How To Measure Recoil Force of Firearms

Super Magnum Shotgun

Written By
Scott E. Mayer, Field Editor
Benelli has seized the 3½-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.

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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. These hulls had larger interiors that permitted the use of heavier wads with larger shot cups. And now powders pushed those larger payloads with less pressure. On the heels of those changes came the 3-inch 12-gauge shell introduced in 1988. The "Long 12" was powerful and versatile when chambered in fixed-barrel guns, such as over/unders, because you could still use 3-inch or 2½-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 2½-inch field loads to the heaviest 3-inch waterfowl loads without having to run the gun designer awake at night. But Benelli (Dept. ST, 17603 Indian Head Hwy., Acecco, MD 20604; 301-263-6081; 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 3½-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—unveiled even the Super Black Eagle's recoil comfort factor. Ammunition makers realized that not everyone was going to run out and buy a new 3½-inch-chambered shotgun just because they were available, and they continued to focus on improving 2½- 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 handling 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 3½-inch shells, and with that all the recoil-mitigating benefits in the Super Black Eagle were pretty much blown away. If you think 3½-inch 12-gauge shells kick, then shooting high-velocity 3½-inch shells will be an experience. Touch off one of the new 12-gauge, 3½-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 3½-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 predecessor a reputation as a hardcord, 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 3½-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 SOFT-TOUCH

Recoil-Reducing Innovations

Also helping to reduce the perception of the straight-back recoil is a new er-
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Recoil reduction was a key part of the design, as Benelli engineers designed a unique test equipment to evaluate how recoil was delivered to the shooters. The story was that the ComforTech System reduces felt recoil by approximately 40% over comparable shotguns.

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

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

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. Naturally, 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 can mean you 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 think of any gun writer who likes getting an assignment that involves shooting several shots of 3½-inch 12 gauge because you take a thorough beating if you do it, but it sure is cool to do. I couldn't find the limit of the SBE II because it simply gobbled down every shell I fed it in a variety of shells. I almost hit another variety of about 200 shells, 100 of which were 3½-inch, without reaching my limit, either. The last load I used was Remington's Heavy Game Load that has 1¼ ounce of shot, 3½-inch high steel and a 2½-inch Drakes equivalent in a 2½ inch shell. On the heavy end of things were Winchester's 3½-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. Some of my steel-shot loads even had a fine coating of silt on them remaining from the cornfields where I hunted geese last year. Light on steel, of course, the SBE II handled all loads with no malfunctions.

About the most sophisticated equipment I have for measuring fall from a 3½-inch 12 gauge is the color and size of the blood left on my shoulder. In the past, 3½-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, when shotguns are as good as I've experienced with other 3½-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 four or five rounds. If I were firing into the barn, I can get off shots much faster, but I don't think a couple of wild shots would improve the indicators of follow-up so I fired my speed shots at patterning paper at 25 yards. It would be obvious if I installed an improvement reasonably close to each other at that range, and if they did, I counted the shots. To establish a speed base, I timed myself shooting Federal's 2½-inch 1-ounce, No. 7½ 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 3½-inch, 1¼-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—but I really don't think it does. I love the Benelli Super Black Eagle II is a faster shooting gun because the Comfortech System provides recoil that is more controlled and manageable.}

SPECs

**Benelli Super Black Eagle II 12-Gauge Semiautomatic Shotgun**

**Importer:** Benelli USA Corp.

**Model:** 17003 Indian Head Hwy.

**Operation:** Short-recoil autoloader

**Gauge:** 12

**Barrel length:** 26 inches

**Overall length:** 47½ inches

**Weight:** 7.5 pounds

**Safety:** Trigger guard-mounted

**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:** $1,195

I'm sold on the recoil handling improvements to the SBE II, but I was struggling with understanding the claimed benefits of the Comfortech system. For example, the sliding stock and ovoid 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 wall resulting in a cleaner bore and reduced pellet deflection.

If there were 13.2 percent more pellets on target, that would mean when I pressed the trigger that a Modified or CW choke 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 the percentage take 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 end for a Full CrioChoke and also lives up to Benelli's more hits claims. Both loads tended to show fairly even patterns with expected pellet distribution.

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

When put to the test, the author was able to fire two aimed shots with the 3½-inch shells from the Benelli Super Black Eagle II as fast as he could with a light 20-gauge semiautomatic shotgun.
The primary elements of Benelli’s ConforTech stock center on changes to the stock. They include recoil suppressors, a gel recoil pad, and a gel comb.

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I’m sold on the recoil handling improvements to the SBE II, but I was struggling with understanding the claimed benefits of the “ConTech System.” It’s an ergonomic treatment of the SBE II’s barrel and choke. 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 wall resulting in a cleaner bore and reduced pellet deforation.

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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 didn’t work like shotguns expected. It’s true that those shells didn’t work so well, and it was because of the lead-thinking technology used in the time. We’re currently 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-inch 12-gauge loads today if it weren’t for the introduction of steel shot, and there might not be “high-velocity” shotshells or designs that don’t perform as well as such Benelli’s Super Black Eagle II that make shooting more enjoyable regardless of the size of the shell.