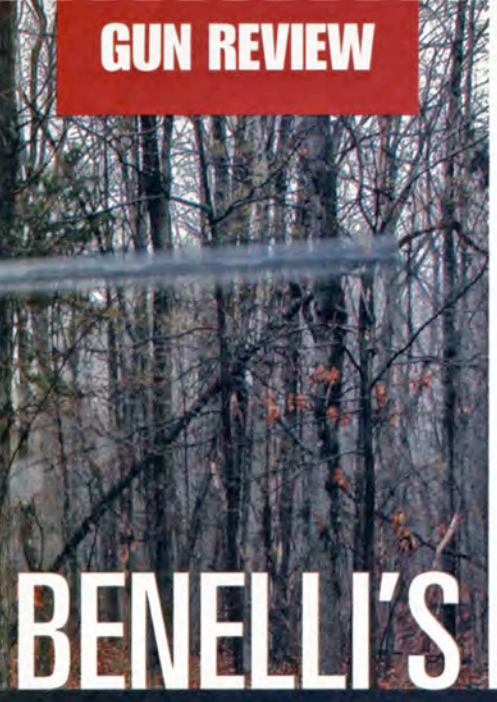
Reliable functioning wasn't the only benefit the Super Black Eagle brought to users of 3 1/2-inch 12-gauge shells. It also offered lower felt recoil relative to what the Long 12 can dish out.

The next big improvement in steel shot—and probably the most significant—unraveled even the Super Black Eagle's recoil comfort factor. Ammunition makers realized that not everyone was going to run out and buy a new 3 1/2-inch-chambered shotgun just because they were available, and they continued to focus on improving 2 3/4- and 3-inch steel shotshells. At the same time, better powders specifically made for steel shotshell loads were developed, and the result of the two efforts were high-velocity steel shotshells. If I recall correctly, back then I was handloading high-velocity steel shells according to data supplied by Ballistic Products, but Winchester Ammunition was the first manufacturer to offer high-velocity shells. Since their introduction, Winchester's Supreme 3-inch No. 2 steel and BB steel—both at 1450 fps—have been a staple diet for my shotgun in duck blinds and goose pits.

It was inevitable that high velocity would find its way into 3 1/2-inch shells. And with that all the recoil-mitigating benefits in the Super Black Eagle were



One part of the Super Black Eagle's unique operating system is a rotating bolt with two lugs that engage cutouts in the steel barrel extension.



BENELLI'S SOFT-TOUCH

predecessor a reputation as a hardcore, heavy-duty hunting machine, but this shotgun also has a more sensitive side shooters will appreciate. That sensitive side is in the form of the ComforTech System. The System has several advanced features that bring the perceived recoil of heavy 3 1/2-inch loads back down to a manageable level and alters the gun's handling dynamics to make the SBE II quicker on follow-up shots.

Measuring actual recoil is a simple matter of either using a recoil pendulum or plugging the relative factors into a known formula. Perceived recoil is not readily measurable because it is how the sensation of recoil is felt, and it varies from individual to individual.

Benelli's new ComforTech System gives the new Super Black Eagle II shotgun a soft touch relative to what the 3 1/2-inch 12-gauge shotshell can dish out.

pretty much blown away. If you think 3 1/2-inch 12-gauge shells kick, then shooting high-velocity 3 1/2-inch shells will be an experience. Touch off one of the new 12-gauge, 3 1/2-inch, two-ounce, 1300-fps, high-velocity turkey loads in a lightweight gun, and it will kick the ever-loving sense out of you.

How ComforTech Works

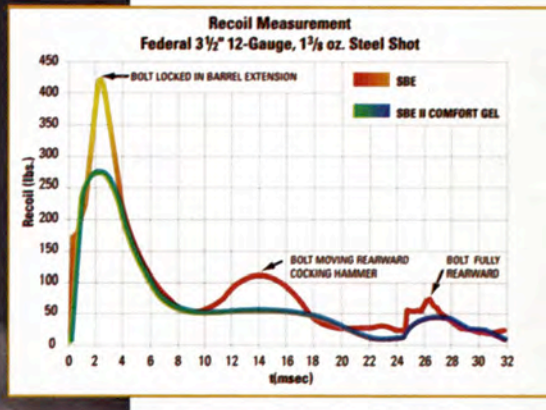
As it did in 1991 with the introduction of the Super Black Eagle, Benelli seized the 3 1/2-inch spotlight again this year with a new shotgun designed with the performance and power of today's high-velocity loads in mind. The Super Black Eagle II (SBE II) retains all of the functional merits that earned its

Viewed as a whole, recoil is a complex combination of action and reaction. Faced with that, Benelli engineers came up with the most practical ways to measure perceived recoil by using unique measuring equipment, computer modeling, and high-speed video to see what was actually happening to the shooter during the shot. That research resulted in the elements of the ComforTech System that center on changes to the stock without any additional weight or design changes.

