RECOIL REDUCTION TESTING RESULTS

When I started my journey to build a shotgun stock I had two goals: 1) to build an adjustable stock that could be customized to fit a shooter's unique size and shape and 2) to reduce the ill effects recoil has on a shooter by designing an effective recoil reduction system.

While both objectives were intertwined and codependent upon each other for the ultimate success of my stock, perfecting the recoil absorption system was by far the most challenging aspect of the mission.

As shooters know, recoil is the kick you feel once the firing pin strikes the primer and ignites the shotshell's powder forcing gas, wad, and shot down the barrel.

Proper stock fit is one of the best ways to reduce recoil and that is why I decided to build an adjustable stock but the way that you hold the gun also can affect recoil greatly.

While no device can eliminate recoil, there is no shortage of products on the market that claim they can dramatically reduce it. Aftermarket recoil pads and stocks with interior springs or pneumatic tubes work on the same principle. They compress under recoil and spread out the recoil. In the case of recoil pads, the recoil is spread across the length and width of the pad; while stocks with interior springs or pneumatic tubs spread it out even more because they spread the recoil along the length of the spring or tube as well as the recoil pad itself. Just how much recoil is reduced is often unknown as some manufacturers only state their product reduces recoil. While some manufacturers who claim their device reduces recoil and this reduction is often shown as a percentage, they do not disclose how they came to their conclusion.

The Grip Plus Recoil Reduction system uses an air-filled chamber that glides along a rail system dispersing the recoil throughout the length of the stock while the butt plate and comb remain stationary. This patented system combined with a custom grip, unparalleled adjustability, and a KICK-EZZ recoil pad has been praised by many of our customers as the "best recoil system" they ever experienced. While we at Grip Plus are pleased with the accolades, we wanted to know specifically how much each of our three shotgun stocks reduced recoil. Thus, in February of 2025 we put our stocks to the test by utilizing two different yet unique recoil testing systems. A shoulder mounted impact force measurement system from Recoil-IQ and a force measurement system from Loadstar Sensors mounted on a hands-free sled, https://www.loadstarsensors.com/easyblog/recoil-force-from-a-gunshot.html

Dr. Mattew Hall, a faculty member in the Thermal/Fluids Systems program in the Department of Mechanical Engineering at the University of Texas, used one of the early versions of a Loadstar Sensor to measure the recoil force from a variety of shotguns. Dr. Hall and I shot skeet together at San Francisco Pacific Rod & Gun Club, when he was at UC Berkeley in the 1980s and he provided me insight on how to conduct our test and also how to build a measurement sled similar to the one he used.

In a side-by-side comparison, we tested our **Premier Stock**, **Supreme Stock** and **Pro Stock** against the factory stock that came standard on a 12-gauge over-under shotgun with a 32-inch barrel. After we tested the shotgun with its factory wooden stock we replaced the factory stock with our three stocks. All stocks were fitted with a one-inch KICK-EZZ recoil pad.

The 12-gauge shotgun with its factory stock and KICK-EZZ recoil pad weighed 8 pounds 3 ounces.

The **Premier** Stock and KICK-EZZ pad fitted on the 12-gauge test gun weighed 9 pounds 2 ounces.

The **Supreme** Stock and KICK-EZZ pad fitted on the weighed12-gauge test gun weighed 9 pounds 9 ounces.

The **Pro Stock** and KICK-EZZ pad fitted on the 12 gauge test gun weighed 9 pounds 9 ounces.

The **Premier** stock is our original and most popular stock purchased. It features an air chamber with a Single O-Ring for a tight air seal. The liner motion components, guide rail, and bearings are all CNC milled from 7075 aircraft grade aluminum and 316 stainless-steel for optimal durability and balance. It features a custom Turkish Walnut pistol grip, stock, comb and KICK-EZZ recoil pad. Our **Supreme** and **Pro** improve upon our premier mode by utilizing a larger air chamber for increased recoil mitigation. In addition to being CNC milled from 7075 aircraft grade aluminum and 316 stainless-steel, the GPS Recoil Supreme also features the use of Ti-5 Titanium for enhanced durability.

Hence, the Supreme and Pro are heavier than the Premier. As we know, in addition to gun fit and grip, a heavier gun mitigates recoil better than a lighter gun.

