LEARN 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 3½-inch 12-gauge shell introduced in 1988. The “Long 12” was powerful and versatile when chambered in fixed-breath guns, such as overunders, 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 loadings to the heaviest 3-inch waterfowl loads without having the gun designer awake at night. But Benelli (Dept. ST, 76003 Indian Head Hwy., Acecoke, MD 20604; 301-263-6881; 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-stroke recoil system with inertial locking system. This 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—unrevealed 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-chamber 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 3-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 hard-core, 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 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.

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.

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

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 notable element of the ComforTech System is the system’s 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 gizmos dreamed up by a gunner with an engineering degree. Instead, Benelli teamed up with materials scientists to find a damping 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.

Recall-Reducing Innovations

Also helping to reduce the perception of the straight-back recoil is a new er-
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Benelli's new ComforTech System gives the new Super Black Eagle II a soft-touch relative to what the 3½-inch 12-gauge shotshell can dish out.

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

I'm sold on the recoil handling improvements to the SBE II, but I was struggling with understanding the claimed benefits of the "Cho 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, that would mean when I pressed the trigger that a Modified Crischoke 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 Crischoke 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 Crischoke did indeed result in more hits on the target. Remington No. 4 lead shot fired from a Full Choke resulted in patterns that averaged 70 percent hits in the 30-inch circle. Again, this is on the high end 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.

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.

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

A multilayered system, however, with more to offer as far as shooting comfort is concerned than just perceived recoil reduction. For one thing, there's a new type of "cheekelocking" called AirTouch molded into the surface of the stock. It has a reverse-dimpled texture that, unlike diamond-patterned checkering, is cut into 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 reinforced 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 has a different feel than Drakes equivalent in a 2½ 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 the shell side, the SBE II handled all loads with no malfunctions.

About the most sophisticated equipment I have for measuring fall is from a 3½-inch 12-gauge is the color and size of the box left on your shoulder. In the past, 3½-inch loads have left me looking like I'm trying to struggle 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 pattering paper, was surprisingly as bad 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 another round. 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 will really indicate follow-up so I fired my speed shots at pattering paper at 25 yards. It would be obvious if I had a couple of shotguns patterned 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 2½-inch 1-inch, 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 .674 second. With the Benelli, I fired Federal's ½-inch, 1½-inch, 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 you're going to love the Benelli Super Black Eagle II is a faster shooting gun because the ComforTech System provides recoil that is more controlled and manageable.

Innovative features that are sure to please hunters include a redesigned forearm 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 3¾-inch shells from the Benelli Super Black Eagle II as fast as he could with a light 20-gauge semiautomatic shotgun.

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If there were 13.2 percent more pellets on target, would that mean when I pressed the trigger that a Modified Crow-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 in the percentage table a choke would score and how the patterns looked. Federal's No. 2 steel shot fired through an Improved Cylinder Crow-Choke 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 Crow-Choke did indeed result in more hits on the target. Remington No. 4 lead shot fired from a Full Crow-Choke resulted in patterns that averaged 70 percent hits in the 30-inch circle. Again, this is on the high end for a Full choke and also lives up to Benelli's more hits claim. Both loads tended to show fairly even patterns with expected pellet distribution.

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-think 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 3¾-inch 12-gauge loads today if weren't for the introduction of steel shot, and there might not be "high-velocity" shotshells or design in guns doesn't spring from a gun such as Benelli's Super Black Eagle II that make shooting more enjoyable regardless of the size of the shell.

SPECs

Benelli Super Black Eagle II

12-Gauge Semiautomatic Shotgun

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<th>Importer</th>
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MTS Sensors, a division of MTS Systems Corporation (NASDAQ: MTSC), vastly expanded its range of products and solutions after MTS acquired PCB Piezotronics, Inc. in July, 2016. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corp.; IMI Sensors and Larson Davis are divisions of PCB Piezotronics, Inc.; Accumetrics, Inc. and The Modal Shop, Inc. are subsidiaries of PCB Piezotronics, Inc.