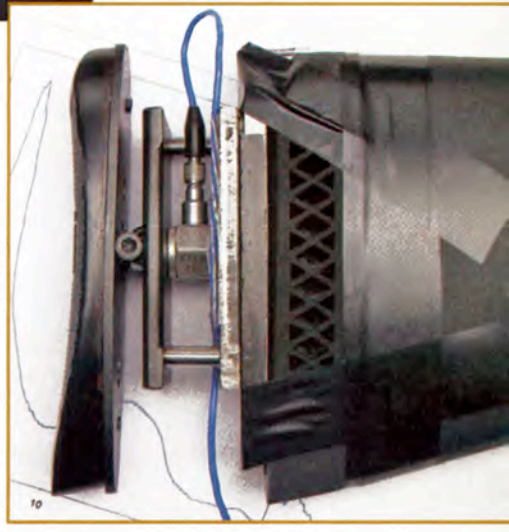
The most noticeable element of the ComforTech System is the dozen synthetic chevron-shaped dampeners running diagonally from the pistol grip cap to the heel of the stock. Some shooters may remember the Winchester Hydra Coil stock: a plastic, telescoping buttstock with, for all intents and purposes, a "shock absorber" between the two stock halves. It worked, but "Where can I get parts for a Hydra Coil stock" is a common question. Benelli's dampeners work much the same way as the Hydra Coil, except there are no moving parts to wear out. Also these dampeners aren't merely some rubber gizzies dreamed up by a gun geek with an engineering degree. Instead, Benelli teamed up with materials scientists to find a dampening material that, when combined with the resilient body of the synthetic stock, forms a flexible recoil barrier that Benelli claims reduces perceived recoil by as much as 48 percent over comparative shotguns.

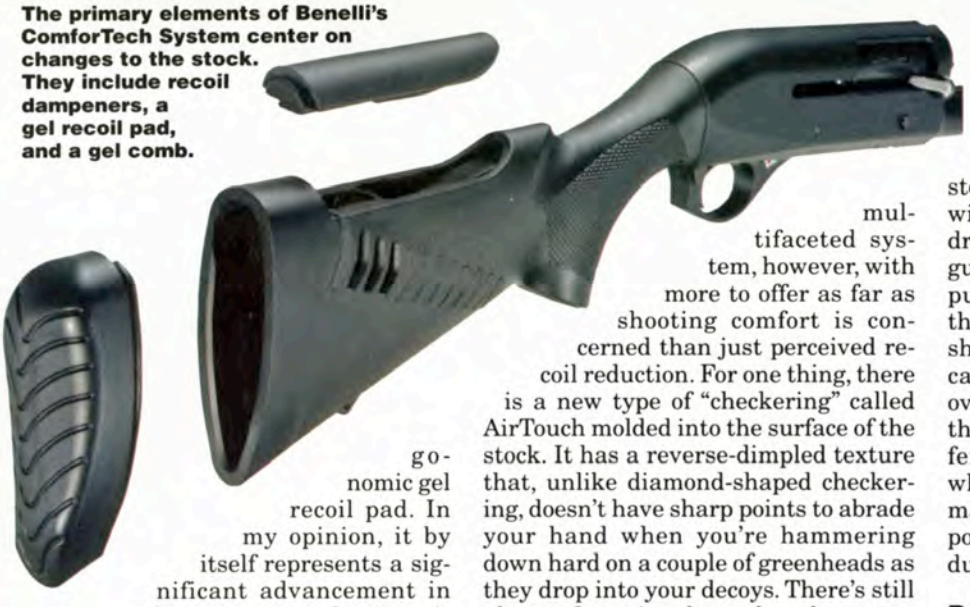
Recoil-Reducing Innovations

Also helping to reduce the perception of the straight-back recoil is a new er-



In determining how to address the problem of perceived recoil, Benelli engineers designed unique test equipment to evaluate how recoil was delivered to the shooter. Benelli claims that the ComforTech System reduces felt recoil by a measurable amount over comparable shotguns.