During our testing, we fired 10 shots for each stock using the same shotgun load: Federal Monark Target Loads, 12 Gauge, 2 ¾ inch 1 1/8 ounce, 1,200 FPD 8.5 shot;

We started our testing using the force measurement system from Loadstar Sensors mounted on a hands-free sled.

Loadstar Sensor testing results:

Stock	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Average**
Factory	1137	1265	1206	1237	1199	1182	1211	1205	1220	1241	1210
Premier	784	803	827	825	824	836	837	814	831	803	818
Supreme	685	694	730	709	707	715	731	726	685	661	704
Pro	526	541	478	516	493	509	545	536	501	493	513

To determine the amount of recoil decrease between the factory stock and the three Grip Plus stocks, we used a percentage decrease calculation which finds the decrease from one value to another in terms of a percentage.

By way of example, we have taken the average of the Factory Stock 1210 (LB-F) and compared it against the average of the Premier Stock 818 (LB-F)

Calculate percentage change
from Starting Value = 1210
to Final Value = 818

(Final−Start) |Start| × 100 (Final−Start) |Start| × 100

= (818−1210) |1210| × 100 = (818−1210) |1210| × 100

= −3921210 × 100 = −3921210 × 100

= −0.323967 × 100 = −0.323967 × 100

= −32.3967% change = −32.3967% change

= 32.3967% decrease

Grip Plus Premier stock reduced recoil by 32% versus the factory stock

Using the same calculation method:
The Grip Plus Supreme stock reduced recoil 41% versus the factory stock.
The Grip Plus Pro stock reduced recoil 57% versus the factory stock.

Once we completed the hands-free sled mounted test using the force measurement system from Loadstar Sensors, we repeated our testing using the shoulder mounted impact force measurement system from Recoil-IQ. Again, we fired 10 shots for each stock.

Recoil-IQ Testing Results:

Stock	1	2	3	4	5	6	7	8	9	10	Average
Factory	344	404	400	384	390	407	417	418	361	428	395
Premier	239	216	227	167	197	200	178	227	153	138	194
Supreme	84	79	84	83	76	81	81	84	87	82	82
Pro	101	103	115	109	135	119	139	92	125	125	116

Again, to determine the amount of recoil decrease between the factory stock and the three Grip Plus stocks we used a percentage decrease calculation. Using this calculation the results showed:

Grip Plus Premier stock reduced recoil 50% versus the factory stock.

The Grip Plus Supreme stock reduced recoil 79% versus the factory stock.

The Grip Plus Pro stock reduced recoil 70% versus the factory stock.

The first thing you will notice in our two tests is the huge difference in recoil recorded between the two systems. As we noted earlier, a perfectly fitted gun, and a shooter's grip will greatly reduce the amount of recoil. For our test, all four-test stocks were adjusted to fit my length of pull, and body type which greatly reduced to the amount of recoil calculated by Recoil-IQ.

The other result that may surprise you in the Recoil-IQ test is that our Supreme stock achieved a greater reduction in recoil than our Pro stock. As noted earlier, all three of our stocks' air chambers were filled to 80 PSI to ensure that we were consistently comparing our different models. The Pro stock has the largest air chamber of our three models and can be filled with more air than the others thereby reducing more recoil. In our testing we discovered the optimal amount of PSI for the Pro model is 100. However, every shooter is different, and we encourage our customers to experiment with PSI levels to find the one that is best for them.

Overall, I was very pleased with the testing results and gratified that we took the time and went to the expense to test our recoil systems. For years, our customers have been praising not only the custom fit they achieve with our stocks but also the recoil reduction they experience. However, in the past, we could only cite anecdotal evidence as to the effectiveness of our recoil systems. Now, I believe we have scientific evidence to back up our recoil reduction claims.

I do realize that there is no perfect way to test recoil reduction as it is something that each shooter experiences differently. I am also aware that critics will find fault with each of our testing methods. I also know that there are many products sold today that claim they reduce recoil. However, few, if any share information on how they have achieved the recoil reduction. Ask yourself why this is so.

At Grip Plus we stand behind our products because we shoot our products.

Sincerely,

Sai Chiang
Grip Plus Founder