The primary elements of Benelli's ComforTech System center on changes to the stock. They include recoil dampeners, a gel recoil pad, and a gel comb.

multifaceted system, however, with more to offer as far as shooting comfort is concerned than just perceived recoil reduction. For one thing, there is a new type of "checkering" called AirTouch molded into the surface of the stock. It has a reverse-dimpled texture that, unlike diamond-shaped checkering, doesn't have sharp points to abrade your hand when you're hammering down hard on a couple of greenheads as they drop into your decoys. There's still plenty of traction there, though, so your hands won't slip when they're cold and wet. Slight palmswells on both sides of the grip add a little more to comfort, there's more room in the trigger guard for gloved hands, and the forend is redesigned to better fit even little guys like me.

As with the Super Black Eagle, the SBE II has a user-adjustable stock via a series of shims that come with it. By using the shims to adjust drop and cast, owners of SBE II shotguns can customize where their guns put their patterns relative to where they point them. Personally, I like my shotguns to pattern a little high so I can always keep a bird in sight just over the top of the rib. Another thing the shims allow adjustment for is different clothing. A bulky parka worn while hunting geese with the SBE II may cause you to shoot to a different point of impact than a light shirt will during spring gobbler season.

But Does It Really Work?

So does the ComforTech System make a difference? I think so. I can't go-nomic gel recoil pad. In my opinion, it by itself represents a significant advancement in recoil management because it takes more than just the physics of recoil into consideration. Rather than being nothing more than a pad of some futuristic squishy material, it's actually ergonomically shaped to conform to the shoulder for maximum contact. Maximum contact means the recoil is spread out over a larger area of the shoulder, so there are no spots where recoil force is concentrated. Since one size does not fit all, different pads, shaped for shooting from either the right or left shoulder and in different thicknesses to adjust length of pull between 14 and 14 3/8 inches, are available. And, yes, the pad is made of a futuristic squishy material originally developed for the medical industry. In addition to being soft, the pad has enough traction to stay put on your shoulder when mounting, firing, and following through on a shot while not being so gummy and sticky as to hang up in clothing when bringing the gun to your shoulder.

Innovative features that are sure to please hunters include a redesigned forend with AirTouch checkering and an enlarged trigger guard for gloved hands.

As anyone who has fired a heavy recoiling gun can attest, and as Benelli found in its research, recoil is not all straight back—there is a considerable upward element to it that can jack your jaw like a well-executed punch. Benelli engineers also addressed that dynamic of recoil with a pop-in comb also made of gel. Not only is the unit soft, it also has a low-friction quality to it so it won't grab your face during recoil. Ideally, I hope Benelli will eventually offer a higher comb insert replacement . I'm sure a lot of the SBE IIs with Advantage camouflage are going to end up with scopes mounted on them for turkey hunting, and a higher cheekpiece will help align those shooters' eyes with their scopes. Ditto on the slug gun version of the SBE II.

That pretty much summarizes what Benelli has done for the recoil-taming part of the ComforTech system. It's a

think of any gun writer who likes getting an assignment that involves shooting several shots of 3 1/2-inch 12 gauge because you take a thorough beating if you really evaluate the gun to its limit. I couldn't find the limit of the SBE II because it simply gobbled down every shell I threw in it. I fired off a variety of about 200 shells, 100 of which were 3 1/2-inch, without reaching my limit, either, thanks to ComforTech.

The lightest load I used was Remington's Heavy Game Load that has 1 1/4 ounces of No. 6 shot powered by 3 3/4 Drams equivalent in a 2 3/4-inch shell. On the heavy end of things were Winchester's 3 1/2-inch high-velocity turkey loads that have two full ounces of shot. In between were an assortment of Federal and Estate Cartridge field loads and a motley assortment of partial boxes of steel and lead shot. Some of my steel-shot loads even had a fine coating of silt on them remaining from the cut cornfields where I hunted geese last year. Light or heavy, silt and all, the SBE II handled all loads with no malfunctions.

About the most sophisticated equipment I have for measuring felt recoil from a 3 1/2-inch 12 gauge is the color and size of the bruise left on my shoulder. In the past, 3 1/2-inch loads have left me looking like I'm trying to smuggle an eggplant in my armpit, but the SBE II left me with only a sore neck and a little redness on my shoulder and that was gone in a couple of days. Squeezing the trigger, even when sitting at the bench deliberately aiming at a patterning paper, wasn't nearly as bad as I've experienced with other 3 1/2-inch 12-gauge guns.

To confirm Benelli's claim of faster follow-up shots, I used a PACT Club Timer II to see just how fast I could lay down that second load. If I'm just firing into the berm, I can get off shots much faster, but I don't think a couple of wild shots is a good indicator of follow-up so I fired my speed shots at patterning paper at 25 yards. It would be obvious if the patterns impacted reasonably close to each other at that range, and if they did, I counted the shots. To establish a speed baseline, I timed myself shooting Federal's 2 3/4-inch 1-ounce, No. 7 1/2 shot load from a 20-gauge Remington 1100 LT Special figuring that it would probably give me the fastest time I was capable of shooting with a shotgun. The baseline speed for putting two shots near each other was 0.74 second. With the Benelli, I fired Federal's 3 1/2-inch, 1 9/16-ounce, No. 2 steel-shot load. With those loads I was able to get the second shot on target in 0.75 second, which is essentially the same as with the little 20-gauge gun. That's not to say the Benelli kicked the same as the 20 gauge—hardly—but I really do believe the Benelli Super Black Eagle II is a faster shooting gun because the ComforTech System provides recoil that is more controlled and manageable.

When put to the test, the author was able to fire two aimed shots with the 3 1/2-inch shells from the Benelli Super Black Eagle II as fast as he could with a light 20-gauge semiautomatic shotgun.

I'm sold on the recoil handling improvements to the SBE II, but I was struggling with understanding the claimed benefits of the "Crio System" cryogenic treatment of the SBE II's barrel and chokes. The claims include 13.2 percent more pellets on target, more evenly distributed pellets in patterns, and a smoother bore surface for less resistance to the wad resulting in a cleaner bore and reduced pellet deformation.

If there were 13.2 percent more pellets on target, would that mean when I pressed the trigger that a Modified CrioChoke would throw a standard Full choke pattern? That could be a bad thing. Would the claim mean patterns are denser in the middle, which could be a good thing, but would also seem to contradict Benelli's other claim of more evenly distributed patterns? To find out, I patterned the SBE II with both steel and lead shot to see where in the percentage table a choke would score and how the patterns looked. Federal's No. 2 steel shot fired through an Improved Cylinder CrioChoke resulted in patterns that put an average of 54 percent of the shot in a 30-inch circle at 40 yards. That's on the high end for an Improved Cylinder choke, so in that case the CrioChoke did indeed result in more hits on the target. Remington No. 4 lead shot fired from a Full CrioChoke resulted in patterns that averaged 70 percent hits in the 30-inch circle. Again, this is on the high side for a Full choke and also lives up to Benelli's more hits claims. Both loads tended to show fairly even patterns with expected pellet distribution.

SPECS

Benelli Super Black Eagle II
12-Gauge Semiautomatic Shotgun

Importer	Benelli USA Corp. 17603 Indian Head Hwy. Accokeek, MD 20604
Model	Super Black Eagle II
Operation	Short-recoil autoloader
Gauge	12
Barrel length	26 inches
Overall length	47.6 inches
Weight	7.2 pounds
Safety	Trigger guard-mounted, trigger blocking
Sights	Vent rib barrel with red fiber-optic front and white metal mid-rib bead
Stock	Black synthetic
Finish	Blued steel and blackened aluminum
Magazine capacity	3 rounds
Price	$1365

It will be interesting to see if shotshells or shotguns can advance beyond where they are today. You know, a lot of people cursed the introduction of steel shot because early loads did not work like shooters expected. It's true that those shells didn't work so well, and it was because of the lead-thinking technology in use at the time. We've come a long way in a short time. I'm not happy that steel is mandated, but I am sort of glad it came along. It really pushed manufacturers to develop truly high-performance loads and guns. We certainly wouldn't have 3 1/2-inch 12-gauge loads today if it weren't for the introduction of steel shot, and there might not be "high-velocity" shotshells or design advances represented by guns such as Benelli's Super Black Eagle II that make shooting more enjoyable regardless of the size of the shell.

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